

Attachment 4

San Diego Bay

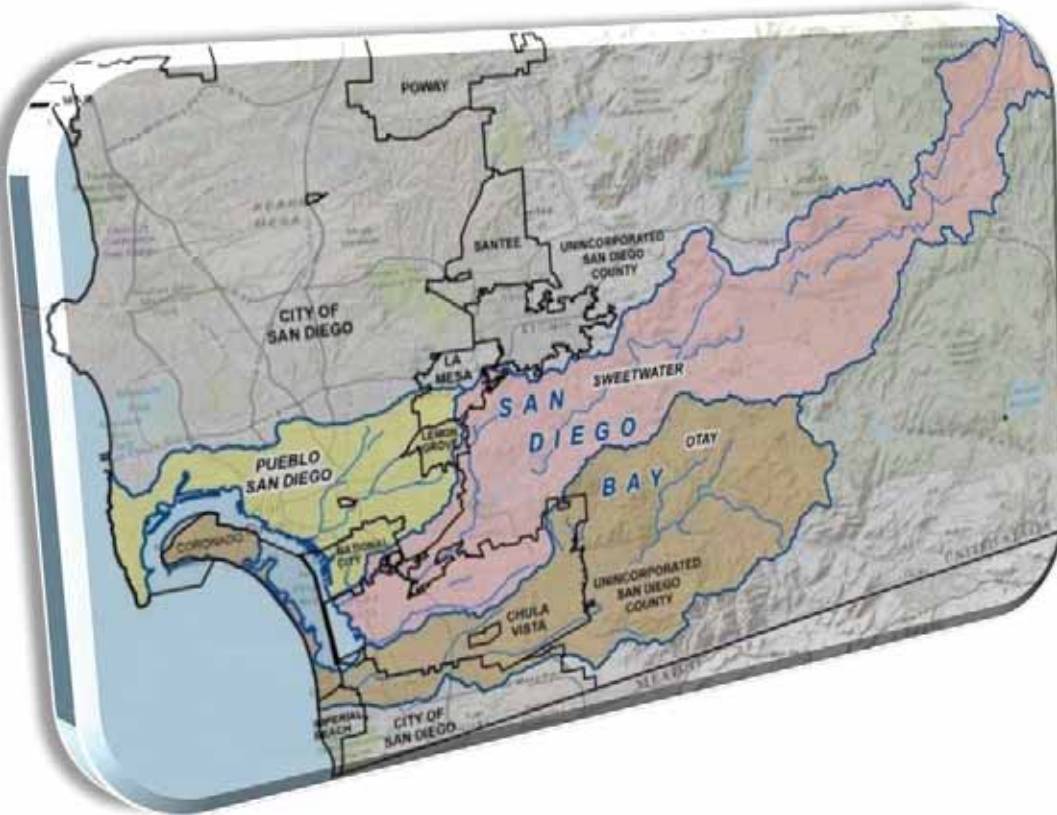
Watershed Management Area

Water Quality Improvement Plan

San Diego Bay Watershed Management Area Water Quality Improvement Plan

Final Deliverable: Water Quality Improvement Plan

Submitted to the
San Diego Regional Water Quality Control Board
by the San Diego Bay Responsible Parties



May 11, 2015 Draft



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Acronyms and Abbreviations

Acronym or Abbreviation	Definition
%	percent
303(d) List	CWA Section 303(d) List of Impaired Water Bodies
AB411	California Assembly Bill 411 (Beach Safety Act)
ABLM	Ambient Bay and Lagoon Monitoring
Airport Authority	San Diego County Regional Airport Authority
Bacteria TMDL	<i>The Revised TMDLs for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)</i> (Bacteria TMDL); Regional Board Resolution No. R9-2010-0001, approved February 10, 2010
Basin Plan	Water Quality Control Plan for the San Diego Basin, Region 9
BLTEA	Baseline Long Term Effectiveness Assessment
BMP	Best Management Practice
BOA	business owner association
BOD	biological oxygen demand
Caltrans	California Department of Transportation
CLRP	Comprehensive Load Reduction Plan
Consultation Panel	Water Quality Improvement Plan Consultation Panel
Copermittee	An agency named in the Municipal Permit Provision B.1.
County	County of San Diego
CRAM	California Rapid Assessment Method
Cu	copper
CWA	Clean Water Act, also referred to as the Federal Water Pollution Control Act (33 U.S.C. 1251-1376)
DEH	(County of San Diego) Department of Environmental Health
DWR	(California) Department of Water Resources
FIB	fecal indicator bacteria
FBO	fixed-based operator
FY	fiscal year
HA	Hydrologic Area

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
HMP	Hydromodification Monitoring Program
HOA	home owner association
HSA	Hydrologic Sub-Area
HU	Hydrologic Unit
IB	Imperial Beach
IBI	Index of Biological Integrity
IC/ID	Illicit connection and/or illicit discharge
IDDE	Illicit Discharge, Detection, and Elimination
IGP	Industrial General Permit
JRMP	Jurisdictional Runoff Management Program/Plan
JURMP	Jurisdictional Urban Runoff Management Program/Plan
LID	low impact development
LOE	line of evidence
LTEA	Long Term Effectiveness Assessment
MEP	Maximum extent practicable
Metals TMDL	<i>TMDLs for Dissolved Copper, Lead, and Zinc in Chollas Creek (Metals TMDL); Regional Board Resolution No. R9-2007-0043, approved October 22, 2008</i>
MLOE	Multiple Lines of Evidence
MLS	Mass Loading Station
MS4	Municipal Separate Storm Sewer System
MTS	Metropolitan Transit System
Municipal Permit	San Diego Regional Water Quality Control Board Order Number R9-2013-0001, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region
N	nitrogen
NAL	Non-storm water action level
NASSCO	National Steel and Shipbuilding Company (General Dynamics)

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
NGO	non-governmental organization
NLCD	National Land Cover Database
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resources Conservation Service
ORWMP	Otay River Watershed Management Plan
P	phosphorus
Pb	lead
PFC	permeable friction course
PGA	Pollutant-Generating Activity
Phase II MS4	An MS4 that is subject to the Statewide Phase II MS4 Permit
Port	Port of San Diego
POTW	Publicly-Owned Treatment Works
psi	pounds per square inch
RCC	Rental Car Center
REC-1	Contact Water Recreation BU – “Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural hot springs.” (San Diego Basin Plan, Chapter 2).
Regional Board	San Diego Regional Water Quality Control Board
Responsible Party (RP)	A Copermittee named in the Municipal Permit Provision B.1, and Caltrans
RHMP	Regional Harbor Monitoring Program
ROW	Right-of-Way
ROWD	Report of Waste Discharge
SAL	storm water action level
SANDAG	San Diego Association of Governments
SHELL	Shellfish Harvesting beneficial use
SMC	Stormwater Monitoring Coalition

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
State	State of California
State Board	State Water Resources Control Board
SUSMP	Standard Urban Storm Water Mitigation Plan
TBD	to be determined
TMDL	Total Maximum Daily Load
U.S.C.	United States Code
USEPA	United States Environmental Protection Agency
UGSG	United States Geological Survey
UTC	urban tree canopy
WAMP	Watershed Asset Management Plan
WARM	Warm Freshwater Habitat BU - "Includes uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates." (San Diego Basin Plan, Chapter 2).
WER	Water Effect Ratio
WLA	waste load allocation
WMA	San Diego Bay Watershed Management Area
WMAA	Watershed Management Area Analysis
WQBEL	Water Quality-Based Effluent Limit
WQC	Water Quality Condition
WQO	water quality objective
WRI	World Resources Institute
WURMP	Watershed Urban Runoff Management Program
Zn	zinc

Executive Summary

In May 2013, the San Diego Regional Water Quality Control Board (Regional Board) adopted Order R9-2013-0001 – National Pollutant Discharge Elimination System Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4) Draining the Watersheds within the San Diego Region (Municipal Permit). The Municipal Permit requires the owners of storm drain systems to implement management programs to limit discharges of non-storm water runoff and pollutants from the storm drain systems. The Municipal Permit requires Responsible Parties, in each of the region’s watersheds, to develop Water Quality Improvement Plans. The San Diego Bay Watershed Water Quality Improvement Plan (Water Quality Improvement Plan) was developed in response to the requirements of the Municipal Permit.

The Municipal Permit is based on watershed program planning and program outcomes. The Municipal Permit’s intent is to enable each jurisdiction to focus its resources and efforts to:

- Effectively prohibit non-storm water discharges to its MS4;
- Reduce pollutants in storm water discharges from its MS4; and
- Achieve the interim and final [Water Quality Improvement Plan] numeric goals.

The Responsible Parties within the San Diego Bay Watershed include the following agencies:

- City of Chula Vista
- City of Imperial Beach
- City of Lemon Grove
- City of San Diego
- San Diego Unified Port District (Port of San Diego)
- San Diego County Regional Airport Authority
- City of Coronado
- City of La Mesa
- City of National City
- County of San Diego
- California Department of Transportation

The purpose of the Water Quality Improvement Plan is to guide the Responsible Parties’ Jurisdictional Runoff Management Programs (JRMPs) toward achieving improved water quality in MS4 discharges and receiving waters. In this Water Quality Improvement Plan, priorities and goals are established and strategies selected for implementation by the Responsible Parties in order to achieve progress toward improving water quality. This approach establishes the Water Quality Improvement Plan as the foundation that each Responsible Party uses to develop and implement its JRMP. “Responsible Parties’ JRMPs contain the strategies, standards and protocols by

which each Responsible Party will implement its individual program in response to the priorities and goals established in the Water Quality Improvement Plan.¹

As defined in the Municipal Permit, a permittee to a National Pollutant Discharge Elimination System (NPDES) permit is responsible only for permit conditions relating to the discharges from the MS4s for which it is an operator. Discharges from non-municipal sources and activities (e.g., runoff from agriculture and industrial land uses, federal and state facilities, Caltrans, and MS4 Phase II permittees) are regulated separately. However, the Municipal Permit requires the Copermittees to control pollutants originating from non-MS4 or non-municipal lands if those pollutants ultimately discharge into the MS4. Therefore, the Copermittees recognize the need to collaborate and improve communication between non-municipal entities within the San Diego Bay Watershed and the appropriate regulatory agencies to ensure that discharges are appropriately regulated before entering the MS4, and to improve water quality throughout the San Diego Bay Watershed.

Figure ES-1 presents the major watersheds in the San Diego Bay Watershed.

¹ This Water Quality Improvement Plan sets forth activities that may occur within each Responsible Party's jurisdiction to satisfy permit requirements. Please note that the "Responsible Party need comply only with permit conditions relating to discharges from the MS4s for which they are operators (40 CFR 122.26(a)(3)(vi))," Order R9-2013-0001 at I.2 (emphasis added), and that each Responsible Party does not necessarily operate all portions of the MS4 within its jurisdiction. . Responsible Parties include Copermittees and other permitted dischargers (e.g., Caltrans) in the watershed.

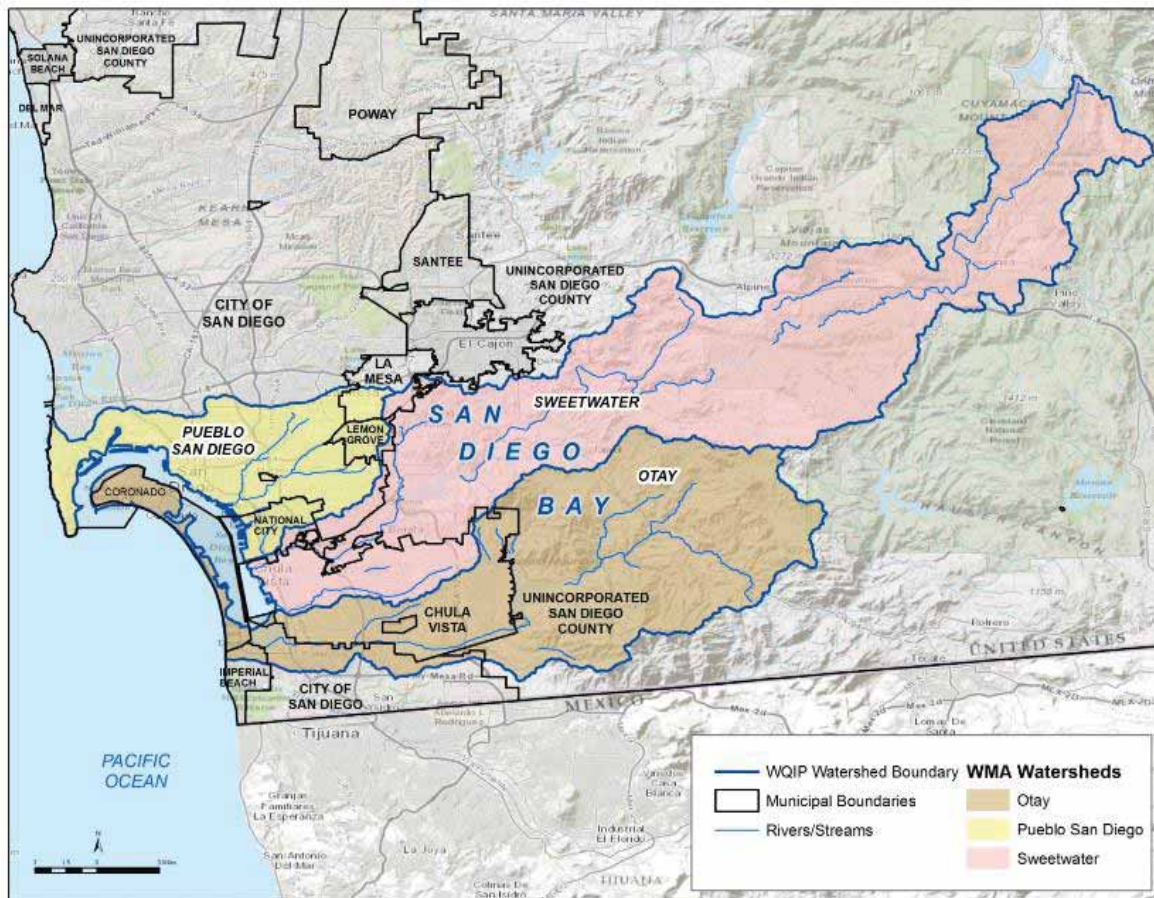


Figure ES-1
San Diego Bay – Major Watersheds

Development Process

The Water Quality Improvement Plan was developed over a two-year period after the Municipal Permit adoption. The Municipal Permit set phased benchmarks for the development and submittal of the components of the Water Quality Improvement Plan. The First Interim Deliverable focused on the assessment of priority water quality conditions and identification of Highest and Focused Priority Conditions. The Second Interim Deliverable focused on the identification of water quality numeric goals and schedules for achieving the goals as well as selection of water quality improvement strategies to address the sources of pollutants contributing to the Highest and Focused Priority Conditions. The final step of the process, the Water Quality Improvement Plan, included development of the monitoring and assessment program and an adaptive management process that are integral to the Water Quality Improvement Plan iterative process. The plan will be implemented through the effective period of the 2013 Municipal Permit.

Public Participation

During the two-year development process, public participation was a critical element. The Water Quality Improvement Plan process relied heavily on an active participation by the public. This process led to a greater amount of public participation than in

previous Municipal Permit related water quality planning processes. The public participation process included four primary components:

- (1) Public Workshops;
- (2) Public Input in Response to Calls for Data;
- (3) Water Quality Improvement Consultation Panel; and
- (4) Regional Board Public Comment Period.

During the plan development process, the Responsible Parties held two public workshops (September 10, 2014 and October 21, 2014) to inform the public of the Water Quality Improvement Plan process and to solicit input on water quality conditions; sources contributing to water quality conditions; strategies to address the sources; and numeric goals and associated schedules. As a result of the solicitations, the public provided a variety of data and information for consideration in the planning process.

The Responsible Parties selected a Consultation Panel from interested candidates. The goal of the Consultation Panel was to provide recommendations to the Responsible Parties during the development of the Water Quality Improvement Plan. The Consultation Panel includes members from the San Diego Regional Board, the environmental community, and the development community, as required, and also includes three at-large members, representing the development and business/industrial community, and residents of the WMA.

The First Interim Deliverable and the Second Interim Deliverable were submitted to the Regional Board and for each a 30-day public comment period was facilitated by Regional Board staff. Each public comment period yielded comments for consideration by the Responsible Parties in the preparation of the final Water Quality Improvement Plan.

Throughout the process, the Consultation Panel and the public provided substantial input, much of which was incorporated into the development process and the final Water Quality Improvement Plan.

Water Quality Improvement Plan Content

Highest and Focused Priority Conditions – Section 2

The Responsible Parties evaluated available data, information, and public input and used the assessment process to identify water quality conditions in the San Diego Bay Watershed. Then the water quality conditions in the watershed were prioritized and several were identified by the Responsible Parties as the focus of their programmatic efforts, as appropriate – these are identified as Highest and Focused Priority Conditions. Although Responsible Parties will primarily target these conditions, it does not mean that other water quality conditions or pollutants will be ignored. To the contrary, many of the strategies implemented to address highest and/or focused priority conditions provide multi-benefit effects by also addressing many other pollutants and water quality conditions.

Table ES-1 summarizes the Highest and Focused Priority Conditions:

Table ES-1.
San Diego Bay Watershed Summary of Highest and Focused Priority Conditions

HU	Condition	Pollutant/ Stressor	Geographic Extent (HU/HA)	Responsible Parties
Pueblo (908)	Water Quality ¹	Bacteria; Dissolved copper, lead, and zinc	Chollas Creek (908.22)	City of La Mesa City of Lemon Grove City of San Diego County of San Diego Port of San Diego Caltrans
	Water Quality	Copper and zinc (Wet Weather)	Airport Authority jurisdiction within HA 908.21	Airport Authority
Sweetwater (909)	Riparian Area Quality	Various	Paradise Creek—lower Sweetwater, HA 909.1 ²	City of National City
	Physical Aesthetics	Trash	The western portion of the City of Chula Vista within HA 909.1	City of Chula Vista Port of San Diego
Otay (910)	Swimmable Waters (Beaches)	Bacteria	Applicable RP jurisdiction within HA 910.1	City of Coronado City of Imperial Beach Port of San Diego
	Physical Aesthetics	Trash	Applicable RP jurisdiction in HA 910.2	City of Chula Vista City of Imperial Beach Port of San Diego

Notes:

HA = Hydrologic Area; HU = Hydrologic Unit; RP = Responsible Party

1. **The conditions in bold are the Highest Priority Conditions for the San Diego Bay Watershed.** Pollutants in regular font are the Focused Priority Conditions.
2. For the purposes of the Water Quality Improvement Plan, Paradise Creek is considered to be part of the lower Sweetwater area, for which the San Diego Bay priority condition analysis has identified potential impacts to beneficial uses such as habitat and non-contact recreation.

Numeric Goals and Schedules – Section 4

Next, the Responsible Parties developed numeric goals and schedules for achieving the goals and to measure progress toward addressing the Highest and Focused Priority Conditions. Numeric goals may take a variety of forms, but all forms should be able to quantify a benefit to water quality so that progress toward and achievement of the goals are measurable. Highest and Focused Priority Conditions may have multiple goals associated with them and goals may have multiple criteria or indicators. Goals for Highest and Focused Priority Conditions may be met in the receiving water or in MS4 discharges. Goals for Focused Priority Conditions may be based on the performance of water quality improvement strategies, on the successful completion of a restoration project, or on other metrics.

The Water Quality Improvement Plan identifies goals related to each Highest Priority and Focused Priority. Furthermore, individual schedules for each goal were established. Together, the goals and schedules define the targets that the Responsible Parties use to develop their programs and to measure progress.

Strategies and Schedules – Section 4

The Responsible Parties determined the strategies to be implemented that are intended to achieve the goals and improve the water quality conditions. The Water Quality Improvement Plan identifies strategies with schedules that include both core Municipal Permit compliance activities and best management practices that Responsible Parties have been implementing for a number of years (to comply with previous permit requirements) as well as new strategies to be implemented that were not a part of explicit permit requirements, e.g., creek restoration.

A summary of the types of strategies identified in the Water Quality Improvement Plan are described in Table ES-2.

Table ES-2
Examples of Strategy Categories

Strategy Category	Example
Planning efforts, assessment, and studies	Trash receptacle assessments
Structural best management practices	Installation of trash capture devices on catch basin inlets
Programmatic best management practices	Street sweeping
Requirement for best management practices of regulated entities	Enforce minimum BMPs for existing residential, commercial, and industrial development.
Incentives	Residential and commercial rebate programs targeting water quality improvements
Activities, such as inspections and surveys	Targeted inspection programs

Monitoring and Assessment – Section 5

The Responsible Parties developed a monitoring and assessment plan that is specific to the Water Quality Improvement Plan. This program plays a key role in the Municipal Permit's new paradigm of focusing on the outcomes of program implementation. The monitoring and assessment program contains three major types of monitoring including general permit-required monitoring, Highest and Focused Priority Condition monitoring, and additional monitoring. Monitoring is intended to measure the progress that the Responsible Parties make towards achieving the established goals and schedules. The program includes assessment for each of the monitoring types, as well as an integrated assessment to evaluate the overall progress in the watershed.

Iterative Process and Adaptive Management – Section 6

The Water Quality Improvement Plan is intended to be a living planning document that is regularly assessed and updated as-needed to reflect new data and input. The Responsible Parties use information as “lessons learned” from plan implementation to improve management decisions related to water quality conditions, numeric goals, strategies and associated schedules, and the monitoring and assessment program. The typical cycle for the implementation, assessment, and the next planning phase is illustrated in Figure ES-2.



Figure ES-2.
Iterative Process to Inform Adaptive Management

The San Diego Bay Water Quality Improvement Plan includes an iterative process for making improvements to components of the plan. Plan improvements take the form of updates to components on the basis of assessed data and new information. Each iteration of the implementation, assessment, and planning cycle is anticipated to provide the Responsible Parties with justifications for plan adaptations. The adaptations to plan components are intended to increase the effectiveness and efficiency of the overall programs.

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1 Introduction

1.1 Regulatory Background

The San Diego Regional Water Quality Control Board (Regional Board) develops and enforces water quality objectives and implements plans to protect the area's waters. On May 8, 2013, the Regional Board adopted a new Municipal Permit² to regulate discharges from Municipal Separate Storm Sewer Systems (MS4s) (Regional Board, 2013). The Municipal Permit established a new watershed-based approach by which the Copermittees plan and implement storm water programs. The new approach requires that the jurisdictions' storm water programs address the priority receiving water conditions, focusing efforts toward measureable improvements in receiving water quality. The Municipal Permit requires that a Water Quality Improvement Plan be developed for the San Diego Bay Watershed Management Area (WMA). The Municipal Permit regulates the Copermittees. Caltrans is regulated separately, but is participating voluntarily in the development of the WQIP as a named party in the TMDLs for Dissolved Copper, Lead, and Zinc in Chollas Creek, Resolution No. R9-2007-0043, referred to as the Metals Total Maximum Daily Load (TMDL). Collectively, the Copermittees and Caltrans are referred to as Responsible Parties (RPs) where appropriate in this document.

1.2 WMA Background

The San Diego Bay WMA encompasses a 444-square-mile area (approximately 284,500 acres) that extends eastward from the San Diego Bay for more than 50 miles to the Laguna Mountains. The WMA ranges in elevation from sea level at San Diego Bay to a maximum elevation of approximately 6,000 feet above sea level at the eastern boundary. Most of the WMA land area generally lies north of the Tijuana River WMA, south of the San Diego River WMA, west of the Anza Borrego WMA, and east of the Pacific Ocean. The Regional Board-prepared *Water Quality Control Plan for the San Diego Basin* (Regional Board, 1994) (Basin Plan) defines the San Diego Bay WMA as containing three hydrologic units (HUs): (1) the Pueblo San Diego (Pueblo) HU, (2) the Sweetwater River (Sweetwater) HU, and (3) the Otay River (Otay) HU.

Figures showing the WMA drainage areas and jurisdictions (Figure B-1), land uses (Figure B-2), vegetative cover (Figure B-3), impervious area (Figure B-4), and Section 303(d)-Listed waterbodies (Figure B-5) in the WMA are in Appendix B.

Most freshwater input to the San Diego Bay is from surface runoff from urban areas and intermittent flow from rivers and creeks during rain events. Dams and extensive use of groundwater over the past century in the Sweetwater and Otay Rivers have significantly reduced the input from these rivers to the Bay (U.S. Army Corp of Engineers, 1973). Surface water beneficial uses are also presented in Appendix B, Table B-1.

² *National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region* (Municipal Permit) (Order Number R9-2013-0001, Regional Board, 2013).

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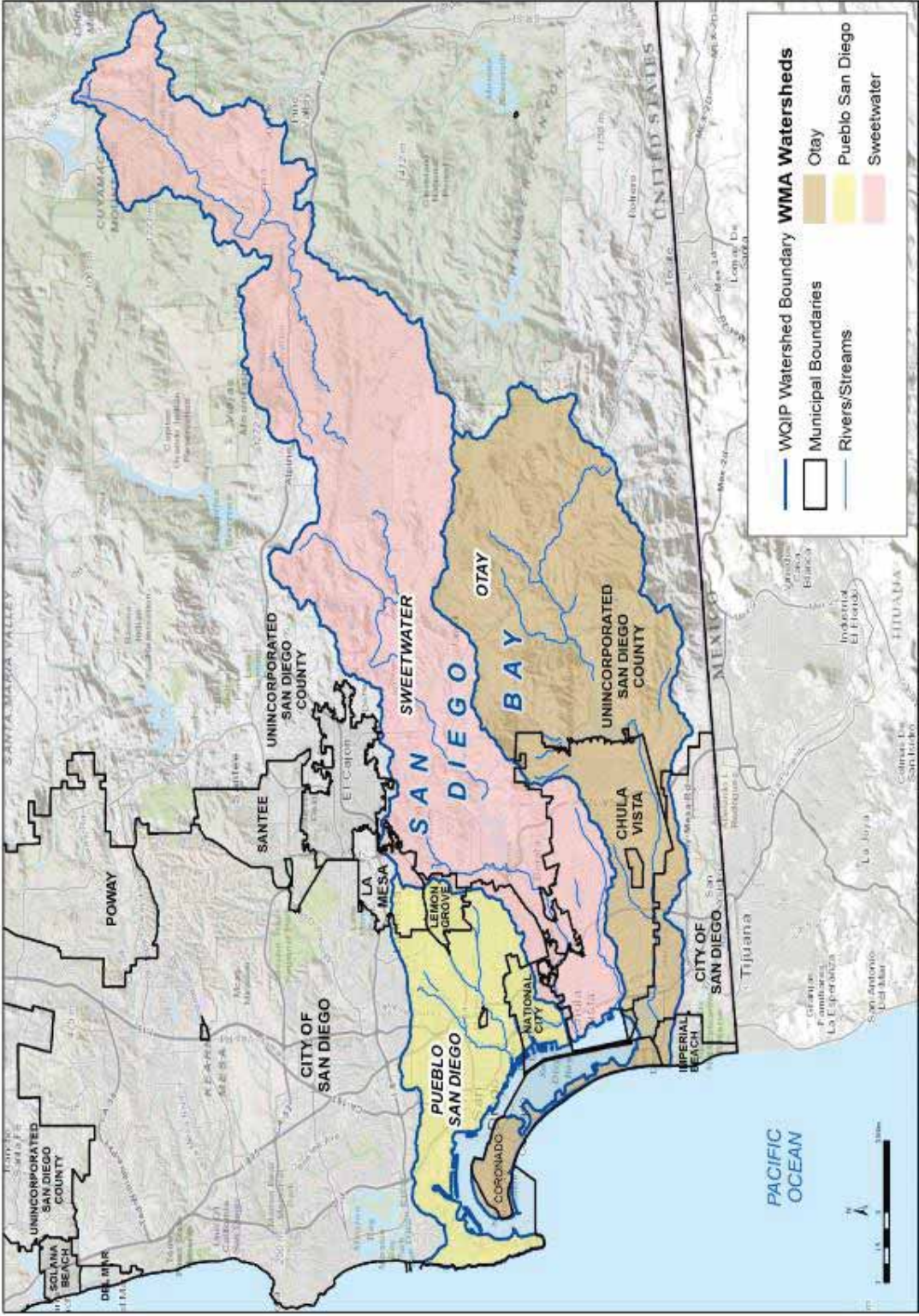


Figure 1-1
San Diego Bay WMA

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1.2.1 Pueblo San Diego (Pueblo) HU (908)

The Pueblo HU encompasses approximately 60 square miles and has no central stream system. The Basin Plan identifies the Pueblo HU as the smallest of the three San Diego Bay HUs, covering approximately 38,000 acres. It is the most developed and most densely populated watershed in the San Diego Bay WMA. It contains three hydrologic areas (HAs): Point Loma (908.1), San Diego Mesa (908.2), and National City (908.3). Major water features are Chollas Creek, Paleta Creek, and San Diego Bay. Most of the water from the Pueblo HU drains to San Diego Bay, although a portion of the Point Loma HA drains directly to the Pacific Ocean. Figure 1-2 maps the Pueblo San Diego HU.

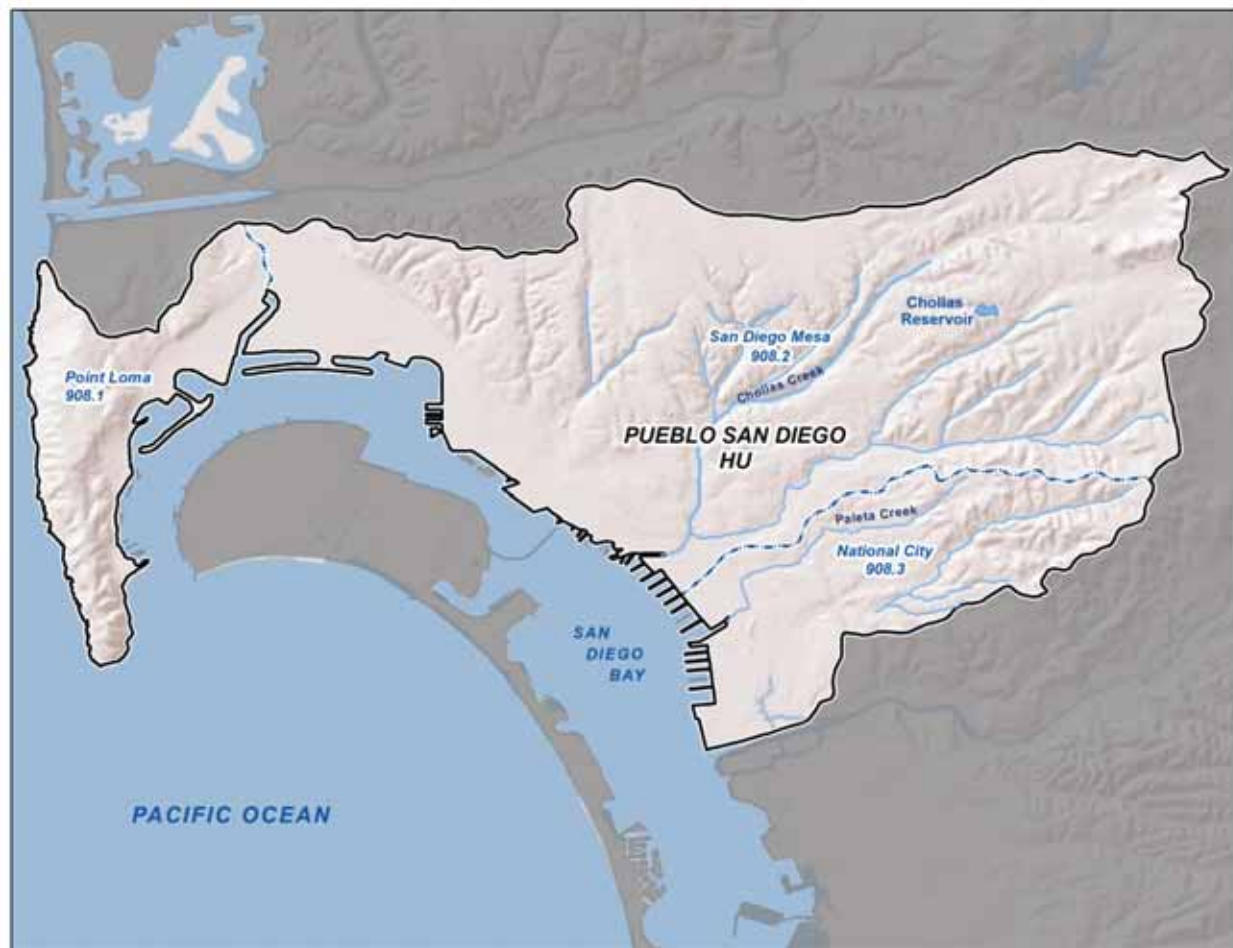


**Figure 1-2
Pueblo HU**

The dominant land uses within the HAs are as follows (San Diego Bay Watershed Copermittees, 2008):

- Point Loma HA (908.1) – Within this HA, Residential uses make up approximately thirty-two percent (32%) of the land uses followed by Vacant/Undeveloped land at nineteen percent (19%), Transportation at sixteen percent (16%), and Military uses at fourteen percent (14%). The remaining nineteen percent (19%) consists primarily of Commercial Businesses, Public Facilities, Open Space/Preserves, and Schools.
- San Diego Mesa HA (908.2) – Within this HA, Residential comprises approximately forty percent (40%) of the land uses followed by Transportation at twenty-nine percent (29%), and Commercial/Office Business are approximately eight percent (8%) of the land use while Industrial Businesses are five percent (5%). Open Space/Preserves comprise approximately six percent (6%) of the HA. The remaining twelve percent (12%) consists of multiple uses, including Public Facilities, Schools, and Parks.
- National City HA (908.3) – Within this HA, Residential makes up forty-six percent (46%) followed by Transportation at twenty-three percent (23%). Military consists of nine percent (9%), while Schools make up nearly five percent (5%). Commercial/Office Businesses are four percent (4%) and Industrial Business is three percent (3%). The remaining ten percent (10%) consists of multiple uses, including Parks and Open Space/Preserves.

1.2.2 Sweetwater River (Sweetwater) HU (909)

The Sweetwater HU is the largest of the three San Diego Bay HUs, encompassing over 148,000 acres. Three main drainage areas are included within the Sweetwater HU: Lower Sweetwater HA (Hydrologic Sub-Areas [HSAs] 909.11, 909.12, and 908.32)³; Middle Sweetwater HA (909.2); and Upper Sweetwater HA (909.3). It has four major waterbodies: Sweetwater River, Sweetwater Reservoir, Loveland Reservoir, and San Diego Bay. Portions of the San Diego Bay National Wildlife Refuges, including the Sweetwater Marsh, are in the Sweetwater HU. Much of this watershed is occupied by undeveloped lands in the Cleveland National Forest, Cuyamaca Rancho State Park, and the unincorporated communities of Pine Valley, Descanso, Alpine, and the Viejas Indian Reservation. The Cleveland National Forest, Cuyamaca Rancho State Park, and Viejas Indian Reservation are regulated separately and the Responsible Parties (RPs)⁴ do not have authority to require their participation or to implement Municipal Permit requirements. Figure 1-2 maps the Sweetwater HU.

³ Telegraph Canyon Channel is in HSA 909.11, but drains directly to San Diego Bay rather than to the Sweetwater River. HSA 908.32, while technically in the Pueblo HU, drains to the Sweetwater River, so it is considered part of the Sweetwater HU.

⁴ In this document, the Copermittees within the San Diego Bay WMA and Caltrans are collectively referred to as Responsible Parties (RPs).

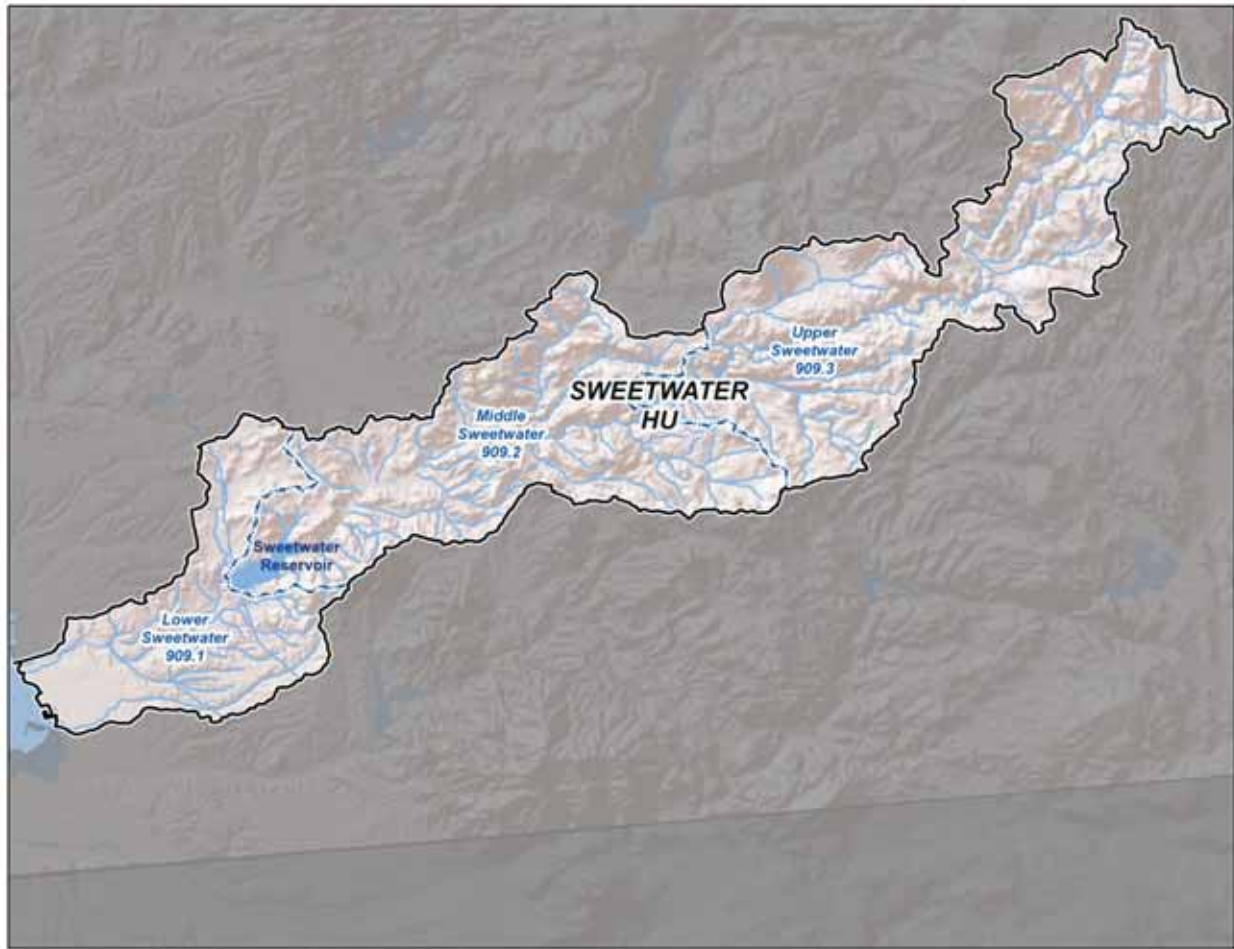


Figure 1-3
Sweetwater HU

The dominant land uses within the HAs are as follows (San Diego Bay Watershed Copermittees, 2008):

- Lower Sweetwater HA (909.1): Within this HA, Residential comprises approximately forty-four percent (44%), followed by Transportation at eighteen percent (18%) and Open Space/Preserves at thirteen percent (13%). The remaining twenty-five percent (25%) consists of multiple uses, including Commercial and Industrial Businesses, Schools, and Undeveloped/Vacant Land.
- Middle Sweetwater HA (909.2): Within this HA, Undeveloped or Vacant land dominated with approximately thirty-eight percent (38%), followed by Residential consisting of twenty-eight percent (28%) and Open Space/Preserves at twenty-five percent (25%). The remaining eight percent (8%) consists of multiple uses, including Commercial Businesses and Transportation.

Upper Sweetwater HA (909.3): The majority of the land within this HA is Undeveloped or Vacant land (50%), while Open Space/Preserves comprise thirty-two percent (32%) of land use. Twelve percent (12%) of the remaining area consists of Residential and four percent (4%) is Agriculture.

1.2.3 Otay River (Otay) HU (910)

The Basin Plan identifies the Otay HU as the second largest of the three San Diego Bay HUs. The Otay HU consists of three HAs: Coronado (910.1), Otay Valley (910.2), and Dulzura (910.3). It comprises nearly 98,500 acres and includes four major waterbodies: the Upper and Lower Otay Reservoirs, Otay River, and San Diego Bay. The two reservoirs supply drinking water, wildlife habitat, and recreational opportunities. The Otay HU includes portions of the San Diego Bay and San Diego Bay National Wildlife Refuges, the Rancho Jamul Ecological Reserve, the Otay Valley Regional Park, and approximately 23,000 acres that provide habitat for endangered plant and animal species as part of the San Diego County Multiple Species Conservation Program. Figure 1-2 maps the Otay River HU.



Figure 1-4
Otay HU

The dominant land uses within the HAs are as follows (San Diego Bay Watershed Copermittees, 2008):

- Coronado HA (910.1): Military uses comprise approximately fifty-two percent (52%) of land in this HA. Other significant land uses include Residential at fifteen percent (15%), followed by Transportation at twelve percent (12%), and Commercial/Office at eight percent (8%). Open Space/Preserves and Parks account for a combined ten (10%) percent of land uses. The remaining three percent (3%) consists of multiple uses, including Undeveloped/Vacant land, Schools, and Public Facilities.
- Otay HA (910.2): Within this HA, Undeveloped/Vacant land accounts for twenty-five percent (25%) and Open Space/Preserves make up twenty-four percent (24%) of the land use. Other significant land uses include Residential at eighteen percent (18%), Transportation and Industrial at nine percent (9%) respectively, Public Facilities at five percent (5%), and Commercial/Office at four percent (4%). The remaining six percent (6%) consists of multiple uses, including Agriculture and Schools.
- Dulzura HA (910.3): Within this HA, Open Space/Preserves make up the majority of land use at forty-eight percent (48%), followed by Undeveloped or Vacant land at thirty-seven percent (37%), and Residential at twelve percent (12%). The remaining three percent (3%) consists of multiple uses, including Commercial and Industrial Businesses, Agriculture, and Transportation.

Over sixty-nine percent (69.5%) of the Otay Watershed is unincorporated area. The other thirty-one percent (30.5%) is divided among the following jurisdictions: the Port of San Diego, and the cities of Chula Vista, Coronado, Imperial Beach, and San Diego. Land ownership within the Otay Watershed is predominantly private with a small percentage of local, state, and federally owned lands.

1.3 Water Quality Improvement Plan Process and Approach

Since 2002, under previous permits, the Copermittees have worked together to successfully implement the San Diego Bay Watershed Urban Runoff Management Program (WURMP). The WURMP was a collaborative effort to address high priority surface water quality issues throughout the San Diego Bay WMA. The program includes identifying and addressing high priority water quality problems in the WMA, developing and implementing activities that include pollutant load reduction and abatement (Watershed Water Quality Activities), implementing Watershed Education Activities, and improving public participation and collaborative land use planning.

The new watershed-based emphasis of the Municipal Permit continues the WURMP's approach to water quality management by focusing on providing consistent implementation, improving interagency communication and collaboration, and establishing requirements that focus on attaining water quality improvement goals. The emphasis of the Municipal Permit is on water quality outcomes rather than fulfillment of prescriptive activities. This approach assesses the WMA in its entirety, as well as at the

subwatershed and jurisdictional level. The outcome-based adaptive management process supports the use of scientific tools to answer management questions that lead to implementation actions in the WMA. The goal of the Water Quality Improvement Plan is to reduce pollutants and other stressors from the RPs' MS4 discharges to further the Clean Water Act's objective to protect, preserve, enhance, and restore the water quality and designated beneficial uses of waters of the state.

The Water Quality Improvement Plan helps guide future updates to the Copermittees' jurisdictional programs and to the California Department of Transportation (Caltrans) Storm Water Management Program to achieve improved water quality in MS4 discharges and receiving waters by concentrating efforts on the Highest Priority Conditions and Focused Priority Conditions in the WMA. Numeric goals, strategies, and schedules are developed for Highest Priority Conditions and Focused Priority Conditions by the RPs with public input. The process for selecting Highest Priority Conditions and Focused Priority Conditions is described in more detail in Section 2.2 of this document.

1.3.1 Responsible Party Collaboration

The RPs identified in the Municipal Permit in the San Diego Bay WMA include the County of San Diego, the San Diego Unified Port District (Port of San Diego), the San Diego County Regional Airport Authority (Airport Authority), and the Cities of Chula Vista, Coronado, Imperial Beach, La Mesa, Lemon Grove, National City, and San Diego. Caltrans is also participating voluntarily in the development of the San Diego Bay WMA Water Quality Improvement Plan as a named party in the Chollas Creek Total TMDLs. Although Caltrans is under a separate storm water permit (Order No. 2012-0011-DWQ) (State Water Resources Control Board [State Board], 2013), the agency is participating voluntarily in multiple Water Quality Improvement Plan development efforts throughout the San Diego region.

Water Quality Improvement Plan development and implementation is a collaborative effort by all of the RPs. Table 1-1 provides an overview of the three HUs and the jurisdictions within the watershed.

Table 1-1
San Diego Bay WMA Jurisdictional Breakdown (by Hydrologic Area)

Responsible Party	San Diego Bay WMA								
	Pueblo			Sweetwater River			Otay River		
	908.1	908.2	908.3	909.1	909.2	909.3	910.1	910.2	910.3
Airport Authority		✓							
Chula Vista				✓				✓	✓
County		✓		✓	✓	✓		✓	✓
Coronado							✓		
Imperial Beach							✓	✓	
La Mesa		✓		✓					
Lemon Grove		✓		✓					
National City			✓	✓					
Port of San Diego	✓	✓	✓	✓			✓		
San Diego	✓	✓	✓	✓				✓	
Caltrans ¹		✓							

Note:

1. Caltrans is not listed in the Municipal Permit as a Copermittee, but is listed in the Chollas Creek TMDL for an 864-acre area within the Chollas Creek HSA.

1.3.2 Public Participation Process

The development of this Water Quality Improvement Plan was achieved through a public process in which the RPs solicited data, information, and recommendations from the public (per Municipal Permit Provision F.1.a(1-2)). The general public and other agencies and districts located in the San Diego Bay WMA were solicited for participation in the Water Quality Improvement Plan process. The public participation process to date has included two public workshops, with approximately 20 attendees each, the creation of a Water Quality Improvement Plan Consultation Panel (Consultation Panel), and two Consultation Panel meetings.

The goal of the Consultation Panel is to provide recommendations during the development of the Water Quality Improvement Plan. Members of the public and other agencies whose projects or activities may cause discharges into the MS4 were provided an opportunity to participate in the public process, comment, and submit an application to become a member of the Consultation Panel. A Consultation Panel charter was developed to identify the role of the Consultation Panel in the participation process (Appendix C).

The Consultation Panel includes representatives from the following required entities:

- The San Diego Regional Board;
- The environmental community—a non-governmental organization or environmental interest group associated with a waterbody within the WMA; and

- The development community—an organization familiar with the opportunities for and constraints in implementing structural best management practices (BMPs), retrofit projects, and stream, channel, or habitat rehabilitation in the WMA.

In addition, the RPs chose four “at-large” representatives, based on interest forms received after the first public workshop. At-large representatives are individuals familiar with water quality issues and/or topics pertaining to the three HUs. Two environmentally focused non-governmental organizations, San Diego Coastkeeper and Wildcoast, participated in the San Diego Bay WMA Consultation Panel. Panel members are as follows:

San Diego Bay Water Quality Improvement Plan Consultation Panel	San Diego Regional Board	Wayne Chiu, PE
	Environmental Community	Travis Prichard
	Development Community	Cary Lowe, JD, PhD, AICP
	At-Large (Environmental)	John Holder
	At-Large (Development)	Patrick Mock, PhD, CSE, CWB
	At-Large (Business/Industrial)	Hugo Bermudez
	At-Large (Resident)	Lydia Roach Dorrance, PhD

The Consultation Panel and the public provided substantial input, much of which was incorporated. For example, public input led to the inclusion of Focused Priority Conditions in the Water Quality Improvement Plan as well as Highest Priority Conditions (see Section 2). Overall, the public provided input on the following Water Quality Improvement Plan topics:

- Water quality conditions in the watershed;
- Sources of the conditions;
- Strategies and BMPs to address the conditions;
- Goals for measuring water quality improvements in the WMA; and
- Schedules for meeting the goals.

The public, including the Consultation Panel and the Regional Board were provided with a 30-day comment period for each of two interim deliverables, and will also be provided with a 30-day comment period for the complete Water Quality Improvement Plan (this document) prior to its adoption by the Regional Board.

1.3.3 Water Quality Improvement Plan Development Process

The Water Quality Improvement Plan development process involves three phases. The first phase requires RPs to identify Priority Conditions, likely sources of those conditions, and potential strategies to address those conditions. The second phase requires RPs to identify goals, strategies, and schedules to address the Highest Priority Conditions and Focused Priority Conditions identified as part of the first phase. The third phase is the final Water Quality Improvement Plan document, in which the first phases, monitoring and assessment, and adaptive management processes, are incorporated. Each phase involves multiple opportunities for the public to participate and comment. Table 1-2 summarizes the three phases and associated deliverables.

The First Phase of the Water Quality Improvement Plan Development Process

The first phase (following Municipal Permit Provision B.2) was completed by the RPs in June 2014, by submittal of the San Diego Bay Watershed Management Area Water Quality Improvement Plan – First Interim Deliverable: Priority Conditions, Sources, and Potential Strategies (First Interim Deliverable). Tasks included in the First Interim Deliverable are listed in Table 1-2.

The First Interim Deliverable (San Diego Bay Responsible Parties, December 2014) was posted by the Regional Board for a 30-day public comment period. Public comments were received and considered by the RPs. The RPs are to incorporate the comments into the Final Water Quality Improvement Plan as appropriate.

The Second Phase of the Water Quality Improvement Plan Development Process

The second phase of the Water Quality Improvement Plan process (following Municipal Permit Provision B.3) is the development of final and interim numeric goals for each Highest Priority Condition and Focused Priority Condition, and the strategies that the RPs intend to implement to make measureable progress toward the goals. Each goal is assigned an associated date for achievement, and the strategies are scheduled accordingly. The tasks that have been completed to date for the Second Interim Deliverable are listed in Table 1-2.

The Second Interim Deliverable (San Diego Bay Responsible Parties, 2014) was posted by the Regional Board for a 30-day public comment period. No public comments were received by the comment deadline on January 29, 2015. However, the Regional Board requested that the RPs consider comments received for a different WMA (Los Peñasquitos) primarily regarding the RP's level of responsibility for discharges from agencies outside their jurisdictions. The RPs are to incorporate the comments into the Final Water Quality Improvement Plan as appropriate.

The Third Phase of the Water Quality Improvement Plan Development Process

The third phase is the development of the complete Water Quality Improvement Plan (this document), which includes information from the First and Second Interim Deliverables, the Monitoring and Assessment Program, and the Iterative Approach and Adaptive Management Process. The Monitoring and Assessment Program describes the data collection and analysis needed to evaluate progress toward achieving the numeric goals. The Iterative Approach and Adaptive Management Process establishes the methods that RPs employ to evaluate water quality issues and to periodically revise the Water Quality Improvement Plan. The Final Water Quality Improvement Plan will be delivered to the Regional Board in June 2015, completing the third phase of the Water Quality Improvement Plan Development Process.

Post-Water Quality Improvement Plan Development

The Water Quality Improvement Plan will be implemented by the RPs upon the completion of the 30-day public comment period and receipt of written notification of acceptance of the final Water Quality Improvement Plan by the Regional Board. The information contained within the Water Quality Improvement Plan will be analyzed and updated through annual reporting and integrated assessments. Results from those assessments will be used to revise the Water Quality Improvement Plan, as necessary, as part of the Iterative Approach and the Adaptive Management Process.

Table 1-2
Water Quality Improvement Plan Development Process Phase and Deliverable Summary

Deliverable(s)	Tasks Completed to Date	Due to Regional Board
<i>Phase 1</i>		
First Interim Deliverable: Priority Conditions, Sources, and Potential Strategies	Public Workshop: November 22, 2013 Consultation Panel: April 24, 2014 Submitted to the Regional Board in June 2014; 30-day public comment period complete. The Deliverable included: • A summary of the regulatory structure and background of the Water Quality Improvement Plan, the public participation process, and the Consultation Panel; • A description of the San Diego Bay WMA, including maps of the Pueblo, Sweetwater, and Otay HUs; • Priority Conditions identified for the WMA; • Highest Priority Conditions, a subset of the Priority Conditions; • Focused Priority Conditions, a subset of the Priority Conditions; • MS4 sources of pollutants and/or stressors that potentially cause or contribute to the Highest Priority Conditions and Focused Priority Conditions; and • Potential strategies that may be used by RPs to address the sources in an effort to improve the identified water quality conditions.	June 26, 2014

Table 1-2 (continued)
Water Quality Improvement Plan Development Process Phase and Deliverable Summary

Deliverable(s)	Tasks Completed to Date	Due to Regional Board
<i>Phase 2</i>		
Second Interim Deliverable: Goals, Strategies, and Schedules	Public Workshop: September 10, 2014 Consultation Panel: October 21, 2014 Submitted to the Regional Board in December 2014; 30-day public comment period complete. The Deliverable included: • A summary of the Water Quality Improvement Plan process; • A Highest Priority Condition and Focused Priority Condition summary; • Goals and Schedules identified for each Highest Priority Condition and Focused Priority Condition in the WMA; • Strategies and Schedules for each Highest Priority Condition and Focused Priority Condition in the WMA; and • WMA strategies.	December 26, 2014
<i>Phase 3</i>		
Monitoring and Assessment Program	• Combine First and Second Interim Deliverables with Monitoring and Assessment Plan and Iterative Approach and Adaptive Management Process to complete the Water Quality Improvement Plan • Posted by the Regional Board for a 30-day public comment period and incorporate public comments as appropriate • Anticipate approval by the Regional Board in August, 2015	June 26, 2015
Iterative Approach and Adaptive Management Process		
Final Water Quality Improvement Plan		

1.4 Core Jurisdictional Programs

For more than 20 years, RPs have implemented jurisdictional BMPs to control MS4 discharges and protect water quality. The Municipal Permit requires RPs to implement compliance programs within their boundaries. The Municipal Permit, specifically Provisions D and E, describes the rigorous requirements of the Jurisdictional Runoff

Management Programs (JRMPs). BMPs are implemented by each RP and typically address a wide range of water quality concerns. For example, public education addresses nearly all of the common water quality concerns (and typically involves more than just water quality), and certain street sweeping methods are generally effective to address sediment, trash, and a number of pollutants associated with roadway runoff. Other strategies and programs may be used in conjunction with street sweeping to prevent other pollutant sources, such as illegal dumping.

In addition to the core jurisdictional strategies, the JRMPs will include the additional strategies identified through the Water Quality Improvement Plan planning process. The core jurisdictional program elements required of the JRMPs (with Municipal Permit provisions in parentheses) include, but are not limited to:

- (1) Outfall Monitoring Program (D.2.);
- (2) Assessment (D.4.);
- (3) Establishment and Enforcement of Legal Authority (E.1.);
- (4) Illicit Discharge Detection and Elimination (E.2.);
- (5) Development Planning (E.3.);
- (6) Construction Management (E.4.);
- (7) Existing Development Management (E.5.);
- (8) Enforcement Response Plans (E.6.); and
- (9) Public Education and Participation (E.7.).

1.5 Jurisdiction and Responsibilities

As defined in the Municipal Permit, a permittee to a National Pollutant Discharge Elimination System (NPDES) permit is responsible only for permit conditions relating to the discharges from the MS4s for which it is an operator. Discharges from non-municipal sources and activities (e.g., runoff from agriculture and industrial land uses, federal and state facilities, Caltrans, and Phase II storm water permittees) are regulated separately. For example, facilities designated as Phase II permittees (small MS4s) are regulated under the Phase II General Permit (State Board Order No. 2013-0001-DWQ). In California, industrial and construction activities are regulated under either the General Industrial Permit (State Board Order No. 2014-0057-DWQ) (State Board, 2014) or the General Construction Permit (State Board Order No. 2012-0006-DWQ) (State Board, 2012). Finally, conditional waivers that remove the need to file a report of waste discharge and that avoid coverage under the NPDES permit program are given to activities such as agriculture and nursery operations, onsite disposal systems, silvicultural operations, and animal operations. Recently, draft general water discharge requirements for commercial agricultural and nursery operations were released for public review. The tentative draft order may be finalized during the development of this Water Quality Improvement Plan; this order will affect the ways in which sources from commercial agricultural and nursery operations are managed.

Under this regulatory framework, there are two general areas of storm water management responsibilities: (1) jurisdictional inspection and oversight (such as education, enforcement, and other Illicit Discharge Detection and Elimination (IDDE) activities), as described in the JRMPs in the Municipal Permit, and (2) control of pollutant discharges.

- (1) *Jurisdictional inspections*: The Copermittees, as owners and operators of MS4s, require controls, such as minimum BMPs and inspection programs, to effectively prohibit non-storm water discharges into the MS4s and to reduce the discharge of pollutants in storm water from their own MS4s to the maximum extent practicable. Exceptions include NPDES Phase II, agricultural, state, federal, Caltrans, and Indian reservation lands. The United States Environmental Protection Agency (USEPA), State Board, and Regional Board are responsible for inspections of Phase II, agricultural, state, federal, and Indian reservation lands. Caltrans is subject to its own State of California (State)-issued MS4 Permit. In addition, the USEPA, State Board, and Regional Board have dual permitting and oversight responsibilities over industrial lands and construction sites.

The Copermittees have limited regulatory oversight over industrial lands, construction sites, Phase II MS4s, and agricultural, state, federal, and Indian reservation lands. For example, the RPs implement IDDE activities to identify, investigate, and enforce discharges to their MS4s. Discharges to receiving waters from non-municipal sources and activities (e.g., runoff from agriculture and industrial land uses, federal and state facilities, Caltrans, and Phase II storm water permittees) are not regulated or controlled by the Copermittees since they do not enter a MS4. Accordingly, the scope of the Water Quality Improvement Plan is limited to the regulatory oversight of the Copermittees specified above.

- (2) *Controlling pollutant discharges*: Various NPDES permits or conditional waivers regulate storm water and non-storm water discharges within the San Diego Bay WMA. The Copermittees are responsible for controlling pollutant discharges from their MS4s, except for agriculture and industrial land uses, federal and state facilities, Caltrans, and Phase II storm water permittees. The Copermittees do not have regulatory authority under the Municipal Permit to require entities regulated by other permits issued by the USEPA, State Board, or Regional Board to implement and/or construct BMPs to treat wet/dry weather pollutant discharges originating from their properties, facilities and/or activities. However, the MS4 Permit requires the RPs to control pollutants originating from non-MS4 or non-municipal lands if those pollutants ultimately discharged into the MS4. Therefore, the Copermittees recognize the need to collaborate and improve communication between non-municipal entities within the WMA and the appropriate regulatory agencies to ensure discharges are appropriately regulated before entering the MS4, and to improve water quality throughout the San Diego Bay WMA. The RPs follow procedures to report discharges from these areas to the owner or manager of the area, and may report the discharge to the Regional Board if the discharge is not addressed.

Caltrans has partial responsibility for the implementation of the Metals TMDL, and *Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)*, Resolution No. R9-2010-0001, referred to as the Bacteria TMDL. Caltrans has its own separate NPDES permit (Order No. 2012-0011-DWQ) (State Board, 2012b) and is not subject to the Municipal Permit. Caltrans is participating voluntarily along with the Copermitees as an RP in the development of the Water Quality Improvement Plan for the San Diego Bay WMA and other WMAs across the region.

Currently, some of the RPs are pursuing a subvention of funds from the State to pay for certain activities required by the 2007 Municipal Permit, including activities that require RPs to perform activities outside their jurisdictional boundaries and on a regional or watershed basis. Nothing in this Water Quality Improvement Plan should be viewed as a waiver of those claims or as a waiver of the rights of RPs to pursue a subvention of funds from the State to pay for certain activities required by the 2013 Municipal Permit, including the preparation and implementation of the Water Quality Improvement Plan. In addition, several RPs have filed petitions with the State Board challenging the requirement to prepare Water Quality Improvement Plans that are not voluntary and that are not linked to a receiving water limitations language compliance path, and on other issues related to the Municipal Permit. Because the State Board has not issued a stay of the 2013 Municipal Permit, RPs must comply with the Municipal Permit's requirements while the State Board process is pending.

1.6 Water Quality Improvement Plan Organization

Generally, the Water Quality Improvement Plan is structured to follow requirements of Provision B of the Municipal Permit and the Water Quality Improvement Plan process. Appendix A provides a “crosswalk,” which is a table listing the individual Municipal Permit requirements and the corresponding section of the Water Quality Improvement Plan in which the requirement is addressed.

The document is divided into six sections:

Section 1. Introduction—This section provides background on the regulatory drivers of the Water Quality Improvement Plan and the San Diego Bay WMA. The introduction provides an overview of the Water Quality Improvement Plan process and approach, and outlines the document structure.

Section 2. Priority Water Quality Conditions (Priority Conditions)—This section describes the methodology used to identify Priority Conditions in the San Diego Bay WMA, and the selected Highest Priority Conditions and Focused Priority Conditions.

Section 3. Sources of Pollutants and Stressors—This section summarizes potential sources identified or with unknown contribution to the Highest and Focused Priority Conditions identified in the San Diego Bay WMA.

Section 4. Goals, Strategies and Schedules—This section describes the goals, strategies, and schedules for each of the Highest and Focused Priority Conditions. The

common goals and schedules are presented in this section, as well as goals and schedules for each RP, where applicable. The subsections provide jurisdiction-specific interim goals, where applicable, and summarize the strategies and approach that each RP will implement to achieve the goals.

Each RP's approach to attaining the goals and the strategies to address the goals are summarized in this section. Each RP's strategies list is included in Appendix I.

Some strategies were identified as optional, requiring a trigger in order for a timeline to be initiated. Optional strategies will be considered for implementation depending on the performance of the near-term strategies and as resources become available.

This section also describes the collaborative strategies developed by the RPs. Collaborative strategies augment jurisdictional strategies and provide opportunities for efficiencies and effectiveness throughout the WMA. In particular, the RPs collectively chose to implement the optional Watershed Management Area Analysis (WMAA) per Municipal Permit Provision B.3.b(4) to provide for offsite alternative compliance. Further information on the WMAA is provided in Appendix J.

Section 5. Monitoring and Assessment—This section summarizes the Monitoring and Assessment Program organization and approach and provides monitoring program highlights.

Section 6. Adaptive Management and Iterative Approach—This section discusses the process and approach for refinement and adaptation of Sections 2 through 5 of this Water Quality Improvement Plan.

Appendices A through K—The appendices provide all of the supporting information summarized in Sections 2 through 5.

2 Priority Water Quality Conditions

The Municipal Permit required the RPs to identify receiving water condition priorities within the San Diego Bay WMA that will be addressed in the Water Quality Improvement Plan. The San Diego Bay WMA RPs recognize that the San Diego Bay WMA is different from other WMAs in San Diego County. The WMA comprises three very distinct HUs that are not hydrologically interconnected, but that have one final downstream receiving water body, namely San Diego Bay (small portions of the Pueblo and Otay HUs discharge directly to the Pacific Ocean). The San Diego Bay WMA was separated into three HUs to help prioritize receiving water quality conditions for each distinct watershed and to manage the JRMP) efforts.

This section describes the methodology used to identify Priority Conditions, Highest Priority Conditions, and Focused Priority Conditions, and presents the results of the analysis. Based on input from the Consultation Panel, RPs that do not contribute to the Highest Priority Conditions identified Focused Priority Conditions that they will address and for which they will establish numeric goals, strategies, and schedules. Municipal Permit Requirements for the Priority Conditions and Highest Priority Conditions considerations are included in Appendix A, Municipal Permit Provision B.2 and Water Quality Improvement Plan Crosswalk, which links the Municipal Permit requirements to the various sections contained in the Water Quality Improvement Plan.

2.1 Methodology to Identify Priority Conditions, Highest Priority Conditions, and Focused Priority Conditions

The methodology to identify the Priority Conditions and Highest Priority Conditions for the San Diego Bay WMA used a multiple lines of evidence (MLOE) approach, based on the principles presented in the Municipal Permit (Provision B.2). The process is shown schematically in Figures 2-1 and 2-2. Priority Conditions were identified by assessing the best available data and information from multiple sources of existing information. Figure 2-1 presents the Priority Conditions and Highest Priority Conditions selection process; Figure 2-2 presents the Focused Priority Conditions selection process.

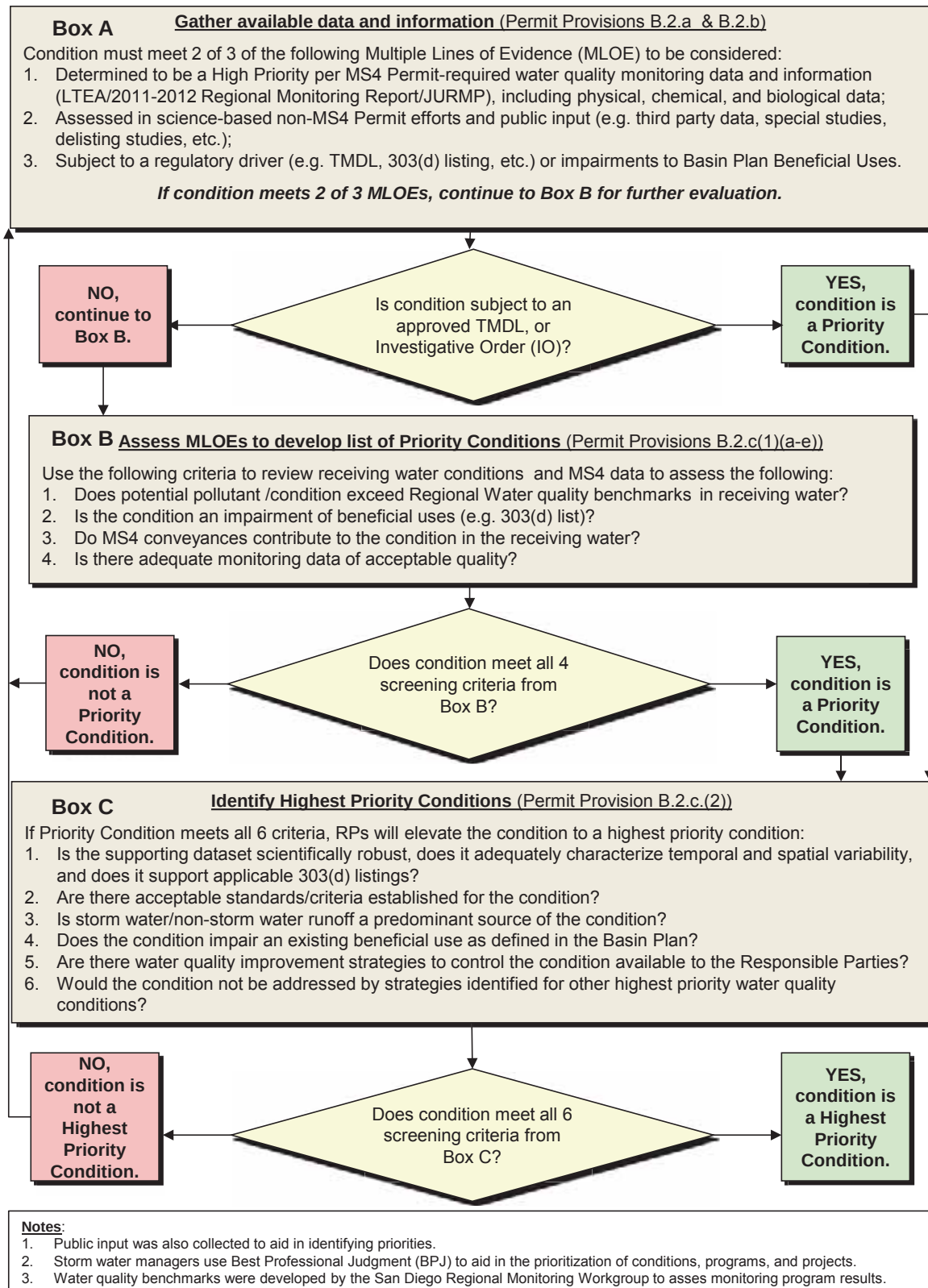
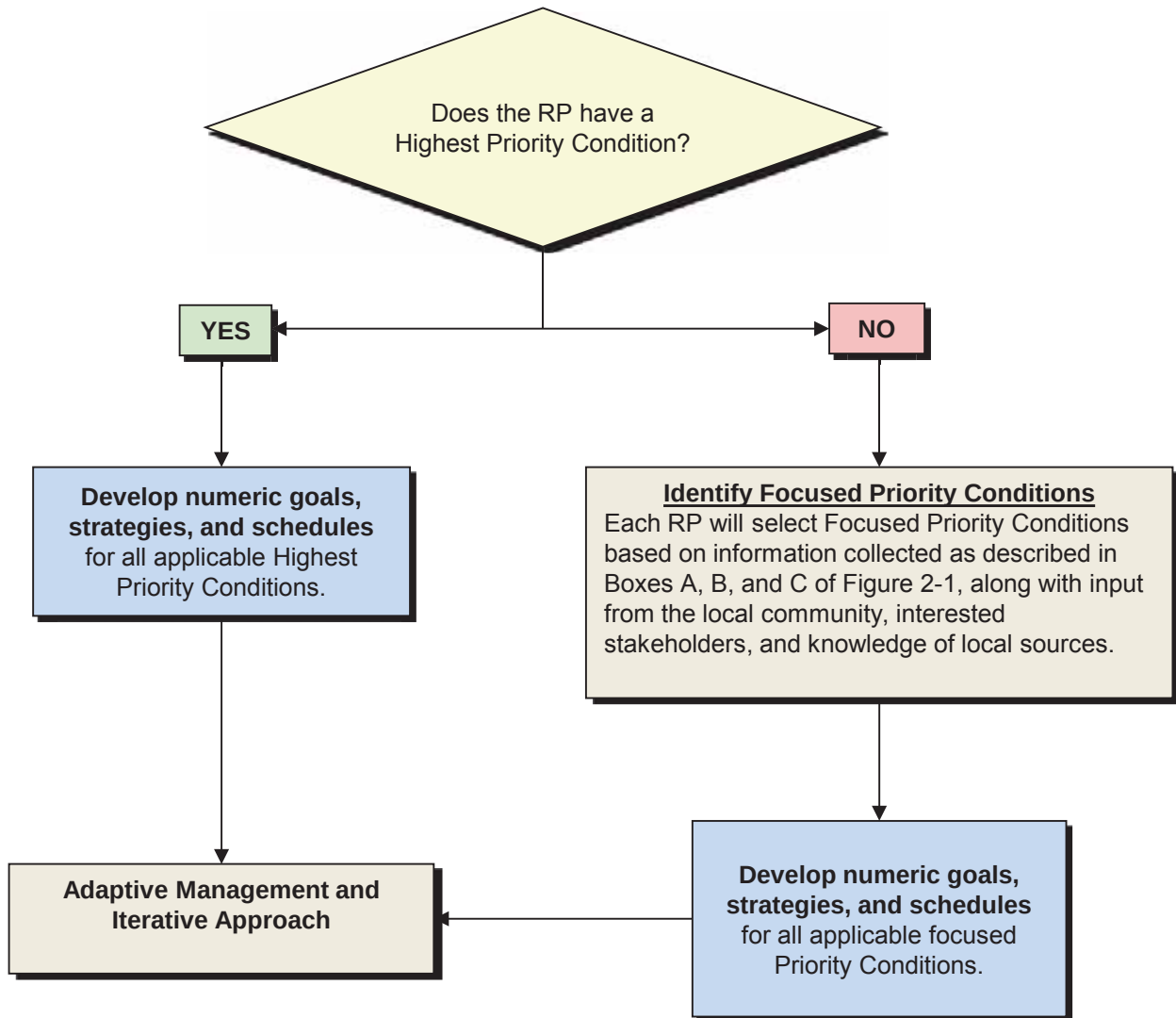


Figure 2-1
Priority Condition and Highest Priority Condition Selection Process



Notes:

1. Public input was also collected to aid in identifying priorities.
2. Storm water managers use Best Professional Judgment (BPJ) to aid in the prioritization of conditions, programs, and projects.
3. Regional water quality benchmarks were developed by the San Diego Regional Monitoring Workgroup for use in assessing the regional monitoring program results.
4. Numeric goals for Focused Priority Conditions can be BMP or performance-based goals.
5. The adaptive management process allows RPs to alter goals, strategies and schedules based on the performance of program implementation and to re-evaluate the process as both effective and ineffective strategies are identified and goals and schedules are attained.

Figure 2-2
Focused Priority Condition Selection Process

2.1.1 Gather Data (Figure 2-1, Box A)

The RPs gathered existing data and information into three lines of evidence for consideration. The evaluation of available data included analysis of the relevant water and sediment chemistry, physical habitat, and biological data received in the “call for data” process. The following are examples of reports, plans, and data assessed in the process:

- 2011 Long Term Effectiveness Assessment (LTEA), which assessed Copermittee historical receiving water and MS4 monitoring data from the 2005-2006 through the 2009–2010 monitoring years;
- 2011–2012 San Diego Copermittee Regional Monitoring Report;
- 2011–2012 San Diego Coastkeeper water quality monitoring data;
- 2011–2012 WURMP Annual Report, including Chollas Creek TMDL monitoring;
- 2011–2012 Jurisdictional Urban Runoff Management Program/Plan (JURMP) Annual Reports, including jurisdictional dry weather MS4 monitoring;
- 2008 WURMP Program, which assesses multiple years of Copermittee historical receiving water and MS4 monitoring data;
- Otay River Watershed Management Plan;
- 2008 Regional Harbor Monitoring Report;
- Water Quality Control Plan for the San Diego Basin (Basin Plan);
- 2008 Southern California Bight Program Report; and
- Stakeholder and public input.

Receiving waters with impairments of beneficial uses or with elevated levels of pollutants or stressors were identified, based on the considerations in Municipal Permit Provision B.2.a. These conditions are presented as a table in Appendix D, Assessment of Impacts of MS4 Discharges on Potential Receiving Water Conditions. Then the considerations in Municipal Permit Provision B.2.b were used to identify potential MS4 causes of or contributions to these conditions. These conditions were then reviewed for data gaps and assessed according to the following MLOEs (Box A of Figure 2-1):

- (1) Determined to be a Highest Priority Condition per Municipal Permit-required water quality monitoring data and information (LTEA/2011-2012 Regional Monitoring Report/JURMP);

- (2) Assessed in science-based non-Municipal Permit efforts and public input (e.g. third-party data, special studies, delisting studies, etc.); and
- (3) Subject to a regulatory driver (e.g., TMDL, Clean Water Act [CWA] Section 303(d) List of Impaired Water Bodies [303(d) List or Listing], etc.) or impairments to Basin Plan Beneficial Uses.

Details of these considerations and the results of this assessment are presented in Appendix E, Initial Receiving Water Quality Conditions Multiple Line of Evidence.

2.1.2 Methodology to Identify Priority Conditions (Figure 2-1, Box B)

To be considered for evaluation as a Priority Condition, the condition had to meet at least two of the three lines of evidence (LOEs). The RPs assessed the resulting conditions to develop a list of Priority Conditions. If the MS4 contributed to a condition that was subject to a regulatory driver, such as an approved TMDL or Investigative Order, the condition was automatically considered a Priority Condition. These conditions were prioritized in order for the RPs to comply with pre-existing regulations. All other potential conditions were screened according to Municipal Permit Provision B.2.c(1) and to considerations specific to the San Diego Bay WMA. A condition had to meet all of the following four San Diego Bay WMA-specific criteria to be considered a Priority Condition (Box B of Figure 2-1):

- (1) Does the potential pollutant or condition exceed regional water quality benchmarks in the receiving water?
- (2) Is the condition an impairment of a beneficial use (e.g., 303(d) List)?
- (3) Do MS4 conveyances contribute to the condition in the receiving water?
- (4) Are there adequate monitoring data of acceptable quality (e.g., temporal and spatial representativeness, meeting planned data quality objectives, statistical confidence, etc.)?

The results of this assessment are presented in Appendix F. Additional information about the Priority Conditions that is required by the Municipal Permit is provided in Appendix G.

2.1.3 Methodology to Identify Highest Priority Conditions (Figure 2-1, Box C) and Focused Priority Conditions (Figure 2-2)

The list of Priority Conditions was then evaluated to identify a subset of water quality conditions (identified pursuant to Municipal Permit Provision B.2.c(2)) that were considered to be highest priority. As part of the assessment to determine whether a Priority Condition was to be elevated to a Highest Priority Condition, the RPs developed six criteria to which Priority Conditions should be classified as Highest Priority Conditions.

Throughout this process, the RPs used their best professional judgment to help identify a Highest Priority Condition. Highest Priority Conditions are required to meet all six of the following criteria (Box C of Figure 2-1), as evaluated in Appendix F:

- (1) Is the supporting dataset scientifically robust; does it adequately characterize temporal and spatial variability; and does it support applicable 303(d) Listings?
- (2) Are there acceptable standards or criteria established for the condition?
- (3) Is storm water/non-storm water runoff a predominant source of the condition?
- (4) Does the condition impair an existing beneficial use as defined in the Basin Plan?
- (5) Are there water quality improvement strategies to control the condition available to the RPs?
- (6) Would the condition not be addressed by each RP's strategies identified for other Highest Priority Conditions?

As part of the assessment to determine whether a priority was to be elevated to a highest priority, the RPs also considered the multiple benefit effects of various strategies or BMPs (Criterion 6, above). For instance, it may not be necessary to elevate a particular Priority Condition to a Highest Priority Condition if there are strategies or BMPs already identified to address another Highest Priority Condition and if those strategies or BMPs are known or will be considered in the effectiveness evaluation of load reductions. The goal of this approach is to enable the RPs to focus resources and efforts where they are most needed.

The methodology determined the Highest Priority Conditions for the WMA; however, some jurisdictions do not discharge or contribute to the Highest Priority Conditions. While this is a positive result that may reflect a high level of attainment of beneficial uses, these jurisdictions recognize the need to develop numeric goals, strategies, and schedules for the Priority Conditions within their jurisdictions. Accordingly, and based on input from the Consultation Panel, these RPs identified Focused Priority Conditions. The Focused Priority Conditions were based on the results of the assessment described above (Figure 2-1), local knowledge of conditions and pollutants, and best professional judgment. The RPs considered local issues and concerns, including those raised by the public and citizen groups, ongoing jurisdictional strategies and policies, and known sources of pollutants and stressors. Figure 2-2 summarizes the process for identifying Focused Priority Conditions.

The Priority Condition selection methodology may be updated periodically through an adaptive management approach that incorporates new data and information to refine the selection process. Re-evaluations and recommendations for modifications to the priorities list will be addressed in future updates of the Water Quality Improvement Plan. The list of priorities may change as water quality is improved and additional information and data are obtained.

2.2 Summary of Highest and Focused Priority Conditions

As described in Section 2.1, the RPs collected data to create an initial list of conditions that were then evaluated to identify Priority Conditions and Highest Priority Conditions.

2.2.1 Selection of Priority Conditions

Following the methodology presented in Section 2.1, the RPs analyzed the available reports, plans, and data to identify water quality conditions for consideration as a Priority Condition. Although the RPs' water quality monitoring programs to date have focused heavily on water chemistry, the RPs will continue to assess available physical and biological data as part of the periodic Water Quality Improvement Plan updates.

Of the 128 water quality conditions initially identified and assessed, 30 water quality conditions met the receiving water quality conditions MLOE criteria (Box A of Figure 2-1). Of the 30 water quality conditions, 21 conditions met the Priority Condition assessment criteria (Box B of Figure 2-1). Once the list of Priority Conditions was developed, "a subset of the water quality conditions identified pursuant to Provision B.2.c.(1)" was identified as the highest priorities per Municipal Permit Provision B.2.c.(2). Finally, two water quality conditions met the Highest Priority Condition assessment criteria (Box C of Figure 2-1). Five receiving water quality conditions were identified as Focused Priority Conditions (Figure 2-2). The rationale for the selection of Focused Priority Conditions is provided in Section 2.1.3. For details on the assessment results, refer to Appendix E (Initial MLOE Assessment) and Appendix F (Priority Conditions Evaluation and Highest Priority Conditions Evaluation).

The Highest Priority Conditions and Focused Priority Conditions identified through this process are summarized in Table 2-1. Highest Priority Conditions are indicated in bold text. Maps of Highest Priority Conditions and Focused Priority Conditions are available in Appendix B.

**Table 2-1
San Diego Bay WMA Summary of Highest and Focused Priority Conditions**

HU	Condition	Pollutant/ Stressor	Geographic Extent (HU/HA)	Responsible Parties
Pueblo (908)	Water Quality ¹	Bacteria; Dissolved copper, lead, and zinc	Chollas Creek (908.22)	City of La Mesa City of Lemon Grove City of San Diego County of San Diego Port of San Diego Caltrans
	Water Quality	Copper and zinc (Wet Weather)	Airport Authority jurisdiction within 908.21	Airport Authority
Sweetwater (909)	Riparian Area Quality	Various	Paradise Creek—lower Sweetwater, HA 909.1 ²	City of National City
	Physical Aesthetics	Trash	The western portion of the City of Chula Vista within HA 909.1	City of Chula Vista Port of San Diego
Otay (910)	Swimmable Waters (Beaches)	Bacteria	Applicable RP jurisdiction within HA 910.1	City of Coronado City of Imperial Beach Port of San Diego
	Physical Aesthetics	Trash	Applicable RP jurisdiction in HA 910.2	City of Chula Vista City of Imperial Beach Port of San Diego

Notes:

1. **The conditions in bold are the Highest Priority Conditions for the San Diego Bay WMA.** Pollutants in regular font are the Focused Priority Conditions.
2. For the purposes of the Water Quality Improvement Plan, Paradise Creek is considered to be part of the lower Sweetwater area, for which the San Diego Bay priority condition analysis has identified potential impacts to beneficial uses such as habitat and non-contact recreation.

2.2.2 Identification of Highest Priority Conditions

The Highest Priority Conditions were identified as the potential impairments in Chollas Creek (908.22 HSA) of water quality by indicator bacteria (contact water recreation beneficial use [REC-1]) and by metals (warm freshwater habitat beneficial use [WARM], for copper, lead, and zinc). The Highest Priority Conditions listed in Table 2-1 have the greatest potential for near-term improvement in water quality that can be achieved by controlling discharges from the MS4. The two Highest Priority Conditions in the Chollas Creek HSA have approved TMDLs and extensive research has been conducted to assess their contributions from the RPs' MS4s. The research includes the existence of a robust monitoring dataset demonstrating elevated levels of pollutants and stressors in the HSA, with evidence that the MS4 is a predominant source of the impairment. In addition, a Comprehensive Load Reduction Plan (CLRP) has previously been developed to identify how the RPs plan to reduce the contribution of MS4 discharges.

2.2.3 Identification of Focused Priority Conditions

RPs that did not have any MS4 within a portion of the watershed for which a Highest Priority Condition has been identified selected Focused Priority Conditions (Table 2-1), for which numeric goals, strategies, and schedules will be developed. The RPs responsible for each Focused Priority Condition will develop their strategies to target Focused Priority Conditions with respect to their jurisdiction. The rationale for selecting the Focused Priority Conditions is summarized below.

2.2.3.1 Pueblo HU

Focused Priority Conditions have been identified in the Pueblo HU for the following jurisdiction:

- Airport Authority.

Water Quality (San Diego Mesa HA 908.21): The Airport Authority has identified metals in wet weather as a Focused Priority Condition, based on monitoring data and knowledge of sources collected under the industrial program. Wet weather runoff sampling has been conducted at San Diego International Airport since the inception of the Airport Authority, in 2003. The runoff sampling is conducted in compliance with the State's Industrial General Stormwater Permit (NPDES Permit No. CAS000001). The annual sampling data are published on the Airport Authority webpage. Historically, the sampling data have consistently identified total and dissolved copper and total and dissolved zinc as contaminants of concern. While aerial deposition of copper and zinc generated from offsite may be one source, likely onsite sources have also been identified throughout existing airport facilities (building roofs and galvanized fencing) and operations (tire and brake pad wear from aircraft and vehicle traffic).

2.2.3.2 Sweetwater HU

Focused Priority Conditions have been identified in the Sweetwater HU for the following jurisdictions:

- City of National City;
- City of Chula Vista; and
- Port of San Diego.

Riparian Area Quality (Lower Sweetwater HA 909.1): The City of National City has identified riparian area quality along Paradise Creek as a Focused Priority Condition. The selection was based on a number of local factors, including public knowledge of the condition and ongoing improvement efforts. The City of National City is the only municipality that drains to Paradise Creek, although other entities such as school districts and transportation agencies are also located in the Paradise Creek watershed. Paradise Creek is listed as being part of the Pueblo HU in the Basin Plan, but actually drains to the Sweetwater River Estuary. For the purposes of the Water Quality Improvement Plan, Paradise Creek is considered to be part of the lower Sweetwater

area, for which the San Diego Bay priority condition analysis has identified potential impacts on beneficial uses, such as habitat and non-contact recreation.

Of the water bodies within the City of National City, Paradise Creek was deemed to have the greatest potential for improvements benefitting both water quality and the community. While most of the other water bodies within the City are largely channelized and fenced off to prevent public access, several segments of Paradise Creek are directly accessible to the public in established City parks. In Paradise Creek, impacts on riparian area quality include a concrete channel bottom and non-native bank vegetation in the Kimball Park area and occasional trash at various points along the creek. Improving riparian area quality along Paradise Creek is part of the City's larger vision to provide residents in the central and western portions of the City with improved access to natural environments and green spaces. The City has also established a partnership with a local environmental group, Paradise Creek Educational Park, Inc., which maintains native vegetation along portions of Paradise Creek and completes regular creek cleanups. Improvements to riparian area quality in Paradise Creek may also positively impact the downstream Paradise Marsh portion of the Sweetwater Marsh Complex, which is part of the San Diego Bay National Wildlife Refuge.

Physical Aesthetics (Lower Sweetwater HA 909.1): The City of Chula Vista and the Port of San Diego have identified physical aesthetic impacts that are due to trash as a Focused Priority Condition. Trash inspections of storm drain structures during the previous dry weather and MS4 outfall monitoring programs in the City of Chula Vista have found that there is more trash in storm drains in the western portion of the City's jurisdiction. Additionally, the public has expressed concern about trash in both the Sweetwater and Otay HUs. Focusing on strategies to reduce trash helps improve both the aesthetic quality as well as various beneficial uses of receiving waters. Wildlife can ingest or become entangled in trash that gets into the waterways. Trash that settles in receiving waters can also harm benthic organisms and can contaminate the sediment in which these creatures live. By focusing on trash, the City and Port can improve receiving water quality and increase public awareness and education about proper waste disposal. BMPs that focus on trash also have the potential to address other pollutants, thus achieving a multiple-benefit effect.

2.2.3.3 Otay HU

Focused Priority Conditions have been identified in the Otay HU for the following jurisdictions:

- City of Coronado;
- City of Imperial Beach;
- City of Chula Vista; and
- Port of San Diego.

Swimmable Waters (Coronado HA 910.1): The RPs in the Coronado HA (the City of Coronado, the City of Imperial Beach and the Port of San Diego) have identified swimmable waters as a Focused Priority Condition. These RPs will work collaboratively, where feasible, to address receiving water conditions and preserve and/or enhance swimmable waters in the Coronado HA. Water recreation e.g., boating, fishing, swimming, bird watching, and beach walking) is a major part of the quality of life in the San Diego Bay. As such, swimmable waters are important to the local community and stakeholders.

Bacterial indicators have been identified as a potential pollutant that may affect swimmable conditions at beaches such as those in the Coronado HA. The RPs plan to collaborate on developing an approach to address bacteria.

Physical Aesthetics (Otay Valley HA 910.2): Three RPs in the Otay Valley HA (the City of Chula Vista, the City of Imperial Beach, and the Port of San Diego) have identified physical aesthetic impacts due to trash as a Focused Priority Condition. The RPs will work collaboratively, where feasible, to address impairments of physical aesthetics due to trash. In addition to the concern expressed by the public about trash in the Otay HU during the public participation process, the Otay River Watershed Management Plan (ORWMP) identified trash (e.g., illegal dumping and litter) as a significant issue. Activities implemented to reduce trash can improve water quality and help to increase public awareness and education about proper waste disposal. BMPs that focus on trash also have the potential to address other pollutants (such as bacteria), thus achieving a multiple-benefit effect.

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3 Municipal Separate Storm Sewer System (MS4) Sources of Pollutants and /or Stressors

Known and suspected sources of storm water and non-storm water pollutants and/or stressors associated with MS4 discharges that cause or contribute to Highest Priority Conditions were identified on the basis of available resources and the considerations required by the Municipal Permit (Provision B.2(d)). Eight primary resources provided the information needed:

- 2011 LTEA;
- 2008 WURMP Program;
- 2011–2012 WURMP Annual Report;
- 2011–2012 JURMP Annual Reports;
- Stakeholder and public input;
- Approved and draft TMDLs source analysis information;
- Bacteria source characterization process (City of San Diego, 2012); and
- MS4 structure geospatial data maintained by each RP.

The potential source input received from stakeholders at the November 22, 2013, public workshop and additional data sources used to augment the primary sources listed above are in Appendix G.

3.1 Potential Sources of Pollutants and/or Stressors

Updates to MS4 source identification (Municipal Permit Provision B.2.d) were built upon source assessments of general pollutant categories previously conducted as a part of the 2011 LTEA and the 2012 WURMP Annual Report. The 2011 LTEA began with sources identified in the previous Municipal Permit (R9-2007-001) and updated the list based on the most recent inventory and available data associated with the JURMPs. To identify sources, the LTEA evaluated the available wet and dry weather receiving water and outfall monitoring data and IDDE program results, as well as the adequacy of the data. Additional information and supporting documentation are in Appendix G.

To assess the potential sources of pollutants and/or stressors of Focused Priority Conditions and Highest Priority Conditions, tables were developed to correlate Priority Conditions with the RP's currently inventoried sources. The process used to develop the tables was taken directly from the 2005 Baseline LTEA (BLTEA) and 2011 LTEA. A total of 37 facility, area, and activity categories were evaluated and identified as likely sources of stressors in the LTEA, which was conducted on a regional level. The 2012 WURMP Annual Report refined the likely sources of pollutant categories identified in the LTEA to those that are found specifically within the San Diego Bay WMA. The inventoried sources in each of the HAs are also summarized in Appendix G.

Sources other than the MS4 discharges that are not under the RP's regulatory authority may also contribute to the potential impairments within the San Diego Bay WMA. These other pollutant sources are summarized in Table 3-1. Discharges from these sources are often conveyed to receiving waters by the RPs' MS4s.

Table 3-1
Other Known or Suspected Sources of Pollutants and/or Stressors

Other Known or Suspected Sources	Description
Phase II MS4 outfalls	Smaller agencies or areas regulated under the State's Phase II MS4 Permit (State Board Order No. 2013-0001-DWG). Examples: Schools, Metropolitan Correctional Center San Diego (Pueblo HU), and Donovan State Prison (Otay HU)
Other permitted discharges	Discharges covered under California's Construction General Permit and the Industrial General Permit; discharges from waste sites (e.g., landfills and waste transfer stations); other NPDES permits (i.e., US Navy, Caltrans)
Other potential point sources ¹	Private outfalls; Waste water collection systems and treatment plants (POTWs); discharge of drinking water supply into receiving waters, boating activities
Other non-point sources ²	Agriculture (sites currently operate under a conditional waiver from Regional Board), livestock operations, wildlife, homeless encampments, sewage infrastructure, bacteria regrowth, atmospheric deposition, and other natural sources (e.g., groundwater infiltration and rising groundwater)

Notes:

POTWs – publicly owned treatment works

1. A point source is any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. (Clean Water Act, Section 502(14)).
2. Non-point source pollution is derived from many different sources and is transported by rainfall or snowmelt moving over and through the ground, which picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, and coastal waters.

RPs are responsible for controlling pollutant discharges from their MS4s. The USEPA, State Board, and Regional Board regulate discharges from construction sites, industrial, agricultural, Phase II, state, federal, and Indian reservation lands under separate permits or waivers. However, the Copermitttees' Municipal Permit and Caltrans' MS4 Permit hold the RPs responsible for pollutants originating from these lands if those pollutants are ultimately discharged from an MS4 operated by one of the RPs. Therefore, the RPs recognize the need for coordination and improved communication with non-municipal sources and the appropriate regulatory agencies to ensure that these discharges are appropriately regulated before entering the RPs' storm drain systems and improve water quality throughout the watershed.

All sources of stressors have different discharge potential under wet and dry conditions, and the transport mechanisms are different. During wet weather, pollutants from these sources discharge to the MS4 and then to the receiving waters via storm water runoff. The discharge is spread over a general area and can be represented by a category such as land use. Runoff during wet weather mobilizes and transports pollutants from areas that are collectively associated with particular land uses. This is in contrast to the pollutants found in dry weather urban runoff, which are generally associated with identifiable dischargers such as residences and commercial facilities.

During dry weather, discharge pollutants are typically conveyed by means of non-storm water runoff, which includes illicit discharges, over-irrigation, groundwater infiltration, and permitted discharges; these discharges are generally associated with specific facilities, areas, or activities. The different wet and dry weather transport mechanisms require varying strategies to address the sources and to minimize the pollutants through selected strategies. As more source information is gathered, the priorities may change and vary by RP. Detailed information on land uses in each of the HAs is summarized in Appendix B.

Identifying the potential sources, pollutant discharges, and/or other factors causing the San Diego Bay WMA's Priority Conditions, to the extent possible, will assist the RPs in directing programmatic efforts and resources toward relevant Focused Priority Conditions and Highest Priority Conditions, as appropriate.

3.2 MS4 Sources of Highest Priority Conditions

Section 2.2.2 established that the Highest Priority Conditions in the San Diego Bay WMA are the impairments of REC-1 due to bacteria and WARM due to dissolved metals in Chollas Creek (908.22 HSA) in the Pueblo HU. The goal of this section is to comply with the requirements of Provision B.2.d of the Municipal Permit (identification and prioritization) and identify, to the extent possible, the known or suspected sources, pollutant discharges, and/or other factors causing the Highest Priority Conditions within the Chollas Creek HSA.

As discussed in Section 2.3.1, source identification and prioritization were based upon source assessments previously conducted as a part of the 2011 LTEA and refined in the 2012 WURMP Annual Report. The pollutant source assessment was based on currently available data associated with RPs' monitoring, inspections, and inventories that were refined for each of the Highest Priority Conditions. These data sources have provided sufficient information to categorize the likely sources of stressors of the Highest Priority Conditions.

3.2.1 Sources of Pollutants and/or Stressors

To determine and prioritize potential sources of pollutants or stressors for the Highest Priority Conditions in the Chollas Creek HSA, likely sources were reviewed based on information collected as part of the 2012 WURMP Annual Report. Table 3-2 summarizes the facilities, areas, and activities identified by the RPs as known or

suspected sources of pollutants and/or stressors identified for the Highest Priority Conditions for the San Diego Mesa HA, which includes the Chollas Creek HSA.

Table 3-2
Likely Sources of Pollutants and/or Stressors of Highest Priority Conditions

Source Type	Total Number of Facilities in HA ¹	Bacteria	Metals
<i>Chollas Creek (San Diego Mesa HA)</i>			
Agriculture	1	✓	✓
Animal Facilities	82	✓	
Automotive	876		✓
Eating or Drinking Establishments	2,316	✓	
Equipment	91		✓
General Industrial	95		✓
Institutional	68		✓
Manufacturing	57		✓
Metal	40		✓
Nurseries/Greenhouses	18	✓	✓
Stone/Glass Manufacturing	9		✓
Storage/Warehousing	210		✓
Municipal	298		✓
Residential Areas ²	10,716 (acres)	✓	✓

Notes:

✓ = Stressor has been identified for the Highest Priority Condition in the HA.

Blank = Stressor is not identified as a potential source in the WURMP Annual Reports.

1. Total number of facilities in San Diego Mesa HA. Many of these facilities do not drain to the Chollas Creek HSA.

2. Residential areas are reported as acreage and not by the number of dwellings.

Additional Potential Sources of Bacteria

The Chollas Creek Bacteria TMDL⁵ Technical Report identifies wildlife areas as including agriculture, dairy intensive livestock operations (not currently subject to NPDES requirements), open recreation, open space, and water resource land uses. The wildlife areas partially account for bacteria contributions from wild animals and decaying plant sources in Chollas Creek (Regional Board, 2010).

⁵ Chollas Creek Bacteria TMDL, commonly referred to as the Twenty Beaches and Creeks Bacteria TMDL: California Regional Water Quality Control Board, San Diego Region (Regional Board). 2010. Revised TMDL for Indicator Bacteria, Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek). Resolution No. R9-2010-0001. Approved February 10.

The Bacteria Source Characterization Process (Chollas Creek) identifies homeless encampments as a bacteria source that can directly discharge bacteria from human origins to receiving waters (City of San Diego, 2012). Sources related to sewage infrastructure, such as sewer collection systems, sanitary sewer overflows, illicit discharges to the sewer system, and septic tanks, have also been identified by the RPs as potential sources of bacteria in Chollas Creek (City of San Diego, 2012).

In addition to these non-point sources, the contribution of groundwater into the MS4 through infiltration and receiving waters at areas where the groundwater table reaches surface water (rising groundwater) may also be considered a non-point source for freshwater discharges (Regional Board, 2010).

Additional Potential Sources of Dissolved Metals

The highest relative load contributions of dissolved copper, lead, and zinc in Chollas Creek have been attributed to freeways and commercial/industrial land uses, which may include both point and non-point sources (Regional Board, 2008). Discharge of drinking water supply into Chollas Creek has also been identified as a point source of metals. Metals in drinking water may be partially contributed to by piping infrastructure. Industrial sources may be a significant source of copper, lead, and zinc in Chollas Creek (Regional Board, 2008). Atmospheric deposition of metals has been found to be a non-point source (City of San Diego, 2012). Additionally, brake pad wear on automobiles is a likely non-point source of copper, and, to a lesser extent, a source of lead and zinc (Regional Board, 2008) due to deposition of brake dust that is transported by rainfall into Chollas Creek.

3.2.2 Controllability of Sources of Pollutants and /or Stressors

Sources in the Chollas Creek HSA were prioritized based on two factors: the ability of the RPs to control the source and the level of anthropogenic (i.e., associated with humans) contribution. The prioritization of the known and suspected sources is described in Section 3.2.3.

To determine whether a potential source is controllable, four factors were considered (supporting information is in Appendix G:

- (1) The locations of the MS4s;
- (2) The potential contributing land uses during wet weather;
- (3) Known outfalls with persistent dry weather flow; and
- (4) Jurisdictional authority.

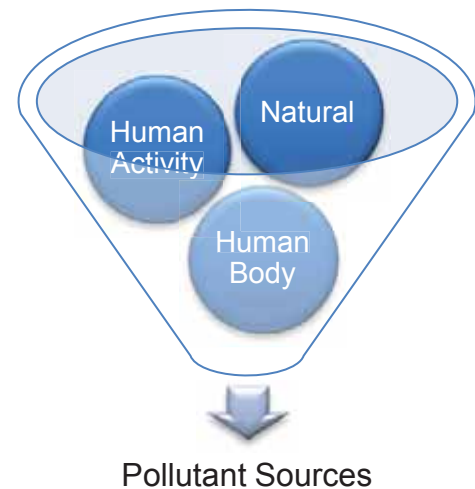
Sources were ranked based on the ability of RPs to control the associated discharges. Most point sources are considered controllable, whereas many non-point sources are not. The Bacteria TMDL provided guidance on how a controllable source is defined, stating that controllable sources are those sources that are anthropogenic (i.e., influenced by humans) in origin (Regional Board, 2010). In addition, sources considered to be non-controllable by the RPs included sources outside the RPs' jurisdictional boundaries, sources over which the RPs do not have regulatory authority, and non-point sources that are not considered controllable.

3.2.3 Level of Human Influence and Source Prioritization

Sources of bacteria and metals were also prioritized, based on human influence on the sources in the Chollas Creek HSA. The Bacteria Source Characterization Process submitted in the San Diego County Municipal Copermittees *2011–2012 Urban Runoff Monitoring Report* (San Diego County Copermittees, 2013) provided a methodology to characterize the sources of indicator bacteria (*Enterococcus*, fecal coliform, and total coliform) by the level of human influence. Metals source prioritization used the same methodology as that for bacteria, excluding sources from the human body.

The three categories of source origin are the human body, human activity, and natural:

- Human Body (not applicable to metals): Bacteria carried or shed by humans (e.g., bather shedding and sewage);
- Human Activity: Sources from non-human anthropogenic origins (the source is natural and is not from the human body, but it may be increased by human influence or activities such as pet waste for bacteria or brake pad wear for metals); and
- Natural: Sources from non-human non-anthropogenic origins (i.e., independent of human influence), such as natural sources, including wildlife and natural plant decay for bacteria or geologic features for metals.



Sources were ranked based on the category of the source origin first by sources associated with human activity, and then by sources known or suspected to be natural in origin. Natural sources of indicator bacteria include animal (e.g., birds, coyotes, and native reptiles) and vegetable (e.g., decaying leaves, wrack-line kelp) sources. Natural sources of metals include rocks and soils subject to natural erosion, and groundwater with high concentrations of salts. For indicator bacteria, sources were given an additional category: from the human body. Sources identified as from the human body were given the highest priority.

For the Chollas Creek HA, the final prioritization is described in Table 3-3.

Table 3-3
Source Prioritization Matrix

Stressor	Controllability	Origin	Priority
Bacteria	Controllable	Human Body	High
		Human Activity	Medium
		Natural	Low
	Not Controllable	Any	Low
Metals	Controllable	Human Activity	High
		Natural	Low
	Not Controllable	Any	Low

Table 3-4 presents the prioritization of identified known and suspected sources of bacteria and metals in the Chollas Creek HSA in the Pueblo HU. Sources that are considered high priority by the RPs are presented in boldface font.

Table 3-4
Prioritization of Identified Known and Suspected Sources of Bacteria and Metals

Known or Suspected Source ¹	Wet or Dry Weather	Controllability Based on Copermittee Jurisdiction	Potential Origin of the Source	Final Ranking
<i>Chollas Creek (San Diego Mesa HA)—Bacteria</i>				
Agriculture	Wet & Dry	Not controllable ²	Human activity	Low
Animal Facilities	Wet	Controllable	Human activity	Medium
Eating or Drinking Establishments	Wet & Dry	Controllable	Human activity	Medium
Nurseries/Greenhouses	Wet & Dry	Controllable	Human activity	Medium
Residential Areas	Wet & Dry	Controllable	Human activity	Medium
Wildlife	Wet	Not controllable	Natural	Low
Homeless Encampments	Wet & Dry	Controllable	Human body & human activity	Medium ³

Notes:

1. High priority sources are presented in **boldface** font.
2. Agricultural sources are considered not-controllable by the RPs because they are regulated under the Conditional Waiver of Discharges from Agricultural and Nursery Operations (Resolution No. R9-2007-0104).
3. Recognizing that homeless encampments are neither fully controllable nor fully uncontrollable, they have been assigned a priority of medium.

Table 3-4 (continued)
Prioritization of Identified Known and Suspected Sources of Bacteria and Metals

Known or Suspected Source ¹	Wet or Dry Weather	Controllability Based on Copermittee Jurisdiction	Potential Origin of the Source	Final Ranking
Sewage Infrastructure & Activities	Wet & Dry	Controllable	Human body & human activity	High
Biofilm Regrowth	Wet	Controllable	Human activity & natural	Low
Open Space/Recreation Land Uses	Wet	Controllable	Human activity & natural	Low
Natural/Background Growth in Water Land Uses	Wet	Not controllable	Natural	Low
Decaying Plant Sources	Wet	Not controllable	Natural	Low
Septic Tanks	Wet & Dry	Controllable	Human body & human activity	High
Groundwater Contribution	Dry	Not controllable	Human activity & natural	Low
Over-irrigation	Dry	Controllable	Human activity	Medium
<i>Chollas Creek (San Diego Mesa HA)—Metals</i>				
Agriculture	Wet & Dry	Not controllable	Human activity	Medium
Automotive	Wet	Controllable	Human activity	High
Equipment Repair	Wet	Controllable	Human activity	High
General Industrial	Wet & Dry	Controllable	Human activity	High
Institutional	Wet	Controllable	Human activity	High
Manufacturing	Wet	Controllable	Human activity	High
Metal	Wet	Controllable	Human activity	High
Nurseries/Greenhouses	Wet & Dry	Controllable	Human activity	High
Stone/Glass Manufacturing	Wet	Controllable	Human activity	High
Storage/Warehousing	Wet	Controllable	Human activity	High
Municipal	Wet	Controllable	Human activity	High
Residential Areas	Wet & Dry	Controllable	Human activity	High
Roads, Streets, Freeways	Wet & Dry	Controllable	Human activity	High
Sediment Accumulation	Wet & Dry	Controllable	Human activity & natural	Low
Groundwater contribution	Dry	Not controllable	Human activity & natural	Low
Brake Pad Wear	Wet & Dry	Not controllable	Human activity	High
Natural/Background	Wet	Not controllable	Natural	Low
Atmospheric Deposition	Wet & Dry	Not controllable	Natural	Low

Notes:

1. High priority sources are presented in **boldface** font.
2. Agricultural sources are considered not-controllable by the RPs because they are regulated under the Conditional Waiver of Discharges from Agricultural and Nursery Operations (Resolution No. R9-2007-0104).
3. Recognizing that homeless encampments are neither fully controllable nor fully uncontrollable, they have been assigned a priority of medium.

3.3 MS4 Sources of Focused Priority Conditions

Section 2.2.3 established the Focused Priority Conditions for the RPs that did not have any jurisdictional area within a portion of the watershed for which a Highest Priority Condition has been assigned. The goal of this section is to identify, to the extent possible, the known or suspected sources, pollutant discharges, and/or factors contributing to the Focused Priority Conditions.

3.3.1 Water Quality in San Diego Mesa, HA 908.21

As established in Section 2.2.3, the Airport Authority has identified total and dissolved copper and zinc in wet weather as a Focused Priority Condition, based on monitoring data and knowledge of sources collected under the industrial program. The Airport Authority's 2011–2012 Municipal Stormwater Permit Annual Report identified airport operations, industrial land use, and ground transportation as the land uses most closely associated with the potential for copper and zinc pollution. Atmospheric deposition of metals generated offsite is another potential source. Table 3-5 summarizes the facilities, areas, and activities identified by the Airport Authority as known or suspected sources of copper and zinc in Airport Authority jurisdiction in the San Diego Mesa HA.

Table 3-5
Likely Sources of Pollutants and/or Stressors of Focused Priority Conditions
in the Airport Authority Jurisdiction

Source Type
<i>Airport Authority Jurisdiction (San Diego Mesa HA)¹</i>
Industrial—Tenant Operational Areas
Industrial—Airport Operational Areas (runway, taxiways, roofs)
Ground Transportation—Parking Lots/Roads

Note:

1. Only facilities within the Airport Authority jurisdiction in the San Diego Mesa HA are identified.

Controllability and Source Prioritization

Using the methodology outlined in Section 3.2, the sources were prioritized and ranked, based on the ability of the Airport Authority to control the associated discharges. The results of this prioritization are presented in Table 3-6.

Table 3-6
Prioritization of Sources—Focused Priority Conditions in the
Airport Authority Jurisdiction

Known or Suspected Source	Wet or Dry Weather	Controllability Based on Copermittee Jurisdiction	Potential Origin of the Source	Final Ranking
<i>Airport Authority Jurisdiction (San Diego Mesa HA)— Total and Dissolved Copper and Zinc</i>				
Industrial—Tenant Operational Areas	Wet	Controllable	Human activity	High
Industrial—Airport Operational Areas	Wet	Controllable	Human activity	High
Ground Transportation—Parking Lots/Roads	Wet	Controllable	Human activity	High
Atmospheric Deposition	Wet & Dry	Not Controllable	Human activity	Low

Note:

1. High Priority Conditions are presented in **boldface** font.

3.3.2 Riparian Area Quality in Paradise Creek, Sweetwater, HA 909.1

In Paradise Creek, impacts on riparian area quality include a concrete channel bottom and non-native bank vegetation in the Kimball Park area and occasional trash at various points along the creek. While channelization and the presence of invasive species are not necessarily directly related to MS4 discharges, it may still be possible to make improvements with respect to these stressors to improve water quality, for example, through creek restoration or buffer enhancement projects.

Paradise Creek is 303(d)-Listed for selenium. A study to evaluate selenium levels in Paradise Creek is currently underway. So far approximately 50 samples have been collected, and none has exceeded the water quality objective for selenium (personal communication with John Quenzer of D-MAX Engineering, March 27, 2015). Based on that information, selenium does not appear to be a significant stressor affecting riparian area quality in Paradise Creek.

The City of National City evaluates trash pollutant discharge potential during inspections of industrial, commercial, and municipal sites. Commercial businesses (the majority of which are eating and drinking establishments in strip malls), municipal facilities, and residential land uses were identified as potential sources of trash. Past residential evaluation programs completed by the City of National City have indicated that multi-family residential areas are more likely to be a source of trash than single-family residential. Phase II jurisdiction facilities, including schools and a Metropolitan Transit

System (MTS) trolley station, are also potential sources of trash within the Paradise Creek drainage area. Based on field observations during past dry weather and MS4 outfall monitoring programs, homeless populations are also a source of trash.

Controllability and Prioritization of Sources of Pollutants and/or Stressors: Paradise Creek

Sources in the Paradise Creek drainage area were prioritized based on two factors: the ability of the RPs to control the source and the level of anthropogenic (i.e., associated with humans) contribution. The prioritization of the known and suspected sources is described in this section.

To determine whether a potential source is controllable, four factors were considered as described in Section 3.2 (supporting information is located in Appendix G):

- (1) The locations of the MS4s;
- (2) The potential contributing land uses during wet weather;
- (3) Known outfalls with persistent dry weather flow; and
- (4) Jurisdictional authority.

Currently, field observations show that there are three outfalls in the Paradise Creek drainage area with persistent flow. None of these are major flow sources: one has had a flow rate of 0.5 gallon per minute, and the other two have had ponded water but have not been observed with flowing water. The ponded sites are classified as persistently flowing because of three consecutive visits with ponded water, in accordance with the Municipal Permit's definition of persistent flow (City of National City, 2014).

Most of the major sources discussed above are considered controllable. The exceptions are portions of the watershed controlled by Phase II agencies (which are outside the RP's jurisdiction) and homeless communities (which are neither fully controllable nor fully uncontrollable). Most of the sources and stressors are also linked to human activity, although not necessarily to MS4 discharges.

Two general categories of sources and stressors were considered for evaluation: (1) stressors related to conditions in the stream and stream corridor, and (2) upstream sources of other stressors. In general, stressors in the stream and stream corridor are considered a higher priority for action because addressing them will likely result in a greater improvement to riparian area quality. At this point, trash is the main stressor of concern related to upstream sources in the watershed. High levels of trash have not been observed throughout the creek, and it is considered a lower priority than the in-stream and stream corridor stressors. For this reason, the upstream watershed sources are considered a medium priority.

Table 3-7 summarizes the prioritization of identified known and suspected sources or stressors.

Table 3-7
Prioritization of Identified Known and Suspected Sources or Stressors

Known or Suspected Source or Stressor ¹	Wet or Dry Weather	Final Ranking
<i>Paradise Creek (Lower Sweetwater)—Riparian Area Quality: In-Stream and Stream Corridor</i>		
Concrete Channel Bottom (Segment within Kimball Park)	Wet & Dry	High
Non-Native Bank Vegetation (Segment within Kimball Park)	Wet & Dry	High
<i>Paradise Creek (Lower Sweetwater)—Riparian Area Quality: Watershed Sources²</i>		
Eating or Drinking Establishments	Wet	Medium
Automotive	Wet	Medium
Multi-Family Residential Areas	Wet	Medium
Homeless Encampments	Wet & Dry	Medium
Roads and Streets	Wet	Medium
Municipal	Wet	Medium

Notes:

1. High priority sources are presented in **boldface** font.
2. Trash is the primary stressor of concern associated with upstream watershed sources.

3.3.3 Physical Aesthetics of Trash in Lower Sweetwater, HA 909.1 and in Otay Valley, HA 910.2

Within the Lower Sweetwater HA, trash was established as a Focused Priority Condition for the western portion of the City of Chula Vista, which includes tideland areas under the jurisdiction of the Port of San Diego. Past trash monitoring data and public input were factors that elevated trash to a Focused Priority Condition in this area. Trash was established as a Focused Priority Condition for the western portion of the City of Chula Vista and portions of the City of Imperial Beach and Port of the San Diego within the Otay Valley HA. Public input, previous monitoring data, as well as the ORWMP, have identified trash as a pollutant in this area. In addition to impacts on the physical aesthetics of an area, trash poses a health risk to both humans and wildlife and can affect the beneficial uses of waterways. Table 3-8 summarizes the RPs involved, the areas of focus, and the drivers to identify trash.

Table 3-8
Physical Aesthetics Program Participants and Drivers

Known or Suspected Source or Stressor	Areas of Focus	Trash ID Drivers
Chula Vista	Lower Sweetwater HA	Public input and previous monitoring
Port of San Diego		
Chula Vista	Otay Valley HA	Public input, previous monitoring, and ORWMP
Imperial Beach		
Port of San Diego		

Notes:

ORWMP = Otay River Watershed Management Plan

Sources of Pollutants and/or Stressors

There are numerous types of land uses associated with trash generation. Trash can enter waterways by being transported in the storm drain system, through wind action, or by illegal dumping.

Table 3-9 summarize the general types of sources of trash as well as their associated land use(s) identified by the RPs. Table 3-10 summarizes the general types of sources of trash as well their associated land use(s) identified by the RPs in the western portion of the City of Chula Vista, and portions of the City of Imperial Beach and Port of San Diego within the Otay Valley HA. To determine and prioritize potential sources of pollutants or stressors for trash in these areas, likely sources were reviewed on the basis of information collected as part of the 2012 WURMP Annual Report and in the ORWMP.

Table 3-9
Likely Sources of Trash—Lower Sweetwater, HA 909.1

Known or Suspected Source	Land Uses						
	Commercial	Industrial	Municipal	Residential	Parks and Recreation	Open Space	Other ¹
General Retail/ Commercial Areas, including Eating or Drinking Establishments	✓						
General Industrial		✓					
Illegal Dumping	✓	✓	✓	✓	✓	✓	✓
Institutional Facilities							✓
Homeless Encampments					✓	✓	
Municipal Facilities			✓		✓		
Recreational Land Uses/ Open Space					✓	✓	
Residential Areas ²				✓			
Roads and Highways ³			✓				✓

Notes:

1. Other sources are those sources outside of the Responsible Parties' jurisdiction and regulatory authority; see Section 3.1.
2. Port of San Diego does not have residential land uses.
3. Roads and highways are not limited to the Cities of Chula Vista and Imperial Beach, and the Port of San Diego jurisdictions.

Table 3-10
Likely Sources of Trash in Otay Valley, HA 910.2

Known or Suspected Source	Land Uses						
	Commercial	Industrial	Municipal	Residential	Parks and Recreation	Open Space	Other ¹
General Retail/ Commercial Areas, including Eating or Drinking Establishments	✓						
General Industrial		✓					
Illegal Dumping	✓	✓	✓	✓	✓	✓	✓
Institutional Facilities							✓
Homeless Encampments					✓	✓	
Municipal Facilities			✓		✓		
Recreational Land Uses/ Open Space					✓	✓	
Residential Areas ²				✓			
Roads and Highways ³			✓				✓

Notes:

1. Other sources are those sources outside of the Responsible Parties' jurisdiction and regulatory authority; see Section 3.1.
2. Port of San Diego does not have residential land uses.
3. Roads and highways are not limited to the Cities of Chula Vista and Imperial Beach, and the Port of San Diego jurisdictions.

Controllability of Sources of Pollutants and/or Stressors and Source Prioritization

To identify the controllability and prioritize sources of trash in the Lower Sweetwater HA and in the Otay Valley HA, the RPs used a process similar to the method described in Section 3.2 for the Chollas Creek HSA. Because trash is anthropogenic in nature, human activity is always considered the origin of the source of trash.

A thorough assessment of all available trash and source data, drainage areas, and potential locations in high-volume trash-generating areas is needed to fully characterize sources of trash and to feasibly implement partial and full capture trash devices and other trash strategies. The approach for physical aesthetics within the Sweetwater River HA (909.1) and Otay River HA (910.2) may potentially serve as a model that the RPs can use in other areas of their jurisdictions.

Table 3-11 presents the prioritization of identified known and suspected sources of trash in Lower Sweetwater HA (910.1 HA) in the western portion of the City of Chula Vista. Table 3-12 presents the prioritization of identified known and suspected sources of trash in Otay Valley HA (910.1 HA) in the western portion of the City of Chula Vista, and

portions of the City of Imperial Beach and Port of San Diego. High priority sources are presented in boldface font. Sources of trash were ranked by adapting the methodology for metals described in Section 3.2. Recognizing that trash inherently originates from human activity, all sources within the jurisdiction were considered controllable. The final ranking was determined by best professional judgment of the RPs' ability to directly address the predominant sources. In general, commercial land uses tend to generate the highest amounts of trash, which includes shopping centers and eating or drinking establishments. Trash from these areas was considered a high priority source. Residential areas, municipal facilities, and recreational/open space land uses were considered low priority because, in general, they have been found to generate less trash than commercial areas.

Table 3-11
Prioritization of Known and Suspected Sources of Trash
in Lower Sweetwater, HA 909.1

Known or Suspected Source ¹	Controllability Based on Copermittee Jurisdiction	Final Ranking
General Retail/ Commercial Areas, including Eating or Drinking Establishments	Controllable	High
General Industrial Areas	Controllable	Medium
Homeless Encampments ²	Controllable	Medium
Illegal Dumping	Controllable	Medium ²
Institutional Facilities	Controllable	Medium
Municipal Facilities	Controllable	Low
Residential Areas ³	Controllable	Low
Recreational Land Uses/ Open Space	Controllable	Low
Roads and Highways ⁴	Controllable	Medium

Notes:

1. High priority sources are presented in **boldface** font.
2. Recognizing that homeless encampments and illegal dumping are neither fully controllable nor fully uncontrollable, they have been assigned a priority of medium.
3. Port of San Diego does not have residential land uses.
4. Roads and highways are not limited to the Cities of Chula Vista and Imperial Beach, and the Port of San Diego jurisdictions.

Table 3-12
Prioritization of Known and Suspected Sources of Trash
in Otay Valley, HA 910.2

Known or Suspected Source ¹	Controllability Based on Copermittee Jurisdiction	Final Ranking
General Retail/ Commercial Areas, including Eating or Drinking Establishments	Controllable	High
General Industrial Areas	Controllable	Medium
Homeless Encampments ²	Controllable	Medium
Illegal Dumping	Controllable	Medium ²
Institutional Facilities	Controllable	Medium
Municipal Facilities	Controllable	Low
Residential Areas ³	Controllable	Low
Recreational Land Uses/ Open Space	Controllable	Low
Roads and Highways ⁴	Controllable	Medium

Notes:

1. High priority sources are presented in **boldface** font.
2. Recognizing that homeless encampments and illegal dumping are neither fully controllable nor fully uncontrollable, they have been assigned a priority of medium.
3. Port of San Diego does not have residential land uses.
4. Roads and highways are not limited to the Cities of Chula Vista and Imperial Beach, and the Port of San Diego jurisdictions.

3.3.4 Swimmable Waters in HA 910.1

The Focused Priority Condition for 910.1 HA is Swimmable Waters. To determine and prioritize potential sources of indicator bacteria in 910.1 HA, likely sources were reviewed, based on information collected as part of the 2012 WURMP Annual Report. Table 3-13 summarizes the facilities, areas, and activities identified by the RPs as known or suspected sources of pollutants and/or stressors identified for the Focused Priority Condition in HA 910.1.

For bacteria in particular, the source or sources of the indicator bacteria at a beach are often not known for certain because of the complex workings of wind, weather, and water patterns. As discussed in Table 3-13, non-point sources in 910.1 HA may be wild life areas, near-shore intertidal habitats (e.g., seagrass beds), biofilm regrowth, and decaying plant sources. Wildlife areas may include sources from animals such as waterfowl (sea gulls, terns, ducks, etc.) and wildlife (deer, rabbits, squirrels, etc.). Pets (dogs, cats, etc.) have also been identified as potential sources. In addition, recreational open space/parks, swimming, and boat waste discharge are also potential sources.

The Tijuana River flow may also be a potential source of bacteria to beaches in 910.1 HA in both wet and dry weather. However, a Tijuana River dry weather flow diversion and treatment plant was part of a multi-faceted water quality treaty between the United States and Mexico, which has led to significantly improved summer dry beach water

quality along the south county coastline. During wet weather, flows from the sewage-impacted Tijuana River during high volume flows (e.g., during a significant rain event) may continue to impact San Diego beaches from the international border north to Coronado. Tides, wind, near-shore ocean currents and other factors will determine how far north the Tijuana River impacts may extend and potentially affect beaches in 910.1 HA. To identify the controllability and prioritize sources of bacteria in 910.1 HA, the RPs used a process similar to the method described in Section 3.2 for Chollas Creek HSA. Table 3-14 presents the prioritization of identified known and suspected sources of bacteria in 910.1 HA. High priority sources are presented in boldface font.

Table 3-13
Pollutant-Generating Sources and Associated Land Uses—
Swimmable Waters in HA 910.1

Known or Suspected Source	Land Uses						
	Commercial	Industrial	Municipal	Residential	Parks and Recreation	Open Space	Other ¹
Animal Facilities	✓				✓		✓
Eating or Drinking Establishments	✓		✓		✓		
General Retail	✓						
Golf	✓				✓		✓
Nurseries/Greenhouses	✓						✓
Residential Areas ²				✓			✓
Wildlife					✓	✓	
Pet Waste	✓			✓	✓	✓	✓
Homeless Encampments			✓		✓	✓	
Sewage Infrastructure and Activities		✓	✓	✓	✓		
Biofilm Regrowth			✓				✓
Natural/Background Growth in Water					✓		✓
Boat Waste Discharge		✓	✓		✓		✓
Swimming					✓		✓
Groundwater Contribution					✓	✓	✓
Over-irrigation	✓	✓	✓	✓	✓		✓

Notes:

1. Other sources are those sources outside of the RPs' jurisdiction and regulatory authority; see Section 2.3.
 2. Port of San Diego does not have residential land uses.
- ✓ Indicates known or suspected source identified.

Table 3-14
Prioritization of Known and Suspected Sources—
Swimmable Waters in HA 910.1

Known or Suspected Source ¹	Wet or Dry Weather	Controllability Based on Copermittee Jurisdiction	Potential Origin of the Source	Final Ranking
Animal Facilities	Wet	Controllable	Human activity	High
Eating or Drinking Establishments	Wet & Dry	Controllable	Human activity	High
General Retail	Wet & Dry	Controllable	Human activity	Low
Golf	Wet & Dry	Controllable	Human activity	Low
Nurseries/Greenhouses	Wet & Dry	Controllable	Human activity	Medium
Residential Areas ²	Wet & Dry	Controllable	Human activity	Medium
Wildlife	Wet	Not controllable	Natural	Low
Pet Waste	Wet & Dry	Controllable	Human activity	High
Homeless Encampments	Wet & Dry	Controllable	Human body & human activity	Medium ³
Sewage Infrastructure & Activities	Wet & Dry	Controllable	Human body & human activity	High
Biofilm Regrowth	Wet	Controllable	Human activity & natural	Low
Open Space/Recreation Land Uses	Wet	Controllable	Human activity & natural	Low
Natural/Background Growth in Water Land Uses	Wet	Not controllable	Natural	Low
Decaying Plant Sources	Wet	Not controllable	Natural	Low
Boat Waste Discharge	Wet & Dry	Controllable	Human activity	Medium
Swimming	Wet & Dry	Controllable	Human body & human activity	Medium
Groundwater Contribution	Dry	Not controllable	Human activity & natural	Medium ⁴
Over-irrigation	Dry	Controllable	Human activity	Medium

Notes:

1. High priority sources are presented in **boldface** font.
2. Port of San Diego does not have residential land uses.
3. Recognizing that homeless encampments are neither fully controllable nor fully uncontrollable, they have been assigned a priority of medium.
4. RP observations and experience indicates that groundwater can infiltrate the storm drain system and act as a mobilizer and medium for regrowth of bacteria.

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4 Goals, Strategies, and Schedules

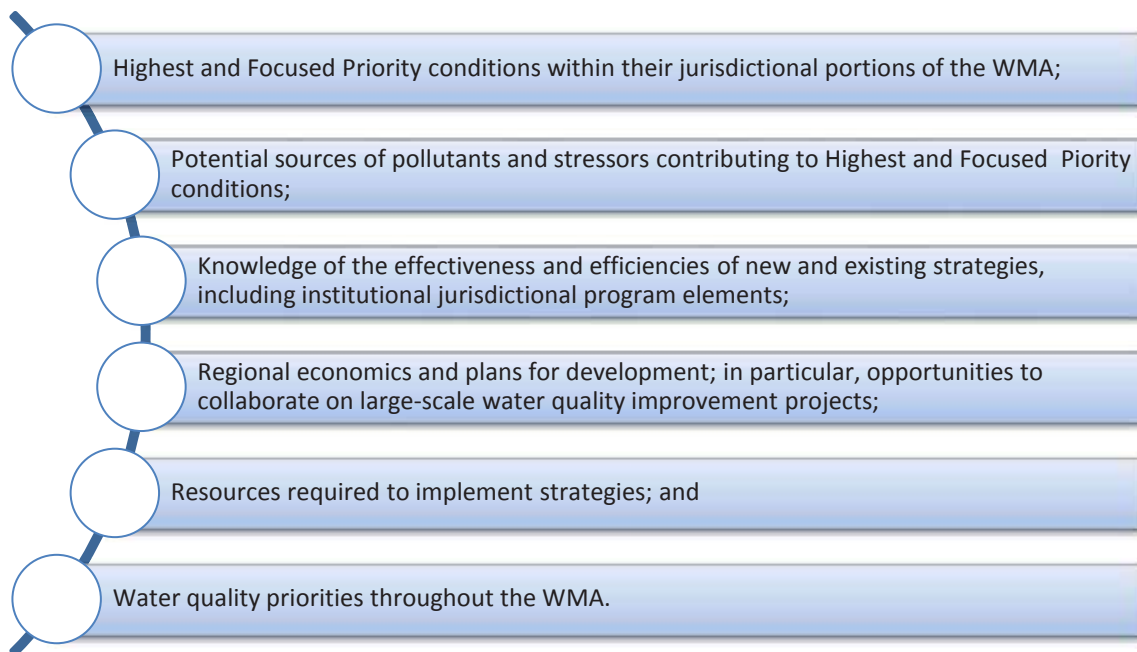
The ultimate goal of the Water Quality Improvement Plan is to prevent MS4 discharges from causing or contributing to beneficial use impairments in the San Diego Bay WMA. Setting specific numeric goals establishes the desired results for the programmatic efforts that the RPs plan to implement. Identifying goals and the means to achieve them is fundamental for demonstrating improvements in water quality in the San Diego Bay WMA. To achieve those goals, RPs must review and implement jurisdictional, watershed, and regional strategies and set schedules for strategy assessment and progress towards meeting the goals.

This section develops numeric goals and schedules for the Highest Priority Conditions and Focused Priority Conditions. Footnote 6 to Municipal Permit Provision II.B.3.a(1) states that interim and final numeric goals for Highest Priority Conditions can “...take on a variety of forms such as TMDL established Water Quality-Based Effluent Limits (WQBELs), action levels, pollutant concentrations, load reductions, number of impaired water bodies delisted from the List of Water Quality Impaired Segments, Index of Biological Integrity (IBI) scores, or other appropriate metrics.” Numeric goals for Focused Priority Conditions can take the form of metrics that may include operational or management performance goals that measure criteria or indicators that align the Focused Priority Conditions, where applicable, with JRMP elements (e.g., existing development and public education). Numeric goals for Focused Priority Conditions can take the form of inspection frequencies, amounts of debris removed, or implementation of BMPs.

4.1 Overview of Goals

Two types of numeric goals are required for each of the Highest Priority Conditions and Focused Priority Conditions: interim and final goals. Final goals provide end-points that mark achievement of desired water quality improvements. Interim goals are benchmarks for program performance and are intended to establish checkpoints along the path toward achieving final goals. Interim goals have been developed for each five-year period following Water Quality Improvement Plan approval until the proposed completion date for the final goal, including an interim goal for the current permit term.

To develop the initial schedule for achieving goals, the RPs considered the following:



Numeric goals have been developed to measure progress toward addressing the Highest Priority Conditions and Focused Priority Conditions. Numeric goals may take a variety of forms, but must quantify a benefit to water quality so that progress toward and achievement of the goals are measurable. Based on the multiple compliance pathways available under Municipal Permit Attachment E.6.b.(3), *Final TMDL Compliance Determination*, each Highest Priority Condition and Focused Priority Condition may include multiple goals, and goals may have multiple criteria or indicators. For example, goals for Highest Priority Conditions may be met in the receiving water, in MS4 discharges, or in several other ways (see Section 3.1). Goals for Focused Priority Conditions may be based on the performance of water quality improvement strategies, on the successful completion of a restoration project, or on other metrics (see Sections 3.2 through 3.7).

The RPs developed collaborative and individual goals to address the sources and stressors within the watershed and with respect to their MS4s. RPs focused on goals that can be addressed collaboratively but assessed individually. Collaborative goals were developed for those Highest Priority Conditions and Focused Priority Conditions with geographic boundaries that extend to multiple jurisdictions. Individual jurisdiction goals may provide the flexibility for jurisdiction-specific strategies and schedules and the framework for a more accurate assessment of progress toward achieving goals within each jurisdiction.

4.2 Strategy Identification and Selection

The RPs will implement strategies to achieve the final and interim goals. A list of strategies was developed by the RPs on the basis of (1) the list of potential strategies developed for the First Interim Deliverable, (2) enhancements to previous JURMP

activities, and (3) public input and discussion with the Consultation Panel. To meet the goals, strategies were selected on the basis of their ability to achieve the following specific objectives:

- Effectively prohibit non-storm water discharges to the MS4;
- Reduce pollutants in storm water discharges from the MS4 to the maximum extent practicable (MEP); and
- Programmatic or institutional best management practices.

Core jurisdictional programs consist of the baseline requirements of Municipal Permit Provision E. These program elements are applied throughout each jurisdiction per Municipal Permit Provision E to protect and enhance water quality. Additional strategies have been developed to address the Highest Priority Conditions and Focused Priority Conditions. The Municipal Permit (Provision B.3.b) requires the RPs to identify strategies that will be implemented in their jurisdictions.

The term “strategies” in the Water Quality Improvement Plan includes, but is not limited to, the following:



During strategy selection, each RP considered the following:

- Ability to target Highest Priority Conditions and Focused Priority Conditions;
- Ability to address additional priorities and conditions (i.e., provide multiple benefits);

- The triple bottom line, which consists of the environmental, economic, and social components and consequences of the strategies; and
- Opportunity to improve and promote cooperation and collaboration among the RPs and other agencies, for example:
 - o Community-based groups in the WMA;
 - o Non-governmental organizations (NGOs);
 - o Developers;
 - o Caltrans;
 - o Water districts, school districts, etc.; and,
 - o Among different departments within each RP agency.

Schedules reflect the time necessary to fully fund, develop, initiate, and complete the strategies. Strategies with relatively high impact and low resource requirements are scheduled earlier. Strategies planned for later years may have implementation requirements that depend on the outcomes of earlier strategies, or may have significant funding needs. Some strategies, especially those that are not linked to TMDL compliance and are scheduled to commence more than five years after Water Quality Improvement Plan approval, may change depending on the results of the near-term strategies. Section 6 describes how the RPs will adaptively manage the strategies on the basis of results and experience.

4.3 Goals for Bacteria and Metals in Chollas Creek HSA (908.22)

Metals and bacteria in Chollas Creek are the Highest Priority Conditions in the San Diego Bay WMA. In addition, specific areas of Chollas Creek and its tributaries have been identified for targeted BMP implementation. The geographic extent of the Highest Priority Conditions is the drainage area of Chollas Creek within the jurisdictional boundaries of the Cities of La Mesa, Lemon Grove, and San Diego, the County of San Diego, the Port of San Diego, and Caltrans within the Pueblo HU. The RPs have identified goals and strategies that will be implemented to address these conditions.

Two TMDLs are in effect for Chollas Creek (Municipal Permit Attachment E):

TMDLs for Dissolved Copper, Lead, and Zinc in Chollas Creek (Metals TMDL); Regional Board Resolution No. R9-2007-0043, approved October 22, 2008; and

The Revised TMDLs for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek) (Bacteria TMDL); Regional Board Resolution No. R9-2010-0001, approved February 10, 2010.

The TMDLs include numeric final and interim goals. The RPs developed additional interim goals to help assess progress on the basis of the understanding that significant improvements in receiving water quality may not be apparent in the short term. The RPs developed goals and strategies both collaboratively and individually to best address the sources and stressors within the watershed and with respect to their MS4s.

Both TMDLs identify receiving water and watershed targets. Water Quality Improvement Plan numeric goals mirror TMDL targets and provide multiple compliance pathways that can be met within the receiving water or within the watershed. Water Quality Improvement Plan numeric goals may be met in one of five ways:

- (1) Meeting receiving water limitations in the receiving water; or
- (2) Demonstrating that the MS4 is not causing or contributing to receiving water exceedances through MS4 discharge compliance with final receiving water limitations; or
- (3) Complying with final effluent limitations for MS4 discharges; or
- (4) Demonstrating that there are no direct or indirect discharges for the MS4s; or
- (5) Implementing an approved Water Quality Improvement Plan that used a watershed model or other watershed analytical tool to identify BMPs required to achieve compliance with the final receiving water or effluent limitations.

Compliance with the Bacteria TMDL may also be met if the RPs can demonstrate that the final receiving water limitations are due to loads from natural sources and pollutant loads from the MS4s are found to not cause or contribute to the exceedances.

The multiple compliance pathways previously discussed allow each RP the flexibility to determine its approach for addressing bacteria and metals and for selection of strategies, based on either the compliance analysis results or other methods, which may include, but does not necessitate, watershed modeling. Watershed models inherently include a degree of uncertainty in the results due to a number of factors, including the availability of long-term data for model calibration, complexity of the watershed, constantly changing weather conditions, irrigation patterns and timing, and dynamic interactions between surface and groundwater components. RPs that used the compliance analysis to guide BMP implementation and as a potential compliance pathway have included the strategies and schedules that provide reasonable assurance that the jurisdiction will meet final receiving water or effluent limitations.

Following adoption of the TMDLs, the RPs developed a CLRP (Chollas Creek TMDL Responsible Parties, 2012) that recommended a number of nonstructural and structural BMPs. A follow-up effort to the CLRP (*ibid.*, 2013), completed in 2013, contained a compliance analysis based on a watershed model to quantify load reductions to support evaluation of TMDL compliance and select the most cost-effective BMP strategy for implementation.

The Municipal Permit states that final and interim compliance with the TMDLs may be met by any one of the compliance pathways presented for each TMDL, as indicated by the “or” between pathways. These goals apply to all jurisdictions in the Chollas Creek HSA, with the exception of Caltrans. Caltrans’ compliance with the Metals TMDL and Bacteria TMDL is assessed using compliance units. Caltrans’ goals are presented in Section 4.3.6. The Water Quality Improvement Plan final and interim goals for wet weather and dry weather are presented in Table 3-1 and Table 3-2, respectively.

Appendix H describes the Chollas Creek Metals TMDL and Bacteria TMDL numeric targets, how the targets were derived, and how the targets were translated into numeric goals for the Water Quality Improvement Plan. During Water Quality Improvement Plan development, the compliance analysis was updated based on the results of the site-specific water effect ratio (WER) evaluation, planned for adoption in 2015. BMP implementation strategies were reevaluated and the modeling quantified the new estimated level of effort required to achieve final and interim load reduction goals. Metals TMDL targets are currently being reviewed by the Regional Board to include a site-specific WER and a revision to the lead water quality objective (WQO) equation. Approval of the site-specific targets and amendment of the Basin Plan (required to update the Chollas Creek Metals TMDL) is anticipated in 2015. The Water Quality Improvement Plan goals include the anticipated Basin Plan amendment. If alternate targets are adopted as part of the Basin Plan amendment, the Water Quality Improvement Plan will be updated accordingly.

In the subsequent sections, each RP also has identified specific goals, referenced as performance measures in Tables 4-1 and 4-2. Performance-based goals are included to measure the short-term jurisdictional progress toward achieving goals given that sustained water quality improvement is typically demonstrated over a longer timeframe. Performance measures are intended to measure an outcome from a strategy or suite of strategies, and provide an interim link to demonstrate reasonable incremental progress in the quality of MS4 discharges and receiving waters.

In addition to strategies that are linked to performance measures, the RPs will continue to implement and revise their JRMPs, which include the RPs’ core compliance program strategies. To make progress toward their identified goals, the RPs may enhance existing JRMP strategies and implement new strategies that concentrate on the Highest and Focused Priority Conditions. The complete plan of strategies is in Appendix I of this Water Quality Improvement Plan and in each of the jurisdictions’ JRMPs.

Sections 4.3.1 through 4.3.6 present the jurisdiction-specific goals and strategies for each RP to address the Highest Priority Conditions in Chollas Creek.

Table 4-1
Wet Weather Numeric Goals for Chollas Creek

Compliance Pathways	Baseline	Assessment Period and Fiscal Year				
		Current Permit Term	FY 16-20	FY 21-25	FY 26-30	FY 31-36
WET WEATHER METALS						
		FY 18	FY 19¹	FY 24	FY 29¹	N/A
MS4 Discharges Allowable % Above Effluent Limitations	Copper	100% exceedance of effluent limitations in FY 09 (Year 1 of TMDL compliance)	See Performance Measures	20%	15%	0%
	Lead					
	Zinc					
OR						
Receiving Water Allowable % Above Receiving Water Limitations	Copper	100% exceedance of receiving water limitations in FY09 (Year 1 of TMDL compliance)	See Performance Measures	0%	0%	
	Lead					
	Zinc					
OR						
# of Direct or Indirect MS4 Discharges to Receiving Water	Number of flowing MS4 outfalls during wet weather monitoring (Monitoring and Assessment Program Section of the Final Water Quality Improvement Plan)	See Performance Measures	0	0	0	
		OR				

Notes:

1. Denotes TMDL final and interim target. Alternative interim compliance dates are presented.
2. The County of San Diego has selected alternative interim schedules and goals for compliance with the Bacteria TMDL. The County will meet the goal in FY 29. See Section 4.3.4.1 for County of San Diego final and interim goals.
3. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the RAs by maintaining the existing wet weather exceedance frequency.
4. Total coliform effluent limitations only apply to MS4 outfalls that discharge to the Chollas Creek mouth.
5. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.

% = percent; FY = fiscal year; WER = Water-Effect Ratio; WQO = Water Quality Objective

Table 4-1 (continued)
Wet Weather Numeric Goals for Chollas Creek

Compliance Pathways		Baseline	Assessment Period and Fiscal Year				
			Current Permit Term	FY 16-20	FY 21-25	FY 26-30	FY 31-36
			FY 18	FY 19 ¹	FY 24	FY 29 ¹	N/A
Implement Accepted Water Quality Improvement Plan Strategies to Reduce MS4 Discharges Will Result in % Load Reduction (Using WER Update 2014)	Metric for compliance analysis is MS4 discharge % load reduction. Interim compliance is implementation of strategies and schedule based on analysis results (Appendix I). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment.						
	Copper	0% Load Reduction (2003 TMDL Model)	See Performance Measures	0%	0%	0%	0%
	Lead			0%	0%	0%	
	Zinc			23.3%	24.7%	29.1%	
WET WEATHER INDICATOR BACTERIA							
			FY 18	FY 19	FY 24 ^{1, 2}	FY 29 ²	FY 31 ¹
Receiving Water % Days Exceeding WQO	Fecal coliform	60% Days Exceeding WQO (2002 TMDL Model)	See Performance Measures	60% ³	41%	32%	22%
	Enterococcus	63% Days Exceeding WQO (2002 TMDL Model)		63% ³	43%	33%	22%
OR							

OR

Notes:

1. Denotes TMDL final and interim target. Alternative interim compliance dates are presented.
2. The County of San Diego has selected alternative interim schedules and goals for compliance with the Bacteria TMDL. The County will meet the goal in FY 29. See Section 4.3.4.1 for County of San Diego final and interim goals.
3. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the RAs by maintaining the existing wet weather exceedance frequency.
4. Total coliform effluent limitations only apply to MS4 outfalls that discharge to the Chollas Creek mouth.
5. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.

% = percent; FY = fiscal year; WER = Water-Effect Ratio; WQO = Water Quality Objective

Table 4-1 (continued)
Wet Weather Numeric Goals for Chollas Creek

Compliance Pathways			Baseline	Assessment Period and Fiscal Year				
				Current Permit Term	FY 16-20	FY 21-25	FY 26-30	FY 31-36
MS4 Discharges % Load Reduction	Fecal coliform <i>Enterococcus</i> Total coliform ⁴	0% Load Reduction (2002 TMDL Model)	OR	FY 18	FY 19	FY 24 ^{1,2}	FY 29 ²	FY 31 ¹
				See	5%	15%	26%	29%
				Performance Measures	4%	12%	20%	24%
					3%	9%	15%	18%
MS4 Discharges % Days Exceeding WQO	Fecal coliform <i>Enterococcus</i> Total coliform ⁴	Historical MS4 wet weather data will be used to identify the baseline in the first annual report	OR	See	22%	22%	22%	22%
				Performance Measures	22%	22%	22%	22%
					22%	22%	22%	22%
# of Direct or Indirect MS4 Discharges to Receiving Water		Number of flowing MS4 outfalls during wet weather monitoring (Monitoring and Assessment Program Section of the Final Water Quality Improvement Plan)	OR	See	0	0	0	0
				Performance Measures				

Notes:

1. Denotes TMDL final and interim target. Alternative interim compliance dates are presented.
2. The County of San Diego has selected alternative interim schedules and goals for compliance with the Bacteria TMDL. The County will meet the goal in FY 29. See Section 4.3.4.1 for County of San Diego final and interim goals.
3. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the RAs by maintaining the existing wet weather exceedance frequency.
4. Total coliform effluent limitations only apply to MS4 outfalls that discharge to the Chollas Creek mouth.
5. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
% = percent; FY = fiscal year; WER = Water-Effect Ratio; WQO = Water Quality Objective

Table 4-1 (continued)
Wet Weather Numeric Goals for Chollas Creek

Compliance Pathways		Baseline	Assessment Period and Fiscal Year				
			Current Permit Term	FY 16-20	FY 21-25	FY 26-30	FY 31-36
% of Exceedances of Final Receiving Water WQOs due to Natural Sources ⁵	Fecal coliform	Not available	FY 18	FY 19	FY 24 ^{1,2}	FY 29 ²	FY 31 ¹
	<i>Enterococcus</i>		100%	100%	100%	100%	100%
	OR		100%	100%	100%	100%	100%
Implement Accepted Water Quality Improvement Plan	Metric for compliance analysis is MS4 discharge % load reduction. Interim compliance is implementation of strategies and schedule based on analysis results (Appendix I). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment.						

Notes:

1. Denotes TMDL final and interim target. Alternative interim compliance dates are presented.
2. The County of San Diego has selected alternative interim schedules and goals for compliance with the Bacteria TMDL. The County will meet the goal in FY 29. See Section 4.3.4.1 for County of San Diego final and interim goals.
3. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the RAs by maintaining the existing wet weather exceedance frequency.
4. Total coliform effluent limitations only apply to MS4 outfalls that discharge to the Chollas Creek mouth.
5. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances. % = percent; FY = fiscal year; WER = Water-Effect Ratio; WQO = Water Quality Objective

Table 4-2 (continued)
Dry Weather Numeric Goals for Chollas Creek

Compliance Pathways		Baseline	Assessment Period and Fiscal Year	
			Current Permit Term	FY 16-20
# of Direct or Indirect MS4 Discharges to Receiving Water		Number of persistently flowing major MS4 outfalls provided in the Monitoring and Assessment Program Section of the Final Water Quality Improvement Plan	See Performance Measures	0
		OR		
% of Exceedances of Final Receiving Water WQOs due to Natural Sources ⁵	Fecal coliform	Not Available	100%	100%
	<i>Enterococcus</i>			
		OR		
Implement Accepted Water Quality Improvement Plan	Metric for compliance analysis is MS4 discharge % load reduction. Interim compliance is implementation of strategies and schedule based on analysis results (Appendix I). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment.			

Notes:

1. Denotes TMDL final and interim target. Alternative interim compliance dates are presented.
2. The existing exceedance frequency was calculated on the basis of available monitoring data between 1996 and 2002 per Municipal Permit requirements and presented in more detail in Appendix H.
3. The County of San Diego has selected an alternative interim schedule for compliance with interim Chollas Creek Bacteria TMDL targets. The County will meet the goal in FY 20.
4. Total coliform effluent limitations only apply to MS4 outfalls that discharge to the Chollas Creek mouth.
5. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.

4.3.1 City of La Mesa

City of La Mesa (La Mesa) jurisdiction-specific goals are presented in Section 4.3.1.1. The key strategies identified to address the Highest Priority Conditions in La Mesa's jurisdiction are in Section 4.3.1.2. Most of La Mesa's jurisdiction that drains to Chollas Creek is south of Interstate 8. Therefore, the southern half of La Mesa is the area that will be targeted by strategies to meet the final and interim goals. In Chollas Creek, a compliance analysis using a watershed model was conducted to identify the strategies required to be implemented to meet final goals. The strategies and implementation schedules identified demonstrate that numeric goals will be met. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the compliance analysis will be updated as needed to provide assurance that numeric goals will be met.

4.3.1.1 Goals and Schedules

In addition to the TMDL-derived goals applicable to La Mesa in Tables 4-1 and 4-2, jurisdiction-specific interim Water Quality Improvement Plan wet and dry weather goals are presented in Table 4-3. Performance-based goals are included to measure the short-term jurisdictional progress toward achieving goals, given that monitoring is required to demonstrate sustained water quality improvement over time.

Table 4-3
Goals for Chollas Creek (Wet and Dry Weather) – City of La Mesa

Performance Measure for Key First Permit Term Strategies		Assessment Period and Fiscal Year
		Current Permit Term
PERFORMANCE MEASURE – WET AND DRY WEATHER		
Performance Metrics		FY 18
Design, Construct, and Maintain Low-Impact Development (LID) Retrofits	Linear Feet	Approximately 4,540 linear feet of bioretention areas will replace impervious asphalt along University Avenue between La Mesa Boulevard and Harbison Avenue.

4.3.1.2 Summary of Strategies and Schedules

La Mesa has selected jurisdictional strategies that best suit the topography and characteristics of its jurisdiction to comply with Municipal Permit requirements. A complete list of strategies planned for implementation within the WMA is provided in Appendix I. The following is a summary of the implementation approach and key strategies that have been identified to address the Highest Priority Condition in La Mesa's jurisdiction within the Chollas Creek HSA. Figure 4-1 shows La Mesa's jurisdiction within the Chollas Creek Highest Priority Condition where the strategies will be implemented.

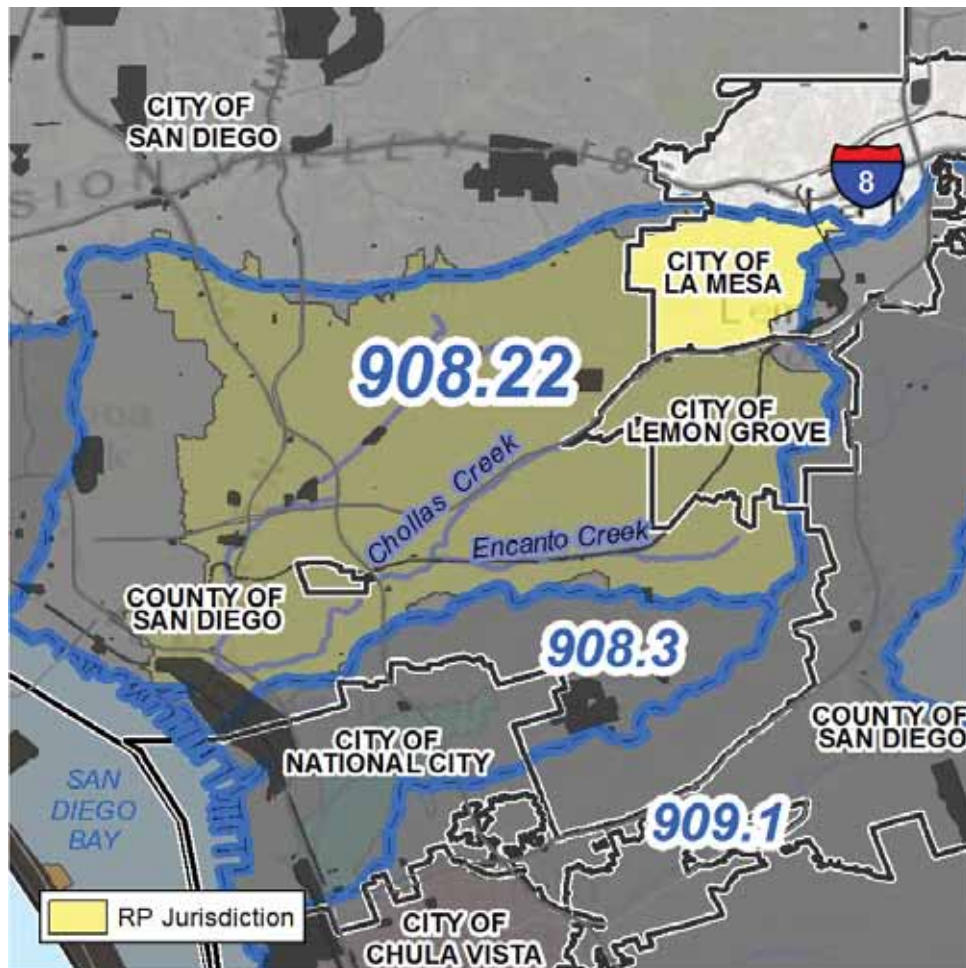


Figure 4-1

La Mesa's Jurisdiction Within the Chollas Creek Highest Priority Condition

Optional strategies that will be considered upon need and as resources are available are also summarized. In Chollas Creek, a compliance analysis using a watershed model was conducted to identify the strategies required to be implemented to meet final goals. The strategies and implementation schedules identified demonstrate that numeric goals will be met. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the compliance analysis will be updated as needed to provide assurance that numeric goals will be met.

To address bacteria, metals, and other pollutants in MS4 discharges in wet and dry weather, La Mesa plans to implement or continue public area enhancements, including low-impact development retrofit projects in roadway medians, sanitary sewer infrastructure replacement, and enhanced operation and maintenance activities for MS4 infrastructure and public roadways, such as installing trash capture devices in catch basins.

Specifically, La Mesa has been awarded a grant from the State Water Resources Control Board Proposition 84 Storm Water Grant Program for the University Avenue Median Water Quality Improvement project to remove and replace impervious medians with pervious bioretention areas that will reduce pollutant discharges to receiving waters. In addition, a major effort to prevent bacteria from entering the receiving water is planned. Aging sewer infrastructure within the flood plain will be removed and relocated to reduce the potential for sewer leaks and breaks.

To reduce pollutants from private land uses, La Mesa is planning to expand the commercial facility and construction site inspection program and increase public education and outreach. High priority commercial businesses may be inspected twice per year, while high priority construction sites will be inspected twice per week. La Mesa has a robust education and outreach program that includes collaboration with the Environmental Sustainability Commission, which targets residents and commercial business owners. Educational activities include supporting Eagle Scout groups in their efforts to build information kiosks to provide information about pet waste and trash pickup and other park rules.

Table 4-4 summarizes La Mesa's strategies and schedules for the Chollas Creek HSA.

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Table 4-4
Summary of Strategies for Chollas Creek – City of La Mesa

Strategy	Jurisdictional Areas		Priority Conditions				Implementation Schedule						
	Jurisdiction-Wide	Chollas	Trash	Bacteria	Nutrients	Metals	Previous Fiscal Year(s)	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Future Fiscal Year(s)
University Avenue median water quality improvements		X	X	X	X	X			X				
Sanitary sewer infrastructure replacement	X	X		X	X				X				
MS4 infrastructure and outfall operation and maintenance	X	X	X	X	X	X				X	X	X	X
Enhanced street sweeping	X	X	X	X		X				X	X	X	X
Installation of trash capture devices on catch basin inlets	X	X	X						X				
Inspection programs	X	X	X	X	X	X	X	X	X	X	X	X	X
Education and outreach	X	X	X	X	X	X		X	X	X	X	X	X
Monitoring		X				X	X	x	X	X	X	X	X
Optional Jurisdictional Strategies													
Collaborate with homeowners' associations	X		X	X	X								
Participate in a regional social services effort for homelessness	X		X	X									
Implement sweeping and maintenance of private roads and parking lots in targeted areas			X	X		X							
Replace La Mesa-owned vehicle brake pads with copper-free brake pads as they become commercially available						X							
Implement other green infrastructure projects			X	X	X	X							
See Appendix I for criteria for initiating strategies													

See Appendix I for criteria for initiating strategies

Note:
Implementation of strategies is dependent on approval of fiscal budgets and available resources.

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4.3.2 City of Lemon Grove

The City of Lemon Grove's (Lemon Grove) jurisdiction within the Chollas Creek HSA is relatively small and includes a mixture of residential, light industrial, and commercial developments. Industrial and commercial development is primarily concentrated along Federal Boulevard and Broadway. Lemon Grove primarily discharges to the south fork of Chollas Creek.

Like the other jurisdictions in the Chollas Creek HSA, Lemon Grove is subject to TMDLs for metals and bacteria, and these pollutants are also the relevant Highest Priority Condition. Monitoring data from the last three monitoring years at Lemon Grove's jurisdictional boundary has shown metals levels below the TMDL final targets. The City's dry weather MS4 outfall monitoring program has determined that there is only one site in the City with persistent flow, and the rest of the sites are dry. The City has taken this data into account when developing its strategies, as discussed in more detail in Section 4.3.2.2. Goals and strategies for the current Municipal Permit term focus dry weather implementation on the reduction of irrigation runoff, beginning with municipal facilities as an example of BMP implementation. Goals and strategies for wet weather during the current Municipal Permit term also focus on municipal facilities, including installation of downspout disconnections and enhanced street sweeping, as well as the continuation of a robust inspection program targeting restaurants to reduce bacteria loading.

Lemon Grove's jurisdiction-specific Water Quality Improvement Plan goals are presented in Section 4.3.2.1. The key strategies identified to address the Highest Priority Condition in Lemon Grove's jurisdiction are presented in Section 4.3.2.2. Strategies and implementation schedules were identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. The strategies selected represent actions and activities that Lemon Grove has seen success in implementing on the basis of monitoring results that have shown progress in improving water quality, as discussed in more detail in Section 4.3.2.2. Lemon Grove expects that further implementation of these strategies will attain TMDL final and interim receiving water or effluent limitations. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the Water Quality Improvement Plan will be updated. The implementation of each strategy will be contingent upon annual budget approvals and funding availability.

4.3.2.1 Goals and Schedules

In addition to the TMDL-derived goals applicable to Lemon Grove in Tables 3-1 and 3-2, jurisdiction-specific interim Water Quality Improvement Plan wet and dry weather goals are presented in Table 4-5. Performance-based goals are included to measure the short-term jurisdictional progress toward achieving goals, given that monitoring is required to demonstrate sustained water quality improvement over time.

Table 4-5
Current Municipal Permit Term Goals for Chollas Creek – City of Lemon Grove

Performance Measures for Key First Permit Term Strategies		Current Permit Term (FY 14 – FY 18)
		FY 18
PERFORMANCE MEASURES – WET WEATHER		
Reduction in Bacteria	Restaurant Used Cooking Oil Bins Stored in Covered Areas Protected from Run-On	75 percent (%) ¹
OR		
Municipal Facility Retrofits for Reduction of Bacteria and Metals	Redirect parking lot runoff to pervious area	2 municipal facilities retrofitted (drainage area/facility to be determined (TBD) during site selection in FY 16)
	Redirect Roof Downspouts to Pervious Area	2 municipal facilities retrofitted (drainage area/facility TBD during site selection in FY 16)
PERFORMANCE MEASURES – DRY WEATHER		
Non-Storm Water Flow Reduction Programs	Install smart irrigation systems at municipal facilities	8 Cal-Sense smart irrigation systems installed

Note:

1. These data have not been directly recorded in past inspection programs. The City's current BMP requirements state that bins must be kept clean but do not always require coverage. Based on discussion with inspection staff, it is estimated that about 20-30% of used oil cooking bins are stored in covered areas protected from run-on.

4.3.2.2 Summary of Strategies and Schedules

Lemon Grove has selected jurisdictional strategies that best suit the topography and characteristics of its jurisdiction to comply with Municipal Permit requirements. A complete list of strategies planned for implementation within the WMA is provided in Appendix I. The following is a summary of the implementation approach and key strategies that have been identified to address the Highest Priority Conditions in Lemon Grove's jurisdiction within the Chollas Creek HSA. Figure 4-2 shows the portion of Lemon Grove's jurisdiction that drains to Chollas Creek, which is where the strategies will be implemented.

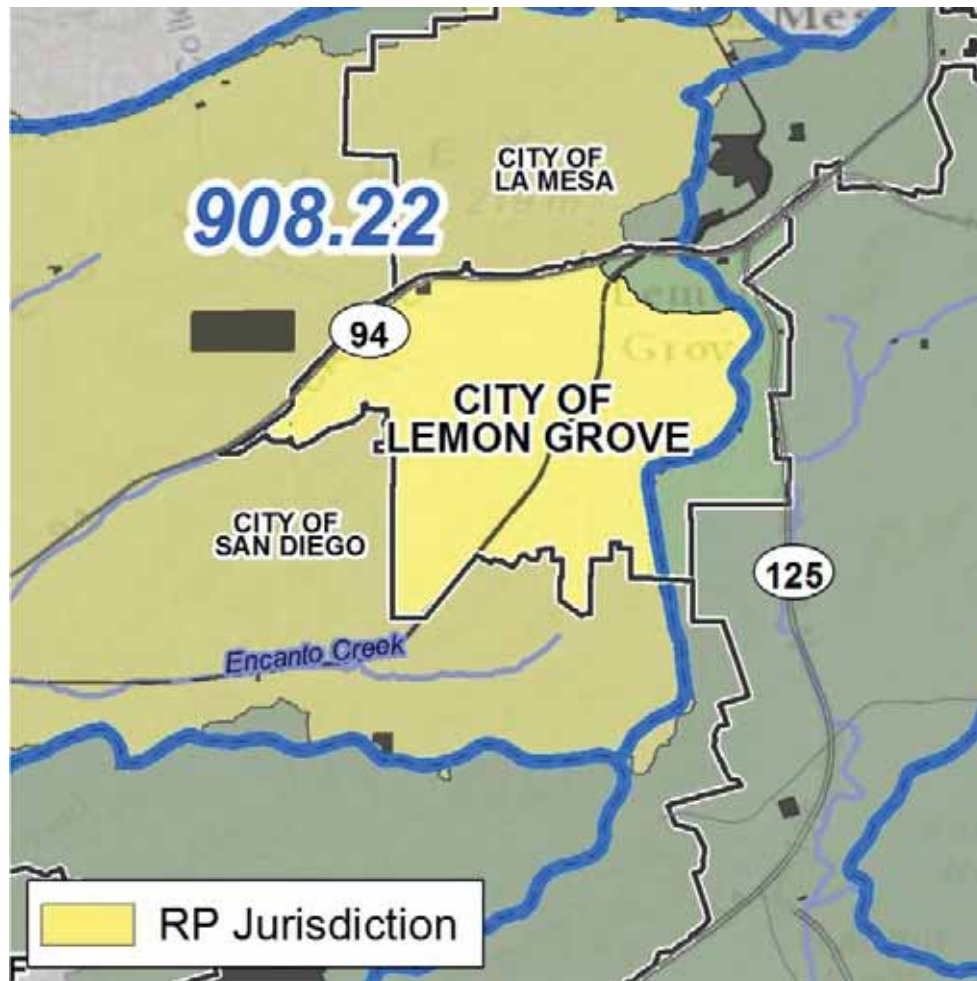


Figure 4-2
Lemon Grove's Jurisdiction Within the Chollas Creek HSA

Strategy Selection Process Overview

As part of the process of selecting strategies, the City of Lemon Grove has evaluated modeling results and water quality monitoring data. Modeling done for the entire watershed as part of the CLRP suggests that metals, particularly copper, must be reduced by just over 73 percent to meet the TMDL compliance targets. However, the modeled load reduction was calculated on the basis of the entire watershed, not specifically Lemon Grove. Water quality monitoring data collected in the receiving water body just downstream of Lemon Grove's jurisdictional boundary from 2011 through 2014 has consistently shown metals—copper, lead, and zinc—levels below the TMDL targets (City of San Diego et al, 2012; 2013, 2014). Metals TMDL compliance monitoring farther downstream at the south fork of Chollas Creek monitoring station demonstrates compliance with receiving water limitations for the 2012-2013 storm season (City of San Diego et al, 2013). Both of these sets of results are based on the default WER value of 1.0. If the proposed higher WERs are adopted, the City of Lemon Grove's data would be even farther below the regulatory limits. While the City of Lemon Grove does not consider the existing data set to show a long enough history that metals

should no longer be a Highest Priority Condition for Lemon Grove at all, the data does suggest that the City's programs have been working and that the large amount of additional structural BMP implementation proposed in the CLRP is likely not necessary to meet metals compliance targets.

The City of Lemon Grove's initial focus for bacteria is on dry weather contributions, for which the TMDL numeric target deadlines arrive sooner than for the wet weather targets. The City of Lemon Grove has been taking action to reduce dry weather flow for several years and now has only one persistently flowing outfall. The remainder of the City's outfalls have been dry. The City's actions to reduce dry weather bacteria levels will primarily target the drainage area for the persistently flowing outfall, which encompasses a large area of the City along Broadway, plus a portion along Federal Boulevard.

While a relatively robust Lemon Grove-specific data set is in place for dry weather flow and for metals, somewhat less information is available for wet weather bacteria. Considering the gap between the metals load reduction suggested by the CLRP modeling effort and actual monitoring data at Lemon Grove's jurisdictional boundary, it is possible that the level of wet weather bacteria reduction proposed in the CLRP is also not representative of the conditions specific to Lemon Grove. During the current Municipal Permit term, the City will begin with non-structural strategies that target known sources of bacteria, such as grease bin and trash storage areas at restaurants. As more bacteria data becomes available and as the wet weather bacteria requirements are further clarified via the bacteria TMDL reopener process, Lemon Grove will be able to better define the level of structural strategies that may be necessary to meet TMDL compliance targets for bacteria in wet weather conditions. For this reason, most structural BMPs targeted at wet weather bacteria levels are currently listed as optional strategies in Appendix I.

Discussion of Specific Strategies

To address bacteria, metals, and other pollutants in MS4 discharges in wet weather during the current Municipal Permit term, Lemon Grove will concentrate efforts on areas of existing development. Targeted municipal operation and maintenance activities include street sweeping using more efficient equipment (e.g., vacuum-assisted street sweepers) at increased frequencies in commercial areas. Lemon Grove municipal property will also serve as demonstration projects for the implementation of storm water retrofits. City Hall and Civic Center Park will be evaluated for potential retrofits, such as downspout disconnects and routing storm water from parking lots to landscaped areas. As commercial and industrial facilities are inspected, they will also be evaluated for their potential to discharge high priority pollutants and for potential retrofit opportunities. Retrofit opportunities evaluated during the inspections include disconnecting downspouts, converting landscape to xeriscape, directing runoff from paved areas to landscaped areas, and installing rain barrels. The commercial inspection program will further specifically target eating and drinking establishments that store used cooking oil. Used cooking oil storage areas have been identified as a potential source of bacteria during past inspection programs. Lemon Grove will work with its food service

establishments so that businesses store oil indoors or in covered areas, reducing the potential for leakage and bacteria discharge during wet weather. Lemon Grove will work with grease rendering companies to provide education and indoor grease containers to business owners free of charge.

Dry weather issues are addressed similarly by implementing projects on public property and encouraging implementation of similar techniques on private property. Because irrigation runoff is often a major transport mechanism for bacteria and other pollutants to the MS4 and receiving waters during dry weather conditions, many of Lemon Grove's strategies will target irrigation runoff in existing development. Lemon Grove will facilitate residential and commercial landscaping retrofits and other outdoor water conservation behaviors through collaboration with Helix Water Department. This effort will also include increasing awareness about landscaping and sprinkler system retrofit incentive programs available to residents and businesses. Recognizing that Lemon Grove can further encourage private water conservation efforts by demonstrating its own commitment to water conservation, Lemon Grove will continue to convert additional road median landscaping to drip irrigation and will install Cal-Sense smart irrigation systems at municipal facilities such as parks. Through these efforts, Lemon Grove's goal is two-fold: (1) improve water conservation, which is especially important in ongoing drought conditions, and (2) reduce dry weather flows in its storm drain system.

Lemon Grove's complete list of strategies is provided in Appendix I. Optional strategies that will be considered upon need and as resources are available are also listed in Appendix I. Strategies and implementation schedules were identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the Water Quality Improvement Plan will be updated. The implementation of each strategy will be contingent upon annual budget approvals and funding availability.

Table 4-6 summarizes Lemon Grove's strategies and schedules for the Chollas Creek HSA.

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Table 4-6
Summary of Strategies for Chollas Creek – City of Lemon Grove

Strategy	Jurisdictional Areas	Priority WQCs				Implementation Schedule						
	Jurisdiction-Wide	Trash	Bacteria	Nutrients	Metals	Previous Fiscal Year(s)	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Future Fiscal Year(s)
Municipal irrigation control systems	X		X	X	X	X	X	X	X	X	X	X
Retrofit requirements	X	X	X	X	X	X	X	X	X	X	X	X
Pilot projects and studies of downspout disconnects and other retrofits	X		X	X	X		X	X	X	X	X	X
Street sweeping	X	X	X	X	X	X	X	X	X	X	X	X
Inspection programs	X	X	X	X	X		X	X	X	X	X	X
Monitoring	X				X	X	X	X	X	X	X	X
Optional Jurisdictional Strategies												
Participate in a regional social services effort for homelessness	X	X	X									See Appendix I for criteria for initiating strategies.
Enhance catch basin cleaning	X	X	X		X							
Inspect businesses for irrigation runoff during non-daytime hours	X		X	X								
Evaluate feasibility of rehabilitation projects	X	X	X	X	X							
Implement green street retrofits	X	X	X	X	X							
Implement additional structural BMPs to reduce wet weather bacteria	X		X									

Note:
Implementation of strategies is dependent on approval of fiscal budgets and available resources.
WQC = Water Quality Condition

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4.3.3 City of San Diego

The City of San Diego's (San Diego) jurisdiction includes dense population and increased impervious land use types. Strategies such as education and outreach targeting irrigation runoff, rebate and incentive opportunities for rain barrels and downspout disconnections, and pilot green infrastructure projects and treatment basins are considered across San Diego's jurisdiction. San Diego's strategies are calibrated to meet the Water Quality Improvement Plan numeric goals for the TMDLs in Chollas Creek. In addition, many of the strategies are implemented across San Diego's jurisdiction throughout the WMA and will provide benefits to other Priority Conditions.

The San Diego jurisdiction-specific goals are presented in Section 4.3.3.1. A summary of strategies to address the Highest Priority Conditions in San Diego's jurisdiction are presented in Section 4.3.3.2. A complete list of strategies planned for implementation within the WMA is provided in Appendix I.

4.3.3.1 Goals and Schedules

In addition to the TMDL-derived goals applicable to San Diego presented in Tables 4-1 and 4-2, jurisdiction-specific interim Water Quality Improvement Plan wet and dry weather goals are presented in Table 4-7. Performance-based goals are included to measure the short-term jurisdictional progress toward achieving goals given that monitoring is required to demonstrate sustained water quality improvement over time.

Table 4-7
Goals for Chollas Creek (Wet and Dry Weather) – City of San Diego

Suite of Strategies to Measure Performance during First Permit Term	Baseline	Assessment Period
		Current Permit Term (FY 14-FY 18)
		FY 18
Develop a green infrastructure policy, attain City Council approval, and construct green infrastructure BMPs to improve water quality during wet and dry weather	0 acres treated in 2002, the year used as baseline in the Bacteria TMDL	44.6 acres of drainage area treated through construction of 6 green infrastructure BMPs ¹
Implement runoff reduction programs that include targeted education and outreach efforts, enhanced inspections, additional rebate programs ² , and increased enforcement	Historical dry weather monitoring data will be used to establish a baseline in the first Water Quality Improvement Plan annual report	10% prohibited ³ dry weather reduction in flow from baseline measured at persistently flowing outfalls in the WMA

Notes:

1. The 44.6 acres of drainage area treated are associated with three (3) of the six (6) GI projects that will complete by FY 18: (1) bioretention and curbside filtration units at 43rd and Logan draining 6.49 acres, (2) bioretention at Southcrest Park on Newton Avenue, west of 43rd, draining 36 acres, and (3) bioretention at Beta Street draining 2.1 acres. At this time, three (3) of the GI projects have not been designed or do not have a drainage area quantified: (1) vegetated filter strips and swale at North 252 Corridor Park, located at I-5 and Rigel Street, (2) biofiltration planters and porous pavers at Southeast Family Resource Center, and (3) permeable pavement at Central Region Public Health Center. As such, the total drainage treatment area will be greater than 44.6 acres by FY 18.
2. City of San Diego rebates include grass replacement, rainwater harvesting, downspout disconnect, and micro-irrigation.
3. Does not include allowable discharges as defined in Provision A and Provision E.2.a of the Municipal Permit.

4.3.3.2 Summary of Strategies and Schedules

San Diego has identified administrative policies, urban development management programs, and innovative pilot projects, and is investing in research for site locations for green infrastructure and other treatment BMPs throughout its jurisdiction in multiple watersheds. San Diego has identified water quality improvement strategies that are expected to provide the greatest benefits to the watershed and its residents, businesses, and communities within San Diego's jurisdictional boundaries. San Diego is currently developing a framework to evaluate other⁶ potential benefits that the recommended strategies may provide beyond improved water quality. These other benefits may be financial, environmental, or societal. The recommended strategies will be evaluated on the basis of the number of other benefits they may provide, and could guide future updates to the Water Quality Improvement Plan.

The strategies have also been selected on the basis of the compliance analysis initially completed for the CLRP Phase I and Phase II efforts and were recently updated during Water Quality Improvement Plan development. The CLRP Phase II report provided BMP modeling and cost-optimization analysis to quantify the most cost-effective strategies to reach TMDL compliance (City of San Diego, 2013). Recent updates to the compliance analysis considered a site-specific WER and an update to the estimated load reductions achieved from a larger suite of nonstructural strategies. Section 4.3.3.2.1 presents example strategies selected by San Diego to meet the Water Quality Improvement Plan final and interim goals. Section 4.3.3.2.2 presents the compliance analysis modeling results for each strategy category in terms of percent load reductions. This section also presents graphical summaries of load reductions expected over the compliance period. Appendix I provides the implementation date for each strategy.

4.3.3.2.1 Example Strategies

Example strategies to address the Highest Priority Conditions in San Diego's jurisdiction within Chollas Creek, as well as other priorities throughout San Diego's jurisdiction, are summarized below. Figure 4-3 shows San Diego's jurisdiction within the Chollas Creek Highest Priority Condition where the strategies will be implemented.

⁶ Other benefits refer to outcomes of a strategy beyond water quality improvements. Other benefits can include reduced air pollution, increased water conservation, aesthetics-induced property value increases, and increased business investments.

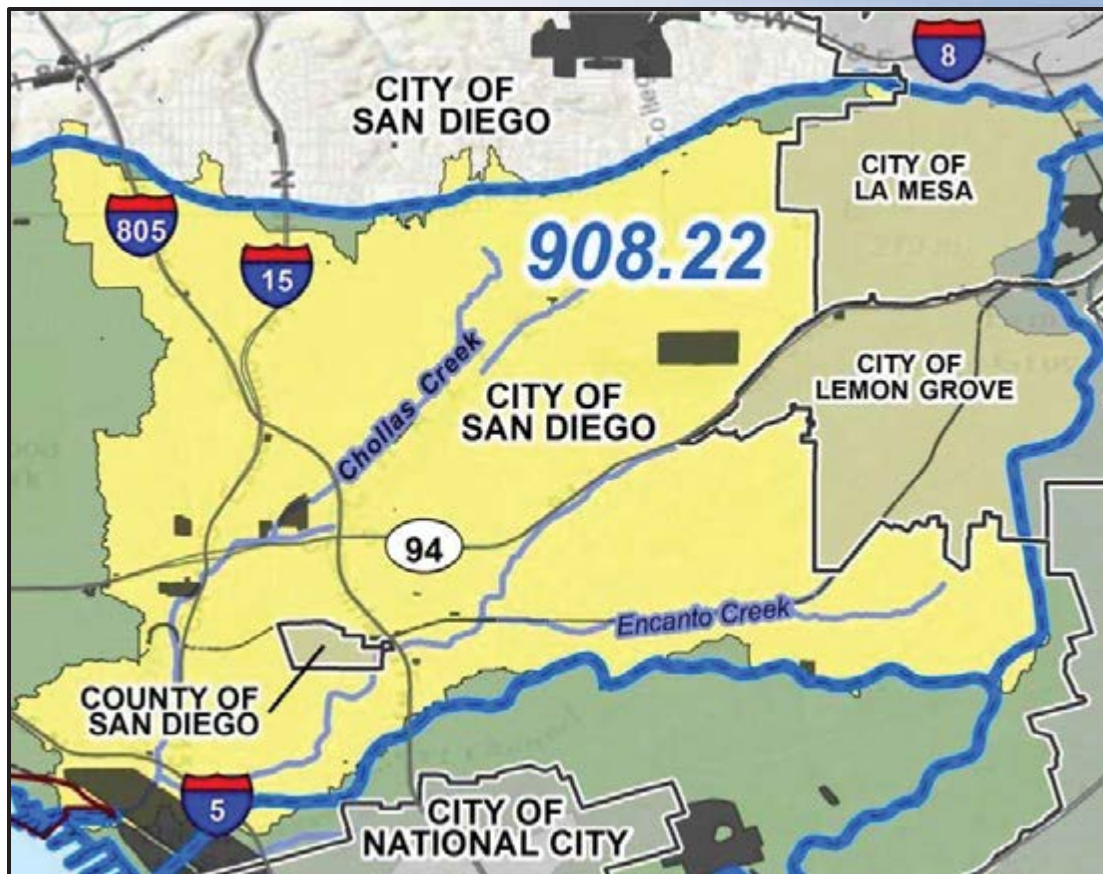


Figure 4-3
San Diego's Jurisdiction Within the Chollas Creek Highest Priority Condition

A complete list of strategies to be implemented within the WMA is provided in Appendix I. In Chollas Creek, a compliance analysis using a watershed model was conducted to identify the strategies required to be implemented to meet final and interim goals. The strategies and implementation schedules identified in Appendix I demonstrate that numeric goals will be met on the basis of that analysis. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies, if necessary. If strategies are modified, the compliance analysis will be updated as needed to provide assurance that numeric goals will be met. These strategies will be implemented by San Diego; they are not intended to be implemented by private entities (e.g., development, business, industry, etc.). However, some of San Diego's strategies, such as development planning, may have implications for private entities.

San Diego will address discharges of metals, bacteria, and other pollutants through activities on public land across its jurisdiction. The following example strategies provide multiple benefits by addressing the Highest Priority Conditions of metals and bacteria, and also other water quality pollutants such as trash and sediment. During dry weather, implementation will focus on the reduction of irrigation runoff.

Development Planning – Development and Implementation of a Green Infrastructure Policy and Program

San Diego will begin developing a policy in Fiscal Year (FY) 16 that will require inclusion of green infrastructure features on all suitable projects, including non-Stormwater Mitigation Plan for Land Development and Public Improvement Projects (Standard Urban Stormwater Mitigation Plan [SUSMP]) projects. This policy will be coordinated with ongoing efforts to update San Diego design manuals and low-impact development (LID) design standards for public LID BMPs. The program will begin with research and recommendations for appropriate green infrastructure project siting and prioritization methods within San Diego. By FY 18, San Diego will complete construction of green infrastructure and/or green streets projects as detailed in San Diego's corresponding structural strategies.

Enhanced Street Sweeping

To target metals and sediment, San Diego plans to enhance street sweeping operations by sweeping additional miles of curb and gutter and using more efficient equipment. Over time, replacement of street sweeping equipment with high-efficiency Regen-Air and vacuum-assisted sweepers is expected to further increase load reductions (even if current sweeping routes and frequencies remain unchanged). Sweeping will also be initiated for median areas that are not currently subject to regular sweeping.

Enhanced Catch Basin Cleaning

To increase pollutant load removal, catch basins will be cleaned four times per year during the wet weather season, if feasible, to target metals and sediment in the Chollas Creek HSA. Currently, the catch basins are cleaned one time per year. San Diego's catch basin cleaning pilot study found that major pollutants vary from neighborhood to neighborhood (yard waste versus trash and sediment). Future catch basin cleaning practices may be adapted as a result of better record keeping and data analysis.

Existing Development – Enhanced Property-Based Inspection Program

To address bacteria and metals, by FY 16, San Diego plans to administer, as part of their existing development program, an enhanced property-based inspection program. The enhanced property-based inspection program is intended to increase the number of discharges prevented through property-based inspections and increased minimum BMP implementation. San Diego has conducted an extensive multi-year pilot study of its business inspection program and has found that more discharges were discovered and abated by inspecting large properties rather than individual businesses. For example, instead of inspecting one restaurant in a strip-mall, the entire strip-mall would be inspected as one property. Enhanced property-based inspections will be conducted at appropriate frequencies and using appropriate methods such as property- or area-based inspections, as specified in the Municipal Permit (Provision E.5). The program will also require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and pollutant-generating activities (PGAs).

Existing Development – Increased Enforcement

San Diego intends to enhance enforcement responses by increasing the number of Code Compliance staff. Between FY 16 and FY 19, San Diego is planning to gradually hire additional Code Compliance Officers and support staff to increase compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development as detailed in the San Diego's Enforcement Response Plan. This effort will target enhanced enforcement of irrigation runoff, water-using mobile businesses, and other entities contributing to the Highest Priority Conditions.

Source Reduction Initiatives

San Diego will continue to implement source reduction initiatives, where feasible. Bans or progressive phase-outs to be considered include pesticides and herbicides on landscapes, leaf blowers, plastic bags, and architectural copper (generally a legacy issue); vehicle washing will also be prohibited or regulated aggressively. San Diego will also consider legislative mandate and cooperative implementation of copper-free brake pads on City-owned vehicles to reduce pollutant deposition. Lastly, San Diego will consider a zinc reduction program and a roof replacement initiative program for source reduction initiatives if the prior strategies do not succeed in addressing the Highest Priority Conditions.

San Diego plans expansion of programs to target irrigation runoff and other dry weather pollutant sources. These strategies primarily target meeting dry weather goals, but may also have wet weather benefits. Because dry weather strategies tend to target the elimination of dry weather flows, they provide load reduction benefits to most water quality pollutants.

Existing Development – Residential and Commercial Rebate Programs Targeting Water Quality

San Diego plans to continue and expand its landscape-based rebate program to target Highest Priority Conditions, such as bacteria and metals, from residential and commercial areas in FY 16 and beyond. Expansion of this program may occur by providing for additional rebates and/or distribution of promotional and informational materials and brochures to community groups, libraries, and recreation centers. Educational material would emphasize watershed stewardship and encourage the implementation of designated BMPs through rebates for rain barrels, grass replacement, downspout disconnections, and micro-irrigation BMPs in residential and commercial areas.

Increased Public Education and Participation

San Diego conducts an extensive public education and outreach program through its Think Blue program. Examples include the following:

- San Diego will continue and expand several of its current outreach programs. Outreach programs would be widely implemented but targeted to home owner associations (HOAs), business owner associations (BOAs), maintenance districts, various community groups through organized community trash cleanup events, and water-using mobile businesses.
- Workshops will be held, community events will be organized, and informational material and brochures will be disbursed to reach community members and advise them of incentives, regulations, and training, and provide general information they need for implementation of good watershed stewardship practices or BMPs.

Cost of Service Study

San Diego plans to conduct a Cost of Service Study starting in FY 15. This study will examine the full cost of flood control and storm water strategies needed to comply with storm water regulations for San Diego. The City of San Diego's Watershed Asset Management Plan (WAMP) will be used as the basis for the study.

Table 4-8 summarizes a subset of San Diego's strategies to address bacteria and metals in Chollas Creek. A complete list of strategies to be implemented within the WMA is provided in Appendix I.

Table 4-8
Summary of Strategies for Chollas Creek – City of San Diego

Strategy	Jurisdictional Areas		Priority WQCs				Implementation Schedule						
	Jurisdiction-Wide	Chollas	Trash	Bacteria	Nutrients	Metals	Previous Fiscal Year(s)	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Future Fiscal Year(s)
Development and implementation of a green infrastructure policy and program	X	X	X	X	X	X			X	X	X	X	X
Increased enforcement	X	X	X	X	X	X		X	X	X	X		
Residential and commercial rebate programs targeting water quality	X	X	X	X	X	X	X	X	X	X	X	X	X
Enhanced street sweeping	X	X	X	X		X	X	X	X	X	X	X	X
Enhanced catch basin cleaning	X	X	X	X		X			X	X	X	X	X
Increased public education and participation	X	X	X	X	X	X		X	X	X	X	X	X
Source reduction initiatives	X	X	X	X	X	X	X	X	X	X	X	X	X
Enhanced property-based inspection program	X	X	X	X	X	X	X		X	X	X	X	X
Optional Jurisdictional Strategies													
Participate in a regional social services effort for homelessness	X	X	X	X	X								See Appendix I for criteria for initiating strategies.
Assess feasibility and effectiveness of implementing an Urban Tree Canopy (UTC) program	X	X											
Evaluate feasibility and effectiveness of Permeable Friction Course (PFC), a porous asphalt overlay	X	X	X	X		X							

Notes:

Highlights denote a Highest Priority Condition.

Implementation of strategies is dependent on approval of fiscal budgets and available resources.

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4.3.3.2.2 Compliance Analysis Results

Nonstructural and structural strategies were modeled to demonstrate progress toward attaining the numeric goals. The focus of the optimization analysis was to consider the cost-effectiveness of watershed-wide implementation of BMPs. Optimization incrementally considers costs of BMP implementation and accounts for progress toward achieving the load reduction goals. The targets for optimization are the percent load reduction goals for each TMDL presented in Tables 4-1 and 4-2.

Strategies were prioritized in order of those that are most cost-effective and considering the shortest practicable schedule to implement. Prioritization, beginning with those implemented immediately, is (1) non-modeled nonstructural strategies, (2) modeled nonstructural strategies, (3) multiuse treatment areas, and (4) green infrastructure. Most nonstructural strategies are planned for implementation before or upon approval of the Water Quality Improvement Plan. Structural BMPs can be cost-effective when greater load reductions are needed and treatment must occur after the pollutants enter the storm drain system, particularly when benefits other than water quality improvements are considered. However, planning for structural BMPs requires more time to secure resources, design BMPs, and obtain permits. Most of the structural BMPs are planned for later in the compliance period to allow more time to ensure that the implementation is necessary to meet numeric goals and is designed to achieve the load reductions required, and that alternatives to construction have been evaluated.

Non-Modeled, Nonstructural Strategies

Most nonstructural strategies cannot be effectively modeled for load reductions because of their variable implementation, so these strategies are referred to as non-modeled nonstructural strategies. Because their benefits are not individually quantifiable, these strategies were assigned a conservative cumulative pollutant load reduction value of 10 percent. The 10 percent load reduction was estimated by averaging the range of measured and anticipated pollutant removal from the list of San Diego nonstructural strategies. Strategies were categorized as “high” percent removal, i.e., those with greater jurisdictional control (operation and maintenance of MS4 infrastructure), or “low” percent removal, i.e., those requiring public behavioral changes. The range of pollutant load reduction was as low as approximately 2 percent and as high as 72 percent. The overall average percent removal for all constituents and all activities is 10.1 percent (City of San Diego, 2014). Each of these non-modeled nonstructural strategies is described in further detail in the jurisdictional strategy table in Appendix I.

Modeled Nonstructural Strategies

Five of the nonstructural strategies selected for implementation in the Chollas Creek HSA were modeled: street sweeping, catch basin cleaning, Rain Barrels Incentive Program, Downspout Disconnection Incentive Program, and Irrigation Runoff Reduction Program. A description of the modeling analysis is provided in the CLRP Phase II report. A description of the level of implementation for each of the modeled nonstructural strategies is provided in the jurisdictional strategy table in Appendix I.

Structural Strategies

Structural strategies (BMPs) provide the opportunity to intercept runoff and filter, infiltrate, and treat storm water. These structures tend to be more expensive than nonstructural strategies, but they also tend to have predictable and reliable effectiveness in removing pollutant loads. Additionally, structural BMPs provide other multiuse benefits to the community, such as habitat, aesthetics, and recreational opportunities. Two major categories of potential structural BMPs were modeled in the Chollas Creek HSA: (1) multiuse treatment areas, and (2) green infrastructure, including green streets. Large treatment structural BMPs (referred to as multiuse treatment areas) are regional facilities that receive flows from neighborhoods or larger areas, which often serve dual purposes—flood control and groundwater recharge. These BMPs are often located in public spaces and can be co-located within parks or green spaces; these BMPs can provide excellent ecosystem services and aesthetic value to stakeholders. Green infrastructure uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city, green infrastructure refers to the patchwork of natural areas that provide habitat, flood protection, and cleaner water, and may also benefit the environment through cleaner air. At the scale of a neighborhood or site, green infrastructure includes storm water management systems such as bioretention areas, permeable pavements, and green roofs that use natural processes to soak up, store, and treat water. A description of the modeling analysis is provided in the CLRP Phase II report. Structural project details are provided in the jurisdictional strategy table in Appendix I.

Table 4-9 provides the strategy category and the wet weather load reduction benefit for Highest Priority Conditions in addition to water quality benefits for other pollutants. The Water Quality Improvement Plan final goals are also presented to provide assurance that the final goals will be met. Figures 4-4 and 4-5 provide the schedules for implementation of each strategy category and the load reduction expected over the compliance period for wet and dry weather, respectively. In addition, the interim and final goals for the Highest Priority Conditions are presented to show the anticipated progress over the compliance time period.

Table 4-9
Wet Weather Load Reductions for the City of San Diego in Chollas Creek HSA

Strategy and Level of Implementation ¹	City of San Diego – Wet Weather Percentage Reductions									
	Total Zn	Fecal Coliform	Enterococcus	Total Coliform	Total Sediment	Flow	Total Cu	Total Pb	Total N	Total P
Nonstructural, non-modeled	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Modeled nonstructural	1.4%	0.3%	0.3%	0.1%	0.6%	<0.1%	1.6%	0.8%	0.8%	0.6%
Street sweeping										
Catch basin cleaning	1.13%	<0.01%	<0.01%	<0.01%	0.01%	<0.01%	2.30%	1.23%	0.86%	1.04%
Rain barrel installations	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.02%	0.01%	0.01%
Downspout disconnect	0.2%	0.1%	0.2%	0.2%	0.1%	0.1%	0.1%	0.2%	0.1%	0.1%
Irrigation reduction	0.2%	0.3%	<0.1%	<0.1%	1.4%	1.7%	0.4%	0.6%	0.5%	1.5%
Multiuse Treatment Areas										
4.9-acre BMP to treat a total drainage area of 360 acres with a total storage volume of 13.7 acre-feet	2.2%	9.4%	10.9%	9.4%	1.3%	3.6%	2.4%	2.2%	6.0%	4.0%
Green Infrastructure										
10.31-acre BMP to treat an impervious drainage area of 298.12 acres with a total storage volume of 13.56 acre-feet	3.0%	5.3%	3.8%	1.1%	3.4%	3.5%	1.9%	2.9%	3.3%	4.6%

Notes:

- These numbers are planning-level calculated at a sub-watershed scale; structural BMPs should be designed to meet both jurisdictional standards and the numeric goals outlined above at each respective project site. Reported BMP sizes include projects that have already been implemented.
- Orange-shaded cells indicate Highest Priority Conditions for the Chollas Creek HSA.
- Nonstructural load reductions include both the modeled and non-modeled load reductions. Non-modeled load reductions are assumed to be 10% for all pollutants (City of San Diego, 2014) and modeled load reductions vary by strategy and pollutant.
- Irrigation reduction strategies include the implementation of grass replacement projects, micro-irrigation system conversions, weather-based irrigation controllers, downspout disconnections, education and outreach and enforcement of regulations that prohibit runoff.
- Load reduction totals that exceed the goals reflect coarseness in the model that can be improved with finer physical data at the parcel and/or street scale.
Cu = copper; Pb = lead; Zn = zinc; N = nitrogen; P = phosphorus

Table 4-9 (continued)
Wet Weather Load Reductions for the City of San Diego in Chollas Creek HSA

Strategy and Level of Implementation ¹		City of San Diego – Wet Weather Percentage Reductions									
		Total Zn	Fecal Coliform	Enterococcus	Total Coliform	Total Sediment	Flow	Total Cu	Total Pb	Total N	Total P
Green Streets											
25.52-acre BMP to treat a total drainage area of 7,260.34 acres with a total storage volume of 39.66 acre-feet		11.0%	11.2%	11.7%	11.4%	8.1%	2.7%	9.8%	8.2%	8.5%	10.0%
Total		29.1%	36.6%	37.0%	32.1%	24.9%	21.6%	28.5%	26.0%	30.1%	31.8%
		Goal = 29.1%	Goal = 29%	Goal = 24%	Goal = 18%						

Notes:

1. These numbers are planning-level calculated at a sub-watershed scale; structural BMPs should be designed to meet both jurisdictional standards and the numeric goals outlined above at each respective project site. Reported BMP sizes include projects that have already been implemented.
2. Orange-shaded cells indicate Highest Priority Conditions for the Chollas Creek HSA.
3. Nonstructural load reductions include both the modeled and non-modeled load reductions. Non-modeled load reductions are assumed to be 10% for all pollutants (City of San Diego, 2014) and modeled load reductions vary by strategy and pollutant.
4. Irrigation reduction strategies include the implementation of grass replacement projects, micro-irrigation system conversions, weather-based irrigation controllers, downspout disconnections, education and outreach and enforcement of regulations that prohibit runoff.
5. Load reduction totals that exceed the goals reflect coarseness in the model that can be improved with finer physical data at the parcel and/or street scale.

Cu = copper; Pb = lead; N = nitrogen; P = phosphorus

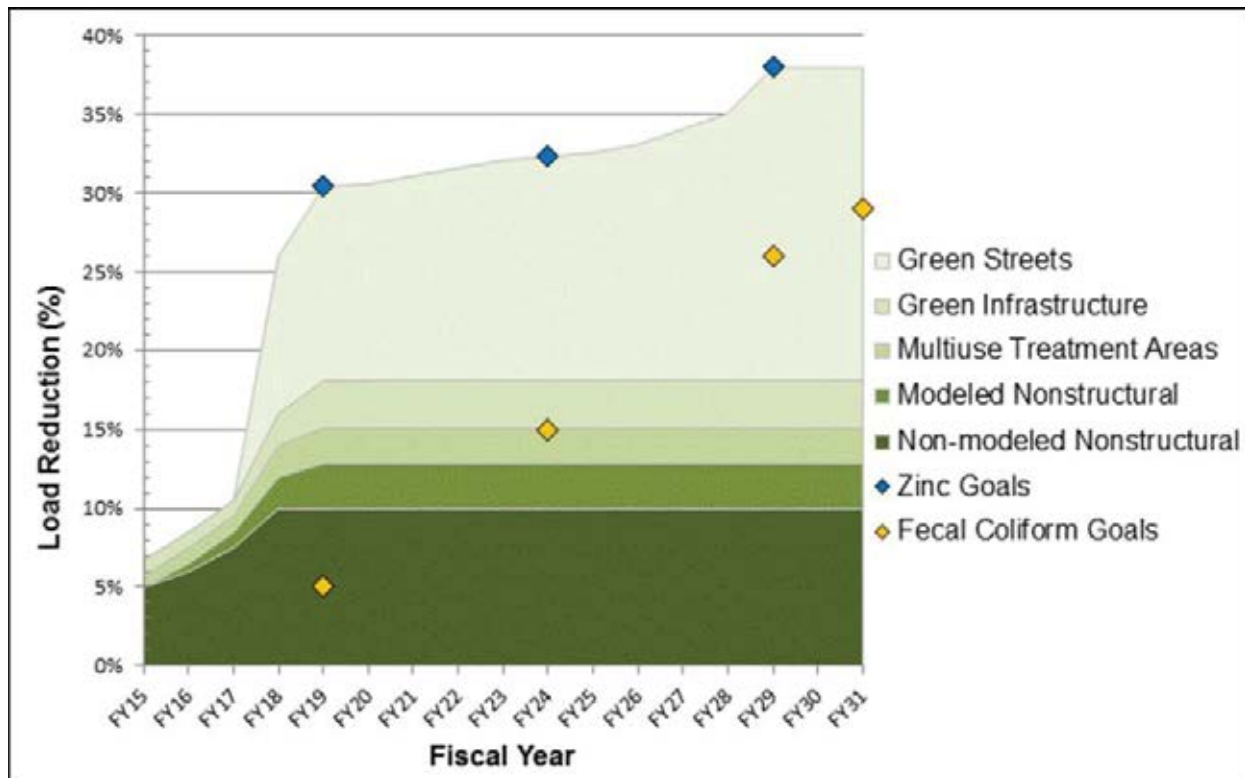


Figure 4-4
Anticipated Progress Toward Meeting Final and Interim Wet Weather Goals (Zinc and Fecal Coliform)

The primary strategy to reduce dry weather pollutant loading is to eliminate dry weather flows. The primary cause of dry weather flows in an arid environment is irrigation runoff. In California, outdoor water consumption exceeds 40 percent of overall urban water use (California Department of Water Resources [DWR], 2010). Reducing and ultimately eliminating irrigation runoff is not only a benefit to receiving water quality, but it also aligns with the state's 20x2020 Water Conservation Plan (20x2020 Plan). The 20x2020 Plan cites multiple benefits of reducing urban water use by 20 percent by the year 2020, including reduced costs of new water infrastructure, reduced water-related energy demands, better capacity to meet the challenge of California's growing population, and improved quality of receiving waters.

Progress toward eliminating dry weather flows will be addressed by a suite of strategies that may include good landscaping practices such as education and outreach and rebate programs supporting the use of micro-irrigation, grass replacement, and weather-based irrigation controllers. These practices, collectively, were modeled by adjusting (reducing) irrigation inputs to urban grass land uses and adjusting how irrigation overspray is allocated between impervious and pervious land uses. The model assumes truly dry conditions and does not include flow from small storm events under 0.2 inch of rainfall.

The model estimates the reduction in all indicator bacteria from the suite of irrigation reduction strategies and programmatic implementation to be over 99 percent for the City of San Diego within the Chollas Creek HSA, meeting the final indicator bacteria goals. Figure 4-5 presents the *Enterococcus*, fecal coliform, and total coliform load reductions anticipated over the compliance period through the non-modeled nonstructural and modeled irrigation reduction strategy discussed above.

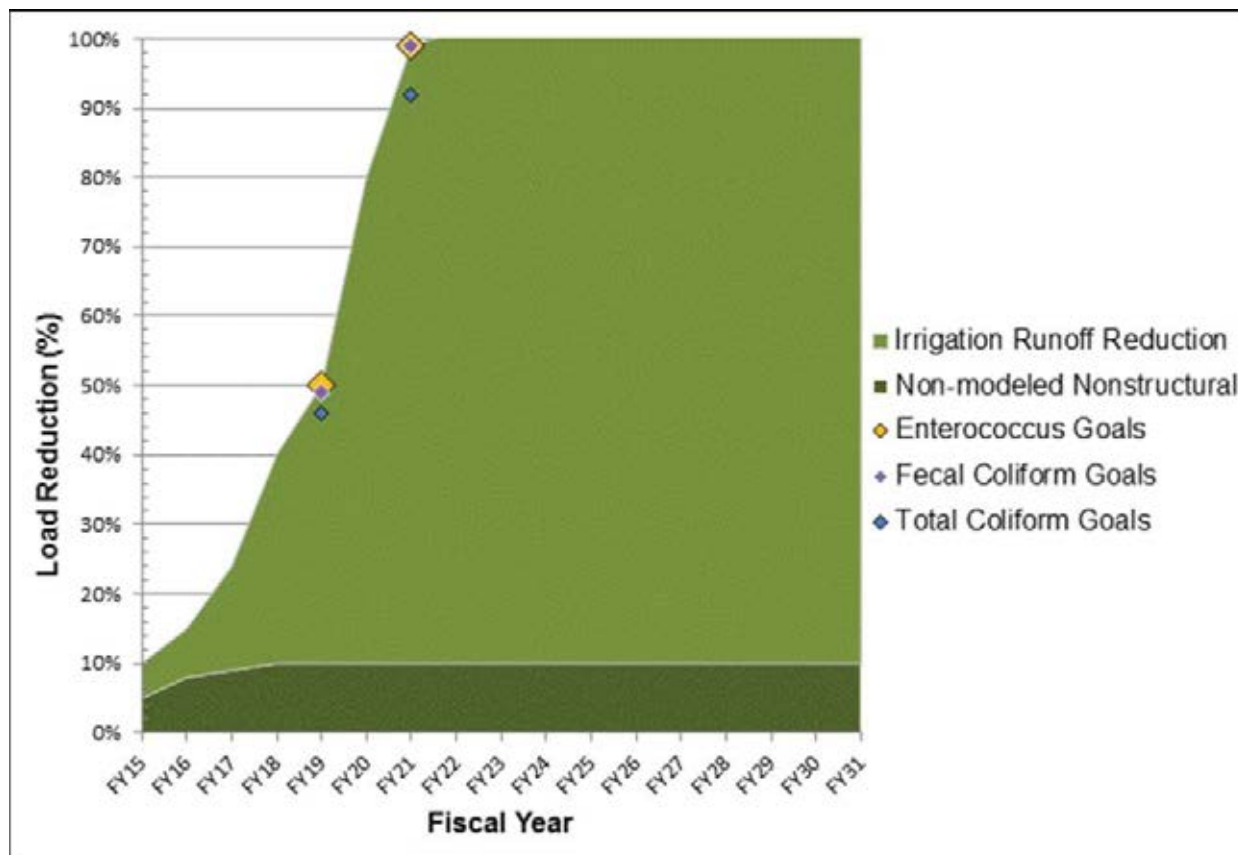


Figure 4-5
Anticipated Progress Toward Meeting Final and Interim Dry Weather Goals
(*Enterococcus*, Fecal Coliform, and Total Coliform)

4.3.3.2.3 Alternative BMP Implementation Scenario for Refinement of Water Quality Regulations

The pollutant loads from Non-Phase I MS4s (Non-MS4s) can be differentiated from Phase I MS4s (MS4s) loads to more accurately and fairly assess load reduction responsibilities within the Chollas Creek subwatershed. Load reduction responsibilities are assigned to responsible dischargers in a TMDL and are enforceable when adopted in a NPDES Permit. The Chollas Creek Dissolved Metals TMDL (R9-2007-0043) and the recently updated MS4 Permit (R9-2015-0001) identify responsible dischargers subject to the Metals TMDL. The responsible dischargers include Phase I MS4s, Phase II MS4s, industrial facilities, permitted construction activities, and groundwater extraction discharges in the subwatershed. By contrast, the Bacteria TMDL (R9-2010-0001) only

assigns load reduction responsibility to the MS4s, although Non-MS4 areas are present within the watershed and contribute to bacteria loads. It is worth noting that pollutant loads from Non-MS4 areas may discharge directly to a receiving water body or enter a MS4 before ultimately discharging to a receiving water body.

Given these inconsistencies and the lack of clarity on how responsible dischargers are identified in the TMDLs, the primary scenario included in this Water Quality Improvement Plan currently does not differentiate between MS4 loads and Non-MS4 loads. To separate Non-MS4 loads from MS4 loads, a preliminary alternative modeling analysis was performed and is presented in this section. The purpose of this analysis is to foster future discussions about accurate and fair apportionment of pollutant reduction responsibilities in the subwatershed to ensure that Non-MS4 discharges are regulated before they enter a MS4 to improve water quality throughout the watershed. It is important to note that under the Alternative Scenario the MS4s would continue to implement programs to inspect and provide oversight of industrial discharges and detect illicit discharges.

The first step of the analysis was to update the watershed model to remove areas associated with the following Non-MS4s: registered industrial permits, Phase II permits, Federal and State lands (and Indian lands, if present), and agricultural lands. Federal/State/Indian lands and agricultural lands were removed because these areas are also subject to separate regulatory requirements. Land areas involving pollutant loading from construction activities and groundwater extraction were not considered because the limited timeframe associated with construction permits and groundwater extraction impacts were assumed to be negligible. The second step was to optimize the proposed structural strategies in the remaining MS4 areas to achieve the required MS4 load reductions to meet the Water Quality Improvement Plan numeric goals while maintaining cost efficiencies.

The overall watershed load reduction goal would be met through reductions by both the MS4s and Non-MS4s, thereby maintaining equity among all dischargers. Estimated load reductions were based on the relative loading from each responsible discharger in the watershed.

Table 4-10 summarizes the current Water Quality Improvement Plan load reduction requirements (primary scenario) and the alternative scenario results which separate MS4 and Non-MS4 loads. The Alternative Scenario allows cost efficiencies to be achieved while still meeting the watershed's overall load reduction goal. Although the MS4 load reduction difference between the primary and alternative scenarios is small, the total cost savings to the MS4s are significant. This is due to structural BMP optimization within MS4 areas and a greater proportion of the required load reduction being addressed by nonstructural programs which are less costly. Note that BMP optimization refers to the modeling analysis that was conducted to identify the "optimal" structural BMP opportunities (considering BMP size, type, and location in the watershed) that would achieve the load reduction with the lowest cost. BMP optimization was conducted for both scenarios; however, additional cost savings are

provided in the alternative scenario because only MS4 areas are considered. Results of this analysis are shown for the City of San Diego in Table 4-11, as an example.

Table 4-10
Summary of Alternative Scenario Results

Primary Scenario (MS4 + Non-MS4 Areas Combined)		Alternative Scenario (Separate MS4 and Non-MS4 Areas)			
		MS4 Allocation		Non-MS4 Allocation	
Zn Load Reduction		Zn Load Reduction		Zn Load Reduction	
%	Pounds	%	Pounds	%	Pounds
29%	2,084	29%	2,047	29%	37

Table 4-11
Example Cost and Load Reduction Summary for the City of San Diego

Cost Comparison between Primary and Alternative Scenario	Primary Scenario (MS4 + Non-MS4 Areas Combined ¹ ; \$Million)	Alternative Scenario (MS4 Only ² ; \$Million)	Cost Savings from Primary Scenario (\$Million)
	\$171	\$139	\$33 (19%)
MS4 Load Reduction Summary for Alternative Scenario	MS4 Existing Load for Zn (lbs.)	Load Reduction Target for Zn (%) ³	Load Reduction Target for Zn (lbs.)
	5,383	29.1%	1,566

Note:

1. MS4 treats loads from other regulated sources
2. MS4 treats loads within its jurisdiction
3. Updated based on proposed site-specific Water Effects Ratios (WERs) and Total-to-Dissolved conversion factors

The MS4s assert that the Regional Board is ultimately responsible for regulating storm water discharges from Non-MS4s to more accurately and fairly assign pollutant reduction responsibilities in the watershed. The MS4s support this regulatory approach as an effective tool for improving water quality, and are committed to participating in efforts to incorporate non-MS4s into current water quality regulations. To that end the MS4s will continue to refine and update the alternative scenario analysis, and engage stakeholders in a dialogue about how all the responsible parties within the watershed can work together to achieve the numeric goals in the Water Quality Improvement Plan. For example, the current list of Industrial General Permit (IGP) non-filers could be added to the analysis to more accurately estimate load reduction responsibilities for industrial dischargers within the watershed.

In addition, the Regional Board should work with the MS4s to identify potential updates to TMDLs, the MS4 Permit, and other responsible parties' NPDES permits, as appropriate, to more accurately and fairly assign load responsibilities among all the responsible parties in the watershed. The MS4s will provide the Regional Board with additional analysis and information necessary to facilitate future determinations by the

Regional Board on load reduction responsibilities within the watershed. The Water Quality Improvement Plan may be revised in a future update to remove the Non-MS4 loads.

4.3.4 County of San Diego

The County of San Diego (County) Water Quality Improvement Plan final and interim goals are presented in Section 4.3.4.1. The key strategies identified to address the Highest Priority Conditions in the County's jurisdiction are presented in Section 4.3.4.2. In the Chollas Creek HSA, the County's limited jurisdiction includes a cemetery, part of one road, one residence, a YMCA, and part of one MS4 outfall. The outfall discharges sheet flow from the cemetery during wet weather and is reported to be dry (i.e., no discharges) during dry weather. This will be verified through increased monitoring and visual surveillance. There are no catch basins in the County's area. In Chollas Creek, a compliance analysis using a watershed model was conducted to identify the strategies required to be implemented to meet final goals. The strategies and implementation schedules demonstrate that numeric goals will be met. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the compliance analysis will be updated as needed to provide assurance that numeric goals will be met.

4.3.4.1 Goals and Schedules

The County has identified alternative compliance dates for the TMDL-derived goals presented in Tables 4-1 and 4-2 to meet interim goals for bacteria in both wet weather and dry weather. The County-specific interim Water Quality Improvement Plan wet weather goals are presented in Table 4-12 and dry weather goals in Table 4-13.

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Table 4-12
Goals for Chollas Creek (Wet Weather) – County of San Diego

Compliance Pathways		Assessment Period and Fiscal Year					
		Baseline	Current Permit Term	FY 16-20	FY 21-25	FY 26-30	FY 31-36
WET WEATHER METALS							
MS4 Discharges Allowable % Above Effluent Limitations	Copper	100% allowable exceedance of effluent limitations in FY 09 (Year 1 of TMDL compliance)	FY 18	FY 19 ^{1,3}	FY 24	FY 29 ¹	N/A
	Lead		See Performance Measures	20%	15%	0%	
	Zinc						
OR							
Receiving Water Allowable % Above Receiving Water Limitations	Copper	100% allowable exceedance of receiving water limitations in FY 09 (Year 1 of TMDL compliance)	See Performance Measures	0%	0%	0%	
	Lead						
	Zinc						
OR							
# of Direct or Indirect MS4 Discharges to Receiving Water		TBD	See Performance Measures	0	0	0	
OR							

Notes:

1. Denotes TMDL final and interim target.
2. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the RPs by maintaining the existing wet weather exceedance frequency.
3. The County of San Diego has selected alternate interim schedules and goals for compliance with the Bacteria TMDL.
4. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
5. The County of San Diego is concerned that a long-term funding source is not identified for constructing and maintaining structural BMPs, if structural BMPs are needed to meet compliance.

Table 4-12 (continued)
Goals for Chollas Creek (Wet Weather) – County of San Diego

Compliance Pathways		Assessment Period and Fiscal Year					
		Baseline	Current Permit Term	FY 16-20	FY 21-25	FY 26-30	FY 31-36
Implement Accepted Water Quality Improvement Plan Strategies to Reduce MS4 Discharges Will Result in % Load Reduction (Using WER Update 2014)	Metric for compliance analysis is MS4 discharge % load reduction. Interim compliance is implementation of strategies and schedule based on analysis results (Appendix I). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment.						
	Copper	0% Load Reduction (2003 TMDL Model)	See Performance Measures	0%	0%	0%	
	Lead			0%	0%	0%	
	Zinc			23.3%	24.7%	29.1%	
WET WEATHER INDICATOR BACTERIA							
Receiving Water % Days Exceeding WQO	Fecal coliform	60% Days Exceeding WQO (2002 TMDL Model)	See Performance Measures	60% ²	54%	41% ³	22%
	Enterococcus	63% Days Exceeding WQO (2002 TMDL Model)		63% ²	57%	43% ³	22%
	OR						

Notes:

1. Denotes TMDL final and interim target.
2. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the RPs by maintaining the existing wet weather exceedance frequency.
3. The County of San Diego has selected alternate interim schedules and goals for compliance with the Bacteria TMDL.
4. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
5. The County of San Diego is concerned that a long-term funding source is not identified for constructing and maintaining structural BMPs, if structural BMPs are needed to meet compliance.

Table 4-12 (continued)
Goals for Chollas Creek (Wet Weather) – County of San Diego

Compliance Pathways		Assessment Period and Fiscal Year					
		Baseline	Current Permit Term	FY 16-20	FY 21-25	FY 26-30	FY 31-36
MS4 Discharges % Load Reduction	Fecal coliform	0% Load Reduction (2002 TMDL Model)	See Performance Measures	5%	11%	15% ³	29%
	<i>Enterococcus</i>			4%	9%	12% ³	24%
OR							
MS4 Discharges % Days Exceeding WQO	Fecal coliform	Historical MS4 wet weather data will be used to identify the baseline in the first annual report	See Performance Measures	22%	22%	22%	22%
	<i>Enterococcus</i>			22%	22%	22%	22%
OR							
# of Direct or Indirect MS4 Discharges to Receiving Water		TBD	See Performance Measures	0	0	0	0
OR							
% of Exceedances of Final Receiving Water WQOs due to Natural Sources ⁴	Fecal coliform	Not available	100%	100%	100%	100%	100%
	<i>Enterococcus</i>		100%	100%	100%	100%	100%
OR							

Notes:

1. Denotes TMDL final and interim target.
2. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the RPs by maintaining the existing wet weather exceedance frequency.
3. The County of San Diego has selected alternate interim schedules and goals for compliance with the Bacteria TMDL.
4. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
5. The County of San Diego is concerned that a long-term funding source is not identified for constructing and maintaining structural BMPs, if structural BMPs are needed to meet compliance.

Table 4-12 (continued)
Goals for Chollas Creek (Wet Weather) – County of San Diego

Compliance Pathways		Assessment Period and Fiscal Year					
		Baseline	Current Permit Term	FY 16-20	FY 21-25	FY 26-30	FY 31-36
Implement Accepted Water Quality Improvement Plan	Metric for compliance analysis is MS4 discharge % load reduction. Interim compliance is implementation of strategies and schedule based on analysis results (Appendix I). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment.						
WET WEATHER PERFORMANCE MEASURES ⁵							
			FY 18			FY 23	
County Facility Retrofits for Reduction in Bacteria and Metals	N/A	Treat 20,000 square feet of parking lot runoff through Installation of Pervious Pavement Over Infiltration Basin (Southeast Family Resource Center retrofitted)		Retain and treat Parking Lot Runoff to a Biofiltration Basin and Redirect Roof Downspouts to Pervious Area (Central Regional Public Health Center retrofitted)			

Notes:

1. Denotes TMDL final and interim target.
2. Denotes existing wet weather frequency as modeled in the Bacteria TMDL. With limited baseline monitoring data available, this goal reflects a reasonable estimate considering the difficulty in demonstrating progress within the receiving water during wet weather in a short amount of time. Furthermore, development and redevelopment of the urban environment has occurred since the Bacteria TMDL baseline loads were calculated in 2001. As such, this goal demonstrates that progress has been made by the RPs by maintaining the existing wet weather exceedance frequency.
3. The County of San Diego has selected alternate interim schedules and goals for compliance with the Bacteria TMDL.
4. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
5. The County of San Diego is concerned that a long-term funding source is not identified for constructing and maintaining structural BMPs, if structural BMPs are needed to meet compliance.

Table 4-13
Goals for Chollas Creek (Dry Weather) – County of San Diego

Compliance Pathways		Baseline	Assessment Period and Fiscal Year		
			Current Permit Term	FY 16-20	FY 21-25
DRY WEATHER INDICATOR BACTERIA					
			FY 18	FY 20 ^{1,3}	FY 21 ¹
Receiving Water % Days Exceeding WQO	Fecal coliform	100% (1996-2002 ²)	See Performance Measures	50% ³	0%
	Enterococcus	100% (1996-2002 ²)		50% ³	0%
OR					
MS4 Discharges % Load Reduction	Fecal coliform	0% (2002 TMDL Model)	See Performance Measures	49.4% ³	98.8%
	Enterococcus			49.7% ³	99.3%
	Total coliforms ⁴			46.1% ³	92.1%
OR					
MS4 Discharges % Days Exceeding WQO	Fecal coliform	Historical MS4 dry weather data will be used to identify the baseline in the first annual report	See Performance Measures	0%	0%
	Enterococcus			0%	0%
	Total coliforms ⁴			0%	0%
OR					
# of Direct or Indirect MS4 Discharges to Receiving Water		TBD	See Performance Measures	0	0

Notes:

1. Denotes TMDL final and interim target.
2. The existing exceedance frequency was calculated on the basis of available monitoring data between 1996 and 2002 per Municipal Permit requirements and presented in more detail in Appendix H.
3. The County of San Diego has selected an alternate interim schedule for compliance with interim Bacteria TMDL target. The County will meet the goal in FY 20.
4. Total coliform effluent limitations only apply to MS4 outfalls that discharge to the Chollas Creek mouth.
5. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
6. The County of San Diego is concerned that a long-term funding source is not identified for constructing and maintaining structural BMPs, if structural BMPs are needed to meet compliance.

Table 4-13 (continued)
Goals for Chollas Creek (Dry Weather) – County of San Diego

Compliance Pathways		Baseline	Assessment Period and Fiscal Year		
			Current Permit Term	FY 16-20	FY 21-25
OR					
% of Exceedances of Final Receiving Water WQOs due to Natural Sources ⁵	Fecal coliform	Not Available	100%	100%	100%
	<i>Enterococcus</i>				
OR					
Implement Accepted Water Quality Improvement Plan	Metric for compliance analysis is MS4 discharge % load reduction. Interim compliance is implementation of strategies and schedule based on analysis results (Appendix I). Final compliance is implementation of BMPs based on analysis results and demonstration of compliance with any of the compliance pathways through monitoring and assessment.				
DRY WEATHER INDICATOR BACTERIA ⁶					
Compliance Pathway		Baseline	FY 18	FY 20 ³	FY 21
Effectively eliminate anthropogenic dry weather flows from storm drain outfalls.	Measured by % reduction of flow volume or number of outfalls with persistent flows	To be established FY 15-16 using dry weather flow measurements	Reduce by 20% the aggregate flow volume or the number of persistently flowing outfalls during dry weather.	Reduce by 75% the aggregate flow volume or the number of persistently flowing outfalls	Effectively eliminate anthropogenic dry weather discharges from storm drain outfalls to the receiving water

Notes:

1. Denotes TMDL final and interim target.
2. The existing exceedance frequency was calculated on the basis of available monitoring data between 1996 and 2002 per Municipal Permit requirements and presented in more detail in Appendix H.
3. The County of San Diego has selected an alternate interim schedule for compliance with interim Bacteria TMDL target. The County will meet the goal in FY 20.
4. Total coliform effluent limitations only apply to MS4 outfalls that discharge to the Chollas Creek mouth.
5. Demonstration of exceedances due to natural sources includes demonstration that pollutant loads from MS4s are not causing or contributing to exceedances.
6. The County of San Diego is concerned that a long-term funding source is not identified for constructing and maintaining structural BMPs, if structural BMPs are needed to meet compliance.

4.3.4.2 Summary of Strategies and Schedules

The County has selected jurisdictional strategies that best suit the characteristics of its jurisdiction to comply with Municipal Permit requirements. A complete list of strategies planned for implementation within the WMA is provided in Appendix I. The following is a summary of the implementation approach and key strategies that have been identified to address the Highest Priority Conditions in the County's jurisdiction within the Chollas Creek HSA. Figure 4-6 shows the County's jurisdiction within the Chollas Creek Highest Priority Condition where the strategies will be implemented.



Figure 4-6
County's Jurisdiction Within the Chollas Creek
Highest Priority Condition

Optional strategies that will be considered upon need and as resources are available are also summarized. In Chollas Creek, a compliance analysis using a watershed model was conducted to identify the strategies required to be implemented to meet final goals. The strategies and implementation schedules demonstrate that numeric goals will be met. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the compliance analysis will be updated as needed to provide assurance that numeric goals will be met.

Potential dry weather flows will be evaluated through inspections of MS4 outfalls discharging to receiving waters. The County of San Diego has shifted to a more active field program to better locate and abate dry weather flow. Staff spend a greater frequency of time present in unincorporated communities identifying nuisance anthropogenic flows and addressing them through appropriate education and enforcement strategies. County of San Diego staff members have been trained to identify and report illicit discharges and illicit connections during required annual storm water training; this training has been updated to reflect recent Municipal Permit changes.

The County will also collaborate with watershed partners to implement watershed strategies to reduce pollutants in storm water runoff discharges from storm drain outfalls. To reduce metals in MS4 discharges, the County will increase the frequency of street sweeping for the jurisdictional public roadways within the watershed.

In two recent examples of retrofit projects that targeted potential runoff from County facilities, LID approaches were utilized in conjunction with drainage and parking improvements were completed at the Southeast Family Resource Center and Central Regional Public Health Center. The facilities consisted primarily of impervious areas consisting of rooftops and parking lots. The improvements effectively reduced flows during storm events and substantially reduced concentrations of metals.

Table 4-14 lists the key strategies and schedule for the County's jurisdiction within the Chollas Creek HSA.

Table 4-14
Summary of Strategies for Chollas Creek – County of San Diego

Strategy Name	Jurisdictional Areas		Priority WQCs				Implementation Schedule						
	Jurisdiction-Wide	Chollas	Trash	Bacteria	Nutrients	Metals	Previous Fiscal Year(s) ¹	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Future Fiscal Year(s)
Increased frequency of street sweeping		X	X	X		X				X	X	X	X
Enhanced outreach and education on reducing over-irrigation		X	X	X	X	X		X	X	X	X	X	X
Continued operation and maintenance of county retrofit projects in areas of existing development		X	X	X	X	X	X						
Optional Jurisdictional Strategies													
Continue participation in source reduction activities	X	X	X	X	X	X							See Appendix I for criteria for initiating strategies.
Collaborate with partners on watershed on potential rehabilitation projects	X	X	X	X	X	X							

Notes:
Implementation of strategies is dependent on approval of fiscal budgets and available resources.

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4.3.5 Port of San Diego

The Highest Priority Conditions in Chollas Creek within the Pueblo HU (908.2) are water quality impairments due to metals and bacteria. The Port of San Diego's boundaries comprise approximately 115 acres (which overlap with the City of San Diego's boundaries) or 1 percent of the Chollas Creek drainage area. Several factors were considered during the development of the Port's approach in this area. The watershed model used to calculate the TMDL's Waste Load Allocations assumed that all land within the District's parcels are (1) ongoing point sources of discharges, and (2) all of the land within the tidelands boundary is under the Port's authority. The Port submitted a jurisdictional analysis report to the Regional Board in December 2013 to provide more information and further clarify the potential for discharges from the Port's boundaries to Chollas Creek (Port of San Diego, 2013). The report provided a detailed analysis that identified the Port's ability to control discharges from within the Tidelands boundary in Chollas Creek, where the Port has authority and where it does not. The Port of San Diego's approach and strategies to addressing metals and bacteria in Chollas Creek are based on the findings in the jurisdictional analysis report.

The primary land use in this area is industrial, and is represented by a single tenant, General Dynamics National Steel and Shipbuilding Company (NASSCO). Chollas Creek discharges to San Diego Bay at the southern boundary of a parcel under long term lease to NASSCO. NASSCO's leasehold is regulated by an individual NPDES industrial permit. Since the mid-1980s, NASSCO has instituted BMPs and pollution prevention programs as required by their individual NPDES industrial permit. The individual NPDES Industrial Permit requires that any discharges from the facility meet stringent toxicity standards. As a result, the facility elected to install a self-contained retention/treatment system that captures and treats all storm water discharges. Therefore, NASSCO has minimized potential discharges to San Diego Bay and eliminated discharges from its facility to Chollas Creek. NASSCO does not discharge storm water or non-storm water from within NASSCO's containment area to the City of San Diego's 28th Street storm drain (which drains to the Chollas Creek mouth) or the Port District's MS4.

The remaining area of San Diego Bay tidelands within the Port's boundaries consists of a section of a NASSCO parking lot east of Harbor Drive (approximately 0.04 acres) and a small triangle of pavement (approximately 0.02 acres) west of Harbor Drive between the entrance gates of NASSCO and the US Navy facility. This parking lot is leased to NASSCO by BNSF, not the Port of San Diego. Potential discharges from the parking lot have been identified as negligible (Regional Board, 2013). The jurisdictional analysis also identified that there are no storm drain inlets in the parking lot area and storm water runoff from the parking lot discharges to the rail road easement adjacent to Chollas Creek via sheet flow. Thus the Port of San Diego does not operate an MS4 that discharges to Chollas Creek.

4.3.5.1 Goals and Schedules

In addition to the TMDL-derived goals presented in Tables 4-1 and 4-2, the Port identified an interim goal to reduce metals and bacteria from MS4 discharges in the Chollas Creek HSA (908.22) (Table 4-15). The Port's jurisdictional area is small in the Chollas Creek HSA and there is limited, if any, capacity to implement BMPs. The interim goal focuses on incrementally increasing the percentage of the existing non-diverted or treated drainage area. The interim goal will serve to demonstrate that the Port is addressing the negligible discharges as feasible in this area over multiple permit cycles. The Port will adjust their programs as-needed to continue to demonstrate effectiveness of the implemented strategies and compliance with the TMDL.

Table 4-15
Goals for Chollas Creek (Wet and Dry Weather) – Port of San Diego

Numeric GoalUnit of Measure		Assessment Period and Fiscal Year		
		FY 16-20	FY 21-25	FY 26-30
PERFORMANCE MEASURES – WET AND DRY WEATHER				
MS4 Discharges Reduce Discharges From Targeted Areas	% of Port Jurisdictional Area in Chollas Creek HSA Diverted or Treated ¹	50%	75%	

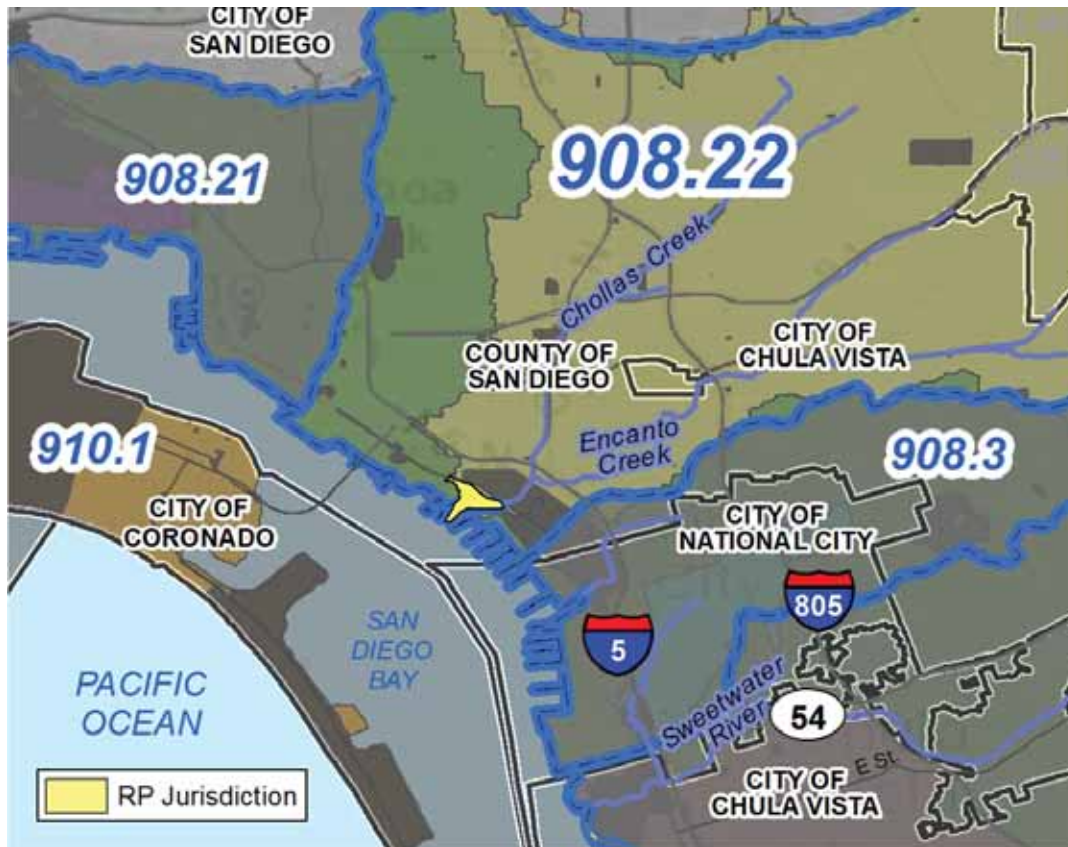
Note:

1. Calculation based on existing non-diverted/treated area in the Port's jurisdiction (outside of NASSCO) in the Chollas Creek HSA.

4.3.5.2 Summary of Strategies and Schedules

The Port identified an approach and strategies to address the interim goal identified in Section 4.3.5.1 for metals and bacteria that best suit the characteristics of potential discharges to Chollas Creek from within its boundaries. The Port's approach will help to demonstrate compliance with the TMDL and Water Quality Improvement Plan goals, and assist in increasing public awareness through education and outreach activities. In addition, BMPs that focus on metals and bacteria also have the potential to address other pollutants, such as sediment, thus achieving multiple pollutant benefits. A complete list of strategies to be implemented to address metals and bacteria is provided in Appendix I, Table I-11.

The area highlighted in yellow in Figure 4-7 shows the Port's boundaries within the Chollas Creek Highest Priority Condition where the strategies will be implemented.



Note:

As set forth above, the Port District does not operate any segment of MS4 that discharges to Chollas Creek.

Figure 4-7
Port's Jurisdiction Within the Chollas Creek Highest Priority Condition

The Port will continue to implement its core JRMP program, update its JRMP program, and implement new strategies to further address efforts to address bacteria and metals with respect to its MS4. As presented in Table I-11 in Appendix I, the types of strategies included permit-required administrative type JRMP updates, permit-required JRMP implementation efforts, potential enhancements to the Port's JRMP program, as well as other non-permit required strategies.

Improving public understanding of the water quality issues and promoting behavior change through education and outreach type strategies will continue to be a major part of the Port's approach in Chollas Creek. However, it is often difficult to directly correlate education and outreach efforts to numeric improvements in water quality. The Port will work with other RPs and third parties, such as environmental organizations, to provide education and volunteer opportunities to a variety of audiences.

The Port will incorporate many of the same strategies identified in Table I-11 in Appendix I to its jurisdiction within Switzer Creek and the downtown anchorage to address the pollutants identified in the draft *TMDLs for Toxic Pollutants in Sediment at the Mouth of Chollas and Switzer Creeks in San Diego Bay* (draft Tentative Resolution No. R9-2013-0003) and the draft downtown anchorage area regulations. In the

Jurisdictional Analysis report (Port of San Diego, 2013), approximately 96 percent of the Port's boundaries within Switzer Creek drainage area is comprised of industrial facilities that are regulated under the Industrial General Permit. This land use is similar to the land use in the Port's boundaries within Chollas Creek. As such, similar strategies may be effective in reducing pollutants in both areas.

The Port's boundaries in both creek mouth areas is tidally influenced and is located downstream of the where watershed monitoring has historically occurred. It is anticipated that data collected by the Port at Chollas Creek could potentially be compared to data from Switzer Creek to determine the effectiveness of implementing such strategies at multiple locations.

Table 4-16 summarizes a subset of the Port's strategies that address bacteria and metals within Chollas Creek.

Table 4-16
Summary of Strategies for Chollas Creek – Port of San Diego¹

Strategy	Jurisdictional Areas		Priority WQCs				Implementation Schedule						
	Jurisdiction-Wide	Chollas	Trash	Bacteria	Nutrients	Metals	Previous Fiscal Year(s)	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Future Fiscal Year(s)
Installation of inserts in storm drains in high priority areas	X	X	X	X		X					X	X	X
Street sweeping	X	X	X	X	X	X		X	X	X	X	X	X
Increased MS4 inspections and cleaning		X	X	X	X	X			X	X	X	X	X
Cleanup events	X	X	X	X		X	X	X	X	X	X	X	X
Education and outreach	X	X	X	X		X	X	X	X	X	X	X	X
Targeted inspection programs	X	X	X	X		X			X	X	X	X	X
Optional Jurisdictional Strategies													
Adopt a construction and demolition recycling ordinance	X		X	X		X		X	X	X	X	X	X
Replace/upgrade current street sweeping equipment to new, more efficient and effective options (e.g. vacuum sweeper)	X		X	X		X							See Appendix I for criteria for initiating strategies
Support organizations and regional social services effort for homelessness	X		X	X	X								
Replace all Port-owned vehicle brake pads with copper-free brake pads as they become commercially available	X					X							

Note:

1. Table 4-16 is a subset of the Port's strategies relating to Highest Priority Conditions. Refer to Table I-11 in Appendix I for complete list of strategies.

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4.3.6 Caltrans

Caltrans is not regulated under the Municipal Permit; however, Caltrans is subject to similar requirements through its MS4 Permit (State Board, 2013) (Caltrans Permit). Caltrans has voluntarily contributed to the Water Quality Improvement Plan effort to provide a consistent and watershed-wide approach to meeting applicable TMDL requirements. The baseline strategies are continuously implemented and augmented as resources become available.

Attachment IV to the Caltrans MS4 Permit outlines a methodology for prioritizing stream segments included in TMDLs to which Caltrans is subject. The Caltrans Permit establishes BMP implementation requirements, evaluated in terms of compliance units. Caltrans is expected to achieve 1650 compliance units per year through the implementation of retrofit BMPs, cooperative implementation, and post construction treatment beyond permit requirements.

Impaired reaches throughout the state will be prioritized on the basis of several factors, including, but not limited to, percent reduction needed, Caltrans drainage area contributing to the reach, and proximity to receiving waters. Reaches with metals TMDLs will likely be prioritized. This prioritization list is currently under negotiation between Caltrans Headquarters and the State Water Quality Control Board.

Caltrans' jurisdiction areas include roadway, land adjacent to roadways, and facilities. Caltrans' jurisdictional strategies specifically focus on BMP implementation to reduce known pollutants within these areas. Caltrans' strategies vary from those of other RPs (in both type and name) to best address freeway characterization discharges from its Right-of-Way (ROW). Strategies include programs developed by Caltrans Headquarters for statewide execution and District 11 implementation. Caltrans' implementation of strategies with the WMA is dependent on legislative approval.

4.3.6.1 Goals and Schedules

For Bacteria TMDLs, Caltrans is expected to eliminate dry weather flows by implementing control measures to ensure effective prohibition (Provision B.2 of the Municipal Permit). For wet weather flows, Caltrans is expected to implement control measures or BMPs to prevent discharge of bacteria from the right-of-way (ROW); these can include source control and preemptive activities such as street sweeping, cleanup of illegal dumping, and public education on littering. Implementation of these controls is in accordance with the TMDL prioritization list currently under development.

Caltrans Water Quality Improvement Plan performance-based final and interim goals for wet weather are presented in Table 4-17. Caltrans Water Quality Improvement Plan performance-based final and interim goals for dry weather are presented in Table 4-18.

Table 4-17
Goals for Chollas Creek (Wet Weather) – Caltrans

Goals	Unit of Measure	Assessment Metric
MS4 Discharges	Cooperative Implementation Agreement	Achieve compliance units by contributing funds to a cooperative implementation agreement or grant program
OR		
MS4 Discharges	Implement Nonstructural BMPs	Continued implementation of wet weather nonstructural BMP activities within the watershed
OR		
MS4 Discharges	Implement Structural BMPs	Continued implementation of wet weather structural BMP activities for proposed projects within the watershed

Table 4-18
Goals for Chollas Creek (Dry Weather) – Caltrans

Goals	Unit of Measure	Assessment Metric
MS4 Discharges	Reduction in Dry Weather Flow	Eliminate dry weather flows by implementing control measure to ensure effective prohibition
OR		
MS4 Discharges	Implement Dry Weather BMPs	Implement drought-tolerant landscaping and conversion to smart irrigation controllers within the watershed

4.3.6.2 Summary of Strategies and Schedules

Caltrans' jurisdiction areas include roadways, land adjacent to roadways, and facilities. Caltrans' jurisdictional strategies specifically focus on BMP implementation to reduce known pollutants within these areas. Caltrans is not permitted under the Municipal Permit; however, Caltrans is subject to TMDL requirements through its MS4 Permit (State Board, 2013). Caltrans has voluntarily contributed to the Water Quality Improvement Plan effort to provide a consistent and watershed-wide approach to meeting applicable TMDL requirements. The baseline strategies are continuously implemented and augmented as resources become available.

Impaired reaches throughout the state will be prioritized on the basis several factors, including, but not limited to, percent reduction needed, Caltrans drainage area contributing to the reach, and proximity to receiving waters. Reaches with metals TMDLs will likely be prioritized. This prioritization list is currently under negotiation between Caltrans Headquarters and State Water Control Board.

Caltrans has voluntarily contributed to the Water Quality Improvement Plan effort to provide a consistent and watershed-wide approach to meeting applicable TMDL requirements. The baseline strategies are continuously implemented and augmented as resources become available.

Attachment IV to the Caltrans MS4 Permit outlines a methodology for prioritizing stream segments included in TMDLs to which Caltrans is subject. The permit establishes BMP implementation requirements, evaluated in terms of compliance units. Caltrans is expected to achieve 1,650 compliance units per year through the implementation of retrofit BMPs, cooperative implementation, and post-construction treatment beyond permit requirements.

Impaired reaches throughout the state will be prioritized on the basis several factors, including, but not limited to, percent reduction needed, Caltrans drainage area contributing to the reach, and proximity to receiving waters. Reaches with metals TMDLs will likely be prioritized. This prioritization list is currently under negotiation between Caltrans Headquarters and State Water Control Board.

Caltrans' strategies vary from those of other RPs (in both type and name) to best address typical freeway characterization discharges from its right-of-way. Strategies include programs developed by Caltrans Headquarters for statewide execution and District 11 implementation. Caltrans' implementation of strategies within the WMA is dependent on legislative approval. A complete list of strategies and their anticipated implementation schedule is provided in Appendix I. The strategies and schedules are subject to change and are contingent upon annual budget approvals and funding availability. They will be modified through the adaptive management process as needed.

4.4 Water Quality Within Airport Authority Jurisdiction (908.21)

Water quality, in terms of copper and zinc concentrations in wet weather discharges from the Airport Authority, is a Focused Priority Condition in the Pueblo HU. The geographic extent of the Focused Priority Condition is the jurisdiction of the Airport Authority, which is the sole RP for the condition. The Airport Authority has identified goals and strategies that will be implemented throughout its jurisdiction. In addition, three drainage areas with historically higher concentrations of dissolved copper and zinc have been identified for targeted BMP implementation.

Section 4.4.1 presents final and interim goals and schedules. A summary of key strategies identified to meet the goals is presented in Section 4.4.2.

4.4.1 Goals and Schedules

Goals developed for the Focused Priority Condition target MS4 discharge concentrations. The outcomes of strategies are expected to help the Airport Authority comply with the Industrial General Permit (IGP) and the Municipal Permit. Table 4-19 lists the goals and schedule for meeting final and interim goals for this Focused Priority Condition.

Table 4-19
Goals for Water Quality (Copper and Zinc) Within Airport Authority
Jurisdiction (908.21)

WATER QUALITY						
Numeric Goals		Assessment Period and Fiscal Year				
		Current Permit Term	FY 16-20	FY 21-25	FY 26-30	FY 31-35
		FY 17	FY 18	FY 23	FY 28	FY 33
MS4 Discharges Jurisdiction-wide % of Samples With Concentrations Exceeding IGP Non-storm Water Action Levels (NALs)	Dissolved Copper ¹	71%	57%	46%	23%	10%
	Dissolved Zinc ¹	62%	50%	44%	11%	0%
OR						
		FY 17	FY 18	FY 23	FY 28	FY 33
MS4 Discharges Sub-basins 1, 3, and 5 (total or assess individually) % Load Reduction ²	Dissolved Copper	20%	36%	48%	75%	95%
	Dissolved Zinc	20%	36%	44%	85%	85%
OR						

Notes:

1. Concentration goals based on anticipated load reduction benefit of key strategies outlined in Appendix I; these include biweekly runway/taxiway sweeping by FY 17, optimizing runway rubber removal by FY 18, installation of PFC by FY 28, and initiating source reduction programs by FY 33.
2. Load goals based on anticipated load reduction benefit of key strategies outlined in Appendix I; these include biweekly runway/taxiway sweeping by FY 17, optimizing runway rubber removal strategies and increasing street sweeping areas by FY 18, increasing square footage of area treated with rubber removal/power washing by FY23, installation of PVC by FY 28, and initiating source reduction programs by FY 33.

Table 4-19 (continued)
Goals for Water Quality (Copper and Zinc) Within Airport Authority
Jurisdiction (908.21)

WATER QUALITY						
Numeric Goals		Assessment Period and Fiscal Year				
		Current Permit Term	FY 16-20	FY 21-25	FY 26-30	FY 31-35
Performance Metrics		FY 16	FY 18	FY 23		
MS4 Discharges Sub-basins 1, 3, and 5 (in total)	Acres/ Week	34 Acres/ Week (Current Frequency)	90 Acres/ Week (Approx. 3-fold increase in area)			
Area Treated with Street Sweeping						
MS4 Discharges Sub-basins 1, 3, and 5 (in total)	Square Feet/ Week	Average of 10,000 Square Feet per Week (Current Frequency)		Average of 20,000 Square Feet per Week (Approx. 2-fold increase in area)		
Area Treated with Rubber Removal and/or Power Washing						

Notes:

1. Concentration goals based on anticipated load reduction benefit of key strategies outlined in Appendix I; these include biweekly runway/taxiway sweeping by FY 17, optimizing runway rubber removal by FY 18, installation of PFC by FY 28, and initiating source reduction programs by FY 33.
2. Load goals based on anticipated load reduction benefit of key strategies outlined in Appendix I; these include biweekly runway/taxiway sweeping by FY 17, optimizing runway rubber removal by FY 18, installation of PVC by FY 28, and initiating source reduction programs by FY 33.

4.4.2 Summary of Strategies and Schedules

Strategies to meet the water quality goals for copper and zinc in wet weather discharges were selected to best suit the unique characteristics of the Airport Authority. For example, the airport is almost entirely paved, and space available for many traditional BMPs is severely limited.

The Airport Authority will continue to implement its core JRMP, which includes many strategies that have positive impacts on the water quality of MS4 discharges. To make progress toward its identified goals, the Airport Authority will enhance some existing JRMP strategies and will implement new strategies that concentrate on the Focused Priority Conditions.

The Airport Authority's approach focuses on areas that generate the Focused Priority Condition metals, namely, the airside impermeable surfaces (e.g., runways and taxiways) and parking lots. Removing pollutant materials from the ground surface and disposing of them properly before they are mobilized by rain runoff is fundamental. The Airport Authority plans to achieve this goal through enhanced source control BMPs, i.e., active programs of removing rubber (generated from aircraft tires during landings) and sweeping on the airside. The Airport Authority is also focusing on passenger parking lots, minimizing pollutants from runoff prior to discharge. The primary method to achieve this goal is the use of green infrastructure and treatment systems that collect and treat parking lot runoff.

Catch basin cleaning is another key to addressing general areas of discharge. The Airport Authority will increase the frequency of its basin inspection and cleaning. This step is anticipated to increase the amount of pollutants collected so that they are not discharged to receiving waters during rain events.

The Airport Authority's key strategies are summarized below. In addition, depending on the performance of near-term strategies and the availability of resources, optional strategies will be considered. A complete list of strategies to be implemented within the WMA is provided in Appendix I. Strategies and implementation schedules were identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the Water Quality Improvement Plan will be updated. The implementation of each strategy will be contingent upon annual budget approvals and funding availability.

Sweeping Airside Corridors

The Airport Authority has been sweeping the runway, taxiways, ramp areas, roads, and parking lots for several years, if not decades, prior to FY 16. Under the Water Quality Improvement Plan, sweeping on the eastern end of the airfield (in particular, the runway, taxiways, and vehicle service road) will be modified and enhanced to increase the effectiveness of sweeping. Modifications or enhancements are expected to result in an increase in the area swept and/or the frequency of sweeping, depending on available funding. The Airport Authority has obtained a Regen-Air vacuum sweeper, which has been shown to have performance better than that of mechanical broom sweepers for removing fine sediments, which often bind a higher proportion of heavy metals. In addition, the Airport Authority proposes to implement optimal sweeping locations and frequencies on runways, taxiways, and airfield service roads to maximize metals removal.

Rubber Removal and Power Washing

Aircraft tires and brakes, known to contain heavy metals, are considered likely to be major sources of copper and zinc. When a plane lands, the tires are not spinning initially but instead are dragging on the runway as well as being put under pressure by the weight of the airplane. The heat generated by friction on the tires is enough to melt the

rubber and leave hardened rubber deposits on the runway. Aircraft brakes, which are also likely sources of metals, are applied shortly after landing. Runway rubber removal is a critical maintenance technique for maintaining an adequate friction coefficient on the runway. The portion of the runway that requires routine rubber removal is the aircraft touchdown area (not the entire runway) on the eastern end of the airport, because that end of the runway is predominantly used by landing aircraft.

Rubber removal is currently conducted using methods and equipment similar to those for power washing, except that the water pressure used for rubber removal is much greater than that used for power washing. Water pressures used for rubber removal can approach 10,000 pounds per square inch (psi), while water pressures used for power washing are typically closer to 3,000 psi on asphalt surfaces. The Airport Authority wants to determine optimal runway rubber removal frequencies, equipment, methods, and locations to maximize pollutant removal. Expanding rubber removal and/or power washing to a larger portion of the runway, beyond the touchdown zone, is expected to improve runoff water quality.

Green Infrastructure and Treatment Systems

The Airport Authority is focusing on the following green infrastructure and treatment system projects:

- More than \$25 million has been expended to improve approximately 60 acres of public parking lots at San Diego International Airport. The improvements include small, strategically located areas of permeable pavement, three hydrodynamic separators, and a high-rate media filter that reduces metals concentrations and other conditions. This strategy was established in FY 13 and requires ongoing maintenance.
- The Green Build Terminal Expansion Project was completed in FY 14 at a cost of \$1 billion. The project included installation of numerous structural BMPs. The reconfigured public parking lot received three high-rate media filters, a hydrodynamic separator, and an acre of permeable pavers and swales. In addition, a high-rate media filter and 1.75 acres of permeable artificial turf were added on the airfield. Overall, the project addresses metals and various other conditions.
- On the northern side of the airfield, a new 16-acre public parking lot was opened in June 2014, and the project included installation of 12 modular wetland treatment systems.
- In August 2014, Landmark Aviation opened the new fixed-based operator facility (FBO), serving general aviation. Construction of the new 12.4-acre FBO included 2.9 acres of pervious pavement and bioswales.
- One facility on the northern side of the jurisdiction is still under construction and will become the new Rental Car Center (RCC). Storm water treatment controls are being incorporated into the 25-acre project site, including a total of 1.25 acres of bioretention swales.

Catch Basin Cleaning

The Airport Authority plans to protect a larger number of catch basin inlets and to increase the frequency of catch basin cleaning. On the southern side of the jurisdiction, screens were installed in front of curb inlets. These screens are easily cleaned by street sweepers and reduce pollutant loads in the catch basin. The Airport Authority will consider installing screens in front of additional curb inlets. Currently, priority catch basins at San Diego International Airport are cleaned quarterly, and all others are inspected annually and cleaned as necessary. High-priority areas are typically closer to terminals. The Airport Authority will identify other high-priority areas that may benefit from more frequent inspection and cleaning.

Enhanced Tenant BMP Inspections and Enforcement

The Airport Authority will enhance tenant BMP inspections and enforcement. Inspections will increase from quarterly to monthly or weekly and will be PGA-based. Tenant BMP enforcement will be achieved with a graph scoring system, and tenants will be encouraged to implement additional BMPs to achieve a better score.

Source Identification Study for Highest Pollutant-Generating Areas/Activities

The Airport Authority will design, implement, and evaluate a source identification study to determine the highest potential pollutant generating areas and PGAs.

Increased Inspections of Highest Pollutant Generating Areas/Activities

The Airport Authority will increase inspection frequency for the highest potential pollutant generating areas and PGAs.

The key strategies to be implemented to achieve the specified goals in Table 4-19 are as follows:

- (1) Determine and implement optimal street sweeping;
- (2) Determine and implement optimal runway rubber removal;
- (3) Determine and implement optimal catch basin cleaning;
- (4) Continue to implement green infrastructure at San Diego International Airport; and
- (5) Continue to identify and target high priority areas for enhanced inspections, and BMP implementation and enforcement.

Table 4-20 summarizes the key strategies identified for meeting final and interim goals for this Focused Priority Condition.

Table 4-20
Summary of Strategies for Water Quality (Copper and Zinc) Within Airport Authority Jurisdiction (908.21)

Strategy	Jurisdictional Areas				Priority WQCs				Implementation Schedule							
	Jurisdiction-Wide	Sub-Basin			Metals	Bacteria	Nutrients	Sediment	Trash	Previous Fiscal Year(s)	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Future Fiscal Year(s)
		1	3	5												
Sweeping of airside corridors	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Rubber removal		X	X	X	X					X	X	X	X	X	X	X
Green infrastructure and treatment systems — parking lot BMPs	X			X	X	X	X	X	X	X	X	X	X	X	X	X
Green infrastructure and treatment systems —green build terminal expansion project	X			X	X	X	X	X	X	X						
Green infrastructure and treatment systems —north side BMPs	X			X	X	X	X	X	X		X	X	X	X	X	X
Catch basin cleaning	X				X	X	X	X	X	X	X	X	X	X	X	X
Continue public education, participation and staff and tenant storm water training	X				X	X	X	X	X	X	X	X	X	X	X	X
Enhanced tenant BMP inspections and enforcement	X				X	X	X	X	X	X	X	X	X	X	X	X
Source identification study for highest pollutant-generating areas/activities	X				X				X				X	X	X	X
Increased inspections of highest pollutant-generating areas/activities	X				X			X	X					X	X	X

Note:
Implementation of strategies is dependent on approval of fiscal budgets and available resources.

Table 4-20 (continued)
Summary of Strategies for Water Quality (Copper and Zinc) Within Airport Authority Jurisdiction (908.21)

Strategy	Jurisdictional Areas					Priority WQCs				Implementation Schedule							
	Jurisdiction-Wide	Sub-Basin				Metals	Bacteria	Nutrients	Sediment	Trash	Previous Fiscal Year(s)	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Future Fiscal Year(s)
		1	3	5													
Optional Jurisdictional Strategies																	
Phase in advanced BMPs in priority areas	X					X	X	X	X	X							
Identify candidate areas for retrofit projects	X					X	X	X	X	X							
Enhance street sweeping through accelerating equipment replacement timelines	X					X					X						
Perform an evaluation of permeable friction course and other permeable surfaces	X					X					X						
Implement source reduction initiatives	X					X											
Preserve naturally functioning areas	X					X	X	X	X	X							
Identify candidate runoff water capture and reuse projects	X					X	X	X	X	X							
Implement an alternative compliance program for offsite structural BMP implementation	X					X	X	X	X	X							
Reduce storm water volume or volume offset of potable water use	X					X	X	X	X	X							

See Appendix I for criteria for initiating strategies.

See Appendix I for criteria for initiating strategies.

Note:
Implementation of strategies is dependent on approval of fiscal budgets and available resources.

4.5 Riparian Area Habitat in Paradise Creek (909.1)

Riparian area habitat in Paradise Creek is a Focused Priority Condition in the Lower Sweetwater HA. The geographic extent of the Focused Priority Condition is the drainage area of Paradise Creek within the jurisdiction of the City of National City (National City), which is the sole RP for the condition. National City has identified goals and strategies that will be implemented throughout its jurisdiction. In addition, particular areas in Paradise Creek and the area that drains to it have been identified for targeted BMP implementation.

Section 4.5.1 presents final and interim goals and schedules. A summary of key strategies identified to meet the goals is presented in Section 4.5.2.

4.5.1 Goals and Schedules

Goals developed for the Focused Priority Condition target MS4 discharge concentrations and creek restoration outcomes. Paradise Creek was chosen as the focused area because it was deemed to have the greatest potential for improvements benefiting both water quality and the community. While most of the other water bodies within National City are channelized and fenced off to prevent public access, several segments of Paradise Creek are directly accessible to the public in National City parks. In Paradise Creek, impacts on riparian area quality include a concrete channel bottom and non-native bank vegetation in the Kimball Park area and occasional trash at various points along the Creek.

Improving riparian area quality along Paradise Creek is part of National City's larger vision to provide residents in the central and western portions of its jurisdiction with improved access to natural environments and green spaces. National City expects that improvements to riparian area quality in Paradise Creek will positively impact the downstream Paradise Marsh portion of the Sweetwater Marsh Complex, which is part of the San Diego Bay National Wildlife Refuge. In addition, Paradise Creek is on the 303(d) List for selenium and one of National City's goals is to implement strategies that will lead to its removal from the 303(d) List. As detailed in Table 4-21, National City will assess existing selenium data during the current Municipal Permit term, submit data during the earliest available solicitation period, and finally achieve removal of Paradise Creek from the 303(d) List for selenium. Table 4-21 presents the goals and schedule for meeting final and interim goals for this Focused Priority Condition.

Table 4-21
Goals for Riparian Area Habitat in Paradise Creek (909.1)

RIPARIAN AREA QUALITY				
Performance Metrics		Assessment Period and Fiscal Year		
		Current Permit Term	FY 16-20	FY 21-25
		FY 16	FY 18	FY 22
Receiving Water Removal of 303(d) Selenium Listing	303(d) Listed Segment	Collect and analyze 48 samples for selenium, with zero exceedances of the water quality objective ¹	If Data Support Removal of Segment from 303(d) List, Submit Data During Earliest Available Solicitation Period	Removal of Paradise Creek from 303(d) List for Selenium
		FY 17		FY 22
Restore Native Riparian Vegetation and Wetlands	Remove Concrete Bottom from Paradise Creek	1,000 Linear Feet		Successful Establishment of Restored Vegetation and Wetlands, per Standards in Resource Agency Permits
	Wetland Restoration	6,000 Square Feet		
	Native Plants Replacing Turf, Invasive Plants, or Existing Impervious Area	45,000 Square Feet		
	Provide Treatment for Tributary Urbanized Areas	130 Treated Acres		

Notes:

1. These numbers are designed such that the when analyzed together with the historical data upon which the current 303(d) Listing is based, the entire data set (current study data plus historical data) will meet the delisting criteria in the State listing policy (State Board, 2004).

4.5.2 Summary of Strategies and Schedules

To make progress toward its identified goals, National City will implement new strategies and enhance existing JRMP strategies to address its Focused Priority Condition, riparian area quality in Paradise Creek. Figure 4-8 shows National City's jurisdiction within the Sweetwater Focused Priority Condition, where the strategies will be implemented.

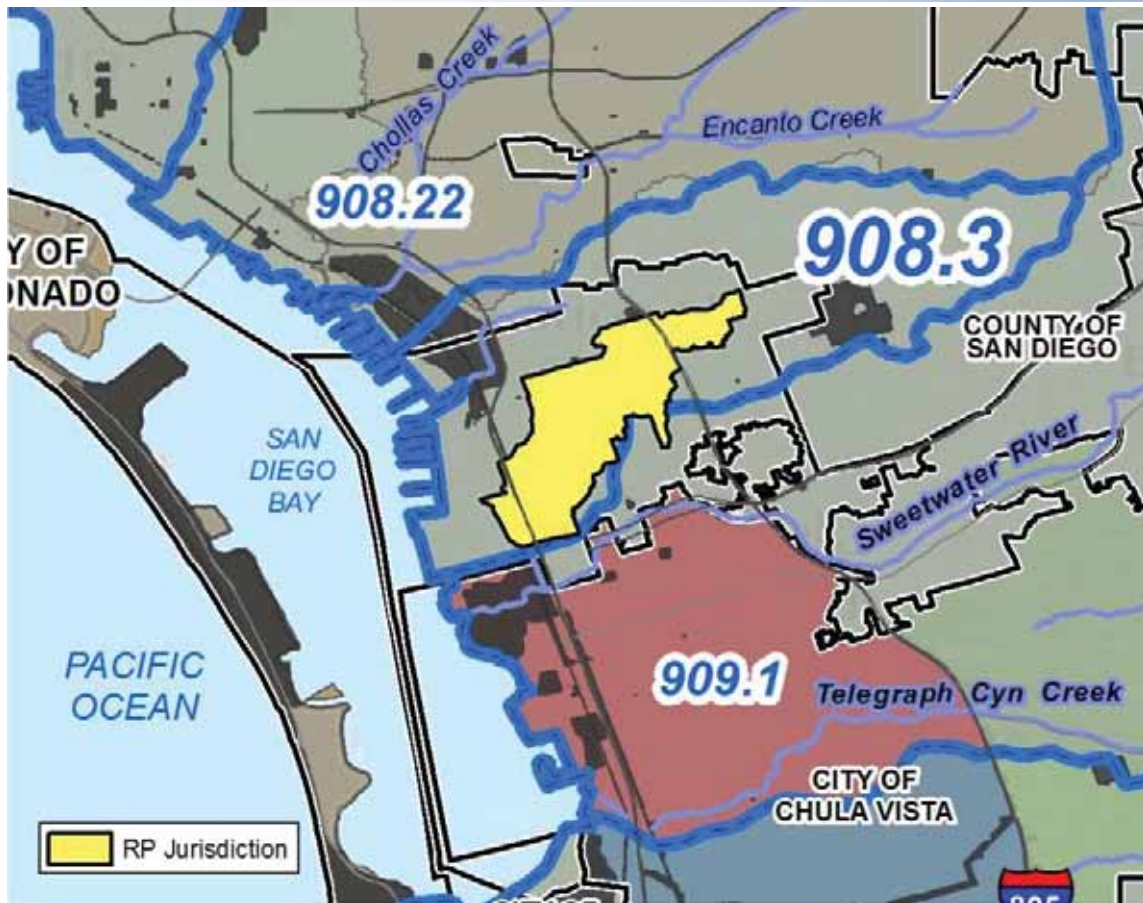


Figure 4-8
National City's Jurisdiction Within the Sweetwater Riparian Area Habitat
Focused Priority Condition

National City's strategies will provide improved aesthetics and better access to green space and natural habitats in a highly urbanized area, improve pedestrian access and walkability, and benefit riparian habitat and water quality. Water quality benefits include reducing runoff volume and levels of bacteria, metals, trash, and other pollutants. Key strategies are summarized below, and a complete list of National City's strategies is included in Appendix I.

National City's approach is to implement improvements directly in Paradise Creek and in areas tributary to the Creek. National City plans to restore the approximately 1,000-linear-foot reach of Paradise Creek that runs through Kimball Park by replacing the existing concrete-bottom channel with a natural-bottom channel and replacing turf grass and invasive plant species with native plants along the banks. National City will also retrofit surrounding areas that drain to this creek reach with LID measures, including bioretention areas, and a cistern to harvest water for irrigation within Kimball Park. National City has successfully obtained Proposition 84 grant awards from the State of California to help fund these creek restoration and LID retrofit projects.

National City will also convert its existing Public Works maintenance yards, which directly border Paradise Creek, to a transit-oriented residential housing project and a public park. In addition to converting these areas to land uses with lower pollutant discharge potential, water quality treatment measures will be incorporated into the project design.

With the help of a community group, Paradise Creek Educational Park, Inc., National City was able to secure a grant for Paradise Creek Educational Park that provides the resources to remove existing impervious area and replace it with native vegetation. As part of the project, a bioretention area, educational garden, and cistern to harvest water for the garden will also be installed at Paradise Creek Educational Park. Paradise Creek Educational Park, Inc. also maintains native vegetation along portions of Paradise Creek and completes regular creek cleanups.

In addition, depending on the performance of near-term strategies and the availability of resources, optional strategies will be considered. Strategies and implementation schedules were identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the Water Quality Improvement Plan will be updated. The implementation of each strategy will be contingent upon annual budget approvals and funding availability.

Table 4-22 summarizes the key strategies identified for meeting final and interim goals for this Focused Priority Condition.

Table 4-22
Summary of Strategies for Riparian Area Habitat in Paradise Creek (909.1)¹

Strategy	Jurisdictional Areas				Priority WQCs						Implementation Schedule							
	Jurisdiction-Wide	Paradise Creek Drainage Area	Project Areas			Riparian Area Quality	Bacteria	Nutrients	Sediment	Metals	Trash	Previous Fiscal Year(s)	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Future Fiscal Year(s)
			Kimball Park LID and Paradise Creek Restoration	"A" Avenue Green Street and Pedestrian	Paradise Creek Educational Park													
Delisting selenium in Paradise Creek		X				X							X	X	X	X	X	X
Creek restoration			X			X	X	X	X	X			X	X	X	X	X	X
Green infrastructure			X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
Land-use conversion			X	X		X	X	X	X	X			X	X	X	X	X	X
Impervious surface reduction			X	X		X	X	X	X	X			X	X	X	X	X	X
Community partnerships	X	X				X	X	X	X	X		X	X	X	X	X	X	X
Perform CRAM before and after grant projects			X	X		X							X					
Implement BMP-specific monitoring			X	X		X	X	X	X	X	X		X	X				
Collaboration with Sweetwater Authority to reduce irrigation runoff	X					X	X	X	X	X			X	X	X	X	X	X
Catch basin cleaning	X					X	X	X	X	X	X	X	X	X	X	X	X	X

Notes:

1. .Please see Appendix I for the full list of proposed strategies.
Implementation of strategies is dependent on approval of fiscal budgets and available resources.

Table 4-22 (continued)
Summary of Strategies for Riparian Area Habitat in Paradise Creek (909.1)¹

Strategy	Jurisdictional Areas				Priority WQCs				Implementation Schedule																
	Jurisdiction-Wide	Paradise Creek Drainage Area	Project Areas			Riparian Area Quality	Bacteria	Nutrients	Sediment	Metals	Trash	Previous Fiscal Year(s)	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Future Fiscal Year(s)							
			Kimball Park LID and Restoration	"A" Avenue Green Street and Pedestrian	Paradise Creek Educational Park																				
Optional Jurisdictional Strategies																									
Participate in a regional social services effort for homelessness	X						X																		X
Collaborate with Sweetwater Water Authority to prohibit over-irrigation	X						X	X	X	X															
Implement additional trash BMPs to comply with the upcoming state trash amendments	X																								X
See Appendix I for criteria for initiating strategies.																									

Notes:

1. Please see Appendix I for the full list of proposed strategies. Implementation of strategies is dependent on approval of fiscal budgets and available resources.

4.6 Physical Aesthetics in Lower Sweetwater HA (909.1)

Physical aesthetics impairment due to trash is a Focused Priority Condition in the Lower Sweetwater HA. Trash assessment data, public input, and anticipated future development along the bay front were factors that elevated trash to a Focused Priority Condition in this area. In addition, the RPs' efforts assist in proactively addressing the recently adopted state-led trash amendments.

Trash not only impacts the physical aesthetics of an area, but also can pose a health risk to humans and wildlife and can affect the beneficial uses of waterways. By focusing on physical aesthetics, the RPs can increase public awareness and education about proper waste disposal, which will ultimately reduce amounts of trash, leading to improvements in water quality. The RPs have worked collaboratively to identify final and interim goals for this Focused Priority Condition. Each RP has identified strategies to reduce amounts of trash, improve water quality, and increase public awareness and education within their jurisdictions. In addition, BMPs that focus on trash also have the potential to address other pollutants, such as bacteria and sediment, thus achieving multiple pollutant benefits.

The geographic extent of the Focused Priority Condition is the jurisdiction of the City of Chula Vista (Chula Vista) west of Interstate 805 and the Port of San Diego (collectively the RPs).

4.6.1 Goals and Schedules

The RPs identified final and interim goals to reduce trash from MS4 discharges in the Lower Sweetwater River HA (909.1); these goals are presented in Table 4-23. The RPs identified two goals that will demonstrate reductions in trash over multiple permit cycles. In addition, the RPs developed interim goals to measure short-term progress toward achieving the final goals. Efforts to address the goals will focus on identifying (1) known sources of trash in each jurisdiction, (2) appropriate strategies to reduce trash, and (3) where BMPs can be strategically located to achieve the greatest trash reductions.

The first goal identified in Table 4-23 seeks to increase the number of sites within the priority area having "optimal" trash scores. This goal incorporates a visual quantification of trash at a site. The methodology is based on the assessment process currently used by the RPs to assess trash from MS4 discharges. The RPs' storm water monitoring programs assess trash at MS4 outfalls during dry weather. Locations are categorized under one of five categories (optimal, sub-optimal, marginal, sub-marginal, or poor) on the basis of the amount of trash visually observed at the site. An optimal rating indicates that the site has little to no trash. Using this process, the RPs will assess MS4 outfalls within the Focused Priority Condition area to be able to identify the percentage of MS4 outfalls that receive optimal trash assessment scores during each assessment period (as identified in Table 4-23). Areas falling below "optimal" will be targeted with strategies to clean up existing trash and prevent future trash buildup. Using historical trash assessment data as a baseline, the RPs' goal is to incrementally increase the percentage of sites consistently meeting the optimal criteria. This will serve to demonstrate that RPs are reducing the amount of trash from their MS4s in the Focused

Priority Condition areas and will allow them to adjust their programs as needed to continue to show improvement over time.

The second goal identified in Table 4-23 focuses on incrementally increasing the drainage area treated by trash BMPs (structural control BMPs) in each jurisdiction. This goal was selected to demonstrate how the RPs will prioritize high-volume trash-generating areas within their own jurisdictions and implement appropriate BMP retrofits to address various sources of trash within these areas. The final and interim goals were based on the RP's current knowledge of high-trash areas in their jurisdictions. However, the RPs recognize that there are data gaps that will need to be addressed in the near term. A thorough assessment is needed of all available trash and source data, drainage areas, and potential locations in high-volume trash-generating areas to feasibly implement partial and full capture trash devices and other trash strategies. The approach for physical aesthetics within the Sweetwater River HA (909.1) and Otay River HA (910.2) may potentially serve as a model that the RPs can use in other areas of their jurisdictions.

Table 4-23
Goals for Physical Aesthetics in Lower Sweetwater HA (909.1)

PHYSICAL AESTHETICS						
Numeric Goal	Unit of Measure	Baseline	Assessment Period and Fiscal Year			
			Current Permit Term (FY 14 – FY 18)	FY 16-20	FY 21-25	FY 26-30
			FY 18	FY 20	FY 24	FY 29
MS4 Discharges % Optimal ¹ Trash Assessment Scores	MS4 Outfalls Assessed for Trash	60% ²	65%	75%	85%	95%
OR						
MS4 Discharges % Jurisdictional High Volume Trash Drainage Area Treated for Trash within 909.1 ³	Feasible Drainage Area for BMP retrofit	Historical Trash Assessment Data ⁴	10%	20%	50%	90%

Notes:

- Historically, an optimal score was given to sites meeting the following requirements: "On first glance, no trash visible. Little or no trash (<10 pieces) evident when evaluated area is closely examined for litter and debris." This definition may change in the future and will be noted in Water Quality Improvement Plan updates.
- Based on the RPs' cumulative number of site visits of major MS4 outfalls in the Focused Priority Condition area for dry weather and MS4 outfall monitoring during FY 12 through FY 14.
- These values are based on best available information and current jurisdictional knowledge. A feasibility study is required to determine where BMP retrofits can be implemented.
- An assessment is needed and will incorporate review of all available trash and source assessment data, drainage areas, and potential locations in high-volume trash-generating areas to feasibly implement structural control BMPs to identify or verify high-volume trash areas and % area feasible to retrofit with trash BMPs. The goals may be updated accordingly and provided in a future annual report.

4.6.2 Summary of Strategies and Schedules

The RPs will continue to implement their core JRMP, which includes many strategies that have positive impacts on trash. To make progress toward their identified goals, the RPs will both enhance specific JRMP strategies and implement new strategies that concentrate on trash.

The RPs' approach to improving the physical aesthetics Focused Priority Condition is to identify targeted areas within their jurisdictions and implement strategies that will reduce trash from their MS4 they operate. An initial assessment built upon available historical maintenance and monitoring data will be used to identify high trash-generating areas within the geographic extent of the Focused Priority Condition for both Chula Vista and the Port of San Diego. From this assessment, the opportunities for retrofits or other treatment methods will be identified and prioritized. Retrofits may be structural BMPs such as trash guards or catch basin inserts within the MS4. Other treatment options may include enforcing requirements for retrofits of trash enclosures on private and public property and providing targeted education and outreach to reduce the sources of trash.

It is anticipated that a combination of specific strategies will allow the RPs to make progress toward, and ultimately achieve, the established goals for this Focused Priority Condition. Part of the RPs' long-term strategy for addressing physical aesthetics is to collaborate with other RPs in Sweetwater and Otay HUs to conduct public perception surveys and adapt programs in response to public input. The surveys are intended both to inform strategy selection and assess progress over time. In addition, data currently available to assess high-volume trash areas may not reflect areas most important to the public. Including the public in the assessment and prioritization process will potentially engage residents, visitors, and business owners and begin the integral first steps toward source control for trash. Improvement of physical aesthetics is expected to improve water quality for multiple pollutants in addition to trash.

A complete list of strategies to be implemented by each jurisdiction within the WMA is provided in Appendix I. Subsets of each RP's strategies are also summarized below. In addition, depending on the performance of near-term strategies and the availability of resources, optional strategies will be considered in the future. Strategies and implementation schedules were identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the Water Quality Improvement Plan will be updated. The implementation of each strategy will be contingent upon annual budget approvals and funding availability.

4.6.2.1 City of Chula Vista

Chula Vista's approach to improving the physical aesthetics within the Lower Sweetwater HA is to identify targeted areas within its jurisdiction and implement strategies focused primarily on trash. Figure 4-9 shows Chula Vista's jurisdiction within the Sweetwater Focused Priority Condition, where the strategies will be implemented.

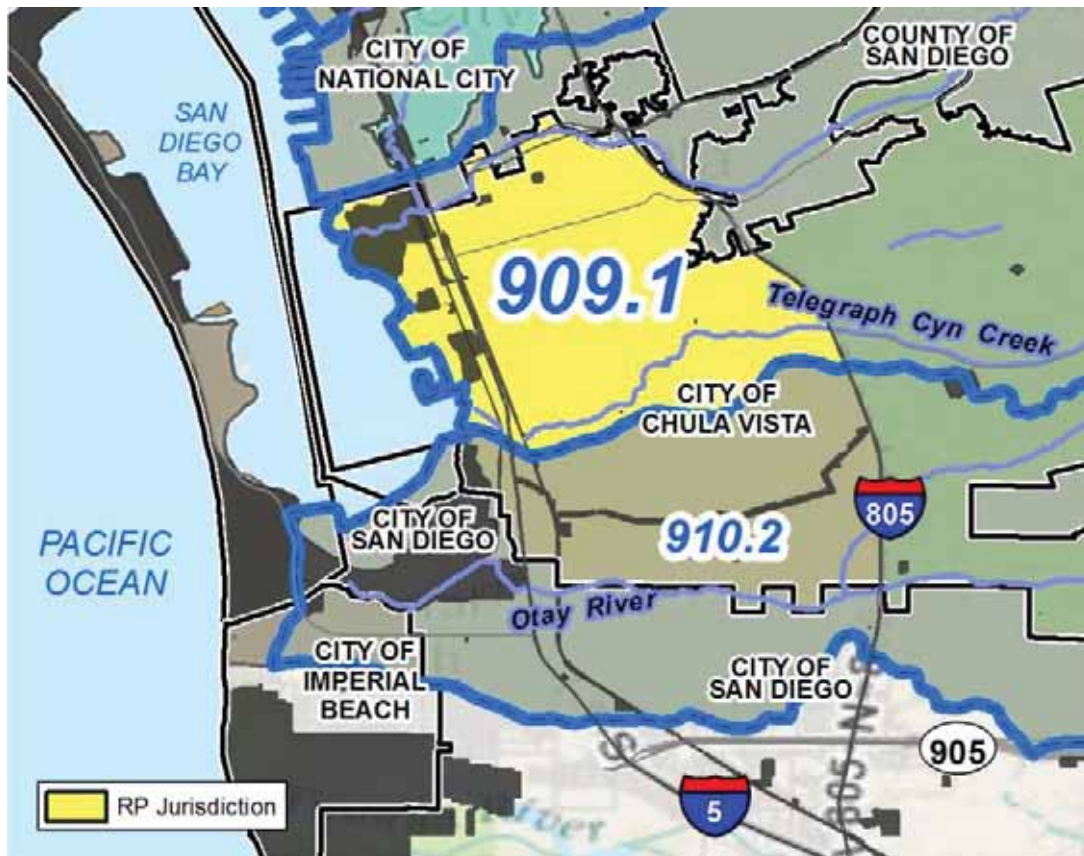


Figure 4-9
Chula Vista's Jurisdiction Within the Sweetwater Physical Aesthetics
Focused Priority Condition

To identify high-volume trash-generating areas within the geographic extent of the Focused Priority Conditions, Chula Vista will build upon historical catch basin data and additional monitoring and assessment results by FY 17. On the basis of previous water quality programs, the area west of Interstate 805 is known to be high density, with many commercial businesses, dirt alleys, and illegal dumping issues. Identifying hot spots will help addresses trash and other water quality conditions. Using the hot spot maps created in this effort, Chula Vista plans to revise its current facilities-based inspection program to focus on trash pollutant-generating activities. Inspections, including education and outreach during the inspection, are intended to reduce and eliminate trash discharges from existing development by providing appropriate management practices to commercial businesses. Chula Vista's voluntary CLEAN Business Program, with 200 businesses already certified, is one example of this blended enforcement and education effort that encourages environmental stewardship by reducing trash pollution and offers other benefits such as water and energy conservation.

The hot spots maps may also be used to target outreach to residents, including HOAs. As with reducing waste from commercial entities, reducing trash from residential areas and encouraging behavioral change is true source control. Chula Vista will continue to identify and promote opportunities to educate the public and businesses via Chula Vista's website, bill inserts, door hangers, community events, school programs, and collaboration with the Otay Water District and Sweetwater Authority Agencies.

Changing the behavior of residents, business owners, and visitors takes time. Chula Vista will continue to remove trash and other pollutants from publicly maintained facilities such as MS4 infrastructure and roadways. Inspections and cleaning of MS4 infrastructure and street sweeping will continue, in addition to the identification of retrofit opportunities for infrastructure to capture and remove trash and sediment, providing multiple benefits to water quality.

4.6.2.2 Port of San Diego

The Focused Priority Condition in the Sweetwater River HA (909.1) is physical aesthetics due to trash pollution. The Port of San Diego's jurisdictional area in this HA is approximately 347 acres, all of which fall within the City of Chula Vista. Facilities or land uses that may be potential sources of trash in this area of the Port's jurisdiction include six commercial facilities, seven industrial facilities, two municipal facilities, and two parks. In addition to identifying strategies to address the current sources, the Port is also identifying how to address trash in the future development of the Chula Vista Bayfront area as part of the Port of San Diego's Chula Vista Bayfront Master Plan. This highly visible development area presents the Port of San Diego opportunities to implement a variety of strategies to address trash from development and existing development sources. Figure 4-10 shows the Port of San Diego's jurisdiction within the Sweetwater Focused Priority Condition, where the strategies will be implemented.

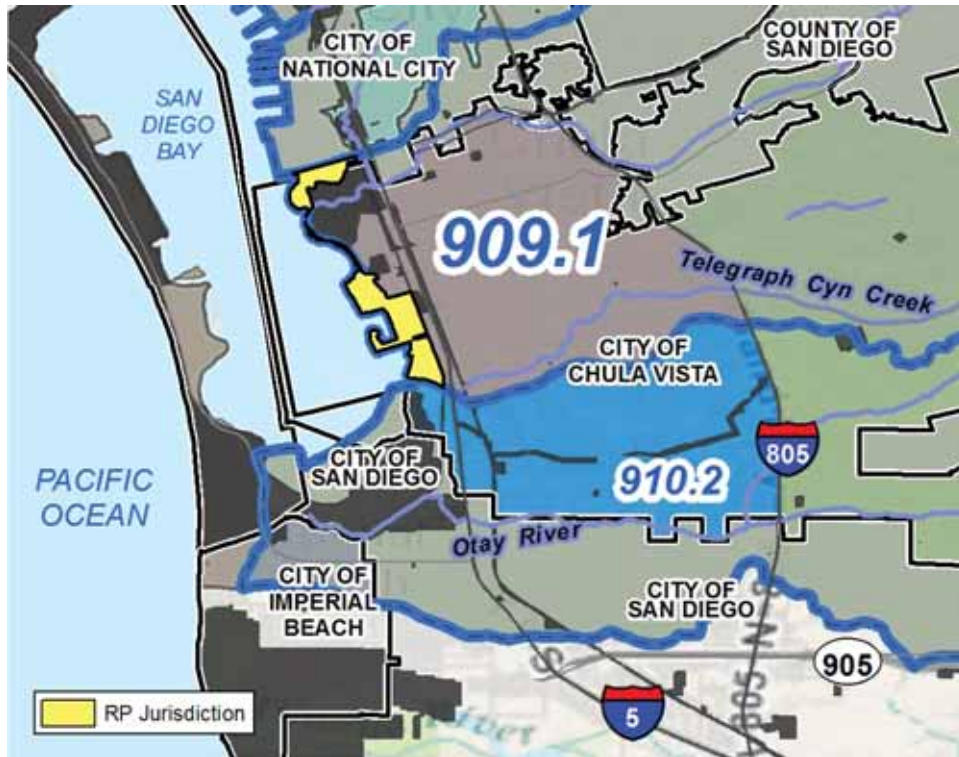


Figure 4-10
Port's Jurisdiction Within the Sweetwater Physical Aesthetics
Focused Priority Condition

The strategies identified by the Port focus on reducing the amount of trash, adding structural controls where feasible, improving water quality, and increasing public awareness through education and outreach. The Port will continue to implement their core JRMP program, is updating their program, and have identified new strategies to further address trash jurisdiction-wide and on a targeted basis. As presented in Table I-11 in Appendix I, the types of strategies include permit-required administrative type JRMP updates, permit-required JRMP implementation efforts, potential enhancements to the Port's JRMP program, as well as other non-permit required strategies. Non-permit required strategies include clean-up events, special studies or pilot projects.

To effectively target potential problem areas and prioritize efforts, the Port will evaluate available trash data from past JRMP activities (such as dry weather monitoring, street sweeping, MS4 maintenance, and park maintenance), cleanup events, and other data sources relevant to this area to identify high volume trash generating areas and locations where implementation of Trash BMP retrofits may be feasible. The Port will then be able to prioritize areas and have a targeted implementation approach for the selected strategies ranging from source control activities to partial and full capture trash BMPs.

Municipal Permit-required JRMP implementation efforts include activities that effectively reduce trash and, to a lesser extent, bacteria. These activities include, but are not limited to, MS4 infrastructure cleaning, street sweeping, and industrial and commercial facility inspections. The Port will continue to inspect and remove trash and other pollutants from publicly maintained facilities such as MS4 infrastructure, roadways, and parks. In addition, the Port will assess the feasibility of installing trash capture devices (structural BMPs) in the high-volume trash-generating areas to collect and remove trash prior to its entry into the MS4 that it operates. In combination, these strategies will prevent trash and other pollutants from reaching the receiving waters. The Port may also do a pilot project to assess the effectiveness of using trash skimmers in marina basins along the Chula Vista Bayfront.

Source control strategies to target trash will include education and outreach, as well as an internal assessment of trash and waste diversion measures (i.e., strategies to reduce the amount of waste going to local landfills or contributing to littering) currently in place to identify structural or source control improvements for high volume trash generating areas. In addition to reducing trash, implementing these strategies will also address bacteria and other water quality pollutants (e.g., sediment, metals), and will protect wildlife from harmful debris.

Table 4-24 summarizes a subset of the RPs' strategies identified for meeting interim and final goals for this Focused Priority Condition.

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Table 4-24
Summary of Strategies for Physical Aesthetics in Lower Sweetwater HA (909.1)

Strategy	Jurisdictional Areas		Priority WQCs				Implementation Schedule									
							Previous Fiscal Year(s)	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Future Fiscal Year(s)			
	Trash	Bacteria	Nutrients	Sediment	Metals											
Special Study: Identification of high volume trash-generating areas and potential high-volume trash areas feasible for retrofits	Chula Vista (West of I-805)	X	X	X					X							
			X		X				X							
			X		X				X							
			X		X				X							
			X		X				X							
			X		X				X							
			X		X				X							
			X		X				X							
			X		X				X							

Table 4-24 (continued)
Summary of Strategies for Physical Aesthetics in Lower Sweetwater HA (909.1)

Strategy	Jurisdictional Areas		Priority WQCs					Implementation Schedule						
	Chula Vista (West of I-805)	Port of San Diego	Trash	Bacteria	Nutrients	Sediment	Metals	Previous Fiscal Year(s)	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Future Fiscal Year(s)
Optional Jurisdictional Strategies														
Collaborate with regional education and outreach efforts	X	X	X	X										See Appendix I for criteria for initiating strategies
Support organizations and regional social services effort for homelessness	X	X	X	X										
Installation of inlet filters at storm drains in high volume trash generating areas		X	X			X								
Replace/Upgrade current street sweeping equipment to new, more efficient and effective options (e.g., vacuum sweeper)		X	X	X		X	X							
Install trash skimmers in marina basins		X	X											

4.7 Swimmable Waters (Beaches) in the Coronado HA (910.1)

Swimmable water at beaches is a Focused Priority Condition in the Otay HU. This Focused Priority Condition is intended to address receiving water conditions and preserve and enhance swimmable waters. For the purposes of this Water Quality Improvement Plan, recreational uses of water for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, and fishing. While bacteria typically compose the pollutant of concern for protecting public health while swimming, this Focused Priority Condition is intended to be broad to allow jurisdictional focus on multiple conditions in order to address other priorities identified in the future.

The geographic extent of the Focused Priority Condition is the jurisdictional boundaries of the City of Coronado (Coronado), the City of Imperial Beach (Imperial Beach), and the Port of San Diego (Port) (collectively, RPs) within the Coronado HA (910.1) in the Otay HU. Swimmable waters (beaches) strategies apply only to the areas within the RPs' jurisdictions and exclude federal properties (e.g., U.S. Navy facilities).

4.7.1 Goals and Schedules

The RPs identified final and interim goals toward maintaining swimmable waters at beaches in their respective jurisdictions in the Coronado HA (Table 4-25). Goals developed for the Focused Priority Condition target bacteria in MS4 discharges and illicit discharges. The RPs identified two goals that will demonstrate reductions in bacteria over multiple permit cycles. In addition, the RPs developed interim goals to measure short-term progress toward achieving the final goals. Strategies to address the goals will focus on identifying (1) known sources of bacteria in each jurisdiction, (2) the types of BMPs that will reduce bacteria from identified sources, and (3) locations where BMPs can be strategically place to achieve the greatest load reductions.

Delisting water bodies from the 303(d) List is the first goal identified in Table 4-25 for the Swimmable Waters condition. TThe RPs will undertake strategies in the listed area to ensure that they meet water quality standards. The goal is to have the Tidelands Park beach segment delisted by the State by 2024 or sooner. The final goal's assessment metric, an exceedance frequency of less than 15 percent, was based on the Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List using the binomial distribution methodology.

The RPs' interim goals demonstrate an incremental decrease in the percentage of water quality samples exceeding water quality objectives for *Enterococcus* (REC-1) as compared with a baseline determined from historical County of San Diego Department of Environmental Health (DEH) data. The interim goals will allow the RPs to demonstrate the effectiveness of the strategies implemented by each RP to remove bacteria from its MS4 discharges into the listed beach segments.

The current interim goal were based on a preliminary review of the existing DEH data. The process is underway to gather additional MS4 and other receiving water data

(where available) and to expand from the initial assessment to better understand the water quality conditions at the sites. The RPs also recognize that there are gaps in seasonal data sets that will need to be addressed in the near term. Such refinements will enable the RPs to identify whether the interim goals need to be modified or whether sufficient data are available to support a delisting of the beach segment. The process will also help identify where additional strategies may be needed to adequately address MS4 sources so that the beach can be delisted in the future.

The second goal involves demonstrating that the water quality at the beaches is not impaired and then relaying this message to the public through the use of a Water Quality Report Card (Table 4-25). Public perception and awareness of water quality is a key component of the RPs' approach to promoting swimmable waters (REC-1 beneficial uses) at their beaches. Current efforts, such as the one developed by the nonprofit organization, *Heal the Bay*, use a report card system to provide grades to beach areas. The focus of the report card is to provide a public-friendly mechanism for reporting water quality conditions. The goal of using the report card is to obtain a higher percentage of "A" ratings over time in both dry and wet weather by reducing water quality contamination due to bacteria. The RPs will evaluate a pre-set number of beaches (estimated to be four to five) in the Coronado HA (910.1) to determine the current rating and implement targeted strategies to address bacteria sources and improve or sustain "A" ratings. The RPs' interim goals reflect an approach to incrementally increase the percentage of time that the beaches consistently meet the A rating criteria in dry and wet weather during each assessment period (as identified in Table 4-25). This will serve to demonstrate that RPs are adequately addressing bacteria from their MS4s in the Focused Priority Condition area.

Table 4-25
Goals for Swimmable Waters (Beaches) in the Coronado HA (910.1)

SWIMMABLE WATERS						
Numeric Goal	Unit of Measure	Baseline	Assessment Period and Fiscal Year			
			Current Permit Term (FY 16 – FY 18)	FY 16-20	FY 21-25	FY 26-30
Receiving Water Removal of 303(d) Indicator Bacteria Listings for Recreation Water Contact (REC-1 Beneficial Use)	% of Samples Exceeding WQOs San Diego Bay Shoreline, Tidelands Park ¹	15%	FY 18	FY 20	FY 24	FY 29
			Maintain 15%	Maintain 15%	15% ²	Delist San Diego Bay Shoreline, Tidelands Park from 303(d) List for <i>Enterococcus</i> (REC-1)
OR						
Performance Metrics						
Water Quality Report Card – Achieve A grade and inform the public	% Beaches ³ Achieving Water Quality Report Card Grade Dry Weather (Summer and Winter)	75% of Beaches Grade A ⁴	83% of Beaches Grade A	92% of Beaches Grade A	92% of Beaches Grade A	
	% Beaches ³ Achieving Water Quality Report Card Grade Wet Weather	44% of Beaches Grade A ⁵	50% of Beaches Grade A	58% of Beaches Grade A	67% of Beaches Grade A	75% of Beaches Grade A

Notes:

1. Applicable to the City of Coronado and the Port of San Diego.
2. The Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List states that WQOs for bacteria are not exceeded using a binomial distribution methodology. The Policy also allows use of a reference beach to compare results. The binomial distribution allows approximately 15% of samples to exceed WQO.
3. Percentage of beaches will be calculated using a three year rolling average of four beaches within in the Coronado HA (910.1).
4. Baseline for dry weather calculated using a three year (Years 11-12, 12-13, 13-14) rolling average of the scores from the Heal the Bay report cards for four beaches within the Coronado HA (910.1).
5. Baseline for wet weather calculated using a three year (Years 11-12, 12-13, 13-14) rolling average of the scores from the Heal the Bay report cards for four beaches within the Coronado HA (910.1).

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4.7.2 Summary of Strategies and Schedules

The RPs will continue to implement their core JRMP, which includes many strategies that have positive impacts on the water quality of MS4 discharges. To make progress toward their identified goals, the RPs will both enhance specific JRMP strategies and implement new strategies that target bacteria stressors to the Focused Priority Condition.

The RPs' approach to improving swimmable beaches is to implement strategies to reduce sources of bacteria, and to obtain a better understanding of the public's perception of water quality conditions. It is anticipated that a combination of specific strategies will allow the RPs to make progress toward, and ultimately achieve, the established goals for this Focused Priority Condition. In Coronado and Imperial Beach, many of the MS4 outfalls within the Focused Priority Condition area have low-flow and first-flush diversions to the sanitary sewer to prevent bacteria from entering the receiving waters during dry weather and during the initial portions of storms. Examples of strategies include continued and potentially enhanced MS4 infrastructure and public road operation and maintenance activities. These strategies are effective in reducing trash, sediment, and metals, and have a potential benefit of bacteria reduction. For example, in Coronado, street sweeping on public roads is conducted weekly, and beachfront areas within the Focused Priority Condition are typically hand swept or otherwise maintained daily and kept free of trash and debris.

Because jurisdictions have been continuously implementing and progressively improving their jurisdictional programs and strategies for over the last 12 years to improve water quality, one of the first strategies to be implemented by the RPs is the assessment of available data to determine whether the segments named on the 303(d) List are still impaired. If impairments are verified, follow-up source investigations will be initiated to direct future implementation efforts.

Public perception of water quality will also be assessed. The public's perception of water quality is equally as important to the RPs within the Coronado HA (910.1) as is the impairment assessment. The public perception surveys are intended both to refine the strategies and to assess progress over time. Monitoring data alone may not identify the areas of public concern or perception. Survey results will be used within the adaptive management framework to assess the effectiveness of current strategies and to determine changes that may be needed.

A complete list of strategies to be implemented within the WMA is provided in Appendix I by jurisdiction. Subsets of the RPs' strategies are also summarized below. In addition, depending on the performance of near-term strategies and the availability of resources, optional strategies will be considered in the future. Strategies and implementation schedules were identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the Water Quality Improvement Plan will be updated. As strategies are modified, the

Water Quality Improvement Plan will be updated. The implementation of each strategy will be contingent upon annual budget approvals and funding availability.

4.7.2.1 City of Coronado

Coronado's approach to improving swimmable beaches is to implement strategies focused on sources of bacteria and trash, and to obtain a better understanding of the public's perception of water quality conditions. Figure 4-11 shows Coronado's jurisdiction within the Coronado HA Focused Priority Condition, where the strategies will be implemented.



Figure 4-11
Coronado's Jurisdiction Within the Coronado HA Swimmable Beaches
Focused Priority Condition

Frequent maintenance of public areas is a key approach for Coronado. Jurisdictional strategies include daily beach patrols for trash and debris and weekly street sweeping and hardscape cleaning throughout the entire jurisdiction. There are 13 low-flow and first-flush diversions throughout Coronado that are inspected bimonthly. The continuous maintenance of public areas and facilities reduces the amounts of trash, bacteria, sediment, and other pollutants on beaches and in receiving waters. In addition, Coronado administers surveys to collect data to inform targeted education and outreach campaigns and to evaluate municipal services. Collaboration with the other RPs to assess public perception will build upon historical data to guide adaptive management for Coronado.

4.7.2.2 City of Imperial Beach

Imperial Beach's approach to improving swimmable beaches is to implement strategies focused on sources of bacteria and trash, and to obtain a better understanding of the public's perception of water quality conditions. Figure 4-12 shows Imperial Beach's jurisdiction within the Coronado HA Focused Priority Condition, where the strategies will be implemented.



Figure 4-12
Imperial Beach's Jurisdiction Within the Coronado HA Swimmable Beaches
Focused Priority Condition

Collaboration with other watershed stakeholders is integral to Imperial Beach's approach to water quality improvement. Imperial Beach continues to work with Scripps Institute of Oceanography to support research activities such as coastal monitoring and grant applications for work along the Imperial Beach shoreline. Collaboration with the U.S. Fish and Wildlife Service has allowed for several restoration projects with additional projects planned for the future. Collaboration with the Tijuana National Estuarine Research Reserve provided an opportunity for implementation of low-impact development within the Focused Priority Condition. In addition to the collaborative opportunities, Imperial Beach will continue to maintain MS4 infrastructure and public roadways and address discharges from existing development to reduce amounts of bacteria, trash, and other pollutants from MS4s to meet the swimmable waters goals.

4.7.2.3 Port of San Diego

The Focused Priority Condition in the Otay River HA (910.1) is Swimmable Waters (beaches). The Port of San Diego's jurisdictional area in the Otay River HA (910.1) is approximately 242 acres. Facilities or land uses in this portion of the Port's jurisdiction includes 32 commercial facilities (including marinas, restaurants, general retail, and hotels) and three parks (e.g., Tidelands Park). The Port will implement various JRMP activities to reduce or eliminate bacteria with respect to its MS4. A targeted effort will

focus on potential MS4 discharges from the Port's boundaries within the Tidelands Park drainage area, which is currently on the 303(d) List of impaired water bodies. Figure 4-13 shows the Port's jurisdiction within the Coronado HA Focused Priority Condition, where the strategies will be implemented.

Tidelands Park is a 22-acre waterfront park that offers a small beach, recreational fields, picnic areas and open space for a variety of outdoor activities. In addition to addressing water quality, the Port is also interested in identifying ways to increase the use of the park by residents, visitors and the local community and promoting the park as a venue for safe waterside activities. The Port's approach for Swimmable Waters (bacteria) within the Tidelands Park drainage area may also potentially serve as a model to address other San Diego Bay beach areas within the Port's jurisdiction.

The Port's strategies identified for Tidelands Park focus on reducing bacteria and trash, improving water quality, obtaining a better understanding of the public's perception of water quality conditions, and increasing public awareness through education and outreach. Table I-11 in Appendix I identifies the types of Port strategies, including permit required administrative type JRMP updates and permit required JRMP implementation efforts. In addition to updating their current JRMP program per permit requirements, the Port identified a number of programmatic enhancements and other strategies to address sources of bacteria with respect to its MS4. Table I-11 provides information on when implementation of the different strategies may occur.



Figure 4-13
Port's Jurisdiction Within the Coronado HA Swimmable Beaches Focused
Priority Condition

The Port currently implements a number of permit required JRMP activities as well as other jurisdictional programs that address potential sources of bacteria within the Tidelands Park drainage area. These activities include, but are not limited to, dry weather monitoring, MS4 infrastructure inspection and cleaning, municipal park inspections, storm drain inlet inserts, and street and parking lot sweeping. Non-permit required strategies that are currently being implemented in Tidelands Park include, but are not limited to, the Port's preventative maintenance program at park restrooms and the pet waste bag program. Enhancements or new strategies that may be implemented include, but are not limited to, delisting studies or other special studies and public surveys. In addition to addressing bacteria, implementing these strategies will also address trash and potentially other water quality pollutants (e.g., sediment, metals).

The Port will coordinate with the City of Coronado to ascertain whether potential sources of bacteria have been adequately addressed, whether removal of Tidelands Park from the 303(d) List is possible, and, if not, what actions would likely need to be taken for delisting to be achieved. The Port is also aware of the importance of public perception and awareness of water quality when promoting swimmable waters (REC-1) uses at beaches like Tidelands Park. The Port will collaborate with the Cities of Coronado and Imperial Beach to use a report card system to provide a public-friendly mechanism for reporting water quality conditions at the beaches during each assessment period.

Table 4-26 summarizes a subset of the RPs' strategies identified for meeting interim and final goals for this Focused Priority Condition.

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Table 4-26
Summary of Strategies for Swimmable Waters (Beaches) in the Coronado HA (910.1)

Strategy	Jurisdictional Area			Priority WQCs					Implementation Schedule						
	Coronado	Imperial Beach	Port of San Diego	Trash	Bacteria	Nutrients	Sediment	Metals	Previous Fiscal Year(s)	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Future Fiscal Year(s)
Special Study: Delisting studies (Tidelands Park Listed Segment)	X		X		X					X	X	X	X	X	X
Street sweeping and hardscape cleaning frequencies: Coronado—every street weekly Imperial Beach—daily in Tidelands Park area Port—weekly in Tidelands Park public parking lot and surrounding Port jurisdiction draining to listed segment	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Low-flow and first-flush diversions	X			X	X	X	X	X	X	X	X	X	X	X	X
Support of coastal research	X			X	X	X	X	X	X	X	X	X	X	X	X
Bayshore bikeway access improvement		X (10 th Street)		X	X	X	X	X	X	X	X	X	X	X	X
Eco bike route project		X (Palm Avenue)		X	X	X	X	X	X	X	X	X	X	X	X
Pump stations		X (West side)		X	X	X	X	X	X	X	X	X	X	X	X
Cleanup events	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Note:
Implementation of strategies is dependent on approval of fiscal budgets and available resources.

Table 4-26 (continued)
Summary of Strategies for Swimmable Waters (Beaches) in the Coronado HA (910.1)

Strategy	Jurisdictional Area			Priority WQCs					Implementation Schedule						
	Coronado	Imperial Beach	Port of San Diego	Trash	Bacteria	Nutrients	Sediment	Metals	Previous Fiscal Year(s)	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Future Fiscal Year(s)
MS4 catch basin filters	X (Targeted Areas)	X		X	X	X	X	X	X	X	X	X	X	X	X
Restoration projects		X (San Diego Bay)		X	X	X	X	X	X	X	X	X	X	X	X
Trash receptacle assessments	X (Targeted Areas)		X (Targeted Areas)	X	X	X	X	X		X	X	X	X	X	X
Public perception surveys in targeted areas	X	X	X	X	X						X				X
Increased MS4 inspections and cleaning	X (Targeted Areas)	X	X (Targeted Areas)	X	X	X	X	X			X	X	X	X	X
Pet waste bag dispensers in parks	X		X		X				X		X	X	X	X	X
Optional Jurisdictional Strategies															
Implement unimproved alleys enhancements		X		X	X	X	X	X							
Support organizations and regional social services effort for homelessness			X	X	X										
Replace/upgrade current street sweeping equipment to new, more efficient and effective options			X	X	X		X	X							
See Appendix I for criteria for initiating strategies.															

Note:
Implementation of strategies is dependent on approval of fiscal budgets and available resources.

See Appendix I for criteria for initiating strategies.

4.8 Physical Aesthetics in the Otay River HA (910.2)

Physical aesthetics impairment due to trash pollution is a Focused Priority Condition in the Otay River HA (910.2). Previous trash monitoring data, existing management plans such as the Otay River Watershed Management Plan (ORWMP), public input, and anticipated future development along the bay front were factors that elevated trash to a Focused Priority Condition in this area. In addition, the RPs' efforts assist in proactively addressing the upcoming state-led draft trash amendments.

Trash not only impacts the physical aesthetics of an area, but also can pose a health risk to humans and wildlife and can affect the beneficial uses of waterways. By focusing on physical aesthetics, the RPs can increase public awareness and education about proper waste disposal, which will ultimately reduce amounts of trash, leading to improvements in water quality. The RPs worked collaboratively to identify final and interim goals for this Priority Condition. Each RP has identified strategies to reduce amounts of trash, improve water quality, and increase public awareness and education within their jurisdictions. In addition, BMPs that focus on trash also have the potential to address other pollutants, such as bacteria and sediment, thus achieving multiple pollutant benefits.

The geographic extent of the Focused Priority Condition is the jurisdiction of the City of Chula Vista (Chula Vista) west of Interstate 805, the eastern portion of the City of Imperial Beach (IB), and the Port of San Diego (Port) (collectively the RPs). In addition, particular portions of these areas will be identified for targeted BMP implementation.

4.8.1 Goals and Schedules

The RPs identified final and interim goals to reduce trash from MS4 discharges in the Otay River HA (910.2), which are presented in Table 4-27. As in the Lower Sweetwater HA (909.1), the RPs identified two goals that will demonstrate reductions in trash over multiple permit cycles. In addition, the RPs developed interim goals to measure short-term progress toward achieving the final goals. Efforts to address the goals will focus on identifying (1) known sources of trash in each jurisdiction, (2) appropriate strategies to reduce trash, and (3) locations where BMPs can be strategically placed to achieve the greatest trash reductions.

The first goal identified in Table 4-27 is to increase the number of sites within the priority area having "optimal" trash scores. This goal incorporates a visual quantification of trash at a site. The methodology is based on the assessment process currently used by the RPs to assess trash from MS4 discharges. The RPs' storm water monitoring programs assess trash at MS4 outfalls during dry weather. Locations are categorized under one of five categories (optimal, sub-optimal, marginal, sub-marginal, or poor) based on the amount of trash visually observed at the site. An optimal rating indicates that the site has little to no trash. Using this process, the RPs will assess MS4 outfalls within the Focused Priority Condition area to be able to identify the percent of MS4 outfalls that receive optimal trash assessment scores during each assessment period (as identified in Table 4-27). Areas falling below "optimal" will be targeted with strategies to clean up existing trash and prevent future trash buildup. Using historical trash assessment data

as a baseline, the RPs' goal is to incrementally increase the percentage of sites consistently meeting the optimal criteria. This will serve to demonstrate that RPs are reducing the amount of trash from their MS4s in the Focused Priority Condition areas and will allow them to adjust their programs as needed to continue to show improvement over time.

The second goal identified in Table 4-27 focuses on incrementally increasing the drainage area treated by trash BMPs (structural control BMPs) in each jurisdiction. This goal was selected to demonstrate how the RPs will prioritize high-volume trash-generating areas within their own jurisdictions and implement appropriate BMP retrofits to address various sources of trash within these areas. The final and interim goals were based on the RP's current knowledge of high-trash areas in their jurisdictions. However, the RPs recognize that there are data gaps that will need to be addressed in the near term. A thorough assessment is needed of all available trash and source data, drainage areas, and potential locations in high-volume trash-generating areas to feasibly implement partial or full capture trash devices and other trash studies. The approach for Physical Aesthetics within the Lower Sweetwater HA (909.1) and Otay River HA (910.2) may potential serve as a model the RPs can use in other areas of their jurisdictions.

Table 4-27
Goals for Physical Aesthetics in Otay River HA (910.2)

PHYSICAL AESTHETICS						
Numeric Goal	Unit of Measure	Baseline	Assessment Period and Fiscal Year			
			Current Permit Term (FY 14 – FY 18)	FY 16-20	FY 21-25	FY 26-30
			FY 18	FY 20	FY 24	FY 29
MS4 Discharges % Optimal ¹ Trash Assessment Scores	MS4 Outfalls Assessed for Trash	60% ²	65%	75%	85%	95%
OR						
MS4 Discharges % Jurisdictional High Volume Trash Drainage Area Treated for Trash within 909.1 ³	Feasible Drainage Area for BMP retrofit	Historical trash assessment data ⁴	10%	20%	50%	90%

Notes:

1. Historically, an optimal score was given to sites meeting the following requirements: "On first glance, no trash visible. Little or no trash (<10 pieces) evident when evaluated area is closely examined for litter and debris." This definition may change in the future and will be noted in Water Quality Improvement Plan updates.
2. Based on the RPs' cumulative number of site visits of major MS4 outfalls in the Focused Priority Condition area for dry weather and MS4 outfall monitoring during FY 12 through FY 14
3. These values are based on best available information and current jurisdictional knowledge. A feasibility study is required to determine where BMP retrofits can be implemented.
4. An assessment is needed and will incorporate review of all available trash and source assessment data, drainage areas, and potential locations in high volume trash generating areas to feasibly implement structural control BMPs to identify or verify high Volume Trash Areas and % area feasible to retrofit with trash BMPs. The goals may be updated accordingly and provided in a future annual report.

4.8.2 Summary of Strategies and Schedules

The RPs will continue to implement their core JRMP, which includes many strategies that have positive impacts on the water quality of MS4 discharges. To make progress toward their identified goals, the RPs will enhance some existing JRMP strategies and implement new strategies focused on the Focused Priority Conditions.

The RPs' approach to improving the physical aesthetics within the Focused Priority Condition is to identify targeted areas within their jurisdictions and implement strategies focused primarily on trash. An initial assessment built upon available historical maintenance and monitoring data will be used to identify high trash-generating areas within the geographic extent of the Focused Priority Condition for Chula Vista, Imperial Beach, and the Port. From this assessment, the opportunities for retrofits or other treatment methods will be identified and prioritized. Retrofits may be structural BMPs such as trash guards or catch basin inserts within the MS4. Other treatment options may include requiring retrofits of trash enclosures on private and public property and providing targeted education and outreach to reduce the source of trash.

It is anticipated that a combination of specific strategies will allow the RPs to make progress toward, and ultimately achieve, the established goals for this Focused Priority Condition. Part of the RPs' long-term strategy for addressing physical aesthetics is to collaborate with other RPs in Sweetwater and Otay HUs to conduct public perception surveys and adapt programs in response to public input. The surveys are intended both to inform strategy selection and to assess progress over time. Data available currently to assess high-volume trash areas may not reflect areas most important to the public. Including the public in the assessment and prioritization process will engage residents, visitors, and business owners. It will be an integral first step towards true source control for trash and other pollutants that are expected to improve physical aesthetics.

A complete list of strategies to be implemented within the WMA is provided in Appendix I by jurisdiction. Subsets of each RP's strategies are also summarized below. In addition, depending on the performance of near-term strategies and the availability of resources, optional strategies will be considered in the future. Strategies and implementation schedules were identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the Water Quality Improvement Plan will be updated. The implementation of each strategy will be contingent upon annual budget approvals and funding availability.

4.8.2.1 City of Chula Vista

Chula Vista's approach to improving the physical aesthetics within the Otay River HA is to identify targeted areas within its jurisdiction and implement strategies focused primarily on trash. Figure 4-14 shows Chula Vista's jurisdiction within the Otay Focused Priority Condition, where the strategies will be implemented.

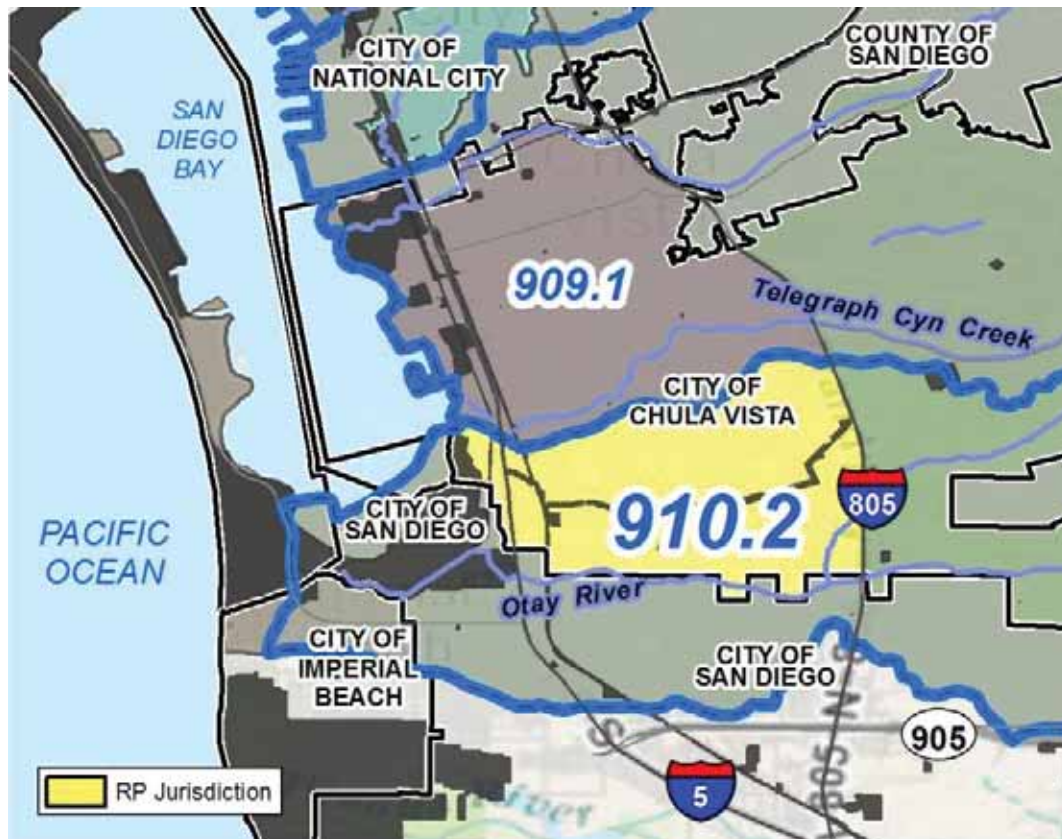


Figure 4-14
Chula Vista's Jurisdiction Within the Otay River HA Physical Aesthetics
Focused Priority Condition

To identify high trash-generating areas within the geographic extent of the Focused Priority Condition, Chula Vista will build upon historical catch basin data and additional monitoring and assessment results by FY 17. Based on previous water quality program results, the area west of I-805 is known to be high density, with many commercial businesses, dirt alleys, and illegal dumping issues. Identifying hot spots will help address trash and other water quality conditions. Using the hot spot maps created in this effort, Chula Vista plans to revise its current facilities-based inspection program to focus on trash pollutant-generating activities. Inspections, including education and outreach during the inspection, is intended to reduce and eliminate trash discharges from existing development by providing appropriate management practices to commercial businesses. Chula Vista's voluntary CLEAN Business Program, with 200 businesses already certified, is one example of this blended enforcement and education effort to encourage environmental stewardship by reducing trash pollution and offering other benefits such as water and energy conservation.

The hot spots maps may also be used to target outreach to residents, including HOAs. As with reducing waste from commercial entities, reducing trash from residential areas and encouraging behavioral change is true source control. Chula Vista will continue to identify opportunities to educate the public and businesses via Chula Vista's website,

bill inserts, door hangers, community events, school programs, and collaboration with the Otay Water District and Sweetwater Authority Agencies.

Changing the behavior of residents, business owners, and visitors takes time. Chula Vista will continue to remove trash and other pollutants from publicly maintained facilities such as MS4 infrastructure and roadways. Inspections and cleaning of MS4 infrastructure and street sweeping will continue, in addition to identification of retrofit opportunities for infrastructure to capture and remove trash and sediment, providing multiple benefits to water quality.

4.8.2.2 City of Imperial Beach

Imperial Beach's approach to improving the physical aesthetics within the Otay River HA is to identify targeted areas within its jurisdiction and implement strategies focused primarily on trash. Figure 4-15 shows Imperial Beach's jurisdiction within the Otay Focused Priority Condition, where the strategies will be implemented.

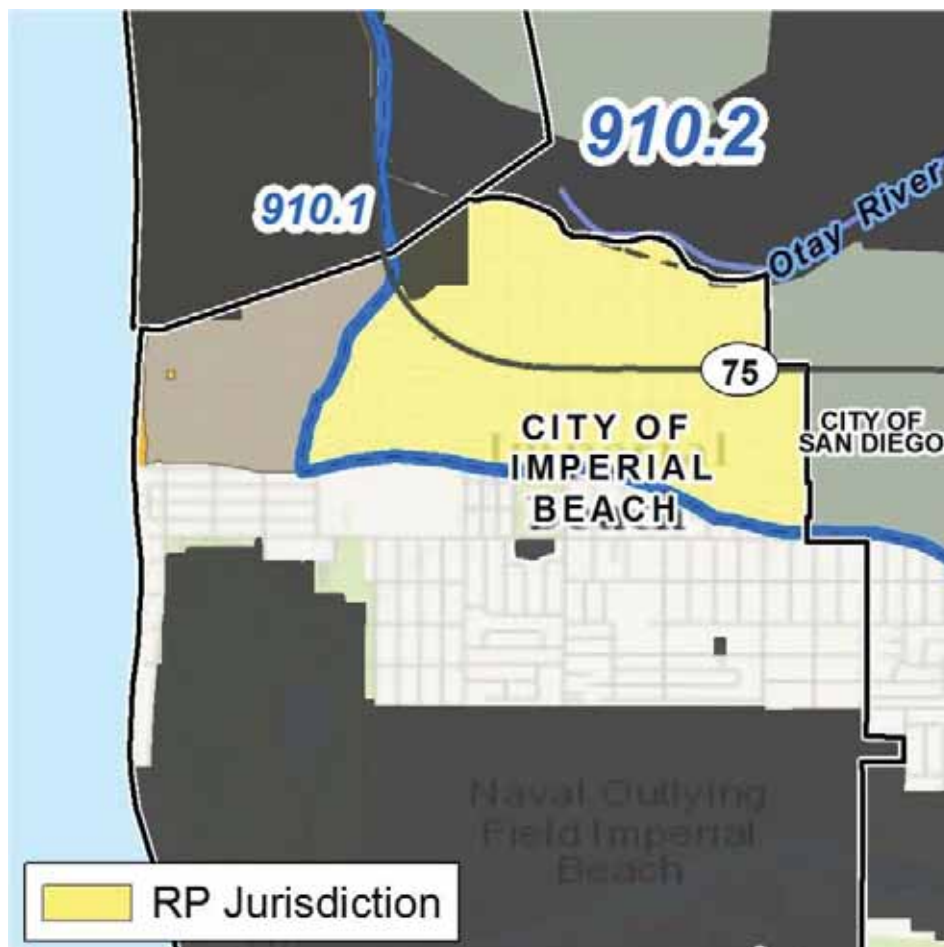


Figure 4-15
Imperial Beach's Jurisdiction Within the Otay River HA Physical Aesthetics
Focused Priority Condition

Collaboration with other watershed stakeholders is integral to the Imperial Beach's approach to water quality improvement. In addition to the other RPs, Imperial Beach continues to work with Scripps Institute of Oceanography to support research activities such as coastal monitoring, and grant applications for work along the Imperial Beach shoreline. Collaboration with the U.S. Fish and Wildlife Service has allowed for several restoration projects with additional projects planned for the future.

In addition to the collaborative opportunities, Imperial Beach will continue to maintain MS4 infrastructure and public roadways and address discharges from existing development to reduce bacteria, trash, and other pollutants from MS4s to meet the physical aesthetics goals. The feasibility of trash capture devices is an important component of strategy selection and implementation because of the elevation of Imperial Beach's MS4 infrastructure. Flooding is a concern during storm events, so devices to capture or otherwise treat discharges will need to consider the protection of public and private property, as well as storm water.

4.8.2.3 Port of San Diego

The Focused Priority Condition in the Otay River HA (910.2) is physical aesthetics due to trash pollution. The Port of San Diego's jurisdictional area in this HA is approximately 241 acres. Facilities or land uses that may be potential sources of trash in this area of the Port's boundaries include one commercial facility and the site of the former South Bay Power Plant. The Port of San Diego has focused its efforts on trash because the ORWMP and public input identified trash as a priority issue in the Otay River HA. Although current use of the property within the Port of San Diego in this area is limited, the Port recognized that the future development of the Chula Vista Bayfront presents opportunities to be able to implement a variety of strategies to address trash from both development and existing development sources. Figure 4-16 shows the Port of San Diego's boundaries within the Otay Focused Priority Condition, where the strategies will be implemented.

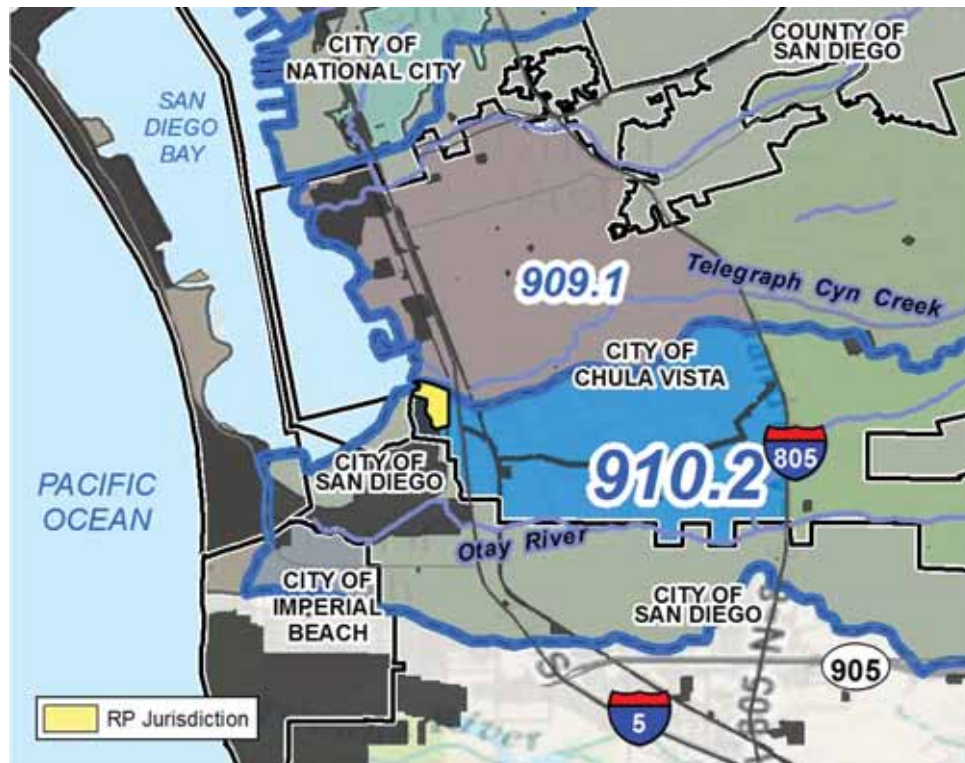


Figure 4-16
Port's Jurisdiction Within the Otay River HA Physical Aesthetics
Focused Priority Condition

The strategies identified by the Port focus on reducing the amount of trash, adding structural controls where feasible, improving water quality, and increasing public awareness through education and outreach. The Port will continue to implement its core JRMP program, is updating its program, and has identified new strategies to further address trash with respect to its MS4. As presented in Table I-11 in Appendix I, the types of strategies include permit-required administrative type JRMP updates, permit-required JRMP implementation efforts, potential enhancements to the Port's JRMP program, as well as other non-permit required strategies. Non-permit required strategies include enhancements to development or construction requirements, clean-up events, special studies, or restoration efforts.

To effectively target potential problem areas and prioritize efforts to address trash, the Port will evaluate available past JRMP activities (such as dry weather monitoring, inspections, street sweeping, and MS4 maintenance), cleanup events, and other data sources relevant to this area. This effort will allow the Port to identify whether high-volume trash-generating areas are present in this area within the Port's boundaries and be able to locate where implementation of trash BMP retrofits may be feasible. The Port will then be able to prioritize areas and have a targeted implementation approach of strategies ranging from source control activities to partial and full capture trash BMPs.

Municipal Permit-required JRMP implementation efforts include activities that effectively reduce trash and, to a lesser extent, bacteria. The JRMP activities relevant to trash include, but are not limited to, MS4 infrastructure cleaning, street sweeping, and commercial facility inspections. The Port will continue to inspect and remove trash and other pollutants from publicly maintained facilities such as MS4 infrastructure and roadways. Using the same approach as in the Sweetwater River HA, the Port will assess the feasibility of installing trash capture devices (structural BMPs) in the high-volume trash-generating areas to collect and prevent trash from reaching the receiving waters.

Source control strategies will include education and outreach, as well as an internal assessment of trash and waste diversion measures (i.e., strategies to reduce the amount of waste going to local landfills or contributing to littering) currently in place to identify structural or source control improvements for high volume trash generating areas. In addition to reducing trash, implementing these strategies will also address bacteria and other water quality pollutants (e.g., sediment and metals), and will protect wildlife from harmful debris. A summary of strategies is presented in Table 4-28.

Table 4-28
Summary of Strategies for Physical Aesthetics in Otay River HA (910.2)

Strategy	Jurisdictional Area			Priority WQCs				Implementation Schedule							
	Chula Vista (West of I-805)	Imperial Beach	Port of San Diego	Trash	Bacteria	Nutrients	Sediment	Metals	Previous Fiscal Year(s)	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Future Fiscal Year(s)
Special Study: Identification of high volume trash-generating areas and potential high-volume trash areas feasible for retrofits	X	X	X	X	X					X					
CLEAN Team	X			X	X	X	X	X	X	X	X	X	X	X	X
Targeted existing development inspections	X		X (Targeted Areas)	X	X	X	X	X	X	X	X	X	X	X	X
CLEAN business programs	X			X	X	X	X	X	X	X	X	X	X	X	X
Education and outreach	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Catch basin cleaning	X		X (Targeted Areas)	X	X	X	X	X	X	X	X	X	X	X	X
MS4 outfall monitoring	X		X	X	X	X	X	X		X	X	X	X	X	X
Low-flow and first-flush diversions		X (Palm and Date Avenues)		X	X	X	X	X	X	X	X	X	X	X	X
Support of coastal research		X (Shoreline)		X	X	X	X	X	X	X	X	X	X	X	X

Notes:
Implementation of strategies is dependent on approval of fiscal budgets and available resources.

Table 4-28 (continued)
Summary of Strategies for Physical Aesthetics in Otay River HA (910.2)

Strategy	Jurisdictional Area			Priority WQCs				Implementation Schedule							
	Chula Vista (West of I-805)	Imperial Beach	Port of San Diego	Trash	Bacteria	Nutrients	Sediment	Metals	Previous Fiscal Year(s)	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Future Fiscal Year(s)
Bayshore bikeway access improvement		X (10 th Street)		X	X	X	X	X	X	X	X	X	X	X	X
Eco bike route project		X (Palm Avenue)		X	X	X	X	X	X	X	X	X	X	X	X
Install fence along Pond 20 and grates at storm drain inlets			X (Targeted Area)	X						X					
MS4 catch basin filters		X		X	X	X	X	X	X	X	X	X	X	X	X
Restoration projects		X (San Diego Bay)		X	X	X	X	X	X	X	X	X	X	X	X
Trash receptacle assessments	X		X (Targeted Areas)	X	X	X	X	X		X	X	X	X	X	X
Cleanup events		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Increased MS4 inspections and cleaning	X	X	X (Targeted Areas)	X	X	X	X	X			X	X	X	X	X
Public perception surveys in targeted areas	X	X	X	X	X						X				X
Street sweeping	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Notes:

Implementation of strategies is dependent on approval of fiscal budgets and available resources.

Table 4-28 (continued)
Summary of Strategies for Physical Aesthetics in Otay River HA (910.2)

Strategy	Jurisdictional Area			Priority WQCs					Implementation Schedule	
	Chula Vista (West of I- 805)	Imperial Beach	Port of San Diego	Trash	Bacteria	Nutrients	Sediment	Metals	Previous Fiscal Year(s)	Future Fiscal Year(s)
<i>Optional Jurisdictional Strategies</i>										
Collaborate with regional education and outreach efforts	X		X	X	X	X	X	X		
Support organizations and regional social services effort for homelessness	X	X	X	X	X					
Enhance street sweeping contract for effectiveness		X		X	X		X	X		
Implement unimproved alleys enhancements		X		X	X	X	X	X		
Install inlet filters in storm drains in high priority areas			X	X			X			
Replace/upgrade current street sweeping equipment to new, more efficient and effective options (e.g., vacuum sweeper)			X	X	X		X	X		
See Appendix I for criteria for initiating strategies.										

Notes:
Implementation of strategies is dependent on approval of fiscal budgets and available resources.

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5 Monitoring and Assessment

Provision D of the Municipal Permit requires that a Monitoring and Assessment Program be developed as part of the Water Quality Improvement Plan and implemented to assess impacts of MS4 discharges on receiving water conditions. Monitoring data comprises all information collected under the Monitoring and Assessment Program, and includes diverse sets of scientific and programmatic results. Examples include water quality data (e.g., chemistry, toxicity), trash assessments, bioassessments, hydromodification measurements, and sediment sampling. This section summarizes the Monitoring and Assessment Program. The complete program is attached as Appendix K.

Collection and assessment of monitoring data helps to guide future implementation of management actions by the RPs as part of the Water Quality Improvement Plan process. Monitoring during wet and dry weather is conducted to collect observational and analytical data. These data are used to help RPs determine whether receiving water conditions are improving, degrading, or staying the same.

The Monitoring and Assessment Program provides the vehicle for determination of whether intended outcomes are being realized or whether adaptations of RPs' programs are necessary to achieve the intended outcomes. RPs assess the data, in combination with their management actions, to determine what actions are improving receiving water conditions and where additional actions are necessary to improve conditions. The Municipal Permit supports this outcome-based approach, as implemented and adapted through the Water Quality Improvement Plan process.

5.1 Purpose of the Monitoring and Assessment Program

The Monitoring and Assessment Program incorporates requirements of Provision D of the Municipal Permit along with the specific monitoring and assessment requirements for applicable TMDLs listed in Attachment E of the Municipal Permit and specific monitoring for Focused Priority Conditions. The purpose of the Monitoring and Assessment Program is to monitor and assess the impact on the conditions of receiving waters caused by discharges from MS4s.

Based on the requirements of the Municipal Permit, the RPs in the San Diego Bay WMA have developed an integrated Monitoring and Assessment Program that:

- (1) Measures the progress toward addressing the Highest Priority Conditions and Focused Priority Conditions;
- (2) Assesses the progress toward achieving the Water Quality Improvement Plans numeric goals and schedules; and
- (3) Evaluates each RP's overall efforts to implement the Water Quality Improvement Plan.

The Monitoring and Assessment Program for the San Diego Bay WMA includes three primary monitoring components:

- (1) Receiving water and MS4 outfall monitoring per Municipal Permit Provision D;
- (2) Highest and Focused Priority Condition monitoring;
and
- (3) Special studies and additional TMDL monitoring.

The Assessment Program includes an annual analysis of the monitoring data and an integrated analysis that combines all previously performed evaluations at the end of the Municipal Permit term. The program also reviews metrics collected through programmatic assessments and strategic implementation.

5.2 Monitoring and Assessment Program Schedule

Since adoption of the Municipal Permit in June, 2013, the RPs have implemented a regional transitional monitoring program. Per the Municipal Permit, the transitional monitoring program remains in place until Regional Board approval of the Final Water Quality Improvement Plan. When the Final Water Quality Improvement Plan is approved by the Regional Board, the RPs will implement the Monitoring and Assessment Program. The program will be implemented jurisdictionally, on a watershed-wide basis, and regionally, as applicable. Approval of the Final Water Quality Improvement Plan is anticipated in summer 2015. The transitional monitoring program is anticipated to continue until the end of the monitoring year (September 30, 2015). The RPs expect to implement the Monitoring and Assessment Program beginning October 1, 2015.

Annual monitoring assessments are to be included as part of the Water Quality Improvement Plan Annual Report. Six months prior to the end of the Municipal Permit term, the RPs are to submit a regional monitoring and assessment report in collaboration with other Copermittees in the San Diego Region. At the same time, the RPs also submit the Report of Waste Discharge, which includes an integrated assessment of both this Monitoring and Assessment Program and RPs respective JRMPs.

5.3 Monitoring Program Overview

Table 5-1 presents an overview of planned monitoring activities for the San Diego Bay WMA. The overview includes key monitoring elements, sampling types, monitoring locations, and monitoring frequency by program. Figure 5-1 presents an overview of the San Diego Bay WMA's various monitoring programs and station locations including the Long-Term Receiving Water Monitoring, the MS4 Outfall Monitoring, the Highest and Focused Priority Condition programs, and Additional Monitoring Programs.

**Table 5-1
Summary of Monitoring Programs**

Monitoring Program	Temporal Extent	Monitoring Elements ¹	Timeline (Fiscal Year) ²
Receiving Water Monitoring			
Long-Term Receiving Water Monitoring	Wet and Dry Weather	Chemistry/FIB	2013-2014
		Toxicity	
		Trash Assessment	
		Bioassessment	
		Hydromodification	
Regional Southern California Bight Monitoring	Dry Weather	Chemistry	2013-2014
		Toxicity	
		Bioassessment	
Regional Stormwater Monitoring Coalition (SMC)	Dry Weather	TBD (Bioassessment)	2013-TBD
Regional Hydromodification Monitoring Program	Wet Weather	Rain Gauge Analysis	2013-2015 (TBD)
		Stream Gauge Analysis	
		Channel Assessment	
		Flow	
		Sediment Transport	
Sediment Quality	Dry Weather	Chemistry	2013 ⁴ -2018
		Toxicity	
		Bioassessment	
		Trash Assessment	
Regional Harbor Monitoring Program (RHMP)	Dry Weather	Chemistry	2013-2014
		Bioassessment	
		Trash Assessment	

Notes:

AB411 = California Assembly Bill 411; BOD = biological oxygen demand; CRAM = California Rapid Assessment Method; FIB = fecal indicator bacteria; HMP = Hydromodification Monitoring Program; IC/ID = illicit connection and/or illicit discharge; RHMP = Regional Harbor Monitoring Program; SMC = Southern California Stormwater Monitoring Coalition; TBD = to be determined

1. Some monitoring elements may not be conducted under the entire temporal extent of the program. See Appendix K for details.
2. The TBD has been assigned if the program has not been developed or monitoring plans are not complete.
3. The AB411 program monitoring is conducted during the dry season by the County of San Diego Department of Environmental Health will be tracked and incorporated into bacteria-related receiving water assessments. Monitoring under AB411 is not required under Provision D of the Municipal Permit, but bacteria monitoring is required as part of the Bacteria TMDL (Municipal Permit Attachment E.6). AB411 monitoring may be used to augment RP monitoring and will be reviewed as part of the data assessment. RPs will be doing dry weather monitoring during wet weather season starting in FY 2016.
4. Completed under the Ambient Bay and Lagoon Monitoring (ABLM) Program, as part of Bight '13.
5. Airport monitoring for metals will be conducted as part of the Industrial General Permit monitoring. Additional constituents are monitored under that program.
6. Monitoring is paired. Receiving Water and MS4 Outfall will be monitored the same day.

Table 5-1 (continued)
Summary of Monitoring Programs

Monitoring Program	Temporal Extent	Monitoring Elements ¹	Timeline (Fiscal Year) ²
MS4 Monitoring			
MS4 Field Screening	Dry Weather	Flow	2013-2018
		Trash	
		IC/ID	
		Condition	
MS4 Outfall Monitoring	Wet and Dry Weather	Chemistry/FIB	2013-2018
		Visual Observations	
		<i>In-situ</i> Measurements	
Highest Priority Condition Monitoring			
Chollas Creek Metals TMDL	Wet Weather	Chemistry/FIB	2013-2018
Chollas Creek Bacteria TMDL	Wet and Dry Weather	FIB	2013-2018
Focused Priority Condition Monitoring			
Airport Metals ⁵	Wet Weather	Chemistry (metals)	2013-2018
Riparian Area Monitoring (Paradise Creek)	Dry Weather	Bioassessment (CRAM)	2014 (TBD)-2018
Physical Aesthetics (Sweetwater and Otay) ⁶	Wet Weather (post-storm) and Dry Weather	Trash Assessments	2016-2018
Swimmable Waters – Beaches (Otay) ³	Wet Weather	FIB	2016-2018
	Dry Weather		1999-2018
Additional TMDL Monitoring			
Shelter Island Yacht Basin Copper TMDL – Receiving Water	See Regional Board Investigative Order No. No. R9-2011-0036.		
Shelter Island Yacht basin Copper TMDL – MS4 Outfall	Wet and Dry Weather	Chemistry (dissolved copper)	2013-2018
Shelter Island Shoreline Park Bacteria TMDL	Wet and Dry Weather	FIB	2013-2018

Notes:

AB411 = California Assembly Bill 411; BOD = biological oxygen demand; CRAM = California Rapid Assessment Method; FIB = fecal indicator bacteria; HMP = Hydromodification Monitoring Program; IC/ID = illicit connection and/or illicit discharge; RHMP = Regional Harbor Monitoring Program; SMC = Southern California Stormwater Monitoring Coalition; TBD = to be determined

- Some monitoring elements may not be conducted under the entire temporal extent of the program. See Appendix K for details.
- The TBD has been assigned if the program has not been developed or monitoring plans are not complete.
- The AB411 program monitoring is conducted during the dry season by the County of San Diego Department of Environmental Health will be tracked and incorporated into bacteria-related receiving water assessments. Monitoring under AB411 is not required under Provision D of the Municipal Permit, but bacteria monitoring is required as part of the Bacteria TMDL (Municipal Permit Attachment E.6). AB411 monitoring may be used to augment RP monitoring and will be reviewed as part of the data assessment. RPs will be doing dry weather monitoring during wet weather season starting in FY 2016.
- Completed under the Ambient Bay and Lagoon Monitoring (ABLM) Program, as part of Bight '13.
- Airport monitoring for metals will be conducted as part of the Industrial General Permit monitoring. Additional constituents are monitored under that program.
- Monitoring is paired. Receiving Water and MS4 Outfall will be monitored the same day.

Table 5-1 (continued)
Summary of Monitoring Programs

Monitoring Program	Temporal Extent	Monitoring Elements ¹	Timeline (Fiscal Year) ²
Special Studies and AB411 Monitoring			
San Diego Regional Reference Streams and Beaches	Wet and Dry Weather	Chemistry/FIB	2013-2016 (TBD)
		Flow	
		Bioassessment	
San Diego Bay Debris Study	Dry Weather	Trash Assessment	TBD
		Physical Habitat	
Pueblo HU Refuse Assessment Program	Dry Weather	Trash Assessment	2013-2018
Chollas Jurisdictional Boundary Study	Wet Weather	Chemistry	2013-2015 (TBD)
Regional Beach Water Quality (AB411) ³	Dry Weather	FIB	1999-2018
Riparian Area Selenium Study	Wet and Dry Weather	Chemistry (selenium)	2013-2015 (TBD)

Notes:

AB411 = California Assembly Bill 411; BOD = biological oxygen demand; CRAM = California Rapid Assessment Method; FIB = fecal indicator bacteria; HMP = Hydromodification Monitoring Program; IC/ID = illicit connection and/or illicit discharge; RHMP = Regional Harbor Monitoring Program; SMC = Southern California Stormwater Monitoring Coalition; TBD = to be determined

1. Some monitoring elements may not be conducted under the entire temporal extent of the program. See Appendix K for details.
2. The TBD has been assigned if the program has not been developed or monitoring plans are not complete.
3. The AB411 program monitoring is conducted during the dry season by the County of San Diego Department of Environmental Health will be tracked and incorporated into bacteria-related receiving water assessments. Monitoring under AB411 is not required under Provision D of the Municipal Permit, but bacteria monitoring is required as part of the Bacteria TMDL (Municipal Permit Attachment E.6). AB411 monitoring may be used to augment RP monitoring and will be reviewed as part of the data assessment. RPs will be doing dry weather monitoring during wet weather season starting in FY 2016.
4. Completed under the Ambient Bay and Lagoon Monitoring (ABLM) Program, as part of Bight '13.
5. Airport monitoring for metals will be conducted as part of the Industrial General Permit monitoring. Additional constituents are monitored under that program.
6. Monitoring is paired. Receiving Water and MS4 Outfall will be monitored the same day.

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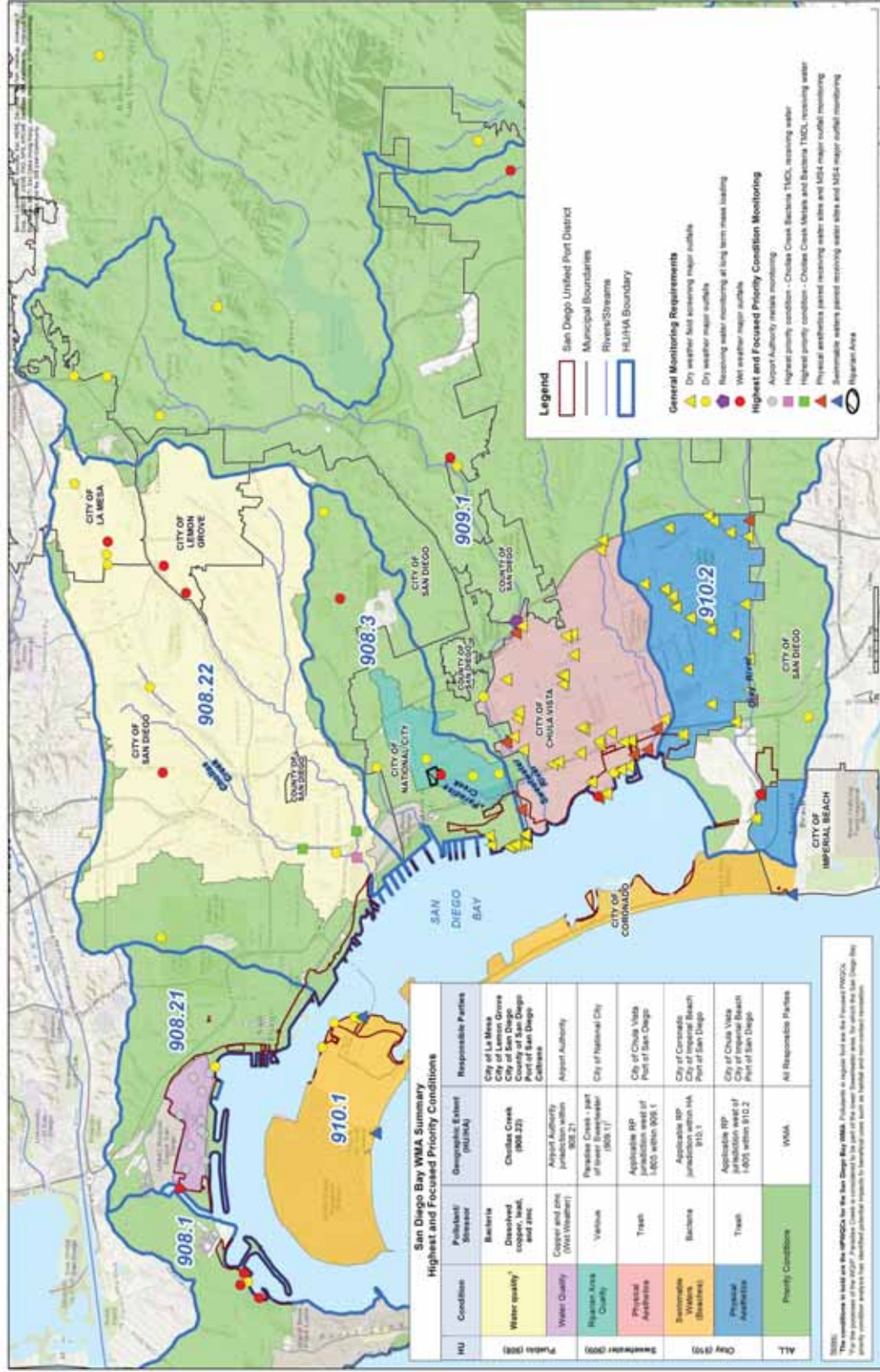


Figure 5-1
Summary of Monitoring Locations

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5.4 Assessment Summary

The assessment portion of the Monitoring and Assessment Program evaluates the data collected under the monitoring programs summarized in Section 5.3, as well as the information collected as part of the JRMP. The data collected from these programs are used to assess the progress toward achieving the Water Quality Improvement Plan numeric goals and schedules and to measure the progress toward addressing the Highest and Focused Priority Conditions. Programmatic assessment includes:

- General permit-required assessment (assessment requirements prescribed in Provision D of the Municipal Permit);
- Highest and Focused Priority Condition assessment (analysis intended to inform programs and assess progress toward the goals outlined in the Water Quality Improvement Plan Second Interim Deliverable);
- Additional assessment (assessments toward achieving the waste load allocations (WLAs) outlined in applicable TMDLs, where the TMDL is not a Highest or Focused Priority Condition, and special studies assessments); and
- An integrated assessment (an assessment incorporating data collected from the assessments above, requirements as part of the JRMP program(s) under Provision E of the Municipal Permit, and additional regional assessment requirements required under Provision F of the Municipal Permit).

Figure 5-2 presents an overview of the general approach for assessment of monitoring data.

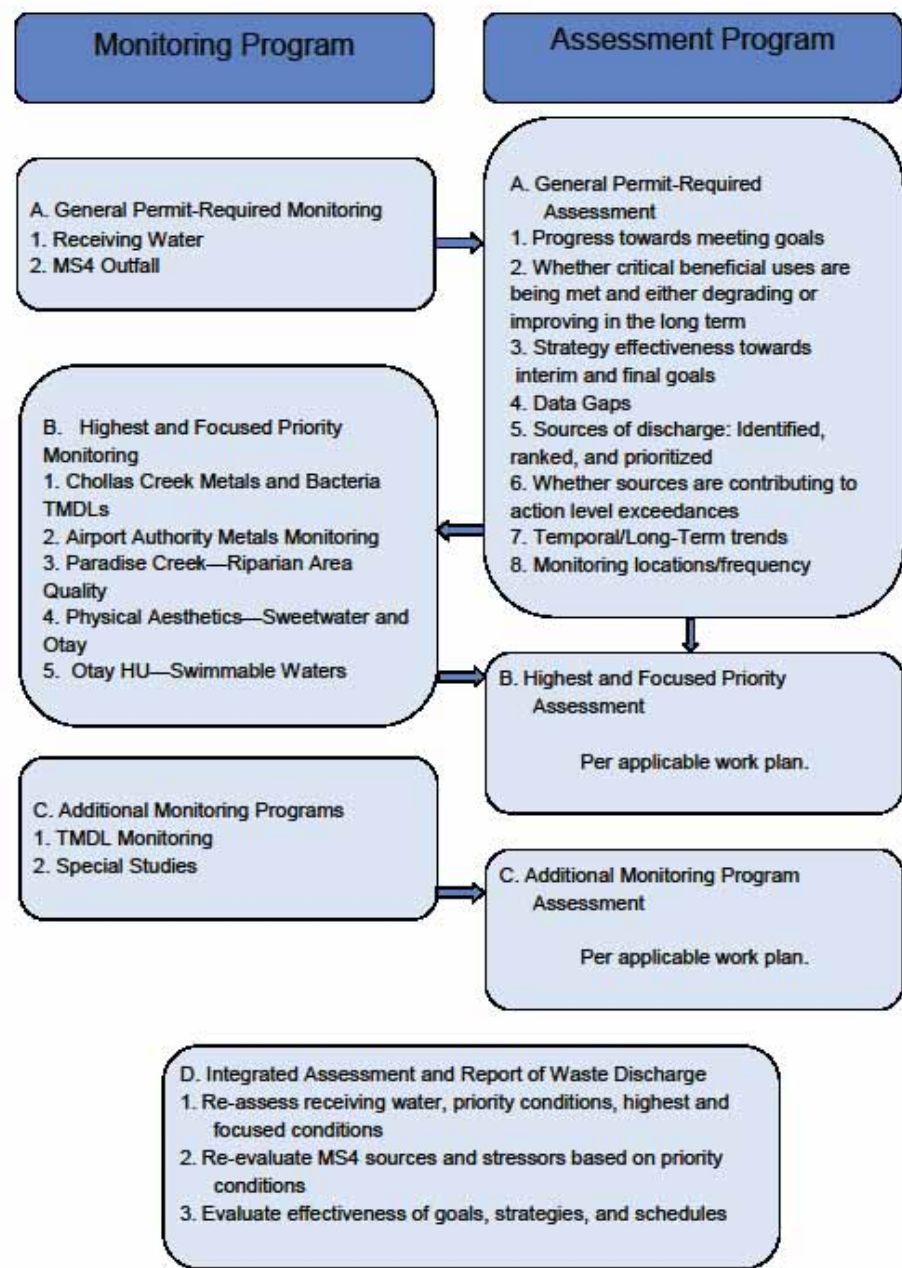


Figure 5-2
Monitoring and Assessment Approach

5.5 TMDL Assessment Summary

This section summarizes monitoring to assess progress towards achieving goals related to the Highest Priority Condition, which is water quality due to bacteria and metals in Chollas Creek, as described in Section 3.2. Goals are based on the multiple compliance pathways set forth for the Metals TMDL and for the Bacteria TMDL in Attachment E.6 of the Municipal Permit. Compliance with the TMDL may be demonstrated via one of the compliance pathways identified in the Municipal Permit. The proposed compliance dates for both the TMDL's interim goals and final goals are set outside of the permit cycle.

Table 5-2 presents the compliance options for the interim TMDL goals and the monitoring that may be used to track progress toward achieving these goals.

Each RP in the Chollas Creek subwatershed has established both wet and dry weather jurisdictional goals for bacteria and metals during the Municipal Permit term to demonstrate progress towards compliance with the TMDL requirements. Generally, RPs have identified near-term goals to address potential bacteria and metals sources and/or to reduce anthropogenic dry weather flow in storm drain outfalls. Data collection or monitoring elements that go beyond the prescribed Municipal Permit activities are tailored to measure progress towards meeting each goal. These elements, which are further detailed in the following subsections, may include visual surveys, inspections, physical sampling or measurements, and development of new outreach and source control programs related to bacteria and metals reduction.

Table 5-2
Monitoring Related to TMDL Interim and Final Goals¹

Compliance Pathway		TMDL Goal	Monitoring Elements
1 OR	Receiving Water Conditions	Meet allowable exceedance frequency of the interim or final Receiving Water Limitations (RWLs) in the receiving water	Bacteria data collected at compliance points as described in Section 5.1.2, TMDL Monitoring Program
			Metals TMDL
2 OR	MS4 Outfall Discharges	Meet allowable exceedance frequency in MS4 outfall discharges	Bacteria and flow data collected at outfalls as described in as described in Section 5.1.3, MS4 Outfall Monitoring Program
			Metals TMDL
3	MS4 Outfall	Pollutant load reductions	Bacteria and flow data

Table 5-2 (continued)
Monitoring Related to Bacteria TMDL Interim and Final Goals¹

Compliance Pathway		TMDL Goal	Monitoring Elements
OR	Discharges	for discharges from the Responsible Agencies' MS4 outfalls greater than or equal to the final load reductions	collected at outfalls as described in as described in Section 5.1.3, MS4 Outfall Monitoring Program
4 OR	MS4 Outfall Discharges	No direct or indirect discharge from the Responsible Agencies' MS4 outfalls to the receiving water ²	Visual observation of flow from outfalls to receiving waters as described in Section 5.1.3, MS4 Outfall Monitoring Program
			Metals TMDL
5 OR	Receiving Water Conditions	Exceedances of the final receiving water limitations in the receiving waters due to loads from natural sources	Data from Sections 5.1.1, 5.1.2, 5.1.4, and Jurisdictional Runoff Management Programs.
6	Water Quality Improvement Plan	Implementation of Water Quality Improvement Plan and use of adaptive management (Interim Goal)	Data from Jurisdictional Runoff Management Programs
			Metals TMDL
		OR	
		Implementation of Water Quality Improvement Plan and use of adaptive management (Final Goal)	Data from monitoring and Jurisdictional Runoff Management Programs
			Metals TMDL

Notes:

1. The County of San Diego proposed schedule to meet the TMDL interim goals in Attachment E.6 of the Municipal Permit is 2021 for dry weather and 2028 for wet weather. All other Copermittees propose to meet the TMDL interim goals by 2019 for dry weather and 2024 for wet weather.
2. Does not include allowable discharges as defined in Municipal Permit Provision A and Provision E.2.a.

6 Iterative Approach and Adaptive Management Process

The iterative approach that facilitates the adaptive management process for the San Diego Bay WMA is presented in this section. The iterative approach involves re-evaluating the water quality conditions and priorities, goals, and strategies. The adaptive management process details how the Water Quality Improvement Plan (including the Monitoring and Assessment Plan) may be revised when goals may need to be adjusted or new goals added, strategies need to be modified, or when goals for current priorities are met and new priorities may be added.

The adaptive management approach includes program planning, implementation, monitoring, and assessment, illustrated in Figure 6-1. The Monitoring and Assessment Program will collect data and information that feeds into the assessment process. The assessment processes evaluate the data and information from the monitoring programs to make status determinations on water quality conditions, goals, strategies and programs. Assessment includes a variety of calculations, comparisons, and determinations that may or may not support Water Quality Improvement Plan component adaptations.



Figure 6-1
Iterative Process to Inform Adaptive Management

Each iteration of the cycle is intended to apply what has been learned from data collected to inform program planning and implementation. The RPs will use the outcomes of the monitoring and assessment processes to determine whether Water Quality Improvement Plan components warrant adaptation.

Components may be dynamic during the initial cycles of implementation, assessment, and iteration. However, the intent of the iterative process is to improve program planning and implementation and provide a process RPs may use to modify the Priority Conditions to focus on as conditions are being addressed. Through plan modifications the Water Quality Improvement Plan components are expected to stabilize and allow programs to operate more effectively and efficiently to ultimately achieve beneficial use attainment.

The Municipal Permit describes various triggers that may require program adaptation, including exceedances of water quality standards in receiving waters, new information, Regional Board recommendations, and public participation. The results of effectiveness assessments of JRMP programs and strategies may also trigger adaptations to the Water Quality Improvement Plan. Adaptations may occur for one or more of the following plan elements:

- Priority, Highest Priority, and Focused Priority Conditions;
- Water Quality Numeric Goals and Schedules;
- Water Quality Improvement Strategies and Schedules;
- Monitoring Program; and
- Assessment Program.

The Water Quality Improvement Plan components are interrelated; a balance amongst all elements must be maintained during the iterative process. When changes occur within one of the elements, it necessitates changes in other elements. For example, adaptations in strategies may require modifications to the data collection (monitoring) for the strategies and also how the collected data is assessed.

Section F.2.c of the Municipal Permit describes the process the RPs must follow when updating the Water Quality Improvement Plan. Accordingly, the RPs will follow the following steps for implementing changes to the plan:

1. The RPs will convene the Consultation Panel for a public meeting at least annually as needed to present proposed changes and solicit input from the public.
2. After consideration of public and Consultation Panel feedback, the RPs will propose changes to the plan, including supporting rationale, in the Water Quality Improvement Plan Annual Reports or Report of Waste Discharge.
3. The RPs will implement the changes and post a revised Water Quality Improvement Plan to the Regional Clearinghouse unless notified in writing by the San Diego Water Board Executive Officer within 90 days of submittal of the proposed changes.

6.1 Re-evaluation of Priority Water Quality Conditions

The RPs will re-evaluate water quality conditions on a regular basis to determine potential changes to the Priority Water Quality Conditions based on available data and information. Any proposed changes to the plan will be either reported in a Water Quality Improvement Plan Annual Report or in the Report of Waste Discharge (ROWD), due to the Regional Board no later than December 2017. In the absence of such findings, the RPs maintain that the existing Priority Conditions, Highest Priority Conditions, and Focused Priority Conditions should remain the focus of the Water Quality Improvement Plan and JRMP implementation.

Examples of Prompts for Adaptation of Water Quality Conditions (Focused Priority Conditions and Highest Priority Conditions)

- Numeric goals have been attained
- Beneficial use(s) in receiving waters are attained
- Water quality monitoring data show that the MS4 is not causing or contributing to water quality conditions in receiving waters
- Regulatory conditions change: new or developing TMDLs, new policies (e.g., trash)

Re-evaluation of the water quality conditions will consider the best available data and information as identified in Figure 2-1, Priority Condition and Highest Priority Condition Selection Process in Section 2 of this Water Quality Improvement Plan. In addition to the data and information collected and evaluated in the initial Water Quality Improvement Plan development process, the RPs will, at a minimum, consider:

- Whether water quality improvement outcomes were achieved in MS4 discharges and/or receiving waters;
- Data, information, and recommendations provided by the public;
- Water quality monitoring collected after initial Water Quality Improvement Plan development, including transitional monitoring data collected in 2013 and 2014;
- Special studies results related to water quality conditions or MS4 sources of pollutants and/or stressors;
- New and developing regulations related to water quality conditions, e.g., TMDLs and policies;
- Revised 303(d) Listings;
- Basin plan amendments related to water quality conditions; and
- Regional Board recommendations.

Based on the outcomes of the re-evaluation process, the RPs will determine whether adaptations to the Priority Water Quality Conditions are justified. Changes to the Priority Conditions, Highest Priority Conditions, and Focused Priority Conditions will be made if new conditions are identified or conversely, if assessments identify that conditions are being addressed effectively and the data supports removal of conditions from the current listings.

6.2 Adaption of Goals and Schedules

Interim and final numeric goals and the associated schedules may be modified. Assessment of the goals and compliance pathways is performed using data collected per the Monitoring and Assessment Program and JRMP, along with the schedules developed in conjunction with each goal. Achieving goals is accomplished through successful implementation of effective strategies and then appropriately monitoring and assessing the effects of the strategies. The integrated assessment processes described in the Monitoring and Assessment Plan (Appendix K) will provide the necessary data to evaluate the progress toward achieving the interim and final numeric goals.

Examples of Outcomes from Re-Evaluating Water Quality Conditions

- Changing Priority Conditions
- Changing Highest and Focused Priority Conditions
- Changes in Priority Areas within the WMA

Depending on the results of the assessment, it may be appropriate to adjust either the numeric goals or the schedules associated with each goal, or both. The exception is where the interim or final numeric goals and schedules are based on approved TMDL compliance schedules. In this case, interim schedules may be modified. However, numeric targets (interim and final) and final schedules cannot be modified without changes to the TMDL.

At a minimum, a re-evaluation of goals and schedules will be performed and reported in the ROWD.

Re-evaluation of the goals and schedules will consider:

- Progress toward achieving interim and final goals;
- New and developing regulations related to the established goals;
- Water quality and conditions assessments;
- Changes to Priority Conditions, Highest Priority Conditions, or Focused Priority Conditions based on re-evaluations;
- Data, information, and recommendations provided by the public;
- Special studies results related to goals;

- Regional Board recommendations;
- Amount of resources applied in areas of associated established goals; and
- Effectiveness of strategies implemented in areas of associated established goals.

The established goals and schedules are based upon existing conditions. It is anticipated that the goals and schedules may be dynamic in the first few years of implementation as the RPs continue to collect effectiveness and efficiency data and information. However, through the iterative process, the goals and schedules are expected to stabilize, along with other components of the Water Quality Improvement Plan.

Using a combination of assessments, RPs will compare the anticipated (identified in goal schedules) and actual measured rates of progress to determine whether adjustments to the goals or schedules are warranted.

RPs may consider the following potential prompts for adaptations to the goals and schedules:

- When the level of effort expended (implemented strategies) does not correlate well with the rate of progress toward achieving interim and final goals; and
- When it is determined that the selected goals (i.e., interim goals) do not demonstrate progress towards meeting ultimate goals of eliminating MS4 non-storm water discharges, eliminating pollutants in MS4 storm water discharges, or restoring or protecting beneficial uses in downstream receiving waters.

Examples of Outcomes from Adapting Goals and Schedule

- Changing timelines to achieve interim and final goals/targets
- Modifying goals/targets
- Changing locations of where goals/targets are focused

6.3 Adaptation of Strategies and Schedules

Strategies and associated schedules are subject to adaptation through the iterative process. Modifying programs to implement the most effective and efficient strategies is conceptually easy to understand. When strategies are more efficient and effective, their application in larger geographic scales or greater frequencies is expected to yield measureable outcomes identified through the assessments. However, assessing strategies to determine adaptations can be challenging. In general, the greatest challenge is linking implementation of strategies to change in water quality conditions.

Evaluating strategies and schedules will consider many factors, including:

Factors for
consideration
when
evaluating
strategies
and
schedules

Progress toward achieving interim and final goals;

Water quality and conditions assessments;

Changes to Priority Conditions, Highest Priority Conditions, or Focused Priority Conditions based on re-evaluations;

Data, information, and recommendations provided by the public;

Special studies results related to strategies;

Regional Board recommendations;

Amount of resources applied in areas of associated established goals; and,

New advances in science and technology, including watershed modeling and development of local or site-specific conditions.

Although the Municipal Permit identifies steps to be taken for re-evaluation of strategies (Provision D.4.d.(2)), the RPs will also look beyond those minimum required steps and evaluate the relative effectiveness and efficiency of multiple strategies. By comparing effectiveness and efficiencies of strategies, RPs will be better equipped to prioritize resource allocation among strategic options.

The process for adapting strategies and schedules will include a review of the monitoring data assessments, JRMP implementation and special studies results. Receiving water data may be used to evaluate the collective effectiveness of the Water Quality Improvement Plan strategies. This information provides a “big picture” assessment of the success of the strategies over the long term. MS4 outfall data and special studies results may provide information that is more directly linked to the implementation of individual strategies. Where appropriate, these assessments may include a comparison of the data with the non-storm water action levels (NALs) and storm water action levels (SALs) as required per Municipal Permit Provision C. These data provide the foundation for the MS4 outfall discharge assessments described in Section 5, which examine the results of RP IDDE Programs and MS4 Outfall Discharge Monitoring Programs.

The RPs will perform a comparative analysis where relative comparisons of strategies and methods of strategy implementation will be conducted to determine those that are effective and efficient to address specific water quality conditions. Where strategies can be linked to measurable or demonstrable reductions of non-storm water discharges or of pollutants in storm water, appropriate modifications will be made.

Modifications to strategies may include, but are not limited to:

- Removal or addition of strategies from the suite of strategies implemented; and
- Modifications to the methods of strategy implementation (e.g., methods for conducting inspections).

6.4 Adaptation of Monitoring and Assessment Program

As previously stated, the Water Quality Improvement Plan elements are interrelated: changes to one of the elements will impact the other elements. As part of the Report of Waste Discharge, the RPs consider modifications to the Monitoring and Assessment Program, consistent with the requirements in Municipal Permit Provision D.4.d.(3). During the Municipal Permit term, modifications must be consistent with the requirements of Provisions D.1, D.2, and D.3 (receiving water, MS4 outfall, and special study monitoring requirements, respectively), which limit the amount of adaptation that is possible. However, recommendations within the Report of Waste Discharge provide an opportunity to make more meaningful modifications to the Monitoring and Assessment Program.

At a minimum, a re-evaluation of the Monitoring and Assessment Program will be performed and discussed in the ROWD.

The RPs will modify the Monitoring and Assessment Program based upon the following considerations, at a minimum:

- Sufficiency of the existing monitoring program to generate required findings, in particular, the existence of data gaps that prevent completion of assessments;
- Sufficiency of existing monitoring program to adequately capture changes in water quality conditions or the established goal metrics; and
- Sufficiency of existing assessments to provide findings to provide rationale for adaptations or to justify maintaining plan elements.

The RPs will evaluate the Monitoring and Assessment Program by reviewing the data collected and the assessments performed. For each assessment identified in the Monitoring and Assessment Plan, the following will be determined:

- (1) Is there adequate data to perform the assessment?
- (2) Does the outcome of the assessment provide rationale for adaptations or to justify maintaining plan elements?

Based on the assessment of the Monitoring and Assessment Plan, RPs may elect to adapt monitoring elements (while maintaining consistency with Municipal Permit requirements) as well as modify the assessments.

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7 Conclusion

This Water Quality Improvement Plan is the culmination of two years of RP efforts since the adoption of the Municipal Permit in 2013. The goal of the Water Quality Improvement Plan is to further the Clean Water Act's objective to protect, preserve, enhance, and restore the water quality and designated beneficial uses of waters of the state by achieving the outcome of improved water quality in MS4 discharges and receiving waters.

Priority water quality conditions and their sources in discharges to the San Diego Bay were identified through public input and an evaluation of more than 20 years of research. For this plan, the RPs developed a methodology to further prioritize these conditions as Highest and Focused Priorities. These include water quality related to metals and bacteria in Chollas Creek, which is subject to TMDLs, riparian area quality, swimmable beaches, and physical aesthetics due to trash in two sub-watersheds.

Numeric goals and associated schedules for achievement were established for each of the Highest and Focused Priority conditions. Strategies were identified to meet these goals, and preference was given to strategies that provide multiple benefits and will address water quality conditions that were not elevated to a Highest or Focused Priority. Thus, the strategies and jurisdictional programs in this Water Quality Improvement Plan are expected to improve the quality of MS4 discharges (or eliminate them altogether during dry weather) throughout the entire San Diego Bay WMA.

In order to measure progress toward achieving the goals, the RPs developed a Monitoring and Assessment Plan. The MAP details several different types of monitoring, including water quality evaluations of MS4 outfall discharges and receiving waters, trash assessments, bioassessments and habitat evaluations, and special studies that focus on a particular concern. The monitoring is primarily watershed-based, and is focused on water quality outcomes as opposed to an accounting of activities. The MAP describes the methods for assessing the monitoring data and evaluating progress towards achieving the established water quality goals.

Finally, the Water Quality Improvement Plan will be updated in the future according to an Iterative Approach and Adaptive Management process. As progress towards achieving goals is made, the water quality conditions in the San Diego Bay will be re-evaluated, and new priorities will be identified where appropriate. Where goals and schedules are not mandated by a TMDL, they may be adapted based on the success of implemented strategies and additional public input.

The Water Quality Improvement Plan is a new, watershed- and outcome-based framework for managing the quality and quantity of discharges to the San Diego Bay and receiving waters throughout the WMA within the limits of the RP's jurisdictions. This process also involves substantial public involvement. It is designed to be adapted based on actual progress toward improved water quality as well as regular input from the public.

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Appendix A – WQIP Crosswalk
Municipal Permit Requirements Considerations

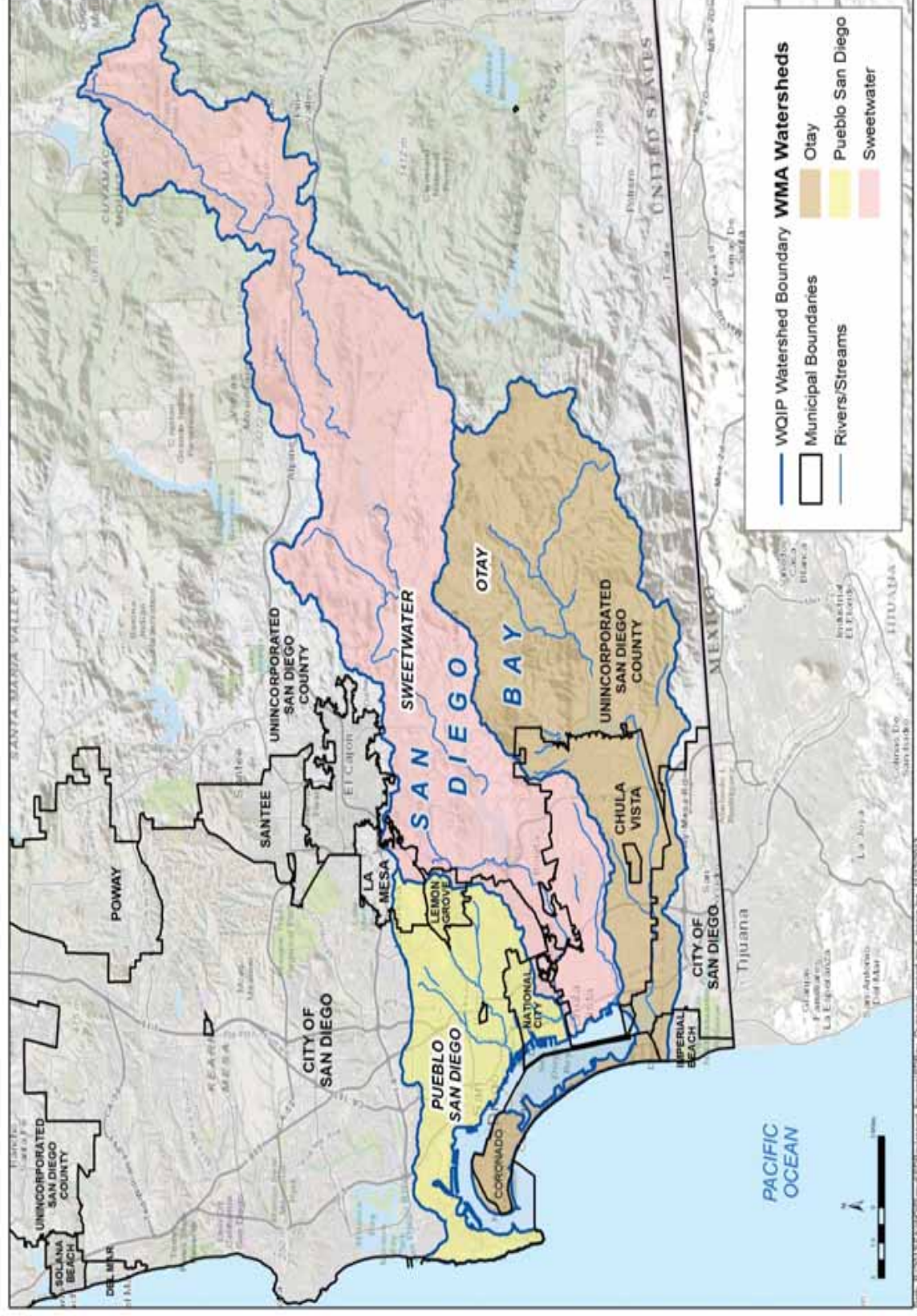
Permit Considerations	Municipal Permit Section	WQIP Document Section/Appendix
Watershed Management Area	B.1 (pg. 17)	Section 1.2
Water Quality Improvement Plan Submittal, Updates, and Implementation	B.6 (pg. 32)	Section 1.3
Priority Water Quality Conditions	B.2 (pg. 19)	Section 2
1. Assessment of Receiving Water Conditions	B.2.a (pg. 19)	Section 2.1, Appendix D, Appendix E
2. Assessment of Impacts From MS4 Discharges	B.2.b (pg. 20)	Appendix D, Appendix E
3. Identification of Priority Water Quality Conditions	B.2.c (pg. 20)	Section 2.1, Section 2.2, Appendix F
4. Identification of MS4 Sources of Pollutants and/or Stressors	B.2.d (pg. 21)	Section 3, Appendix G
5. Identification of Potential Water Quality Improvement Strategies	B.2.e (pg. 22)	First Interim Deliverable (Not required in Final WQIP. Final strategies included in Section 4.)
Water Quality Improvement Goals, Strategies and Schedules	B.3 (pg. 23)	Section 4
1. Water Quality Improvement Goals and Schedules	B.3.a (pg. 23)	Section 4, Appendix H
2. Water Quality Improvement Strategies and Schedules	B.3.b (pg. 25)	Section 4, Appendix I
Water Quality Improvement Monitoring and Assessment Program	B.4 (pg. 30)	Section 5, Appendix K
Iterative Approach	B.5 (pg. 30)	Section 6
1. Re-Evaluation of Priority Water Quality Conditions	B.5.a (pg. 30)	Section 6.3
2. Adaptation of Goals, Strategies and Schedules	B.5.b (pg. 31)	Section 6.4
3. Adaptation of Monitoring and Assessment Program	B.5.c (pg. 32)	Section 6.6

APPENDIX B

San Diego Bay WMA Supporting Data

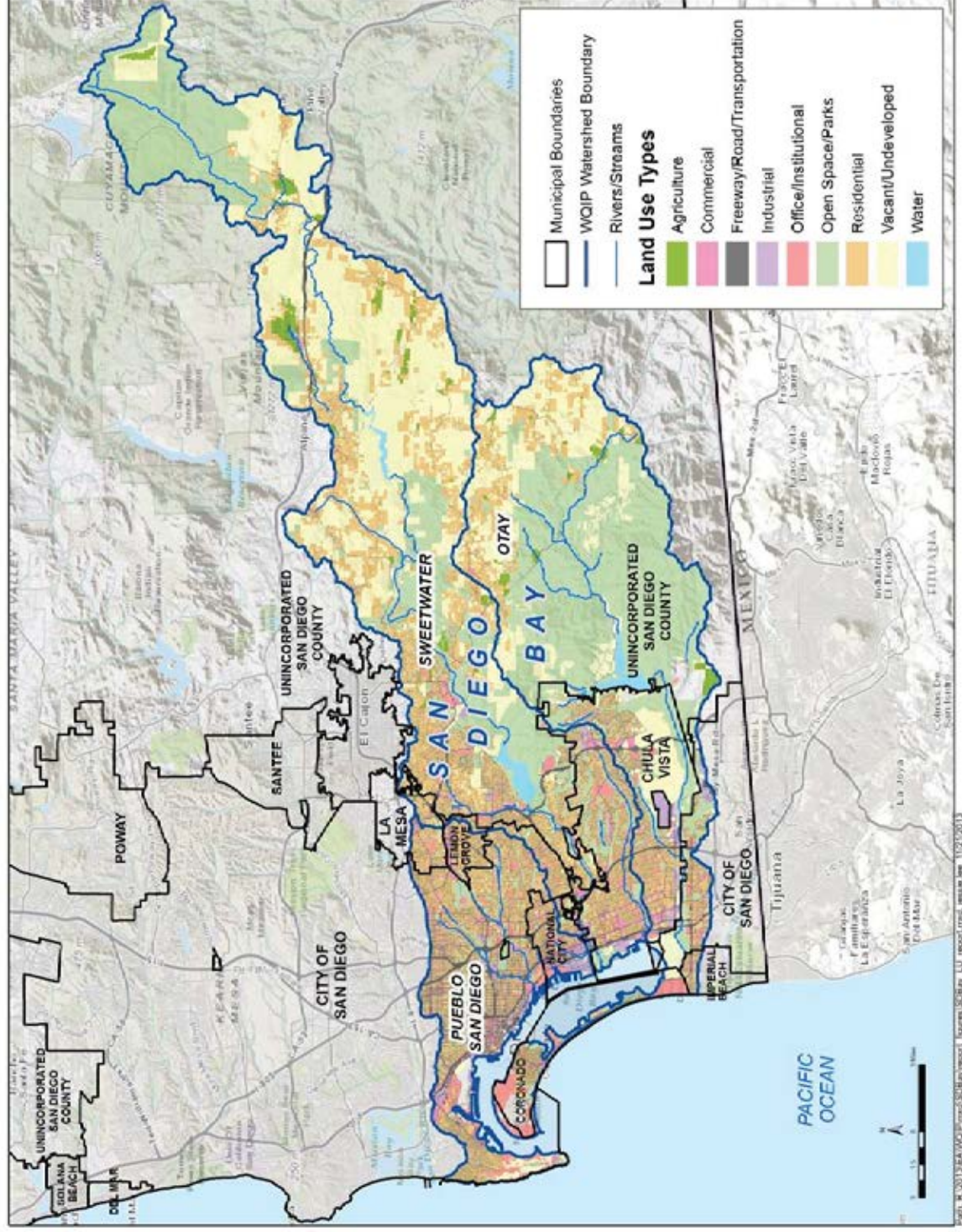
APPENDIX B
SAN DIEGO WATERSHED MANAGEMENT AREA
SUPPORTING DATA

Figure B-1.
San Diego Bay WMA Subwatersheds and Responsible Parties



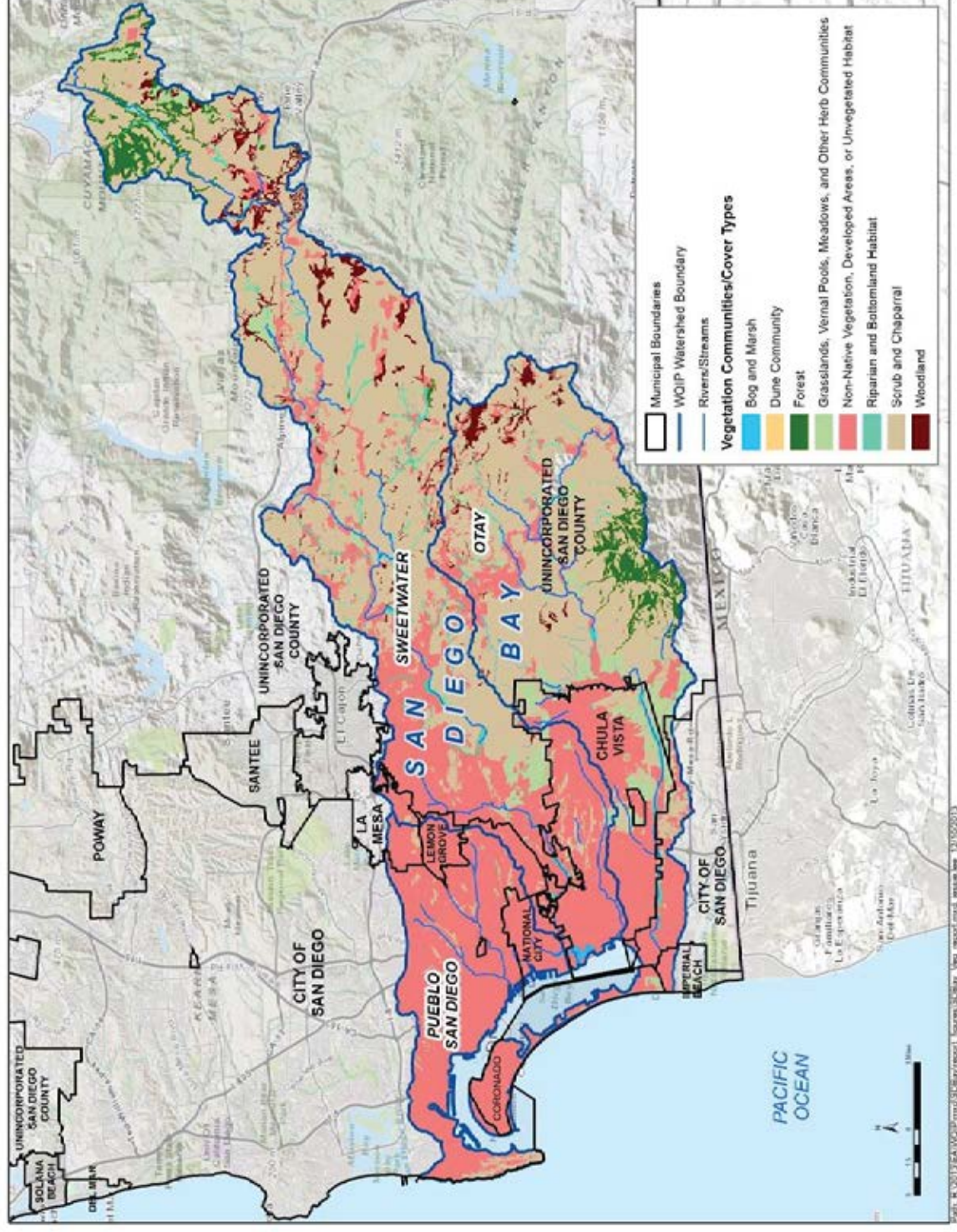
APPENDIX B
SAN DIEGO WATERSHED MANAGEMENT AREA
SUPPORTING DATA

Figure B-2.
San Diego Bay Watershed Management Area—Land Use (SANDAG)



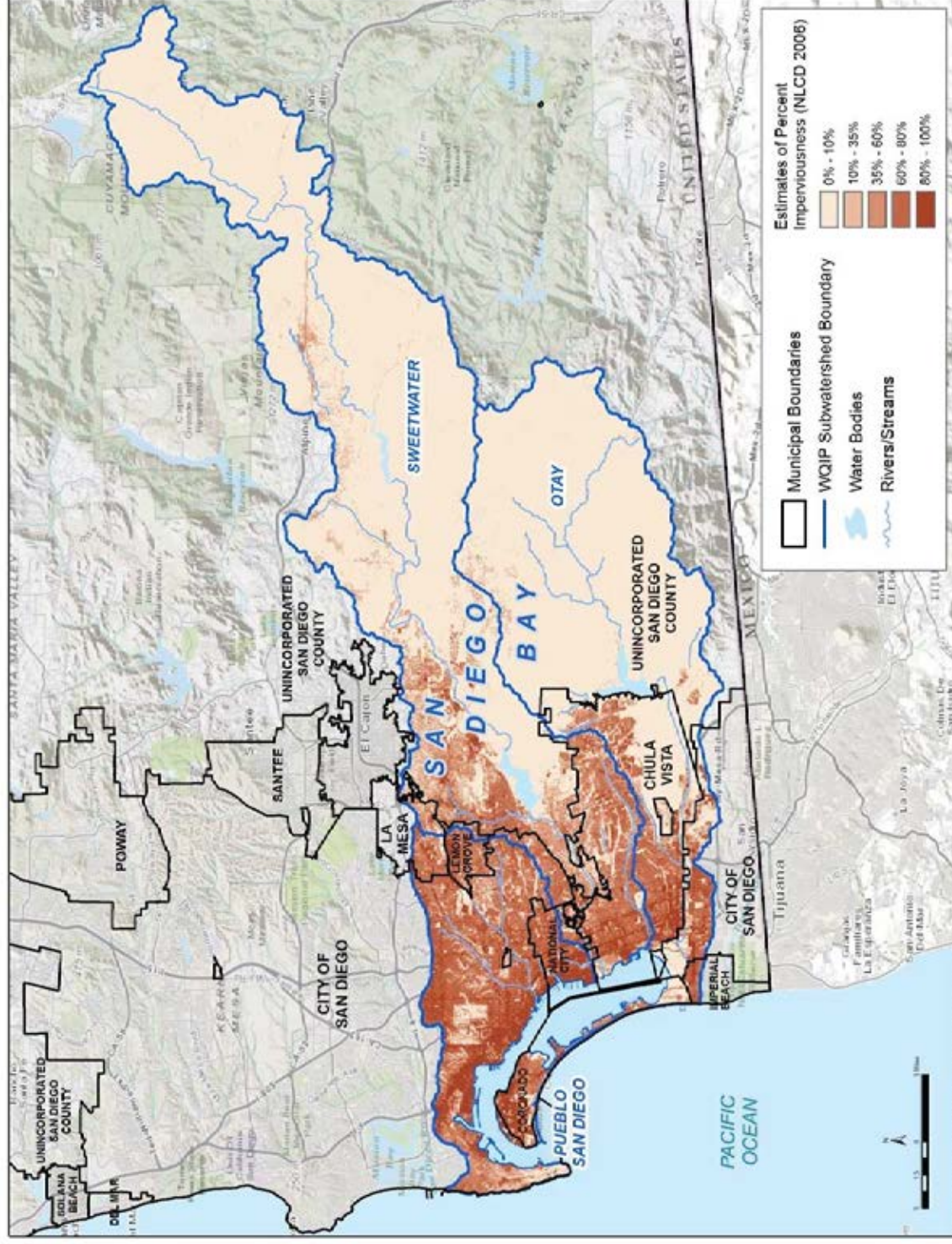
APPENDIX B
SAN DIEGO WATERSHED MANAGEMENT AREA
SUPPORTING DATA

Figure B-3.
San Diego Bay Watershed Management Area—Vegetative Cover (SANDAG, 2008)



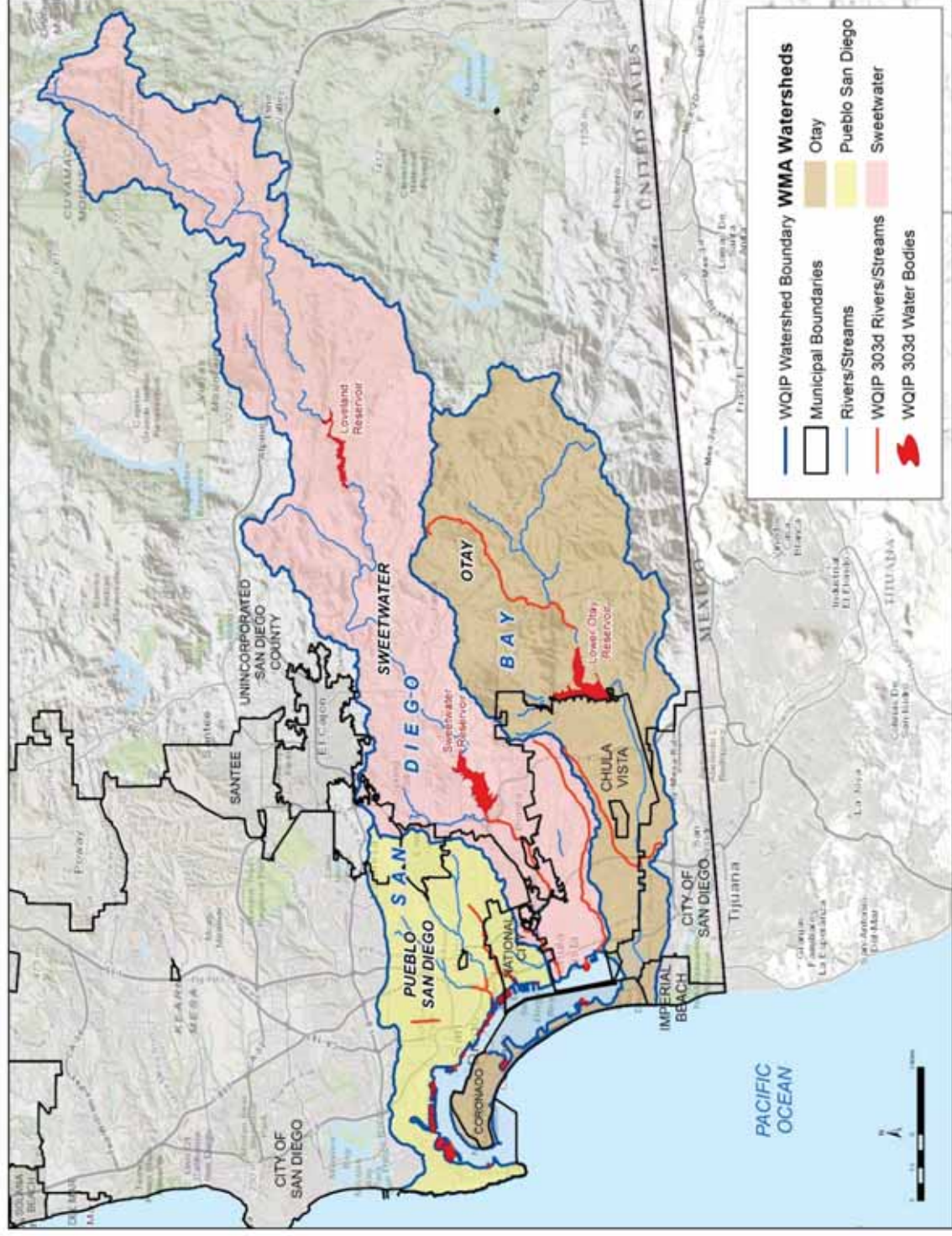
APPENDIX B
SAN DIEGO WATERSHED MANAGEMENT AREA
SUPPORTING DATA

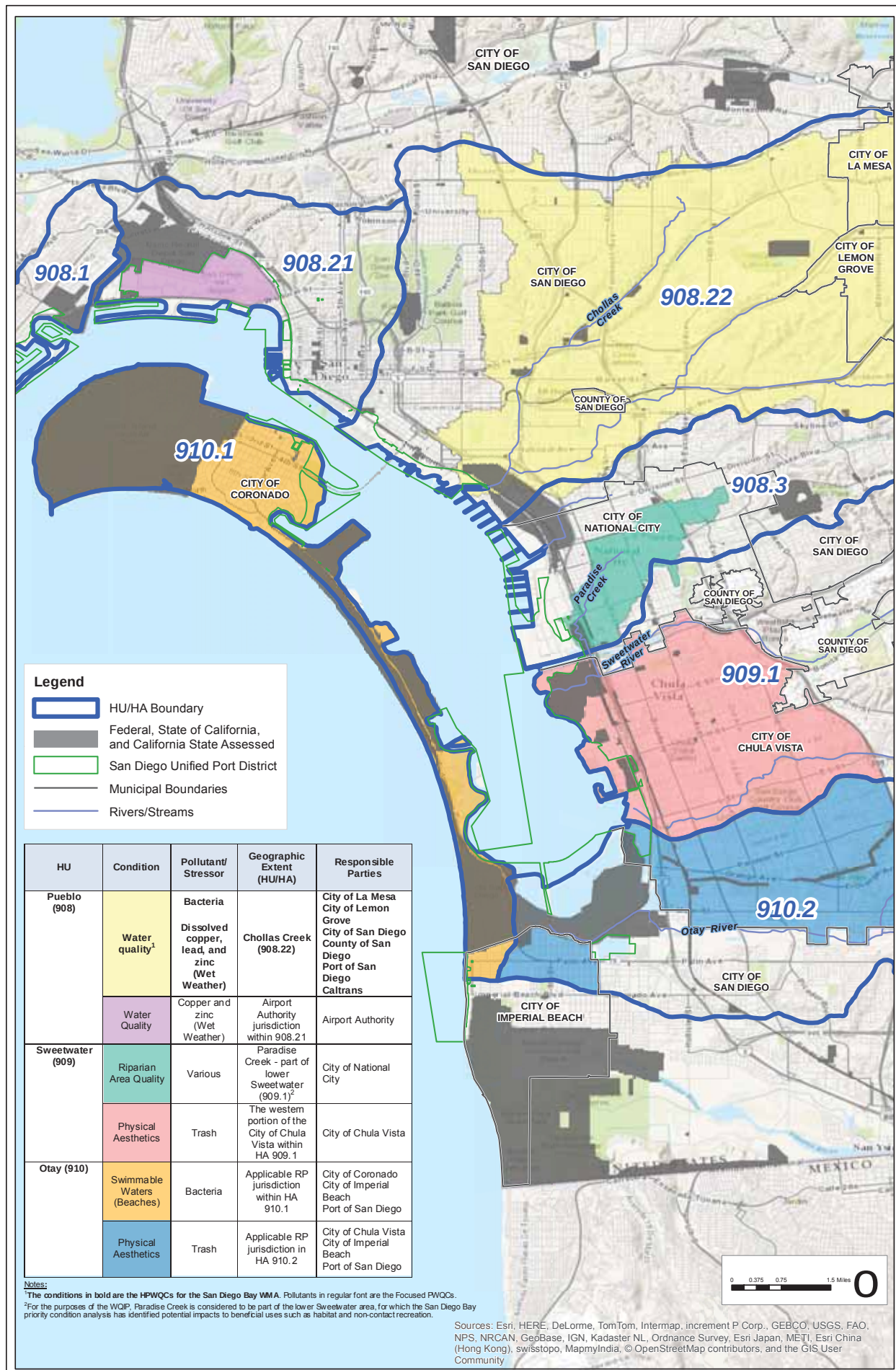
Figure B-4.
San Diego Bay Watershed Management Area—Percentage Impervious (NLCD, 2006)



APPENDIX B
SAN DIEGO WATERSHED MANAGEMENT AREA
SUPPORTING DATA

Figure B-5
San Diego Bay Watershed Management Area—2010 303(d)-Listed Waterbodies





FIGURE

B-6

APPENDIX B
SAN DIEGO WATERSHED MANAGEMENT AREA
SUPPORTING DATA

**Table B-1.
San Diego Bay Watershed Management Area–2010 303(d) Listings and Associated Beneficial Uses**

Water Body Name	Beneficial Use														
	MUN	AGR	IND	NAV	COMM	PROC	GWR	FRSH	POW	REC-1	REC-2	BIOL	WARM	COLD	WILD
<i>Pueblo Watershed</i>															
Paleta Creek	+									0	•	•	•		•
San Diego Bay			•	•	•					•	•	•			•
San Diego Bay Shoreline, North of 24th Street Marine Terminal			•	•	•					•	•	•			•
San Diego Bay Shoreline, Seventh Street Channel			•	•	•					•	•	•			•
Pacific Ocean Shoreline, Point Loma HA, at Bermuda Ave			•	•	•					•	•	•		•	
San Diego Bay Shoreline, at Americas Cup Harbor			•	•	•					•	•	•			•
San Diego Bay Shoreline, near sub base			•	•	•					•	•	•			•
San Diego Bay Shoreline, Shelter Island Shoreline Park			•	•	•					•	•	•			•
San Diego Bay, Shelter Island Yacht Basin			•	•	•					•	•	•			•
Chollas Creek	+									0	•	•	•		•
San Diego Bay Shoreline, 32nd St San Diego Naval Station			•	•	•					•	•	•			•
San Diego Bay Shoreline, at Harbor Island (East Basin)			•	•	•					•	•	•			•
San Diego Bay Shoreline, at Harbor Island (West Basin)			•	•	•					•	•	•			•
San Diego Bay Shoreline, at Marriott Marina			•	•	•					•	•	•			•
San Diego Bay Shoreline, at Spanish Landing			•	•	•					•	•	•			•
San Diego Bay Shoreline, between Sampson and 28th Streets			•	•	•					•	•	•			•
San Diego Bay Shoreline, Downtown Anchorage			•	•	•					•	•	•			•
San Diego Bay Shoreline, G Street Pier			•	•	•					•	•	•			•
San Diego Bay Shoreline, near Chollas Creek			•	•	•					•	•	•			•
San Diego Bay Shoreline, near Coronado Bridge			•	•	•					•	•	•			•
San Diego Bay Shoreline, near Switzer Creek			•	•	•					•	•	•			•
San Diego Bay Shoreline, Vicinity of B St and Broadway Piers			•	•	•					•	•	•			•
Switzer Creek	+									0	•	•	•		•

APPENDIX B
SAN DIEGO WATERSHED MANAGEMENT AREA
SUPPORTING DATA

**Table B-1.
San Diego Bay Watershed Management Area–2010 303(d) Listings and Associated Beneficial Uses (continued)**

Water Body Name	Beneficial Use														
	MUN	AGR	IND	NAV	COMM	PROC	GWR	FRSH	POW	REC-1	REC-2	BIOL	WARM	COLD	WILD
Sweetwater Watershed															
Paradise Creek, HSA 908.320	+									o	•		•		
San Diego Bay Shoreline, at Bayside Park (J Street)			•	•	•					•	•	•			•
San Diego Bay Shoreline, Chula Vista Marina			•	•	•					•	•	•			•
Sweetwater River, Lower (below Sweetwater Reservoir)	+		•							o	•		•		
Sweetwater Reservoir	•	•	•			•				•	•		•		
Loveland Reservoir	•	•	•			•				•	•		•		
Otay Watershed															
Pacific Ocean Shoreline, Coronado HA, at Silver Strand (north end, Oceanside)			•	•	•					•	•	•			•
Pacific Ocean Shoreline, Imperial Beach Pier			•	•	•					•	•	•			•
Pacific Ocean Shoreline, Otay Valley HA, at Carnation Ave and Camp Surf Jetty			•	•	•					•	•	•			•
San Diego Bay Shoreline, at Coronado Cays			•	•	•					•	•	•			•
San Diego Bay Shoreline, at Glorietta Bay			•	•	•					•	•	•			•
San Diego Bay Shoreline, Tidelands Park			•	•	•					•	•	•			•
Jamul Creek	•	•	•			•				•	•	•	•		•
Lower Otay Reservoir	•	•	•			•				•	•	•	•		•
Poggi Canyon Creek	+	•	o							o	•		•		

Notes:

Shaded cells indicate that the beneficial use is listed as impaired in the 303(d) listing.

Striped cells indicate that the beneficial use is listed as impaired in the 2010 303(d) listing, but the 2010303(d)-listed beneficial use is not designated as a beneficial use for the waterbody in the Basin Plan.

- Existing Beneficial Use
- o Potential Beneficial Use
- + Excepted from MUN

Notes:

Beneficial Use Categories: MUN = municipal and domestic supply; AGR = agricultural supply; IND = industrial service supply; NAV = navigation; COMM = commercial and sport fishing; PROC = industrial process supply; GWR = groundwater recharge, FRSH = freshwater replenishment; POW = hydropower generation; REC-1 = contact water recreation; REC-2 = non-contact water recreation; BIOL = preservation of biological habitats of special significance; WARM = warm freshwater habitat; COLD = cold freshwater habitat; WILD = wildlife habitat; RARE = rare, threatened, or endangered species; SPWN = spawning, reproduction, and/or early development; MAR = marine habitat; AQUA = aquaculture; MIGR = migration of aquatic organisms; "SHELL = shellfish harvesting; EST = estuarine habitat.

APPENDIX B
 SAN DIEGO WATERSHED MANAGEMENT AREA
 SUPPORTING DATA
*San Diego Bay Water Quality Improvement Plan—Phase I
 Resource Documents*

Primary References

2011 Long-Term Effectiveness Assessment Final Report. San Diego Stormwater Copermittees Urban Runoff Management Programs
2011-2012 San Diego County Municipal Copermittee Receiving Waters and Urban Runoff Monitoring Report
2011-2012 San Diego Bay WMA WURMP Annual Report
2010 California 303(d) List of Impaired Water Bodies
2013 Municipal Permit Order No. R9-2013-0001
2013 Paleta, Chollas, and Switzer Creeks Sediment TMDL Draft Technical Report
2010 Twenty Beaches and Creeks Bacteria TMDL Resolution No. R9-2010-0001 and Technical Report
2008 Shelter Island Shoreline Park Bacteria TMDL Resolution No. R9-2008-0027 and Technical Report
2007 Shelter Island Shoreline Park Dissolved Copper, Lead, and Zinc TMDL Resolution No. R9-2007-0043 and Technical Report
2005 Shelter Island Yacht Basin Dissolved Copper TMDL Resolution No. R9-2005-0019 and Technical Report
2003 Chollas Creek Diazinon TMDL Resolution No. R9-2002-0123 and Technical Report
San Diego Basin Plan, with amendments
2013 Regional Board Practical Vision
2012 Chollas Creek Watershed Comprehensive Load Reduction Plan
Chollas Creek Total Maximum Daily Load 2012-2013 Water Quality Compliance Monitoring Report
2005 Phase II TMDL Sediment Quality Assessment Study at the B Street/Broadway Piers, Downtown Anchorage, and Switzer Creek, San Diego.
2013 CalRecycle Solid Waste Information System Website
2014 Paradise Creek Selenium Monitoring Final Report
2014 City of National City Transitional Dry Weather MS4 Outfall Monitoring Program
Clean Water Act of 1972, with amendments
2010 Multi-Pollutant TMDL Implementation Plan for the Unincorporated Area of the Los Angeles River Watershed
2012 County of San Diego SUSUMP
2011 National Land Cover Database
1999 National Resources Conservation Service California Watershed Dataset
2008 San Diego Bay WMA WURMP
2003 San Diego Bay WMA WURMP
SANDAG Vegetation GIS Layers
SANDAG Vegetation Land Use Layers
2012 San Diego Coastkeeper Comments on Tentative Order No. R9-2012-0011
2014 SMARTS Online Database

APPENDIX B
SAN DIEGO WATERSHED MANAGEMENT AREA
SUPPORTING DATA

Primary References (continued)

2014 State Water Resources Control Board NPDES Permit Database
2013 SWAMP Tools for Assessing the Biological Integrity of Surface Waters
2014 USEPA Website discussing Green Infrastructure
2014 USEPA TMDL Glossary
2009 USEPA TMDL Program Results Analysis Fact Sheet
2012 San Diego Bay National Wildlife Refuge Information from the US Fish and Wildlife Service
2009 USGS article on Mercury Contamination of Aquatic Ecosystems
2008 Wanatabe et al. article on Diazinon in the Chollas Creek Watershed
2013 Online article on Eutrophication and Hypoxia

Additional Resources

Armand Ruby Consulting in Association with AMEC. Draft Technical Memorandum. Summary of Literature Review, Bacteria Source Identification and Conceptual Model (2012)
City of Chula Vista 2012 Dry Weather Monitoring Report
Caltrans Stormwater Management Program Annual Report (2012-2013)
Caltrans Stormwater Management Program District 11 Work Plan (2012-2013)
City of Chula Vista Jurisdictional Urban Runoff Monitoring Program (JURMP) Annual Report (2011-2012)
City of Chula Vista JURMP (2007)
City of Chula Vista Selenium Special Study Monitoring Results (2011-2013)
City of Coronado JURMP Annual Report (2011-2012)
City of Coronado JURMP Annual Report (2012-2013)
City of Imperial Beach JURMP (2008)
City of La Mesa Dry Weather Field Screening and Analytical Monitoring Program (2013)
City of La Mesa JURMP (2008)
City of Lemon Grove JURMP Annual Report (2011-2012)
City of National City JURMP (2008)
City of National City JURMP Annual Report (2012-2013)
City of National City Municipal Separate Storm Sewer Dry Weather Outfall Monitoring Analytical Results (2013)
City of San Diego Chollas Creek Copper, Lead, and Zinc Water-Effect Ratio Study (2011)
City of San Diego Chollas Creek Storm Drain Characterization Study (2010)
City of San Diego Chollas Creek TMDL Source Loading, Best Management Practices, and Monitoring Strategy Assessment. Final Report (2006)
City of San Diego Enterococcal Sources and Growth Related to Two Storm Drains in San Diego County. Draft Final Report. (2011)
City of San Diego JURMP (2008)
City of San Diego JURMP Annual Report (2010-2011)
City of San Diego JURMP Annual Report (2011-2012)

APPENDIX B
SAN DIEGO WATERSHED MANAGEMENT AREA
SUPPORTING DATA

Additional Resources (continued)

City of San Diego Shelter Island Dissolved Copper Total Maximum Daily Load Compliance Monitoring Report (2011-2012)
City of San Diego Targeted Aggressive Street Sweeping Pilot Study Effectiveness Assessment. Final Report (2010)
County of San Diego JURMP (2011-2012)
Otay River Watershed Management Plan (2006)
Port of San Diego Annual Report for Storm Water Discharges Associated with Industrial Activities-Cruise Ship Terminal (2012-2013)
Port of San Diego Annual Report for Storm Water Discharges Associated with Industrial Activities-National City Marine Terminal (2012-2013)
Port of San Diego Annual Report for Storm Water Discharges Associated with Industrial Activities-Tenth Avenue Marine Terminal (2012-2013)
Port of San Diego Bacteriological Data Evaluation for Shelter Island Shoreline Park, 2004 through 2012. Final Report (2012)
Port of San Diego JURMP (2007)
Port of San Diego JURMP Annual Report (2012-2013)
Port of San Diego JURMP Annual Update Part I & II (2012-2013)
Port of San Diego Master Plan Amendment. Draft Chula Vista Bayfront Master Plan & Port Master Plan Amendment (2010)
Port of San Diego San Diego Bay Integrated Natural Resources Management Plan (2013)
Port of San Diego. Shelter Island Yacht Basin Total Maximum Daily Load Monitoring and Progress Report. AMEC. (2013)
Regional Harbor Monitoring Program Copper Literature Review & Biotic Ligand Model Analysis (2011)
Regional Harbor Monitoring Program Final Report (2008)
Regional Harbor Monitoring Program Pilot Project 2005-08 Summary Final Report
Regional Harbor Monitoring Program Special Study Sediment and Water Toxicity Assessment (2011)
San Diego County Regional Airport Authority SAN Storm Water Management Plan (2008)
San Diego County Regional Airport Authority Annual Illicit Discharge Detection and Elimination Report (2011-2012)
San Diego County Regional Airport Authority Municipal Stormwater Permit Annual Report (2011-2012)
San Diego County Regional Airport Authority Municipal Stormwater Permit Annual Report (2012-2013)
San Diego Integrated Regional Water Management Plan, Volume I & II (2013)
SCCWRP 2008 Bight Regional Monitoring Program documents (data incorporated in 2010 LTEA)
SPAWAR Stormwater Toxicity Evaluation: Naval Station San Diego, Naval Submarine Base San Diego, Naval Amphibious Base Coronado, and Naval Air Station North Island. (2006)

APPENDIX B
SAN DIEGO WATERSHED MANAGEMENT AREA
SUPPORTING DATA

Additional Resources (continued)

TDY Industries, LLC. Post-Remediation Risk Assessment Work Plan for the Airport/Former TDY Site (2013)

APPENDIX C

Consultation Panel Charter



San Diego Bay Watershed Water Quality Improvement Plan

Consultation Panel Charter

I. PURPOSE

The Cities of Chula Vista, Coronado, Imperial Beach, La Mesa, Lemon Grove, National City, San Diego, the County of San Diego, San Diego County Regional Airport Authority, and the San Diego Unified Port District (Agencies) are collaborating to protect water quality in the San Diego Bay Watershed. The San Diego Bay Watershed is comprised of three sub-watersheds: Pueblo San Diego, Sweetwater, and Otay. The Agencies are required to convene a Consultation Panel to provide recommendations during the development of a Water Quality Improvement Plan (WQIP) as part of their response to new storm water regulations. The Consultation Panel and the development of the WQIP are required by Provision B of the San Diego Regional Water Quality Control Board's (SDRWQCB) Order Number R9-2013-0001 for Discharges from the Municipal Separate Storm Sewer System (MS4 permit).

II. CONSULTATION PANEL ROLE

The Agencies are seeking Consultation Panel members who have knowledge of the San Diego Bay Watershed, have a general knowledge of the requirements and intent of the MS4 permit as well as water quality issues and concerns in the San Diego Bay Watershed. Consultation Panel members will represent the perspectives of the organization they belong to, and be able to provide a broad and collaborative perspective of regional water quality management concepts for the development of the WQIP.



a. CONSULTATION PANEL RESPONSIBILITIES

1. Consultation Panel members are expected to serve throughout the entire WQIP development process, beginning in November 2013 through July 2015.

2. Public workshops: At least two (2) public workshops will be held to obtain input from the public regarding the WQIP development process. The Agencies strongly encourage Consultation Panel members to attend the workshops. The first workshop is tentatively planned for November 22, 2013 and the second workshop in August 2014.

3. Committee meetings: Up to five (5) meetings are currently anticipated. Consultation Panel members are expected to attend all scheduled meetings. These are expected to be up to two (2) hours long. If a Consultation Panel member is unable to attend a meeting, he or she will have an opportunity to provide written comments on the materials discussed according to the project schedule.

4. Consultation Panel members are expected to review up to three (3) WQIP drafts prepared by the Agencies. The Consultation Panel is expected to provide input to the Agencies regarding water quality improvement in the watershed. A tentative schedule of the meetings with general descriptions is provided in Table 1.

5. Each Consultation Panel member is expected to represent the general overall views of the area of representation. A member's personal or employer's opinion or input should be qualified as such and may only be offered following all general input by all other Consultation Panel members.

III. COMPOSITION AND MEMBERSHIP

The Consultation Panel will be comprised of members in the categories listed below. The Agencies may choose to add additional members at-large if there is sufficient interest in a particular sub-watershed. Every effort will be made to ensure a balanced representation of interests and service categories.

a. CORE MEMBERS

1. One (1) required representative assigned by the SDRWQCB.

2. One (1) required representative of the environmental community familiar with the water quality conditions of concern of the receiving waters in the watershed.

3. One (1) required representative of the development community familiar with the opportunities and constraints for implementing structural Best Management Practices (BMPs), retrofitting projects, and stream, channel or habitat rehabilitation projects in the watershed, preferably with relevant engineering, hydrology, and/or geomorphology experience in the watershed.



4. At-Large representative(s) familiar with water quality issues and/or topics pertaining to the three sub-watersheds. These individuals may include, but not be limited to representatives from:

- US EPA; assigned by EPA
- The business community
- Residential tenant/owner or representative of homeowner associations
- The agricultural community
- Water purveyors/waste water/water recycling community
- The academic community
- Other representatives who meet the minimum criteria as identified by the Agencies

b. ADDITIONAL MEMBERS AND REPLACEMENTS

Additional Consultation Panel members may be added at the discretion of the Agencies to provide additional perspectives and recommendations during WQIP development. Additional members must meet the same requirements as described above.

A Consultation Panel member who cannot meet his/her obligations and serve for the entire term will be required to provide the Agencies a 30-day notice in writing. At the Agencies' discretion, previously submitted interest forms may be reviewed to find a member's replacement or publish a new call for Consultation Panel membership. Replacement members must complete the interest form and be screened through the selection process in the same manner as original members (as described below).

IV. CONSULTATION PANEL SOLICITATION AND SELECTION PROCESS

The Agencies will publicize the request for membership in the San Diego Bay Consultation Panel and distribute membership solicitation notices in November 2013 via email and by posting it on the Project Clean Water website (www.projectcleanwater.org). Persons interested in Consultation Panel participation and representation of a core or at-large member seat will be asked to complete a statement of interest form.

The interest forms will be reviewed by the Agencies to ensure that membership candidates are capable of fulfilling the requirements, roles and responsibilities as described in Section II above and as required by the MS4 permit. If more than one person is interested in filling a specific category on the Consultation Panel, the Agencies will request that all those representatives within that category determine among themselves who shall serve. The Agencies reserve the right to appoint a specific individual from the pool of candidates if the applicants cannot reach a consensus among themselves. The Agencies may also select additional individuals for the At-Large category to help ensure a well-balanced and knowledgeable Consultation Panel.

V. CONSULTATION PANEL PARTICIPATION PROCESS

a. DISCUSSION AND DELIBERATIONS (GROUND RULES)

The Consultation Panel will provide input, advice, insight, suggestions and recommendations to the Agencies. Discussions do not have to reach consensus. Input provided by the Consultation Panel will be considered by the Agencies and incorporated into the WQIP as deemed appropriate or necessary. All input provided by the Consultation Panel will be public information.

The following ground rules apply to all Consultation Panel members:

1. All perspectives are welcomed and valued. Everyone is encouraged to share their views and disagreements shall be offered to the Consultation Panel members in a constructive and respectful manner.
2. One person at a time will be invited to speak by the meeting facilitator.
3. Time constraints will be honored by all Consultation Panel members. All will be offered an equal opportunity to address approved agenda items.

b. FACILITATION

Workshops and Consultation Panel meetings will be facilitated and supported by a neutral third party to ensure all perspectives are heard throughout the process.

c. OBSERVERS

Observers are welcome at Consultation Panel meetings. However, meetings are primarily intended for the dialogue between the Consultation Panel representatives and the Agencies and are facilitated to promote balanced, constructive interaction. Observers will be asked to refrain from commenting during the proceedings and may be allowed, time permitting, an opportunity for questions or comments at end of the meetings.

d. MEDIA AND OUTREACH

The Agencies cannot and will not restrict communication with media and others interested in the WQIP development process, they will work to ensure that the comments of individual Consultation Panel members are not construed as being statements made by the Consultation Panel as a whole.

Consultation Panel members will be asked not to make public statements about the Consultation Panel's deliberations to the media that may hamper constructive discussions. Consultation Panel members should also

speak for themselves and not on behalf of other members or the Consultation Panel as a whole. Agency staff and consultants will also refrain from such statements about the Consultation Panel's deliberations.

VI. SCHEDULE

Two (2) public workshops will be held for the San Diego Bay Watershed. The Consultation Panel will meet up to five (5) times: once before and potentially once after the first and second interim reports are submitted to the SDRWQCB and once prior to submitting the final WQIP to the SDRWQCB. The latest schedule will be posted on the Project Clean Water website (www.projectcleanwater.org) and is subject to change.

TABLE 1. SAN DIEGO BAY WQIP CONSULTATION PANEL SCHEDULE (TENTATIVE)

Events	Description	Date
1 st Public Workshop	• Project overview, process and schedule • Call for data and information from the public • Collect public recommendations for priority water quality conditions and potential strategies	November 22, 2013
1 st Consultation Panel Meeting	• Provide recommendations on priority water quality conditions and potential strategies	January, 2014
2 nd Consultation Panel Meeting	• Review the modified water quality conditions and potential strategies based on SDRWQCB public comment period	August, 2014
2 nd Public Workshop	• Collect recommendations from the public on potential numeric goals and strategies	August, 2014
3 rd Consultation Panel Meeting	• Review modified potential numeric goals and strategies based on SDRWQCB public comment period	February, 2015

VII. REGULATORY BACKGROUND

On May 8, 2013, the SDRWQCB adopted Order No. R9-2013-0001 as NPDES Permit No. CAS0109266 for Discharges from Municipal Storm Sewer Systems or MS4 Draining the Watersheds of the San Diego Region (MS4 permit). The MS4 permit went into effect on June 27, 2013 and can be found on the SDRWQCB website.

The MS4 permit is implemented in San Diego County by the cities, the County of San Diego, the San Diego County Regional Airport Authority and San Diego Unified Port District or Copermittees. The MS4 permit requires the Copermittees to develop and implement, for each watershed, a WQIP to further the federal Clean Water Act's objective to protect, preserve, enhance, and restore the water quality and designated beneficial uses of waters of the state. The process to develop the WQIP is through an adaptive planning and management process that identifies the highest water quality conditions within a watershed and implements strategies through the Copermittees' jurisdictional runoff management programs to achieve improvements in the quality of the dischargers from the MS4 and receiving waters.

VIII. INTEREST FORM AND INSTRUCTIONS

Persons or organizations interested in participating as a Consultation Panel member shall complete the attached interest form and submit it via email to: gnelson@imperialbeachca.gov by December 2, 2013. Any questions or clarification on the interest form or the San Diego Bay Water Quality Improvement Plan Consultation Panel Charter should be directed via email to: gnelson@imperialbeachca.gov.



San Diego Bay Watershed WQIP Consultation Panel

Membership Interest Form

Due by: December 2, 2013 via email to gnelson@imperialbeachca.gov

I, _____, volunteer to serve on the San Diego Bay WQIP Consultation Panel for the following interest category:

- ☐ Representative of the environmental community
- ☐ Representative of the development community
- ☐ At-Large representative for: _____ (see Charter Section III.a.4)

Applicant Name

Organization Name/Description

Organization Address

Phone number

Website

Email

Please provide an official letter or resolution from the organization, on their letterhead, authorizing you to represent them (attached to this interest form).

Please provide: 1) Past and present experience with San Diego Bay watershed topics and issues; 2) Familiarity with water quality issues in San Diego Bay; 3) Specific knowledge about any one of the three sub-watersheds in the San Diego Bay Watershed (Pueblo San Diego, Sweetwater, or Otay); 4) Experience with implementing joint water quality programs or projects with other agencies or stakeholders; and 5) Other qualifications that you believe will benefit the development of the San Diego Bay Watershed WQIP. Submittal is limited to five (5) pages, plus required attachments.

APPENDIX D
San Diego Bay Watershed Management Area—
Assessment of Impacts of MS4 Discharges on Potential Receiving Water Conditions

HA	Waterbody	Condition	Receiving Water Data or Regulatory Drivers Support Consideration as a Receiving Water Condition		MS4 Monitoring Data Indicates Potential MS4 Impact			MS4 Listed as Source on the 303(d) List	Determining Factors
			Dry	Wet	Dry	Wet	Wet		
Pueblo Watershed									
908.1	Pacific Ocean Shoreline, Point Loma HA, at Bermuda Ave	Impairment of REC-1 and SHELL due to total coliform	✓	✓	--	--	--	✓	2010 303(d)
908.1	San Diego Bay Shelter Island Yacht Basin	Impairment of EST due to copper	✓	✓	✓	✓	✓	--	TMDL ¹ , 2010 303(d), and current and historical monitoring data
908.1	San Diego Bay Shoreline, at Americas Cup Harbor	Impairment of EST due to copper	✓	✓	✓	--	--	--	2010 303(d) and current monitoring data
908.1	San Diego Bay Shoreline, at Harbor Island (West Basin)	Impairment of EST due to copper	✓	✓	✓	--	--	--	2010 303(d)
908.1	San Diego Bay Shoreline, near sub base	Impairment of MAR due to benthic community effects and sediment toxicity	✓	--	--	--	✓	--	TMDL ² , 2010 303(d)
908.1	San Diego Bay Shoreline, near sub base	Impairment of MAR due to toxicity	--	✓	--	--	--	✓	TMDL ² , 2010 303(d), and historical monitoring data
908.1	San Diego Bay Shoreline, Shelter Island Shoreline Park	Impairment of REC-1 due to enterococcus, fecal coliform, and total coliform	✓	✓	✓	--	--	✓	TMDL ³ and 2010 303(d)
908.2	Chollas Creek	Impairment of AGR (WARM) due to copper	✓	✓	✓	✓	✓	--	2010 303(d), current and historical monitoring data, and TMDL ⁴
908.2	Chollas Creek	Impairment of WARM due to zinc	✓	✓	✓	✓	✓	✓	2010 303(d), current and historical monitoring data, and TMDL ⁴
908.2	Chollas Creek	Impairment of WARM due to lead	✓	✓	✓	--	--	✓	2010 303(d), current and historical monitoring data, and TMDL ⁴
908.2	Chollas Creek	Impairment of WARM due to diazinon	✓	✓	✓	--	--	--	2010 303(d) and TMDL ⁵ , and historical monitoring data
908.2	Chollas Creek	Impairment of WARM due to phosphorus	✓	--	--	--	--	--	2010 303(d) and current and historical monitoring data
908.2	Chollas Creek	Impairment of WARM due to Total Nitrogen as N	✓	✓	✓	✓	✓	--	2010 303(d) and current and historical monitoring data
908.2	Chollas Creek	Impairment of REC-1 due to indicator bacteria	✓	✓	✓	✓	✓	✓	2010 303(d) and TMDL ⁶ and current and historical monitoring data
908.2	Chollas Creek	Impairment of REC-2 due to trash	✓	✓	✓	✓	✓	✓	2010 303(d) and current monitoring data
908.2	Chollas Creek	Very poor IBI	✓	✓	✓	--	--	--	Current monitoring data
908.2	Chollas Creek	Elevated enterococcus	✓	--	--	✓	--	--	Current and historical monitoring data
908.2	Chollas Creek	Elevated bifenthrin and TSS	--	✓	--	--	✓	--	Current and historical monitoring data
908.2	Chollas Creek	Toxicity	✓	✓	--	--	--	--	Current and historical monitoring data
908.2	Chollas Creek	Elevated turbidity, BOD, and COD	✓	✓	--	--	--	--	Current and historical monitoring data
908.2	Chollas Creek	Elevated turbidity	✓	--	✓	✓	--	--	Current and historical monitoring data

Notes: ✓ = Data supports consideration; -- = No data available (data gap) or inapplicable.

1. TMDL for Dissolved Copper in Shelter Island Yacht Basin, San Diego Bay. Approved 12/2005.

2. Naval Submarine Base San Diego TMDL. In development.

3. TMDL for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay. Approved 09/2009.

4. TMDL for Dissolved Copper, Lead, and Zinc in Chollas Creek, Tributary to San Diego Bay. Approved 10/2008.

5. Chollas Creek Diazinon TMDL. Approved 09/2003.

6. Revised TMDL for Indicator Bacteria, Project I--Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek). Approved 04/2011.

7. TMDL for Toxic Pollutants in Sediment at San Diego Bay Shorelines--Downtown Anchorage and B Street/Broadway Piers. In development.

8. Sediment Toxicity TMDL for the Mouths of Chollas, Paleta, and Switzer Creeks. In development.

APPENDIX D
San Diego Bay Watershed Management Area—
Assessment of Impacts of MS4 Discharges on Potential Receiving Water Conditions

HA	Waterbody	Condition	Receiving Water Data or Regulatory Drivers Support Consideration as a Receiving Water Condition		MS4 Monitoring Data Indicates Potential MS4 Impact		MS4 Listed as Source on the 303(d) List	Determining Factors
			Dry	Wet	Dry	Wet		
908.2	Chollas Creek	Low O/E and California Rapid Assessment Method scores	✓	--	✓	--	--	Historical monitoring data
908.2	Chollas Creek	Poor IBI	✓	--	--	--	--	Historical monitoring data
908.2	Chollas Creek	pH level outside of water quality objective	✓	--	--	--	--	Historical monitoring data
908.2	Chollas Creek	Elevated Ammonia as N, benthic algae, and oil & grease	✓	--	--	--	--	Current and historical monitoring data
908.2	Chollas Creek	Elevated permethrin	--	✓	--	--	--	Historical monitoring data
908.2	Chollas Creek	Elevated fecal coliform and surfactants (MBAS)	✓	✓	--	--	--	Historical monitoring data
908.2	Chollas Creek	Elevated fecal coliform	✓	--	✓	--	--	Historical monitoring data
908.2	San Diego Bay Shoreline, 32nd St San Diego Naval Station	Impairment of MAR due to benthic community effects and sediment toxicity	✓	✓	--	--	--	2010 303(d)
908.2	San Diego Bay Shoreline, at Harbor Island (East Basin)	Impairment of EST due to copper	✓	✓	--	--	--	2010 303(d)
908.2	San Diego Bay Shoreline, at Marriott Marina	Impairment of EST due to copper	✓	✓	--	--	--	2010 303(d)
908.2	San Diego Bay Shoreline, at Spanish Landing	Impairment of REC-1 and SHELL due to total coliform	✓	✓	--	--	--	2010 303(d)
908.2	San Diego Bay Shoreline, between Sampson and 28th Streets	Impairment of MAR due to copper	✓	✓	✓	✓	--	2010 303(d)
908.2	San Diego Bay Shoreline, between Sampson and 28th Streets	Impairment of MAR due PAHs	✓	✓	✓	✓	--	2010 303(d) and historical data
908.2	San Diego Bay Shoreline, between Sampson and 28th Streets	Impairment of COMM due to mercury	✓	✓	✓	✓	--	2010 303(d) and historical data
908.2	San Diego Bay Shoreline, between Sampson and 28th Streets	Impairment of COMM due to PCBs	✓	✓	✓	✓	✓	2010 303(d) and historical data
908.2	San Diego Bay Shoreline, between Sampson and 28th Streets	Impairment of WARM due to zinc	✓	✓	✓	✓	--	2010 303(d) and historical data
908.2	San Diego Bay Shoreline, Downtown Anchorage	Impairment of MAR due to benthic community effects and sediment toxicity	✓	✓	--	--	✓	2010 303(d) and historical data
908.2	San Diego Bay Shoreline, Downtown Anchorage	Impairment of MAR due to sediment toxicity and benthic community effects	--	✓	--	--	✓	TMDL ⁷ and historical data

Notes: ✓ = Data supports consideration; -- = No data available (data gap) or inapplicable.

1. TMDL for Dissolved Copper in Shelter Island Yacht Basin. Approved 12/2005.
2. Naval Submarine Base San Diego TMDL. In development.
3. TMDL for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay. Approved 09/2009.
4. TMDL for Dissolved Copper, Lead, and Zinc in Chollas Creek, Tributary to San Diego Bay. Approved 10/2008.
5. Chollas Creek Diazinon TMDL. Approved 09/2003.
6. Revised TMDL for Indicator Bacteria, Project I--Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek). Approved 04/2011.
7. TMDL for Toxic Pollutants in Sediment at San Diego Bay Shorelines--Downtown Anchorage and B Street/Broadway Piers. In development.
8. Sediment Toxicity TMDL for the Mouths of Chollas, Paleta, and Switzer Creeks. In development.

APPENDIX D
San Diego Bay Watershed Management Area—
Assessment of Impacts of MS4 Discharges on Potential Receiving Water Conditions

HA	Waterbody	Condition	Receiving Water Data or Regulatory Drivers Support Consideration as a Receiving Water Condition		MS4 Monitoring Data Indicates Potential MS4 Impact		MS4 Listed as Source on the 303(d) List	Determining Factors
			Dry	Wet	Dry	Wet		
908.2	San Diego Bay Shoreline, G Street Pier	Impairment of REC-1 and SHELL due to total coliform	✓	✓	--	--	--	2010 303(d)
908.2	San Diego Bay Shoreline, near Chollas Creek	Impairment of MAR due to benthic community effects and sediment toxicity	✓	✓	--	--	--	2010 303(d) and TMDL ⁸
908.2	San Diego Bay Shoreline, near Coronado Bridge	Impairment of MAR due to benthic community effects and sediment toxicity	✓	✓	--	--	✓	2010 303(d)
908.2	San Diego Bay Shoreline, near Switzer Creek	Impairment of MAR due to benthic community effects and sediment toxicity	✓	✓	✓	✓	✓	2010 303(d) and TMDL ⁸
908.2	San Diego Bay Shoreline, near Switzer Creek	Impairment of COMM due to chlordane	✓	✓	--	--	✓	2010 303(d) and TMDL ⁸
908.2	San Diego Bay Shoreline, Vicinity of B St and Broadway Piers	Impairment of REC-1 and SHELL due to total coliform	✓	✓	--	--	✓	2010 303(d)
908.2	San Diego Bay Shoreline, Vicinity of B St and Broadway Piers	Impairment of MAR due to benthic community effects and sediment toxicity	✓	✓	--	--	--	2010 303(d) and TMDL ⁷
908.2	Switzer Creek	Impairment of WARM due to copper, lead, and zinc	✓	✓	✓	✓	✓	2010 303(d) and current monitoring data
908.3	Paleta Creek	Impairment of WARM due to copper and lead	✓	✓	✓	✓	✓	2010 303(d) and current monitoring data
908.3	Paradise Creek	Impairment of WARM due to selenium	✓	✓	--	--	--	2010 303(d)
908.3	San Diego Bay Shoreline, North of 24th Street Marine Terminal	Impairment of MAR due to benthic community effects and sediment toxicity	✓	✓	--	--	--	2010 303(d)
908.3	San Diego Bay Shoreline, Seventh Street Channel (Paleta Creek)	Impairment of MAR due to benthic community effects and sediment toxicity	✓	✓	--	--	✓	2010 303(d) and TMDL ⁸
Sweetwater Watershed								
909.1	Lower Sweetwater River, below Sweetwater Reservoir	Impairment of REC-1 due to <i>Enterococcus</i> and fecal coliform	✓	✓	✓	✓	✓	2010 303(d) and current monitoring data
909.1	Lower Sweetwater River, below Sweetwater Reservoir	Impairment of WARM due to selenium, nitrogen, phosphorus, TDS, and toxicity	✓	✓	--	--	✓	2010 303(d) and current monitoring data
909.1	Paradise Creek	Impairment of WARM due to selenium	✓	✓	--	--	--	2010 303(d)
909.1	San Diego Bay Shoreline, at Bayside Park (J Street)	Impairment of REC-1 due to <i>Enterococcus</i> and total coliform	✓	✓	--	--	✓	Current monitoring data
909.1	San Diego Bay Shoreline, Chula Vista Marina	Impairment of EST due to copper	✓	✓	--	--	--	Current monitoring data
909.1	San Diego County Wildlife Refuge-Sweetwater Marsh Unit	Preservation of special habitat	✓	✓	--	--	--	Special Habitat
909.1	Sweetwater River MLS	Elevated salinity	✓	--	--	--	--	Current and historical monitoring data
909.1	Sweetwater River MLS	Toxicity to <i>C. dubia</i> reproduction	✓	--	--	--	--	Current and historical monitoring data

Notes: ✓ = Data supports consideration; -- = No data available (data gap) or inapplicable.

1. TMDL for Dissolved Copper in Shelter Island Yacht Basin, San Diego Bay. Approved 12/2005.

2. Naval Submarine Base San Diego TMDL. In development.

3. TMDL for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay. Approved 09/2009.

4. TMDL for Dissolved Copper, Lead, and Zinc in Chollas Creek, Tributary to San Diego Bay. Approved 10/2008.

5. Chollas Creek Diazinon TMDL. Approved 09/2003.

6. Revised TMDL for Indicator Bacteria, Project I--Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek). Approved 04/2011.

7. TMDL for Toxic Pollutants in Sediment at San Diego Bay Shorelines--Downtown Anchorage and B Street/Broadway Piers. In development.

8. Sediment Toxicity TMDL for the Mouths of Chollas, Paleta, and Switzer Creeks. In development.

APPENDIX D
San Diego Bay Watershed Management Area—
Assessment of Impacts of MS4 Discharges on Potential Receiving Water Conditions

HA	Waterbody	Condition	Receiving Water Data or Regulatory Drivers Support Consideration as a Receiving Water Condition		MS4 Monitoring Data Indicates Potential MS4 Impact		MS4 Listed as Source on the 303(d) List	Determining Factors
			Dry	Wet	Dry	Wet		
909.1	Sweetwater River MLS	Very poor IBI	✓	✓	--	--	--	Historical monitoring data
909.1	Sweetwater River MLS	Toxicity to <i>C. dubia</i> acute reproduction	✓	✓	--	--	--	Historical monitoring data
909.1	Sweetwater River MLS	Toxicity to <i>C. dubia</i> acute and chronic survival	✓	--	--	--	--	Historical monitoring data
909.1	Sweetwater River MLS	Elevated <i>Enterococcus</i>	✓	--	✓	--	--	Current and historical monitoring data
909.1	Sweetwater River MLS	Elevated dissolved and total phosphorus	✓	--	✓	--	--	Current and historical monitoring data
909.1	Sweetwater River MLS	Elevated total nitrogen	✓	--	✓	--	--	Current and historical monitoring data
909.1	Sweetwater River MLS	Elevated chloride	✓	--	✓	--	--	Historical monitoring data
909.1	Sweetwater River MLS	Low DO	✓	--	✓	--	--	Historical monitoring data
909.1	Sweetwater River MLS	Poor IBI	✓	--	✓	--	--	2010 303(d)
909.1	Sweetwater River MLS	Elevated fecal coliform	--	✓	--	✓	--	Current and historical monitoring data
909.1	Sweetwater River MLS	Toxicity to <i>S. capricornutum</i>	✓	✓	--	--	--	2010 303(d)
909.1	Sweetwater River MLS	Elevated salinity	✓	✓	--	--	--	2010 303(d)
909.1	Sweetwater River MLS	Low O/E and California Rapid Assessment Method scores	✓	--	--	--	--	2010 303(d)
909.1	Sweetwater River MLS	Elevated bifenthrin and turbidity	--	✓	--	--	--	Current monitoring data
909.1	Sweetwater River MLS	Toxicity to <i>C. dubia</i> reproduction	✓	✓	--	--	--	Current monitoring data
909.1	Telegraph Canyon Creek	Impairment of WARM due to selenium	✓	✓	--	--	--	2010 303(d)
909.2	Sweetwater Reservoir	Impairment of MUN due to low DO	✓	✓	--	--	✓	Current and historical monitoring data
909.2	Sweetwater River TWAS	Elevated total phosphorus	✓	--	✓	--	--	Current monitoring data
909.2	Sweetwater River TWAS	Toxicity to <i>S. capricornutum</i> growth	✓	--	--	--	--	Current monitoring data
909.2	Sweetwater River TWAS	Elevated suspended solids	--	✓	--	--	--	Current monitoring data
909.2	Sweetwater River TWAS	Very poor IBI	✓	✓	--	--	--	Current and historical monitoring data
909.2	Sweetwater River TWAS	Elevated <i>Enterococcus</i>	✓	--	✓	--	--	Current and historical monitoring data
909.2	Sweetwater River TWAS	Elevated fecal coliform	--	✓	--	✓	--	Current and historical monitoring data
909.2	Sweetwater River TWAS	Elevated turbidity	--	✓	--	--	--	Current and historical monitoring data
909.2	Sweetwater River TWAS	Elevated salinity	✓	✓	--	--	--	Current and historical monitoring data
909.2	Sweetwater River TWAS	Low O/E	✓	--	--	--	--	Historical monitoring data
909.2	Sweetwater River TWAS	Elevated benthic algae	✓	--	--	--	--	Historical monitoring data
909.2	Sweetwater River TWAS	Poor IBI	✓	--	--	--	--	Historical monitoring data
909.2	Sweetwater River TWAS	Elevated bifenthrin	--	✓	--	--	--	Historical monitoring data
909.2	Sweetwater River TWAS	Toxicity to <i>S. capricornutum</i> acute	✓	✓	--	--	--	2010 303(d)
909.3	Loveland Reservoir	Impairment of MUN due to pH, aluminum, manganese, and low DO	✓	✓	--	--	--	2010 303(d)
909.1, 909.2, 909.3	Not specified	Impairment of unknown condition due to trash	✓	✓	--	--	--	Public input data (from public workshop)

Notes: ✓ = Data supports consideration; -- = No data available (data gap) or inapplicable.
1. TMDL for Dissolved Copper in Shelter Island Yacht Basin, San Diego Bay. Approved 12/2005.
2. Naval Submarine Base San Diego TMDL. In development.
3. TMDL for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park in San Diego Bay. Approved 09/2009.
4. TMDL for Dissolved Copper, Lead, and Zinc in Chollas Creek, Tributary to San Diego Bay. Approved 10/2008.
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7. TMDL for Toxic Pollutants in Sediment at San Diego Bay Shorelines—Downtown Anchorage and B Street/Broadway Piers. In development.
8. Sediment Toxicity TMDL for the Mouths of Chollas, Palera, and Switzer Creeks. In development.

APPENDIX D
San Diego Bay Watershed Management Area—
Assessment of Impacts of MS4 Discharges on Potential Receiving Water Conditions

HA	Waterbody	Condition	Receiving Water Data or Regulatory Drivers Support Consideration as a Receiving Water Condition		MS4 Monitoring Data Indicates Potential MS4 Impact			MS4 Listed as Source on the 303(d) List	Determining Factors
			Dry	Wet	Dry	Wet	Wet		
Otay Watershed									
910.1	Pacific Ocean Shoreline, Coronado HA, at Silver Strand (north end, Oceanside)	Impairment of REC-1 due to <i>Enterococcus</i>	✓	✓	---	---	---	✓	2010 303(d)
910.1	Pacific Ocean Shoreline, Imperial Beach Pier	Impairment of REC-1 due to fecal coliform and total coliform	✓	✓	---	---	---	✓	2010 303(d)
910.1	Pacific Ocean Shoreline, Imperial Beach Pier	Impairment of COMM due to PCBs	✓	✓	---	---	---	---	2010 303(d)
910.1	Pacific Ocean Shoreline, Otay Valley HA, at Carnation Ave and Camp Surf Jetty	Impairment of REC-1 due to total coliform	✓	✓	✓	✓	✓	✓	2010 303(d) and current monitoring data
910.1	San Diego Bay Shoreline, at Coronado Cays	Impairment of EST due to copper	✓	✓	---	---	---	---	2010 303(d)
910.1	San Diego Bay Shoreline, at Glorieta Bay	Impairment of EST due to copper	✓	✓	---	---	---	---	2010 303(d)
910.1	San Diego Bay Shoreline, Tidelands Park	Impairment of REC-1 due to <i>Enterococcus</i>	✓	✓	✓	✓	✓	✓	2010 303(d) and current monitoring data
910.1	San Diego Bay Shoreline, Tidelands Park	Impairment of SHELL due to total coliform	✓	✓	✓	✓	✓	✓	2010 303(d) and current monitoring data
910.1	San Diego County Wildlife Refuge-South San Diego Bay Unit	Preservation of special habitat	✓	✓	---	---	---	---	Special Habitat
910.2	Otay River	Elevated <i>Enterococcus</i>	✓	---	✓	---	---	---	Historical monitoring data
910.2	Otay River	Elevated <i>E. coli</i> , fecal coliform, malathion and permethrin	---	✓	---	---	✓	---	Historical monitoring data
910.2	Otay River	Toxicity to <i>C. dubia</i> acute and chronic survival, <i>H. azteca</i> acute, and <i>S. capricornutum</i> growth	---	✓	---	---	✓	---	Historical monitoring data
910.2	Otay River	Very poor IBI	✓	✓	---	---	---	---	Historical monitoring data
910.2	Otay River	Toxicity to <i>C. dubia</i> acute reproduction	✓	✓	---	---	---	---	Historical monitoring data
910.2	Otay River	Elevated dissolved and total phosphorus	✓	---	---	---	---	---	Historical monitoring data
910.2	Otay River	Elevated total nitrogen	✓	---	✓	---	---	---	Historical monitoring data
910.2	Otay River	Elevated surfactants (MBAs), bifenthrin, and turbidity	---	✓	---	---	---	---	Historical monitoring data
910.2	Otay River	Elevated salinity	✓	✓	---	---	---	---	Historical monitoring data
910.2	Otay River	Low O/E and California Rapid Assessment Method scores	✓	---	---	---	---	---	Historical monitoring data
910.2	Otay River	Poor IBI	✓	---	---	---	---	---	2010 303(d)

Notes: ✓ = Data supports consideration; -- = No data available (data gap) or inapplicable.

1. TMDL for Dissolved Copper in Shelter Island Yacht Basin, San Diego Bay. Approved 12/2005.

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7. TMDL for Toxic Pollutants in Sediment at San Diego Bay Shorelines--Downtown Anchorage and B Street/Broadway Piers. In development.

8. Sediment Toxicity TMDL for the Mouths of Chollas, Palera, and Switzer Creeks. In development.

APPENDIX D
San Diego Bay Watershed Management Area—
Assessment of Impacts of MS4 Discharges on Potential Receiving Water Conditions

HA	Waterbody	Condition	Receiving Water Data or Regulatory Drivers Support Consideration as a Receiving Water Condition		MS4 Monitoring Data Indicates Potential MS4 Impact		MS4 Listed as Source on the 303(d) List	Determining Factors
			Dry	Wet	Dry	Wet		
910.2	Otay River	Toxicity to <i>C. dubia</i> acute and chronic survival and reproduction	✓	--	--	--	--	2010 303(d)
910.2	Otay River	Elevated dissolved copper, cyfluthrin, and TSS	--	✓	--	--	--	2010 303(d)
910.2	Poggi Canyon Creek	Impairment of WARM due to toxicity	✓	✓	--	--	✓	2010 303(d)
910.3	Jamul Creek	Impairment of WARM due to toxicity	✓	✓	--	--	✓	2010 303(d)
910.3	Lower Otay Reservoir	Impairment of MUN due to high pH, ammonia, color, iron, and manganese	✓	✓	--	--	--	2010 303(d)
910.3	Lower Otay Reservoir	Impairment of WARM due to nitrogen	✓	✓	✓	✓	✓	Historical monitoring data
910.1, 910.2, 910.3	Not specified	Impairment of unknown condition due to trash	✓	✓	--	--	--	Public input data
San Diego Bay (All watersheds)								
908.1, 909.1, 910.1	San Diego Bay (all)	Moderate toxicity at some monitoring stations	✓	--	--	--	--	Historical monitoring data
908.1, 909.1, 910.1	San Diego Bay (Deep areas)	Elevated mercury in deep area sediments	✓	--	✓	--	--	Historical monitoring data
908.1, 909.1, 910.1	San Diego Bay (Deep areas)	Elevated anthracene in deep area sediments	✓	--	--	--	--	Historical monitoring data
908.1, 909.1, 910.1	San Diego Bay (Freshwater Influenced Areas)	Elevated pesticides in freshwater influenced areas	✓	--	✓	--	✓	Historical monitoring data
908.1, 909.1, 910.1	San Diego Bay (Freshwater Influenced Areas)	Elevated zinc in freshwater influenced areas	✓	--	✓	--	✓	Historical monitoring data
908.1, 909.1, 910.1	San Diego Bay (Freshwater Influenced Areas)	Benthic community effects	✓	--	--	--	--	Historical monitoring data
908.1, 909.1, 910.1	San Diego Bay (Freshwater Influenced Areas)	Elevated arsenic in sediments in freshwater influenced areas	✓	--	--	--	--	Historical monitoring data
908.1, 909.1, 910.1	San Diego Bay (Freshwater Influenced Areas)	Elevated mercury in sediments in freshwater influenced areas	✓	--	✓	--	--	Historical monitoring data

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APPENDIX D
San Diego Bay Watershed Management Area—
Assessment of Impacts of MS4 Discharges on Potential Receiving Water Conditions

HA	Waterbody	Condition	Receiving Water Data or Regulatory Drivers Support Consideration as a Receiving Water Condition		MS4 Monitoring Data Indicates Potential MS4 Impact		MS4 Listed as Source on the 303(d) List	Determining Factors
			Dry	Wet	Dry	Wet		
908.1, 909.1, 910.1	San Diego Bay (Industrial areas)	Elevated PCBs in industrial area sediments	✓	--	✓	--	--	Historical monitoring data
908.1, 909.1, 910.1	San Diego Bay (Industrial areas)	Elevated copper in industrial area sediments	✓	--	✓	--	✓	Historical monitoring data
908.1, 909.1, 910.1	San Diego Bay (Industrial areas)	Elevated mercury in industrial area sediments	✓	--	✓	--	--	Historical monitoring data
908.1, 909.1, 910.1	San Diego Bay (Marinas)	Elevated copper in marina surface waters and sediments	✓	--	✓	--	✓	Historical monitoring data
908.1, 909.1, 910.1	San Diego Bay (Marinas)	Elevated mercury in marina surface waters and sediments	✓	--	✓	--	--	Historical monitoring data
908.1, 909.1, 910.1	San Diego Bay (Marinas)	Elevated zinc in marina sediments	✓	--	✓	--	✓	Historical monitoring data
908.1, 909.1, 910.1	San Diego Bay (Marinas)	Elevated organics in marina sediments	✓	--	✓	--	--	Historical monitoring data
908.1, 909.1, 910.1	San Diego Bay (Marinas)	Elevated arsenic in marina sediments	✓	--	--	--	--	Historical monitoring data
908.1, 909.1, 910.1	San Diego Bay (Marinas)	Elevated mercury in marina sediments	✓	--	✓	--	--	Historical monitoring data
908.1, 909.1, 910.1	San Diego Bay (Marinas)	Mean ER-M quotients for sediment chemistry were elevated in marinas.	✓	--	--	--	--	Historical monitoring data
908.1, 909.1, 910.1	San Diego Bay (Marinas)	Benthic community effects	✓	--	--	--	--	Historical monitoring data
908.1, 909.1, 910.1	San Diego Bay (Shallow areas)	Elevated chlordane in shallow area sediments	✓	--	--	--	✓	Historical monitoring data

Notes: ✓ = Data supports consideration; -- = No data available (data gap) or inapplicable.
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APPENDIX E
San Diego Bay Watershed Management Area—
Initial Receiving Water Quality Conditions Multiple Line of Evidence Assessment

HA	Initial Water Quality Condition	Potential Stressor(s)	Temporal Extent	Geographic Extent	Determining Factors	Data Gaps		Potentially Responsible Parties												Lines of Evidence															
						Are there gaps in the MS4 data used to characterize contribution to priority water quality condition?	Are there gaps in the RW data used to characterize the priority water quality condition?	Coronado	Chula Vista	County of San Diego	Imperial Beach	Port of San Diego	Lemon Grove	La Mesa	National City	City of San Diego	San Diego Regional Airport Authority	Caltrans	U.S. Navy	1. NPDES Permit-Required Monitoring	2. Regulatory Drivers	3. Public Input and Additional Studies													
Pueblo Watershed																																			
908.1	Impairment of EST in the Shelter Island Yacht Basin	Dissolved Copper	Dry, Wet	San Diego Bay 303(d) Listed segment	TMDL, Stressors causing the 2010 303(d) listing unknown and may be MS4 sources	NO	NO																												
908.1	Impairment of REC-1 at the San Diego Bay Shoreline, Shelter Island Shoreline Park	Bacteria	Dry, Wet	San Diego Bay Shoreline 2010 303(d)-Listed segment	TMDL, Urban runoff/storm sewers listed in 2010 303(d) as a source	NO	NO																									3			
908.2	Impairment of WARM in Chollas Creek	Copper and Zinc	Dry, Wet	Chollas Creek 2010 303(d)-Listed segment	TMDL, Stressors causing the 2010 303(d) listing unknown and may be MS4 sources	NO	NO																												
908.2	Impairment of WARM in Chollas Creek	Lead	Dry, Wet	Chollas Creek 2010 303(d)-Listed segment	TMDL, Stressors causing the 2010 303(d) listing unknown and may be MS4 sources	YES	NO																												
908.2	Impairment of WARM in Chollas Creek	Diazinon	Dry, Wet	Chollas Creek 2010 303(d)-Listed segment	TMDL, Historic Receiving Water Monitoring, Stressors causing the 2010 303(d) listing unknown and may be MS4 sources	NO	NO																												
908.2	Impairment of WARM in Chollas Creek	Phosphorus	Dry	Chollas Creek 2010 303(d)-Listed segment	Current and Historic Receiving Water Monitoring, Stressors causing the 2010 303(d) listing unknown and may be MS4 sources	NO	NO																												

Notes:
2010 303(d) = 2010 Section 303(d) of the Clean Water Act; MS4 = municipal separate storm sewer system; NPDES = National Pollutant Discharge Elimination System; TMDL = Total Maximum Daily Load
1. Chollas Creek Water Effects Ratio Study: Provides site-specific objectives based on adjustment to the waterbody-specific water effect ratio for calculation of California Toxics Rule objectives for Dissolved Copper and Dissolved Zinc in Chollas Creek.
2. Public Input data from Water Quality Improvement Plan Workshop.
3. Bacteria Delisting Study in Point Loma HA: Bacteria (Total Coliform, Fecal Coliform, Enterococcus) concentrations below allowable exceedance frequencies for samples collected between 2004 and 2012 (737 analyses).

APPENDIX E
San Diego Bay Watershed Management Area—
Initial Receiving Water Quality Conditions Multiple Line of Evidence Assessment

HA	Initial Water Quality Condition	Potential Stressor(s)	Temporal Extent	Geographic Extent	Determining Factors	Data Gaps		Potentially Responsible Parties											Lines of Evidence				
						Are there gaps in the MS4 data used to characterize contribution to priority water quality condition?	Are there gaps in the RW data used to characterize the priority water quality condition?	Chula Vista	County of San Diego	Imperial Beach	Port of San Diego	Lemon Grove	La Mesa	National City	City of San Diego	San Diego Regional Airport Authority	Caltrans	U.S. Navy	1. NPDES Permit-Required Monitoring	2. Regulatory Drivers	3. Public Input and Additional Studies		
908.2	Impairment of WARM in Chollas Creek	Nitrogen	Dry, Wet	Chollas Creek 2010 303(d)-Listed segment	Current and Historic Receiving Water Monitoring, Stressors causing the 2010 303(d) listing unknown and may be MS4 sources	NO	NO		✓		✓		✓		✓			✓			✓		
908.2	Impairment of REC-1 in Chollas Creek	Bacteria	Dry, Wet	Chollas Creek 2010 303(d)-Listed segment	TMDL, Current and Historic Receiving Water Monitoring, Urban runoff/storm sewers listed in 2010 303(d) as a source	NO	NO		✓		✓		✓		✓			✓			✓		
908.2	Impairment of REC-2 in Chollas Creek	Trash	Dry, Wet	Chollas Creek 2010 303(d)-Listed segment	Urban runoff/storm sewers listed in 2010 303(d) as a source	YES	NO		✓		✓		✓		✓			✓			✓		✓ ²
908.2	Impairment of MAR at the Mouth of Chollas Creek	PAHs	Dry, Wet	San Diego Bay 2010 303(d)-Listed segment	TMDL, Stressors causing the 2010 303(d) listing unknown and may be MS4 sources	YES	NO		✓		✓		✓		✓			✓			✓		
908.2	Impairment of MAR at the Mouth of Chollas Creek	PCBs	Dry, Wet	San Diego Bay 2010 303(d)-Listed segment	TMDL, Stressors causing the 2010 303(d) listing unknown and may be MS4 sources	YES	NO		✓		✓		✓		✓			✓			✓		
908.2	Impairment of MAR at the Mouth of Chollas Creek	Chlordane	Dry, Wet	San Diego Bay 2010 303(d)-Listed segment	TMDL, Stressors causing the 2010 303(d) listing unknown and may be MS4 sources	YES	NO		✓		✓		✓		✓			✓			✓		
908.2	Impairment of unknown condition in Chollas Creek	Turbidity	Dry	Near monitoring station	Stressors causing the 2010 303(d) listing unknown and may be MS4 sources	NO	NO		✓		✓		✓		✓						✓		

Notes:
2010 303(d) = 2010 Section 303(d) of the Clean Water Act; MS4 = municipal separate storm sewer system; NPDES = National Pollutant Discharge Elimination System; TMDL = Total Maximum Daily Load
1. Chollas Creek Water Effects Ratio Study: Provides site-specific objectives based on adjustment to the waterbody-specific water effect ratio for calculation of California Toxics Rule objectives for Dissolved Copper and Dissolved Zinc in Chollas Creek.
2. Public Input data from Water Quality Improvement Plan Workshop.
3. Bacteria Delisting Study in Point Loma HA: Bacteria (Total Coliform, Fecal Coliform, Enterococcus) concentrations below allowable exceedance frequencies for samples collected between 2004 and 2012 (737 analyses).

APPENDIX E
San Diego Bay Watershed Management Area—
Initial Receiving Water Quality Conditions Multiple Line of Evidence Assessment

HA	Initial Water Quality Condition	Potential Stressor(s)	Temporal Extent	Geographic Extent	Determining Factors	Data Gaps		Potentially Responsible Parties											Lines of Evidence			
						Are there gaps in the MS4 data used to characterize contribution to priority water quality condition?	Are there gaps in the RW data used to characterize the priority water quality condition?	Coronado	Chula Vista	County of San Diego	Imperial Beach	Port of San Diego	Lemon Grove	La Mesa	National City	City of San Diego	San Diego Regional Airport Authority	Caltrans	U.S. Navy	1. NPDES Permit-Required Monitoring	2. Regulatory Drivers	3. Public Input and Additional Studies
908.2	Impairment of MAR at the San Diego Bay Shoreline, between Sampson and 28th Streets	Copper	Dry, Wet	San Diego Bay Shoreline 2010 303(d)-Listed segment	Stressors causing the 2010 303(d) listing unknown and may be MS4 sources	NO	YES					✓				✓			✓		✓	
908.2	Impairment of MAR at the San Diego Bay Shoreline, between Sampson and 28th Streets	PAHs	Dry, Wet	San Diego Bay Shoreline 2010 303(d)-Listed segment	Stressors causing the 2010 303(d) listing unknown and may be MS4 sources	NO	YES					✓				✓			✓		✓	
908.2	Impairment of COMM at the San Diego Bay Shoreline, between Sampson and 28th Streets	Mercury	Dry, Wet	San Diego Bay Shoreline 2010 303(d)-Listed segment	Stressors causing the 2010 303(d) listing unknown and may be MS4 sources	NO	YES					✓				✓			✓		✓	
908.2	Impairment of COMM at the San Diego Bay Shoreline, between Sampson and 28th Streets	PCBs	Dry, Wet	San Diego Bay Shoreline 2010 303(d)-Listed segment	TMDL, Urban runoff/storm sewers listed in 2010 303(d) as a source	NO	YES					✓				✓			✓		✓	
908.2	Impairment of WARM at the San Diego Bay Shoreline, between Sampson and 28th Streets	Zinc	Dry, Wet	San Diego Bay Shoreline 2010 303(d)-Listed segment	Stressors causing the 2010 303(d) listing unknown and may be MS4 sources	NO	YES					✓				✓			✓		✓	
908.2	Impairment of MAR at the San Diego Bay Shoreline at the Mouth of Switzer Creek	PAHs	Dry, Wet	San Diego Bay Shoreline 2010 303(d)-Listed segment	TMDL, Urban runoff/storm sewers listed in 2010 303(d) as a source	YES	NO					✓				✓			✓		✓	
908.2	Impairment of MAR at the San Diego Bay Shoreline at the Mouth of Switzer Creek	PCBs	Dry, Wet	San Diego Bay Shoreline 2010 303(d)-Listed segment	TMDL, Urban runoff/storm sewers listed in 2010 303(d) as a source	YES	NO					✓				✓			✓		✓	
908.2	Impairment of MAR at the San Diego Bay Shoreline at the Mouth of Switzer Creek	Chlordane	Dry, Wet	San Diego Bay Shoreline 2010 303(d)-Listed segment	TMDL, Urban runoff/storm sewers listed in 2010 303(d) as a source	YES	NO					✓				✓			✓		✓	

Notes:
 2010 303(d) = 2010 Section 303(d) of the Clean Water Act; MS4 = municipal separate storm sewer system; NPDES = National Pollutant Discharge Elimination System; TMDL = Total Maximum Daily Load
 1. Chollas Creek Water Effects Ratio Study: Provides site-specific objectives based on adjustment to the waterbody-specific water effect ratio for calculation of California Toxics Rule objectives for Dissolved Copper and Dissolved Zinc in Chollas Creek.
 2. Public Input data from Water Quality Improvement Plan Workshop.
 3. Bacteria Delisting Study in Point Loma HA: Bacteria (Total Coliform, Fecal Coliform, Enterococcus) concentrations below allowable exceedance frequencies for samples collected between 2004 and 2012 (737 analyses).

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San Diego Bay Watershed Management Area—
Initial Receiving Water Quality Conditions Multiple Line of Evidence Assessment

HA	Initial Water Quality Condition	Potential Stressor(s)	Temporal Extent	Geographic Extent	Determining Factors	Data Gaps		Potentially Responsible Parties											Lines of Evidence						
						Are there gaps in the MS4 data used to characterize contribution to priority water quality condition?	Are there gaps in the RW data used to characterize the priority water quality condition?	Coronado	Chula Vista	County of San Diego	Imperial Beach	Port of San Diego	Lemon Grove	La Mesa	National City	City of San Diego	San Diego Regional Airport Authority	Caltrans	U.S. Navy	1. NPDES Permit-Required Monitoring	2. Regulatory Drivers	3. Public Input and Additional Studies			
908.2	Impairment of WARM in Switzer Creek	Copper, Lead and Zinc	Dry, Wet	Switzer Creek 2010 303(d)-Listed segment	TMDL, Urban runoff/storm sewers listed in 2010 303(d) as a source	NO	YES						✓			✓							✓	✓	
908.3	Impairment of WARM in Paleta Creek	Copper and Lead	Dry, Wet	Paleta Creek 2010 303(d)-Listed segment	TMDL, Urban runoff/storm sewers listed in 2010 303(d) as a source	NO	YES								✓								✓	✓	
908.3	Impairment of MAR at the San Diego Bay Shoreline at the Mouth of Paleta Creek	PAHs	Dry, Wet	San Diego Bay Shoreline 2010 303(d)-Listed segment	TMDL, Urban runoff/storm sewers listed in 2010 303(d) as a source	YES	YES						✓			✓							✓	✓	
908.3	Impairment of MAR at the San Diego Bay Shoreline at the Mouth of Paleta Creek	PCBs	Dry, Wet	San Diego Bay Shoreline 2010 303(d)-Listed segment	TMDL, Urban runoff/storm sewers listed in 2010 303(d) as a source	YES	YES						✓			✓							✓	✓	
908.3	Impairment of MAR at the San Diego Bay Shoreline at the Mouth of Paleta Creek	Chlordane	Dry, Wet	San Diego Bay Shoreline 2010 303(d)-Listed segment	TMDL, Urban runoff/storm sewers listed in 2010 303(d) as a source	YES	YES						✓			✓							✓	✓	
Sweetwater Watershed																									
909.1	Impairment of REC-1 at Lower Sweetwater River, below Sweetwater Reservoir	Bacteria	Dry, Wet	Lower Sweetwater River 2010 303(d)-Listed segment	Current Receiving Water and Outfall Monitoring Data, Urban runoff/storm sewers listed in 2010 303(d) as a source	NO	YES		✓	✓													✓	✓	
909.1	Impairment of WARM at Lower Sweetwater River, below Sweetwater Reservoir	TDS	Dry, Wet	Lower Sweetwater River 2010 303(d)-Listed segment	Current Receiving Water and Outfall Monitoring Data, Urban runoff/storm sewers listed in 2010 303(d) as a source	YES	NO		✓	✓													✓	✓	

Notes:
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1. Chollas Creek Water Effects Ratio Study: Provides site-specific objectives based on adjustment to the waterbody-specific water effect ratio for calculation of California Toxics Rule objectives for Dissolved Copper and Dissolved Zinc in Chollas Creek.
2. Public Input data from Water Quality Improvement Plan Workshop.
3. Bacteria Delisting Study in Point Loma HA: Bacteria (Total Coliform, Fecal Coliform, Enterococcus) concentrations below allowable exceedance frequencies for samples collected between 2004 and 2012 (737 analyses).

APPENDIX E
San Diego Bay Watershed Management Area—
Initial Receiving Water Quality Conditions Multiple Line of Evidence Assessment

HA	Initial Water Quality Condition	Potential Stressor(s)	Temporal Extent	Geographic Extent	Determining Factors	Data Gaps		Potentially Responsible Parties										Lines of Evidence		
						Are there gaps in the MS4 data used to characterize contribution to priority water quality condition?	Are there gaps in the RW data used to characterize the priority water quality condition?	Chula Vista	County of San Diego	Imperial Beach	Port of San Diego	Lemon Grove	La Mesa	National City	City of San Diego	San Diego Regional Airport Authority	Caltrans	U.S. Navy	1. NPDES Permit-Required Monitoring	2. Regulatory Drivers
909.1	Impairment of WARM at Lower Sweetwater River, below Sweetwater Reservoir	Phosphorus	Dry	Lower Sweetwater River 2010 303(d)-Listed segment	Current Receiving Water and Outfall Monitoring Data, Urban runoff/storm sewers listed in 2010 303(d) as a source	NO	NO	✓	✓									✓	✓	
909.1	Impairment of WARM at Lower Sweetwater River, below Sweetwater Reservoir	Nitrogen	Dry	Lower Sweetwater River 2010 303(d)-Listed segment	Current Receiving Water and Outfall Monitoring Data, Urban runoff/storm sewers listed in 2010 303(d) as a source	NO	NO	✓	✓									✓	✓	
909.1	Impairment of unknown condition at Lower Sweetwater River, below Sweetwater Reservoir	Trash	Dry, Wet	Near monitoring station	Public Input	YES	YES	✓	✓									✓		✓
909.2	Impairment of unknown condition at Middle Sweetwater River	Bacteria	Dry, Wet	Near monitoring station	Current Receiving Water and Outfall Monitoring Data	NO	NO	✓										✓		
Otay Watershed																				
910.1	Impairment of WARM in Lower Otay Reservoir	Nitrogen	Dry, Wet	Lower Otay Reservoir 303(d)-listed segment	Historic monitoring data, Urban runoff/storm sewers listed in 2010 303(d) as a source	NO	NO	✓										✓	✓	
910.1	Impairment of REC-1 at the Pacific Ocean Shoreline, Otay Valley HA, at Carnation Ave and Camp Surf Jetty	Bacteria	Dry, Wet	Pacific Ocean Shoreline 2010 303(d)-Listed segment	Urban runoff/storm sewers listed in 2010 303(d) as a source	NO	YES	✓										✓	✓	
910.3	Impairment of REC-1 at the San Diego Bay Shoreline, Tidelands Park	Bacteria	Dry, Wet	Pacific Ocean Shoreline 2010 303(d)-Listed segment	Urban runoff/storm sewers listed in 2010 303(d) as a source	NO	YES	✓			✓							✓	✓	

Notes:
2010 303(d) = 2010 Section 303(d) of the Clean Water Act; MS4 = municipal separate storm sewer system; NPDES = National Pollutant Discharge Elimination System; TMDL = Total Maximum Daily Load
1. Chollas Creek Water Effects Ratio Study: Provides site-specific objectives based on adjustment to the waterbody-specific water effect ratio for calculation of California Toxics Rule objectives for Dissolved Copper and Dissolved Zinc in Chollas Creek.
2. Public Input data from Water Quality Improvement Plan Workshop.
3. Bacteria Delisting Study in Point Loma HA: Bacteria (Total Coliform, Fecal Coliform, Enterococcus) concentrations below allowable exceedance frequencies for samples collected between 2004 and 2012 (737 analyses).

APPENDIX F
San Diego Bay Watershed Management Area
Priority and Highest Priority Water Quality Conditions Evaluation

		Priority Water Quality Conditions Criteria					Highest Priority Water Quality Conditions Criteria						
Waterbody	Pollutant Category	Condition exceeds Regional Water quality benchmarks in receiving water in wet weather, dry weather, or both (Provision B2c1(c))	Condition is impairment of beneficial uses - 303(d) (Provision B2c1(a))	MS4 conveyances contribute to the condition in the receiving water (Provision B2c1(d))	Monitoring data of acceptable quality and no data gaps (Provision B2c1(e))	Is it a priority condition?	Dataset is spatially and temporally appropriate and contains robust science-based data. No studies indicate water quality standards are now being met	There acceptable standards/ criteria established for condition	Evidence that MS4 Discharges are a predominant source of the condition	The condition impairs an existing beneficial use as defined in the Basin Plan	Water quality improvement strategies to control condition are available to RPs	Would the condition not be addressed by strategies identified for other HIGHEST PRIORITY CONDITIONS ¹	Is it a HIGHEST PRIORITY CONDITION?
Pueblo Watershed													
Pueblo Point Loma/908.1 Shelter Island Yacht Basin	Metals (Dissolved Copper)	Yes	Approved TMDL – automatically a PWQC; Impairment of EST	Yes	Yes	Yes	No. City of San Diego's TMDL compliance monitoring of MS4 discharge indicates WLAs are being met. However, the US Navy toxicity study indicates NASSCO MS4 discharges have exhibited toxicity to organisms and the stressors identified were copper and zinc	There is an established numeric standard in the Basin Plan and the California Toxics Rule for dissolved copper	Although LTEA identifies MS4 sources of copper in wet weather, monitoring data indicates the Copernitee's MS4 are not predominant sources of the condition	Yes, EST	LTEA identifies strategies that address MS4 copper issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No
Pueblo Point Loma/908.1 Shelter Island Shoreline Park	Bacteria	Yes	Approved TMDL – automatically a PWQC; Impairment of REC-1	Yes	Yes	Yes	MLOE not supporting	There are established numeric standards in the Basin Plan	No. Port of San Diego completed a delisting study and demonstrated MS4 is not source of bacteria	Yes, REC-1	LTEA identifies strategies that address MS4 bacteria issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No
Pueblo San Diego Mesa/ 908.22 Chollas Creek	Metals (Dissolved Copper, zinc, and lead)	Yes	Approved TMDL – automatically a PWQC; Impairment of WARM	Yes	Yes	Yes	1. LTEA: Water quality data supports elevated levels of copper, lead, and zinc during wet conditions and copper in dry conditions 2. Annual Regional Monitoring: supports elevated levels of copper in receiving water during wet conditions 3. 303(d) listings: supported by data in the lines of evidence	There are established numeric standards (basin plan and California Toxics Rule) for copper, lead, and zinc	LTEA identifies MS4 sources of copper, lead, and zinc in wet weather Atmospheric deposition also noted as uncontrollable source	Yes, WARM	LTEA identifies strategies that address MS4 metals issues	Yes	Yes
Pueblo San Diego Mesa/ 908.22 Chollas Creek	Bacteria	Yes, wet weather	Approved TMDL – automatically a PWQC; Impairment of REC-1	Yes	Yes	Yes	1. LTEA: Water quality data supports elevated levels of indicator bacteria during wet and dry conditions 2. Annual Regional Monitoring: supports elevated levels of indicator bacteria during wet and dry conditions 3. 303(d) listings: supported by data in the lines of evidence	There are established numeric standards (basin plan, REC-1 Bacteria TMDL in SD County) for indicator bacteria	LTEA identifies MS4 sources of bacteria; However, natural sources contributed unknown amounts of non-MS4 loadings of bacteria to the receiving water's	No, REC-1 is a potential beneficial use	LTEA identifies strategies that address MS4 bacteria issues	Yes	Yes
Pueblo San Diego Mesa/ 908.22 Chollas Creek	Diazinon	No	Approved TMDL – automatically a PWQC; Impairment of WARM	Yes	Yes	Yes	303(d) listing/TMDL not supported with data in lines of evidence	Basin plan water quality objectives are narrative	MS4 not predominant source due to true source control measures (US EPA ban of product)	Yes, WARM	LTEA identifies strategies that address MS4 diazinon issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No

Notes:

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APPENDIX F
San Diego Bay Watershed Management Area
Priority and Highest Priority Water Quality Conditions Evaluation

		Priority Water Quality Conditions Criteria					Highest Priority Water Quality Conditions Criteria						
	Pollutant Category	Condition exceeds Regional Water quality benchmarks in receiving water in wet weather, dry weather, or both (Provision B2c1(c))	Condition is impairment of beneficial uses - 303(d) (Provision B2c1(a))	MS4 conveyances contribute to the condition in the receiving water (Provision B2c1(d))	Monitoring data of acceptable quality and no data gaps (Provision B2c1(e))	Is it a priority condition?	Dataset is spatially and temporally appropriate and contains robust science-based data. No studies indicate water quality standards are now being met	There acceptable standards/ criteria established for condition	Evidence that MS4 Discharges are a predominant source of the condition	The condition impairs an existing beneficial use as defined in the Basin Plan	Water quality improvement strategies to control condition are available to RPs	Would the condition not be addressed by strategies identified for other HIGHEST PRIORITY CONDITIONS ¹	Is it a HIGHEST PRIORITY CONDITION?
HU HA/HSA and Waterbody	Nutrients (Phosphorus - Total Nitrogen)	Yes, Phosphorus - dry weather Total Nitrogen - wet and dry weather	303(d) listing for WARM	Yes	Yes	Yes	1. LTEA: Water quality data supports elevated levels of various nutrients during dry conditions 2. Annual Regional Monitoring: supports elevated levels of various nutrients during dry conditions in receiving water 3. 303(d) listings: supported by data in the lines of evidence	Basin Plan Water Quality Objectives provide a nitrogen to phosphorus ratio with goal objectives for phosphorus	LTEA identifies MS4 sources of nutrients However, groundwater intrusion has also been found to be source of nutrients in MS4 systems	Yes, WARM	LTEA identifies strategies that address MS4 nutrient issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No
Pueblo San Diego Mesa/ 908.22 Chollas Creek	Trash	Yes	13267 Investigative Order – automatically a PWQC; Impairment of REC-2	Yes	Yes	Yes	1. Annual Regional Monitoring: supports elevated levels of trash during dry weather 2. 303(d) listings: supported by data in the lines of evidence 3. Identified as an issue from Public Input	Basin plan water quality objectives are narrative	LTEA identifies MS4 sources of trash in wet weather, but other non-MS4 sources may contribute	Yes, REC-2	LTEA identifies MS4 sources of trash in wet weather, but other non-MS4 sources may contribute	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No
Pueblo San Diego Mesa/ 908.22 Chollas Creek	Turbidity	Yes	No	Yes	Yes	No							No
Pueblo San Diego Mesa/ 908.22 Chollas Creek (at Mouth)	PAHs	Yes, wet weather	Draft TMDL – automatically a PWQC; Impairment of MAR	Yes	Yes	Yes	MLOE not supporting: Monitoring done for draft TMDL supports listing; However, source identification studies are needed to link to MS4 and potential sources	Basin plan water quality objectives are narrative	Unknown if predominant Draft TMDL identifies Phase I MS4 as source, but Caltrans, US Navy, Phase II MS4s, and enrollees of Industrial and construction general permits also identified as responsible parties Atmospheric deposition noted as uncontrollable source	Yes, MAR	LTEA identifies strategies that address MS4 organics issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No

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APPENDIX F
San Diego Bay Watershed Management Area
Priority and Highest Priority Water Quality Conditions Evaluation

		Priority Water Quality Conditions Criteria					Highest Priority Water Quality Conditions Criteria					Would the condition not be addressed by strategies identified for other HIGHEST PRIORITY CONDITIONS ¹	Is it a HIGHEST PRIORITY CONDITION?
		Condition exceeds Regional Water quality benchmarks in receiving water in wet weather, dry weather, or both (Provision B2c1(c))	Condition is impairment of beneficial uses - 303(d) (Provision B2c1(a))	MS4 conveyances contribute to the condition in the receiving water (Provision B2c1(d))	Monitoring data of acceptable quality and no data gaps (Provision B2c1(e))	Is it a priority condition?	Dataset is spatially and temporally appropriate and contains robust science-based data. No studies indicate water quality standards are now being met	There acceptable standards/ criteria established for condition	Evidence that MS4 Discharges are a predominant source of the condition	The condition impairs an existing beneficial use as defined in the Basin Plan	Water quality improvement strategies to control condition are available to RPs		
HU HAI/HA and Waterbody	Pollutant Category												
Pueblo San Diego Mesa/ 908.22 Chollas Creek (at Mouth)	Chlordane	Yes, wet weather	Draft TMDL – automatically a PWQC; Impairment of COMM	Yes	Yes	Yes	MLOE not supporting; Monitoring done for draft TMDL supports listing; However, source identification studies are needed to link to MS4 and potential sources	Basin plan water quality objectives are narrative	Unknown if predominant Draft TMDL identifies Phase I MS4 as source, but Caltrans, US Navy, Phase II MS4s, and enrollees of Industrial and construction general permits also identified as responsible parties	Yes, COMM	LTEA identifies strategies that address MS4 organics issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No
Pueblo San Diego Mesa/ 908.22 Chollas Creek (at Mouth)	PCBs	Yes, wet weather	Draft TMDL – automatically a PWQC; Impairment of COMM	Yes	Yes	Yes	MLOE not supporting; Monitoring done for draft TMDL supports listing; However, source identification studies are needed to link to MS4 and potential sources	Basin plan water quality objectives are narrative	Unknown if predominant Draft TMDL identifies Phase I MS4 as source, but Caltrans, US Navy, Phase II MS4s, and enrollees of Industrial and construction general permits also identified as responsible parties	Yes, COMM	LTEA identifies strategies that address MS4 organics issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No
Pueblo San Diego Mesa/ 908.2 San Diego Bay Shoreline, between Sampson and 28th Streets	Copper	Yes	303(d) listing for MAR	Yes	No	No							No

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Priority and Highest Priority Water Quality Conditions Evaluation

		Priority Water Quality Conditions Criteria					Highest Priority Water Quality Conditions Criteria						
	Pollutant Category	Condition exceeds Regional Water quality benchmarks in receiving water in wet weather, dry weather, or both (Provision B2c1(c))	Condition is impairment of beneficial uses - 303(d) (Provision B2c1(a))	MS4 conveyances contribute to the condition in the receiving water (Provision B2c1(d))	Monitoring data of acceptable quality and no data gaps (Provision B2c1(e))	Is it a priority condition?	Dataset is spatially and temporally appropriate and contains robust science-based data. No studies indicate water quality standards are now being met	There acceptable standards/ criteria established for condition	Evidence that MS4 Discharges are a predominant source of the condition	The condition impairs an existing beneficial use as defined in the Basin Plan	Water quality improvement strategies to control condition are available to RPs	Would the condition not be addressed by strategies identified for other HIGHEST PRIORITY CONDITIONS ¹	Is it a HIGHEST PRIORITY CONDITION?
HU HA/HSA and Waterbody													
Pueblo San Diego Mesa/ 908.2 San Diego Bay Shoreline, between Sampson and 28th Streets	PAHs	Yes	Draft TMDL – automatically a PWQC; Impairment of MAR	Yes	Yes	Yes	303(d) listing/TMDL not supported with data in lines of evidence	Basin plan water quality objectives are narrative	Unknown if predominant Draft TMDL identifies Phase I MS4 as source, but Caltrans, US Navy, Phase II MS4s, and enrolees of industrial and construction general permits also identified as responsible parties Atmospheric deposition noted as uncontrollable source	Yes, MAR	L TEA identifies strategies that address MS4 organics issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No
Pueblo San Diego Mesa/ 908.2 San Diego Bay Shoreline, between Sampson and 28th Streets	Mercury	Yes	Draft TMDL – automatically a PWQC; Impairment of MAR	No	No	Yes	MLOE not supporting	There are established numeric standards in the Basin Plan	Unknown if predominant Draft TMDL identifies Phase I MS4 as source, but Caltrans, US Navy, Phase II MS4s, and enrolees of industrial and construction general permits also identified as responsible parties	Yes, MAR	L TEA identifies strategies that address MS4 organics issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No
Pueblo San Diego Mesa/ 908.2 San Diego Bay Shoreline, between Sampson and 28th Streets	PCBs	Yes	Draft TMDL – automatically a PWQC; Impairment of MAR	No	No	Yes	MLOE not supporting	Basin plan water quality objectives are narrative	Unknown if predominant Draft TMDL identifies Phase I MS4 as source, but Caltrans, US Navy, Phase II MS4s, and enrolees of industrial and construction general permits also identified as responsible parties	Yes, MAR	L TEA identifies strategies that address MS4 organics issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No

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Priority and Highest Priority Water Quality Conditions Evaluation

		Priority Water Quality Conditions Criteria					Highest Priority Water Quality Conditions Criteria						
	Pollutant Category	Condition exceeds Regional Water quality benchmarks in receiving water in wet weather, dry weather, or both (Provision B2c1(c))	Condition is impairment of beneficial uses - 303(d) (Provision B2c1(a))	MS4 conveyances contribute to the condition in the receiving water (Provision B2c1(d))	Monitoring data of acceptable quality and no data gaps (Provision B2c1(e))	Is it a priority condition?	Dataset is spatially and temporally appropriate and contains robust science-based data. No studies indicate water quality standards are now being met	There acceptable standards/ criteria established for condition	Evidence that MS4 Discharges are a predominant source of the condition	The condition impairs an existing beneficial use as defined in the Basin Plan	Water quality improvement strategies to control condition are available to RPs	Would the condition not be addressed by strategies identified for other HIGHEST PRIORITY CONDITIONS ¹	Is it a HIGHEST PRIORITY CONDITION?
HU HA/HA and Waterbody	Zinc	Yes	Draft TMDL – automatically a PWQC; Impairment of MAR	No	No	Yes	MLOE not supporting	There are established numeric standards in the Basin Plan and California Toxics Rule	Unknown if predominant Draft TMDL identifies Phase I MS4 as source, but Caltrans, US Navy, Phase II MS4s, and enrolees of industrial and construction general permits also identified as responsible parties Atmospheric deposition noted as uncontrollable source	Yes, MAR	LTEA identifies strategies that address MS4 metals issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No
Pueblo San Diego Mesa/ 908.2 San Diego Bay Shoreline, near Switzer Creek (at the Mouth)	PAHs	Yes, wet weather	Draft TMDL – automatically a PWQC; Impairment of MAR	Yes	Yes	Yes	MLOE not supporting; Monitoring done for draft TMDL supports listing; However, source identification studies are needed to link to MS4 and potential sources	Basin plan water quality objectives are narrative	Unknown if predominant Draft TMDL identifies Phase I MS4 as source, but Caltrans, US Navy, Phase II MS4s, and enrolees of industrial and construction general permits also identified as responsible parties Atmospheric deposition noted as uncontrollable source	Yes, MAR	LTEA identifies strategies that address MS4 organics issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No
Pueblo San Diego Mesa/ 908.2 San Diego Bay Shoreline, near Switzer Creek (at the Mouth)	PCBs	Yes, wet weather	Draft TMDL – automatically a PWQC; Impairment of MAR	Yes	Yes	Yes	MLOE not supporting; Monitoring done for draft TMDL supports listing; However, source identification studies are needed to link to MS4 and potential sources	Basin plan water quality objectives are narrative	Unknown if predominant Draft TMDL identifies Phase I MS4 as source, but Caltrans, US Navy, Phase II MS4s, and enrolees of industrial and construction general permits also identified as responsible parties	Yes, MAR	LTEA identifies strategies that address MS4 organics issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No

Notes:
Highest priorities are presented in **boldface font**.

1. 'No' in this column indicates that strategies for other HIGHEST PRIORITY CONDITIONS are expected to also address the condition. 'Yes' in this column indicates that potential strategies for other HIGHEST PRIORITY CONDITIONS are not likely to address this condition.

APPENDIX F
San Diego Bay Watershed Management Area
Priority and Highest Priority Water Quality Conditions Evaluation

	Pollutant Category	Priority Water Quality Conditions Criteria					Highest Priority Water Quality Conditions Criteria					Would the condition not be addressed by strategies identified for other HIGHEST PRIORITY CONDITIONS ¹	Is it a HIGHEST PRIORITY CONDITION?
		Condition exceeds Regional Water quality benchmarks in receiving water in wet weather, dry weather, or both (Provision B2c1(c))	Condition is impairment of beneficial uses - 303(d) (Provision B2c1(a))	MS4 conveyances contribute to the condition in the receiving water (Provision B2c1(d))	Monitoring data of acceptable quality and no data gaps (Provision B2c1(e))	Is it a priority condition?	Dataset is spatially and temporally appropriate and contains robust science-based data. No studies indicate water quality standards are now being met	There acceptable standards/ criteria established for condition	Evidence that MS4 Discharges are a predominant source of the condition	The condition impairs an existing beneficial use as defined in the Basin Plan	Water quality improvement strategies to control condition are available to RPs		
HU HAI/HA Waterbody													
Pueblo San Diego Mesa/ 908.2 San Diego Bay Shoreline, near Switzer Creek (at the Mouth)	Chlordane	Yes, wet weather	Draft TMDL – automatically a PWQC Impairment of MAR	Yes	Yes	Yes	MLOE not supporting: Monitoring done for draft TMDL supports listing. However, source identification studies are needed to link to MS4 and potential sources	Basin plan water quality objectives are narrative	Unknown if predominant Draft TMDL identifies Phase I MS4 as source, but Caltrans, US Navy, Phase II MS4s, and enrollees of Industrial and construction general permits also identified as responsible parties	Yes, MAR	LTEA identifies strategies that address MS4 organics issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No
Pueblo San Diego Mesa/ 908.22 Switzer Creek	Copper	Yes	303(d) listing for WARM	No	No	No							No
Pueblo San Diego Mesa/ 908.22 Switzer Creek	Lead	Yes	303(d) listing for WARM	No	No	No							No
Pueblo San Diego Mesa/ 908.22 Switzer Creek	Zinc	Yes	303(d) listing for WARM	No	No	No							No
Pueblo National City/908.3 Paleta Creek	Copper	Yes	303(d) listing for Copper	No	No	No							No
Pueblo National City/908.3 Paleta Creek	Lead	Yes	303(d) listing for Copper	No	No	No							No

Notes:
Highest priorities are presented in **boldface font**.

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APPENDIX F
San Diego Bay Watershed Management Area
Priority and Highest Priority Water Quality Conditions Evaluation

		Priority Water Quality Conditions Criteria					Highest Priority Water Quality Conditions Criteria						
		Condition exceeds Regional Water quality benchmarks in receiving water in wet weather, dry weather, or both (Provision B2c1(c))	Condition is impairment of beneficial uses - 303(d) (Provision B2c1(a))	MS4 conveyances contribute to the condition in the receiving water (Provision B2c1(d))	Monitoring data of acceptable quality and no data gaps (Provision B2c1(e))	Is it a priority condition?	Dataset is spatially and temporally appropriate and contains robust science-based data. No studies indicate water quality standards are now being met	There acceptable standards/ criteria established for condition	Evidence that MS4 Discharges are a predominant source of the condition	The condition impairs an existing beneficial use as defined in the Basin Plan	Water quality improvement strategies to control condition are available to RPs	Would the condition not be addressed by strategies identified for other HIGHEST PRIORITY CONDITIONS ¹	Is it a HIGHEST PRIORITY CONDITION?
HU HAHSA and Waterbody	Pollutant Category												
Pueblo National City/908.3 Mouth of Paleta Creek/Seventh Street Channel	PAHs	Yes, wet weather	Draft TMDL – automatically a PWQC Impairment of MAR	Yes	Yes	Yes	MLOE not supporting: Monitoring done for draft TMDL supports listing; However, source identification studies are needed to link to MS4 and potential sources	Basin plan water quality objectives are narrative	Unknown if predominant Draft TMDL identifies Phase I MS4 as source, but Caltrans, US Navy, Phase II MS4s, and enrolees of industrial and construction general permits also identified as responsible parties Atmospheric deposition noted as uncontrollable source	Yes, MAR	LTEA identifies strategies that address MS4 organics issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No
Pueblo National City/908.3 Mouth of Paleta Creek/Seventh Street Channel	PCBs	Yes, wet weather	Draft TMDL – automatically a PWQC Impairment of MAR	Yes	Yes	Yes	MLOE not supporting: Monitoring done for draft TMDL supports listing; However, source identification studies are needed to link to MS4 and potential sources	Basin plan water quality objectives are narrative	Unknown if predominant Draft TMDL identifies Phase I MS4 as source, but Caltrans, US Navy, Phase II MS4s, and enrolees of industrial and construction general permits also identified as responsible parties	Yes, MAR	LTEA identifies strategies that address MS4 organics issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No
Pueblo National City/908.3 Mouth of Paleta Creek/Seventh Street Channel	Chlordane	Yes, wet weather	Draft TMDL – automatically a PWQC Impairment of MAR	Yes	Yes	Yes	MLOE not supporting: Monitoring done for draft TMDL supports listing; However, source identification studies are needed to link to MS4 and potential sources	Basin plan water quality objectives are narrative	Unknown if predominant Draft TMDL identifies Phase I MS4 as source, but Caltrans, US Navy, Phase II MS4s, and enrolees of industrial and construction general permits also identified as responsible parties	Yes, MAR	LTEA identifies strategies that address MS4 organics issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No

Notes:
Highest priorities are presented in **boldface font**.

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APPENDIX F
San Diego Bay Watershed Management Area
Priority and Highest Priority Water Quality Conditions Evaluation

	Pollutant Category	Priority Water Quality Conditions Criteria					Highest Priority Water Quality Conditions Criteria					Would the condition not be addressed by strategies identified for other HIGHEST PRIORITY CONDITIONS ¹	Is it a HIGHEST PRIORITY CONDITION?
		Condition exceeds Regional Water quality benchmarks in receiving water in wet weather, dry weather, or both (Provision B2c1(c))	Condition is impairment of beneficial uses - 303(d) (Provision B2c1(e))	MS4 conveyances contribute to the condition in the receiving water (Provision B2c1(d))	Monitoring data of acceptable quality and no data gaps (Provision B2c1(e))	Is it a priority condition?	Dataset is spatially and temporally appropriate and contains robust science-based data. No studies indicate water quality standards are now being met	There acceptable standards/ criteria established for condition	Evidence that MS4 Discharges are a predominant source of the condition	The condition impairs an existing beneficial use as defined in the Basin Plan	Water quality improvement strategies to control condition are available to RPs		
Sweetwater Watershed													
Sweetwater Lower (909.1)	Bacteria	Yes		MS4 listed as source in 303(d) listing and supported by MS4 monitoring data	Yes	Yes	1. LTEA: Water quality data supports elevated levels of indicator bacteria during wet and dry conditions 2. Annual Regional Monitoring: supports elevated levels of indicator bacteria during wet and dry conditions 3. 303(d) listings: supported by data in the lines of evidence	There are established numeric standards in the Basin Plan	LTEA identifies MS4 sources of bacteria; However, natural sources contributed unknown amounts of non-MS4 loadings of bacteria to the receiving waters	No, REC-1 is a potential beneficial use	LTEA identifies strategies that address MS4 bacteria issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No
Sweetwater Lower (909.1)	TDS	Yes		303(d) listing indicates MS4 potential source but not supported by MS4 monitoring data	Yes	No	1. LTEA: Water quality data supports elevated levels of TDS during wet and dry conditions 2. Annual Regional Monitoring: supports elevated levels of TDS during dry conditions 3. 303(d) listings: supported by data in the lines of evidence	There are established numeric standards in the Basin Plan	Unknown	Yes, WARM	No strategies available to adequately address	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No
Sweetwater Lower (909.1)	Nutrients	Yes		303(d) listing indicates MS4 potential source but not supported by MS4 monitoring data	Yes	Yes	1. LTEA: Water quality data supports elevated levels of various nutrients during dry conditions 2. Annual Regional Monitoring: supports elevated levels of various nutrients during dry conditions in receiving water 3. 303(d) listings: supported by data in the lines of evidence	Basin Plan Water Quality Objectives provide a phosphorus ratio with goal objectives for phosphorus	LTEA identifies MS4 sources of nutrients; However, groundwater intrusion has been found to be source of nutrients in MS4 systems	Yes, WARM	LTEA identifies strategies that address MS4 nutrient issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No
Sweetwater Lower (909.1)	Trash	No		Yes	Yes	Yes	MLOE not supporting	Basin plan water quality objectives are narrative	LTEA identifies MS4 sources of trash in wet weather, but other non-MS4 sources may contribute	No	LTEA identifies strategies that address MS4 trash issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No
Sweetwater Middle (909.2)	Bacteria	Yes		MS4 not indicated in 303(d) as potential source but MS4 monitoring data supports	Yes	Yes	1. LTEA: Water quality data supports elevated levels of various bacteria during wet and dry conditions 2. Although available shows elevated levels of bacteria during wet and dry conditions in receiving water, dry weather in MS4, the dataset is not robust enough to be considered highest priority 3. 303(d) listings: not listed	There are established numeric standards in the Basin Plan	LTEA identifies MS4 sources of bacteria; However, natural sources contributed unknown amounts of non-MS4 loadings of bacteria to the receiving waters	No	LTEA identifies strategies that address MS4 bacteria issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No

Notes:

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APPENDIX F
San Diego Bay Watershed Management Area
Priority and Highest Priority Water Quality Conditions Evaluation

		Priority Water Quality Conditions Criteria					Highest Priority Water Quality Conditions Criteria						
Pollutant Category	HU HA/HSA and Waterbody	Condition exceeds Regional Water quality benchmarks in receiving water in wet weather, dry weather, or both (Provision B2c1(c))	Condition is impairment of beneficial uses - 303(d) (Provision B2c1(a))	MS4 conveyances contribute to the condition in the receiving water (Provision B2c1(d))	Monitoring data of acceptable quality and no data gaps (Provision B2c1(e))	Is it a priority condition?	Dataset is spatially and temporally appropriate and contains robust science-based data. No studies indicate water quality standards are now being met	There acceptable standards/ criteria established for condition	Evidence that MS4 Discharges are a predominant source of the condition	The condition impairs an existing beneficial use as defined in the Basin Plan	Water quality improvement strategies to control condition are available to RPs	Would the condition not be addressed by strategies identified for other HIGHEST PRIORITY CONDITIONS ¹	Is it a HIGHEST PRIORITY CONDITION?
Olay Watershed													
	Olay Coronado/ 910.1 Pacific Ocean Shoreline at Carnation Ave and Camp Surf Jetty	Yes	303(d) listed for REC-1	Yes	No	Yes	MLOE not supporting	There are established numeric standards in the Basin Plan	LTEA identifies MS4 sources of bacteria; However, natural sources contributed unknown amounts of non-MS4 loadings of bacteria to the receiving waters	Yes, REC-1	LTEA identifies strategies that address MS4 bacteria issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No
	Olay Coronado / 910.1 Pacific Ocean Shoreline at Tidelands Park	Yes	303(d) listing for REC-1 for Enterococcus and SHELL for Total Coliform	Yes	No	Yes	1. 303(d) listing/TMDL not supported with data in lines of evidence (spatial and temporal factors) 2. Annual Regional Monitoring: does not support elevated levels of bacteria during wet and dry conditions in receiving water and MS4 3. RPs reviewing Coastal Stormdrain Monitoring and DEH AB411 data to verify whether the listing is supported	There are established numeric standards in the Basin Plan	LTEA: Water quality data does not support condition	Yes, REC-1	LTEA identifies strategies that address MS4 bacteria issues Diversion of stormwater and first flush stormwater in place	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No
	Olay Dulzura / 910.3 Lower Olay Reservoir	Yes	303(d) listing for WARM	Yes	No	Yes	MLOE not supporting	Basin Plan Water Quality Objectives provide a nitrogen to phosphorus ratio with goal objectives for phosphorus	LTEA identifies MS4 sources of nutrients However, groundwater intrusion has also been found to be source of nutrients in MS4 systems	No	LTEA identifies strategies that address MS4 nutrient issues	No, strategies for other HIGHEST PRIORITY CONDITIONS will address this condition.	No

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Table G-1: Land Use Acreage by Hydrologic Area

Land Use	Hydrologic Area (acres)										Land Use Totals (acres)
	Pueblo			Sweetwater			Otay				
	908.1	908.2	908.3	909.1	909.2	909.3	910.1	910.2	910.3		
Agricultural	–	14.8	–	68.6	584.7	2,163.2	–	429.8	759.2	4,020.3	
Automotive and Transportation	36.4	1140.5	134.8	166.2	11.5	10.6	6.8	166.1	55.9	1,728.8	
Beach, Bay and Lagoon	7.3	34.2	17.9	66.2	–	–	363.5	11.6	–	500.7	
Commercial	240.1	1647.9	244.3	1,024.1	227.4	129.7	125.7	750.5	83.5	4,473.2	
Health Services	16.4	131.6	27.7	62.4	11.4	10.1	16.4	71.5	–	347.5	
Industrial	6	634.6	276.2	413.6	341.1	–	.1	1,778.6	56.9	3,507	
Institutional	166.3	1,060.7	328.3	1,242.4	565.8	15.1	47.8	1,906.7	73.2	5,406.3	
Junkyard, Dump, Landfill	–	14.3	–	–	77.3	–	–	785.3	–	876.9	
Lake, Reservoir, Large Pond	3.4	14	–	54.6	946.7	427.9	8.3	–	1,040.5	2,495.4	
Military	602.8	542.2	400.4	–	–	–	2,837.4	–	–	4,382.8	
Mixed Use	–	4.6	1.7	.7	–	–	–	–	–	7	
Mobile Home Park	–	121.2	4.6	228.5	139.5	99.8	2.1	383.2	–	978.9	
Multi-Family Residential	84.8	1,644.2	305.9	1,033.2	277.9	117.1	121.3	765	14	4,363.4	
Municipal	24.9	248.7	22.5	113.8	25.8	2.9	8.9	45.7	14.1	507.3	
Open Space	207.2	1,534.7	207.3	4,842.3	14,233.6	19,533.2	77.6	9,903.3	37,127.3	87,666.5	
Parks, Golf Courses, Cemeteries	122.3	1,038.2	138.9	1,101.6	923.6	1	367.1	655.3	12.9	4,360.9	
Recreation	11.4	90	11.5	125.1	166	146.8	65.2	130.7	370.1	1,116.8	
Residential	1	5.7	1.1	5.2	72	10.2	.6	45.9	27.2	168.9	
Roads and Freeways	722.1	6,890	1,536	5,829.3	1,794.7	1,182.5	630.7	3,028	616.6	22,229.9	
Single Family Residential	1,376	8,929.5	2,421	12,094.8	5,223.4	530.2	735.5	4,198.9	346.6	35,855.9	
Spaced Rural Residential	–	14.9	7.9	453.3	10,202.2	7,361.4	–	26.6	7,094.3	25,160.6	
Storage and Warehousing	–	75.4	113.8	99.3	31.5	–	.1	105.7	–	425.8	
Utilities	50	168.5	16.9	431.9	121	6.5	14.8	338.9	32.1	1,180.6	
Vacant and Undeveloped	709.3	618	156.2	1,092.2	17,510.8	30,997.8	111.8	4,043.3	15,532.7	70,772.1	
TOTALS	4,388	26,619	6,375	30,549	53,488	62,746	5,542	29,571	63,257	282,533.5	

Source: SANDAG 2009

Table G-2: Pollutant Generating Sources – 908.1 Point Loma Hydrologic Area*

Inventory Sites/Facilities**	Quantities			Pollutant Source Loading Potential***							
				Heavy Metals	Organics	Oil & Grease	Sediment	Pesticides	Nutrients	Gross Pollutants	Bacteria
Agriculture	0			L	UL	UL	L	L	L	UK	L
Animal	13			N	L	UL	L	UK	L	UK	L
Automotive	61			L	L	L	UL	UL	UK	L	UL
Cemetery	0			N	N	UL	L	L	L	L	L
Contractor	97			UL	UL	UL	L	UL	UL	L	UL
Food Establishment	174			N	L	L	UL	UK	UK	L	L
Equipment	20			L	L	L	UL	UL	UK	L	UL
Fueling	7			UK	L	L	UK	N	N	UK	N
General Industrial	18			L	L	L	UK	UK	UK	UK	UK
General Retail	38			UL	UL	UL	L	UL	UL	L	UL
Golf	1			N	N	UL	L	L	L	L	L
Health Services	1			N	L	UL	L	UK	L	UK	UL
Institutional	2			L	UK	UK	UK	UK	UK	UK	UL
Manufacturing	4			L	UK	UK	UK	UK	UK	UK	UL
Metal	4			L	L	L	UK	UK	UK	UK	UL
Nursery	2			L	UL	UL	L	L	L	UK	L
Stone	1			L	UK	UK	UK	UK	UK	UK	UL
Storage & Warehousing	61			L	UK	UK	UK	UK	UK	UK	UL
Municipal	High	Non-High		L	L	L	L	UK	UK	UK	UL
	15	0									
Construction	High	Medium	Low	UL	UL	UL	L	UL	UL	L	UL
	8	5	207								
Residential	1,462 acres			L	L	L	L	L	L	UK	L

The highest threat-to-water-quality (TTWQ) rated sources within each HA based on the HPWQPs are identified in the table (yellow highlight signifies HPWQP). The HPWQP is associated with the sources that are likely to generate those pollutants (green highlight).

*Prepared based on the WURMP Copermittees FY 2012 JURMP Annual Reports.

**Other sources are not reported in this table including: Land Development and Non-inventoried Businesses

***Pollutant Source Loading Potential taken from BLTEA 2005 and LTEA 2011; N = None, UK = Unknown, UL = Unlikely, L = Likely
None (N) includes sources with zero identified pollutant generating activities and low discharge potential.

Unknown (UK) includes sources with one or more identified pollutant generating activities, but very low discharge potential.

Unlikely (UL) includes sources with no pollutant generating activities, but high discharge potential, or sources with moderate discharge potential and one or more pollutant generating activities.

Likely (L) includes sources with high discharge potential and identified pollutant generating activities.

Table G-3: Pollutant Generating Sources – 908.2 San Diego Mesa Hydrologic Area*

Inventory Sites/Facilities**	Quantities			Pollutant Source Loading Potential***								
				Heavy Metals	Organics	Oil & Grease	Sediment	Pesticides	Nutrients	Gross Pollutants	Bacteria	Trash
Agriculture	1			L	UL	UL	L	L	L	UK	L	L
Animal	82			N	L	UL	L	UK	L	UK	L	L
Automotive	876			L	L	L	UL	UL	UK	L	UL	L
Contractor	389			UL	UL	UL	L	UL	UL	L	UL	L
Food Establishment	2,316			N	L	L	UL	UK	UK	L	L	L
Equipment	91			L	L	L	UL	UL	UK	L	UL	L
General Industrial	95			L	L	L	UK	UK	UK	UK	UK	L
General Retail	260			UL	UL	UL	L	UL	UL	L	UL	L
Health Services	18			N	L	UL	L	UK	L	UK	UL	L
Institutional	68			L	UK	UK	UK	UK	UK	UK	UL	L
Manufacturing	57			L	UK	UK	UK	UK	UK	UK	UL	L
Metal	40			L	L	L	UK	UK	UK	UK	UL	L
Nursery	18			L	UL	UL	L	L	L	UK	L	L
Stone	9			L	UK	UK	UK	UK	UK	UK	UL	L
Storage & Warehousing	210			L	UK	UK	UK	UK	UK	UK	UL	L
Municipal	High	Non-High		L	L	L	L	UK	UK	UK	UL	L
	259	39										
Construction	Hig h	Mediu m	Low	UL	UL	UL	L	UL	UL	L	UL	L
	4	18	1,06 6									
Residential	10.716 acres			L	L	L	L	L	L	UK	L	L

The highest threat-to-water-quality (TTWQ) rated sources within each HA based on the HPWQPs are identified in the table (yellow highlight signifies HPWQP). The HPWQP is associated with the sources that are likely to generate those pollutants (green highlight).

*Prepared based on the WURMP Copermittees FY 2012 JURMP Annual Reports.

**Other sources are not reported in this table including: Land Development and Non-inventoried Businesses

***Pollutant Source Loading Potential taken from BLTEA 2005 and LTEA 2011; N = None, UK = Unknown, UL = Unlikely, L = Likely

None (N) includes sources with zero identified pollutant generating activities and low discharge potential.

Unknown (UK) includes sources with one or more identified pollutant generating activities, but very low discharge potential.

Unlikely (UL) includes sources with no pollutant generating activities, but high discharge potential, or sources with moderate discharge potential and one or more pollutant generating activities.

Likely (L) includes sources with high discharge potential and identified pollutant generating activities.

Table G-4: Pollutant Generating Sources – 908.3 National City Hydrologic Area*

Inventory Sites/Facilities**	Quantities			Pollutant Source Loading Potential***								
				Heavy Metals	Organics	Oil & Grease	Sediment	Pesticides	Nutrients	Gross Pollutants	Bacteria/Pathogens	Trash
Agriculture	0			L	UL	UL	L	L	L	UK	L	L
Animal	3			N	L	UL	L	UK	L	UK	L	L
Automotive	234			L	L	L	UL	UL	UK	L	UL	L
Contractor	82			UL	UL	UL	L	UL	UL	L	UL	L
Food Establishment	233			N	L	L	UL	UK	UK	L	L	L
Equipment	45			L	L	L	UL	UL	UK	L	UL	L
General Industrial	36			L	L	L	UK	UK	UK	UK	UK	L
General Retail	30			UL	UL	UL	L	UL	UL	L	UL	L
Health Services	0			N	L	UL	L	UK	L	UK	UL	L
Manufacturing	10			L	UK	UK	UK	UK	UK	UK	UL	L
Metal	19			L	L	L	UK	UK	UK	UK	UL	L
Nursery	0			L	UL	UL	L	L	L	UK	L	L
Stone	17			L	UK	UK	UK	UK	UK	UK	UL	L
Storage & Warehousing	69			L	UK	UK	UK	UK	UK	UK	UL	L
Municipal	High	Non-High		L	L	L	L	UK	UK	UK	UL	L
	23	10										
Construction	High	Medium	Low	UL	UL	UL	L	UL	UL	L	UL	L
	3	11	230									
Residential	2,741 acres			L	L	L	L	L	L	UK	L	L

The highest threat-to-water-quality (TTWQ) rated sources within each HA based on the HPWQPs are identified in the table (yellow highlight signifies HPWQP). The HPWQP is associated with the sources that are likely to generate those pollutants (green highlight).

*Prepared based on the WURMP Copermittees FY 2012 JURMP Annual Reports.

**Other sources are not reported in this table including: Land Development and Non-inventoried Businesses

***Pollutant Source Loading Potential taken from BLTEA 2005 and LTEA 2011; N = None, UK = Unknown, UL = Unlikely, L = Likely
None (N) includes sources with zero identified pollutant generating activities and low discharge potential.

Unknown (UK) includes sources with one or more identified pollutant generating activities, but very low discharge potential.

Unlikely (UL) includes sources with no pollutant generating activities, but high discharge potential, or sources with moderate discharge potential and one or more pollutant generating activities.

Likely (L) includes sources with high discharge potential and identified pollutant generating activities.

Table G-5: Pollutant Generating Sources – 909.1 Lower Sweetwater Hydrologic Area*

Inventory Sites/Facilities**	Quantities			Pollutant Source Loading Potential****							
				Heavy Metals	Organics	Oil & Grease	Sediment	Pesticides	Nutrients	Gross Pollutants	Bacteria/Pathogens
Agriculture	0			L	UL	UL	L	L	L	UK	L
Animal	28			N	L	UL	L	UK	L	UK	L
Automotive	452			L	L	L	UL	UL	UK	L	UL
Contractor	113			UL	UL	UL	L	UL	UL	L	UL
Food Establishment	491			N	L	L	UL	UK	UK	L	L
Equipment	40			L	L	L	UL	UL	UK	L	UL
General Industrial	29			L	L	L	UK	UK	UK	UK	UK
General Retail	74			UL	UL	UL	L	UL	UL	L	UL
Manufacturing	3			L	UK	UK	UK	UK	UK	UK	UL
Metal	15			L	L	L	UK	UK	UK	UK	UL
Nursery	9			L	UL	UL	L	L	L	UK	L
Stone	12			L	UK	UK	UK	UK	UK	UK	UL
Storage & Warehousing	46			L	UK	UK	UK	UK	UK	UK	UL
Municipal	High	Non-High		L	L	L	L	UK	UK	UK	UL
	69	27									
Construction	High	Medium	Low	UL	UL	UL	L	UL	UL	L	UL
	12	26	264								
Residential	13,815 acres			L	L	L	L	L	L	UK	L

The highest threat-to-water-quality (TTWQ) rated sources within each HA based on the HPWQPs are identified in the table (yellow highlight signifies HPWQP). The HPWQP is associated with the sources that are likely to generate those pollutants (green highlight).

*Prepared based on the WURMP Copermittees FY 2012 JURMP Annual Reports.

**Other sources are not reported in this table including: Land Development and Non-inventoried Businesses

***Pollutant Source Loading Potential taken from BLTEA 2005 and LTEA 2011; N = None, UK = Unknown, UL = Unlikely, L = Likely
None (N) includes sources with zero identified pollutant generating activities and low discharge potential.

Unknown (UK) includes sources with one or more identified pollutant generating activities, but very low discharge potential.

Unlikely (UL) includes sources with no pollutant generating activities, but high discharge potential, or sources with moderate discharge potential and one or more pollutant generating activities.

Likely (L) includes sources with high discharge potential and identified pollutant generating activities.

Table G-6: Pollutant Generating Sources – 909.2 Middle Sweetwater Hydrologic Area*

Inventory Sites/Facilities**	Quantities			Pollutant Source Loading Potential***							
				Heavy Metals	Organics	Oil & Grease	Sediment	Pesticides	Nutrients	Gross Pollutants	Bacteria/Pathogens
Agriculture	0			L	UL	UL	L	L	L	UK	L
Animal	8			N	L	UL	L	UK	L	UK	L
Automotive	33			L	L	L	UL	UL	UK	L	UL
Contractor	1			UL	UL	UL	L	UL	UL	L	UL
Food Establishment	76			N	L	L	UL	UK	UK	L	L
Equipment	1			L	L	L	UL	UL	UK	L	UL
General Industrial	0			L	L	L	UK	UK	UK	UK	UK
General Retail	5			UL	UL	UL	L	UL	UL	L	UL
Health Services	0			N	L	UL	L	UK	L	UK	UL
Institutional	0			L	UK	UK	UK	UK	UK	UK	UL
Manufacturing	0			L	UK	UK	UK	UK	UK	UK	UL
Metal	0			L	L	L	UK	UK	UK	UK	UL
Nursery	6			L	UL	UL	L	L	L	UK	L
Stone	0			L	UK	UK	UK	UK	UK	UK	UL
Storage & Warehousing	0			L	UK	UK	UK	UK	UK	UK	UL
Municipal	High		Non-High	L	L	L	L	UK	UK	UK	UL
	2		28								
Construction	High	Medium		UL	UL	UL	L	UL	UL	L	UL
	23	10									
Residential	15.915 acres			L	L	L	L	L	L	UK	L

The highest threat-to-water-quality (TTWQ) rated sources within each HA based on the HPWQPs are identified in the table (yellow highlight signifies HPWQP). The HPWQP is associated with the sources that are likely to generate those pollutants (green highlight).

*Prepared based on the WURMP Copermittees FY 2012 JURMP Annual Reports.

**Other sources are not reported in this table including: Land Development and Non-inventoried Businesses

***Pollutant Source Loading Potential taken from BLTEA 2005 and LTEA 2011; N = None, UK = Unknown, UL = Unlikely, L = Likely

None (N) includes sources with zero identified pollutant generating activities and low discharge potential.

Unknown (UK) includes sources with one or more identified pollutant generating activities, but very low discharge potential.

Unlikely (UL) includes sources with no pollutant generating activities, but high discharge potential, or sources with moderate discharge potential and one or more pollutant generating activities.

Likely (L) includes sources with high discharge potential and identified pollutant generating activities.

Table G-7: Pollutant Generating Sources – 909.3 Upper Sweetwater Hydrologic Area*

Inventory Sites/Facilities**	Quantities			Pollutant Source Loading Potential***							
				Heavy Metals	Organics	Oil & Grease	Sediment	Pesticides	Nutrients	Gross Pollutants	Bacteria/Pathogens
Animal	6			N	L	UL	L	UK	L	UK	L
Automotive	0			L	L	L	UL	UL	UK	L	UL
Contractor	0			UL	UL	UL	L	UL	UL	L	UL
Food Establishment	0			N	L	L	UL	UK	UK	L	L
Equipment	0			L	L	L	UL	UL	UK	L	UL
General Industrial	0			L	L	L	UK	UK	UK	UK	UK
General Retail	1			UL	UL	UL	L	UL	UL	L	UL
Manufacturing	0			L	UK	UK	UK	UK	UK	UK	UL
Metal	0			L	L	L	UK	UK	UK	UK	UL
Nursery	0			L	UL	UL	L	L	L	UK	L
Stone	0			L	UK	UK	UK	UK	UK	UK	UL
Storage & Warehousing	0			L	UK	UK	UK	UK	UK	UK	UL
Municipal	High		Non-High	L	L	L	L	UK	UK	UK	UL
	1		3								
Construction	High	Medium		UL	UL	UL	L	UL	UL	L	UL
	0	4									
Residential	8,119 acres			L	L	L	L	L	L	UK	L

The highest threat-to-water-quality (TTWQ) rated sources within each HA based on the HPWQPs are identified in the table (there are no HPWQP identified for this HA at this time). The HPWQP is associated with the sources that are likely to generate those pollutants (green highlight).

*Prepared based on the WURMP Copermittees FY 2012 JURMP Annual Reports.

**Other sources are not reported in this table including: Land Development and Non-inventoried Businesses

***Pollutant Source Loading Potential taken from BLTEA 2005 and LTEA 2011; N = None, UK = Unknown, UL = Unlikely, L = Likely

None (N) includes sources with zero identified pollutant generating activities and low discharge potential.

Unknown (UK) includes sources with one or more identified pollutant generating activities, but very low discharge potential.

Unlikely (UL) includes sources with no pollutant generating activities, but high discharge potential, or sources with moderate discharge potential and one or more pollutant generating activities.

Likely (L) includes sources with high discharge potential and identified pollutant generating activities.

Table G-8: Pollutant Generating Sources – 910.1 Coronado Hydrologic Area*

Inventory Sites/Facilities**	Quantities			Pollutant Source Loading Potential***							
				Heavy Metals	Organics	Oil & Grease	Sediment	Pesticides	Nutrients	Gross Pollutants	Bacteria/Pathogens
Animal	4			N	L	UL	L	UK	L	UK	L
Automotive	14			L	L	L	UL	UL	UK	L	UL
Contractor	0			UL	UL	UL	L	UL	UL	L	UL
Food Establishment	118			N	L	L	UL	UK	UK	L	L
Equipment	1			L	L	L	UL	UL	UK	L	UL
General Industrial	0			L	L	L	UK	UK	UK	UK	UK
General Retail	47			UL	UL	UL	L	UL	UL	L	UL
Manufacturing	1			L	UK	UK	UK	UK	UK	UK	UL
Metal	0			L	L	L	UK	UK	UK	UK	UL
Nursery	0			L	UL	UL	L	L	L	UK	L
Stone	0			L	UK	UK	UK	UK	UK	UK	UL
Storage & Warehousing	0			L	UK	UK	UK	UK	UK	UK	UL
Municipal	High	Non-High		L	L	L	L	UK	UK	UK	UL
	77	23									
Construction	High	Medium	Low	UL	UL	UL	L	UL	UL	L	UL
	52	3	334								
Residential	860 acres			L	L	L	L	L	L	UK	L

The highest threat-to-water-quality (TTWQ) rated sources within each HA based on the HPWQPs are identified in the table (yellow highlight signifies HPWQP). The HPWQP is associated with the sources that are likely to generate those pollutants (green highlight).

*Prepared based on the WURMP Copermittees FY 2012 JURMP Annual Reports.

**Other sources are not reported in this table including: Land Development and Non-inventoried Businesses

***Pollutant Source Loading Potential taken from BLTEA 2005 and LTEA 2011; N = None, UK = Unknown, UL = Unlikely, L = Likely
None (N) includes sources with zero identified pollutant generating activities and low discharge potential.

Unknown (UK) includes sources with one or more identified pollutant generating activities, but very low discharge potential.

Unlikely (UL) includes sources with no pollutant generating activities, but high discharge potential, or sources with moderate discharge potential and one or more pollutant generating activities.

Likely (L) includes sources with high discharge potential and identified pollutant generating activities.

Table G-9: Pollutant Generating Sources – 910.2 Otay Hydrologic Area*

Inventory Sites/Facilities**	Quantities			Pollutant Source Loading Potential***							
				Heavy Metals	Organics	Oil & Grease	Sediment	Pesticides	Nutrients	Gross Pollutants	Bacteria/Pathogens
Animal	6			N	L	UL	L	UK	L	UK	L
Automotive	420			L	L	L	UL	UL	UK	L	UL
Contractor	71			UL	UL	UL	L	UL	UL	L	UL
Food Establishment	314			N	L	L	UL	UK	UK	L	L
Equipment	26			L	L	L	UL	UL	UK	L	UL
General Industrial	79			L	L	L	UK	UK	UK	UK	UK
General Retail	163			UL	UL	UL	L	UL	UL	L	UL
Manufacturing	15			L	UK	UK	UK	UK	UK	UK	UL
Metal	17			L	L	L	UK	UK	UK	UK	UL
Nursery	3			L	UL	UL	L	L	L	UK	L
Stone	5			L	UK	UK	UK	UK	UK	UK	UL
Storage & Warehousing	70			L	UK	UK	UK	UK	UK	UK	UL
Municipal	High		Non-High	L	L	L	L	UK	UK	UK	UL
	45		11								
Construction	High	Medium	Low	UL	UL	UL	L	UL	UL	L	UL
	14	14	309								
Residential	5,036 acres			L	L	L	L	L	L	UK	L

The highest threat-to-water-quality (TTWQ) rated sources within each HA based on the HPWQPs are identified in the table (yellow highlight signifies HPWQP). The HPWQP is associated with the sources that are likely to generate those pollutants (green highlight).

*Prepared based on the WURMP Copermittees FY 2012 JURMP Annual Reports.

**Other sources are not reported in this table including: Land Development and Non-inventoried Businesses

***Pollutant Source Loading Potential taken from BLTEA 2005 and LTEA 2011; N = None, UK = Unknown, UL = Unlikely, L = Likely

None (N) includes sources with zero identified pollutant generating activities and low discharge potential.

Unknown (UK) includes sources with one or more identified pollutant generating activities, but very low discharge potential.

Unlikely (UL) includes sources with no pollutant generating activities, but high discharge potential, or sources with moderate discharge potential and one or more pollutant generating activities.

Likely (L) includes sources with high discharge potential and identified pollutant generating activities.

Table G-10: Pollutant Generating Sources – 910.3 Dulzura Hydrologic Area*

Inventory Sites/Facilities**	Quantities			Pollutant Source Loading Potential***							
				Heavy Metals	Organics	Oil & Grease	Sediment	Pesticides	Nutrients	Gross Pollutants	Bacteria/Pathogens
Animal	2			N	L	UL	L	UK	L	UK	L
Automotive	1			L	L	L	UL	UL	UK	L	UL
Contractor	0			UL	UL	UL	L	UL	UL	L	UL
Food Establishment	1			N	L	L	UL	UK	UK	L	L
Equipment	0			L	L	L	UL	UL	UK	L	UL
General Industrial	0			L	L	L	UK	UK	UK	UK	UK
General Retail	0			UL	UL	UL	L	UL	UL	L	UL
Manufacturing	0			L	UK	UK	UK	UK	UK	UK	UL
Metal	0			L	L	L	UK	UK	UK	UK	UL
Nursery	1			L	UL	UL	L	L	L	UK	L
Stone	0			L	UK	UK	UK	UK	UK	UK	UL
Storage & Warehousing	0			L	UK	UK	UK	UK	UK	UK	UL
Municipal	High		Non-High	L	L	L	L	UK	UK	UK	UL
	3		2								
Construction	High		Medium	UL	UL	UL	L	UL	UL	L	UL
	8		2								
Residential	7.482 acres			L	L	L	L	L	L	UK	L

The highest threat-to-water-quality (TTWQ) rated sources within each HA based on the HPWQPs are identified in the table (there are no HPWQP for this HA identified at this time). The HPWQP is associated with the sources that are likely to generate those pollutants (blue highlight).

*Prepared based on the WURMP Copermittees FY 2012 JURMP Annual Reports.

**Other sources are not reported in this table including: Land Development and Non-inventoried Businesses

***Pollutant Source Loading Potential taken from BLTEA 2005 and LTEA 2011; N = None, UK = Unknown, UL = Unlikely, L = Likely

None (N) includes sources with zero identified pollutant generating activities and low discharge potential.

Unknown (UK) includes sources with one or more identified pollutant generating activities, but very low discharge potential.

Unlikely (UL) includes sources with no pollutant generating activities, but high discharge potential, or sources with moderate discharge potential and one or more pollutant generating activities.

Likely (L) includes sources with high discharge potential and identified pollutant generating activities.

Table G-11: San Diego Bay WMA Sources

Pollutant Generating Sources Inventory	Quantities ¹							
	Point Loma	San Diego Mesa	National City	Lower Sweetwater	Middle Sweetwater	Upper Sweetwater	Coronado	Otay Valley
Hydrologic Area or Sub-area	908.1	908.2	908.3	909.1	909.2	909.3	910.1	910.2
Area (ac)	4,409	25,890	1,713	35,834	53,488	62,589	5,471	29,623
Percentages of WMA	1.56%	9.17%	0.61%	12.69%	18.95%	22.17%	1.94%	10.49%
Agriculture	0	1	0	0	0	0	0	0
Animal Facilities	13	82	3	28	8	6	4	6
Automotive	61	876	234	452	33	0	14	420
Cemetery	0	0	0	0	0	0	0	0
Contractor	97	389	82	113	1	0	0	71
Eating or Drinking Establishments	174	2,316	233	491	76	0	118	314
Equipment	20	91	45	40	1	0	1	26
Fueling	7	0	0	0	0	0	0	0
General Industrial	18	95	36	29	0	0	0	79
General Retail	38	260	30	74	5	1	47	163
Golf	1	0	0	0	0	0	0	0
Health Services	1	18	0	0	0	0	0	0
Institutional	2	68	0	0	0	0	0	0
Manufacturing	4	57	10	3	0	0	1	15
Metal	4	40	19	15	0	0	0	17
Nurseries/Greenhouses	2	18	0	9	6	0	0	3
Stone/Glass Manufacturing	1	9	17	12	0	0	0	5
Storage/Warehousing	61	210	69	46	0	0	0	70
Municipal	15	298	33	96	30	4	100	56
Construction	220	1,088	244	302	159	50	389	337
Residential	1,462 acres	10,716 acres	2,741 acres	13,815 acres	15,915 acres	8,119 acres	860 acres	5,036 acres
1. Quantities from 2011 LTEA and FY 2012 WURMP Annual Report.								
								7,482 acres

Table G-12: Summary of Source Data Provided During the Public Workshop¹

Pollutant or Stressor	Sources Identified by the Public		
	Pueblo San Diego HU	Sweetwater HU	Otay HU
Trash	Poor housekeeping, trash collection systems, single-use packaging containers		
Specific Stressor not Specified	Not specified	Not specified	Large Horse Population
Grease/Food Waste	Grease bins		
Non-point Source Pollution	Agriculture		
Metals and Organics	Auto-wrecking industry	Not specified	Auto-wrecking industry
Specific Stressor not Specified	Parking lots		
Sediment	Unimproved alleys and poorly maintained roads		
Specific Stressor not Specified	Storm drain systems		
Specific Stressor not Specified	First flush after a fire event		
Flow	Sprinkler systems and fire system maintenance and line flushing		
Specific Stressor not Specified	Abandoned industrial sites		

1. No public data was submitted during the data solicitation period. This table summarizes the verbal input received during the public workshop.

Table G-13: Monitoring Activities in the San Diego Bay Watershed Management Area

Pueblo HU						
Program Data Set	Data Assessed	Point Loma	San Diego Mesa	National City	Number of Sites Assessed	
	Hydrologic Area or Sub-area	908.1	908.2	908.3, 908.31		
	Area (ac)	4,409	25,890	1,713		
	Percentages of WMA	1.56%	9.17%	0.61%		
Receiving Water Monitoring					9	
Ambient Monitoring	Water chemistry, toxicity, bacteria, and trash	0	1-MLS	0	1-MLS	
SMC Regional Monitoring	Water chemistry, toxicity, bacteria, rapid stream bioassessment	0	0	0	0	
Wet Weather Monitoring	Water chemistry, bacteria, toxicity, and trash	0	1-MLS	0	1-MLS	
Post-Storm Sediment Pyrethroid Monitoring	Grain size, synthetic pyrethroid pesticides, and TOC	0	1-MLS	0	1-MLS	
Third-Party Data (Coastkeeper and Chollas TMDL)	General chemistry and bacteria	0	2-Coastkeeper	0	2-Coastkeeper	
Chollas Creek TMDL Compliance Monitoring	Metals, pesticides, bacteria	0	2-MLS	0	2-MLS	
Chollas Creek TMDL Special Studies	Metals, pesticides, bacteria	0	4	0	4	
Urban Runoff Monitoring					328	
Jurisdictional Dry Weather Monitoring	Field and analytical chemistry			116 ¹		
Jurisdictional Dry Weather Monitoring – Trash Assessment	Trash			193 ¹		
MS4 Outfall Random Dry Weather Monitoring	Chemistry and bacteria	0	0	0	0	
MS4 Outfall Random Wet Weather Monitoring	Chemistry and bacteria	1	1	0	2	
MS4 Outfall Targeted Dry Weather Monitoring	Chemistry, metals, pesticides, and bacteria	0	4	3	7	
MS4 Outfall Targeted Wet Weather Monitoring	Chemistry, metals, pesticides, and bacteria	0	0	0	0	
Regional Source Identification Monitoring	General chemistry, metals, bacteria, and pesticides	0	0	0	0	
CSDM Program	Coastal outfall and receiving waters			9 ¹		
Shelter Island Yacht Basin Urban Runoff Monitoring Study	Metals	1	0	0	1	

Notes:

Source: FY 2012 WURMP Annual Report.

1. Data Reported did not specify the HA designation, only the HU designation.

Table G-13: Monitoring Activities in the San Diego Bay Watershed Management Area (cont.)

Sweetwater HU							
Program Data Set	Data Assessed	Lower Sweetwater	Middle Sweetwater	Upper Sweetwater	Number of Sites Assessed		
	Hydrologic Area or Sub-area	909.1	909.2	909.3			
	Area (ac)	35,834	53,488	62,589			
	Percentages of WMA	12.69%	18.95%	22.17%			
Receiving Water Monitoring					14		
Ambient Monitoring	Water chemistry, toxicity, bacteria, rapid stream bioassessment, and trash	1-MLS	1-TWAS	0	1-MLS, 1-TWAS		
SMC Regional Monitoring	Water chemistry, toxicity, bacteria, rapid stream bioassessment	1-SMC ¹	0	4-SMC ¹	5-SMC ¹		
Wet Weather Monitoring	Water chemistry, bacteria, toxicity, and trash	1-MLS	1-TWAS	0	1-MLS, 1-TWAS		
Post-Storm Sediment Pyrethroid Monitoring	Grain size, synthetic pyrethroid pesticides, and TOC	1-MLS	1-TWAS	0	1-MLS, 1-TWAS		
Third-Party Data (Coastkeeper)	General chemistry and bacteria	3-Coastkeeper ²			3-Coastkeeper		
Urban Runoff Monitoring					167		
Jurisdictional Dry Weather Monitoring	Field and analytical chemistry	68 ²			68		
Jurisdictional Dry Weather Monitoring – Trash Assessment	Trash	76 ²			76		
MS4 Outfall Random Dry Weather Monitoring	Chemistry and bacteria	4	1	0	5		
MS4 Outfall Random Wet Weather Monitoring	Chemistry and bacteria	1	1	0	2		
MS4 Outfall Targeted Dry Weather Monitoring	Chemistry, metals, pesticides, and bacteria	14	1	0	15		
MS4 Outfall Targeted Wet Weather Monitoring	Chemistry, metals, pesticides, and bacteria	0	0	0	0		
CSDM Program	Coastal outfall and receiving waters	1 ²			1		

Notes:

Source: FY 2012 WURMP Annual Report.

1. The SMC Monitoring Program uses a random stratified program design and is one sample from a 425 sample point program to be collected over 5 years (<http://isocalsmc.org/ProjectThree.aspx>).
2. Data Reported did not specify the HA designation, only the HU designation.

Table G-13: Monitoring Activities in the San Diego Bay Watershed Management Area (cont.)

Program Data Set		Data Assessed	Coronado	Otay Valley	Dulzura	Number of Sites Assessed
Otay HU		Hydrologic Area or Sub-area Area (ac)	910.1	910.2	910.3	
		Percentages of WMA	5,471	29,623	63,257	
			1.94%	10.49%	22.4%	
	Receiving Water Monitoring					5
	Ambient Monitoring	Water chemistry, toxicity, bacteria, and trash	0	1-TWAS	0	1-TWAS
	SMC Regional Monitoring	Water chemistry, toxicity, bacteria, rapid stream bioassessment	0	0	0	0
	Wet Weather Monitoring	Water chemistry, bacteria, toxicity, and trash	0	1-TWAS	0	1-TWAS
	Post-Storm Sediment Pyrethroid Monitoring	Grain size, synthetic pyrethroid pesticides, and TOC	0	1-TWAS	0	1-TWAS
	Third-Party Data (Coastkeeper)	General chemistry and bacteria		2-Coastkeeper ¹		2-Coastkeeper
Urban Runoff Monitoring						137
	Jurisdictional Dry Weather Monitoring	Field and analytical chemistry		47 ¹		47
	Jurisdictional Dry Weather Monitoring – Trash Assessment	Trash		79 ¹		79
	MS4 Outfall Random Dry Weather Monitoring	Chemistry and bacteria	0	1	0	1
	MS4 Outfall Random Wet Weather Monitoring	Chemistry and bacteria	0	2	0	2
	MS4 Outfall Targeted Dry Weather Monitoring	Chemistry, metals, pesticides, and bacteria	1	6	0	7
	MS4 Outfall Targeted Wet Weather Monitoring	Chemistry, metals, pesticides, and bacteria	0	0	0	0
	CSDM Program	Coastal outfall and receiving waters		1 ¹		1

Notes:

Source: FY 2012 WURMP Annual Report.

1. Data Reported did not specify the HA designation, only the HU designation.

APPENDIX H. DEVELOPMENT OF NUMERIC GOALS FOR CHOLLAS CREEK

Chollas Creek is subject to the following Total Maximum Daily Loads (TMDLs), which have been adopted by the California Office of Administrative Law, and are currently being implemented:

- TMDLs for Dissolved Copper, Lead, and Zinc in Chollas Creek (Metals TMDL); San Diego Regional Water Quality Control Board (Regional Board) Resolution No. R9-2007-0043. Approved October 22, 2008 (Regional Board, 2008); and
- The Revised TMDLs for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek) (Bacteria TMDL); Regional Board Resolution No. R9-2010-0001. Approved February 10, 2010 (Regional Board, 2010).

A TMDL represents the maximum amount of a pollutant of concern that a waterbody can receive and still attain water quality standards. TMDLs can take a variety of forms, including concentration-based TMDLs, which focus on reducing pollutant sources to achieve a maximum pollutant concentration consistent with existing water quality objectives (WQOs), and load-based TMDLs, which focus on reducing sources to achieve a watershed-specific maximum load that is protective of beneficial uses. The Chollas Creek Metals TMDL represents a concentration-based TMDL, whereas the Bacteria TMDL incorporates load-based reductions that were calculated on the basis of watershed modeling results and applicable bacteria WQOs.

The following sections summarize how the Metals TMDL and Bacteria TMDL targets were derived and how these targets were translated into Water Quality Improvement Plan numeric goals. Development of numeric goals for each parameter required consideration of the applicable Basin Plan WQOs, TMDL requirements, and other regulatory requirements (e.g., California Toxics Rule). Based on this information, numeric goals were developed to meet the requirements of the Municipal Permit. Attachment E.4 of the Municipal Permit provides the following options to meet numeric goals and to demonstrate final compliance with established TMDLs:

- (1) There is no direct or indirect discharge from the Responsible Party's (RP's) municipal separate storm sewer systems (MS4s) to the receiving water; OR
- (2) There are no exceedances of the final receiving water limitations in the receiving water at, or downstream of, the RP's MS4 outfalls; OR
- (3) There are no exceedances of the final effluent limitations at the RP's MS4 outfalls; OR

- (4) The RPs develop and implement the Water Quality Improvement Plan as follows:
 - (a) The RPs incorporate best management practices (BMPs) to achieve the receiving water limitations and/or the effluent limitations for Chollas Creek;
 - (b) The RPs include an analysis in the Water Quality Improvement Plan, utilizing a watershed model or other watershed analytical tools, to demonstrate that the implementation of the BMPs achieves compliance with the final receiving water and/or effluent limitations;
 - (c) The results of the analysis must be accepted by the San Diego Water Board as part of the Water Quality Improvement Plan;
 - (d) The RPs continue to implement the BMPs; and
 - (e) The RPs continue to perform the specific monitoring and assessment specified to demonstrate compliance with the receiving water and effluent limitations (Regional Board, 2013a).

Compliance with the Bacteria TMDL may also be demonstrated via the following methods:

- (1) The pollutant load reductions for discharges from the RP's MS4 outfalls are greater than or equal to the final effluent limitations; or
- (2) The RPs can demonstrate that exceedances of the final receiving water limitations in the receiving water are due to loads from natural sources, AND pollutant loads from the RP's MS4 are not causing or contributing to the exceedances.

These options (and the resulting Water Quality Improvement Plan numeric goals) provide multiple compliance pathways that can be met within the receiving water or within the watershed to comply with the requirements of the TMDLs.

Section 3 presents the Chollas Creek Metals TMDL and Bacteria TMDL numeric goals that were developed by considering these options to demonstrate compliance. Most of the goals were derived directly from the Water Quality-Based Effluent Limitations (WQBELs) that are presented in the TMDLs and incorporated into the applicable Basin Plan WQOs (e.g., final bacteria goal of zero (0) percent dry weather days that are allowed to exceed bacteria WQOs). Goals were calculated on the basis of updated watershed modeling analyses, as described in the following sections. The modeling results provide compliance analysis that the strategies will meet the Water Quality Improvement Plan goals.

H.1 IDENTIFICATION OF METALS TMDL NUMERIC GOALS

The final numeric goals for Chollas Creek were derived from the Water Quality-Based Effluent Limits (WQBELs) that were identified in the Metals TMDL and incorporated into the Municipal Permit. As discussed above, the Metals TMDL is concentration-based, so the WQOs and TMDL receiving water numeric targets are identical (Regional Board, 2008).

H.1.1 Receiving Water and Effluent Limitations for Metals

The Metals TMDL receiving water targets were set to be equal to the California Toxics Rule (CTR) criteria for freshwater, and thus the TMDL targets are identical to the Basin Plan WQOs, as shown in Table H-1. The final receiving water limitations are expressed for acute (1-hour) and chronic (4-day) durations, and are based on hardness (Table H-1). Final effluent limitations are equal to 90 percent of the final receiving water limitations, taking into account an explicit 10 percent margin of safety (MOS) so that discharges from the MS4s will not cause or contribute to exceedances of receiving water limitations (Table H-2).

Table H-1.
Metals TMDL Targets and Basin Plan WQOs for Chollas Creek
(Receiving Water Limitations)

Metal	Numeric Target for Acute Conditions: CTR Criteria Maximum Concentration (CMC)
Copper	$(0.96) * \{e^{[0.9422 * \ln(\text{hardness}) - 1.700]}\} * \text{WER}$
Lead	$\{1.46203 - [0.145712 * \ln(\text{hardness})]\} * \{e^{[1.273 * \ln(\text{hardness}) - 1.460]}\} * \text{WER}$
Zinc	$(0.978) * \{e^{[0.8473 * \ln(\text{hardness}) + 0.884]}\} * \text{WER}$
Metal	Numeric Target for Chronic Conditions: CTR Criteria Continuous Concentration (CCC)
Copper	$(0.96) * \{e^{[0.8545 * \ln(\text{hardness}) - 1.702]}\} * \text{WER}$
Lead	$\{1.46203 - [0.145712 * \ln(\text{hardness})]\} * \{e^{[1.273 * \ln(\text{hardness}) - 4.705]}\} * \text{WER}$
Zinc	$(0.986) * \{e^{[0.8473 * \ln(\text{hardness}) + 0.884]}\} * \text{WER}$

Notes:

Hardness is expressed as milligrams per liter (mg/L).

Calculated concentrations should have two significant figures [40 CFR 131.38(b)(2)].

The natural log and exponential functions are represented as "ln" and "e", respectively.

CTR = California Toxics Rule; WER = Water-Effect Ratio

**Table H-2.
Metals TMDL Targets and Basin Plan WQOs for Chollas Creek
(Effluent Limitations)**

Metal	Numeric Target for Acute Conditions: CTR Criteria Maximum Concentration (CMC)
Copper	$(0.96) * \{e^{[0.9422 * \ln(\text{hardness}) - 1.700]}\} * \text{WER} * 0.9$
Lead	$\{1.46203 - [0.145712 * \ln(\text{hardness})]\} * \{e^{[1.273 * \ln(\text{hardness}) - 1.460]}\} * \text{WER} * 0.9$
Zinc	$(0.978) * \{e^{[0.8473 * \ln(\text{hardness}) + 0.884]}\} * \text{WER} * 0.9$
Metal	Numeric Target for Chronic Conditions: CTR Criteria Continuous Concentration (CCC)
Copper	$(0.96) * \{e^{[0.8545 * \ln(\text{hardness}) - 1.702]}\} * \text{WER} * 0.9$
Lead	$\{1.46203 - [0.145712 * \ln(\text{hardness})]\} * \{e^{[1.273 * \ln(\text{hardness}) - 4.705]}\} * \text{WER} * 0.9$
Zinc	$(0.986) * \{e^{[0.8473 * \ln(\text{hardness}) + 0.884]}\} * \text{WER} * 0.9$

Notes:

Hardness is expressed as milligrams per liter (mg/L).

Calculated concentrations should have two significant figures [40 CFR 131.38(b)(2)].

The natural log and exponential functions are represented as "ln" and "e", respectively.

CTR = California Toxics Rule; WER = Water-Effect Ratio

The Water Quality Improvement Plan final numeric goals for receiving water compliance and MS4 discharges require zero (0) percent exceedance of the receiving water and effluent limitations presented above. These goals are consistent with the Metals TMDL requirements and WQOs for dissolved metals. As an option, a numeric goal that focuses on eliminating direct and indirect discharges to receiving waters was also included in the plan. Achievement of this goal would demonstrate that MS4s are not causing or contributing to receiving water exceedances and would support the conclusion that any exceedances found would likely be due to loads from non-MS4 sources.

H.1.2 Compliance Analysis for Metals and Other Compliance Pathways

Compliance analysis goals were developed to provide a better understanding of the relationship between BMP implementation and load reduction, leading to more efficient and cost-effective targeting of Water Quality Improvement Plan strategies. Updated watershed modeling analyses were performed to identify the load reduction required for each metal that would achieve the TMDL receiving water limitations, MS4 permit requirements, and Basin Plan WQOs. Load reduction goals were developed on the basis of modeling that was originally completed during development of the Metals and Bacteria TMDLs. The watershed model was first updated during development of the Chollas Creek Comprehensive Load Reduction Plan, Phase II (Chollas Creek CLRP II) (City of San Diego, 2013). During Water Quality Improvement Plan development, the model was updated for a second time to include the site-specific Water Effect Ratios

(WERs) currently being finalized as part of the 2014 Chollas Creek WER Study Update (2014 WER Update). These updates provide an analysis of the adequacy and cost-effectiveness of structural and nonstructural BMPs to support evaluation of TMDL compliance through modeling to quantify required load reductions. The analysis included optimization modeling to evaluate the most cost-effective combination of BMPs to meet the requirements. The updated WER values are provided in Section H.1.2.2. The metals goals presented in Section 3 of the Water Quality Improvement Plan include the load reductions required using the site-specific WERs, anticipated for adoption in 2015.

H.1.2.1 Chollas Creek CLRP II Modeling Analysis and Metals-Related Assumptions

The Chollas Creek watershed model simulates daily flow and receiving water concentrations for metals, bacteria, and other water quality constituents. A representative Water Year (Water Year 2003) was selected to simulate weather conditions. Water Year 2003 represents typical wet and dry weather conditions within the watershed, based on an analysis of rainfall data over a 20-year time period. Implementation planning based on a representative period will allow the RPs to accurately design programs and size BMPs to meet Water Quality Improvement Plan goals.

Because the WQOs are hardness-based equations, load reductions were calculated on the basis of the modeling results and used average hardness values for wet and dry conditions based on recent Metals TMDL compliance monitoring data (95 mg/L wet; 354 mg/L dry). Average values were used because daily monitoring data were not available to calculate the total load for the representative period. Because of the amount of literature and monitoring data available regarding model parameters for total metals, the model simulates total metals rather than dissolved metals. Recent Chollas Creek monitoring data were used to develop site-specific total-to-dissolved metals conversion factors to convert the WQOs and resulting numeric goals from dissolved metals to total metals for comparison with the modeled loads. The resulting percent load reductions required based on total metals are also applicable to dissolved metals for the load reduction goals.

Acute WQOs were used to calculate the wet weather Metals TMDL load, which represents most of the total receiving water loading because of the relatively high volume of discharge during wet weather. Chronic concentrations are typically associated with longer periods of dry weather; therefore, the chronic WQOs were used to calculate the dry weather Metals TMDL receiving water loads. Model results are typically less accurate at smaller time-steps (e.g., hourly); therefore, daily average results were used to compare with the metals WQOs. The required load reduction represents the difference between the modeled load for each parameter and the Metals TMDL loads for wet and dry weather conditions (derived from the acute [CMC] and chronic [CCC] WQOs, respectively).

H.1.2.2 Water-Effect Ratio Update

Metals TMDL targets are currently being reviewed by the Regional Board to include site-specific WERs and a revision to the lead WQO equation as part of the 2014 Chollas Creek WER Study Update (2014 WER Update). Approval and the subsequent Basin Plan amendment required to update the Chollas Creek Metals TMDL is anticipated in 2015. Accordingly, the Water Quality Improvement Plan goals include the anticipated load reductions required to meet the receiving water or effluent limitations using the updated WER, described in more detail below.

The following WERs are anticipated to be adopted and were used to develop updated percent load reduction goals:

- Copper WER = 7
- Zinc WER = 1.71

Zinc will require the greatest load reduction based on the updated WER values (29.1 percent). As discussed above, strategies that are targeted to reduce zinc will result in corresponding load reductions for copper, lead, and other associated pollutants. Note that a revision to the lead WQO is also being considered on the basis of recent United States Environmental Protection Agency (USEPA) guidance and other information that would result in the calculation of an alternative percent load reduction for lead. These results indicate that zinc would remain the limiting metals constituent for the numeric goals. Reduction goals calculated with the updated WER are in Table 4-3.

Table H-3.
Chollas Creek Metals Load Reduction Goals Using Updated WER

Metal	Pollutant Load Reduction for Acute Conditions (CMC) (2014 WER Update)
Copper	0.0%
Lead	0.0%
Zinc	29.1%

Notes:

% = percent; CMC = Criteria Maximum Concentration

The load reduction goals were applied equally to each RP in the compliance analysis to provide accountability on a jurisdictional basis. Because Chollas Creek is primarily influenced by storm water runoff, load reductions required to meet acute (wet weather) conditions were identified as limiting. This assumption is conservative, because the highest load reduction was identified for zinc (29.1 percent) to meet the acute WQO-derived load reduction goal. Water Quality Improvement Plan strategies target sources of metals that can impact water quality conditions during all conditions; therefore, the strategies focus on achieving the highest load reduction required, irrespective of

weather or other conditions. In addition, most of the strategies target metals reduction (rather than individual constituents), resulting in significant reductions in metals overall as well as other associated pollutants. These reductions were calculated at the outlet of the Chollas Creek watershed, but will be used to achieve water quality requirements throughout the watershed.

H.1.3 Interim Goals and Schedules

Water Quality Improvement Plan interim numeric goals for receiving water compliance and MS4 discharges allow 20 percent exceedance of the receiving water and effluent limitations presented above. Compliance with numeric goals and TMDL requirements is similar to that for final goals: (1) no direct or indirect discharges from the MS4s, (2) no exceedances of the final receiving water limitations, (3) no exceedances of the interim or final effluent limitations, or (4) submittal and full implementation by the RPs of an accepted Water Quality Improvement Plan that provides compliance analysis that the interim TMDL compliance requirements will be achieved. The Metals TMDL requires compliance with interim targets by October 22, 2018, 10 years after the TMDL effective date.

Interim numeric goals were also included in the Water Quality Improvement Plan schedule to demonstrate progress toward achieving the final load reduction goals. Interim load reduction goals were calculated by multiplying the final load reduction by 80 percent to mirror the 80 percent interim compliance requirement with the receiving water and effluent limitations. Updates to existing programs, changes in municipal ordinances, and collaboration within jurisdictions, watershed management areas (WMAs), and the region have been occurring since the TMDL and the Municipal Permit were adopted. Planning efforts are currently underway, including measures to secure funding and increase general momentum to implement and expand storm water and water conservation measures.

H.2 IDENTIFICATION OF BACTERIA NUMERIC GOALS

The final numeric goals for bacteria in Chollas Creek were derived from the WQBELs that were identified in the Bacteria TMDL and the options for showing compliance with the WQBELs incorporated into the Municipal Permit. The Bacteria TMDL incorporates concentration-based receiving water limitations, and concentration-based and load-based effluent limitations that were calculated on the basis of watershed modeling results and applicable bacteria WQOs (Regional Board, 2010). The Bacteria TMDL included seasonal requirements based on precipitation: wet weather (days with at least 0.2 inch of rainfall and 72 hours after) and dry weather (days with less than 0.2 inch of rainfall observed on each of the prior 3 days).

H.2.1 Receiving Water Limitations

Wet and dry weather receiving water limitations are shown in Table H-4 and discussed below.

Table H-4.
Final Receiving Water Limitations for Chollas Creek

Bacteria Indicator	Chollas Creek WQO (MPN/100mL)	Allowable Exceedance Frequency (% Days Exceeding WQOs)	Final Compliance
Wet Weather (Single Sample Maximum)			
Fecal coliform	400	22%	2031
<i>Enterococcus</i>	61 ¹	22%	
Dry Weather (30-Day Geometric Mean)			
Fecal coliform	200	0%	2021
<i>Enterococcus</i>	33	0%	

Notes:

1. The WQO is determined by usage frequency in the Basin Plan and Chollas Creek is currently listed as a designated creek. If a Basin Plan Amendment designates Chollas Creek as a "moderately to lightly used area" or an "infrequently used area," the WQO will change (Regional Board, 2010).

% = percent; mL = milliliters; MPN = most probable number; WQO = water quality objective

The Bacteria WQOs represent concentrations of bacteria indicators that are at acceptable levels for recreational contact beneficial use (REC-1). Wet weather conditions are episodic and short in duration; therefore, single-sample maximum WQOs apply. Geometric mean WQOs apply during dry weather when monitoring results over a longer time period are averaged and assessed. Total coliform WQOs are not applicable to freshwater streams; therefore, receiving water goals for Chollas Creek are identified only for fecal coliform and *Enterococcus*.

The WQOs do not account for the natural increase in bacteria loads during storm events, referred to as background concentrations. To account for background concentrations of bacteria during wet weather, the Bacteria TMDL incorporated an allowable exceedance frequency of the WQO based on a reference (mostly undeveloped) watershed.

The Bacteria TMDL specifies a final receiving water limitation allowable exceedance frequency of 22 percent during wet weather periods based on reference conditions, but allows no exceedances during dry weather. Although the number of wet and dry weather days may change from year to year because of variable weather conditions, the percentage of allowable wet weather exceedance days will remain fixed. For example, the number of wet weather days in Water Year 2003 was 42. Therefore, the number of allowable wet weather exceedance days was 9 (22 percent of 42 days, rounded). Final compliance with the dry weather WQOs and TMDL loads is required by Fiscal Year (FY) 2021. Final compliance with the wet weather WQOs and TMDL loads is required by FY 2031.

H.2.2 Concentration-Based Effluent Limitations

The Bacteria TMDL provides two expressions of effluent limitations. The first expression is equivalent to the receiving water limitations, but is assessed at MS4 outfalls (Table H-5). The second expression is a mass-based load reduction from the watershed discussed below. Per the Municipal Permit, total coliform WQOs and corresponding exceedance frequencies are applicable to MS4 outfalls that drain to the Chollas Creek mouth and are therefore included in both expressions of effluent limitations.

Table H-5.
Final Effluent Limitations for Chollas Creek

Bacteria Indicator	Chollas Creek WQO (MPN/100mL)	Allowable Exceedance Frequency (% Days Exceeding WQOs)	Final Compliance
Wet Weather (Single Sample Maximum)			
Fecal coliform	400	22%	2031
<i>Enterococcus</i>	61 ¹	22%	
Total coliform ²	10,000	22%	
Dry Weather (30-Day Geometric Mean)			
Fecal coliform	200	0%	2021
<i>Enterococcus</i>	33	0%	
Total coliform ²	1,000	0%	

Notes:

1. The WQO is determined by usage frequency in the Basin Plan and Chollas Creek is currently listed as a designated creek. If a Basin Plan Amendment designates Chollas Creek as a “moderately to lightly used area” or an “infrequently used area,” the WQO will change (Regional Board, 2010).
 2. Total coliform WQOs and corresponding allowable exceedance frequencies are applicable only as effluent limitations on MS4 outfalls that discharge to Chollas Creek. Total coliform WQOs and allowable exceedance frequencies are not applicable to freshwater receiving waters, such as Chollas Creek.
- % = percent; mL = milliliters; MPN = most probable number; WQO = water quality objective

H.2.3 Load-Based Effluent Limitations

The Bacteria TMDL calculated the watershed load reductions that were required to achieve the Bacteria TMDL receiving water limitations. The Municipal Permit incorporated these load reductions for wet and dry weather as effluent limitations. Watershed load reductions were recently recalculated during the development of Chollas Creek CLRP II, considering a representative period to facilitate BMP planning and implementation, as noted in Section H.1 for metals. This analysis updated the load reductions that were presented in the Bacteria TMDL and provides compliance analysis that implementation will meet the numeric goals.

Consistent with the calculation of metals numeric goals, a representative period (Water Year 2003) was selected to simulate weather conditions and bacteria loads. Per the Bacteria TMDL, the loading capacity was calculated by multiplying the WQOs by the average daily modeled flow. Modeled daily loads exceeding this threshold were flagged as an exceedance. The allowable percent exceedance loads for wet weather were calculated by summing the top 9 days (22 percent of the 42 wet weather days in the representative year) with the highest modeled daily loads. This load was then subtracted from the modeled wet weather total for the year. The difference between the remaining modeled load and the updated TMDL load represents the load reduction recommended for wet weather. The percent load reduction is calculated by dividing the exceedance load by the total annual load for the representative year. The final load reductions estimated to meet receiving water goals are presented in Table H-6.

Dry weather numeric goals were calculated using the same formula, but without an allowable load. The difference between the remaining modeled load and the TMDL load represents the required load reduction for dry weather. Dry weather modeling results are typically less reliable than wet weather modeling results because of the episodic nature of irrigation runoff and other water sources during dry periods. The percent load reduction was calculated by dividing the exceedance load by the total annual load for Water Year 2003.

Numeric goals were identified for each RP on the basis of the modeling results. As with metals, percent load reductions were applied equally to each RP to provide accountability on a jurisdictional basis.

Table H-6.
Final Numeric Goals Expressed as Percent Load Reduction in
MS4 Discharges to Chollas Creek

Bacteria Indicator	Chollas Creek Percent Load Reduction ¹	Final Compliance
Wet Weather (Single Sample Maximum)		
Fecal coliform	28.8%	2031
<i>Enterococcus</i>	23.9%	
Total coliform	17.8%	
Dry Weather (30-day Geometric Mean)		
Fecal coliform	98.8%	2021
<i>Enterococcus</i>	99.3%	
Total coliform	92.1%	

Notes:

1. Percent load reductions were derived from updated modeling results and may differ from those presented in the Municipal Permit (see Sections A.2.2 and A.2.3).
% = percent; N/A = not applicable

H.2.4 Other Compliance Pathways

In addition to demonstrating compliance with receiving water and effluent limitations through implementation of a Water Quality Improvement Plan that includes compliance analysis, two additional compliance pathways are available and have been incorporated as numeric goals. A numeric goal that focuses on eliminating direct and indirect discharges to receiving waters was included as an option. Achievement of this goal would demonstrate that MS4s are not causing or contributing to receiving water exceedances. Finally, compliance could be achieved even if receiving water limitations are being exceeded if the RPs can demonstrate that exceedances are due to loads from natural or non-MS4 sources, and pollutant loads from the MS4s are not causing or contributing to the exceedances.

H.2.5 Interim Goals and Schedules

Bacteria TMDL interim compliance for wet weather was calculated as a 50 percent reduction of the “existing” receiving water load. The interim allowable exceedance frequency goal was calculated as a 50 percent reduction from the existing frequency to the final allowable frequency. For example, the Bacteria TMDL states that the existing wet weather exceedance frequency for fecal coliform at the mouth of Chollas Creek is 60 percent. A 50 percent reduction in the existing exceedance frequency (60 percent) to the final allowable exceedance frequency (22 percent) is equal to 41 percent. In the

interim compliance year, the interim goal will be met for fecal coliform if 41 percent or less of the fecal coliform load on wet weather days exceeds the fecal coliform WQO.

The same calculation is conducted for dry weather, but the allowable exceedance frequency is zero (0) percent for dry weather and the Bacteria TMDL does not identify the existing load. The exceedance frequency for dry weather was calculated for each of the indicator bacteria by analyzing the available monitoring data collected between January 1, 1996, and December 31, 2002, for comparison with 30-day geometric mean WQOs. One data point was available during this period; because of the limited sample size, additional data points are necessary to determine a representative dry weather exceedance frequency.

Bacteria TMDL interim compliance for load reductions during dry weather is also 50 percent of the existing load. For example, the updated modeling results estimate that a 28.8 percent load reduction in the Chollas Creek subwatershed is needed during wet weather to meet final goals. Therefore, the Chollas Creek interim load reduction goal is 14.4 percent.

The Municipal Permit allows an alternative interim compliance date from the original TMDL compliance date (Municipal Permit, Attachment E). Interim compliance (50 percent reduction) is most reasonably attained in FY 2024 for wet weather and FY 2019 for dry weather for both expressions of WQBELs. Updates to existing programs, changes in municipal ordinances, and collaboration within jurisdictions, WMAs, and the region have been occurring since the TMDL and the Municipal Permit were adopted. Planning efforts are currently underway, including measures to secure funding and increase general momentum to implement and expand storm water and water conservation measures. The alternative compliance dates allow for the success of the monitoring, assessment, and goal and strategy adaptation process detailed within this Water Quality Improvement Plan.

REFERENCES

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- San Diego Regional Water Quality Control Board (Regional Board). 2013a. *National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds Within the San Diego Region*. Order No. R9-2013-0001. Adopted May 8, 2013.
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APPENDIX I. JURISDICTIONAL STRATEGIES

Jurisdictional strategies are required as part of the Water Quality Improvement Plan (WQIP), under Provision B of the San Diego Regional Water Quality Control Board (Regional Board) National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region, Order Number R9-2013-0001(Municipal Permit). The Responsible Parties (RPs) have identified water quality improvement strategies that may be implemented to address the Highest Priority Conditions or Focused Priority Conditions. The strategies were selected on the basis of their ability to effectively and efficiently eliminate non-storm water discharges to the MS4, reduce pollutants in storm water discharges from the MS4 to the maximum extent practicable (MEP), and achieve the interim and final numeric goals identified in the San Diego Bay Watershed Management Area (WMA) WQIP.

In addition to the strategies and schedules presented in Tables I-1 through I-10, the jurisdictions implement baseline jurisdictional programs. Nonstructural and structural strategies selected by each RP to address Priority Conditions are presented in this document. RP-specific tables for implementation of the selected strategies that outline the method, cost, and additional stakeholder participation are presented in the sections below.

I.1 SAN DIEGO REGIONAL AIRPORT AUTHORITY STRATEGIES

The San Diego County Regional Airport Authority (Airport Authority) has selected strategies to meet the water quality goals for copper and zinc in wet weather discharges to best suit the unique characteristics of the Airport Authority. For example, the Airport is almost entirely paved, and space available for many traditional BMPs is severely limited. The Airport Authority continues to implement its core Jurisdictional Runoff Management Plan (JRMP), which includes many strategies that have positive impacts on the water quality of MS4 discharges. To make progress toward its identified goals, the Airport Authority enhances some existing JRMP strategies and implements new strategies that concentrate on the Focused Priority Conditions.

San Diego International Airport (SDIA) was one of the first major U.S. airports to implement a sustainability policy and, as part of the airport expansion, included structural BMPs to address water quality. The project was designed to achieve Leadership in Energy and Environmental Design (LEED) Silver certification from the U.S. Green Building Council. The project included Best Management Practices (BMPs) such as permeable pavement, bioretention swales, and modular wetland treatment units. Future projects are to continue to consider storm water and water quality improvements in design and implementation, where feasible.

The Airport Authority has identified the jurisdictional strategies, presented in Table I-1, to assist in meeting the WQIP goals. Strategies and implementation schedules were identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the WQIP is to be updated. The implementation of each strategy is contingent upon annual budget approvals and funding availability.

Table I-1. Airport Authority
Jurisdictional Strategies

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
Jurisdictional Strategies								
Development Planning								
All Development Projects								
AA-1	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement Low Impact Development (LID) BMPs to maintain or restore hydrology of the area, where applicable and feasible.	Refer to Storm Water Management Plan (SWMP) (JURMP), Sustainability Policy, and LEED.	Jurisdiction-wide	Jurisdictional	Fiscal Year (FY)16	Ongoing		Environmental Affairs Department, FDD
Priority Development Projects (PDPs)								
AA-2	For PDPs, administer a program requiring implementation of structural BMPs to control pollutants. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	Refer to SWMP (JURMP), Sustainability Policy, and LEED.	Jurisdiction-wide	Jurisdictional	FY16	Ongoing		Environmental Affairs Department, FDD
AA-3	Design and administer an alternative compliance program to off-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects).	Optional.	Jurisdiction-wide	Optional	FY18 or Trigger			Environmental Affairs Department, FDD
Construction Management								
AA-4	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.		Jurisdiction-wide	Jurisdictional	FY16	Ongoing		Environmental Affairs Department, FDD
Existing Development								
Commercial, Industrial, and Municipal Facilities and Areas								
AA-5	Administer and enforce a program to require implementation of minimum BMPs for existing development (commercial, industrial, and municipal) that are specific to the pollutant-generating activities (PGAs) and areas, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	Refer to SWMP (JURMP).	Jurisdiction-wide	Jurisdictional	FY16	Ongoing		Environmental Affairs Department, FDD
	1. Update minimum BMPs for existing commercial and industrial development.		Jurisdiction-wide	Jurisdictional	FY16	Ongoing		Environmental Affairs Department, FDD
	2. Design, implement, and enforce pollutant-generating-area-based and PGA-based inspections.		Jurisdiction-wide	Jurisdictional	FY16	Ongoing		Environmental Affairs Department, FDD

**Table I-1. Airport Authority
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
	3. Design, implement, and evaluate source identification study to determine highest potential pollutant generating areas and PGAs.		Jurisdiction-wide	Jurisdictional	FY18			Environmental Affairs Department, FDD
	4. Increased inspection for highest potential pollutant generating areas and PGAs.		Jurisdiction-wide	Jurisdictional	FY19			Environmental Affairs Department, FDD
	5. Phase in advanced BMPs (as defined in Industrial General Permit (IGP)) in high priority areas.	Optional.	Subwatersheds (Runway, Taxiways, Ramps): Drainage basins 1, 3, & 5	Optional	FY17 or Trigger			Environmental Affairs Department, FMD, FDD
<i>MS4 Infrastructure</i>								
AA-6	Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, detention basins, etc.) for water quality improvement.		Jurisdiction-wide	Jurisdictional	FY16	Ongoing		Environmental Affairs Department, FDD
	1. Determine and implement optimal catch basin cleaning locations and frequencies to maximize pollutant removal.		Subwatersheds (Runway, Taxiways, Ramps): Drainage Basins 1,3, & 5	Jurisdictional	FY17			Environmental Affairs Department, FMD
<i>Hardscapes (Runway, Taxiways, Ramps, Roads, Street, and Parking Lots)</i>								
AA-7	Implement operation and maintenance activities for runway, taxiways, ramp areas, roadways, and parking lots.	Refer to SWMP (JURMP).	Jurisdiction-wide	Jurisdictional	FY16	Ongoing		Environmental Affairs Department, FMD
	1. Determine and implement optimal street sweeping locations and frequencies on runway, taxiways, ramp areas, roads, and parking lots to maximize pollutant removal.		Subwatersheds (Runway, Taxiways, Ramps): Drainage Basins 1,3, & 5	Jurisdictional	FY17			Environmental Affairs Department, FMD
	2. Enhance street sweeping through equipment replacement (replace every X years).		Jurisdiction-wide	Optional	Trigger		Budget/Grant	Environmental Affairs Department, FMD
	3. Determine and implement optimal runway rubber removal locations and frequencies to maximize pollutant removal.		Subwatersheds (Runway, Taxiways, Ramps): Drainage Basins 1,3, & 5	Jurisdictional	FY17			Environmental Affairs Department, FMD
	4. Determine and implement potential enhancements to runway rubber removal operations and equipment.		Subwatersheds (Runway, Taxiways, Ramps): Drainage Basins 1,3, & 5	Jurisdictional	FY18			Environmental Affairs Department, FMD

**Table I-1. Airport Authority
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
<i>Retrofit and Rehabilitation in Areas of Existing Development</i>								
AA-8	Develop a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	Refer to SWMP (JURMP).	Jurisdiction-wide	Jurisdictional	FY16	Ongoing		Environmental Affairs Department, FDD
AA-9	Implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.		Jurisdiction-wide but prioritize Drainage Basins 1, 3, & 5	Optional	FY18			Environmental Affairs Department, FDD
<i>Public Education and Participation</i>								
AA-10	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Refer to SWMP (JURMP).	Jurisdiction-wide	Jurisdictional	FY16	Ongoing		Environmental Affairs Department, FDD
AA-11	Provide municipal staff and tenant training.	Refer to SWMP (JURMP).	Jurisdiction-wide	Jurisdictional	FY16			Environmental Affairs Department
<i>Enforcement Response Plan</i>								
AA-12	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for illicit discharge detection and elimination (IDDE), development planning, construction management, and existing development in the Enforcement Response Plan.	Refer to SWMP (JURMP).	Jurisdiction-wide	Jurisdictional	FY16	Ongoing		Environmental Affairs Department, FDD
<i>Additional Nonstructural Strategies</i>								
AA-13	Continue participating in source reduction initiatives.		Jurisdiction-wide	Optional	FY18+			
	1. Replace Authority-owned vehicle brake pads with copper-free brake pads as they become commercially available.		Jurisdiction-wide	Optional	FY18+			
	2. Encourage and facilitate replacement of tenant-owned vehicle brake pads with copper-free brake pads as they become commercially available.		Jurisdiction-wide	Optional	FY18+			
	3. Encourage and facilitate use of maintenance-free, leak-proof batteries for electric vehicles as available.		Jurisdiction-wide	Optional	FY18+		Budget/Grant	

Table I-1. Airport Authority
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
AA-14	Conduct a feasibility study to test Permeable Friction Course (PFC), a porous asphalt that overlays impermeable asphalt, and other permeable surface treatments.		Subwatersheds (Parking Lots, Taxiways): Drainage Basins 1,3,5,8,9,10, & 11	Optional	FY18+			
AA-15	As opportunities arise and funding sources are identified, protect areas that are functioning naturally by avoiding impervious development and degradation on unpaved open space areas.		Jurisdiction-wide	Optional	FY18+			
Green Infrastructure								
AA-16	Since 2013, approximately 6 acres of permeable surface have been installed at the airport.		Jurisdiction-wide	Jurisdictional	Prior to FY16			Environmental Affairs Department, FDD
AA-17	Develop a strategy to identify candidate runoff water capture and reuse projects and facilitate the implementation of such projects.		Jurisdiction-wide	Optional	FY18			Environmental Affairs Department, FDD
Multiuse Treatment Areas								
Infiltration and Detention Basins								
AA-18	Since 2013, approximately 2 acres of bioswales have been installed at the airport.		Jurisdiction-wide	Jurisdictional	Prior to FY16			Environmental Affairs Department, FDD
AA-19	1.25 acres of bioretention swales at the Rental Car Center.		Subwatershed (Rental Car Center)	Jurisdictional	FY17			Environmental Affairs Department, ADC
Water Quality Improvement BMPs								
Proprietary BMPs								
AA-20	Since 2013, the following proprietary TC BMPs have been installed at the airport: 12 modular wetland treatment units, 6 high-rate media filters, and 4 hydrodynamic separators.		Jurisdiction-wide	Jurisdictional	Prior to FY16			Environmental Affairs Department, FDD

I.2 CALTRANS STRATEGIES

The jurisdiction areas of the California Department of Transportation (Caltrans) include roadways, land adjacent to roadways, and facilities; Caltrans' jurisdictional strategies specifically focus on BMP implementation to reduce known pollutants within these areas. Caltrans is not permitted within the Municipal Permit; however, Caltrans is subject to similar requirements through its MS4 Permit (SWRCB, 2013). Though not permitted within the Municipal Permit, Caltrans has voluntarily contributed to the Water Quality Improvement Plan effort to provide a consistent and subwatershed-wide approach to meeting applicable TMDL requirements. Caltrans voluntary contributions include a detailed list of strategies developed and provided in Table I-2. The strategies and schedules presented in Table I-2 are subject to change and are contingent upon annual budget approvals and funding availability. They are modified through the adaptive management process as needed.

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Table I-2. Caltrans Jurisdictional Strategies

SDB ID	Strategy	Implementation Approach/Level of Effort	Location	Implementation or Construction Year	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
Jurisdictional Strategies							
Design Stormwater Program							
CT-1	Update and implement design BMPs.	Office of Stormwater Management Design (OSWMD) develops, evaluates, and enhances guidance documents and tools. Refer to Landscape Architecture Program (LAP).	Jurisdiction-wide	FY16	Ongoing		HQ (OSWMD)
	1. Update and implement Landscape Architecture Program (LAP).	LAP provides technical assistance on new and ongoing research related to permanent erosion control and permanent BMPs. In addition, the LAP develops methods to enhance roadside vegetation, which protects slopes from erosion and sediment loss, and may remove pollutants from stormwater runoff.	Jurisdiction-wide	FY16	As needed		HQ (OSWMD)
	2. Implement native landscape/LID Design Guide Strategy.	Require native landscaping/LID in stormwater data report and project plan design guide. Done as part of erosion control. The Project Planning and Design Guide (PPDG) includes an online training program. Projects go through the same review process for native landscape reviews. If project is greater than an acre, subject to a stormwater data report. Minor projects are not subject to as extensive reviews. Try to treat 100% of roadway.	Jurisdiction-wide	FY16	Ongoing		District 11 with HQ (OSWMD)
CT-2	Train staff on Design Stormwater Program.	Train staff on Design Stormwater Program. Curriculum updated to reflect the latest strategies.	Jurisdiction-wide	FY16	Ongoing		District 11
CT-3	Plan and implement treatment BMPs as appropriate.	Treatment BMPs are planned and implemented to comply with Caltrans NPDES Permit project development requirements, TMDL waste load allocations, location specific requirements, and the requirements in the Project Planning and Design Guide (PPDG) according to the Targeted Design Constituent (TDC) approach. The treatment BMP consideration process favors infiltration of stormwater and directs staff to evaluate LID strategies first.	Jurisdiction-wide	FY16	Ongoing		District 11 NPDES and Design with HQ (OSWMD)
CT-4	Develop procedures to encourage mitigation for projects within the same watershed.	Caltrans will investigate procedures to mitigate within the same watershed as new projects.	Jurisdiction-wide	FY16	Ongoing and As needed		District 11 NPDES and Stewardship
CT-5	Implement a self-audit program to ensure BMPs are designed, implemented, and maintained.	Design Compliance Monitoring Program is a self-audit program that uses the SWDR (Stormwater Data Report) as a tool for documenting compliance with the design pollution prevention and treatment BMP requirements of the 1999 NPDES Permit, 2012 NPDES Permit, and the Caltrans' 2003 Statewide SWMP. The SWDR and its checklists are reviewed by District staff to ensure that BMPs are being considered and appropriately incorporated into Caltrans' projects. This review also ensures stormwater compliance throughout the project planning and design phases.	Jurisdiction-wide	FY16	Ongoing		District 11 NPDES

Table I-2. Caltrans Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location	Implementation or Construction Year	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
Construction Management							
CT-6	Administer a program to oversee implementation of BMPs during the construction phase of Caltrans projects. Includes inspections at an appropriate frequency and enforcement of requirements.	Caltrans complies with the statewide Construction General Permit. The district holds pre-construction meetings for all projects that require a SWPPP. For larger projects, there are year-round, weekly inspections.	Jurisdiction-wide	FY16	Ongoing		District 11 with the Division of Construction
CT-7	Provide construction storm water training for District staff.	Continue implementation of the construction stormwater classes offered throughout the Caltrans districts by the Division of Construction. Classes updated to reflect latest permit requirements.	Jurisdiction-wide	FY16	Ongoing		District 11 with the Division of Construction
CT-8	Implement a self-audit program to ensure compliance with water quality requirements.	Continue implementation of the Construction Compliance Evaluation Plan. Evaluates contractor's Storm Water Pollution Prevention Plan (SWPPP) or WPCP implementation and assesses compliance with water quality requirements, evaluates stormwater contract administration, and incorporates quality control, quality assurance, and independent assurance elements.	Jurisdiction-wide	FY16	Ongoing		District 11 NPDES
CT-9	Provide maintenance training for employees.	The Division of Maintenance has formal stormwater management training sessions for new employees and refresher training for existing staff. Both types of courses are scheduled from one to 15 hours in length. In addition to formal training, Division of Maintenance policy is that Supervisors conduct stormwater BMP tailgate meetings a minimum of every 10 working days or when there is a change in the type of work activity. These meetings are to review BMPs prior to conducting roadside maintenance activities.	Jurisdiction-wide	FY16	Ongoing		District 11 with Division of Maintenance
Maintenance							
Facilities and Areas							
CT-10	Administer a program to require implementation of minimum BMPs for facilities and leased space (air space leases).	Refer to SWMP; Leased space is required to meet current stormwater regulations.	Jurisdiction-wide	FY16	Ongoing		District 11 with ROW Department

Table I-2. Caltrans Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location	Implementation or Construction Year	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
CT-11	Inspection of facilities and leased areas.	The Department will continue to reduce the potential for storm water pollution by the development and implementation of Facility Pollution Prevention Plans (FPPPs), which specify controls to minimize contact between storm water and the various substances at highway maintenance facilities. Per Maintenance Manual Vol.2 under F Family, periodic inspections are conducted to evaluate whether the BMPs are adequate and properly implemented. The SWMP states this provision regarding FPPP. <i>Maintenance Facility Pollution Prevention Plans. Facility Pollution Prevention Plans (FPPP) has been developed for each maintenance facility owned or operated by the Department. The FPPPs describe the activities conducted at the facility and the BMPs to be implemented to reduce the discharge of pollutants in storm water runoff from these facilities. Supervisors inspect their maintenance facilities monthly to monitor the implementation and adequacy of the BMPs. A report that includes the date of the inspection, the name of the inspector, observations, and recommended corrective actions is prepared by the Supervisor. All inspection records will be maintained for a period of 3 years. Any observed instances of non-compliance will be reported to the District Maintenance.</i>	Jurisdiction-wide	FY16	Ongoing		District 11 with ROW Department
CT-12	Implement BMPs targeting reduction of over-irrigation.	Reduce over irrigation by requiring native, drought-tolerant plants and irrigation system improvements.	Jurisdiction-wide	FY16	Ongoing		District 11 Landscape and Stewardship
CT-13	Proactively monitor for erosion, and complete repair and slope stabilization.	Division of Maintenance conduct inspections on a five-year cycle. Program includes self-imposed goal to annually inspect approximately 20% of slopes in each District and includes investigating public complaints and widely understood problem areas (WUPAs).	Jurisdiction-wide	FY16	Ongoing		District 11 with Division of Maintenance
MS4 Infrastructure							
CT-14	Inspect and clean catch basins and conduct source investigations to identify upstream source of materials.	Inspect catch basins once every three years with 1/3 inspected per year. If needed, catch basins are cleaned. If a catch basin is cleaned, a source inspection is conducted to identify source of sediment or other material.	Jurisdiction-wide	FY16	Ongoing		District 11 with Division of Maintenance
CT-15	Proactively repair and replace MS4 components to provide source control from MS4 infrastructure.	Prioritize MS4 repairs. Funding for repairs based on size of project. Districts are able to conduct small repairs immediately, while larger projects are prioritized for repair out of annual budget.	Jurisdiction-wide	FY16	Ongoing		District 11 with Division of Maintenance

Table I-2. Caltrans Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location	Implementation or Construction Year	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
<i>Roads and Streets</i>							
CT-16	Implement operation and maintenance activities on streets and roadways.	Refer to Work Plan.	Jurisdiction-wide	FY16	Ongoing		District 11 with Division of Maintenance
	1. Implement street sweeping.	Every road swept once a month. To meet performance schedule, street sweepers are replaced on a four-year cycle.	Jurisdiction-wide	FY16	Ongoing		District 11 with Division of Maintenance
	2. Perform sweeping of medians on high-volume arterial roadways.	Medians with shoulders are swept approximately once per month.	Jurisdiction-wide	FY16	Ongoing		District 11 with Division of Maintenance
<i>Pesticide, Herbicides, and Fertilizer BMP Program</i>							
CT-17	Implement BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers.	Refer to Vegetation Control Plan. Caltrans is actively reducing fertilizer/pesticide application and only applies to targeted areas. All pesticide use is reported to the California Department of Pesticide Regulation.	Jurisdiction-wide	FY16	Ongoing		District 11 with Roadside Maintenance Office and California DPR
<i>Illicit Connections/Illegal Discharges</i>							
CT-18	Identify and resolve potential illicit connections/illegal discharges (IC/IDs).	Continue maintaining a hotline for reporting of illicit discharges. Majority of calls come from contractors and construction and maintenance staff. Continue coordination with other jurisdictions to address IC/IDs and provide written notification of potential IC/IDs associated with a municipality's jurisdiction.	Jurisdiction-wide	FY16	Ongoing		District 11 with other jurisdictions
CT-19	Identify erosion and slope stabilization issues on private or municipal property and inform the source for repair.	When Caltrans staff or contractors identify erosion or slopes in need of repair, it is treated as an IC/ID and the property owner is notified.	Jurisdiction-wide	FY16	Ongoing		District 11 with Division of Maintenance
<i>Public Education and Participation</i>							
CT-20	Implement a public education and participation program to raise awareness of storm water pollution and prevention on California's freeways and highways.	Continue to implement the "Don't Trash California" Campaign, Adopt-A-Highway program, and partner with local organizations.	Jurisdiction-wide	FY16	Ongoing		District 11 with HQ (OSWMD)
	1. Conduct trash cleanups.	Conduct trash cleanups through local probation and adopt-a-highway programs. Encourage prevention through "Don't Trash California" campaign.	Jurisdiction-wide	FY16	Ongoing		District 11 Division of Maintenance
	2. Target school-based education and outreach.	Provide outreach to schools raising awareness of stormwater pollution through watershed model demonstrations. Hold bring-your-child-to-work days with watershed model.	Jurisdiction-wide	FY16	Ongoing		District 11 with HQ (OSWMD)

Table I-2. Caltrans Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location	Implementation or Construction Year	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
Other Nonstructural Strategies							
CT-21	Provide sanitation and trash management, implement access control in targeted areas.	As necessary, implement methods such as rip-rap, chain link fences, and remove low-lying brush to discourage use of right-of-way areas.	Jurisdiction-wide	FY16	Ongoing		District 11 NPDES, Design and Maintenance
CT-22	Continue participating in source reduction initiatives.	Continue participation in Brake Pad Partnership through work with California Stormwater Quality Association.	Jurisdiction-wide	FY16	Ongoing		HQ with CASQA
CT-23	Remove invasive plants.	Remove invasive plants through maintenance and construction programs.	Jurisdiction-wide	FY16	Ongoing		District 11 with Division of Maintenance
CT-24	Protect areas that are functioning naturally.	Required as part of the stormwater data report (SWDR), the Project Planning and Design Guide (PPDG), and the Natural Environment as Treatment (NEAT) programs, Caltrans minimizes disturbance of exiting vegetation and avoids hardscapes.	Jurisdiction-wide	TBD	As available		District 11 with HQ (OSWMD)
CT-25	Collaborate with RPs on WQIPs.	Voluntarily participate in the development of the WQIP and continue to collaborate with RAs on water quality planning and implementation projects.	Jurisdiction-wide	FY16	Ongoing		District 11
Multiuse Treatment Areas							
Infiltration and Detention Basins							
CT-26	BMP Retrofit (#282401)	Chollas Creek BMP Retrofit Project; Interstate 15 and 94. There are 4 modified infiltration trenches, 1 austin vault sand filter, and 3 biofiltration swales. DSA is modified to 3.74 acres from PA&ED of 4.69 acres.	San Diego Bay, Chollas Creek	2014	2014		District 11
CT-27	Construct Lanes and Transit Station) (#2T1301)	Construct BRT Lanes and Transit Station on Interstate 15. Install 2 bioswales and 1 media filter to treat approximately 18 acres.	San Diego Bay, Chollas Creek	2014	2016		District 11
Other Opportunities							
CT-28	Soundwall Construction (#2T1831)	Soundwall Construction; I-805 (BMPs?). Only the last portion of project falls in Chollas Creek.	San Diego Bay, Chollas Creek	2014	2016		District 11

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I.3 CITY OF CHULA VISTA STRATEGIES

The City of Chula Vista (Chula Vista) is located within the Sweetwater River and Otay River subwatersheds. Jurisdictional strategies will target the Focused Priority Conditions in both subwatersheds. Chula Vista will implement jurisdictional programs city-wide. Additional strategies will be implemented west of Interstate 805, which contains high-density urban land uses with aging infrastructure, to address the Focused Priority Conditions. The area east of Interstate 805 generally has newer development and infrastructure, and more pervious area and BMP implementation, because these areas were developed under more recent permits and land development requirements.

Chula Vista has a robust education and outreach program, which includes Home-Owners Association (HOA) collaboration, bimonthly trash bill inserts, collaboration with “I Love a Clean San Diego” on cleanup events, and a revamped website. Chula Vista also formed the CLEAN Team, which consists of the Conservation, Environmental Services, and Storm Water Management Sections of the City. In addition, a new City Operations Sustainability Plan, detailing water use, energy use, green purchasing, recycling and waste management, pollution prevention, transportation, green buildings, and green infrastructure, was adopted in June 2014.

Strategies and implementation schedules were identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the WQIP is updated. The implementation of the strategies and schedules presented in Table I-3 is contingent upon annual budget approvals and funding availability.

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Table I-3. City of Chula Vista
Jurisdictional Strategies

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
Jurisdictional Strategies								
Development Planning								
All Development Projects								
CV-1	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area, where applicable and feasible.	Refer to Jurisdictional Runoff Management Program (JRMP) Development Planning Section.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	NPDES Section, Engineering Section
CV-2	Amend municipal code and ordinances to facilitate and encourage LID opportunities.	Refer to JRMP.	City-wide	Jurisdictional	FY16	As needed	Departmental Budget	NPDES Section
CV-3	Train staff on LID regulatory changes and BMP Design Manual.	Refer to JRMP.	City-wide	Jurisdictional	FY16	As needed	Departmental Budget	NPDES Section
CV-4	Maintain existing floor area ratio requirements to limit impervious surface areas.	Optional.	City-wide	Optional	Trigger (if included in BMP Design Manual requirements)		TBD	
Priority Development Projects (PDPs)								
CV-5	For PDPs, administer a program requiring implementation of structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	NPDES Section, Engineering Section & Development Services Department
	1. Administer self-certification program for treatment control BMP compliance.	Self-certification program and corresponding form are already being used. Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	NPDES Section
CV-6	Amend BMP Design Manual for trash areas. Require full four-sided enclosure, siting away from storm drains and cover. Consider the retrofit requirement.	Trash enclosure details are included in Storm Water Ordinance and Recycling and Solid Waste Manual.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Environmental Services Section & Development Services Department
CV-7	Administer an alternative compliance program to on-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects).	List of sites will be included in WQIP. After approval, implementation will be in 6 months.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Development Services Department

Table I-3. City of Chula Vista
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
Construction Management								
CV-8	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	Program is included in existing construction program, Refer to JRMP.	City-wide	Jurisdictional	FY16	Monthly	Departmental Budget	NPDES Section, Construction Inspections Section
Existing Development								
Commercial, Industrial, Municipal, and Residential Facilities and Areas								
CV-9	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	Refer to JRMP and BMPs design manuals.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	NPDES Section
	1. Update minimum BMPs for existing residential, commercial, and industrial development.	Refer to JRMP.	City-wide	Jurisdictional	FY15	Once	Departmental Budget	NPDES Section
	2. Design, implement, and enforce property- and PGA-based inspections to focus on trash.	Current inspection program is facilities-based and will also inspect per hot spots map. High priority areas are inspected once a year, and low priority areas are inspected once every five years. Refer to JRMP.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	NPDES Section
	3. Design, implement, and enforce mobile business program.	Chula Vista has a mobile business program in effect. Business License Department administers storm water information packet and questionnaire, and businesses must agree to not discharge pollutants into storm drains. Storm Water Section has final approval. Mobile businesses are inspected as needed.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	NPDES Section
	4. Review policies and procedures to ensure discharges from swimming pools meet permit requirements.	Storm Water Ordinance and JRMP will be updated.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	NPDES Section
	5. Implement program to require retrofit of trash enclosures.	Part of the Recycling & Solid Waste Planning Manual. Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Development Services Department & Environmental Services Section

Table I-3. City of Chula Vista
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
	6. Implement Water Efficient Landscape Ordinance.	The Water Efficient Landscape Ordinance will be amended to include new permit requirements, and the Storm Water Ordinance will be updated to disallow over irrigation.	City-wide	Jurisdictional	FY15	Once	Departmental Budget	Conservation Section
CV-10	Implement pet waste program. May include installation and maintenance of pet waste bag dispensers and trash bins, and signage and education.	Chula Vista distributes pet waste bag holders and has pet waste bag stations in parks. There is also a hotline to report incidences, and public education will be increased. Refer to JRMP.	Parks, trails	Jurisdictional	FY16	Ongoing	Departmental Budget	Parks
CV-11	Promote and encourage implementation of designated BMPs at residential areas.	The Conservation Section has programs for water efficiency. In addition, the new City Operations Sustainability Plan was adopted in July 2014.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	CLEAN Team
	1. Encourage use of compost/soil amendments as opposed to fertilizer to decrease runoff.	Chula Vista is working with landscape architects to require in all new construction.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Development Services Department & Franchise Holler with Republic
	2. Promote and collaborate with water agencies and other groups to encourage implementation of water conservation programs that improve water quality by reducing over-irrigation with smart products or turf replacement and capturing rain water in residential areas.	Chula Vista works with Otay and Sweetwater Water Agencies.	City-wide	Jurisdictional	FY16	Ongoing	Water District Funds	Otay and Sweetwater Water Agencies
MS4 Infrastructure								
CV-12	Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, detention basins, etc.) for water quality improvement and flood control risk management.	Chula Vista has an MS4 inspection and maintenance program in place. Refer to JRMP for more information.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Wastewater Section
	1. Optimize catch basin cleaning to maximize pollutant removal (prioritize catch basin cleaning based on collected data).	Current catch basin cleaning is once a year. Cleanings are prioritized by amount of trash. Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Wastewater Section & NPDES Section
	2. Proactively repair and replace MS4 components to provide source control from MS4 infrastructure.	Chula Vista has an MS4 inspection and maintenance program in place and provides surveys and performs repairs ASAP when needed.	City-wide	Jurisdictional	FY16	As needed	Departmental Budget	Wastewater Section

Table I-3. City of Chula Vista
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
CV-13	Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	Chula Vista has a monitoring survey and SSO plan.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Sewer Collection
	1. Identify sewer leaks and areas for sewer pipe replacement prioritization.	Wastewater Section performs repairs.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Wastewater Section
<i>Roads, Street, and Parking Lots</i>								
CV-14	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways	Street sweeping is contracted out. Commercial, industrial, and business street segments are swept once per two weeks. Residential, center islands, medians, and center lines street segments and public parking lots are swept once per two months. Republic manages Main Street and areas near landfill. Refer to JRMP for more information.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Contractor via Streets Section, Republic
<i>Pesticide, Herbicides, and Fertilizer BMP Program</i>								
CV-15	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Parks and Open Spaces Section
<i>Retrofit and Rehabilitation in Areas of Existing Development</i>								
CV-16	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	NPDES Section & Development Services Department
CV-17	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	NPDES Section & Development Services Department

**Table I-3. City of Chula Vista
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
<i>Illicit Discharge, Detection, and Elimination (IDDE) Program</i>								
CV-18	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include: maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	Chula Vista contracts out outfall monitoring and receives hotline and email complaints. Refer to JRMP for more information.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Contractor
	1. Implement program for employee reporting of potential illicit discharges.	Chula Vista trains City employees to look for illegal discharges and report them. Current training frequency is once a year. There is also a hotline dispatch and anyone can call and report. Refer to JRMP.	City-wide	Jurisdictional	FY16	Annually	Departmental Budget	NDPES Section, Public Works Operations
	2. Utilize "Act Chula Vista" smartphone application to encourage residents to report potential illicit discharges or other storm water violations.	"Act Chula Vista" smartphone application is currently in use.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Public Works Operations
CV-19	Conduct frequent visual outfall monitoring to identify and eliminate illicit discharges.	Chula Vista will develop a trash program to target more outfalls, increase inspection, and amend the observation form. Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	NDPES Section, Wastewater Section, Contractor
<i>Public Education and Participation</i>								
CV-20	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	The CLEAN Team, Environmental Services Section, and Conservation Section work together on public outreach programs. Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	CLEAN Team, Environmental Services Section, Conservation Section
	1. Expand outreach to multi-unit family complexes, which is defined as HOAs and apartments.	Chula Vista will outreach to HOAs. Mailers with trash information are sent out twice a year via Environmental Services Section, and information on over irrigation, BMPs, and general stormwater can be included.	City-wide	Jurisdictional	FY16	1-2 times a year	Departmental Budget	Environmental Services Section
	2. Develop an outreach and training program for residential property managers responsible for HOAs.	The program will target trash and irrigation reduction. Refer to JRMP.	City-wide	Jurisdictional	FY18	As needed	Departmental Budget	NPDES Section & Residential property managers
	3. Enhance and expand trash cleanups through community-based organizations involving target audiences.	Chula Vista partners with "I Love a Clean San Diego" on cleanup events, such as Creek to Bay, Coastal Cleanup, and Adopt a Canyon. Chula Vista also has its own cleanup event called Beautify CV Day.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	NPDES Section, Environmental Services Section, & ILACSD

Table I-3. City of Chula Vista
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
	4. Improve consistency and content of websites to highlight enforceable conditions and reporting methods.	The Chula Vista website is currently being updated and will include information for the public on environmental programs. Information can also be sent out in bimonthly trash bill inserts.	City-wide	Jurisdictional	FY15	As needed	Departmental Budget	CLEAN Team
	5. Promote community events and clean businesses.	The CLEAN team has booths at public festivals and provides information. The clean business program, led by the Environmental Services Section, verifies businesses to become clean businesses.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	CLEAN team, Environmental Services Section
	6. Enhance school and recreation-based education and outreach.	Chula Vista works with "I Love a Clean San Diego" on over 30 community events a year for the Boys and Girls Club, schools, high school environment clubs, and adult organizations.	City-wide	Jurisdictional	Prior to FY16	Ongoing	Departmental Budget	NPDES Section, Environmental Section, & ILACSD
	7. Collaborate with regional education and outreach efforts.	Participate in regional education & outreach program along with other Copermittees.	Region-wide	Jurisdictional	FY16	Ongoing	Departmental Budget paid into regional cost share	NPDES Section & Regional groups
	8. Develop education and outreach to reduce over-irrigation.	Chula Vista partners with Otay and Sweetwater Water Agencies and will add irrigation reduction information to bimonthly trash bills. Chula Vista will also educate and publicize new Storm Water Ordinance.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Conservation Section, Otay and Sweetwater Water Agencies
CV-21	Provide municipal staff training.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	NPDES Section
CV-22	Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements.	Chula Vista conducts surveys and will collaborate with CLEAN team to improve outreach based on survey results.	City-wide	Jurisdictional	FY18 (trash program)	Ongoing	Departmental Budget	CLEAN Team

Table I-3. City of Chula Vista
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
Enforcement Response Plan								
CV-23	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	The City has an enforcement program in place, which provides for escalating enforcement. Refer to the Enforcement Response Plan in the JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	NPDES Section
	1. Increase enforcement of over-irrigation.	Chula Vista have a residential program in place. Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	NPDES Section, Conservation Section City in partnership with Sweetwater Water Authority and Otay Water District
	2. Focus locally on enforcement of water-using mobile businesses.	The mobile business program and Enforcement Response Plan are used.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	NPDES Section
CV-24	Enforce minimum BMPs for existing residential, commercial, and industrial development. Includes power washing at non-residential sites.	Minimum BMPs will be included in the JRMP update.	City-wide	Jurisdictional	F16	Ongoing	Departmental Budget	CLEAN business program, NPDES Section
Additional Nonstructural Strategies								
CV-25	Address and clean up pollutants from homeless encampments through Homeless Outreach Team	The City does not have an outreach program, but the NPDES, Wastewater, and Police Department work collaboratively.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	NPDES Section, Wastewater Section, Police Department
CV-26	Continue participating in source reduction initiatives.					Ongoing		
	1. Continue implementation of cigarette ban.	Smoking is banned at City of Chula Vista parks & in all outdoor dining areas.	City-wide	Jurisdictional	Prior to FY16	Ongoing	Departmental Budget	Code Enforcement
	2. Continue program to address and capture trash and debris.	The City will look at enhancements where possible to install trash capture systems.	City-wide	Jurisdictional	FY 18	Ongoing	Departmental Budget	NPDES Section, Wastewater Section, & Environmental Services

Table I-3. City of Chula Vista
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
CV-27	Proactively monitor for erosion, and complete minor repair and slope stabilization on municipal property.	This is included in the municipal inspection program.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	NPDES Section, Parks
CV-28	Conduct special studies							
	1. Reference watershed study	Chula Vista is participating in the regional water study.	Region-wide	Jurisdictional/ Regional	FY16	Until study completion	Regional	NPDES Section
CV-29	Proactively repair and replace corrugated metal pipe (CMP) MS4 components to provide source control from MS4 infrastructure.	There is an MS4 inspection and maintenance program in place.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Wastewater Section
CV-30	If a regional social services effort is established, support workgroup to provide sanitation and trash management for person experiencing homelessness and determine if the program is suitable and appropriate for jurisdictional needs to meet goals.	The City may participate jointly with other agencies as part of a regional program.	TBD	Optional	TBD	TBD	TBD	TBD
CV-31	If invasive plant and animal removal is necessary in key locations, collaborate with Urban Corps of San Diego or other volunteer groups as needed.	Projects are contingent on identifying grants or other funding sources.	TBD	Optional	TBD	TBD	TBD	TBD

I.4 CITY OF SAN DIEGO STRATEGIES AND FUNDING NEEDS

The City of San Diego (City) is currently implementing administrative policies, urban development management programs, and innovative pilot studies, and is investing in research for site locations for green infrastructure and other treatment BMPs throughout its jurisdiction in multiple watersheds. The City has identified water quality improvement strategies that are expected to provide the greatest benefits to the watershed and its residents, businesses, communities within the City's jurisdictional boundaries.

Strategies were selected by evaluating the following considerations, in descending priority:

- Potential to reduce pollutant loads for the Highest Priority Conditions;
- Potential to reduce loads for other pollutants (including Priority Conditions);
- Cost effectiveness;
- Feasibility and ease of implementation;
- Social impacts and benefits; and
- Other¹ impacts and benefits.

The strategies that provide the best value, most sustainable return on investment, and greatest range of benefits were selected, as needed, as the City moves forward in its water quality improvement efforts. These strategies are consistent with those already identified in the Comprehensive Load Reduction Plans (CLRPs) for various TMDLs in the San Diego Region.

The City is currently developing a framework to evaluate the potential additional benefits the strategies may provide beyond improved water quality. These additional benefits may be financial, environmental, or societal. The strategies will be evaluated based on these benefits and assigned a potential benefit level which may guide future updates to the WQIP.

The cumulative storm water quality benefits of the strategies identified in this WQIP represent the level of effort needed to demonstrate progress toward achieving the WQIP interim and final numeric goals. It is important to note that these strategies are subject to change through the iterative, adaptive management process set forth in this Water Quality Improvement Plan. Through the adaptive management process the City will be able to implement strategies and assess their impact to water quality and use new available information to refine, modify, remove, replace, or add strategies which will

¹ Other benefits refer to *additional* outcomes of a strategy beyond water quality improvements. Other benefits can include reduced air pollution, increased water conservation, aesthetics-induced property value increases, and increased business investments.

ensure the most effective suite of strategies are being implemented. Therefore, actual implementation of strategies is dependent upon both approval of funding in future annual budgets and adjustments that may occur as part of the iterative process. If the City elects to use the WQIP as a TMDL compliance document per Attachment E of the Municipal Permit, then the compliance analysis under Attachment E will be updated to ensure that any modifications to strategies will continue to achieve compliance with the TMDL targets.

The recommended strategies will be implemented by the City; they are not intended to be implemented by private entities (e.g., development, business, industry, etc.). Some of the City's strategies, such as development planning, may have implications for private entities. The City has also developed a schedule as a best estimate of the shortest amount of time required to plan and implement the strategies. A compliance analysis using a watershed model was conducted to identify the strategies required to be implemented to meet interim and final goals. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the compliance analysis will be updated as needed to provide assurance that numeric goals will be met.

Optional strategies are activities that may be implemented by the City at its discretion through the iterative approach. Optional strategies may or may not be necessary in order to achieve the WQIP goals, depending on the performance of the near-term strategies. The City may select from the optional strategies if the current suite of strategies is not demonstrating sufficient progress toward achieving interim or final numeric goals, or if grant funding or partnership opportunities arise for one of the optional strategies. These optional strategies are also subject to approval of City's budget and availability of funding.

San Diego's jurisdiction includes a dense population and increased impervious urban land uses. The following strategies address the Highest Priority Conditions in San Diego's jurisdiction within the San Diego Bay WMA and other jurisdictional areas outside of the boundaries where the Highest Priority Condition has been identified. For example, the City implements a trash mitigation strategy in western Otay River Valley Park. Although the City is focusing efforts in the Chollas Creek Watershed, many strategies presented are implemented in jurisdictional areas outside of Chollas Creek Watershed.

The City's Storm Water Division leads the City's efforts to protect and improve water quality and reduce flood risk. These activities include but are not limited to: public education, employee training, water quality monitoring, source identification, code enforcement, watershed management, and Best Management Practices development/implementation within the City's jurisdictional boundaries. The Storm Water Division is also tasked with providing the most efficient storm drain system operation and maintenance services including inspection, maintenance, and repair of

storm drain systems in the public right of way and drainage easements. The complete list of strategies undertaken by the Storm Water Division is presented in this section.

The City has developed projected funding needs that will be used to submit annual budget requests to secure the resources necessary to comply with the Municipal Permit. These funding needs include four general categories:

1. Storm Water Division funding needs to implement day-to-day operational JRMP activities as required by Provision E in the Municipal Permit;
2. Storm Water Division funding needs for flood risk management programs associated with the JRMP, such as infrastructure repair and replacement;
3. Storm Water Division funding needs for activities managed by the Storm Water Division to meet the goals identified in the WQIP; and
4. Funding needs for City departments and divisions other than the Storm Water Division to implement day-to-day operational JRMP activities, as required by the Municipal Permit. Examples of JRMP activities include administration, training, and best management (BMP) implementation.

The City's Storm Water Division funding needs (which represent the first three categories above) are presented below as "City of San Diego" funding needs, but do not include funding needs for other City departments and divisions to implement required JRMP activities (category four above) because the recommended strategies included in this plan only apply to the City's Storm Water Division. For more information about the funding needs for non-Storm Water Division departments and divisions, please refer to the fiscal analysis in the City's Jurisdictional Runoff Management Plan (Section 10). Table I-4 presents the projected funding needs to implement the San Diego Bay WMA Water Quality Improvement Plan through FY40. The compliance period for San Diego Bay is through FY31, when the final goals are expected to be met. To maintain comparability among Water Quality Improvement Plan projected funding needs for different WMAs (the City is in six WMAs with different compliance schedules), ongoing operation and maintenance costs after the compliance period (between FY32 and FY40 for San Diego Bay) are included in Table I-4. However, the majority of the funding will be needed within the first 15 years to meet the numeric goals. Twenty five year funding needs (FY16 - FY40) for the San Diego Bay WMA are presented for JRMP activities, flood risk management programs, and Water Quality Improvement Plan activities by funding source: the City's General Fund (GF) or Capital Improvement Projects (CIP) funds. The General Fund is generally used for nonstructural strategies, design support, and operations and maintenance (O&M) of structural projects. CIP funding is used during the design and construction phase of structural projects. The source of the funding needs is the Storm Water Division's 2015 Watershed Asset Management Plan

(WAMP) Cost Update, which will be made available on the Storm Water Division's website² in July 2015.

Figure I-1 illustrates the projected fiscal year annual funding needs over the 25-year compliance period for the Storm Water Division to implement its JRMP activities, flood risk management programs, and Water Quality Improvement Plan activities in the San Dieguito River WMA. Figure I-2 shows the projected fiscal year GF and CIP funding needs for each of these years. Figure I-3 and Figure I-4 show the projected fiscal year GF and CIP funding needs, respectively, by category for each of these years.

The recommended strategies selected are presented in Table I-5. The City's schedule table is found in Table I-6.

Table I-4
City of San Diego Projected Fiscal Year Funding Needs by Funding Source and Category for the San Diego Bay WMA (FY16-40)¹

General Fund	
Water Quality Improvement Plan	\$45,580,530
JRMP	\$81,639,237
Flood Risk Management	\$283,398,096
Sub Total General Fund	\$410,617,863
CIP	
Water Quality Improvement Plan	\$129,782,660
JRMP	\$0
Flood Risk Management	\$422,299,775
Sub Total CIP	\$552,082,435
Total	
25 FY San Diego Bay WMA Total Need	\$962,700,298

Notes:

1. Does not include funding needs for other City of San Diego Departments or Divisions to implement JRMP required activities.

² <http://www.sandiego.gov/stormwater/plansreports/>

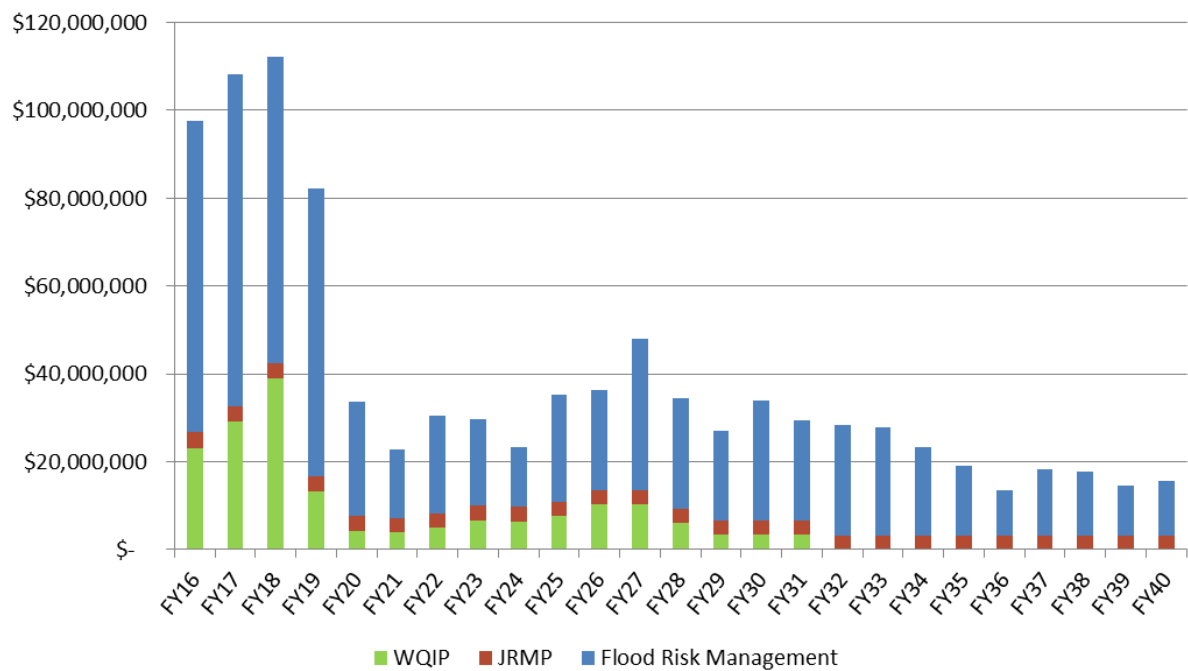


Figure I-1
City of San Diego Projected Fiscal Year Annual Funding Needs by Category for the San Diego Bay WMA

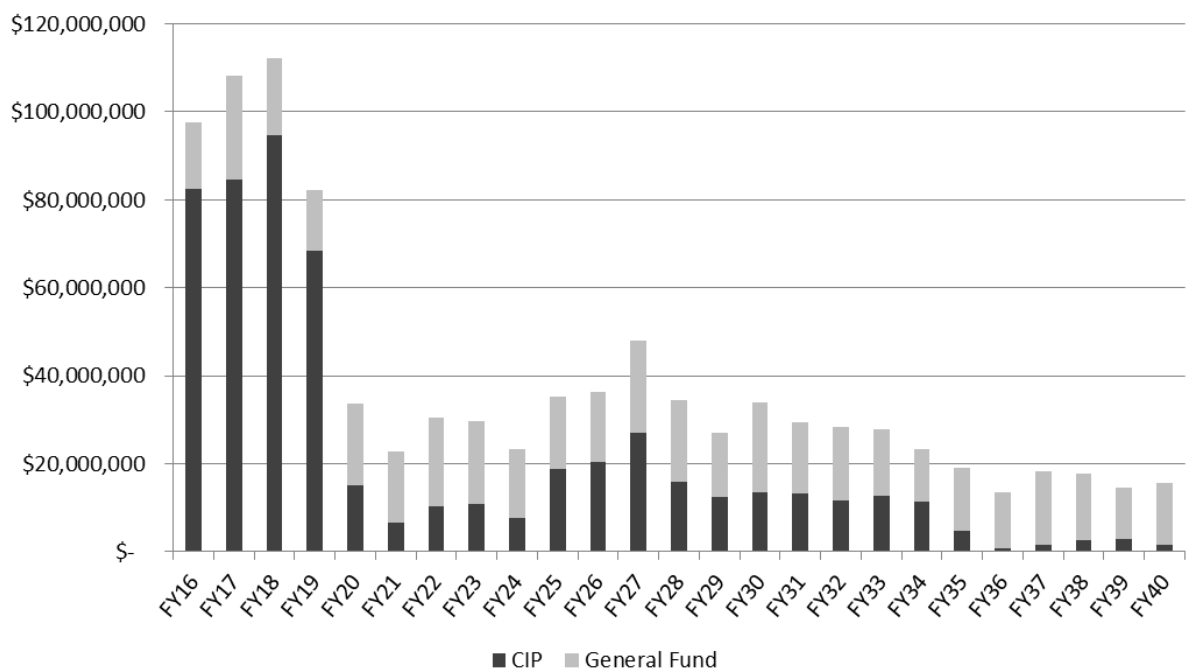


Figure I-2
City of San Diego Projected Fiscal Year Annual Funding Needs by Funding Source for the San Diego Bay WMA

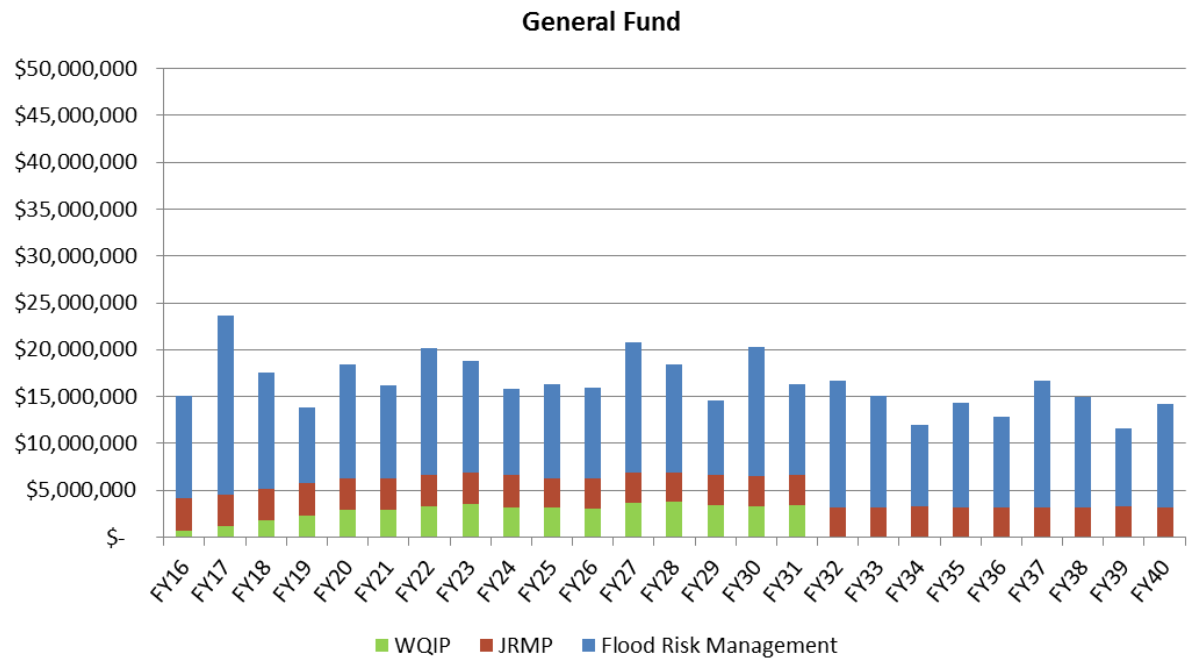


Figure I-3
City of San Diego Projected Fiscal Year Annual General Fund Funding Needs for the San Diego Bay WMA

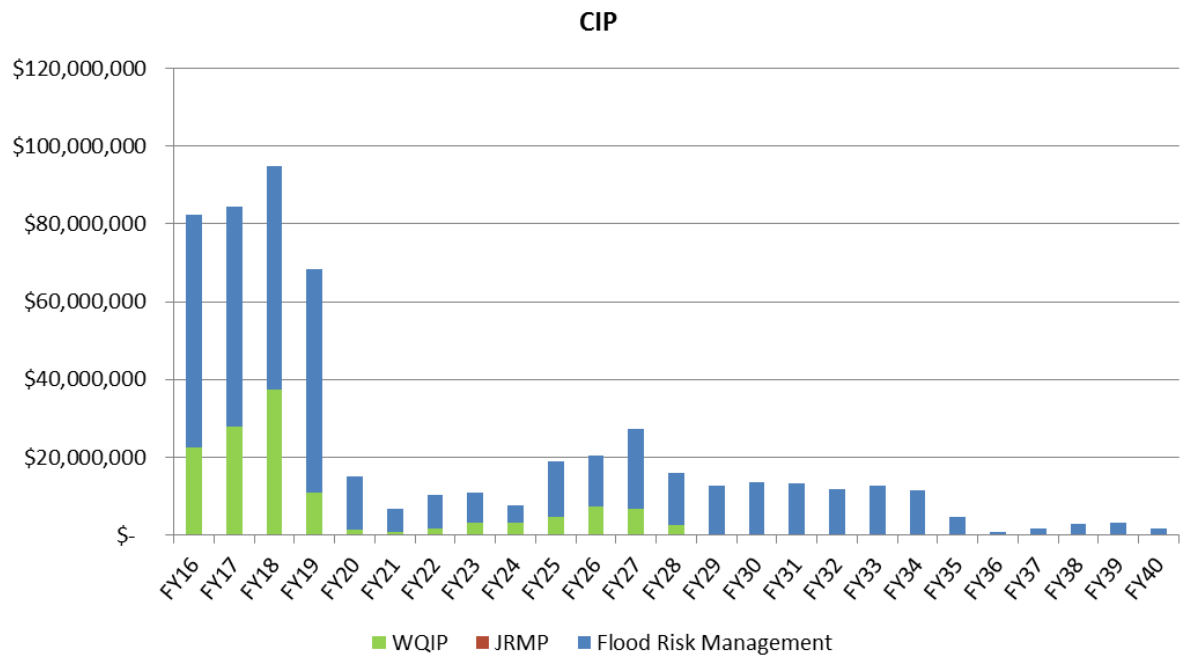


Figure I-4
City of San Diego Projected Fiscal Year Annual CIP Funding Needs for the San Diego Bay WMA

Table I-5. City of San Diego
Jurisdictional Strategies

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
Jurisdictional Strategies							
Development Planning							
All Development Projects							
CSD-1	Establish guidelines and standards for all development projects; provide technical support related to implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area or implement easements to protect water quality, where applicable and feasible. Includes internal coordination and collaboration between City departments (DSD, PWD, and Engineering) to improve success and long-term benefits of BMPs.	Refer to JRMP Section 4.	City-wide	Jurisdictional	Prior to FY16	Ongoing	T&SW with DSD, PWD, BIA, NGOs, Copermittees, and Engineering Community
CSD-1.1	Investigate and research emerging technology.	Annually the Construction & Development Standards Group identifies new tasks to conduct literature review, communication with researchers outside of the City, physical testing and experimentation of new or emerging technologies, and other research with the goal of updating tools available for reducing pollutant loads from development and redevelopment sites.	City-wide	Jurisdictional	Prior to FY16	As needed	T&SW with DSD, PWD, BIA, NGOs, Copermittees, and Engineering Community
CSD-1.2	Approve and implement a green infrastructure policy.	The City will begin developing a policy in FY16 that will increase the green infrastructure requirements for City CIP projects. This policy will be coordinated with ongoing efforts to update City design manuals and LID design standards for public LID BMPs.	City-wide	Jurisdictional	FY16 (Begin)	As needed	T&SW with DSD and PWD
CSD-1.3	Develop Design Standards for Public LID BMPs.	Improve quality of design to ensure efficiency and reliability in public designs.	City-wide	Jurisdictional	FY14-FY15	As needed	T&SW with DSD, PWD, BIA, NGOs, Copermittees, and Engineering Community

**Table I-5. City of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
CSD-1.4	Provide outreach to impacted industry regarding minimum BMP requirement updates.	Affects commercial, industrial, and residential development.	City-wide	Jurisdictional	FY15	As needed	TBD
CSD-2	Train staff on LID regulatory changes and LID practices.	Formal training is required for all staff involved in development plan review to increase knowledge of LID BMPs. Goal of training associated with LID practices and regulations is to promote LID implementation and to avoid adverse conditions such as trees planted within swales, or planned drainage patterns which obstruct or inhibit LID performance.	City-wide	Jurisdictional	FY16	As needed	T&SW with DSD, PWD, BIA, NGOs, Copermittees, and Engineering Community
CSD-3	Amend municipal code and ordinances, including zoning ordinances, to facilitate and encourage LID opportunities to support compliance with the MS4 Permit and TMDLs in a reasonable manner. Ensure consistency with the City of San Diego's BMP Design Manual. Update the Storm Water Standards Manual accordingly.	Municipal codes and ordinances will be brought to City Council for consideration to encourage LID implementation (e.g., runoff detention and filtration using natural filters and stormwater retention for reuse). LID stormwater management will be encouraged in proposed codes and ordinances associated with development and redevelopment projects, which are brought to City Council for consideration.	City-wide	Jurisdictional	FY15	As needed	T&SW with DSD, PWD, BIA, NGOs, Copermittees, and Engineering Community
CSD-4	Create a manual that outlines right-of-way design standards.	Create a manual that includes flood control performance standards, permanent BMP elements design standards, design standards for green streets and other BMPs, and maintenance access. Provides drainage and streets design standards. Opportunity to merge various existing manuals and provide consistency.	City-wide	Jurisdictional	FY15	One time	T&SW with DSD and PWD
CSD-5	Provide technical education and outreach to the development community on the design and implementation requirements of the MS4 Permit and Water Quality Improvement Plan requirements.	Technical education and outreach to the development community includes outreach on design standards, City design manuals, and the WMAA.	City-wide	Jurisdictional	Prior to FY16	Ongoing	T&SW with DSD
Priority Development Projects (PDPs)							
CSD-6	For PDPs, provide technical support to other City departments to ensure implementation of on-site structural BMPs to control pollutants and manage hydromodification by developing City wide storm water development standards and design guidelines.	Coordinate with other City departments to promote and confirm a thorough understanding of requirements for implementing structural BMPs that control pollutants and manage hydromodification. Included in that understanding are requirements to confirm proper design and construction through processes controlled by other City departments.	City-wide	Jurisdictional	FY16	Ongoing	T&SW with DSD, PWD, BIA, NGOs, Copermittees, and Engineering Community

Table I-5. City of San Diego
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
CSD-6.1	Institute a program to verify and enforce maintenance and performance of treatment control BMPs.	Refer to JRMP Section 4.5.	City-wide	Jurisdictional	FY16	Ongoing	T&SW with DSD, PWD, BIA, NGOs, Copermittees, and Engineering Community
CSD-7	Update BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	Refer to JRMP Section 4.	City-wide	Jurisdictional	FY15	Every 5 years/ permit cycle	T&SW with DSD, PWD, BIA, NGOs, Copermittees, and Engineering Community
CSD-7.1	Amend BMP Design Manual for trash areas. Require full four-sided enclosure, siting away from storm drains and cover. Consider the retrofit requirement.	Amend BMP Design Manual and zoning standards/requirements which address reduction of pollutants for common areas of trash build-up (e.g. restaurants, supermarkets, "big box" retail stores with food, pet stores). Most effective method for source control of bacteria and trash is to employ four-sized trash enclosures with a cover over trash areas.	City-wide	Jurisdictional	FY15	One time	T&SW with DSD, PWD, BIA, NGOs, Copermittees, and Engineering Community
CSD-7.2	Amend BMP Design Manual for animal-related facilities, such as such as animal shelters, "doggie day care" facilities, veterinary clinics, breeding, boarding and training facilities, groomers, and pet care stores.	Amend BMP Design Manual and zoning requirements (including retrofits) to provide supplemental standards for animal facilities (including animal shelters, dog daycares, veterinary clinics, groomers, pet car stores, and breeding, boarding, and training facilities). Supplemental standards may include requiring covered trash enclosures, identification of landscaped relief areas on site plans, ensuring drainage connections and treatment swales for areas that will not drain to the sanitary sewer, as well as inspection of grading, drainage, and landscaping for outdoor exercise areas.	City-wide	Jurisdictional	FY15	One time	T&SW with DSD, PWD, BIA, NGOs, Copermittees, and Engineering Community

Table I-5. City of San Diego
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
CSD-7.3	Amend BMP Design Manual for nurseries and garden centers.	Amend BMP Design Manual to provide supplemental standards for plant nurseries and garden centers. Standards will focus on reducing irrigation runoff, and loading of sediment, pesticides, and nutrients. Measures may include: covered outdoor storage, green waste management BMPs, improved irrigation efficiency to reduce dry-weather runoff, and containment of runoff from impervious areas where plants and materials are stored.	City-wide	Jurisdictional	FY15	One time	T&SW with DSD, PWD, BIA, NGOs, Copermittees, and Engineering Community
CSD-7.4	Amend BMP Design Manual for auto-related uses.	Amend BMP Design Manual to provide supplemental standards for automotive-related uses to reduce loading of metals, oils, grease, and trash. Measures may include: four-sized covered trash enclosures, and careful review of auto-related usage areas (e.g. garage bays at repair shops) for grading, drainage, and drain connections to sanitary sewer systems.	City-wide	Jurisdictional	FY15	One time	T&SW with DSD, PWD, BIA, NGOs, Copermittees, and Engineering Community
CSD-8	Develop and administer an alternative compliance program for on-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects).	Refer to JRMP Section 4.2.3.1.	City-wide	Jurisdictional	FY15	Ongoing	T&SW with DSD, PWD, BIA, NGOs, Copermittees, and Engineering Community
CSD-8.1	Create a fund that allows habitat acquisition, protection enhancement, and restoration in conjunction with other cooperating entities including community groups, academic institutions, state county, and federal agencies, etc.	This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, 4) partners have been identified and formal MOUs have been developed, and 5) consensus and community support has been achieved.	City-wide	Optional	Optional	TBD	T&SW with DSD, PWD, BIA, NGOs, Copermittees, and Engineering Community

Table I-5. City of San Diego
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
Construction Management							
CSD-9	Coordinate with other City departments to promote and confirm a thorough understanding of requirements for implementing temporary BMPs that control sediment and other pollutants during the construction phase of projects. Included in that understanding are requirements to inspect at appropriate frequencies and effectively enforce requirements through process controlled by other City departments.	Refer to JRMP Section 5.	City-wide	Jurisdictional	FY16	Ongoing	T&SW with DSD, PWD, BIA, NGOs, Copermittees, and Engineering Community
Existing Development							
Commercial, Industrial, Municipal, and Residential Facilities and Areas							
CSD-10	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	Refer to JRMP Sections 6, 7, and 8.	City-wide	Jurisdictional	FY16	Ongoing	T&SW with DSD, PUD, & PWD
CSD-10.1	Update minimum BMPs for existing residential, commercial, and industrial development. Specific updates to BMPs include required street sweeping, catch basin cleaning, and maintenance of private roads and parking lots in targeted areas.	Refer to JRMP Appendix IX.	City-wide	Jurisdictional	FY15	Every 5 years	T&SW
CSD-10.2	Provide outreach to property managers and trash haulers to elevate the emphasis of power washing as a pollutant source.	Emphasis will be placed on non-compliant washing as an enforceable violation.	City-wide Residential, commercial and industrial areas	Jurisdictional	FY15	Ongoing	T&SW

**Table I-5. City of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
CSD-10.3	Implement property based inspections.	Property-based inspections increase awareness and responsibility for individual properties to tackle issues associated with trash, landscapes, and parking areas. Expanding beyond the business-level inspections will achieve different and more effective opportunities for education, outreach, inspection, and enforcement to encourage water conservation strategies.	City-wide	Jurisdictional	Prior to FY16	Ongoing	T&SW
CSD-10.4	Review policies and procedures to ensure discharges from swimming pools meet permit requirements.	Verify and bring to City Council for consideration an update (as needed) for the City's Municipal Code (43.0301) to meet new permit requirements for swimming pool discharges.	City-wide	Jurisdictional	FY15	As needed	T&SW, City Attorney (Civil & Criminal)
CSD-11	Promote and encourage implementation of designated BMPs for residential and non-residential areas.	Landscape-based rebates are a "gateway" for adoption of other beneficial practices and are one of the nonstructural methods which address impacts from single-family residential areas (City of San Diego 2011 program development background study). Residential incentives can include: education and training (neighborhood watershed field days), and aggressive subsidies or rebates for grass replacement and rainwater harvesting. Existing programs will be expanded overall, and also have targeted expansion within specific subwatershed, particularly with highest water quality priority conditions.	City-wide Residential and Commercial Areas	Jurisdictional	Prior to FY16	Ongoing	T&SW with DSD, PUD, PWD, MWD, CWA & local water agencies
CSD-11.1	Residential and Commercial BMP: Rain Barrel	The existing PUD rebate program will continue for residential properties and expand for commercial properties for water collection, conservation, and reuse with rain barrels.	City-wide Residential Areas	Jurisdictional	Prior to FY16	Ongoing	T&SW with DSD, PUD, PWD, & local water agencies
CSD-11.2	Residential and Commercial BMP: Grass Replacement	The existing PUD grass replacement cash rebate program will continue and expand for residential and commercial properties. Program encourages a reduction in water use through the conversion of non-artificial grass to water wise plant material, while maintaining a high level of living landscape to benefit the environment. Program does not allow for conversion to artificial turf.	City-wide Residential and Commercial Areas	Jurisdictional	Prior to FY16	Ongoing	T&SW with DSD, PUD, PWD, & local water agencies

Table I-5. City of San Diego
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
CSD-11.3	Residential and Commercial BMP: Downspout Disconnect	Disconnecting downspouts provide alternate runoff pathways from rooftops, sidewalks, driveways, and roads. Disconnecting downspouts from residential areas to pervious land can allow for depression storage and infiltration.	City-wide Residential and Commercial Areas	Jurisdictional	FY16	Ongoing	T&SW with DSD, PUD, PWD, & local water agencies
CSD-11.4	Residential and Commercial BMP: Micro-irrigation	The existing PUD micro-irrigation rebate program will continue and increase for residential and commercial properties. Application of micro-irrigation aims to improve the efficiency of landscape irrigation through the precise application of water.	City-wide Residential Areas	Jurisdictional	Prior to FY16	Ongoing	T&SW with DSD, PUD, PWD, & local water agencies
CSD-11.5	Provide Onsite Water Conservation Surveys.	Provide free onsite water conservation surveys to commercial and residential customers to reduce over-irrigation and to encourage water conservation.	City-wide Residential and Commercial Areas	Jurisdictional	Prior to FY16	Ongoing	T&SW with DSD, PUD, PWD, & local water agencies
MS4 Infrastructure							
CSD-12	Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, channels as allowed by resource agencies, detention basins, pump stations, etc.) for water quality improvement and for flood control risk management.	Refer to JRMP Section 7.	City-wide	Jurisdictional	FY16	Ongoing	T&SW
CSD-12.1	Enhance catch basin cleaning to increase pollutant removal (up to 4 times per year) in the rainy season.	To increase pollutant load removal, catch basins will be cleaned up to four times per year in the rainy season. The City of San Diego's pilot study found that major pollutants may vary from neighborhood to neighborhood (yard waste versus trash and sediment). Implementation may be adapted based on catch basin record keeping and cleaning optimization. Increase in frequency will be phased over 4 Fiscal Years.	Chollas: High priority areas identified in pilot study	Jurisdictional	FY16	Ongoing	T&SW

Table I-5. City of San Diego
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
CSD-12.2	Increase frequency of catch basin inspection and as-needed cleaning.	For every segment of channel that is cleared, the City will conduct an inspection and as-needed cleaning of every catch basin within 100 feet of the cleared segment of channel. Additional inspection and as-needed cleaning will occur every three months for one year after the segment of channel is cleared.	Chollas (48 open channel segments)	Jurisdictional	FY13	5 years (ends FY18)	T&SW
CSD-12.3	Proactively repair and replace MS4 components to provide source control from MS4 infrastructure.	In order to limit inflow of pollutants and reduce pollutant loads, proactive measures will be taken to improve, repair, and replace MS4 components. The City of San Diego will start a multi-year program of repairing and replacing storm drain pipes to reduce sediment loading to the MS4. Development of an assessment management program and bond issues will be addressed. Exploration of daylighting pipes will take place where feasible and appropriate.	City-wide	Jurisdictional	FY16	Ongoing	T&SW
CSD-12.4	Replacement of hard assets including storm drains and structures.	Refer to JRMP Section 7.	City-wide	Jurisdictional	FY16	Ongoing	T&SW
CSD-13	Coordinate with other City departments (PUD) to implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	Refer to JRMP Section 7.	City-wide	Jurisdictional	FY16	Ongoing	T&SW with PUD
CSD-13.1	Identify sewer leaks and areas for sewer pipe replacement prioritization.	Risk assessment to include identifying targeted areas (age, location, proximity to MS4), coming up with methodology, pilot, desktop exercise/analysis.	City-wide	Jurisdictional	FY16	As needed	T&SW with PUD
Roads, Street, and Parking Lots							
CSD-14	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways.	Refer to JRMP Section 7.	City-wide	Jurisdictional	FY16	Ongoing	T&SW
CSD-14.1	Provide outreach to street sweeping enhancement-targeted areas.	Division staff will conduct a thorough education and outreach effort beginning months in advance of the expansion of sweeping routes. Staff will work with the affected Council offices, community stakeholders, non-governmental organizations and community groups to build community awareness and acceptance of the enhanced sweeping program.	Chollas Watershed	Jurisdictional	FY16	Ongoing	T&SW

Table I-5. City of San Diego
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
CSD-14.2	Enhance street sweeping through equipment replacement (replace mechanical sweepers with regenerative air sweepers) and route optimization (sweep all routes twice per month) in targeted areas.	Following outreach and posting, street sweeping efforts will be increased in target areas (those with sediment or metals as a highest priority water quality conditions). Replacement of street sweeping equipment with high-efficiency regenerative air and vacuum-assisted sweepers over time is expected to further increase load reductions (even if current routes and frequencies remain unchanged).	Chollas Watershed	Jurisdictional	FY17	Ongoing	T&SW
CSD-14.3	Initiate sweeping of medians on high-volume arterial roadways.	Medians of roadways are also a potential source of pollutants. Consider implementing or increasing sweeping of medians. Consider mechanical and hand sweeping techniques.	City-wide	Jurisdictional	FY17	Ongoing	T&SW
CSD-14.4	Implement additional street sweeping (Settlement Agreement).	City shall increase street sweeping frequency by prioritizing high traffic commercial routes adjacent to maintained channel with vacuum-assisted sweeper for every 400 linear feet of vegetation that is removed (except for removal of invasive species, e.g., Arundo) within a drainage area. Sweeping shall be conducted in median areas that are not subject to regular sweeping routes, and shall occur at a frequency of at least once per quarter for one calendar year after maintenance.	Chollas Watershed	Jurisdictional	FY13	5 years (ends FY18)	T&SW
<i>Pesticide, Herbicides, and Fertilizer BMP Program</i>							
CSD-15	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	Refer to JRMP Sections 7, 8, and 9.	City-wide	Jurisdictional	FY16	Ongoing	T&SW with Parks and Rec
<i>Retrofit and Rehabilitation in Areas of Existing Development</i>							
CSD-16	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	Refer to JRMP Appendix XIX. The Offsite Alternative Compliance Program will include methods for identifying and assessing potential retrofit projects in existing development areas. Retrofit project selection will be based upon a variety of factors including proximity to high priority water quality conditions, potential pollutant load removal effectiveness, and feasibility of implementation. The program will include protocols related to funding mechanisms for project construction and long-term maintenance, payment and credit structures, and water quality equivalency standards.	City-wide	Jurisdictional	TBD	Ongoing	T&SW with DSD, PWD, BIA, NGOs, Copermittees, and Engineering Community

Table I-5. City of San Diego
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
CSD-17	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	Refer to JRMP Appendix XIX. The Offsite Alternative Compliance Program (Section 9.2 and Appendix C) will include methods for identifying and assessing potential stream, channel, or habitat rehabilitation projects in existing development areas. Rehabilitation project selection will be based upon a variety of factors including existing stream or habitat degradation, potential future cumulative stream or habitat impacts, and feasibility of implementation. The program will include protocols related to funding mechanisms for project construction and long-term maintenance, payment and credit structures, and water quality equivalency standards.	City-wide	Jurisdictional	TBD	Ongoing	T&SW with DSD, PWD, BIA, NGOs, Copermittees, and Engineering Community
<i>Illicit Discharge, Detection, and Elimination (IDDE) Program</i>							
CSD-18	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include: maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	Refer to JRMP Section 3.	City-wide	Jurisdictional	Prior to FY16	Ongoing	T&SW
<i>Public Education and Participation</i>							
CSD-19	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Refer to JRMP Section 9.	City-wide	Jurisdictional	Prior to FY16	Ongoing	T&SW
CSD-19.1	Continue implementation of a Pet Waste Program.	Pet Waste Program includes outreach on "Scoop the poop", installation of posts for dispensers, distribution of lawn signs, and attendance at dog-related community activities.	City-wide	Jurisdictional	Prior to FY16	Ongoing	T&SW with Parks and Rec

**Table I-5. City of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
CSD-19.2	Promote and encourage implementation of designated BMPs in commercial and industrial areas.	Provide education and outreach on BMPs for commercial businesses and industrial facilities.	City-wide Non-residential Areas	Jurisdictional	Prior to FY16	Ongoing	T&SW with PUD; Funding: Prop 84 and water districts (MWD)
CSD-19.3	Expand outreach to homeowners' association (HOA) common lands and HOA incentives.	Approaches to consider include: offering incentives to HOAs and maintenance districts to adopt water-conserving/efficiency and stormwater-reduction changes to their landscapes, irrigation, and maintenance; conducting workshops with property managers; providing supplemental standards, inspection, or enforcement for HOA-managed properties.	City-wide	Jurisdictional	FY16	Ongoing	T&SW
CSD-19.4	Develop an outreach and training program for property managers responsible for HOAs and maintenance districts.	Approaches to engage HOAs and property managers include: conducting workshops with property managers, providing supplemental standards, inspections or enforcement around HOA properties, and offering incentives to HOAs and maintenance districts to adopt changes to landscapes, irrigation, or maintenance which promote water conservation or stormwater reduction. Property managers are also a target for enhanced outreach.	City-wide	Jurisdictional	FY16	Ongoing	T&SW
CSD-19.5	Enhance and expand trash cleanups through community-based organizations involving target audiences.	Increase effectiveness and reach of trash/beach cleanups and community based efforts by engaging community groups to self-define and carry-out trash clean-ups. Longstanding partnerships and sponsorships with I Love A Clean San Diego and others are recommended to be continued and enhanced. To effectively target stream clean-up efforts, focus on partnerships with community organizations which provide strong engagement with target audiences and communities.	City-wide	Jurisdictional	FY16	Ongoing	T&SW; Park and Rec

Table I-5. City of San Diego
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
CSD-19.6	Provide trash mitigation in the western portion of the Otay River HU.	Longstanding partnerships and sponsorships with I Love A Clean San Diego and Otay Valley Regional Park (OVRP) will be continued and enhanced. The City of San Diego has a Joint Exercise Powers Agreement with the City of Chula Vista and the County of San Diego to manage the OVRP. City of San Diego park rangers perform regular maintenance of the Western OVRP including, but not limited to: overseeing all contract services; patrolling the Park and keeping it as clean and safe as possible; providing educational opportunities for visitors; providing consistent public outreach; maintaining the grounds and facilities; and coordinating with various agencies, public utilities, and other organizations. The park rangers work with WildCoast to educate the local community, and WildCoast supports OVRP's educational programs, such as brochure development and public outreach events like OVRP Day, I Love A Clean San Diego cleanups, and various other events throughout the year.	Otay River HU	Jurisdictional	Prior to FY16	Ongoing	Parks and Rec
CSD-19.7	Improve consistency and content of websites to highlight enforceable conditions and reporting methods.	Websites will be updated to provide a user-friendly format and clarity for stormwater violations, conditions which citizens can and should report, and how to make such reports. Examples of reports for common incidents will be developed and posted which may vary locally and regionally. Photographs of allowable practices as well as illegal practices should be shown for utmost clarity. Displaying hotline numbers prominently on the website and near the photographs of illegal practices will ensure that those seeking to report will be able to do so easily. Also ensure hotline number and website are searchable and can be retrieved by simple internet searches.	City-wide	Jurisdictional	Prior to FY16	Ongoing	T&SW
CSD-19.8	Enhance school and recreation-based education and outreach.	Develop curriculum and establish distribution in public schools. Includes education on water conservation.	City-wide	Jurisdictional	FY15	Ongoing	T&SW, PUD with community-based organization

Table I-5. City of San Diego
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
CSD-19.9	Develop education and outreach to reduce irrigation runoff.	Example approaches to reduce or eliminate irrigation runoff may include: education and outreach, prohibition, enhanced enforcement of existing prohibitions, and pilot projects such as the City of Del Mar's pilot door hanger project.	City-wide	Jurisdictional	Prior to FY16	Ongoing	T&SW with PUD
CSD-19.10	Develop regional training for water-using mobile businesses.	Consider development of supplemental standards for mobile businesses including: covered trash enclosures, careful review of washing areas (grading, drainage, landscaping, sanitary sewer system connectivity), and appropriate signage (either through zoning for retrofits or "best fix" approaches, or through BMP Design Manual standards). Businesses may include carpet cleaners, tile installers, plumbers, etc.	City-wide	Jurisdictional	FY16	Ongoing	T&SW
CSD-19.11	Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements.	Use effectiveness surveys to enhance existing education and outreach programs while proactively keeping up with and incorporating changing regulatory requirements.	City-wide	Jurisdictional	FY16	Ongoing	T&SW
CSD-19.12	Continue to promote and encourage implementation of Integrated Pest Management (IPM) for residents and businesses.	The City will continue to provide education on IPM techniques during presentations and on the City's Think Blue website.	City-wide	Jurisdictional	Prior to FY16	Ongoing	T&SW
Enforcement Response Plan							
CSD-20	Continue to implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Storm Water Code Enforcement Unit's Standard Operating Procedures (SOPs) - Enforcement Response Plan.	Refer to JRMP Appendix XIII.	City-wide	Jurisdictional	Prior to FY16	Ongoing	T&SW with PUD, other City enforcement compliance programs
CSD-20.1	Increase enforcement of irrigation runoff.	Increased enforcement policies against irrigation runoff will be established in tandem with the education and outreach programs on how these actions lead to pollutant loading. By shifting to property-based inspections irrigation runoff can be handled as enforceable violations once the public is well-informed.	City-wide	Jurisdictional	FY16	Ongoing	T&SW

Table I-5. City of San Diego
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
CSD-20.2	Increase enforcement of water-using mobile businesses.	In addition to education, pollution associated with mobile business sources can be handled through policy, code development, inspections of business practices, and enforcement.	City-wide	Jurisdictional	FY16	Ongoing	T&SW
CSD-21	Increase enforcement of all minimum BMPs for existing residential, commercial, and industrial development.	Increased enforcement of existing development minimum BMPs.	City-wide	Jurisdictional	FY16	As needed	T&SW
CSD-22	Increase enforcement associated with property-based inspections.	Shifting inspections from businesses-specific to property-based will increase effectiveness and sense of responsibility and ownership. Education and outreach must be followed up with inspection and enforcement of regulations to encourage proper landscape and water conservation strategies.	City-wide	Jurisdictional	FY16	Ongoing	T&SW
CSD-23	Increase enforcement of sweeping and maintenance of private roads and parking lots in targeted areas.	Refer to Minimum BMPs in JRMP (Appendix IX).	City-wide	Jurisdictional	FY16	Ongoing	T&SW
CSD-24	Increase identification and enforcement of actionable erosion and slope stabilization issues on private property and require stabilization and repair.	Eroding and unstable slope areas on private property (excluding construction sites) will be identified as potential sediment loading sources and subject to enforcement. In the short term, this will target enhanced inspection and enforcement programs to ensure inspectors address erosion and slope instability for the purpose of education.	City-wide	Jurisdictional	FY16	Ongoing	T&SW
Additional Nonstructural Strategies							
CSD-25	Conduct a Comprehensive Benefits Analysis to identify benefits other than water quality that are applicable to each of the specific WQIP strategies.	The analysis identifies which other benefits apply to each strategy, and documents the assumptions making those linkages. The delineation of other benefits to strategies includes a general description of each benefit, and a listing of the assumptions that were made to link those benefits to strategies. In addition, the other benefits are characterized with respect to who is directly affected: the city, local residents, local businesses, or visitors. This analysis may be used as part of the adaptive management process to modify future strategies.	City-wide	Jurisdictional	FY15	One time	T&SW

**Table I-5. City of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
CSD-26	Address and clean up trash from transient encampments with collaboration from the Homeless Outreach Team.	Coordinate with the Homeless Outreach Team to respond to transient encampment trash complaints.	City-wide	Jurisdictional	FY16	Ongoing	T&SW with Police, ESD, Urban Corps, Alpha Project
CSD-27	Continue participating in source reduction initiatives.	Source reduction initiatives are ultimately the most effective measure to remove pollutants from surface waters, where feasible. Bans or progressive phase-outs that may be considered include: leaf blowers, plastic bags, architectural copper (generally a legacy issue), as well as prohibiting or more aggressively regulating vehicle washing. Additional source reduction initiatives to consider include pesticide sales at hardware stores and irrigation supply stores.	City-wide	Jurisdictional	Prior to FY16	Ongoing	T&SW
CSD-27.1	Coordinate with Fleet Services to replace City-owned vehicle brake pads with copper-free brake pads as they become commercially available.	Consider legislative mandate and cooperative implementation of copper-free brake pads on city-owned vehicle to reduce pollutant deposition.	City-wide	Jurisdictional	FY18	Ongoing	T&SW, ESD with PWD (Fleet Services)
CSD-27.2	Develop and implement a Zinc Reduction Program.	Develop and implement zinc reduction program. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, and 3) staff resources are identified and secured.	Chollas Watershed	Optional	FY17	2 years (FY17-FY18)	TBD
CSD-27.3	Develop and implement targeted roof replacement incentive program for Chollas Creek Watershed.	If determined feasible and effective upon completion of development of Zinc Reduction Program, rebates or other incentive programs to replace metal roofs will be considered. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, and 3) staff resources are identified and secured.	Chollas Watershed	Optional	Optional	TBD	TBD
CSD-28	Proactively monitor for erosion, and complete minor repair and slope stabilization on municipal property.	Actively identify and repair eroding slopes that may be contributing to sediment loading. Prepare an inventory and assessment of eroding areas and their risk to surface waters. Follow assessment with a schedule for ongoing inspection and stabilization (potentially based on a number or percentage of sites annually). Consider Caltrans program as a template.	City-wide	Jurisdictional	FY16	Ongoing	T&SW

**Table I-5. City of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
CSD-29	Conduct special studies.	Special studies will be conducted to gather data to identify pollutant sources, appropriate targets, or other information. Includes collaboration with universities.	City-wide	Jurisdictional	FY16	Ongoing	T&SW
CSD-29.1	Participate in Reference Watershed Study.	The San Diego Regional Reference Stream Study (currently being conducted by the Southern California Coastal Water Research Project). The study will develop numeric targets that account for “natural sources” to establish the concentrations or loads from streams in a minimally disturbed or “reference” condition. Refer to Section 5.1 for further details.	Region-wide	Jurisdictional	Prior to FY16	One time	T&SW, SCCWRP, Regional copermittees
CSD-29.2	Conduct a Cost of Service Study.	Conduct a Cost of Service Study that will examine the full cost of flood control and storm water strategies needed to comply with storm water regulations for the City of San Diego. The City of San Diego’s Watershed Asset Management Plan will be used as the basis for the study.	City-wide	Jurisdictional	FY16	One time	TBD
CSD-30	Conduct Sustainable Return on Investment (SROI) analysis to estimate strategies’ co-benefits and impacts to the public and the private sector on a common scale.	SROI is an economics-based framework for evaluating quantitative and qualitative performance metrics and monetizing them, if possible, along a triple bottom line (i.e. financial, societal, and environmental). This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, 4) partners have been identified and formal MOUs have been developed, and 5) consensus and community support has been achieved.	City-wide	Optional	Optional	TBD	T&SW and public participation

Table I-5. City of San Diego
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
CSD-31	Collaborate with the County, if a County-led regional social services effort is established, to provide sanitation and trash management for individuals experiencing homelessness and determine if the program is suitable and appropriate for jurisdictional needs to meet goals.	Support a non-profit or consortium to provide sanitation services associated with hygiene as well as trash management for persons experiencing homelessness. Rented or purchased shower/sanitary trailers providing mobile showers may be organized at specifically scheduled locations and times. This provision has been proposed as a method for preventing surface water usage for sanitation and bathing, as well as opportunity for outreach and referral by social service agencies. The trash management services will include providing trash bags, trash collection areas, and shower/sanitary facilities at centers which provide daytime shelter to their clients, or on a mobile-basis for known transit camps. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, 4) partners have been identified and formal MOUs have been developed, and 5) consensus and community support has been achieved.	City-wide	Optional	Optional	TBD	T&SW
CSD-32	Participate in an assessment to determine if implementation of an urban tree canopy (UTC) program would benefit water quality and other City goals, where feasible.	Perform a feasibility study to determine if implementing an UTC program would be beneficial to the City's goals. UTC intercepts rainfall through increased coverage of leaves, branches, and stems and reduces runoff from the storm drainage system. Benefits associated with enhancing an UTC include reducing heat island effects and air pollution in addition to aesthetics and community benefits. Where feasible, native trees will be utilized to prevent invasive trees from migrating to open spaces and to conserve water. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, and 3) staff resources are identified and secured.	City-wide	Optional	Optional	TBD	Planning Dept. with T&SW, SANDAG, and Nature Conservancy

Table I-5. City of San Diego
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
CSD-33	Conduct a feasibility study to test Permeable Friction Course (PFC), a porous asphalt that overlays impermeable asphalt.	Perform an assessment to determine the feasibility of implementing PFC on City streets. PFC, an overlay of porous asphalt, is an innovative roadway material that improves driving conditions in wet weather and water quality. Placed in a layer 25-50mm thick on top of regular impermeable pavement, PFC allows rainfall to drain within the porous layer rather than on top of the pavement. PFC has also been shown to reduce concentrations of pollutants commonly observed in highway runoff. PFC incorporates stormwater treatment into the roadway surface and does not require additional right-of-way. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, and 3) staff resources are identified and secured.	City-wide	Optional	Optional	One time	T&SW with DSD, PWD, BIA, NGOs, Copermittees, and Engineering Community
CSD-34	As opportunities arise and funding sources are identified, protect areas that are functioning naturally by avoiding impervious development and degradation on unpaved open space areas, creating permanent open space protections on undeveloped city-owned land, and accepting privately-owned undeveloped open areas.	This strategy may be implemented if there is interest in participation by the public or private entity with current control of the land. Conditions to be met also include 1) identification of partners, if needed (public, private, non-profit), 2) identification of costs and potential sources of funding, 3) final agreement by public or private entity with current control of the land, 4) final agreement by all other participating partners including acceptance by intended land- or asset-owning City department, and 5) funding in place.	City-wide	Optional	Optional	TBD	TBD
CSD-35	Participate in a watershed council or group if one is established.	This strategy may be triggered as 1) partners have been identified and formal MOUs have been developed and 2) consensus and community support has been achieved.	City-wide	Optional	Optional	TBD	TBD
CSD-36	Prohibit introduction of invasive plants in new development and redevelopment projects.	Coordinate with the City's Development Services Department to continue to prohibit introduction of invasive species such as Arundo donax and Cortaderia selloana for new development or redevelopment projects as specified in the City's municipal code for landscape.	City-wide	Jurisdictional	Prior to FY16	Ongoing	T&SW with DSD
Green Infrastructure							
CSD-37	North 252 Corridor Park Phase I (Dorothy Petway Park) - Project ID 1002	2 vegetated filter strips and one vegetated swale was implemented at I-5 and Rigel Street.	Chollas Watershed	Jurisdictional	Prior to FY16	Ongoing	T&SW with PWD

**Table I-5. City of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
CSD-38	43rd and Logan Roadway Improvement - Project ID 1387 (bioretention to treat a drainage area of 0.73 acre)	The City has implemented a bioretention BMP on the northeast corner of the intersection of 43rd and Logan Avenue to treat storm water runoff from the northerly half of Logan Avenue from Dominion Street to 43rd Street (drainage area of about 0.73 acre). In addition, there are three sets of curbside filters installed along the southeast corner of 43rd Street and Logan Avenue. Storm water from Logan Avenue flows through a curb opening into a pretreatment device to filter out gross solids and some sediment, and then flows into 12 filtration units connected in series. The curbside filtration units treat 5.76 acres (See Proprietary BMP Strategies). The City has received grant funding to conduct BMP effectiveness monitoring for hydrologic performance and pollutant removal over a two-year period.	Chollas Watershed	Jurisdictional	FY14	Ongoing	T&SW with PWD
CSD-39	Green lot in Southcrest Park.	Green lot on Newton Ave. west of 43rd to treat a drainage area of 36 acres.	Chollas Watershed	Jurisdictional	Prior to FY16	Ongoing	T&SW with PWD
CSD-40	Central Region Public Health Center replacement of impervious pavement with rubberized porous asphalt.	Central Region Public Health Center replaced 6,250 ft^2 of impervious pavement with rubberized porous asphalt.	Chollas Watershed	Jurisdictional	Prior to FY16	Ongoing	T&SW with PWD
CSD-41	Southeast Family Resource Center bio-filtration planters	Southeast Family Resource Center constructed four bio-filtration planters in the parking lot and adjacent to the building to filter runoff from the roof and parking surface. They also installed porous pavers at the entrance and exit of the parking lot.	Chollas Watershed	Jurisdictional	Prior to FY16	Ongoing	T&SW with PWD
CSD-42	10.31 acres of bioretention have been identified as potential opportunities for green infrastructure implementation on public parcels to treat an impervious drainage area of 298.12 acres with a total storage volume with 13.56 acre-feet.	Staggered construction, operation, and maintenance of 10.31 acres of bioretention to treat an impervious drainage area of 298.12 acres with a total storage volume of 13.56 acre-feet.	Chollas Watershed	Jurisdictional	FY18	Ongoing	T&SW with PWD
Green Streets							
CSD-43	Beta Street	Operation and maintenance of a 0.063 acre (footprint) green street project at Beta Street and 37th to treat a drainage area of 2.1 acres.	Chollas Watershed	Jurisdictional	FY17	Ongoing	T&SW with PWD
CSD-44	25.52 acres of green streets (12.76 acres of bioretention and 12.76 acres of permeable pavement) have been identified as potential opportunities for green street projects to treat a total drainage area of 7,260.34 acres with a total storage volume of 39.66 acre-feet.	Staggered construction, operation and maintenance of 25.52 acres of green streets (12.76 acres of bioretention and 12.76 acres of permeable pavement) to treat a total drainage area of 7,260.34 acres with a total storage volume of 39.66 acre-feet.	Chollas Watershed	Jurisdictional	FY18	Ongoing	T&SW

**Table I-5. City of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
Multiuse Treatment Areas							
Infiltration and Detention Basins							
CSD-45	A dry extended detention basin can be implemented at the Park De La Cruz and Cherokee Point Elementary School site upon detailed site assessment.	Construction, operation and maintenance of a 1.5 acre (footprint) dry extended detention basin to treat a total drainage area of 81 acres (on 5.5 acres of available space, APN 3094130100). Location intersection is Wightman Street and 38th Street.	Chollas Watershed	Jurisdictional	FY18	Ongoing	T&SW with PWD
CSD-46	A subsurface detention basin at Joyner Elementary School can be implemented upon detailed site assessment.	Construction, operation and maintenance of a 1.1 acre (footprint) subsurface detention gallery to treat a total drainage area of 87 acres (on 3.3 acres of available space, APN 4760923000). Location intersection is Myrtle Avenue and 43rd street. Subsurface detention basins would be designed and constructed per all applicable City safety codes and standards.	Chollas Watershed	Jurisdictional	FY18	Ongoing	T&SW with PWD
CSD-47	A subsurface detention basin at Euclid Elementary School can be implemented upon detailed site assessment.	Construction, operation and maintenance of a 0.9 acre (footprint) subsurface detention gallery to treat a total drainage area of 77 acres (on 1.6 acres of available space, APN 4714023000). Location intersection is Orange Avenue and Euclid Avenue. Subsurface detention basins would be designed and constructed per all applicable City safety codes and standards.	Chollas Watershed	Jurisdictional	FY18	Ongoing	T&SW with PWD
CSD-48	A subsurface detention basin at Ibarra Elementary School can be implemented upon detailed site assessment.	Construction, operation and maintenance of a 1.4 acre (footprint) subsurface detention gallery to treat a total drainage area of 108 acres (on 4.0 acres of available space, APN 4714222800). Location intersection is Orange Avenue and Winona Avenue. Subsurface detention basins would be designed and constructed per all applicable City safety codes and standards.	Chollas Watershed	Jurisdictional	FY18	Ongoing	T&SW with PWD
CSD-49	A subsurface detention basin at Alba Middle/High School can be implemented upon detailed site assessment.	Construction, operation and maintenance of a 0.8 acre (footprint) subsurface detention gallery to treat a total drainage area of 62 acres (on 7.0 acres of available space, APN 4721302700). Location intersection is Trojan Avenue and 56th Street. Subsurface detention basins would be designed and constructed per all applicable City safety codes and standards.	Chollas Watershed	Jurisdictional	FY18	Ongoing	T&SW with PWD

Table I-5. City of San Diego
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
CSD-50	A subsurface detention basin at Clay Park can be implemented upon detailed site assessment.	Construction, operation and maintenance of a 0.5 acre (footprint) subsurface detention gallery to treat a total drainage area of 26 acres (on 6.0 acres of available space, APN 4674900400). Location intersection is Solita Avenue and Seminole Drive. Subsurface detention basins would be designed and constructed per all applicable City safety codes and standards.	Chollas Watershed	Jurisdictional	FY18	Ongoing	T&SW with PWD
CSD-51	Memorial Park: An infiltration basin has been constructed from the parking on the west side of Memorial Park to treat a drainage area of 1.4 acres.	A 0.10 acre infiltration basin has been constructed to treat runoff from the parking on the west side of Memorial Park that has been diverted from the existing storm drain system (drainage area of 1.4 acres). Before entering the basin, the runoff passes through a hydrodynamic separator that removes pollutants that settle out or float. Runoff then enters the basin where it infiltrates into the underlying soils. Runoff in excess of the 5-year storm bypasses the BMP via an overflow pipe and returns to the regular storm drain system.	Chollas Watershed	Jurisdictional	FY14	Ongoing	T&SW with PWD
CSD-52	Memorial Skateboard Park- Addition of detention vault to treat a drainage area of 0.69 acre.	A subsurface detention vault is proposed to be installed in line with the existing 12-inch PVC pipe to capture the runoff generated by the 85th percentile storm. Detained runoff is proposed to be reused to irrigate the athletic fields at Memorial Park. Runoff volume in excess of the detention vault capacity is proposed to overflow into an adjacent subsurface infiltration gallery for additional volume reduction and treatment. This project was initially constructed prior to the 2007 Municipal Storm Water Permit, so implementation of the BMP retrofit recommendations exceeds applicable treatment requirements by treating runoff from 0.69 acre of impervious surface to the 85th percentile storm.	Chollas Watershed	Jurisdictional	FY15	Ongoing	T&SW with PWD
CSD-53	If interim load reduction goals are not met and additional multiuse treatment areas are required, an infiltration basin(s) may be considered on publicly owned open spaces in canyon areas on a case-by-case basis when no other opportunities for load reductions exist.	Construction, operation, and maintenance of infiltration basin(s) in canyon areas. Nine potential canyon sites, owned by City of San Diego, have been identified in Chollas watershed that provide up to 30 acres of available space (83 total parcel acreage). This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, 4) partners have been identified and formal MOUs have been developed, and 5) permits required by regulatory agencies are secured.	Chollas Watershed	Optional	Optional	Ongoing	T&SW with PWD

Table I-5. City of San Diego
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
<i>Stream, Channel and Habitat Rehabilitation Projects</i>							
CSD-54	If interim load reduction goals are not met and additional stream, channel, and habitat rehabilitation projects are required, implement as needed.	This strategy may be triggered as 1) funding to address MS4 discharges is identified and secured, 2) staff resources are identified and secured, 3) partners have been identified and formal MOUs have been developed, 4) permits required by regulatory agencies are secured, and 5) recommendations from the community are identified and consensus and community support has been achieved.	Areas identified during feasibility studies	Optional	Optional	TBD	T&SW
<i>Water Quality Improvement BMPs</i>							
<i>Proprietary BMPs</i>							
CSD-55	43rd and Logan Roadway Improvement - Project ID 1387 (filtration units treat 5.76 acres)	Three curbside filtration units were installed along S 43rd street and Logan Avenue. The curbside filtration units treat a total of 5.76 acres. A bioretention BMP is also implemented on this site (See MUTA strategies).	Chollas (Along S 43rd street between Logan Avenue and Keeler Avenue)	Jurisdictional	FY14	Ongoing	T&SW with PWD
CSD-56	N Chollas Community Park Phase 1B - Project ID 855	4 drainage inserts were installed in Chollas Lake Park near College Grove Drive and Caminito Chollas.	Chollas Lake Park	Jurisdictional	Prior to FY14	Ongoing	T&SW with PWD
CSD-57	Lisbon Street Roadway and Utility Improvements - Project ID 858	2 drainage inserts were installed at Imperial Avenue and Lisbon Street.	Chollas (Imperial Avenue and Lison Street)	Jurisdictional	Prior to FY14	Ongoing	T&SW with PWD
CSD-58	Fire Station #12 - Project ID 989	1 downspout filter and 10 drainage inserts were installed at Willie James Jones Avenue and Imperial Avenue.	Chollas (Willie James Jones Avenue and Imperial Avenue)	Jurisdictional	Prior to FY14	Ongoing	T&SW with PWD
CSD-59	Rigel St Bridge Replacement - Project ID 1008	5 drainage inserts were installed at Rigel Street and Main Street.	Chollas (Rigel Street and Main Street)	Jurisdictional	Prior to FY14	Ongoing	T&SW with PWD

Table I-5. City of San Diego
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach	Location	Jurisdictional or Optional	Implementation or Construction Year Start	Frequency of Implementation	Responsible City Department and Other Collaborating Departments or Agencies
Dry Weather Flow Separation and Treatment Projects							
CSD-60	If interim load reduction goals are not met and additional dry weather flow separation and treatment projects are required, implement as needed.	Construction of dry weather flow separation and treatment projects, where identified. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) permits required by regulatory agencies are secured.	Downstream reaches where persistent dry weather flows have been observed	Optional	Optional	TBD	T&SW with PWD
Trash Segregation							
CSD-61	If interim load reduction goals are not met and additional trash segregation projects are required, implement as needed.	Construction of trash segregation (Trash Guards, etc.) projects, where identified. This strategy may be triggered as 1) interim goals are not met, 2) funding to address MS4 discharges is identified and secured, 3) staff resources are identified and secured, and 4) permits required by regulatory agencies are secured.	High-loading areas city-wide	Optional	Optional	TBD	T&SW with PWD

Notes: DSD= Development Services Department; PUD = Public Utilities Department; PWD = Public Works Department; T&SW = Transportation and Storm Water Division; WAMP = Watershed Asset Management Plan; “Refer to Section X” will be updated upon submittal of the City’s JRMP in June 2015; TBD = will be determined during the next fiscal year.

Table I-6. City of San Diego Annual Schedule

Construction																				
Ongoing Implementation/ O&M																				
As needed/Design																				
SDB ID	Strategy	Location	Implementation or Construction Year Start	FY 15 and Earlier	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31
Jurisdictional Strategies																				
Development Planning																				
All Development Projects																				
CSD-1	Establish guidelines and standards for all development projects; provide technical support related to implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area or implement easements to protect water quality, where applicable and feasible. Includes internal coordination and collaboration between City departments (DSD, PWD, and Engineering) to improve success and long-term benefits of BMPs.	City-wide	Prior to FY16	Ongoing																
CSD-1.1	Investigate and research emerging technology.	City-wide	Prior to FY16	As Needed																
CSD-1.2	Approve and implement a green infrastructure policy.	City-wide	FY16 (Begin)	As Needed																
CSD-1.3	Develop Design Standards for Public LID BMPs.	City-wide	FY14-FY15	As Needed																
CSD-1.4	Provide outreach to impacted industry regarding minimum BMP requirement updates.	City-wide	FY15	As Needed																
CSD-2	Train staff on LID regulatory changes and LID practices.	City-wide	FY16		As Needed															
CSD-3	Amend municipal code and ordinances, including zoning ordinances, to facilitate and encourage LID opportunities to support compliance with the MS4 Permit and TMDLs in a reasonable manner. Ensure consistency with the City of San Diego's BMP Design Manual. Update the Storm Water Standards Manual accordingly.	City-wide	FY15	As Needed																
CSD-4	Create a manual that outlines right-of-way design standards.	City-wide	FY15	One time																
CSD-5	Provide technical education and outreach to the development community on the design and implementation requirements of the MS4 Permit and Water Quality Improvement Plan requirements.	City-wide	Prior to FY16	Ongoing																

Table I-6. City of San Diego Annual Schedule (continued)

Construction																					
Ongoing Implementation/ O&M																					
As needed/Design																					
SDB ID	Strategy	Location	Implementation or Construction Year Start	FY 15 and Earlier	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31	
Priority Development Projects (PDPs)																					
CSD-6	For PDPs, provide technical support to other City departments to ensure implementation of on-site structural BMPs to control pollutants and manage hydromodification by developing City wide storm water development standards and design guidelines.	City-wide	FY16		Ongoing																
CSD-6.1	Institute a program to verify and enforce maintenance and performance of treatment control BMPs.	City-wide	FY16		Ongoing																
CSD-7	Update BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	City-wide	FY15	Cycle																	
CSD-7.1	Amend BMP Design Manual for trash areas. Require full four-sided enclosure, siting away from storm drains and cover. Consider the retrofit requirement.	City-wide	FY15	One time																	
CSD-7.2	Amend BMP Design Manual for animal-related facilities, such as such as animal shelters, "doggie day care" facilities, veterinary clinics, breeding, boarding and training facilities, groomers, and pet care stores.	City-wide	FY15	One time																	
CSD-7.3	Amend BMP Design Manual for nurseries and garden centers.	City-wide	FY15	One time																	
CSD-7.4	Amend BMP Design Manual for auto-related uses.	City-wide	FY15	One time																	
CSD-8	Develop and administer an alternative compliance program for on-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects). Refer to Section 4.2.5.	City-wide	FY15	Ongoing																	
CSD-8.1	Create a fund that allows habitat acquisition, protection enhancement, and restoration in conjunction with other cooperating entities including community groups, academic institutions, state county, and federal agencies, etc.	City-wide	Optional	If triggered, begin planning, acquiring funding and resources																	

Table I-6. City of San Diego Annual Schedule (continued)

Construction																					
Ongoing Implementation/ O&M																					
As needed/Design																					
SDB ID	Strategy	Location	Implementation or Construction Year Start	FY 15 and Earlier	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31	
Construction Management																					
CSD-9	Coordinate with other City departments to promote and confirm a thorough understanding of requirements for implementing temporary BMPs that control sediment and other pollutants during the construction phase of projects. Included in that understanding are requirements to inspect at appropriate frequencies and effectively enforce requirements through process controlled by other City departments.	City-wide	FY16		Ongoing																
Existing Development																					
Commercial, Industrial, Municipal, and Residential Facilities and Areas																					
CSD-10	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	City-wide	FY16		Ongoing																
CSD-10.1	Update minimum BMPs for existing residential, commercial, and industrial development. Specific updates to BMPs include required street sweeping, catch basin cleaning, and maintenance of private roads and parking lots in targeted areas.	City-wide	FY15	Cycle																	
CSD-10.2	Outreach to property managers and trash haulers to elevate the emphasis of power washing as a pollutant source.	City-wide Residential, commercial and industrial areas	FY15	Ongoing																	
CSD-10.3	Implement property based inspections.	City-wide	Prior to FY16	Ongoing																	
CSD-10.4	Review policies and procedures to ensure discharges from swimming pools meet permit requirements.	City-wide	FY15	As Needed																	
CSD-11	Promote and encourage implementation of designated BMPs for residential and non-residential areas.	City-wide Residential and Commercial Areas	Prior to FY16	Ongoing																	
CSD-11.1	Residential and Commercial BMP: Rain Barrel	City-wide Residential Areas	Prior to FY16	Ongoing																	

Table I-6. City of San Diego Annual Schedule (continued)

Construction																				
Ongoing Implementation/ O&M																				
As needed/Design																				
SDB ID	Strategy	Location	Implementation or Construction Year Start	FY 15 and Earlier	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31
CSD-11.2	Residential and Commercial BMP: Grass Replacement	City-wide Residential and Commercial Areas	Prior to FY16	Ongoing																
CSD-11.3	Residential and Commercial BMP: Downspout Disconnect	City-wide Residential and Commercial Areas	FY16		Ongoing															
CSD-11.4	Residential and Commercial BMP: Micro-irrigation	City-wide Residential Areas	Prior to FY16	Ongoing																
CSD-11.5	Provide Onsite Water Conservation Surveys.	City-wide Residential and Commercial Areas	Prior to FY16	Ongoing																
MS4 Infrastructure																				
CSD-12	Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, channels as allowed by resource agencies, detention basins, pump stations, etc.) for water quality improvement and for flood control risk management.	City-wide	FY16		Ongoing															
CSD-12.1	Enhance catch basin cleaning to increase pollutant removal (up to 4 times per year) in the rainy season.	Chollas: High priority areas identified in pilot study	FY16		Ongoing															
CSD-12.2	Increase frequency of catch basin inspection and as-needed.	Chollas (48 open channel segments)	FY13																	
CSD-12.3	Proactively repair and replace MS4 components to provide source control from MS4 infrastructure.	City-wide	FY16		Ongoing															
CSD-12.4	Replace of hard assets.	City-wide	FY16		Ongoing															
CSD-13	Coordinate with other City departments (PUD) to implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	City-wide	FY16		Ongoing															

Table I-6. City of San Diego Annual Schedule (continued)

Construction																				
Ongoing Implementation/ O&M																				
As needed/Design																				
SDB ID	Strategy	Location	Implementation or Construction Year Start	FY 15 and Earlier	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31
CSD-13.1	Identify sewer leaks and areas for sewer pipe replacement prioritization.	City-wide	FY16		As Needed															
Roads, Street, and Parking Lots																				
CSD-14	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways.	City-wide	FY16		Ongoing															
CSD-14.1	Provide outreach to street sweeping enhancement-targeted areas.	Chollas Watershed	FY16		Ongoing															
CSD-14.2	Enhance street sweeping through equipment replacement (replace mechanical sweepers with regenerative air sweepers) and route optimization (sweep all routes twice per month) in targeted areas.	Chollas Watershed	FY17			Ongoing														
CSD-14.3	Initiate sweeping of medians on high-volume arterial roadways.	City-wide	FY17			Ongoing														
CSD-14.4	Implement additional street sweeping (Settlement Agreement).	Chollas Watershed	FY13																	
Pesticide, Herbicides, and Fertilizer BMP Program																				
CSD-15	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	City-wide	FY16		Ongoing															
Retrofit and Rehabilitation in Areas of Existing Development																				
CSD-16	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	City-wide	TBD																	
CSD-17	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	City-wide	TBD																	
Illicit Discharge, Detection, and Elimination (IDDE) Program																				
CSD-18	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include: maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	City-wide	Prior to FY16	Ongoing																
Public Education and Participation																				

Table I-6. City of San Diego Annual Schedule (continued)

Construction																				
Ongoing Implementation/ O&M																				
As needed/Design																				
SDB ID	Strategy	Location	Implementation or Construction Year Start	FY 15 and Earlier	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31
CSD-19	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	City-wide	Prior to FY16	Ongoing																
CSD-19.1	Continue implementation of a Pet Waste Program.	City-wide	Prior to FY16	Ongoing																
CSD-19.2	Promote and encourage implementation of designated BMPs in commercial and industrial areas.	City-wide Non-residential Areas	Prior to FY16	Ongoing																
CSD-19.3	Expand outreach to homeowners' association (HOA) common lands and HOA incentives.	City-wide	FY16		Ongoing															
CSD-19.4	Develop an outreach and training program for property managers responsible for HOAs and maintenance districts.	City-wide	FY16		Ongoing															
CSD-19.5	Enhance and expand trash cleanups through community-based organizations involving target audiences.	City-wide	FY16		Ongoing															
CSD-19.6	Provide trash mitigation in the western portion of the Otay River HU.	Otay River HU	Prior to FY16	Ongoing																
CSD-19.7	Improve consistency and content of websites to highlight enforceable conditions and reporting methods.	City-wide	Prior to FY16	Ongoing																
CSD-19.8	Enhance school and recreation-based education and outreach.	City-wide	FY15	Ongoing																
CSD-19.9	Develop education and outreach to reduce irrigation runoff.	City-wide	Prior to FY16	Ongoing																
CSD-19.10	Develop regional training for water-using mobile businesses.	City-wide	FY16		Ongoing															
CSD-19.11	Enhance education and outreach based on results of effectiveness survey and changing regulatory requirements.	City-wide	FY16		Ongoing															
CSD-19.12	Continue to promote and encourage implementation of Integrated Pest Management (IPM) for residents and businesses.	City-wide	Prior to FY16	Ongoing																
Enforcement Response Plan																				
CSD-20	Continue to implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Storm Water Code Enforcement Unit's Standard Operating Procedures (SOPs) - Enforcement Response Plan.	City-wide	Prior to FY16	Ongoing																
CSD-20.1	Increase enforcement of irrigation runoff.	City-wide	FY16		Ongoing															
CSD-20.2	Increase enforcement of water-using mobile businesses.	City-wide	FY16		Ongoing															

Table I-6. City of San Diego Annual Schedule (continued)

Construction																				
Ongoing Implementation/ O&M																				
As needed/Design																				
SDB ID	Strategy	Location	Implementation or Construction Year Start	FY 15 and Earlier	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31
CSD-21	Increase enforcement of all minimum BMPs for existing residential, commercial, and industrial development.	City-wide	FY16		As needed															
CSD-22	Increase enforcement associated with property-based inspections.	City-wide	FY16		Ongoing															
CSD-23	Increase enforcement of sweeping and maintenance of private roads and parking lots in targeted areas.	City-wide	FY16		Ongoing															
CSD-24	Increase identification and enforcement of actionable erosion and slope stabilization issues on private property and require stabilization and repair.	City-wide	FY16		Ongoing															
Additional Nonstructural Strategies																				
CSD-25	Conduct a Comprehensive Benefits Analysis to identify benefits other than water quality that are applicable to each of the specific WQIP strategies.	City-wide	FY15	One time																
CSD-26	Address and clean up trash from transient encampments with collaboration from the Homeless Outreach Team.	City-wide	FY16		Ongoing															
CSD-27	Continue participating in source reduction initiatives.	City-wide	Prior to FY16	Ongoing																
CSD-27.1	Coordinate with Fleet Services to replace City-owned vehicle brake pads with copper-free brake pads as they become commercially available.	City-wide	FY18				Ongoing													
CSD-27.2	Develop and implement a Zinc Reduction Program.	Chollas Watershed	FY17	If triggered, begin planning, acquiring funding and resources																
CSD-27.3	Develop and implement targeted roof replacement incentive program for Chollas Creek Watershed.	Chollas Watershed	Optional	If triggered, begin planning, acquiring funding and resources																
CSD-28	Proactively monitor for erosion, and complete minor repair and slope stabilization on municipal property.	City-wide	FY16		Ongoing															
CSD-29	Conduct special studies.	City-wide	FY16		Ongoing															
CSD-29.1	Participate in Reference Watershed Study.	Region-wide	Prior to FY16	One time																
CSD-29.2	Conduct a Cost of Service Study.	City-wide	FY16		One time															
CSD-30	Conduct Sustainable Return on Investment (SROI) analysis to estimate strategies' co-benefits and impacts to the public and the private sector on a common scale.	City-wide	Optional	If triggered, begin planning, acquiring funding and resources																
CSD-31	Collaborate with the County, if a County-led regional social services effort is established, to provide sanitation and trash management for individuals experiencing homelessness and determine if the program is suitable and appropriate for jurisdictional needs to meet goals.	City-wide	Optional	If triggered, begin planning, acquiring funding and resources																

Table I-6. City of San Diego Annual Schedule (continued)

Construction																					
Ongoing Implementation/ O&M																					
As needed/Design																					
SDB ID	Strategy	Location	Implementation or Construction Year Start	FY 15 and Earlier	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31	
CSD-32	Participate in an assessment to determine if implementation of an urban tree canopy (UTC) program would benefit water quality and other City goals, where feasible.	City-wide	Optional	If triggered, begin planning, acquiring funding and resources																	
CSD-33	Conduct a feasibility study to test Permeable Friction Course (PFC), a porous asphalt that overlays impermeable asphalt.	City-wide	Optional	If triggered, begin planning, acquiring funding and resources																	
CSD-34	As opportunities arise and funding sources are identified, protect areas that are functioning naturally by avoiding impervious development and degradation on unpaved open space areas, creating permanent open space protections on undeveloped city-owned land, and accepting privately-owned undeveloped open areas.	City-wide	Optional	If triggered, begin planning, acquiring funding and resources																	
CSD-35	Participate in a watershed council or group if one is established.	City-wide	Optional	If triggered, begin planning, acquiring funding and resources																	
CSD-36	Prohibit introduction of invasive plants in new development and redevelopment projects.	City-wide	Prior to FY16	Ongoing																	
Green Infrastructure																					
CSD-37	North 252 Corridor Park Phase I (Dorothy Petway Park) - Project ID 1002	Chollas Watershed	Prior to FY16																		
CSD-38	43rd and Logan Roadway Improvement - Project ID 1387 (bioretention to treat a drainage area of 0.73 acre)	Chollas Watershed	FY14																		
CSD-39	Green lot in Southcrest Park.	Chollas Watershed	Prior to FY16																		
CSD-40	Central Region Public Health Center replacement of impervious pavement with rubberized porous asphalt.	Chollas Watershed	Prior to FY16																		
CSD-41	Southeast Family Resource Center bio-filtration planters	Chollas Watershed	Prior to FY16																		
CSD-42	10.31 acres of bioretention have been identified as potential opportunities for green infrastructure implementation on public parcels to treat an impervious drainage area of 298.12 acres with a total storage volume with 13.56 acre-feet.	Chollas Watershed	FY18																		
Green Streets																					
CSD-43	Beta Street	Chollas Watershed	FY17																		

Table I-6. City of San Diego Annual Schedule (continued)

Construction																					
Ongoing Implementation/ O&M																					
As needed/Design																					
SDB ID	Strategy	Location	Implementation or Construction Year Start	FY 15 and Earlier	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31	
CSD-44	25.52 acres of green streets (12.76 acres of bioretention and 12.76 acres of permeable pavement) have been identified as potential opportunities for green street projects to treat a total drainage area of 7,260.34 acres with a total storage volume of 39.66 acre-feet.	Chollas Watershed	FY18																		
Multiuse Treatment Areas																					
Infiltration and Detention Basins																					
CSD-45	A dry extended detention basin can be implemented at the Park De La Cruz and Cherokee Point Elementary School site upon detailed site assessment.	Chollas Watershed	FY18																		
CSD-46	A subsurface detention basin at Joyner Elementary School can be implemented upon detailed site assessment.	Chollas Watershed	FY18																		
CSD-47	A subsurface detention basin at Euclid Elementary School can be implemented upon detailed site assessment.	Chollas Watershed	FY18																		
CSD-48	A subsurface detention basin at Ibarra Elementary School can be implemented upon detailed site assessment.	Chollas Watershed	FY18																		
CSD-49	A subsurface detention basin at Alba Middle/High School can be implemented upon detailed site assessment.	Chollas Watershed	FY18																		
CSD-50	A subsurface detention basin at Clay Park can be implemented upon detailed site assessment.	Chollas Watershed	FY18																		
CSD-51	Memorial Park: An infiltration basin has been constructed from the parking on the west side of Memorial Park to treat a drainage area of 1.4 acres.	Chollas Watershed	FY14																		
CSD-52	Memorial Skateboard Park- Addition of detention vault to treat a drainage area of 0.69 acre.	Chollas Watershed	FY15																		
CSD-53	If interim load reduction goals are not met and additional multiuse treatment areas are required, an infiltration basin(s) may be considered on publicly owned open spaces in canyon areas on a case-by-case basis when no other opportunities for load reductions exist.	Chollas Watershed	Optional	If triggered, begin planning (acquire funding and resources, conduct site feasibility analysis and site selection) to implement multiuse treatment area projects.																	
Stream, Channel and Habitat Rehabilitation Projects																					
CSD-54	If interim load reduction goals are not met and additional stream, channel, and habitat rehabilitation projects are required, implement as needed.	Areas identified during feasibility studies	Optional	If triggered, begin planning (acquire funding and resources, conduct site feasibility analysis and site selection) to implement rehabilitation projects.																	

Table I-6. City of San Diego Annual
Schedule (continued)

Construction																					
Ongoing Implementation/ O&M																					
As needed/Design																					
SDB ID	Strategy	Location	Implementation or Construction Year Start	FY 15 and Earlier	FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31	
Water Quality Improvement BMPs																					
Proprietary BMPs																					
CSD-55	43rd and Logan Roadway Improvement - Project ID 1387 (filtration units treat 5.76 acres)	Chollas (Along S 43rd street between Logan Avenue and Keeler Avenue)	FY14																		
CSD-56	N Chollas Community Park Phase 1B - Project ID 855	Chollas Lake Park	Prior to FY14																		
CSD-57	Lisbon Street Roadway and Utility Improvements - Project ID 858	Chollas (Imperial Avenue and Lison Street)	Prior to FY14																		
CSD-58	Fire Station #12 - Project ID 989	Chollas (Willie James Jones Avenue and Imperial Avenue)	Prior to FY14																		
CSD-59	Rigel St Bridge Replacement - Project ID 1008	Chollas (Rigel Street and Main Street)	Prior to FY14																		
Dry Weather Flow Separation and Treatment Projects																					
CSD-60	If interim load reduction goals are not met and additional dry weather flow separation and treatment projects are required, implement as needed.	Downstream reaches where persistent dry weather flows have been observed	Optional	If triggered, begin planning (acquire funding and resources, conduct site feasibility analysis and site selection) to implement dry weather flow separation projects.																	
Trash Segregation																					
CSD-61	If interim load reduction goals are not met and additional trash segregation projects are required, implement as needed.	High-loading areas city-wide	Optional	If triggered, begin planning (acquire funding and resources, conduct site feasibility analysis and site selection) to implement trash segregation projects.																	

I.5 CITY OF CORONADO STRATEGIES

The City of Coronado (Coronado) is a small beach community located on an island connected to the mainland via a tombolo, the Silver Strand. Coronado has identified strategies to address the Focused Priority Condition for swimmable waters and implement jurisdictional programs citywide. Maintaining Coronado's streets, sanitary sewer system, storm drain system, and other infrastructure is a high priority for the City. All streets in Coronado are swept once a week, regardless of type. Special events are highly scrutinized, permitted, and conditioned, and Coronado provides extra trash receptacles and traffic control. Since 2005, all newly constructed municipal buildings have been certified LEED Silver. Coronado has also implemented permeable paving, downspout disconnects, and other BMPs on City projects. Coronado also coordinates with the Navy for beach cleanups on the Silver Strand. Strategies and implementation schedules, presented in Table I-7, were identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the WQIP is updated. The implementation of each strategy is contingent upon annual budget approvals and funding availability.

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Table I-7. City of Coronado
Jurisdictional Strategies

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
Jurisdictional Strategies								
Development Planning								
All Development Projects								
CO-1	Review projects for potential commercial sources of bacteria and require additional source control BMPs as applicable for persistent problem or high priority areas (e.g., covered trash enclosures).	Refer to JRMP Development Planning Section and BMP Design Manual.	City-wide	Jurisdictional	FY15-16	Ongoing		Community Development, Engineering, Public Services
CO-2	Include staff training to target identification of bacteria pollutant sources during development and building project permitting.	Staff training will be conducted, tailored to implementation tasks and job duties. Training will occur prior to implementation, within 3 months of the start of implementation, and annually thereafter.	City-wide	Jurisdictional	FY15-16	Annually		Community Development, Engineering, Public Services
CO-3	Require projects within the WQSA to implement LID and source control BMPs with focus on potential bacteria sources.	Refer to JRMP Development Planning Section and BMP Design Manual.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Community Development, Engineering, Public Services
Priority Development Projects (PDPs)								
CO-4	Include in the BMP Design Manual BMP requirements applicable to development projects that have a higher potential to contribute to the Priority Conditions (bacteria). See Table 3-4 in SD Bay WQIP for potential sources.	Refer to JRMP Development Planning Section and BMP Design Manual.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Community Development, Engineering, Public Services
	1. Amend BMP Design Manual for trash areas. Require full four-sided enclosure, away from storm drains.	Refer to JRMP Development Planning Section, BMP Design Manual, and Coronado Municipal Code.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Community Development, Engineering, Public Services
	2. Amend BMP Design Manual for animal-related facilities, such as such as animal shelters, "doggie day care" facilities, veterinary clinics, breeding, boarding and training facilities, groomers, and pet care stores.	Refer to JRMP Development Planning Section, BMP Design Manual, and Coronado Municipal Code.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Community Development, Engineering, Public Services
	3. Consider amendment to Coronado Municipal Code (CMC) to support additional requirements in the BMP Design Manual targeting Priority Conditions.	Refer to JRMP Development Planning Section and BMP Design Manual.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Community Development, Engineering, Public Services

Table I-7. City of Coronado
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
Construction Management								
CO-5	Implement program to identify and inspect bacteria source potential, and require construction projects within the WQSA to be identified as High Threat to water quality and implement appropriate BMPs.	Refer to JRMP Construction Management Section.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services, Engineering, Building
CO-6	Implement program to permit and inspect construction site use of Right-of-Way for debris and trash storage with appropriate BMPs.	Refer to JRMP Construction Management Section.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services, Engineering, Building
Existing Development								
Commercial and Residential Facilities and Areas								
CO-7	Implement and enforce property- and PGA-based inspections at increased frequency for identified and targeted high priority sources of bacteria (compared to minimum Permit requirements), as applicable.	Refer to JRMP Existing Development and Public Education and Participation Sections.	Tributary or Basin	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-8	Evaluate sweeping and maintenance of private roads and parking lots in targeted areas. Consider adding to City sweeping program.	Refer to JRMP Existing Development Section.	Otay River HU	Optional	FY15-16	Ongoing	TBD	Public Services
CO-9	Implement program to require retrofit of trash enclosures for persistent and problematic sources.	Refer to JRMP Existing Development and Planning Development Sections.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Community Development, Public Services
CO-10	Maintain existing pet waste program. Including installation and maintenance of pet waste bag dispensers and trash bins. May include signage and education, physical removal of pet waste, or enforcement.	Refer to JRMP Existing Development Section.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-11	Promote, as available, residential BMP (irrigation, rainwater harvesting, and turf conversion) program that may include a rebate programs in target areas.	Refer to JRMP Existing Development Section.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-12	Promote and collaborate with water agencies and other groups to encourage implementation of water conservation programs that improve water quality by reducing over-irrigation with smart products or turf replacement and capturing rain water in residential areas.	Refer to JRMP Existing Development Section.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services

Table I-7. City of Coronado
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
<i>Municipal Facilities and Areas</i>								
CO-13	Conduct enhanced beach maintenance activities to remove trash and debris, additional trash cans during peak periods, and replenish dog bag dispensers.	Refer to JRMP Existing Development Section - Municipal Facilities and Areas.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-14	Identify Focused Priority Conditions in municipal facilities and areas to identified specific BMPs to reduce sources (e.g., special events).	Refer to JRMP Existing Development Section - Municipal Facilities and Areas.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
<i>MS4 Infrastructure</i>								
CO-15	Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, diversion structures, etc.) for optimum water quality.	Refer to JRMP Existing Development Section - Municipal Facilities and Areas.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
	1. Perform MS4 inspection and cleaning at higher frequency for high debris areas.	Refer to JRMP Existing Development Section - Municipal Facilities and Areas.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
	2. Evaluate MS4 inspection and cleaning locations and adjust high frequency to target new/modified high debris areas.	Refer to JRMP Existing Development Section - Municipal Facilities and Areas.	City-wide	Jurisdictional	FY15-16	Annually	TBD	Public Services
	3. Proactively repair and replace MS4 components to maintain proper operation and function.	Refer to JRMP Existing Development Section - Municipal Facilities and Areas.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
	4. Proactively operate, maintain, repair and replace urban runoff diverters to sanitary sewer.	Refer to JRMP Existing Development Section - Municipal Facilities and Areas.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
	5. Proactively repair and replace corrugated metal pipe (CMP) MS4 components to provide source control from MS4 infrastructure.	Refer to JRMP Existing Development Section - Municipal Facilities and Areas.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-16	Implement operation and maintenance activities (inspection and cleaning) for Sanitary Sewer System and related structures for optimum operation.	Refer to JRMP Existing Development Section - Municipal Facilities and Areas.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-17	Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	Refer to JRMP Existing Development Section - Municipal Facilities and Areas.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-18	Identify sewer leaks and areas for sewer pipe replacement prioritization and timely repair.	Refer to JRMP Existing Development Section -Municipal Facilities and Areas.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services

Table I-7. City of Coronado
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
<i>Roads, Street, and Parking Lots</i>								
CO-19	Perform sweeping of high-volume streets at enhanced frequency.	Refer to JRMP Existing Development Section - Municipal Facilities and Areas.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-20	Implement street sweeping public education, temporary posting and towing as needed to accomplish sweeping goals.	Refer to JRMP Existing Development Section - Municipal Facilities and Areas.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-21	Implement maintenance of bike lanes by proactively monitoring for erosion and completing minor repair and slope stabilization.	Refer to JRMP Existing Development Section - Municipal Facilities and Areas.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
<i>Illicit Discharge, Detection, and Elimination (IDDE) Program</i>								
CO-22	Promote and maintain website to encourage residents to report potential illicit discharges or other storm water violations.	Refer to JRMP IDDE Program and Public Education and Participation Sections.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-23	Conduct inspections in targeted areas designated as high priority for IDDEs - follow-up with outreach/education. Enforcement as needed.	Refer to JRMP IDDE Program and Public Education and Participation Sections.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-24	Conduct "off-hours" inspections to identify and eliminate illicit discharges.	Refer to JRMP IDDE Program.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
<i>Public Education and Participation</i>								
CO-25	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Refer to JRMP Public Education and Participation Section.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-26	Develop an outreach and training program for property managers responsible for HOAs.	Refer to JRMP Public Education and Participation Section.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-27	Support trash cleanups through community-based organizations involving target audiences.	Refer to JRMP Public Education and Participation Section.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-28	Improve consistency and content of websites to highlight enforceable conditions and reporting methods.	Refer to JRMP Public Education and Participation Section.	Otay River HU	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-29	Target education toward activities and human behavior (e.g. signage) in parks and other public areas including trash reduction or other high impact behavior to habitat, wildlife, and water quality.	Refer to JRMP Public Education and Participation Section.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services

Table I-7. City of Coronado
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
CO-30	Engage with the Main Street Association to promote activities and good housekeeping practices.	Refer to JRMP Public Education and Participation Section.	Otay River HU	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-31	Collaborate with regional, watershed or subwatershed education and outreach efforts.	Refer to JRMP Public Education and Participation Section.	Otay River HU	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-32	Develop and/or distribute existing materials (from other sources) for education and outreach to reduce over-irrigation.	Refer to JRMP Public Education and Participation Section.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-33	Provide municipal staff training targeted to select groups based on job duties and activities with emphasis on Focused Priority Conditions.	Refer to JRMP Public Education and Participation Section.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services (Lead).
CO-34	Tailor education and outreach based on results of surveys.	Refer to JRMP Public Education and Participation Section.	City-wide	Optional	FY15-16	Ongoing	TBD	Public Services. Administration
CO-35	Provide technical education and outreach to the development community on the design and implementation requirements with an emphasis on Focused Priority Conditions.	Refer to JRMP Public Education and Participation Section.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services, Community Development, Engineering
Enforcement Response Plan								
CO-36	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	Refer to JRMP Enforcement Response Plan.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
	1. Increase enforcement of over-irrigation.	Refer to JRMP Enforcement Response Plan.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
	2. Focus locally on enforcement of water-using mobile businesses.	Refer to JRMP Enforcement Response Plan.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-37	Enforce minimum BMPs for existing residential and commercial development. Includes power washing at non-residential sites targeting Focused Priority Conditions.	Refer to JRMP Enforcement Response Plan.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services

Table I-7. City of Coronado
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
Additional Nonstructural Strategies								
CO-38	Address and clean up pollutants from homeless encampments through homeless outreach activities.	Refer to JRMP IDDE Section.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services
CO-39	Conduct special studies related to bacteria sources and reduction measures, as applicable.	Refer to JRMP Special Studies Section.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services, Engineering
	1. Conduct a reference watershed study.	Refer to JRMP Special Studies Section.	Otay River HU	Optional	FY15-16	Ongoing	Until study completion	Public Services, Engineering
	2. Evaluate Tidelands Park data and delisting.	Refer to JRMP Special Studies Section.	Outfall	Jurisdictional	FY15-16	Ongoing	TBD	Public Services, Engineering
	3. Evaluate Tidelands Park outfall drainage basin for sources of bacteria, IDDE (including over irrigation), animal waste (birds, pets).	Refer to JRMP Special Studies Section.	Outfall	Jurisdictional	FY15-16	Ongoing	TBD	Public Services, Engineering
	4. Evaluate drainage system including condition of MS4 pipes draining to Tidelands Park outfall.	Refer to JRMP Special Studies Section.	Outfall	Jurisdictional	FY15-16	Ongoing	TBD	Public Services, Engineering
	5. Develop work plan and/or revised strategies to address sources and conditions at Tidelands Park outfall based on finding (2-4 above).	Refer to JRMP Special Studies Section.	Outfall	Jurisdictional	FY15-16	Ongoing	TBD	Public Services, Engineering
	6. Collaborate with POSD to evaluate conditions in the drainage basin to Tidelands Park outfall.	Refer to JRMP Special Studies Section.	Outfall	Jurisdictional	FY15-16	Ongoing	TBD	Public Services, Engineering
	7. Evaluate data gaps and monitoring plan options for delisting of Tidelands Park.	Refer to JRMP Special Studies Section.	Outfall	Jurisdictional	FY15-16	Ongoing	TBD	Public Services, Engineering
CO-40	Collaborate with the Navy on water quality-related issues.	Refer to JRMP Special Studies Section.	Otay River HU	Jurisdictional	FY15-16	Ongoing	TBD	Public Services, Engineering
CO-41	Collaborate with the Caltrans on water quality-related issues.	Refer to JRMP Special Studies Section.	Otay River HU	Jurisdictional	FY15-16	Ongoing	TBD	Public Services, Engineering
CO-42	If invasive plant and pest removal is necessary in key locations, implement remedial measures.	Refer to JRMP Existing Development Section - Municipal Facilities and Areas.	City-wide	Jurisdictional	FY15-16	Ongoing	TBD	Public Services

I.6 COUNTY OF SAN DIEGO STRATEGIES

The County of San Diego's (County's) strategies, found in Table I-8, were chosen because they best suit the characteristics of its jurisdiction within the Chollas Creek HA. Potential dry weather flows are evaluated through inspection of MS4 outfalls and education and outreach. To treat potential runoff from County facilities, retrofit projects utilizing LID approaches in conjunction with drainage and parking improvements were completed at the Southeast Family Resource Center and Central Regional Public Health Center. In Chollas Creek, a compliance analysis using a watershed model was conducted to identify the strategies required to be implemented to meet final goals. The strategies and implementation schedules identified provide that numeric goals are met. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the compliance analysis is updated as needed to provide assurance that numeric goals are met.

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**Table I-8. County of San Diego
Jurisdictional Strategies**

SDB ID	Strategy	Program Type (see notes at bottom)	Permit Reference	Sources	Frequency	Schedule
<i>Jurisdictional Runoff Management Programs (JRMP) Strategies</i>						
<i>Illicit Discharge Detection & Elimination (IDDE) Program</i>						
COSD-1	Maintain MS4 Map to facilitate IDDE Program	Base	MS4 Permit, Section E.2.b(1)	N/A	Annually	FY15
COSD-2a	Use municipal personnel/contractors to identify and report IC/IDs	Base	MS4 Permit, Section E.2.b(2)	IC/IDs	Ongoing	Ongoing
	<i>Update focused training for County field staff</i>	Enhanced	-	All pollutants	Annually	FY16
COSD-2b	Collect effluent on the ground (EOG), sanitary sewer overflow (SSO) data	Base	MS4 Permit, Section E.2.b	OWTS/SSO	Ongoing	Ongoing
	<i>Address septic system failures where observed</i>	Base	-	Human sources	Ongoing	Ongoing
COSD-3	Maintain a hotline and email address for public reporting of potential Illicit Connection/Illegal Discharges (IC/IDs).	Base	MS4 Permit, Section E.2.b(3)	IC/IDs	Ongoing	Ongoing
	<i>Refer homeless issue complaints to Sheriff or appropriate jurisdictions</i>	Base	-	Human sources	Ongoing	Ongoing
	<i>Man a bilingual hotline answered by I Love a Clean San Diego"(ILACSD; live operator) with multiple avenues for online reporting</i>	Enhanced	-	IC/IDs	TBD / In development	FY16
	<i>Investigate the feasibility of developing a pilot program (including training) – volunteer surveillance program</i>	Optional	-	IC/IDs	Ongoing	FY16

**Table I-8. County of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Program Type (see notes at bottom)	Permit Reference	Sources	Frequency	Schedule
COSD-4	Implement practices and procedures to address spills that may discharge into MS4	Base	MS4 Permit, Section E.2.b(4)	IC/IDs	Ongoing	Ongoing
	<i>Coordinate spill response with responsible sewer agencies</i>	Base	-	SSOs	Ongoing	FY16
	<i>Implement septic system rebate program with availability of grant funding</i>	Optional	-	OWTS	Ongoing	FY16
	<i>Develop a pilot online septic system maintenance outreach program</i>	Optional; Committed	-	OWTS	Ongoing	Ongoing
COSD-5	Implement practices and procedures to prevent/limit infiltration of seepage from sanitary sewers	Base	MS4 Permit, Section E.2.b(5)	Sewer Infrastructure	Ongoing	Ongoing
COSD-6	Coordinate with upstream Copermittees and/or entities to prevent ID from upstream sources into the MS4	Base	MS4 Permit, Section E.2.b(6)	IC/IDs	Ongoing	Ongoing
COSD-7	Monitor MS4 outfalls for discharges of potential IC/IDs	Base	MS4 Permit, Section E.2.c	Persistent / transient flows	Annually	Ongoing
COSD-8	Develop and implement a strategy for investigating and addressing IC/IDs	Base	MS4 Permit, Section E.2.d	IC/IDs	One time	FY15
Development Planning						
COSD-9	All development projects: Implement or require implementation of source control Best Management Practices (BMPs) to minimize pollutant generation at each project and implement Low Impact Development (LID) BMPs to maintain or restore hydrology of the area, where applicable and feasible	Base	MS4 Permit, Section E.3.a	New and redevelopment	Ongoing	Ongoing

**Table I-8. County of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Program Type (see notes at bottom)	Permit Reference	Sources	Frequency	Schedule
COSD-10	Priority Development Projects (PDPs): In addition to requirement for all development projects, implement or require implementation of onsite structural BMPs to control pollutants and manage hydromodification for PDPs	Base	MS4 Permit, Sections E.3.b & E.3.c	New and redevelopment	Ongoing	Ongoing
COSD-11	Consider feasibility of developing an alternative compliance program to enable “offsite” compliance for new and redevelopment projects.	Optional	MS4 Permit, Section E.3.c(3)	New and redevelopment	In development	future
COSD-12	Update BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	Base	MS4 Permit, Section E.3.d	New and redevelopment	In development	FY16
	<i>Conduct BMP Manual Training – Internal</i>	Base	-	New and redevelopment	One time	FY16
	<i>Conduct BMP Manual Training – External</i>	Enhanced	-	New and redevelopment	One time	FY16
COSD-13	Implement a program that requires and confirms PDP structural BMPs are designed, constructed, and maintained to remove pollutants	Base	MS4 Permit, Section E.3.e	New and redevelopment	Ongoing	Ongoing

**Table I-8. County of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Program Type (see notes at bottom)	Permit Reference	Sources	Frequency	Schedule
COSD-14	Enforce legal authority established for all development projects to achieve compliance	Base	MS4 Permit, Section E.3.f	New and redevelopment	Ongoing	Ongoing
	<i>Update County ordinance related to land development; reference to updated BMP manual</i>	Base	-	New and redevelopment	One time	FY15
	<i>Investigate feasibility of developing a Green Streets Program</i>	Optional	-	All	TBD	TBD
Construction Management						
COSD-15	Maintain and update a watershed-based inventory of all construction projects issued a local permit that allows ground disturbance or soil disturbing activities.	Base	MS4 Permit, Section E.4.b(1)	Construction: waste management, portable toilets	Quarterly	FY16
COSD-16	Implement or require implementation of BMPs that are site specific, seasonally appropriate and construction phase appropriate. Includes inspections at an appropriate frequency and enforcement of requirements.	Base	MS4 Permit, Section E.4.c & E.4.d(1)	Construction: waste management, portable toilets	TBD/ In development	Ongoing
COSD-17	Enforce legal authority established for all its inventoried construction sites to achieve compliance.	Base	MS4 Permit, Section E.4.e	Construction: waste management, portable toilets	As necessary	Ongoing
	<i>Update county ordinance related to construction; reference to existing grading ordinance</i>	Base	-	Construction: waste management, portable toilets	One time	FY15

**Table I-8. County of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Program Type (see notes at bottom)	Permit Reference	Sources	Frequency	Schedule
COSD-18	Conduct internal training on Construction Management	Base	MS4 Permit, Section E.7.a(3)	Construction: waste management, portable toilets	Annually	Ongoing
Existing Development						
COSD-19	Maintain and update a watershed-based inventory of all existing development that may discharge a pollutant load to and from the MS4.	Base	MS4 Permit, Section E.5.a	ICMR	Annually	Ongoing
	<i>Make improvements to tracking watershed based inventories via consolidated database</i>	Optional Committed	-	ICMR	One time	FY16
COSD-20	Designate a minimum set of BMPs required for all existing development inventories, including special event venues. The designated minimum BMPs must be specific to facility or area types and pollutant generating activities, as appropriate.	Base	MS4 Permit, Section E.5.b	ICMR	One time	Ongoing
	<i>Create an Equestrian BMP Handbook</i>	Optional Committed	County Program	Equestrian land uses	One time	FY16
	<i>Develop Stormwater Quality Master Plans for Special Drainage Fee Areas</i>	Optional Committed	-	ICMR	Ongoing	Ongoing

**Table I-8. County of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Program Type (see notes at bottom)	Permit Reference	Sources	Frequency	Schedule
COSD-21	Require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types and pollutant generating activities, as appropriate.	Base	MS4 Permit, Section E.5.c	ICMR	Ongoing	Ongoing
	<i>Facilitate pet waste management in County Parks through outreach or bag dispensers</i>	Enhanced	-	Municipal parks	Ongoing	Ongoing
COSD-22	Operate and maintain (inspect and clean) MS4 and related structures (catch basins, storm drain inlets, detention basins, etc.)	Base	MS4 Permit, Section E.5.b(1)(c)(ii)	MS4	Annually	Ongoing
COSD-23	Operate and maintain (e.g., inspect, sweep) County maintained streets, unpaved roads, paved roads, and paved highways	Base	MS4 Permit, Section E.5.b(1)(c)(iii)	Transportation corridors	Per JRMP	Ongoing
COSD-24	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	Base	MS4 Permit, Section E.5.b(1)(d)	ICMR	Ongoing	Ongoing
COSD-25	Promote and encourage implementation of designated BMPs at residential areas.	Base	MS4 Permit, Section E.5.b(2)	Residential	Ongoing	FY16
COSD-26	Conduct inspections of inventoried existing development to ensure compliance	Base	MS4 Permit, Section E.5.c	ICMR	20% per year, all within 5 years	FY16

**Table I-8. County of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Program Type (see notes at bottom)	Permit Reference	Sources	Frequency	Schedule
	<i>Conduct focused residential inspections based on strategic assessments (modeling, MST, persistent flows, regulatory, monitoring data, SFR/MFR (112 RMAs based on HSA))</i>	Enhanced	-	Residential	20% per year, all within 5 years	FY16
	<i>Investigate the feasibility of a residential inspections tracking program via mobile platform – miles, violations, etc.</i>	Optional Committed	-	Residential	Ongoing with inspections	FY16
	<i>Investigate the feasibility of improvements to inspections data tracking through mobile phone applications</i>	Optional	-	ICMR	-	FY16
COSD-27	Enforce legal authority established for all inventoried existing development to achieve compliance	Base	MS4 Permit, Section E.5.d	ICMR	Ongoing	Ongoing
	<i>Update county ordinance related to existing development; reference to existing guidance documents</i>	Enhanced	-	ICMR	One time	FY15
COSD-28	Develop a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	Base	MS4 Permit, Section E.5.e(1)	Municipal areas	Internal and WMAA	FY15
	<i>Collaborate with partner agencies and groups to promote non-County sponsored incentive programs for BMP retrofits, including rain barrels, smart controllers, soil sensors, turf replacement, etc.</i>	Enhanced	-	Residential/commercial	Ongoing	Ongoing

**Table I-8. County of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Program Type (see notes at bottom)	Permit Reference	Sources	Frequency	Schedule
	<i>Investigate the feasibility of developing and implementing an incentive program for BMP Retrofits (Public-Private Partnerships – a County sponsored program to offer incentives for rain barrel installation, downspout disconnects from the stormwater system, etc.)</i>	Optional Committed	-	-	-	-
COSD-29	Develop a strategy to identify candidate areas of existing development for stream, channel, and/or habitat rehabilitation projects and facilitate implementation of such projects.	Base	MS4 Permit, Section E.5.e(2)	Municipal	Internal and WMAA	FY15
Outreach and Public Participation						
	<i>Develop Sustainable Landscapes Program based on available grant funding</i>	Optional	-	Residential/commercial	Ongoing	FY16
	<i>Develop, improve, distribute outreach materials for existing development</i>	Enhanced	-	ICMR	Ongoing	Ongoing
	<i>Conduct outreach presentations to elementary, middle, and high school students</i>	Enhanced	-	ICMR	Ongoing	Ongoing
	<i>Conduct outreach to mobile landscaping service providers</i>	Enhanced	-	ICMR	Ongoing	Ongoing
	<i>Consider expanding Homeowners Associations Outreach and Coordination (pilot project considered for San Luis Rey, San Dieguito, and San Diego River) as needed and as funding is identified</i>	Optional	-	-	-	TBD

**Table I-8. County of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Program Type (see notes at bottom)	Permit Reference	Sources	Frequency	Schedule
	<i>Sponsor Trash Collection Events</i>	Enhanced	County Program	Existing land use	TBD	Ongoing
	<i>Conduct Educational Workshops (e.g., IPM, manure management)</i>	Enhanced	County Program	Residential	Ongoing	Ongoing
	<i>Conduct education & Outreach Effectiveness Survey</i>	Enhanced	County Program	ICMR	Annually	Ongoing
Enforcement Response Plan						
COSD-30	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	Base	MS4 Permit, Section E.6	All MS4 related sources	Ongoing	Ongoing
COSD-31	Notify the SDWB by email (Nonfilers_R9waterboards.ca.gov) within five (5) calendar days of issuing escalated enforcement to a construction site that poses a significant threat to water quality as a result of violations or other noncompliance.	Base	MS4 Permit, Section E.6.e(1)	Construction	Ongoing	FY16

**Table I-8. County of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Program Type (see notes at bottom)	Permit Reference	Sources	Frequency	Schedule
COSD-32	Notify the SDWB by email (Nonfilers_R9waterboards.ca.gov) any persons required to obtain coverage under the statewide Industrial General Permit and failing to do so, within five (5) calendar days from the time the Copermittee become aware of the circumstances.	Base	MS4 Permit, Section E.6.e(2)	Industrial	Ongoing	FY16
Public Education and Participation						
COSD-33	Implement a public education and participation program to promote and encourage development of programs, management practices and behaviors that reduce the discharge of pollutants in storm water prioritized by high risk behaviors, pollutants of concern, and target audiences.	Base	MS4 Permit, Section E.7	MS4 sources	Ongoing	Ongoing
Physical Strategies						
	<i>Investigate feasibility of Land Acquisitions for habitat restoration or preservation</i>	Optional	WURMP WQ	ICMR	Ongoing	-
COSD-34	Investigate feasibility of planning for Structural BMPs	Optional	MS4 Permit, Section B.2.e	TBD	TBD	Land development programs
COSD-39	Investigate feasibility of Retrofitting projects in areas of existing development	Optional	MS4 Permit, Section B.2.e	TBD	TBD	Potential for implementation via alternative compliance program

**Table I-8. County of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Program Type (see notes at bottom)	Permit Reference	Sources	Frequency	Schedule
COSD-40	Investigate feasibility of stream, channel, and/or habitat rehabilitation process	Optional	MS4 Permit, Section B.2.e	TBD	TBD	Potential for implementation via alternative compliance program
<i>Optional Planning Strategies Developed During WQIP Process</i>						
COSD-42	Consider development of incentive programs for water conservation (turf replacement, smart irrigation controllers, irrigation modifications, sustainable landscapes, rain barrels), in collaboration with water agencies and others, to reduce priority pollutants.	Optional	-	-	-	-
COSD-43	Consider development of incentive programs, in collaboration with DEH, for pumping septic systems in high risk areas adjacent to waterways (within 600 ft) or stormwater system; subject to grant funding.	Optional	-	-	-	-
COSD-44	Consider partnerships with Master Gardeners to provide education opportunities on water use and practices for gardening.	Optional	-	-	-	-

**Table I-8. County of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Program Type (see notes at bottom)	Permit Reference	Sources	Frequency	Schedule
COSD-45	Consider collaboration with community groups to provide “boots on the ground” local information to focus implementation efforts on reducing bacteria and other pollutants, close to the source.	Optional	-	-	-	-
COSD-46	Consider collaboration with COSD internal departments to leverage mutually beneficial projects to promote retrofits to include installation of controls to address priority pollutants, if feasible.	Optional	-	-	-	-
COSD-47	Consider collaboration with watershed partners to encourage consistent messaging to specific targeted audiences (commercial, residents, and others) to conserve water and mitigate dry weather flows.	Optional	-	-	-	-
COSD-48	Consider collaboration with watershed partners on Round 4 of Proposition 84 IRWM grant opportunities to fund targeted educational programs, building of structural controls (brick and mortar projects), or incentive programs to reduce runoff.	Optional	-	-	-	-

**Table I-8. County of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Program Type (see notes at bottom)	Permit Reference	Sources	Frequency	Schedule
COSD-49	Consider collaboration with watershed partners and Regional Water Quality Control Board on effective measures to reduce potential impact of pollutant loads to waterways from unauthorized encampments.	Optional	-	-	-	-
COSD-50	Consider collaboration with wastewater agencies to identify where sewer and stormwater infrastructure are in close proximity and confirm the absence of flow at nearby stormwater MS4 outfall during dry weather.	Optional	-	-	-	-
COSD-52	Consider collaboration with watershed partners to remove invasive non-native plants (Arundo) upstream areas, rivers or tributaries to increase flood and fire protection and reduce the number of unauthorized encampments on the river bottom.	Optional	-	-	-	-
COSD-53	In collaboration with DEH, consider developing program for on-site wastewater treatment (septic) systems. May include mapping and risk assessment, inspection, or maintenance practices.	Optional	-	-	-	-
COSD-54	Implement full scale residential pet waste projects (commitments, large property, urban)	Optional	-	-	-	-

**Table I-8. County of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Program Type (see notes at bottom)	Permit Reference	Sources	Frequency	Schedule
COSD-56	Consider investigating diverting persistent dry weather flows from storm drains to sanitary sewer, where feasible.	Optional	-	-	-	-
COSD-57	Consider the design of structural controls for persistent unpermitted dry weather flows where outreach has been unsuccessful and groundwater or other non-MS4 sources has been ruled out.	Optional	-	-	-	-
COSD-58	Consider developing a strategy to evaluate opportunities to naturalize concrete stormwater conveyances, and identify potential funding sources (such as grants) for design and implementation.	Optional	-	-	-	-
COSD-59	Consider evaluation and reprioritization of the AWM stormwater program to determine inspection priorities for agricultural and related facilities.	Optional	-	-	-	-
COSD-60	Consider collaboration with Caltrans on their implementation of TMDLs at stream reaches on the Caltrans TMDL Prioritization List that are within the County's jurisdiction.	Optional	-	-	-	-

**Table I-8. County of San Diego
 Jurisdictional Strategies (continued)**

SDB ID	Strategy	Program Type (see notes at bottom)	Permit Reference	Sources	Frequency	Schedule
<u>Program Type Notes:</u> Base – Indicates requirements of the MS4 Permit that the County will implement. Enhanced – Base program that has been enhanced beyond the MS4 Permit requirements. The enhanced portions of these strategies would be implemented if needed and if funding is available. Optional – Strategies that are not required by the MS4 Permit. These strategies would be implemented if needed and if funding is available. Those that are “committed” are currently funded this fiscal year (FY14-15) and/or being undertaken or planned for undertaking.						
<u>Responsible Party Notes:</u> WPP = DPW Watershed Protection Plan ED = WPP, Existing Development PS = WPP, Planning and Science DC = WPP, Development and Construction FC = DPW Flood Control CIP = DPW Capital Improvement Projects DEH = Department of Environmental Health AWM = Department of Agriculture, Weights and Measures						

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I.7 CITY OF IMPERIAL BEACH STRATEGIES

The City of Imperial Beach (Imperial Beach) is the southernmost jurisdiction in the San Diego Bay WMA. Long term planning for Imperial Beach includes integration of LID and green street concepts into capital improvement projects (CIPs) and other opportunities as they become available. In addition, Imperial Beach requires source control and LID BMPs as conditions on standard development projects greater than \$50,000.

Low flow and first flush diversions have been installed within Imperial Beach's MS4 that capture trash and dry weather flows. Imperial Beach's Environmental Division incorporates the underserved community in most education activities, which is particularly important to the City because of the large Spanish-speaking community. Imperial Beach maintains ongoing collaboration with the Fish and Wildlife Service on the cleaning and maintenance of MS4 outfall locations along San Diego Bay. In addition, Imperial Beach collaborates with the Navy on annual inspections and operation and maintenance for the portion of the City's MS4 that drains to a detention basin on Navy property. Imperial Beach also actively participates and partners with multiple agencies and stakeholders in the restoration of South San Diego Bay.

Strategies and implementation schedules, presented in Table I-9, were identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the WQIP is updated. The implementation of each strategy is contingent upon annual budget approvals and funding availability.

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Table I-9. City of Imperial Beach
Jurisdictional Strategies

Template ID	Strategy	Permit Reference	Implementation Approach/Level of Effort	Location (Sub watershed, Trib, Outfall, etc.)	Source (Pollutant, PGA, etc.)	Priority	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies	Notes
Jurisdictional Strategies												
Illicit Discharge, Detection, and Elimination (IDDE) Program												
IB-01	Implement Imperial Beach Illicit Discharge Detection and Elimination Program	Municipal Permit, Section E.2.	Investigate and eliminate dry weather discharges and illegal connections to the MS4. Utilize appropriate enforcement actions to achieve compliance. Maintain database of ICIDs.	City-wide				FY16	Ongoing	General Fund	Env Division	
IB-02	Proactively enforce storm water violations and WQIP priority pollutants	Enhancement	Proactively identify storm water violations with an emphasis on WQIP priorities of sediment and trash.	City-wide				FY16	Ongoing	General Fund	Env Division	
IB-03	Maintain Storm Water GIS database and Maps	Municipal Permit E.2.b.1	Maintain the storm water GIS database and generate maps to support the WQIPs for each watershed	City-wide				FY16	Ongoing	General Fund	GIS Admin and Env Division	
IB-04	Perform dry weather field screening of MS4 outfalls	Municipal Permit E.2.C, Enhancement	Perform visual assessment of major MS4 outfalls per Permit Section E.2.C. Visually inspect all MS4 outfalls annually including Navy and Caltrans.	City-wide				FY16	Ongoing	General Fund	Env Division	
IB-04a	Perform persistent dry weather flow monitoring	Municipal Permit E.2.b.1	Dry weather field screening will identify major MS4 outfalls with persistent dry weather flow, which will receive monitoring in accordance with Permit provision D.2.b.(2).	City-wide				FY 16	Ongoing	General Fund	Env Division	
Development Planning												
Non-Priority Development Projects												
IB-05	Provide storm water BMP conditions during the development review phase for non-Priority Development Projects	Municipal Permit, Section E.3.a	Administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area, where applicable and feasible.	City-wide				FY16	Ongoing	Development Permit Fee and General Fund	Community Development and Public Works	
IB-05a	Provide enhanced storm water BMP conditions for non-PDP (Standard Development Projects) with improvement valuation greater than \$50,000	Enhancement	Standard Development Projects that get assessed with an improvement valuation greater than \$50,000 require an additional review by the Public Works Department for public improvement conditions which include specific project conditions for storm water BMPs.	City-wide				FY16	Ongoing	Development Permit Fee and General Fund	Public Works	

Table I-9. City of Imperial Beach
Jurisdictional Strategies (continued)

Template ID	Strategy	Permit Reference	Implementation Approach/Level of Effort	Location (Sub watershed, Trib, Outfall, etc.)	Source (Pollutant, PGA, etc.)	Priority	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies	Notes
Priority Development Projects (PDPs)												
IB-06	Provide storm water BMP conditions during the development review phase for Priority Development Projects.	Municipal Permit, Sections E.3.b, E.3.c, E.3.e	Priority Development Projects as defined by IBMC 8.32 requires BMP certification by City Engineer to meet treatment and retention standards in the Imperial Beach BMP Design Manual.	City-wide				FY16	Ongoing	Development Permit Fee and General Fund	Community Development Public Works, and City Engineer	
IB-07	Update City of Imperial Beach BMP Design Manual	Municipal Permit Section E.3.d	Update IBMC and BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs	City-wide				FY16	Ongoing	General Fund	Env Division	
IB-08	Long-term Structural BMP Maintenance Agreement	Municipal Permit Section E.3.c.4	Require legal agreement, covenant, CEQA mitigation requirement, and/or conditional use permit to ensure long-term maintenance of structural BMPs.	City-wide				FY16	Ongoing	Development Permit Fee and General Fund	Community Development	
IB-09	Review and update Long-term Structural BMP Maintenance Agreement	Enhancement	During each new MS4 Permit cycle provide a review and update to the City's BMP long-term maintenance agreement for PDPs.	City-wide				FY18	As needed	General Fund	Env Division and City Attorney	
IB-10	Provide Structural BMP Maintenance Verification and Inspection	Municipal Permit Section E.3.e.3	Provide annual inspections of high priority structural BMPs and periodic inspections of remaining BMPs at PDP sites.	City-wide				FY16	Ongoing	General Fund	Env Division	
IB-11	Maintain a watershed database of PDP and BMPs	Enhancement	Create and maintain a watershed database of PDPs, structural BMPs, and long-term maintenance agreements in GIS.	City-wide				FY18	Ongoing	General Fund	Env Division and GIS Admin	
IB-12	Develop Watershed Management Area Analysis (WMAA) and alternative compliance program	Enhancement	Collaborate with regional Copermittees on development of the WMAA and alternative compliance program for PDPs.	Regional				FY16	Ongoing	Env Division Budget	Env Division	
Green Streets												
IB-13	Consider retrofit of impervious areas, LIDs, and EPA Green Streets guidance in the design phase for Capital Improvement Projects (CIPs)	Enhancement	The City considers retrofit of impervious areas, LIDs, and EPA Green Streets guidance with the City Engineer in the design phase for all CIPs where practical, feasible, or required by Priority Development status.	City-wide				FY16	Ongoing	General Fund	Public Works	

Table I-9. City of Imperial Beach
Jurisdictional Strategies (continued)

Template ID	Strategy	Permit Reference	Implementation Approach/Level of Effort	Location (Sub watershed, Trib, Outfall, etc.)	Source (Pollutant, PGA, etc.)	Priority	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies	Notes
Construction Management												
IB-14	Approve a Storm Water Management Plan or equivalent plan for discretionary projects	Municipal Permit, Section E.4.a	Discretionary project applicants must submit and receive approval of a Storm Water Management Plan (or for Construction General Permit a Storm Water Pollution Prevention Plan) prior to receiving a building, grading, or demolition permit.	City-wide				FY16	Ongoing	Development Permit Fee and General Fund	Community Development	
IB-14a	Inspect and verify implementation of construction management BMPs for discretionary projects	Municipal Permit, Sections E.4.c and E.4.d and Enhancement	Verify implementation of construction BMPs at discretionary projects though inspections at the beginning of construction activities, prior to rain events, and during any subsequent visit to the project site.	City-wide				FY16	Ongoing	Development Permit Fee and General Fund	Building Official	
IB-14b	Maintain a continuous inventory of construction sites and enforcement actions for discretionary projects	Municipal Permit, Sections E.4.b and E.4.d(3)	For discretionary projects maintain a continuous inventory on the City's HTE database system of active construction sites and notes on enforcement actions.	City-wide				FY16	Ongoing	Development Permit Fee and General Fund	Community Development	
IB-15	Approve a Storm Water Management Plan or equivalent plan for public capital projects	MS4 Permit, Section E.4.a	Contractors for capital projects must submit and receive approval of a Storm Water Management Plan (or for Construction General Permit a Storm Water Pollution Prevention Plan) prior to receiving a notice to proceed.	City-wide				FY16	Ongoing	General Fund and CIP Budget	Public Works	
IB-15a	Inspect and verify implementation of construction management BMPs for capital projects	Municipal Permit, Sections E.4.c and E.4.d and Enhancement	Verify implementation of construction BMPs at capital projects though daily inspections.	City-wide				FY16	Ongoing	General Fund and CIP Budget	Public Works Inspector	
IB-15b	Maintain a continuous inventory of construction sites and enforcement actions for capital projects	MS4 Permit, Sections E.4.b and E.4.d(3)	For capital projects maintain a continuous inventory active construction projects and enforcement actions in Daily Inspection Reports.	City-wide				FY16	Ongoing	General Fund and CIP Budget	Public Works Inspector	
IB-16	Provide annual update to construction management database	Municipal Permit, Sections E.4.d	The Environmental Division will annually collate the construction inventory and inspection/enforcement records from both public and private projects into a comprehensive database.	City-wide				FY16	Ongoing	General Fund	Env Division	

Table I-9. City of Imperial Beach
Jurisdictional Strategies (continued)

Template ID	Strategy	Permit Reference	Implementation Approach/Level of Effort	Location (Sub watershed, Trib, Outfall, etc.)	Source (Pollutant, PGA, etc.)	Priority	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies	Notes
Existing Development												
Commercial, Industrial, Municipal, and Residential Facilities and Areas												
IB-17	Establish minimum BMPs for municipal areas and activities, commercial facilities, and residential areas	Municipal Permit, Section E.5.b	The IBMC 8.30 establishes minimum BMPs and the water quality improvement strategies established in the JRMP requires implementation of BMPs that are specific to the facility, area type, and pollutant generating activity. Minimum BMPs get reviewed and updated at least once per Permit cycle.	City-wide				FY16	Ongoing	General Fund	Public Works	
IB-18	Maintain an annual watershed bases inventory of municipal, commercial, and residential facilities	Municipal Permit, Section E.5.a	At the beginning of each FY update the City's GIS database of existing development inventory of municipal, commercial, and residential facilities.	City-wide				FY 16	Ongoing	General Fund	Env Division and GIS	
IB-19	Inspect and verify implementation of BMPs at municipal areas and facilities	Municipal Permit, Section E.5.c	The responsibility to implement and maintain various municipal BMPs is a task shared by every employee in the Public Works Department. The Environmental Division will verify implementation of BMPs through an onsite annual inspection.	City-wide				FY 16	Ongoing	General Fund	Env Division	
IB-20	Inspect and verify implementation of BMPs at commercial businesses	Municipal Permit, Section E.5.c and Enhancement	The Environmental Division will perform an onsite inspection of each commercial business at least once per permit cycle in addition to performing targeted monthly neighborhood inspections, which include commercial areas.	City-wide				FY 16	Ongoing	General Fund	Env Division	
IB-21	Conduct a neighborhood inspection program	Municipal Permit, Section E.5.c and Enhancement	The Environmental Division conducts monthly neighborhood specific visual inspections of existing developed areas. These inspections allow for focused and targeted inspections that are informed by WQIP or Jurisdictional priorities.	City-wide				FY 16	Ongoing	General Fund	Env Division	
IB-22	Maintain inspection tracking records and violation reports for areas of existing development	Municipal Permit, Section E.5.c.3	Inspection records are maintained according to the Permit violations are tracked on the ICID database.	City-wide				FY 16	Ongoing	General Fund	Env Division	

Table I-9. City of Imperial Beach
Jurisdictional Strategies (continued)

Template ID	Strategy	Permit Reference	Implementation Approach/Level of Effort	Location (Sub watershed, Trib, Outfall, etc.)	Source (Pollutant, PGA, etc.)	Priority	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies	Notes
IB-23	Provide inspection of U.S. Navy MS4	Enhancement	Perform annual inspection of NOLF outfall and MS4 channels on Navy property.	City-wide				FY 16	Ongoing	General Fund	Env Division	
IB-24	Implement a street sweeping program	Municipal Permit, Section E.5.b.1 and Enhancement	Weekly: Commercial areas, Ocean Lane, and parking lots Twice per month: Beachfront posted residential areas Monthly: Non-beachfront residential areas and paved alleys	City-wide				FY 16	Ongoing	General Fund	Env Division and Contractor	
IB-25	Collect illegally dumped material in alleys and public right-of-way	Municipal Permit, Section E.5.b.1 and Enhancement	Illegally dumped materials in City alleys are cleaned up weekly every Thursday by EDCO and Public Works crews collect items left in the public right-of-way.	City-wide				FY 16	Ongoing	General Fund	Env Division and Contractor	
IB-26	Host a home front cleanup event	Enhancement	The City in partnership with EDCO host an annual drop off event for the disposal of any item for residents of Imperial Beach.	City-wide				FY 16	Ongoing	General Fund	Env Division and Contractor	
IB-27	Conduct a pet waste bag program	Municipal Permit, Section E.5.b and Enhancement	The City maintains 10 pet waste bag dispensers twice per week.	City-wide				FY 16	Ongoing	General Fund	Grounds and Facilities Division	
IB-28	Provide a pesticide, herbicide, and fertilizer management	Municipal Permit, Section E.5.b	The City implements an IPM program to minimize the application of chemicals.	City-wide				FY 16	Ongoing	General Fund	Grounds and Facilities Division	
IB-29	Provide sewer system management	Municipal Permit, Section E.5.b.1.c	The operation and maintenance of the sewer collection system is a top priority and managed in accordance with the City's SSMP.	City-wide				FY 16	Ongoing	General Fund	Env and Sewer Divisions	
IB-30	Provide special event permits	MS4 Permit, Section E.5.b	The City provides storm water BMP conditions on special event permits or conditional use permits.	City-wide				FY 16	Ongoing	General Fund	Public Works and Public Safety Dept	
IB-31	Provide residential household hazardous waste program	Municipal Permit, Section E.5.b.2	The City partners with the City of Chula Vista to offer free disposal of HHW for residents.	City-wide				FY 16	Ongoing	General Fund	Env Division	
IB-32	Conduct catch basin and MS4 line O&M	Municipal Permit, Section E.5.b.1.c and Enhancement	The City annually inspects and cleans catch basins and MS4 line.	City-wide				FY 16	Ongoing	General Fund	Env and Sewer Divisions	

Table I-9. City of Imperial Beach
Jurisdictional Strategies (continued)

Template ID	Strategy	Permit Reference	Implementation Approach/Level of Effort	Location (Sub watershed, Trib, Outfall, etc.)	Source (Pollutant, PGA, etc.)	Priority	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies	Notes
IB-33	Conduct open drainage channels and outfalls O&M	MS4 Permit, Section E.5.b.1 and Enhancement	The City annually cleans and maintains open drainage channels and outfall locations.	City-wide				FY 16	Ongoing	General Fund	Env, Streets, and Sewer Divisions, and Contractor	
IB-34	Conduct LID BMPs O&M	Municipal Permit, Section E.5.b.1 and Enhancement	The City provides scheduled maintenance activities for various LID facilities.	City-wide				FY 16	Ongoing	General Fund	Grounds and Facilities Division and Contractor	
IB-35	Conduct storm drain inlet filters O&M	Municipal Permit, Section E.5.b.1 and Enhancement	The City maintains through contract multiple inlet filters located on municipal facilities or at high trash generating areas.	City-wide				FY 16	Ongoing	General Fund	Env Division and Contractor	
IB-36	Conduct Vertech interceptor O&M	Municipal Permit, Section E.5.b.1 and Enhancement	The City maintains a Vertech separator storm drain CDS unit at 10th and Imperial Beach Blvd.	City-wide				FY 16	Ongoing	General Fund	Sewer Division	
IB-37	Conduct storm water diverters O&M	Municipal Permit, Section E.5.b.1 and Enhancement	The City maintains 2 major storm water diverts along the beachfront at Palm Ave and Date Ave that diverts urban runoff and first flush rain events into the sanitary sewer. The City also maintains 3 vehicle and equipment washing diverters for Public Works, Fire Station, and Lifeguards.	City-wide				FY 16	Ongoing	General Fund	Sewer Division	
Retrofit and Rehabilitation in Areas of Existing Development												
IB-38	Integrate LID retrofits where feasible into CIP rehabilitation projects	Municipal Permit, Section E.5.e and Enhancement	The City evaluates the implementation of LIDs into the design of CIPs where practical and feasible.	City-wide				FY 16	Ongoing	General Fund	CIP Manager	
IB-39	Eliminate residential and commercial curb cuts	MS4 Permit, Section E.5.e and Enhancement	The City no longer allows storm water curb cuts for private properties and will eliminate existing curb cuts through redevelopment projects.	City-wide				FY 16	Ongoing	General Fund	Streets Division, Contractor, and Private Property Owners	

Table I-9. City of Imperial Beach
Jurisdictional Strategies (continued)

Template ID	Strategy	Permit Reference	Implementation Approach/Level of Effort	Location (Sub watershed, Trib, Outfall, etc.)	Source (Pollutant, PGA, etc.)	Priority	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies	Notes
IB-40	Encourage LID retrofits of residential and commercial areas for non-PDP redevelopment projects	Municipal Permit, Section E.5.e and Enhancement	During the plan check phase the City evaluates non-PDP redevelopment projects for enhanced public improvement conditions to treat storm water.	City-wide				FY 16	Ongoing	General Fund	Public Works and Community Development Depts	
IB-41	Partner with local, state, and federal agencies to retrofit non-jurisdictional areas	Municipal Permit, Section E.5.e and Enhancement	The City partners with local, state, and federal agencies to improve water quality and wildlife habitat in areas not outside the jurisdictional control of the City.	City-wide				FY 16	Ongoing	General Fund and Grants	Env Division	
Enforcement Response Plan												
IB-42	Enforce storm water code	Municipal Permit Section E.6	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	City-wide				FY 16	Ongoing	General Fund and Grants	Env and Code Enforcement Divisions	
Public Education and Participation												
IB-43	Provide a storm water management education program	Municipal Permit, Section E. 7	Manage the implementation of a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	City-wide				FY16	Ongoing	General Fund	Env Division	
IB-44	Provide education opportunities to development community	Municipal Permit, Section E.7 and Enhancement	Contractors and developers are trained through face-to-face meetings with the Community Development Department and the Publics Works Department during the permitting process, through inspections, and through investigations of illegal discharges. Educational brochures are used as part of the permitting process and web resources are available.	City-wide				FY16	Ongoing	General Fund and Permit Fees	Public Works and Community Development Depts	

Table I-9. City of Imperial Beach
Jurisdictional Strategies (continued)

Template ID	Strategy	Permit Reference	Implementation Approach/Level of Effort	Location (Sub watershed, Trib, Outfall, etc.)	Source (Pollutant, PGA, etc.)	Priority	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies	Notes
IB-45	Provide education to municipal departments and personnel	Municipal Permit, Section E.7 and Enhancement	Multiple training opportunities provided to municipal staff. Annual training is provided to PW department. Monthly code enforcement working group, weekly Community Development department, and weekly staff meetings provide opportunities to discuss storm water issues.	City-wide				FY16	Ongoing	General Fund	Env Division	
IB-46	Provide education opportunities to commercial businesses	Municipal Permit, Section E.7 and Enhancement	Education to businesses provided through storm water brochure provided during business license application and renewal. Education is also provided through inspections and enforcement actions.	City-wide				FY16	Ongoing	General Fund	Env Division	
IB-47	Provide education to residents, general public, and school children	Municipal Permit, Section E.7 and Enhancement	The general public receives educational information in the City's website, quarterly EDCO newsletter, printed materials at offices, through community presentations, ILACSD school presentations, community events, regional events, and various other methods.	City-wide				FY16	Ongoing	General Fund	Env Division	
IB-48	Provide education to underserved community.	Municipal Permit, Section E.7 and Enhancement	Education materials are provided in both English and Spanish. The environmental division incorporates the underserved community in most education activities, which is particularly important to IB due to the large Spanish speaking community.	City-wide				FY16	Ongoing	General Fund	Env Division	
IB-49	Review printed storm water educational materials	Municipal Permit, Section E.7	Review printed materials such as brochures at least once per permit cycle.	City-wide				FY17	Ongoing	General Fund	Env Division	
IB-50	Update electronic website information	MS4 Permit, Section E.7	Annually update storm water information on the City's website.	City-wide				FY16	Ongoing	General Fund	Env Division	

Table I-9. City of Imperial Beach
Jurisdictional Strategies (continued)

Template ID	Strategy	Permit Reference	Implementation Approach/Level of Effort	Location (Sub watershed, Trib, Outfall, etc.)	Source (Pollutant, PGA, etc.)	Priority	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies	Notes
IB-51	Encourage public participation in community events	Municipal Permit, Section E.7 and Enhancement	The City provides or supports multiple community clean up and awareness events throughout the year. Examples include: Creek to Bay, Tijuana River Action Month, Home Front Cleanup, Citywide Garage Sale, Fiesta del Rio, Sun and Sea Festival	City-wide				FY16	Ongoing	General Fund	Env Division	
IB-52	Collaborate with regional education and outreach efforts	Municipal Permit, Section E.7	Collaborate with regional Copermittee education and outreach programs	City-wide				FY16	Ongoing	General Fund	Env Division	
Additional Structural Strategies												
IB-53	Improve dirt alleys in the City	Enhancement	The unimproved dirt alleys in the City are a significant source of sediment tracking into the street and a major maintenance concern for the City and residents alike. The City is working on a phased program to improve the alleys that utilize a green streets approach to manage storm water runoff.	City-wide	Sediment	911.1	Optional	FY18	Ongoing	General Fund and Grants	Public Works	
IB-54	Partner with State and Federal agencies to restore wetlands, native habitat, and enhance public access along San Diego Bay	Enhancement	Partner with FWS to enhance public access along San Diego Bay and continue existing partnerships on wetland restoration of the Salt Ponds in San Diego Bay and native habitat restoration of upland areas.	910.2	All	910.2	Optional	FY16	Ongoing	Grants	Public Works	
IB-55	Partner with local, State, and Federal agencies to address binational pollution issue with the Tijuana River	Enhancement	The City participates in multiple collaborative efforts to address pollution concerns in the Tijuana River. Successful efforts include working partnerships with the Tijuana River Recovery Team, Tijuana River National Estuary Research Reserve Advisory Council, International Boundary and Water Commission Citizen's Forum, the International Boundary and Water Commission Treaty Minute, and EPA Border 2020 Program.	911.1	All	911.1	Optional	FY16	Ongoing	Grants, RWQCB, and legislation	Environmental Div	

Table I-9. City of Imperial Beach
Jurisdictional Strategies (continued)

Template ID	Strategy	Permit Reference	Implementation Approach/Level of Effort	Location (Sub watershed, Trib, Outfall, etc.)	Source (Pollutant, PGA, etc.)	Priority	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies	Notes
IB-56	Update Tijuana River plume tracking model	Enhancement	Work with Regional Board staff, County DEH, Scripps Institute of Oceanography, and local stakeholders to update the Tijuana River plume tracking model to help protect public health along the Imperial Beach shoreline.	Pacific Ocean	Bacteria		Optional	FY16	Needed	Grants and RWQCB	Environmental Div	
IB-57	Make Elm Ave (Seacoast Dr. to 7 th Ave) Street Improvements	Enhancement	The City received State grant funds for street improvements around Mar Vista High School to improve pedestrian safety. Trash and street flooding are known issues around the high school. The City will evaluate storm water drainage improvements and BMPs to control trash and other pollutants with the project.	911.1	Trash		Optional	FY18	Ongoing	General Fund and Grants	Public Works	
IB-58	Study H-outfall drainage basin BMP	Enhancement	The City's main commercial area along HWY 75 drains to the H-outfall, which is tidally impacted by the San Diego Bay. The drainage area is also extremely flat and subject to flooding. A study is needed to evaluate the appropriate BMP options to capture trash and other pollutants that will not contribute to the existing flooding concerns in the area.	910.2	Trash	910.2	Optional	FY17	Needed	General Fund	Public Works	
IB-59	Implement storm water BMP recommendations for the H-outfall drainage basin BMP Study	Enhancement	The results of the BMP study will allow the City to prioritize the implementation of BMPs to control trash and other pollutants for the H-outfall drainage basin.	910.2	Trash	910.2	Optional	After completion of Study	Needed	General Fund and Grants	Public Works	

I.8 CITY OF LA MESA STRATEGIES

The City of La Mesa (La Mesa) is located in the hills of San Diego County with walkable, tree-lined neighborhoods and retail and commercial areas. La Mesa has received funding to implement green infrastructure along a busy corridor of University Avenue. Other strategies to improve water quality include enhancing MS4 infrastructure maintenance and promoting water efficient landscape BMPs. Strategies and implementation schedules, presented in Table I-10, were identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. In Chollas Creek, a compliance analysis using a watershed model was conducted to identify the strategies required to be implemented to meet final goals. The strategies and implementation schedules identified demonstrate that numeric goals are met. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the compliance analysis is updated as needed to provide assurance that numeric goals are met.

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Table I-10. City of La Mesa
Jurisdictional Strategies

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
Jurisdictional Strategies								
Development Planning								
All Development Projects								
LM-1	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area, where applicable and feasible.	Refer to JRMP.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works Department, Engineering Department
LM-2	Amend municipal code and ordinances to require LID implementation.	La Mesa will amend ordinances for dry weather component and per new BMP Manual.	City-wide	Jurisdictional	FY15	As needed		Public Works Department, Engineering Department
LM-3	Train staff on LID regulatory changes and LID Design Manual.	The City performs training on CIP and will examine water quality before scoping and budgeting for projects.	City-wide	Jurisdictional	FY15	Annually		Public Works Department, Engineering Department
Priority Development Projects (PDPs)								
LM-4	For PDPs, administer a program requiring implementation of structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	Refer to JRMP.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works Department, Engineering Department
	1. Administer self-certification program for treatment control BMP compliance.	La Mesa has a program in place.	City-wide	Jurisdictional	Prior to FY16	Annually		Public Works Department, Engineering Department
LM-5	Update BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	The City will update its BMP Design Manual by making small changes to the County's.	City-wide	Jurisdictional	Prior to FY16	As needed		Public Works Department, Engineering Department
	1. Amend BMP Design Manual for trash areas. Require full four-sided enclosure, siting away from storm drains and cover. Consider the retrofit requirement.	La Mesa will consider amending the BMP Design Manual for trash areas.	?	Jurisdictional	FY16	As needed		Public Works Department, Engineering Department
	2. Amend BMP Design Manual for mobile businesses.	La Mesa has a mobile business program. A business is required to read and sign a stormwater affidavit and comply with rules in order to receive a permit.	City-wide	Jurisdictional	Prior to FY16	As needed		Public Works Department, Engineering Department

Table I-10. City of La Mesa
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
LM-6	Administer an alternative compliance program to on-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects).	The City will implement an alternative compliance program to meet City and Developer needs and to fund CIP projects.	City-wide	Jurisdictional	FY18	Ongoing		Public Works Department, Engineering Department
Construction Management								
LM-7	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	The City currently implements this program. During wet season, high priority areas are inspected and cleaned every two weeks, medium areas are inspected and cleaned monthly, and low priority areas are inspected and cleaned once per rainy season. Cleanings are prioritized based on previous implementation.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works Department, Engineering Department
Existing Development								
Commercial, Industrial, Municipal, and Residential Facilities and Areas								
LM-8	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	All facilities are inspected annually.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works Department, Engineering Department
	1. Update minimum BMPs for existing residential, commercial, and industrial development.	The City will update minimum BMPs during JRMP update to include a new residential program. In addition, outdoor exposure will trigger action for BMPs.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works Department, Engineering Department
	2. Design, implement, and enforce property- and PGA-based inspections.	La Mesa will implement property- and PGA-based inspections. Each business will be inspected at least once a year, and high priority areas will be inspected more than once.	City-wide	Jurisdictional	FY15	Annually		Public Works Department, Engineering Department
	3. Increase inspection for highest pollutant potential businesses.	The City will increase inspections based on effectiveness of new program. It currently has FOG inspections for restaurants and will prioritize auto-related facilities within Chollas. Every business is inspected every year.	Chollas Creek HA?	Jurisdictional	FY15	Ongoing		Public Works Department, Engineering Department
	4. Provide BMP factsheet to water-using mobile businesses when business license is granted, and require minimum BMPs for mobile businesses.	La Mesa already accomplished this in existing program.	City-wide	Jurisdictional	Prior to FY16	As needed		Public Works Department, Engineering Department

Table I-10. City of La Mesa
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
	5. Review policies and procedures to ensure discharges from swimming pools meet permit requirements.	La Mesa will update swimming pool items per changes in code.	City-wide	Jurisdictional	FY15	As needed		Public Works Department, Engineering Department
	6. Require sweeping and maintenance of private roads and parking lots in targeted areas.	Optional.	Targeted? Chollas? City-wide?	Optional	Trigger (upon need)			Public Works Department, Engineering Department
	7. Implement Water Efficient Landscape Ordinance.	The City already has a State mandated landscape ordinance.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works Department, Engineering Department
LM-9	Implement pet waste program. May include installation and maintenance of pet waste bag dispensers and trash bins, signage and education, and physical removal of pet waste.	La Mesa has a preexisting pet waste program.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works, Parks
LM-10	Promote and encourage implementation of designated BMPs at residential areas.		City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works
	1. Expand residential BMP (irrigation, rainwater harvesting, and turf conversion) rebate programs to multi-family housing in target areas.	La Mesa will potentially collaborate with HOAs for rebates, inspection reduction programs, and more.	City-wide	?	?	?		Public Works, HOAs
	2. Promote and collaborate with water agencies and other groups to encourage implementation of water conservation programs that improve water quality by reducing over-irrigation with smart products or turf replacement and capturing rain water in residential areas.	La Mesa will potentially collaborate with Helix Water District on rebate programs, and more.	City-wide	Jurisdictional	?	?		Public Works, Helix Water District
	3. Implement Residential BMP: Rain Barrel	The City already has been implementing rain barrels.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works, Helix Water District
LM-11	Promote and encourage implementation of designated BMPs in non-residential areas.	La Mesa will work with Helix Water District. There will be dry weather benefits.	City-wide	Jurisdictional	?	Ongoing		Public Works Department, Engineering Department
LM-12	Implement program to investigate illegal grading on private property.	The City already investigates illegal grading.	City-wide	Jurisdictional	Prior to FY16	Weekly		Public Works Department, Engineering Department

**Table I-10. City of La Mesa
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
MS4 Infrastructure								
LM-13	Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, detention basins, etc.) for water quality improvement and flood control.	La Mesa has an existing program that does this.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works Department, Engineering Department
	1. Optimize catch basin cleaning to maximize pollutant removal (4 times per year for metals and sediment TMDLs, elsewhere 1 per year)	La Mesa has 455 catch basins in the Chollas Creek watershed. Current frequency is two times per year, and it will be increased to four times a year.	Chollas Creek HA	Jurisdictional	FY18	Ongoing		Public Works Department, Engineering Department
	2. Repair MS4 components to provide source control from MS4 infrastructure.	The City repairs MS4 components as needed based on condition assessment and prioritization process.	City-wide	Jurisdictional	Prior to FY16	As needed		Public Works Department, Engineering Department
	3. Implement and increase frequency of annual open-channel cleaning and scour pond repair to reduce pollutant loads and invasive plants and animals as needed.	The City will perform as needed on municipal property via code enforcement on private property.	City-wide	Jurisdictional	Prior to FY16	As needed		Public Works Department, Engineering Department
LM-14	Identify sewer leaks and areas for sewer pipe replacement prioritization.	La Mesa already replaces as needed based on sewer condition assessment and long-term prioritization.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works Department, Engineering Department
	1. Replace pipes as needed in Chollas watershed.	La Mesa currently is performing trunk main pipe replacements. One project is occurring at University and Massachusetts Avenues.	Chollas Creek HA	Jurisdictional	FY17	Time to replace? 2 years?		Public Works Department, Engineering Department
Roads, Street, and Parking Lots								
LM-15	Implement operation and maintenance activities for public streets, unpaved roads, paved roads, and paved highways	The City has a preexisting street sweeping schedule that is prioritized by area.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works
	1. Perform street sweeping in roads, parking lots, and medians on high-volume arterial roadways.	High traffic and arterial areas are swept once a week, other arterial areas are swept every other week, and residential areas are swept once a month. Parking lots and medians are included in street sweeping program.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works
	2. Enhance street sweeping through equipment replacement (replace every 4 years) and route optimization (sweep commercial routes bi-weekly and residential every other month)	Street sweeping is contracted out, and the contractor uses Regen Air sweepers. The City plans to increase frequency in high traffic areas in Chollas to two times a week.	Chollas	Jurisdictional	FY18	Ongoing		Public Works

Table I-10. City of La Mesa
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
<i>Pesticide, Herbicides, and Fertilizer BMP Program</i>								
LM-16	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	The City does not have authority over application of pesticides but will implement BMPs. Industrial and commercial inspections cover requirement, and Parks and Rec implement municipal program. Refer to JRMP.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works, Parks and Rec
<i>Retrofit and Rehabilitation in Areas of Existing Development</i>								
LM-17	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	La Mesa will target municipal areas. Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing		Public Works Department, Engineering Department
LM-18	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing		Public Works Department, Engineering Department
<i>Illicit Discharge, Detection, and Elimination (IDDE) Program</i>								
LM-19	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include: maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	Refer to JRMP.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works
	1. Utilize "Request Tracker," an online web-based program, to encourage residents to report potential illicit discharges or other storm water violations.	The City has "Request Tracker," an online program that anyone can report to. Notifications will remain until solved and will be routed to the appropriate department. The City also has a hotline that people can call.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works

**Table I-10. City of La Mesa
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
<i>Public Education and Participation</i>								
LM-20	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Refer to JRMP.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works
	1. Conduct trash cleanups through community-based organizations involving target audiences.	La Mesa works with "I Love a Clean San Diego" and holds two major cleanups in each watershed per year. The City will possibly work with Groundworks Chollas or other NGOs. Private cleanups are conducted through code enforcement.	Chollas Creek HA	Jurisdictional	Prior to FY16	Ongoing		Public Works, ILACSD, Community Development/Code Enforcement
	2. Review City storm water website and identify and implement required updates to reflect WQIP and JRMP revisions.	The City will update the website to include new permit information, such as for irrigation.	City-wide	Jurisdictional	FY15	As needed		Public Works
	3. Target human behavior in parks and other public areas including trash reduction or other high impact behavior to habitat, wildlife, and water quality.	About six kiosks have been built in parks in collaboration with Eagle Scouts and other community groups. Information on trash and other public issues can be included in these kiosks. La Mesa plans to build one more kiosk per fiscal year.	City parks	Jurisdictional	Prior to FY16	Ongoing		Public Works, Eagle Scouts, community groups
	4. Enhance school and recreation-based education and outreach.	"I Love a Clean San Diego" presents in schools.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works, ILACSD
	5. Continue to support the Environmental Sustainability Commission (ESC), a committee of local residents and business owners working to preserve La Mesa's environment.	The ESC manages the Environmental Awareness Festival, serves as an advisory body to the City Council on how actions and policies of the City may preserve and enhance the quality of La Mesa's environment, and addresses the effects of climate change and assists in the identification of measures that will improve environmental sustainability in La Mesa and the region.	City-wide	Jurisdictional	Prior to FY16	Ongoing		ESC
	6. Collaborate with regional education and outreach efforts.	La Mesa collaborates on regional efforts.	Region-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works
	7. Develop education and outreach to reduce over-irrigation.	The City will distribute flyers and door hangers City-wide. If over irrigation occurs, a pamphlet will be sent to the offender.	City-wide	Jurisdictional	FY16	Ongoing		Public Works

Table I-10. City of La Mesa
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
LM-21	Provide technical education and outreach to the development community on the design and implementation requirements of the Municipal Permit and WQIP requirements.	This will be done regionally and as needed or requested within the City.	Region-wide	Jurisdictional	FY14	As needed		Public Works, regional agencies/groups
Enforcement Response Plan								
LM-22	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	Refer to JRMP.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works
Additional Nonstructural Strategies								
LM-23	Continue participating in source reduction initiatives.	La Mesa will continue to participate in source reduction initiatives.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works
	1. Replace City-owned vehicle brake pads with copper-free brake pads as they become commercially available.	Optional.	City-wide	Optional	Trigger (upon availability of technology)			Public Works
	2. Continue implementation of cigarette ban in parks and commercial areas.	La Mesa will continue the cigarette ban and install more cigarette ash trays.	Targeted for additional ash trays? Or city-wide?	Jurisdictional	Prior to FY16	Ongoing		Public Works
	3. Enhance program to address and capture trash and debris.	The City will install additional capture/trash guards.	Targeted or city-side?	Jurisdictional	FY17	Ongoing		Public Works
LM-24	Proactively monitor for erosion, and complete minor repair and slope stabilization on municipal property.	TBD.	TBD	Jurisdictional	TBD	TBD		Public Works
LM-25	Conduct special studies.			Jurisdictional				Public Works
	1. Reference watershed study.	The City will continue to contribute to the study.	Region-wide	Jurisdictional	Prior to FY16	Ongoing	Until study completion	Public Works
LM-26	Proactively repair and replace corrugated metal pipe (CMP) MS4 components to provide source control from MS4 infrastructure.	La Mesa is trying to get rid of CMP as part of the prioritized replacement program.	City-wide	Jurisdictional	Prior to FY16	Ongoing		Public Works
LM-27	If a regional social services effort is established, support workgroup to provide sanitation and trash management for person experiencing homelessness and determine if the program is suitable and appropriate for jurisdictional needs to meet goals.	La Mesa does not have a homeless outreach team. Police and property owners enforce cleanups of encampments. If there is a regional effort, La Mesa will participate.	City-wide	Optional	Trigger (upon regional effort)			Public Works
LM-28	Conduct a feasibility study to test Permeable Friction Course (PFC), porous asphalt that overlays impermeable asphalt.	Optional.	Chollas Creek HA	Optional	Trigger (if interim FYX goals not met)			Public Works

Table I-10. City of La Mesa
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
Green Infrastructure								
LM-29	Prop 84 Grant Project on University Ave.	Bioretention medians are approximately 4500 linear feet.	University Ave.	Jurisdictional	FY16	Ongoing maintenance		Public Works, GRANT info
LM-30	Identify any planned or potential green infrastructure projects to be constructed.	The City is still considering GI and multi-use project opportunities.	?	?	FY25	?		Public Works
Water Quality Improvement BMPs								
Proprietary BMPs								
LM-31	Identify any existing proprietary BMP projects constructed after 2002.		?	?	?	?		?
LM-32	Identify any planned or potential proprietary BMP projects to be constructed.		?	?	?	?		
	1. Planned- A city park is proposed to be built in a parcel of barren land along Waite Drive. This area can be included for long-term centralized planning.		Chollas Creek HA	TBD	TBD	TBD		?
	2. Planned- A centralized BMP is proposed to be installed in the Future Rehabilitation Project of Vista La Mesa Park.		Chollas Creek HA	TBD	TBD	TBD		?
	3. Potential- Rolando drainage area. Drainage area is 39 acres and 60% impervious.		Chollas Creek HA	TBD	TBD	TBD		?
	4. Potential- Highwood drainage area. Drainage area is 114.5 acres and 44% impervious.		Chollas Creek HA	TBD	TBD	TBD		?

I.9 CITY OF LEMON GROVE STRATEGIES

Lemon Grove plans to be an example to private land uses within the City by implementing landscape practices, such as Cal-Sense irrigation systems, downspout disconnects, and redirection of parking lot runoff to landscaped areas, on municipal property. Other strategies to improve water quality include enhancing MS4 infrastructure maintenance and promoting water efficient landscape BMPs on private property. Strategies and implementation schedules, presented in Table I-11, were identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the WQIP is updated. The implementation of each strategy is contingent upon annual budget approvals and funding availability.

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Table I-11. City of Lemon Grove
Jurisdictional Strategies

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
Jurisdictional Strategies								
Development Planning								
All Development Projects								
LG-1	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area, where applicable and feasible.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Planning, Engineering
LG-2	Amend municipal code and ordinances, including zoning ordinances, to facilitate and encourage LID opportunities.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Planning, Engineering
LG-3	Develop and distribute brochure to encourage downspout disconnection in residential areas.	Lemon Grove will distribute informational brochures.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	City Manager's Office
LG-4	Require downspout connection and/or other runoff reduction measures, where feasible, for non-Priority Projects.	This is required through the building permitting process.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Planning
LG-5	Trash area standards for new development and redevelopment: require full four-sided enclosure, siting away from storm drains, and structural overhead cover.	The City is required to do this through the permitting process for new development and redevelopment.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Planning
LG-6	Train staff on LID regulatory changes and LID Design Manual.	Refer to JRMP and BMP Design Manual.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Planning, Engineering
Priority Development Projects (PDPs)								
LG-7	For PDPs, administer a program requiring implementation of structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	Refer to JRMP and BMP Design Manual.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Planning, Engineering
	1. Administer self-certification program for treatment control BMP compliance.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Storm Water
LG-8	Update BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	Refer to JRMP and BMP Design Manual.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Planning, Engineering
	1. Amend BMP Design Manual for trash areas. Require full four-sided enclosure, siting away from storm drains and cover. Consider the retrofit requirement.	Refer to JRMP and BMP Design Manual.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Planning, Engineering

Table I-11. City of Lemon Grove
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
	2. Amend BMP Design Manual for animal-related facilities, such as such as animal shelters, "doggie day care" facilities, veterinary clinics, breeding, boarding and training facilities, groomers, and pet care stores.	Refer to JRMP and BMP Design Manual.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Planning, Engineering
	3. Amend BMP Design Manual for nurseries and garden centers.	Refer to JRMP and BMP Design Manual.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Planning, Engineering
	4. Amend BMP Design Manual for auto-related uses.	Refer to JRMP and BMP Design Manual.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Planning, Engineering
LG-9	Administer an alternative compliance program to on-site structural BMP implementation (includes identifying Watershed Management Area Analysis [WMAA] candidate projects).	(City still is undecided on this item)	TBD	Optional	TBD	TBD	TBD	TBD
Construction Management								
LG-10	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Engineering
Existing Development								
Commercial, Industrial, Municipal, and Residential Facilities and Areas								
LG-11	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Storm Water
LG-12	Update minimum BMPs for existing residential, commercial, and industrial development.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Storm Water
LG-13	Increase inspection frequency for highest pollutant potential businesses.	Additional, more frequent inspections may be targeted only at certain high-threat areas or activities and/or at entire shopping centers.	Chollas Creek HA	Jurisdictional	FY15	Ongoing	Departmental Budget	Storm Water
LG-14	Implement Water Efficient Landscape Ordinance.	Lemon Grove will implement through the permitting process for development projects.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	Planning
LG-15	Analyze and encourage sweeping of private roads and parking lots in targeted area.	The City will gather more information about existing sweeping frequency for larger commercial parking lots and for private roads within HOAs, and provide outreach to larger commercial properties and HOAs.	Chollas Creek HA	Jurisdictional	FY15	Ongoing	Departmental Budget	City Manager's Office

Table I-11. City of Lemon Grove
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
LG-16	Require minimum sweeping frequency for private roads and parking lots in targeted area.	Optional.	Chollas Creek HA	Optional	Trigger (if interim metals goals not met and investigation determines parking lots and private roads are not swept)		Department Budget and Private Funds	Planning
LG-17	Analyze and encourage indoor used cooking oil storage for food service establishments.	Lemon Grove will work with grease rendering services to educate businesses on availability and benefits of indoor grease storage containers.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	City Manager's Office
LG-18	Require used cooking oil to be either stored indoors or under a structural canopy.	Require for businesses for which outreach efforts were not successful in achieving outcome of having used cooking oil stored in a covered, contained area (e.g., indoors) and at which poor used cooking oil storage BMPs have been observed.	City-wide	Optional	Trigger (if interim bacteria goals not met)		Department Budget and Private Funds	Planning
LG-19	Residential shared outdoor trash storage areas: require full four-sided enclosure, siting away from storm drains, and structural overhead cover when triggered by a building permit application.	Lemon Grove will require retrofit of trash areas at existing facilities when a building permit is applied for at the same property.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Planning
LG-20	Industrial and commercial outdoor trash storage areas: require full four-sided enclosure, siting away from storm drains, and structural overhead cover when triggered by a building permit application.	Lemon Grove will require retrofit of trash areas at existing facilities when a building permit is applied for at the same property.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Planning
LG-21	Industrial and commercial outdoor trash storage areas: require full four-sided enclosure, siting away from storm drains, and structural overhead cover when triggered by a building permit application.	Lemon Grove will require retrofit of trash areas at existing businesses or properties with a repeated history of non-compliance for trash area management BMPs.	City-wide	Optional	Trigger (if interim bacteria goals not met)		Department Budget and Private Funds	Planning
LG-22	Work with Regional Board to ensure industrial businesses subject to the Industrial General Permit obtain coverage and implement BMPs to address discharges of pollutants associated with TMDLs.	The City will share inspection results with Regional Board staff and notify of non-filers or potential non-compliance with other IGP requirements, especially requirements specifically related to discharges of Highest Priority Conditions.	Chollas Creek HA	Jurisdictional	FY15	Ongoing	Departmental Budget	Storm Water

**Table I-11. City of Lemon Grove
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
LG-23	Pet waste control program.	Lemon Grove will provide pet waste bags via dispensers in City parks.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	Public Works
LG-24	Promote and encourage implementation of designated BMPs at residential areas.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Storm Water
LG-25	Work with water utility (Helix) to publicize incentives for rain barrel installation and turf conversion and/or sprinkler system upgrades (e.g., rain shutoff systems) in residential areas, including multi-family residential.	Lemon Grove will collaborate with Helix Water District.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	Storm Water
LG-26	Publicize and market any existing outreach and training programs that the water utility (Helix) provides for property managers responsible for homeowner associations (HOAs) and Maintenance Districts. Main focus would be on irrigation runoff reduction.	Lemon Grove will collaborate with Helix Water District.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	Storm Water
LG-27	Install smart irrigation controllers at City facilities and convert median landscaping to drip irrigation.	The City has installed 7 Cal-Sense irrigation control systems Citywide and continues to make the transition from area sprinklers to drip irrigation along its medians. The City anticipates installing at least one Cal-Sense system more by 2018. The current locations of the systems are Berry Street Park, Lemon Grove Park, Civic Center Park, City Hall, Kunkel Park, Lemon Grove Avenue median (near Mt. Vernon), and Lemon Grove Avenue median (near Broadway).	Targeted City facilities	Jurisdictional	FY18	Ongoing, subject to availability of funds	Departmental Budget	Public Works
MS4 Infrastructure								
LG-28	Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, detention basins, etc.) for water quality improvement: perform catch basin cleaning.	Lemon Grove will clean catch basins per regular maintenance schedule.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Public Works
	1. Proactively repair and replace MS4 components to provide source control from MS4 infrastructure.	Lemon Grove will repair and replace per standard maintenance schedule.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	Public Works
	2. Clean open-channels and repair scour ponds (local depressions formed by erosion where water ponds).	The City will clean and repair per standard maintenance procedures.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	Public Works

Table I-11. City of Lemon Grove
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
LG-29	Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers: identify sewer leaks and areas for sewer pipe replacement prioritization.	The City will repair and replace per standard maintenance schedule and where leaks are identified.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	Public Works
<i>Roads, Street, and Parking Lots</i>								
LG-30	Enhance street sweeping through alternating mechanical and vacuum sweepers and route optimization (sweep downtown commercial areas once a week, main arterials and business areas once every two weeks, and residential areas once every four weeks).	Sweeping is completed by City contractor (note that only streets with curb and gutter can be swept in the City).	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	Public Works
LG-31	Sweep medians in downtown commercial areas, main arterials, and business areas.	Sweeping is completed by City contractor	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	Public Works
<i>Pesticide, Herbicides, and Fertilizer BMP Program</i>								
LG-32	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Storm Water
<i>Retrofit and Rehabilitation in Areas of Existing Development</i>								
LG-33	Develop pilot project to identify and carry out directing runoff from existing parking lots or other hardscape to landscaping.	Lemon Grove will complete field work to identify where existing grades would allow parking lots to be directed to landscaping, and the most suitable site(s) will be selected for retrofit.	Targeted City facilities	Jurisdictional	FY16	As feasible retrofit locations are identified and funds are available.	Departmental Budget	Public Works
LG-34	Develop pilot project to identify and carry out site downspout disconnections for targeted City facilities.	Lemon Grove will complete field work to identify where downspouts exist and could be directed to landscaping. The most suitable site(s) will be selected for retrofit.	Targeted City facilities	Jurisdictional	FY16	As feasible retrofit locations are identified and funds are available.	Departmental Budget	Public Works
LG-35	Retrofit curb and gutter in selected portions of City to capture and infiltrate or evapotranspire small dry weather flows.	Optional.	Chollas Creek HA	Optional	Trigger (if bacteria interim goals are not met and persistent flows remain persistent)	TBD	Department Budget and Private Funds	Public Works, Engineering

Table I-11. City of Lemon Grove
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
LG-36	Provide material storage retrofits/stricter operational controls for sources of metals.	Optional.	Chollas Creek HA	Optional	Trigger (if metals interim goals are not met)	TBD	Department Budget and Private Funds	Planning
LG-37	Provide parking lot retrofits at industrial, commercial, or multi-family residential properties.	Optional.	Chollas Creek HA	Optional	Trigger (if metals interim goals are not met)	TBD	Department Budget and Private Funds	Planning
LG-38	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Engineering, Public Works
LG-39	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Engineering, Public Works
Illicit Discharge, Detection, and Elimination (IDDE) Program								
LG-40	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include: maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Storm Water
Public Education and Participation								
LG-41	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Storm Water
LG-42	Conduct trash cleanups through community-based organizations involving target audiences.	Lemon Grove collaborates with "I Love a Clean San Diego" on trash cleanups. Refer to JRMP for more information.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Storm Water
LG-43	Collaborate with regional education and outreach efforts.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Storm Water
LG-44	Municipal staff training.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Storm Water

Table I-11. City of Lemon Grove
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
Enforcement Response Plan								
LG-45	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Storm Water
LG-46	Enforce minimum BMPs for existing residential, commercial, and industrial development.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Storm Water
Additional Nonstructural Strategies								
LG-47	Participate in regional bacteria reference study.	Refer to regional bacteria study work plan.	Region-wide	Jurisdictional	FY16	Until study completion	Departmental Budget	Storm Water
LG-48	Support partnership effort by social service providers to provide sanitation and trash management for homeless persons.	Optional.	City-wide	Optional	Trigger (upon regional effort)	Ongoing	Department Budget and Private Funds	Public Works

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I.10 CITY OF NATIONAL CITY STRATEGIES

The City of National City (National City) is the second oldest city within San Diego County. National City includes diverse land uses from the San Diego Bay inland. Core jurisdictional programs target the entire National City jurisdiction. National City continues to focus on restoration activities within the small Paradise Creek drainage area to improve water quality. A section of the concrete lined channel in Paradise Creek is to be removed and a buffer area around the channel restored to improve riparian habitat. Additionally, upstream of the targeted area, storm water treatment BMPs are intended to improve and sustain improvement of water and riparian habitat quality. Strategies and implementation schedules, presented in Table I-12, were identified using best information available on efficiency, effectiveness, and level of effort estimated to achieve compliance with numeric goals. The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the WQIP is updated. The implementation of each strategy is contingent upon annual budget approvals and funding availability.

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Table I-12. City of National City
Jurisdictional Strategies

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
Jurisdictional Strategies								
Development Planning								
All Development Projects								
NC-1	For all development projects, administer a program to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area, where applicable and feasible.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budgets, Plan Review Fees	Planning & Building, Engineering/Public Works
NC-2	Amend municipal code and ordinances to facilitate and encourage LID opportunities.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budgets	Planning & Building, Engineering/Public Works
NC-3	Trash area standards for new development and redevelopment: require full four-sided enclosure, siting away from storm drains, and structural overhead cover.	National City will require through permitting process for new development and redevelopment.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Planning & Building
NC-4	Train staff on LID regulatory changes and LID Design Manual.	Refer to JRMP and BMP Design Manual.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budgets	Planning & Building, Engineering/Public Works
Priority Development Projects (PDPs)								
NC-5	For PDPs, administer a program requiring implementation of structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	Refer to JRMP and BMP Design Manual.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budgets, Plan Review Fees	Planning & Building, Engineering/Public Works
NC-6	Administer self-certification program for treatment control BMP compliance.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Engineering/Public Works

Table I-12. City of National City
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
NC-7	Update BMP Design Manual procedures to determine nature and extent of storm water requirements applicable to development projects and to identify conditions of concern for selecting, designing, and maintaining appropriate structural BMPs.	Refer to JRMP and BMP Design Manual.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budgets	Planning & Building, Engineering/Public Works
Construction Management								
NC-8	Administer a program to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements.	The City will inspect sites at the frequencies specified in its JRMP. Refer to JRMP for details.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Engineering/Public Works
Existing Development								
Commercial, Industrial, Municipal, and Residential Facilities and Areas								
NC-9	Administer a program to require implementation of minimum BMPs for existing development (commercial, industrial, municipal, and residential) that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Engineering/Public Works
NC-10	Update minimum BMPs for existing residential, commercial, and industrial development.	Municipal Code update to be completed in FY15. Refer to JRMP for more information.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	Engineering/Public Works
NC-11	Increase inspection for highest pollutant potential businesses.	Optional.	Paradise Creek watershed	Optional	Trigger (if high trash levels are traced back to particular businesses or shopping centers)	TBD	TBD	Engineering/Public Works

Table I-12. City of National City
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
NC-12	Require minimum BMPs for mobile businesses.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Engineering/Public Works
NC-13	Analyze and encourage sweeping of private roads and parking lots in targeted area.	National City will gather more information about existing sweeping frequency for larger commercial parking lots and for private roads within HOAs, and provide outreach to larger commercial properties and HOAs.	Paradise Creek watershed	Jurisdictional	FY15	Ongoing	Departmental Budget	Engineering/Public Works
NC-14	Require minimum sweeping frequency for private roads and parking lots in targeted area.	Optional.	Paradise Creek watershed	Optional	Trigger (if investigation determines parking lots and private roads are not swept)	TBD	TBD	Engineering/Public Works
NC-15	Implement Water Efficient Landscape Ordinance.	The City will implement through permitting process for development projects.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	Planning & Building
NC-16	Implement pet waste program.	The City will provide pet waste bags via dispensers in City parks.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budgets	Engineering/Public Works, Community Services
NC-17	Promote and encourage implementation of designated BMPs at residential areas.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budgets	Engineering/Public Works, Community Services
NC-18	Collaborate with local water authority to promote and encourage water conservation and irrigation runoff reduction programs, including utility-funded rebate or other incentive programs.	National City will collaborate with Sweetwater Water Authority.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget, Water District Incentive Programs	Community Services, Sweetwater Water Authority

Table I-12. City of National City
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
NC-19	Promote and encourage implementation of designated BMPs in non-residential areas.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Engineering/Public Works
NC-20	Require used cooking oil to be either stored indoors or under a structural canopy.	The City will incorporate as part of BMP requirement updates. National City also will work with grease rendering services to educate businesses on availability and benefits of indoor grease storage containers.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Engineering/Public Works
NC-21	Notify Regional Board of industrial businesses subject to the Industrial General Permit so that the businesses may obtain coverage as required.	National City will share inspection results with Regional Board staff and notify of non-filers or potential non-compliance with other IGP requirements.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	Engineering/Public Works, Regional Board
MS4 Infrastructure								
NC-22	Implement operation and maintenance activities (inspection and cleaning) for MS4 and related structures (catch basins, storm drain inlets, channels, detention basins, etc.) for water quality improvement.	Channels and creeks will be cleaned once per month. Trash will be removed from channels by hand. Catch basins will be cleaned to remove trash and debris once per year. Drains with filter inserts (19th Street & Harding, 12th Street & A Avenue, R Avenue between 7th Street & 8th Street, National City library, Bay Marina Way & Marina Way north & south of the street) will be cleaned four times per year.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Engineering/Public Works
NC-23	Proactively repair and replace MS4 components to provide source control from MS4 infrastructure.	National City will repair and replace per standard maintenance schedule.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	Engineering/Public Works

Table I-12. City of National City
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
NC-24	Install structural BMPs to prevent unauthorized persons from entering the MS4.	Grates will be placed over the entrances to six box culvert locations along Lower Paradise Creek to prevent unauthorized persons from entering and occupying the drainage ways.	Lower Paradise Creek	Jurisdictional	FY16	FY 16, ongoing maintenance following completion	Departmental Budget	Engineering/Public Works
NC-25	Implement controls to prevent infiltration of sewage into the MS4 from leaking sanitary sewers.	National City will repair and replace per standard maintenance schedule and where leaks are identified.	City-wide	Jurisdictional	FY15	Ongoing	Sewer fund	Engineering/Public Works
NC-26	Identify sewer leaks and areas for sewer pipe replacement prioritization.	National City will repair and replace per standard maintenance schedule and where leaks are identified.	City-wide	Jurisdictional	FY15	Ongoing	Sewer fund	Engineering/Public Works
Roads, Street, and Parking Lots								
NC-27	Sweep City streets using sweepers and vacuums.	Major arterials are swept daily during the work week. All other streets are swept once per week. The City uses both mechanical and vacuum sweepers. Refer to the JRMP for details.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	Engineering/Public Works
Pesticide, Herbicides, and Fertilizer BMP Program								
NC-28	Require implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Engineering/Public Works

Table I-12. City of National City
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
<i>Retrofit and Rehabilitation in Areas of Existing Development</i>								
NC-29	Develop and implement a strategy to identify candidate areas of existing development appropriate for retrofitting projects and facilitate the implementation of such projects.	See multiple retrofit projects described later on down in this list. Also refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Engineering/Public Works
NC-30	Develop and implement a strategy to identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	See creek restoration project described later on down in this list. Also refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Engineering/Public Works
<i>Illicit Discharge, Detection, and Elimination (IDDE) Program</i>								
NC-31	Implement Illicit Discharge, Detection, and Elimination (IDDE) Program per the JRMP. Requirements include: maintaining an MS4 map, using municipal personnel and contractors to identify and report illicit discharges, maintaining a hotline for public reporting of illicit discharges, monitoring MS4 outfalls, and investigating and addressing any illicit discharges.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Engineering/Public Works
<i>Public Education and Participation</i>								
NC-32	Implement a public education and participation program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budgets	Engineering/Public Works, Community Services

Table I-12. City of National City
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
NC-33	Conduct trash cleanups through community-based organizations involving target audiences.	Local organizations regularly conduct cleanups, both on their own and in direct partnership with the City. Paradise Creek Educational Park, Inc. (PCEPI) completes regular cleanups in Paradise Creek. The City also regularly works with "I Love a Clean San Diego" to complete creek cleanups.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budgets, Assistance from Volunteers	Engineering/Public Works, Community Services, PCEPI, ILACSD
NC-34	Review City storm water website and identify and implement required updates to reflect WQIP and JRMP revisions.	Website will be updated to reflect new requirements.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Engineering/Public Works, Community Services
NC-35	Enhance school and recreation-based education and outreach.	The City partners with National School District to put on a storm water quality themed art contest for elementary students, with a theme of keeping the community clean. Winners' artwork is displayed in a storm water educational calendar distributed throughout the City. Winners are also recognized by the City Council.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	Engineering/Public Works, National School District
NC-36	Collaborate with regional education and outreach efforts.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budgets	Engineering/Public Works, Community Services
NC-37	Develop education and outreach to reduce over-irrigation, including partnering with the local water utility to publicize incentive and rebate programs.	Refer to JRMP. The City will also work with local water district (Sweetwater Water Authority).	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget, Partnership with SWA	Engineering/Public Works, Community Services, SWA
NC-38	Provide municipal staff training.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budget	Engineering/Public Works

Table I-12. City of National City
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
Enforcement Response Plan								
NC-39	Implement escalating enforcement responses to compel compliance with statutes, ordinances, permits, contracts, orders, and other requirements for IDDE, development planning, construction management, and existing development in the Enforcement Response Plan.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budgets	Neighborhood Services, Engineering/Public Works
NC-40	Enforce minimum BMPs for existing residential, commercial, and industrial development.	Refer to JRMP.	City-wide	Jurisdictional	FY16	Ongoing	Departmental Budgets	Neighborhood Services, Engineering/Public Works
Additional Nonstructural Strategies								
NC-41	Work toward Paradise Creek 303(d) delisting study and removal from 303(d) list.	National City will complete monitoring necessary to support removal of Paradise Creek from 303(d) list for selenium, which relates to habitat beneficial use.	Paradise Creek watershed	Jurisdictional	FY15	Complete in FY15. Removal from 303(d) list dependent on SWRCB timeline.	Departmental Budget	Engineering/Public Works, Regional Board, SWRCB
NC-42	Participate in regional reference study.	National City contributes through cost-share agreement.	Region-wide	Jurisdictional	FY14	Until study completion	Departmental Budget	Regional Study (All Copermittees)
NC-43	Develop a program to address and capture trash and debris.	Refer to JRMP.	City-wide	Jurisdictional	FY15	Ongoing	Departmental Budget	Engineering/Public Works
NC-44	If a regional social services effort is established, support workgroup to provide sanitation and trash management for person experiencing homelessness and determine if the program is suitable and appropriate for jurisdictional needs to meet goals.	Optional.	City-wide	Optional	Trigger (if regional effort is developed and if funds are available)	TBD	TBD	Engineering/Public Works
NC-45	If invasive plant and animal removal is necessary in key locations, collaborate with Urban Corps of San Diego or other volunteer groups as needed.	Optional.	City-wide	Optional	Trigger (as funds allow)	TBD	TBD	Engineering/Public Works

Table I-12. City of National City
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
Green Infrastructure								
Green Streets								
NC-46	8th Street Smart Growth.	National City is installing bioretention areas along 8th Street from approximately Highland Avenue to National City Boulevard.	Paleta Creek watershed	Jurisdictional	FY14	Until completed (estimated FY15), ongoing maintenance following completion	CIP Funding	Engineering/Public Works
NC-47	4th Street Corridor.	The City installed infiltration areas along 4th Street at Clairemont Drive and Belmont Drive.	Paradise Creek watershed	Jurisdictional	FY14	Completed in FY14, ongoing maintenance to be provided	CIP Funding	Engineering/Public Works
NC-48	"A" Avenue Green Street and Pedestrian Pathway project.	National City is performing green street retrofits for a 49 acre drainage area. Bioretention, infiltration, water harvesting/reuse for irrigation in Kimball Park, and a trash removal device will be installed.	Paradise Creek watershed	Jurisdictional	FY14	Until completed (estimated FY16), ongoing maintenance following completion	Prop. 84 Grant, City Match	Engineering/Public Works, SWRCB
Multiuse Treatment Areas								
Stream, Channel and Habitat Rehabilitation Projects								
NC-49	Kimball Park LID and Paradise Creek Restoration project.	The City will restore approximately 1,000 linear feet of channelized stream with concrete bottom. The concrete bottom will be removed to restore wetland habitat. Approximately 30,000 sq. ft. of native vegetation will be planted along the Creek. The project will also include LID features along streets in the neighborhood to the south of the park and within the park. These LID features will treat an approximately 73 acre tributary drainage area.	Paradise Creek watershed	Jurisdictional	FY15	Until completed (estimated FY17), ongoing maintenance following completion	Prop. 84 Grant, City Match	Engineering/Public Works, SWRCB

Table I-12. City of National City
Jurisdictional Strategies (continued)

SDB ID	Strategy	Implementation Approach/Level of Effort	Location (Subwatershed, Trib, Outfall, etc.)	Jurisdictional or Optional	Implementation Year (or Trigger if Optional)	Frequency of Implementation	Cost or Funding Strategy	Responsible City Department and Other Collaborating Departments or Agencies
NC-50	Paradise Creek Educational Park.	Paradise Creek Educational Park is located along Hoover Avenue south of 18th Street and continues south along Paradise Creek to 22nd Street. The project includes removing impervious area, constructing an LID feature and a cistern to treat tributary urbanized area, and establishing native vegetation along Paradise Creek.	Paradise Creek watershed	Jurisdictional	FY15	Until completed (estimated FY16), ongoing maintenance following completion	State Urban Greening Grant, City Match	Engineering/Public Works, State Council for Strategic Growth, PCEPI
Water Quality Improvement BMPs								
Proprietary BMPs								
NC-51	Coolidge Avenue Pedestrian Improvements.	High-rate biofilters (Filterra or equivalent) were installed at Civic Center & Harding, 14th Street & Wilson, and 18th Street & Hoover.	Paradise Creek watershed	Jurisdictional	FY14	Completed in FY14, ongoing maintenance will be completed	CIP Funding	Engineering/Public Works

I.11 PORT OF SAN DIEGO STRATEGIES

The Port of San Diego (Port) identified an approach and strategies to address the Highest Priority Conditions and Focused Priority Conditions that best suit the characteristics of potential discharges from within its boundaries. The strategies identified by the Port focus on (1) reducing the amount of bacteria, metals, and trash from the Port's MS4, (2) improving water quality, (3) increasing public awareness through education and outreach, and (4) including structural BMPs where feasible.

The strategies identified in Table I-13 are categorized as permit-required administrative type JRMP updates, permit-required JRMP implementation efforts, potential program enhancements to the Port's JRMP program, as well as other non-permit required strategies. The Port continues to implement its compliance program to address discharges with respect to its MS4 within the Port's boundaries, is updating its program, and has identified new strategies to further assist efforts to address bacteria, trash, and metals jurisdiction-wide and on a targeted basis.

The Port's approach also integrates with other planning efforts, such as the Port's Climate Action Plan (CAP)³. The CAP provides the framework for achieving the Port's goals for the reduction of greenhouse gas (GHG) emissions. The CAP identifies policies and measures, or strategies, to reduce GHG emissions that also provide dual benefits to water quality. CAP strategies that assist the Port in addressing the Highest Priority Conditions and Focused Priority Conditions include water conservation measures and waste reduction and recycling measures (refer to strategies PO-11, PO-14, PO-17, and PO-26 in Table I-13).

The following subsections summarize the key considerations for selecting the appropriate approach and strategies for metals and bacteria in Chollas Creek, Physical Aesthetics (trash) in the Sweetwater and Otay subwatersheds, and Swimmable Waters (bacteria) in the Otay subwatershed.

Water Quality (Metals and Bacteria) – Chollas Creek (908.22)

The Highest Priority Conditions in Chollas Creek within the Pueblo subwatershed (908.2) are water quality impairments due to metals and bacteria. The Port's jurisdiction comprises approximately 115 acres (which overlap with the City of San Diego's boundaries), or 1 percent of the Chollas Creek drainage area. Several factors were considered during the development of the Port's approach to Chollas Creek. A jurisdictional analysis report submitted to the Regional Board in December 2013 provided information and further clarification of the potential for discharges from the Port's jurisdiction in Chollas Creek⁴. The report provided a detailed analysis that identified the Port's ability to control discharges from within the Tidelands boundary in

³ Port of San Diego's Climate Action Plan (2013) (https://www.portofsandiego.org/environment/clean-water/doc_download/5515-port-of-san-diego-climate-action-plan.html)

⁴ Port of San Diego. 2013. "Submittal of Information Relating to the Draft Technical Report for Total Maximum Daily Loads at Paleta, Chollas, and Switzer Creek Mouths". Submitted to the San Diego Regional Water Quality Control Board December 2013.

Chollas Creek, where the Port has authority and where it does not. The Port's jurisdictional area is small in the Chollas Creek HSA and there is limited, if any, capacity to implement BMPs. The Port's approach and strategies to addressing metals and bacteria in Chollas Creek are based on the findings in the jurisdictional analysis report.

The primary land use in this area is industrial, and is represented by a single tenant, General Dynamics NASSCO (NASSCO). NASSCO has an individual NPDES Industrial Permit requiring that any discharges from the facility meet stringent toxicity standards. NASSCO elected to install a self-contained retention/treatment system that captures and treats all stormwater discharges. As a result, NASSCO has minimized potential discharges to San Diego Bay and eliminated discharges from its facility to Chollas Creek.

The Port is to incorporate many of the same strategies identified in Table I-13 to its boundaries within Switzer Creek and the downtown anchorage to address the pollutants identified in the draft *TMDLs for Toxic Pollutants in Sediment at the Mouth of Chollas and Switzer Creeks in San Diego Bay* (draft Tentative Resolution No. R9-2013-0003) and the draft downtown anchorage area regulations. The Jurisdictional Analysis report identified that approximately 96 percent of the Port's boundaries within Switzer Creek drainage area comprises industrial facilities that are regulated under the Industrial General Permit. This land use is similar to the land use in the Port's boundaries within Chollas Creek. As such, similar strategies may be effective in reducing pollutants in both areas. The Port's boundaries in both creek mouth areas is tidally influenced and is located downstream of the where watershed monitoring has historically occurred. It is anticipated that data collected by the Port at Chollas Creek could potentially be compared to data from Switzer Creek to determine the effectiveness of implementing such strategies at multiple locations.

Physical Aesthetics - Sweetwater River subwatershed (909.1)

The Focused Priority Condition in the Sweetwater River subwatershed (909.1) is physical aesthetics due to trash pollution. The Port's jurisdictional area in this subwatershed is approximately 347 acres, all of which falls within the City of Chula Vista. Facilities or land uses that may be potential sources of trash in this area of the Port's boundaries include six commercial facilities, seven industrial facilities, two municipal facilities, and two parks. The strategies identified by the Port focus on reducing the amount of trash, adding structural controls where feasible, improving water quality, and increasing public awareness through education and outreach. In addition to identifying strategies to address the current sources, the Port is also identifying how to address trash in the future development of the Chula Vista Bayfront area as part of the Port's Chula Vista Bayfront Master Plan. This highly visible development area presents the Port opportunities to implement a variety of strategies to address trash from development and existing development sources.

Swimmable Waters – Otay River Subwatershed (910.1)

The Focused Priority Condition in the Otay River subwatershed (910.1) is Swimmable Waters (beaches). The Port's jurisdictional area in the Otay River subwatershed (910.1) is approximately 242 acres. Facilities or land uses in this portion of the Port's jurisdiction includes 32 commercial facilities (ranging from marinas, restaurants, general retail, and hotels) and three parks. However, a targeted effort focuses on potential MS4 discharges from the Port's boundaries within the Tidelands Park drainage area, with the goal of removing Tidelands Park from the 303(d) list of impaired water bodies. The Port's strategies identified for Tidelands Park focus on reducing bacteria and trash, improving water quality, obtaining a better understanding of the public's perception of water quality conditions, and increasing public awareness through education and outreach. Tidelands Park is a 22-acre waterfront park that offers a small beach, recreational fields, picnic areas and open space for a variety of outdoor activities. In addition to addressing water quality, the Port is also interested in identifying ways to increase the use of the park by residents, visitors and the local community and promoting the park as a venue for safe waterside activities.

Physical Aesthetics – Otay River subwatershed (910.2)

The Focused Priority Condition in the Otay River subwatershed (910.2) is physical aesthetics due to trash pollution. The Port's jurisdictional area in this subwatershed falls within the City of Chula Vista. Facilities or land uses that may be potential sources of trash in this area of the Port's boundaries include one commercial facility and the site of the former South Bay Power Plant. The Port has focused its efforts on trash because the Otay River Watershed Management Plan (ORWMP) and public input identified trash as a priority issue in the Otay River subwatershed. The strategies identified by the Port focus on reducing the amount of trash, adding structural controls where feasible, improving water quality, and increasing public awareness through education and outreach. Although current use of this area of the Port's boundaries in this area is limited, the Port recognized that the future development of the Chula Vista Bayfront presents the Port opportunities to be able to implement a variety of strategies to address trash from both development and existing development sources.

The adaptive management process provides the framework to evaluate progress toward meeting the goals and allows for modification of strategies. As strategies are modified, the WQIP is updated. The implementation of each strategy is contingent upon budget and cost considerations and approvals, and technological feasibility.

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Table I-13. Port of San Diego
Jurisdictional Strategies

SDB ID	Strategy	Strategy Type	Location (Subwatershed, Trib, Outfall, etc.)	Implementation Year (or Trigger if Optional)	Frequency of Implementatio n	Funding Strategy	Cost (Estimated Annual Cost) ¹	Responsible Port Department and Other Collaborating Departments or Agencies
Jurisdictional Strategies								
Development Projects (including Priority Development Projects)								
PO-1	Implement Core JRMP Program for all development projects to ensure implementation of source control BMPs to minimize pollutant generation at each project and implement LID BMPs to maintain or restore hydrology of the area, where applicable and feasible.	Permit-required Implementation	Jurisdiction-wide	FY15	Ongoing	ELUM FY Budget	\$\$	ELUM, Engineering, REO
PO-2	For PDPs, administer a program requiring implementation of structural BMPs to control pollutants and manage hydromodification. Includes confirmation of design, construction, and maintenance of PDP structural BMPs.	Permit-required Implementation	Jurisdiction-wide	FY15	Ongoing	ELUM FY Budget	\$\$	ELUM, Engineering, REO
PO-3	Update Stormwater Requirements Checklist to identify whether a project has a high potential to generate trash, metals, and bacteria	Permit required Administrative Update	Jurisdiction-wide	FY15	One time	ELUM FY Budget	\$	ELUM
PO-4	Update BMP Design Manual to include enhancements for projects (both non-PDP and PDP projects) having a high potential to generate trash, metals, and bacteria	Permit required Administrative Update	Jurisdiction-wide	FY15	One time	ELUM FY Budget	\$\$	ELUM, Engineering, REO
PO-5	Train all applicable departments annually on stormwater requirements for all development projects	Permit-required Implementation	Jurisdiction-wide	FY15	Annually	ELUM FY Budget	\$	ELUM
PO-6	Install fence along southern parameter of Pond 20 and grates at stormdrain inlets to capture trash and debris	Additional Non-Permit Required Strategy	Specific drainage area (Otay Sub-watershed)	FY15	One-time	ENG FY Budget	\$\$\$	ENG, GS, ELUM
PO-7	Develop an alternative compliance program framework that provides options for PDPs	Program Enhancement	Jurisdiction-wide	FY15	One time	ELUM FY Budget	\$	ELUM, Engineering, REO, Legal
PO-8	Develop and implement an alternative compliance program providing options for PDPs	Program Enhancement	Jurisdiction-wide	FY16	One time	ELUM FY Budget	\$\$	ELUM, Engineering, REO, Legal
9	Conduct project closeout inspection for all development projects to verify that Trash, Metals, and Bacteria BMPs are properly implemented	Permit-required Implementation	Jurisdiction-wide	FY16	Ongoing	ELUM FY Budget	\$	ELUM
PO-10	Provide technical education and outreach to the development community on permit requirements	Permit – required Implementation	Jurisdiction-wide	FY16	Ongoing	ELUM FY Budget	\$	ELUM
PO-11	Require install shutoff irrigation sensors (e.g., Cal-Sense) for MM/CIP development projects, where applicable. [CAP Water Conservation Measure (WC 1.3)] ²	Optional / Program Enhancement.	Jurisdiction-wide	Trigger (Submission of MM/CIP development projects that this BMP applies to)	As-needed	Project budgets	\$\$	REO, Engineering, ELUM, GS

Table I-13. Port of San Diego
Jurisdictional Strategies (continued)

SDB ID	Strategy	Strategy Type	Location (Subwatershed, Trib, Outfall, etc.)	Implementation Year (or Trigger if Optional)	Frequency of Implementatio n	Funding Strategy	Cost (Estimated Annual Cost) ¹	Responsible Port Department and Other Collaborating Departments or Agencies
Construction Program								
PO-12	Implement Core JRMP Program to require and to oversee implementation of BMPs during the construction phase of land development. Includes inspections at an appropriate frequency and enforcement of requirements. [SWPPP Review, inspections, BMP Implementation]	Permit-required Implementation	Jurisdiction-wide	FY15	Ongoing	ELUM FY Budget	\$\$	ELUM, Engineering, REO
PO-13	Add BMP to construction BMPs that requires covering construction materials (i.e., metals and treated wood) during wet weather	Permit required Administrative Update	Jurisdiction-wide	FY15	Ongoing	ELUM FY Budget	\$	ELUM, Engineering
PO-14	<i>Adopt Construction and Demolition Recycling Ordinance or include language into general requirements for all projects [CAP Waste Reduction and Recycling Measure (SW2)]²</i>	<i>Optional / Program Enhancement.</i>	<i>Jurisdiction-wide</i>	<i>FY16 (Based on evaluation of potential conflicts with member cities)</i>	<i>One-time</i>	<i>ELUM / Eng FY Budget</i>	<i>\$</i>	<i>ELUM, Engineering</i>
Existing Development								
Commercial / Industrial Facilities								
PO-15	Implement Core JRMP Program for existing development (commercial and industrial facilities) to require implementation of minimum BMPs that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of existing development at appropriate frequencies and using appropriate methods, maintenance of an existing development inventory, and enforcement.	Permit-required Implementation	Jurisdiction-wide	FY15	Ongoing	ELUM FY Budget	\$\$	ELUM
PO-16	Perform annual inspection of facilities that are higher sources of trash, metals, and bacteria	Program Enhancement	Jurisdiction-wide	FY16	Annually	ELUM FY Budget	\$\$	ELUM
PO-17	Develop a retrofit program to encourage installation of water conservation measures in existing businesses (e.g. xeriscaping, irrigation sensors, etc.) [CAP Water Conservation Measure (WC 1.3)] ²	Program Enhancement	<i>Phased, targeted areas then jurisdiction-wide</i>	FY17	One-time	Env Fund / Grant	\$	ELUM, GS, REO
PO-18	<i>Installation of structural treatment control BMPs in storm drains in high priority areas to address trash, metals, and bacteria</i>	<i>Optional / Program Enhancement</i>	<i>Phased, targeted areas then jurisdiction-wide</i>	<i>FY16 (facility-specific based on inspections and repeat violations)</i>	<i>As-needed</i>	<i>Tenant</i>	<i>\$</i>	<i>ELUM, REO</i>

**Table I-13. Port of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Strategy Type	Location (Subwatershed, Trib, Outfall, etc.)	Implementation Year (or Trigger if Optional)	Frequency of Implementatio n	Funding Strategy	Cost (Estimated Annual Cost) ¹	Responsible Port Department and Other Collaborating Departments or Agencies
Municipal Areas & Facilities								
PO-19	Implement Core JRMP Program for existing development (municipal facilities) to require implementation of minimum BMPs for municipal facilities that are specific to the facility, area types, and PGAs, as appropriate. Includes inspection of the municipal facilities at appropriate frequencies and using appropriate methods, maintenance of a facility inventory and enforcement.	Permit-required Implementation	Jurisdiction-wide	FY15	Ongoing	ELUM FY Budget	\$\$	ELUM
PO-20	Provide List of BMPs for Special Events with requirements for trash, metals, and bacteria, and ensure compliance thru inspections	Permit required Implementation	Jurisdiction-wide	FY15	Ongoing	ELUM FY Budget	\$	ELUM, GS
PO-21	Continue pet waste bag dispensers in parks	Program Enhancement	Jurisdiction-wide	FY15	Annually	GS FY Budget	\$	GS, ELUM
PO-22	Implement Preventative Maintenance (PM) Plan to prevent backups in Municipal public restrooms	Additional Non-Permit Required Strategy	Jurisdiction-wide	FY15	Ongoing	GS FY Budget	\$	GS, ELUM
PO-23	Development of BMP guidance document for general services staff conducting minor maintenance operations	Program Enhancement	Jurisdiction-wide	FY16	One-time	ELUM FY Budget	\$	ELUM, GS
PO-24	Train general services staff on proper BMP implementation during minor maintenance operations	Program Enhancement	Jurisdiction-wide	FY16	As-needed	ELUM FY Budget	\$	ELUM
PO-25	Conduct Trash Receptacle Assessment in municipal areas	Program Enhancement	Jurisdiction-wide	FY16	One-time	GS FY Budget	\$	GS, ELUM,
PO-26	Develop a process to improve data management for tracking waste and materials diverted from waste stream and landfills [CAP Waste Reduction and Recycling Measure (SW)] ²	Program Enhancement	Jurisdiction-wide	FY17	One-time	ELUM FY Budget	\$	ELUM, GS
PO-27	Update Power-washing Standard Operating Procedure Manual	Program Enhancement	Jurisdiction-wide	FY17	One-time	ELUM FY Budget	\$	GS, ELUM
PO-28	Create Standard Operating Procedure for proper washout procedures in public restrooms (for use by municipal staff and contractors)	Additional Non-Permit Required Strategy	Jurisdiction-wide	FY17	One-time	GS FY Budget	\$	GS, ELUM
PO-29	Retrofit trash enclosures, where applicable, in municipal areas	Optional / Program Enhancement	Phased, targeted areas then jurisdiction-wide	FY18 (identifying appropriate action to be taken as result of retrofit program)	As-needed	GS or ELUM FY Budget	\$ -\$\$	ELUM, GS
PO-30	Replace/upgrade current maintenance equipment, such as street sweeper or power washer, to new, more efficient and effective options	Optional / Program Enhancement	Jurisdiction-wide	FY16 (based on equipment replacement schedule)	Ongoing	GS FY Budget	\$\$-\$\$\$	GS

**Table I-13. Port of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Strategy Type	Location (Subwatershed, Trib, Outfall, etc.)	Implementation Year (or Trigger if Optional)	Frequency of Implementatio n	Funding Strategy	Cost (Estimated Annual Cost) ¹	Responsible Port Department and Other Collaborating Departments or Agencies
MS4 Infrastructure								
PO-31	Implement Core JRMP Program for MS4 infractrure(inspection and cleaning) for water quality improvement.	Permit required Implementation	Jurisdiction-wide	FY15	Ongoing	ELUM FY Budget	\$	ELUM
PO-32	Evaluate MS4 inspection and cleaning locations and adjust as-needed for higher trash generating areas	Program Enhancement	Phased, targeted areas then jurisdiction-wide	FY16	Annually	ELUM FY Budget	\$	ELUM
PO-33	<i>Installation of inlet inserts in storm drains in high priority areas</i>	<i>Optional / Additional Non-Permit Required Strategy</i>	<i>Phased, targeted areas then jurisdiction-wide</i>	<i>FY 18 (based on availability of funding)</i>	<i>Once</i>	<i>TBD</i>	<i>\$-\$</i>	<i>ELUM, GS</i>
Roads, Streets, and Parking Lots								
PO-34	Implement Core JRMP Program for Street and Parking Lot Maintenance inspection and cleaning of public streets, paved roads, and parking lots.	Permit required Implementation	Jurisdiction-wide	FY15	Ongoing	ELUM FY Budget	\$	ELUM
Pesticide, Herbicides, and Fertilizers BMP Program								
PO-35	Implement Core JRMP Program requiring implementation of BMPs to address application, storage, and disposal of pesticides, herbicides, and fertilizers on commercial, industrial, and municipal properties. Includes education, permits, and certifications.	Permit required Implementation	Jurisdiction-wide	FY15	Ongoing	ELUM FY Budget	\$	ELUM
Retrofit and Rehabilitation in Areas of Existing Development								
PO-36	Develop plan that identifies retrofit and rehabilitation opportunities to address trash, bacteria, and metals	Permit – required Administration Update	Jurisdiction-wide	FY15	One-time	ELUM FY Budget	\$	ELUM, GS
Illicit Discharge, Detection, and Elimination (IDDE) Program								
PO-37	Implement Core JRMP Program for IDDE program. Requirements include: maintain MS4 map, identify and report illicit discharges, maintain a hotline for public reporting of illicit discharges, monitor MS4 outfalls, and investigate and address any illicit discharges.	Permit – required Implementation	Jurisdiction-wide	FY15	Ongoing	ELUM FY Budget	\$-\$	ELUM
Enforcement Response Plan								
PO-38	Develop approach for the Enforcement Response Plan [escalating enforcement responses; statutes, ordinances, permits, contracts, orders, and other requirements]	Permit – required Administration Update	Jurisdiction-wide	FY15	One-time	ELUM FY Budget	\$-\$	ELUM
PO-39	Update Port’s Stormwater Ordinance	Permit - required Administrative Update	Jurisdiction-wide	FY15	Ongoing	ELUM FY Budget	\$	ELUM, Legal

**Table I-13. Port of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Strategy Type	Location (Subwatershed, Trib, Outfall, etc.)	Implementation Year (or Trigger if Optional)	Frequency of Implementatio n	Funding Strategy	Cost (Estimated Annual Cost) ¹	Responsible Port Department and Other Collaborating Departments or Agencies
Public Education and Participation								
PO-40	Implement Core JRMP Program for Education and Outreach program to promote and encourage development of programs, management practices, and behaviors that reduce the discharge of pollutants in storm water prioritized by high-risk behaviors, pollutants of concern, and target audiences.	Permit – required Implementation	Jurisdiction-wide	FY15	Ongoing	ELUM FY Budget	\$\$-	ELUM
PO-41	Sponsor, conduct, and host cleanup activities (Operation Clean Sweep, Coastal Cleanup Day, Creek to Bay, etc.). Sponsor regional/watershed collection events for large items or items that may otherwise be illegally dumped. Some events could be considered multi-jurisdictional strategies	Program Enhancement	Jurisdiction-wide	FY16	Ongoing	ELUM FY Budget / Port Environmental Fund/Grant	\$\$-	ELUM, GCR, GS, San Diego Bay RPs, San Diego Port Tenants Association, SD Coastkeeper, I Love a Clean San Diego
PO-42	Improve consistency and content of websites to highlight permit requirements and facilitate public reporting	Program Enhancement	Jurisdiction-wide	FY16	Ongoing	MarCom FY Budget	\$	MarCom, ELUM
PO-43	Develop and conduct public perception survey on Physical Aesthetics and Swimmable Waters Conditions	Additional Non-Permit Required Strategy	Targeted drainage areas	FY17	Once per Permit Cycle	MarCom or ELUM FY Budget (could be cost shared with other RPs)	\$\$-	MarCom, ELUM, San Diego Bay RPs (Chula Vista, Coronado, Imperial Beach)
Additional Non-Structural Strategies								
PO-44	Replace all Port owned/leased vehicle brake pads with copper-free brake pads	Optional / Additional Non-Permit Required Strategy	Jurisdiction-wide	FY17 (based on equipment replacement schedule)	As-needed	GS FY Budget	\$\$	GS, ELUM
PO-45	Support organizations to address homelessness and to provide resources and educational materials to address trash and bacteria	Optional. Additional Non-Permit Required Strategy	Jurisdiction-wide	FY TBD (contingent on ability to modify existing scope of work; or if regional program is established)	Annually	HPD/GCR FY Budget	\$\$	HPD, GCR, ELUM

**Table I-13. Port of San Diego
Jurisdictional Strategies (continued)**

SDB ID	Strategy	Strategy Type	Location (Subwatershed, Trib, Outfall, etc.)	Implementation Year (or Trigger if Optional)	Frequency of Implementatio n	Funding Strategy	Cost (Estimated Annual Cost) ¹	Responsible Port Department and Other Collaborating Departments or Agencies
Special Studies or Pilot Projects								
PO-46	Special Study: Participation in the San Diego Regional Reference Stream Study [The study will develop numeric targets for minimally disturbed or “reference” condition]	Permit – required Implementation	Jurisdiction-wide	FY15/16	One-time	ELUM FY Budget [Regional Cost Share]	\$	ELUM; Regional MS4 Copermittees (20 other jurisdictions)
PO-47	Special Study: Participation in the Southern California Coastal Water Research Project’s (SCCWRP) San Diego Bay Trash Study. SCCWRP will initially assess targeted geographic areas and may include (1) assessment of current conditions to provide a baseline to demonstrate progress in the future, (2) identification of high-priority areas for targeted strategy implementation, and (3) identification of commonalities among jurisdictions for potential collaborative outreach opportunities.	Program Enhancement	Jurisdiction-wide	FY15	One-time	ELUM FY Budget [Cost Shared among participants]	\$	ELUM; San Diego Bay RPs (City of Chula Vista and Imperial Beach); SCCWRP
PO-48	Special Study: Delisting feasibility study for Tidelands Park, Coronado	Additional non-permit required strategy	Targeted drainage areas (Tidelands Park, Coronado)	FY16	One-time	ELUM FY Budget	\$-\$\$	ELUM, San Diego Bay RP (City of Coronado)
PO-49	Special Study: Site/Area prioritization study to identify high volume trash areas	Program Enhancement	Phased, targeted areas then jurisdiction-wide	FY16	One-time	ELUM FY Budget	\$-\$\$	ELUM
PO-50	<i>Pilot project: Installation of trash skimmers in marina basins</i>	<i>Optional. Additional non-permit required strategies</i>	<i>Phased - Specific drainage areas first</i>	<i>Trigger (if marinas are identified as high trash generating area in assessment)</i>	<i>One time</i>	<i>ELUM FY budget/Tenants/ E. Fund</i>	<i>\$\$</i>	<i>ELUM, GS</i>

**Italics indicate a strategy that is considered optional (per Permit section B.3.b.b.and requiring a trigger to be implemented).*

¹ Estimated Cost Range: \$ = \$1,000-25,000; \$\$ = \$26,000 – 200,000; \$\$\$ = \$201,000 – 500,000; \$\$\$\$ = >501,000

² CAP - Port of San Diego’s Climate Action Plan (2013) (https://www.portofsandiego.org/environment/clean-water/doc_download/5515-port-of-san-diego-climate-action-plan.html)

APPENDIX J. WMA ALTERNATIVE COMPLIANCE PROGRAM OVERVIEW

The 2013 San Diego National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater (MS4) Permit (R9-2013-0001) allows for implementation of offsite alternative compliance methods in lieu of meeting structural best management practice (BMP) design standards and/or hydromodification management criteria on the project site.

To implement an offsite alternative compliance program, a jurisdiction must first complete an optional Watershed Management Area Analysis (WMAA), as detailed in Permit Section B.3.b.(4). The San Diego County Responsible Parties have collectively funded and provided guidance for development of a regional WMAA. Findings of the regional WMAA, specific to the San Diego Bay Watershed Management Area (WMA), are summarized in this appendix. The full WMAA will be attached as an appendix to the forthcoming *BMP Design Manual*, currently in development under direction from the Responsible Parties.

In development of the Offsite Alternative Compliance Program framework, Responsible Parties began with research of potential benefits and barriers to program implementation, as summarized in Sections J.1 and J.2. The sections following that discussion outline the selection of candidate sites and the program implementation schedule.

J.1 ALTERNATIVE COMPLIANCE PROGRAM BENEFITS

The 2013 MS4 Permit (Permit) requirements will result in more priority development projects (PDPs), stricter criteria for onsite storm water retention, and larger hydromodification management facilities as compared to the 2007 Permit. The Responsible Parties identified these factors as driving the need for offsite alternative compliance program implementation in the San Diego Bay WMA.

Alternative compliance methods can be implemented at the subwatershed scale (such as regional detention BMPs) or as green infrastructure BMPs (such as green streets). Regardless of scale, the Responsible Parties acknowledged that offsite alternative compliance BMPs provide the opportunity to mitigate for pollutants not reliably retained on the project site or hydromodification impacts not reliably mitigated onsite per requirements detailed in Permit Sections E.3.c.(1) and E.3.c.(2). Note that onsite treatment control BMPs will still be required, though such BMPs would not be required to meet the onsite retention requirements.

Offsite alternative compliance methods can provide enhanced pollutant load reduction benefits for the watershed. For instance, facilities can be designed and customized to maximize targeted pollutant load reductions. If the facilities are located offsite and capable of filtering pollutants from larger contributing watershed areas, the pollutant removal effectiveness can be enhanced. Thus, such facilities could be used as part of

total maximum daily load (TMDL) reduction strategies implemented at the watershed level.

Offsite alternative compliance BMPs provide a method for achieving compliance which might not otherwise be feasible. In some cases, implementation of offsite alternative compliance facilities may provide for a more cost-effective solution or a solution that is more effective in overall watershed pollutant removal. Specific emphasis should be placed on identifying projects that provide multi-jurisdictional benefits.

J.2 ALTERNATIVE COMPLIANCE PROGRAM IMPLEMENTATION BARRIERS

Implementation of an offsite alternative compliance program will require updates to jurisdictional ordinances and development of funding mechanisms, water quality credit systems, and payment structures. Funding options, which are outlined in Table J-1, should be developed to minimize jurisdictional financial risk and to guarantee funding of long-term maintenance activities at the offsite alternative compliance facility. The options should include provisions of jurisdictional responsibility in the event that planned projects do not move forward or projects do not meet funding responsibility after occupancy.

Table J-1 Funding Methods for Offsite Alternative Compliance Candidate Projects

Funding Option	Comment
In-lieu funding of candidate projects	Project applicant must follow the BMP construction and long-term maintenance payment structure to be developed by the jurisdiction.
Funding and construction of BMP water quality credits	Project applicant must follow the water quality credit structure and BMP construction and long-term maintenance payment structure to be developed by the jurisdiction. This could include a process for water quality credit banking and trading.
Funding to offset temporal mitigation of pollutant loads prior to construction of alternative compliance project	Project applicant must follow the temporal loading payment structure to be developed by the jurisdiction.

For Responsible Parties to move forward with offering offsite alternative compliance options to land development applicants, it will be necessary to reduce sources of financial risk, public liability risk, and compliance risk through legal agreements and other mechanisms.

The Permit specifies a timing element regarding the amount of time that may lapse between the completion of development project construction and completion of construction for the offsite mitigation. Programs will need to establish some assurance that the development applicant will meet that timeline and that the Responsible Agency will not be subject to enforcement actions caused by the development applicant's failure

to meet the timeline. A program must be established with sufficient staffing to prevent delays in approvals, funding releases, or contract procurement required by the Responsible Agency to facilitate implementation of the offsite compliance. Provisions must be outlined regarding how Copermittees or private applicants will assume responsibility for proportional completions of large and complex projects, including mechanisms or how local jurisdictions will collect and aggregate private development impact fees.

For private development, the Responsible Agency review process provides some assurance that the permanent BMPs are properly designed and constructed to comply with the performance requirements of the Permit. However, the developer and subsequent owner can be held responsible for corrective work if the BMPs are subsequently determined to be out of compliance with performance requirements of the Permit. It will be necessary to give Responsible Parties the same level of protection for any offsite BMPs used as compliance credit for the development project.

Bonding mechanisms can protect the Responsible Parties from abandoned projects or other issues that could affect the private development. Similar mechanisms would need to be established for offsite BMPs if the Responsible Agency is relying on the development applicant to supply funds or provide construction.

There are public liability risks associated with any public improvements including the offsite BMPs as well as any associated improvements, such as sidewalks and traffic lanes for the alternative compliance site. Responsible Parties will need to establish measures that prevent additional risk associated with the introduction of Green Infrastructure into public spaces and having a private entity design and construct non-standard designs within public lands and right-of-ways. One measure could include the development of new design standards and standard drawings specific to Green Infrastructure in public spaces.

The obligation to maintain any offsite BMPs is essentially “into perpetuity.” Therefore, it will be necessary for Responsible Parties to have durable mechanisms in place that can assure private development financing of maintenance well into the future. Historically, some mechanisms, such as homeowner associations and maintenance assessment districts, have not always proven to be durable over long periods of time including the possibility of severe downturns in the economy. Proper maintenance of BMP facilities is essential to provide for the intended BMP function and to prevent health concerns resulting from potential vector issues.

Possible alternative compliance arrangements could include public-to-public (where a public agency is both the project owner and the owner of the land with the offsite BMP), private-to-private, and private-to-public. The mechanisms needed for a public-to-public arrangement, particularly if both sites are within the same agency, are much less than what might be required for private-to-public. Therefore, some Responsible Parties might be able to exercise alternative compliance in a public-to-public arrangement before all of the assurance mechanisms necessary for private-to-public arrangements are in place.

Per Permit requirements, offsite alternative compliance facilities must be constructed within the San Diego Bay WMA and provide for a greater water quality benefit, as compared to implementation of structural BMPs at the project site. To assess the water quality benefit metric, the jurisdiction must either develop or adopt water quality equivalency standards. Development of these equivalency standards, which represents another barrier to program implementation, has begun at the regional level between representatives of the City of San Diego, the County of San Diego, Orange County, and Riverside County. Equivalency calculations will provide the metric by which watershed improvement is demonstrated.

J.3 SELECTION OF CANDIDATE PROJECTS

Per Permit Section B.3.b.(4)(a), the WMAA must include geographic information system (GIS) mapping layers to characterize the watershed functions detailed in Table J-2. The Responsible Parties have compiled these layers for potential use in selecting candidate project sites. Such detailed information provides for initial project planning guidance, but should be field verified since much of the information was generated using desktop methods.

Table J-2 WMAA GIS Mapping Layers

GIS Mapping Layer	Potential Use
Dominant hydrologic processes	Identify areas prone to overland flow or infiltration.
Existing stream condition	Identify stream bed material, geomorphic processes, flow regime.
Coarse sediment yield areas	Identify buffer areas to minimize reduction in sediment supply and subsequent hydromodification impacts.
Current and future land uses	Determine the developable footprint.
Existing channel structures	Identify flood control channels, grade control structures, and detention facilities that can significantly affect watershed response.

Within the San Diego Bay watershed, detailed stream assessments were prepared for Chollas Creek, Sweetwater River Reach 1 (San Diego Bay to Sweetwater Reservoir), Sweetwater River Reach 2 (Sweetwater Reservoir to Loveland Reservoir), Otay River, and Jamul/Dulzura Creek.

In addition to allowing for offsite alternative compliance program development, the WMAA findings can also help determine the feasibility of candidate projects for offsite alternative compliance implementation (Permit Section B.3.b.(4)(b)). Responsible Parties are currently compiling a list of candidate projects that will include projects previously identified in Comprehensive Load Reduction Plans (CLRPs), Jurisdictional Runoff Management Plans (JRMPs), and other regulatory documents. The numeric goals of the San Diego Bay WMA are also being considered in candidate project selection. Consistent with the Permit, project types being considered are detailed in Table J-3.

Table J-3 Candidate Project Types

Project Type	Potential Mitigation Provided
Infrastructure retrofits	Best management practice (BMP) pollutant mitigation Hydromodification management
Green streets	BMP pollutant mitigation Hydromodification management
Regional BMPs	BMP pollutant mitigation Hydromodification management Floodplain management
Stream rehabilitation or restoration	Hydromodification management Floodplain management Natural water quality filtering
Riparian habitat rehabilitation or restoration	Biological resources
Groundwater recharge and water supply augmentation	Water resources BMP Pollutant mitigation Hydromodification management
Floodplain buffer land acquisition	Floodplain management Open space preservation Natural water quality filtering

This appendix and the Water Quality Improvement Plan will be updated to include the final candidate project list for future drafts, as that list is made available. The candidate project list will remain open to augmentation as Copermittees or private applicants identify additional opportunities.

Responsible Parties will use the results of the WMAA to develop the formal Offsite Alternative Compliance Program. As part of program development, Responsible Parties will need to identify funding mechanisms, develop payment and credits structures, formulate water quality equivalency standards, and implement required ordinance updates. Consideration will also focus on the potential roles of regulatory agencies, such as the U.S. Army Corps of Engineers and the State Department of Fish and Wildlife, in helping to implement offsite alternative compliance facilities.

J.4 ALTERNATIVE COMPLIANCE IMPLEMENTATION SCHEDULE

Table J-4 summarizes milestones regarding the WMAA and potential Offsite Alternative Compliance Program initiation.

Table J-4 WMAA and Alternative Compliance Program Implementation

Milestone	Date	Completion
WMAA public outreach effort	July 2014 to September 2014	Yes
Watershed-specific WMAA GIS layers provided to WQIP groups	September 2014	Yes
Watershed specific WMAAs provided to WQIP groups	October 2014	Yes
Draft WQIP candidate project list	October 2014	Yes
BMP Design Manual submittal (with WMAA as attachment)	June 2015	
Final WQIP submittal with watershed-specific WMAA attached	June 2015	
Submittal of final list of WQIP candidate projects	June 2015	
Water quality equivalency standards—final document	December 2015	
First potential approval of Offsite Alternative Compliance Program	To be determined	

J.5 SAN DIEGO BAY WMAA REPORT AND ATTACHMENTS

The San Diego Bay WMAA report and attachments are included as Attachments J-1 and J-2. These documents were developed as part of a regional Copermitttee effort and included a call for data for information to be included in the analysis. The WMAA documents were developed following criteria set forth in the MS4 Permit. Data included in the documents are intended for guidance purposes. When more site specific data is available, the more detailed information should be used.

The WMAA also provides an assessment of applicable exemptions to hydromodification management requirements, in addition to the Permit's allowed exemptions regarding direct discharges to exempt receiving waters including San Diego Bay, lakes, or reservoirs (or direct discharges to underground storm drains or concrete-lined channels directly discharging to San Diego Bay). For the San Diego Bay watershed, hydromodification exemptions are recommended for direct discharges to the Sweetwater River Reach 1 (between San Diego Bay and Sweetwater Reservoir), and for the Otay River between San Diego Bay and Interstate 805. No additional potential exemptions are recommended with regard to stabilized conveyances, highly impervious watersheds, or tidally-influenced lagoons.

Draft candidate project lists currently available are provided in Attachment J-3. The Water Quality Improvement Plan will be updated to include the final candidate project list, as that list is made available.

APPENDIX J. WMA ALTERNATIVE COMPLIANCE PROGRAM OVERVIEW

The Watershed Management Area Analysis (Attachments J-1 and J-2, pages J-7 to J-146) are provided in Electronic Version only.

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Project Identifier	Watershed Management Area	Jurisdiction	Ownership		Project Location				Project Size & Parameters				Other Notes
			Owner Information	Address	APN	Latitude (X-Coordinate)	Longitude (Y-Coordinate)	Contributing Drainage Area (acres)	Parcel Size (acres)	Project Footprint (acres)	Parameters (with units as necessary)		
Public Parcels Identified as Suitable for Further Assessment to Determine Feasibility of Retrofitting with Green Infrastructure													
Parcels on this list that are 0.25 acres or greater have been assessed using broad assumptions necessary for computer modeling and were found to be potentially effective as an opportunity for contributing to load reduction goals. Considerable further assessment would be required before determining any of these sites to be viable retrofit sites for implementation of Green Infrastructure. That assessment includes verifying public ownership, determining if land use agreements and financing can be established, assessing feasibility based upon further investigation of physical site constraints at a project design level, and determining that construction and necessary approvals, including approvals from regulatory agencies other than the City of San Diego, can be completed within the time constraints in the Municipal Storm Water Permit that pertain to Alternative Compliance.													
1	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4774900300 47749	6308163.79165121	1847315.49213554	TBD	55.95	TBD	TBD	TBD	TBD
2	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5834001700	6322642.22823807	1837110.96043261	TBD	9.27	TBD	TBD	TBD	TBD
3	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4714023000	6302432.41154181	1854512.55101967	TBD	6.65	TBD	TBD	TBD	TBD
4	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5810601300	6317920.14101291	1840355.21876514	TBD	7.77	TBD	TBD	TBD	TBD
5	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4714222800	6303702.05737099	1854491.89574020	TBD	7.78	TBD	TBD	TBD	TBD
6	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4722712400 4722	6305076.63571853	1854236.86292751	TBD	5.88	TBD	TBD	TBD	TBD
7	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4742801700	6315776.28377000	1854032.29942100	TBD	0.16	TBD	TBD	TBD	TBD
8	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4716520500 4716	6300221.00604964	1852469.08170506	TBD	9.41	TBD	TBD	TBD	TBD
9	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4722100400 4722	6307734.63605171	1855157.07249383	TBD	27.27	TBD	TBD	TBD	TBD
10	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5491110800	6309453.28945452	1838843.65591611	TBD	0.95	TBD	TBD	TBD	TBD
11	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5810602100	6318224.32465950	1840343.09259259	TBD	5.67	TBD	TBD	TBD	TBD
12	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4760923000	6299330.26910209	1850570.48593975	TBD	6.31	TBD	TBD	TBD	TBD
13	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5501701700 5501	6293175.50000000	1834031.32716049	TBD	1.29	TBD	TBD	TBD	TBD
14	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4476123600	6296951.34977687	1852632.45529333	TBD	7.04	TBD	TBD	TBD	TBD
15	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5473110100 5473	6302420.12596618	1838057.37037037	TBD	1.92	TBD	TBD	TBD	TBD
16	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4714612300	6300149.56025701	1854086.51164094	TBD	0.25	TBD	TBD	TBD	TBD
17	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5491020700 5491	6313186.12274909	1839520.27160494	TBD	0.39	TBD	TBD	TBD	TBD
18	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4713011200	6301306.03458332	1854994.29325790	TBD	0.07	TBD	TBD	TBD	TBD
19	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5474032700 5476	6298979.80686657	1835985.02715130	TBD	0.27	TBD	TBD	TBD	TBD
20	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4716630100	6301089.43428564	1852593.09017057	TBD	6.32	TBD	TBD	TBD	TBD
21	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5410700100	6300901.98715887	1845283.67119255	TBD	0.18	TBD	TBD	TBD	TBD
22	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4675420700	6311638.12950395	1857588.70724691	TBD	1.14	TBD	TBD	TBD	TBD
23	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5812901100	6317588.07400038	1836691.97475682	TBD	0.56	TBD	TBD	TBD	TBD
24	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5476004700 5474	6302506.21782202	1835350.40134864	TBD	40.42	TBD	TBD	TBD	TBD
25	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4547621200	6298117.42466931	1854066.11111111	TBD	5.60	TBD	TBD	TBD	TBD
26	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4714321900	6304579.31033034	1854590.87733339	TBD	0.14	TBD	TBD	TBD	TBD
27	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4714020800	6302143.12491611	1854535.49141477	TBD	0.14	TBD	TBD	TBD	TBD
28	SDB - Chollas	City of San Diego	Central S D H C F N M A L L C	TBD	4472422300	6295383.08852145	1855337.76737389	TBD	0.14	TBD	TBD	TBD	TBD
29	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5464300400	6297973.18470094	1834909.24441138	TBD	6.27	TBD	TBD	TBD	TBD
30	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5424800900	6304715.80761563	1841181.38116475	TBD	0.25	TBD	TBD	TBD	TBD
31	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5510803500 5510	6299186.62325200	1834192.73020400	TBD	1.27	TBD	TBD	TBD	TBD
32	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4712410900	6300497.67666461	1855096.33129026	TBD	0.15	TBD	TBD	TBD	TBD

33	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4712510500	6301188.92383047	1855392.49967468	TBD	TBD	0.14	TBD	TBD
34	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4538110100	6293781.07842333	1848918.40740741	TBD	TBD	7.62	TBD	TBD
35	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5461750100	6294189.37613036	1836175.03701751	TBD	TBD	1.85	TBD	TBD
36	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4713920700	6301483.99263174	1854596.42030339	TBD	TBD	0.14	TBD	TBD
37	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5455210900	6292150.28066420	1836697.08024691	TBD	TBD	0.16	TBD	TBD
38	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4463842500	6292880.11505922	1854014.74957699	TBD	TBD	0.31	TBD	TBD
39	SDB - Chollas	City of San Diego	Central S D H C F N A L L C	TBD	4464332500	6292842.93808917	1853810.21172118	TBD	TBD	0.17	TBD	TBD
40	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5507804000	6294433.19193600	1832653.34665100	TBD	TBD	2.72	TBD	TBD
41	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5480403900	6304910.90634516	1839116.97801122	TBD	TBD	0.59	TBD	TBD
42	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4674900300	6313322.24980421	1858577.23581306	TBD	TBD	7.37	TBD	TBD
43	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4725010700.47250	6306236.53136869	1853109.39611542	TBD	TBD	0.30	TBD	TBD
44	SDB - Chollas	City of San Diego	San Diego Metropolitan Transit Development Board	TBD	5480201900.54802	6304504.12048885	1839138.03042861	TBD	TBD	2.45	TBD	TBD
45	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4476123700	6296591.34450217	1852484.92306331	TBD	TBD	1.89	TBD	TBD
46	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4714912700	6302282.58929843	1854099.09513882	TBD	TBD	0.14	TBD	TBD
47	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4474913100	6297317.04450800	1853545.17984300	TBD	TBD	0.27	TBD	TBD
48	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4674900400	6312494.98218359	1858252.74013411	TBD	TBD	1.96	TBD	TBD
49	SDB - Chollas	City of San Diego	Redevelopment Agency Of City Of San Diego	TBD	4474311100	6297179.43384005	1853909.8642859	TBD	TBD	0.17	TBD	TBD
50	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5480101600	6303590.09479680	1840041.16317826	TBD	TBD	4.10	TBD	TBD
51	SDB - Chollas	City of San Diego	Central S D H C F N A L L C	TBD	4471812300	6295728.15683950	1856107.28899522	TBD	TBD	0.14	TBD	TBD
52	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5810951800	6319877.86425918	1840149.25814804	TBD	TBD	0.12	TBD	TBD
53	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5512001600.55120	6297564.30178000	1833202.99606200	TBD	TBD	1.21	TBD	TBD
54	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5492400800	6310770.09738674	1837031.91351499	TBD	TBD	9.41	TBD	TBD
55	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4721611300	6304789.96162501	1854857.00061418	TBD	TBD	0.07	TBD	TBD
56	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4732804100	6310577.97949882	1854353.26387737	TBD	TBD	0.12	TBD	TBD
57	SDB - Chollas	City of San Diego	Central S D H C F N A L L C	TBD	4464332400	6292845.27027339	1853758.64710301	TBD	TBD	0.17	TBD	TBD
58	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	5455422300	6293400.48014500	1836642.86499000	TBD	TBD	2.64	TBD	TBD
59	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5811901000	6315853.00096340	1839214.16049383	TBD	TBD	0.19	TBD	TBD
60	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4714500900	6306055.70173567	1847359.80128172	TBD	TBD	7.20	TBD	TBD
61	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5455910100	6290110.50051805	1835445.64340743	TBD	TBD	18.33	TBD	TBD
62	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4764911700.47649	6300249.555990778	1847889.81481680	TBD	TBD	0.57	TBD	TBD
63	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5505201900	6293843.79849272	1832266.08468506	TBD	TBD	0.39	TBD	TBD
64	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5813202100	6317978.99727365	1836993.29293827	TBD	TBD	7.04	TBD	TBD
65	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4721611200	6304790.41654112	1854882.00185634	TBD	TBD	0.07	TBD	TBD
66	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5512313500	6297589.47161747	1832879.73410519	TBD	TBD	0.18	TBD	TBD
67	SDB - Chollas	City of San Diego	San Diego Metropolitan Transit Development Board	TBD	5481210200	6309025.91572072	1838846.29487347	TBD	TBD	0.14	TBD	TBD
68	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4713212700	6302996.00532283	1855441.29540480	TBD	TBD	0.12	TBD	TBD
69	SDB - Chollas	City of San Diego	Central S D H C F N A L L C	TBD	4474712500	6295796.41683686	1853358.33687735	TBD	TBD	0.17	TBD	TBD
70	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4547521500.45475	6297933.39157129	1854338.65089522	TBD	TBD	0.56	TBD	TBD
71	SDB - Chollas	City of San Diego	San Diego Redevelopment Agency	TBD	4547631500.45476	6298278.47550588	1853705.56407160	TBD	TBD	0.81	TBD	TBD
72	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5810404600	6316791.40397169	1840357.06694378	TBD	TBD	0.01	TBD	TBD
73	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4776900100	6306383.79243533	1848313.85802469	TBD	TBD	0.86	TBD	TBD
74	SDB - Chollas	City of San Diego	Central S D H C F N A L L C	TBD	4474021000	6295263.31066077	1853998.65187169	TBD	TBD	0.16	TBD	TBD
75	SDB - Chollas	City of San Diego	Central S D H C F N A L L C	TBD	4474112400	6295810.17136689	1854065.65611683	TBD	TBD	0.16	TBD	TBD
76	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4713920800	6301483.23834666	1854533.94506678	TBD	TBD	0.10	TBD	TBD
77	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4764912400	6300255.16863736	1848203.21246497	TBD	TBD	0.16	TBD	TBD
78	SDB - Chollas	City of San Diego	San Diego Metropolitan Transit Development Board	TBD	5490712100.54907	6311616.34944541	1839396.39023403	TBD	TBD	1.70	TBD	TBD
79	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4720410700	6306081.80650438	1856172.82405368	TBD	TBD	0.20	TBD	TBD
80	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5454922900	6305189.72696022	1841000.16919403	TBD	TBD	0.02	TBD	TBD
81	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5510501100	6298560.03400000	1833403.16900000	TBD	TBD	1.37	TBD	TBD
82	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4717323400.47173	6299824.69970384	1851972.08377683	TBD	TBD	0.36	TBD	TBD
83	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5452402100	6293571.82738493	1839147.83530945	TBD	TBD	0.25	TBD	TBD

84	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4472601600	6296660.00978388	1855325.02469136	TBD	11.59	TBD	TBD	TBD
85	SDB - Chollas	City of San Diego	State Of California	TBD	5430241300	6302003.69565559	1837313.61002308	TBD	0.26	TBD	TBD	TBD
86	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5810202700	6316227.82597809	1840122.36535951	TBD	0.03	TBD	TBD	TBD
87	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4720410600	6306159.95267667	1856201.03474208	TBD	0.24	TBD	TBD	TBD
88	SDB - Chollas	City of San Diego	San Diego Community College District	TBD	4754611400	6300343.84336918	1835376.54579734	TBD	1.79	TBD	TBD	TBD
89	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5831320100	6322151.42929177	1839197.17632923	TBD	0.15	TBD	TBD	TBD
90	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4764912200	6300251.30924571	1848103.40236070	TBD	0.15	TBD	TBD	TBD
91	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5481422000 54814	6303865.33375000	1837133.50950000	TBD	0.36	TBD	TBD	TBD
92	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4774011800	6294971.07978370	1854160.84241955	TBD	4.64	TBD	TBD	TBD
93	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4773413500	6307531.71694841	1848711.62962963	TBD	3.65	TBD	TBD	TBD
94	SDB - Chollas	City of San Diego	Central S D H C F N M A L L C	TBD	4473422800	6296202.68182768	1854777.33127878	TBD	0.16	TBD	TBD	TBD
95	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5510601500	6298715.39105611	1834659.99226152	TBD	1.82	TBD	TBD	TBD
96	SDB - Chollas	City of San Diego	San Diego Metropolitan Transit Development Board	TBD	5472005300	6301969.13044953	1838496.15736042	TBD	0.14	TBD	TBD	TBD
97	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5500610500	6293324.71268657	1834379.50000000	TBD	0.10	TBD	TBD	TBD
98	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4763531000	6298646.38591607	1848349.60493827	TBD	0.40	TBD	TBD	TBD
99	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5442023100	6313359.60907758	1840592.93470600	TBD	0.81	TBD	TBD	TBD
100	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4713010900	6301304.68550000	1854919.27500000	TBD	0.07	TBD	TBD	TBD
101	SDB - Chollas	City of San Diego	City Of San Diego Redevelopment Agency	TBD	4714524000	6299778.95338121	1853932.25178368	TBD	0.12	TBD	TBD	TBD
102	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5450612800 54506	6293265.77500495	1841036.92592593	TBD	0.32	TBD	TBD	TBD
103	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4765804400	6304270.01746440	1848740.86024088	TBD	0.60	TBD	TBD	TBD
104	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5470311600	6300628.55724634	1840273.51716478	TBD	2.97	TBD	TBD	TBD
105	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4713011100	6301305.58500000	1854969.28750000	TBD	0.07	TBD	TBD	TBD
106	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4715300100	6304401.92087378	1853757.10850000	TBD	0.13	TBD	TBD	TBD
107	SDB - Chollas	City of San Diego	United States Of America	TBD	5505001300 55050	6292657.95205447	1830808.38366049	TBD	5.10	TBD	TBD	TBD
108	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5513422800	6298365.49837345	1831742.30459967	TBD	0.16	TBD	TBD	TBD
109	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4547632900	6298418.91942062	1854192.14776382	TBD	0.05	TBD	TBD	TBD
110	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4547632900	6293947.88893867	1853642.83333333	TBD	0.13	TBD	TBD	TBD
111	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4773413400	6306171.93584708	1848836.83095258	TBD	0.25	TBD	TBD	TBD
112	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4674841500	6312962.86894874	1858677.68778395	TBD	0.44	TBD	TBD	TBD
113	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5405401900 5404	6294867.24425559	1843399.28965093	TBD	2.40	TBD	TBD	TBD
114	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4541613100	6297886.41352367	1851976.20090880	TBD	0.37	TBD	TBD	TBD
115	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5414603300	6302877.19199870	1841373.37812195	TBD	26.12	TBD	TBD	TBD
116	SDB - Chollas	City of San Diego	City Of San Diego Redevelopment Agency	TBD	4474310600	6297182.05192778	1854140.51844343	TBD	0.16	TBD	TBD	TBD
117	SDB - Chollas	City of San Diego	City Of San Diego Redevelopment Agency	TBD	5482423000	6304334.63350000	1836802.40350001	TBD	1.13	TBD	TBD	TBD
118	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4773413400	6306171.93584708	1848836.83095258	TBD	0.25	TBD	TBD	TBD
119	SDB - Chollas	City of San Diego	City Of San Diego Redevelopment Agency	TBD	4547631400	6298303.56488948	1853780.69185010	TBD	0.23	TBD	TBD	TBD
120	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4717201400	6299025.30039804	1851741.02305680	TBD	0.18	TBD	TBD	TBD
121	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5412351000	6302578.38939010	1844009.42592593	TBD	9.55	TBD	TBD	TBD
122	SDB - Chollas	City of San Diego	Pacific Bell Telephone Co	TBD	4474121300	6296144.07458703	1853758.24724275	TBD	0.13	TBD	TBD	TBD
123	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4713011000	6301305.13442455	1854944.28153230	TBD	0.07	TBD	TBD	TBD
124	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5481210300	6308709.47407426	1838777.03299049	TBD	0.95	TBD	TBD	TBD
125	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4762910800	6300081.87132976	1849234.71668653	TBD	0.09	TBD	TBD	TBD
126	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4762910700	6300080.76521216	1849272.78383210	TBD	0.08	TBD	TBD	TBD
127	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4544813100	6296860.89048156	1848997.65059630	TBD	0.16	TBD	TBD	TBD
128	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5500110100	6289820.05266204	1834659.05555556	TBD	0.20	TBD	TBD	TBD
129	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4720221200	6305882.54596959	1856516.87654321	TBD	0.84	TBD	TBD	TBD
130	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5810935600	6320372.78856344	1840325.30447529	TBD	0.15	TBD	TBD	TBD
131	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5424800300	6304301.83442575	1841394.42720374	TBD	1.07	TBD	TBD	TBD
132	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5475202700	6298375.38550699	1835467.55614377	TBD	0.64	TBD	TBD	TBD
133	SDB - Chollas	City of San Diego	City Of San Diego Redevelopment Agency	TBD	5481500700	6304313.85002819	1837139.25243210	TBD	0.26	TBD	TBD	TBD
134	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4717202200	6299185.50019568	1851788.77290998	TBD	0.16	TBD	TBD	TBD

135	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5495830100	6309315.95503840	1836276.37647840	TBD	4.88	TBD	TBD	TBD
136	SDB - Chollas	City of San Diego	City Of San Diego Redevelopment Agency	TBD	5516301000	6298892.34221176	1832869.32657257	TBD	0.02	TBD	TBD	TBD
137	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5452400400	6293681.88029019	1839430.0962453	TBD	0.03	TBD	TBD	TBD
138	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5394843600	6291261.21675272	1842423.91298738	TBD	0.59	TBD	TBD	TBD
139	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4544820900	6297084.67430521	1849122.72501056	TBD	0.32	TBD	TBD	TBD
140	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5424801600	6304713.47491006	1841094.86322632	TBD	0.32	TBD	TBD	TBD
141	SDB - Chollas	City of San Diego	United States Of America	TBD	5504800100	6290201.78795261	1832524.25925926	TBD	2.06	TBD	TBD	TBD
142	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5471023800	6292644.14767829	1839636.51614014	TBD	0.22	TBD	TBD	TBD
143	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	5391621100	6291650.62643537	1845533.21921266	TBD	0.16	TBD	TBD	TBD
144	SDB - Chollas	City of San Diego	San Diego Metropolitan Transit Development Board	TBD	5481210400	6308757.81287010	1838868.79241216	TBD	0.26	TBD	TBD	TBD
145	SDB - Chollas	City of San Diego	City Of San Diego Redevelopment Agency	TBD	5516300900	6299098.61350000	1833039.48549999	TBD	0.02	TBD	TBD	TBD
146	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5395003500	6292931.11255540	1842167.27377597	TBD	4.16	TBD	TBD	TBD
147	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4774401500	6307792.45311782	1848315.15075979	TBD	1.72	TBD	TBD	TBD
148	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5461401100	6295327.43767746	1839274.18086027	TBD	7.29	TBD	TBD	TBD
149	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5453330700	6293480.80092593	1838902.85802469	TBD	0.84	TBD	TBD	TBD
150	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5462710100	6295067.99170841	1835950.92610518	TBD	0.12	TBD	TBD	TBD
151	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4465130100	6293644.36250000	1851578.25000000	TBD	0.02	TBD	TBD	TBD
152	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5441910600	6312012.68681143	1841003.18760825	TBD	0.34	TBD	TBD	TBD
153	SDB - Chollas	City of San Diego	City Of San Diego(Memorial Park)	TBD	5455920100	6290740.66586294	1835458.66666667	TBD	17.98	TBD	TBD	TBD
154	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5424201000	6303728.08429723	1841787.32646483	TBD	3.66	TBD	TBD	TBD
155	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5456730700	6292759.00000000	1834743.29012346	TBD	0.06	TBD	TBD	TBD
156	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5512310500	6297387.48830548	1832879.84900322	TBD	0.18	TBD	TBD	TBD
157	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5504623100	6296589.78589707	1832778.34567901	TBD	0.19	TBD	TBD	TBD
158	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5504624600	6296403.41276700	1832740.73898500	TBD	0.31	TBD	TBD	TBD
159	SDB - Chollas	City of San Diego	City Of San Diego Redevelopment Agency	TBD	5506007300	6295054.01394712	1832174.40123457	TBD	0.01	TBD	TBD	TBD
160	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5480602400	6308017.66523800	1838707.19957300	TBD	0.63	TBD	TBD	TBD
161	SDB - Chollas	City of San Diego	Central S D H C F N M A L L C	TBD	5391710600	6292019.00894406	1845898.64606525	TBD	0.16	TBD	TBD	TBD
162	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5811903300	6316345.10488305	1839141.01681205	TBD	0.04	TBD	TBD	TBD
163	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5386200300	6288990.47465887	1834811.75925926	TBD	1.64	TBD	TBD	TBD
164	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5480602500	6308174.35466500	1838725.18031400	TBD	0.64	TBD	TBD	TBD
165	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5383603600	6288432.50876620	1835864.82033615	TBD	4.11	TBD	TBD	TBD
166	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4735802700	6313284.54743363	1852394.38817278	TBD	0.06	TBD	TBD	TBD
167	SDB - Chollas	City of San Diego	United States Postal Service	TBD	5480602000	6307099.53306450	1838791.78417496	TBD	3.89	TBD	TBD	TBD
168	SDB - Chollas	City of San Diego	San Diego Metropolitan Transit Development Board	TBD	5453911900	6292826.34595866	1837685.45444535	TBD	0.28	TBD	TBD	TBD
169	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4464934200	6293584.00071473	1852118.56167284	TBD	0.01	TBD	TBD	TBD
170	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5453911500	6292557.15564591	1837700.04601235	TBD	0.02	TBD	TBD	TBD
171	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4464932600	6293572.57699620	1852131.71648350	TBD	0.02	TBD	TBD	TBD
172	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4546122500	6297206.94062288	1848211.96994102	TBD	0.23	TBD	TBD	TBD
173	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5480602300	6307871.25059200	1838689.21883200	TBD	0.85	TBD	TBD	TBD
174	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5456615100	6292108.18445335	1834967.25110629	TBD	6.49	TBD	TBD	TBD
175	SDB - Chollas	City of San Diego	United States Of America	TBD	5504910100	6290752.00000000	1832521.45061728	TBD	3.92	TBD	TBD	TBD
176	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	5504211000	6290802.84357176	1833280.54665436	TBD	0.17	TBD	TBD	TBD
177	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5471020400	6292020.91646574	1839637.45997623	TBD	0.06	TBD	TBD	TBD
178	SDB - Chollas	City of San Diego	Nextel Of California Inc <L>- Arya Santosh K&Saroj	TBD	5473242100	6301969.63627900	1837266.56380700	TBD	0.00	TBD	TBD	TBD
179	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5503603600	6294436.73911500	1833166.91049600	TBD	0.00	TBD	TBD	TBD
180	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5475202900	6298681.42454100	1834973.91547600	TBD	0.01	TBD	TBD	TBD
181	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5471020200	6299140.90883327	1839638.68257798	TBD	0.11	TBD	TBD	TBD
182	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5471020300	6299177.62681978	1839637.98159085	TBD	0.06	TBD	TBD	TBD
183	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5450620300	6293029.15300867	1840900.11106161	TBD	0.25	TBD	TBD	TBD
184	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5512310200	6297089.63874132	1832917.64810750	TBD	0.18	TBD	TBD	TBD
185	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5476254600	6299436.52437285	1835852.01045325	TBD	0.23	TBD	TBD	TBD

186	SDB - Chollas	City of San Diego	City of San Diego	TBD	5453911300	6292675.47942765	1837847.22750617	TBD	0.03	TBD	TBD	TBD	TBD
187	SDB - Chollas	City of San Diego	City of San Diego	TBD	5481422100	6303829.75500000	1837133.18574999	TBD	0.28	TBD	TBD	TBD	TBD
188	SDB - Chollas	City of San Diego	City of San Diego	TBD	5507803900	6294944.45023395	1832495.46147994	TBD	0.12	TBD	TBD	TBD	TBD
189	SDB - Chollas	City of San Diego	City of San Diego	TBD	5512310100	6297024.69491857	1832898.67415742	TBD	0.05	TBD	TBD	TBD	TBD
190	SDB - Chollas	City of San Diego	City of San Diego	TBD	5504621200	6296685.90186081	1832829.65914690	TBD	0.15	TBD	TBD	TBD	TBD
191	SDB - Chollas	City of San Diego	City of San Diego	TBD	5470121200	6290909.84495076	1839813.54623670	TBD	0.08	TBD	TBD	TBD	TBD
192	SDB - Chollas	City of San Diego	City of San Diego	TBD	5470121400	6299243.84069348	1839810.88730090	TBD	0.10	TBD	TBD	TBD	TBD
193	SDB - Chollas	City of San Diego	City of San Diego	TBD	5512310400	6297335.99113676	1832880.03687609	TBD	0.16	TBD	TBD	TBD	TBD
194	SDB - Chollas	City of San Diego	City of San Diego	TBD	5504622600	6296794.27464303	1832787.98765432	TBD	0.02	TBD	TBD	TBD	TBD
195	SDB - Chollas	City of San Diego	San Diego Metropolitan Transit Development Board	TBD	5472005100	6301785.18931723	1838231.23654843	TBD	0.11	TBD	TBD	TBD	TBD
196	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5425630600	6304484.14285500	1840373.79364400	TBD	0.03	TBD	TBD	TBD	TBD
197	SDB - Chollas	City of San Diego	City of San Diego	TBD	5470121200	6299146.61929587	1839812.66046346	TBD	0.11	TBD	TBD	TBD	TBD
198	SDB - Chollas	City of San Diego	City of San Diego Redevelopment Agency	TBD	5511502700	6299252.52144489	1833095.78860576	TBD	0.01	TBD	TBD	TBD	TBD
199	SDB - Chollas	City of San Diego	City of San Diego	TBD	5470121300	6299197.12297393	1839811.85422276	TBD	0.10	TBD	TBD	TBD	TBD
200	SDB - Chollas	City of San Diego	San Diego Metropolitan Transit Development Board	TBD	5480601800	6307499.30544722	1838899.18747165	TBD	1.44	TBD	TBD	TBD	TBD
201	SDB - Chollas	City of San Diego	City of San Diego	TBD	5407205100	6294490.08010456	1843148.63580247	TBD	0.08	TBD	TBD	TBD	TBD
202	SDB - Chollas	City of San Diego	City of San Diego	TBD	5411900800	6300990.89660494	1843972.13580247	TBD	0.31	TBD	TBD	TBD	TBD
203	SDB - Chollas	City of San Diego	City of San Diego	TBD	5452320700	6293186.78308490	1839151.74180068	TBD	0.22	TBD	TBD	TBD	TBD
204	SDB - Chollas	City of San Diego	City of San Diego	TBD	5407205000	6294482.82573308	1843193.71089980	TBD	0.05	TBD	TBD	TBD	TBD
205	SDB - Chollas	City of San Diego	City of San Diego	TBD	5407203800	6294523.08027284	1843468.23671987	TBD	0.06	TBD	TBD	TBD	TBD
206	SDB - Chollas	City of San Diego	City of San Diego	TBD	5407203700	6294558.21547283	1843463.31105673	TBD	0.07	TBD	TBD	TBD	TBD
207	SDB - Chollas	City of San Diego	City of San Diego	TBD	5461121100	6294992.47599398	1838772.44975536	TBD	0.08	TBD	TBD	TBD	TBD
208	SDB - Chollas	City of San Diego	City of San Diego	TBD	5407203700	6313919.14224691	1836859.13217862	TBD	0.03	TBD	TBD	TBD	TBD
209	SDB - Chollas	City of San Diego	City of San Diego	TBD	5472702100	6300606.68070509	1837622.94073613	TBD	0.11	TBD	TBD	TBD	TBD
210	SDB - Chollas	City of San Diego	City of San Diego	TBD	5450711800	6294573.19613950	1840921.81427015	TBD	0.08	TBD	TBD	TBD	TBD
211	SDB - Chollas	City of San Diego	City of San Diego	TBD	5480602800	6308485.16440000	1838707.19957300	TBD	0.14	TBD	TBD	TBD	TBD
212	SDB - Chollas	City of San Diego	City of San Diego	TBD	5480901700	6306566.62869910	1838808.76334132	TBD	0.01	TBD	TBD	TBD	TBD
213	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	5502313900	6290356.07393988	1833281.64197531	TBD	0.25	TBD	TBD	TBD	TBD
214	SDB - Chollas	City of San Diego	City of San Diego	TBD	5450711900	6294534.89664579	1840930.51286765	TBD	0.11	TBD	TBD	TBD	TBD
215	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	5502314000	6290278.21695963	1833282.32549286	TBD	0.25	TBD	TBD	TBD	TBD
216	SDB - Chollas	City of San Diego	City of San Diego	TBD	5450713100	6294510.17425550	1840999.80628553	TBD	0.17	TBD	TBD	TBD	TBD
217	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	5433500600	6309770.97911671	1842964.22574958	TBD	0.21	TBD	TBD	TBD	TBD
218	SDB - Chollas	City of San Diego	United States Of America	TBD	5504920300	6290845.96877845	1832148.74171703	TBD	1.05	TBD	TBD	TBD	TBD

Public Parcels Identified as Suitable for Further Assessment to Determine Feasibility of Retrofitting

Parcels on this list have been assessed using broad assumptions necessary for computer modeling and were found to be potentially effective as an opportunity for contributing to load reduction goals. Considerable further assessment would be required before determining any of these sites to be viable retrofit. That assessment includes verifying public ownership, determining if land use agreements and financing can be established, assessing feasibility based upon further investigation of physical site constraints at a project design level, and determining that construction and necessary approvals, including approvals from regulatory agencies other than the City of San Diego, can be completed within the time constraints in the Municipal Storm Water Permit that pertain to Alternative Compliance.

219	SDB - Chollas	City of San Diego	City of San Diego	TBD	4538212800	N/A	N/A	TBD	1.24	TBD	TBD	TBD	Canyon Site
220	SDB - Chollas	City of San Diego	City of San Diego	TBD	5411900400	N/A	N/A	TBD	0	TBD	TBD	TBD	Canyon Site
221	SDB - Chollas	City of San Diego	City of San Diego	TBD	5812001600	N/A	N/A	TBD	5.93	TBD	TBD	TBD	Canyon Site
222	SDB - Chollas	City of San Diego	City of San Diego	TBD	5423331600	N/A	N/A	TBD	29.17	TBD	TBD	TBD	Canyon Site
223	SDB - Chollas	City of San Diego	City of San Diego	TBD	5410800900	N/A	N/A	TBD	3.51	TBD	TBD	TBD	Canyon Site
224	SDB - Chollas	City of San Diego	City of San Diego	TBD	4765810200	N/A	N/A	TBD	5.76	TBD	TBD	TBD	Canyon Site
225	SDB - Chollas	City of San Diego	City of San Diego	TBD	5433000800	N/A	N/A	TBD	33.65	TBD	TBD	TBD	Canyon Site
226	SDB - Chollas	City of San Diego	City of San Diego	TBD	5395612100	N/A	N/A	TBD	0.54	TBD	TBD	TBD	Canyon Site
227	SDB - Chollas	City of San Diego	City of San Diego	TBD	4538010900	N/A	N/A	TBD	0	TBD	TBD	TBD	Canyon Site

228	SDB - Chollas	City of San Diego	City of San Diego	TBD	5811903500	N/A	N/A	TBD	2.86	TBD	TBD	Canyon Site

Project Concept for Green Streets Retrofits – Quantity and Location of Suitable City Streets To-Be-Determined												
The City of San Diego is in the process of identifying potential public street locations that could feasibly be retrofitted with Green Infrastructure and provide a meaningful contribution to pollutant load reduction goals. As locations become verified for feasibility and effectiveness, funding mechanisms under an Alternate Compliance program could potentially be used to fill gaps in construction and maintenance funding necessary for the project to go forward. This is pending the ability to establish suitable legal mechanisms and verify that approvals and construction can be completed within the time constraints in the Municipal Storm Water Permit that pertain to Alternative Compliance.												
229	SDB - Chollas	City of San Diego	City of San Diego	TBD	N/A	N/A	N/A	TBD	101.7	TBD	TBD	Green Street TBD

APPENDIX J. WMA ALTERNATIVE COMPLIANCE PROGRAM OVERVIEW

The 2013 San Diego National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater (MS4) Permit (R9-2013-0001) allows for implementation of offsite alternative compliance methods in lieu of meeting structural best management practice (BMP) design standards and/or hydromodification management criteria on the project site.

To implement an offsite alternative compliance program, a jurisdiction must first complete an optional Watershed Management Area Analysis (WMAA), as detailed in Permit Section B.3.b.(4). The San Diego County Responsible Parties have collectively funded and provided guidance for development of a regional WMAA. Findings of the regional WMAA, specific to the San Diego Bay Watershed Management Area (WMA), are summarized in this appendix. The full WMAA will be attached as an appendix to the forthcoming *BMP Design Manual*, currently in development under direction from the Responsible Parties.

In development of the Offsite Alternative Compliance Program framework, Responsible Parties began with research of potential benefits and barriers to program implementation, as summarized in Sections J.1 and J.2. The sections following that discussion outline the selection of candidate sites and the program implementation schedule.

J.1 ALTERNATIVE COMPLIANCE PROGRAM BENEFITS

The 2013 MS4 Permit (Permit) requirements will result in more priority development projects (PDPs), stricter criteria for onsite storm water retention, and larger hydromodification management facilities as compared to the 2007 Permit. The Responsible Parties identified these factors as driving the need for offsite alternative compliance program implementation in the San Diego Bay WMA.

Alternative compliance methods can be implemented at the subwatershed scale (such as regional detention BMPs) or as green infrastructure BMPs (such as green streets). Regardless of scale, the Responsible Parties acknowledged that offsite alternative compliance BMPs provide the opportunity to mitigate for pollutants not reliably retained on the project site or hydromodification impacts not reliably mitigated onsite per requirements detailed in Permit Sections E.3.c.(1) and E.3.c.(2). Note that onsite treatment control BMPs will still be required, though such BMPs would not be required to meet the onsite retention requirements.

Offsite alternative compliance methods can provide enhanced pollutant load reduction benefits for the watershed. For instance, facilities can be designed and customized to maximize targeted pollutant load reductions. If the facilities are located offsite and capable of filtering pollutants from larger contributing watershed areas, the pollutant removal effectiveness can be enhanced. Thus, such facilities could be used as part of

total maximum daily load (TMDL) reduction strategies implemented at the watershed level.

Offsite alternative compliance BMPs provide a method for achieving compliance which might not otherwise be feasible. In some cases, implementation of offsite alternative compliance facilities may provide for a more cost-effective solution or a solution that is more effective in overall watershed pollutant removal. Specific emphasis should be placed on identifying projects that provide multi-jurisdictional benefits.

J.2 ALTERNATIVE COMPLIANCE PROGRAM IMPLEMENTATION BARRIERS

Implementation of an offsite alternative compliance program will require updates to jurisdictional ordinances and development of funding mechanisms, water quality credit systems, and payment structures. Funding options, which are outlined in Table J-1, should be developed to minimize jurisdictional financial risk and to guarantee funding of long-term maintenance activities at the offsite alternative compliance facility. The options should include provisions of jurisdictional responsibility in the event that planned projects do not move forward or projects do not meet funding responsibility after occupancy.

Table J-1 Funding Methods for Offsite Alternative Compliance Candidate Projects

Funding Option	Comment
In-lieu funding of candidate projects	Project applicant must follow the BMP construction and long-term maintenance payment structure to be developed by the jurisdiction.
Funding and construction of BMP water quality credits	Project applicant must follow the water quality credit structure and BMP construction and long-term maintenance payment structure to be developed by the jurisdiction. This could include a process for water quality credit banking and trading.
Funding to offset temporal mitigation of pollutant loads prior to construction of alternative compliance project	Project applicant must follow the temporal loading payment structure to be developed by the jurisdiction.

For Responsible Parties to move forward with offering offsite alternative compliance options to land development applicants, it will be necessary to reduce sources of financial risk, public liability risk, and compliance risk through legal agreements and other mechanisms.

The Permit specifies a timing element regarding the amount of time that may lapse between the completion of development project construction and completion of construction for the offsite mitigation. Programs will need to establish some assurance that the development applicant will meet that timeline and that the Responsible Agency will not be subject to enforcement actions caused by the development applicant's failure

to meet the timeline. A program must be established with sufficient staffing to prevent delays in approvals, funding releases, or contract procurement required by the Responsible Agency to facilitate implementation of the offsite compliance. Provisions must be outlined regarding how Copermittees or private applicants will assume responsibility for proportional completions of large and complex projects, including mechanisms or how local jurisdictions will collect and aggregate private development impact fees.

For private development, the Responsible Agency review process provides some assurance that the permanent BMPs are properly designed and constructed to comply with the performance requirements of the Permit. However, the developer and subsequent owner can be held responsible for corrective work if the BMPs are subsequently determined to be out of compliance with performance requirements of the Permit. It will be necessary to give Responsible Parties the same level of protection for any offsite BMPs used as compliance credit for the development project.

Bonding mechanisms can protect the Responsible Parties from abandoned projects or other issues that could affect the private development. Similar mechanisms would need to be established for offsite BMPs if the Responsible Agency is relying on the development applicant to supply funds or provide construction.

There are public liability risks associated with any public improvements including the offsite BMPs as well as any associated improvements, such as sidewalks and traffic lanes for the alternative compliance site. Responsible Parties will need to establish measures that prevent additional risk associated with the introduction of Green Infrastructure into public spaces and having a private entity design and construct non-standard designs within public lands and right-of-ways. One measure could include the development of new design standards and standard drawings specific to Green Infrastructure in public spaces.

The obligation to maintain any offsite BMPs is essentially “into perpetuity.” Therefore, it will be necessary for Responsible Parties to have durable mechanisms in place that can assure private development financing of maintenance well into the future. Historically, some mechanisms, such as homeowner associations and maintenance assessment districts, have not always proven to be durable over long periods of time including the possibility of severe downturns in the economy. Proper maintenance of BMP facilities is essential to provide for the intended BMP function and to prevent health concerns resulting from potential vector issues.

Possible alternative compliance arrangements could include public-to-public (where a public agency is both the project owner and the owner of the land with the offsite BMP), private-to-private, and private-to-public. The mechanisms needed for a public-to-public arrangement, particularly if both sites are within the same agency, are much less than what might be required for private-to-public. Therefore, some Responsible Parties might be able to exercise alternative compliance in a public-to-public arrangement before all of the assurance mechanisms necessary for private-to-public arrangements are in place.

Per Permit requirements, offsite alternative compliance facilities must be constructed within the San Diego Bay WMA and provide for a greater water quality benefit, as compared to implementation of structural BMPs at the project site. To assess the water quality benefit metric, the jurisdiction must either develop or adopt water quality equivalency standards. Development of these equivalency standards, which represents another barrier to program implementation, has begun at the regional level between representatives of the City of San Diego, the County of San Diego, Orange County, and Riverside County. Equivalency calculations will provide the metric by which watershed improvement is demonstrated.

J.3 SELECTION OF CANDIDATE PROJECTS

Per Permit Section B.3.b.(4)(a), the WMAA must include geographic information system (GIS) mapping layers to characterize the watershed functions detailed in Table J-2. The Responsible Parties have compiled these layers for potential use in selecting candidate project sites. Such detailed information provides for initial project planning guidance, but should be field verified since much of the information was generated using desktop methods.

Table J-2 WMAA GIS Mapping Layers

GIS Mapping Layer	Potential Use
Dominant hydrologic processes	Identify areas prone to overland flow or infiltration.
Existing stream condition	Identify stream bed material, geomorphic processes, flow regime.
Coarse sediment yield areas	Identify buffer areas to minimize reduction in sediment supply and subsequent hydromodification impacts.
Current and future land uses	Determine the developable footprint.
Existing channel structures	Identify flood control channels, grade control structures, and detention facilities that can significantly affect watershed response.

Within the San Diego Bay watershed, detailed stream assessments were prepared for Chollas Creek, Sweetwater River Reach 1 (San Diego Bay to Sweetwater Reservoir), Sweetwater River Reach 2 (Sweetwater Reservoir to Loveland Reservoir), Otay River, and Jamul/Dulzura Creek.

In addition to allowing for offsite alternative compliance program development, the WMAA findings can also help determine the feasibility of candidate projects for offsite alternative compliance implementation (Permit Section B.3.b.(4)(b)). Responsible Parties are currently compiling a list of candidate projects that will include projects previously identified in Comprehensive Load Reduction Plans (CLRPs), Jurisdictional Runoff Management Plans (JRMPs), and other regulatory documents. The numeric goals of the San Diego Bay WMA are also being considered in candidate project selection. Consistent with the Permit, project types being considered are detailed in Table J-3.

Table J-3 Candidate Project Types

Project Type	Potential Mitigation Provided
Infrastructure retrofits	Best management practice (BMP) pollutant mitigation Hydromodification management
Green streets	BMP pollutant mitigation Hydromodification management
Regional BMPs	BMP pollutant mitigation Hydromodification management Floodplain management
Stream rehabilitation or restoration	Hydromodification management Floodplain management Natural water quality filtering
Riparian habitat rehabilitation or restoration	Biological resources
Groundwater recharge and water supply augmentation	Water resources BMP Pollutant mitigation Hydromodification management
Floodplain buffer land acquisition	Floodplain management Open space preservation Natural water quality filtering

This appendix and the Water Quality Improvement Plan will be updated to include the final candidate project list for future drafts, as that list is made available. The candidate project list will remain open to augmentation as Copermittees or private applicants identify additional opportunities.

Responsible Parties will use the results of the WMAA to develop the formal Offsite Alternative Compliance Program. As part of program development, Responsible Parties will need to identify funding mechanisms, develop payment and credits structures, formulate water quality equivalency standards, and implement required ordinance updates. Consideration will also focus on the potential roles of regulatory agencies, such as the U.S. Army Corps of Engineers and the State Department of Fish and Wildlife, in helping to implement offsite alternative compliance facilities.

J.4 ALTERNATIVE COMPLIANCE IMPLEMENTATION SCHEDULE

Table J-4 summarizes milestones regarding the WMAA and potential Offsite Alternative Compliance Program initiation.

Table J-4 WMAA and Alternative Compliance Program Implementation

Milestone	Date	Completion
WMAA public outreach effort	July 2014 to September 2014	Yes
Watershed-specific WMAA GIS layers provided to WQIP groups	September 2014	Yes
Watershed specific WMAAs provided to WQIP groups	October 2014	Yes
Draft WQIP candidate project list	October 2014	Yes
BMP Design Manual submittal (with WMAA as attachment)	June 2015	
Final WQIP submittal with watershed-specific WMAA attached	June 2015	
Submittal of final list of WQIP candidate projects	June 2015	
Water quality equivalency standards—final document	December 2015	
First potential approval of Offsite Alternative Compliance Program	To be determined	

J.5 SAN DIEGO BAY WMAA REPORT AND ATTACHMENTS

The San Diego Bay WMAA report and attachments are included as Attachments J-1 and J-2. These documents were developed as part of a regional Copermittee effort and included a call for data for information to be included in the analysis. The WMAA documents were developed following criteria set forth in the MS4 Permit. Data included in the documents are intended for guidance purposes. When more site specific data is available, the more detailed information should be used.

The WMAA also provides an assessment of applicable exemptions to hydromodification management requirements, in addition to the Permit's allowed exemptions regarding direct discharges to exempt receiving waters including San Diego Bay, lakes, or reservoirs (or direct discharges to underground storm drains or concrete-lined channels directly discharging to San Diego Bay). For the San Diego Bay watershed, hydromodification exemptions are recommended for direct discharges to the Sweetwater River Reach 1 (between San Diego Bay and Sweetwater Reservoir), and for the Otay River between San Diego Bay and Interstate 805. No additional potential exemptions are recommended with regard to stabilized conveyances, highly impervious watersheds, or tidally-influenced lagoons.

Draft candidate project lists currently available are provided in Attachment J-3. The Water Quality Improvement Plan will be updated to include the final candidate project list, as that list is made available.

San Diego Bay Watershed Management Area Analysis



Lake Henshaw

October 3, 2014

Prepared for:
San Diego County Copermittees



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ACRONYMS AND ABBREVIATIONS

%	percent
>	greater than
<	less than
BMP	Best Management Practice
CB	Coarse Bedrock
CEG	Certified Engineering Geologist
CIP	Capital Improvement Project
CLRP	Comprehensive Load Reduction Plan
CSI	Coarse Sedimentary Impermeable
CSP	Coarse Sedimentary Permeable
E _p	Erosion Potential
ET	Evapotranspiration
FB	Fine Bedrock
FEMA	Federal Emergency Management Agency
FIS	Flood Insurance Study
FSI	Fine Sedimentary Impermeable
FSP	Fine Sedimentary Permeable
GIS	Geographic Information System
GLU	Geomorphic Landscape Unit
HA	Hydrologic Area
HCP	Hydromodification Control Plan
HMP	Hydromodification Management Plan
HRU	Hydrologic Response Unit
HSA	Hydrologic Sub Area
HSG	Hydrologic Soil Group
IRWM	Integrated Regional Water Management
JURMP	Jurisdictional Urban Runoff Management Plan
LDW	Land Development Workgroup
LID	Low Impact Development
MAP	Mean Annual Precipitation

San Diego Bay WMAA

ACRONYMS AND ABBREVIATIONS continued

MHPA	Multiple Habitat Planning Area
MS4	Municipal Separate Storm Sewer System
MSCP	Multiple Species Conservation Program
NED	National Elevation Dataset
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resources Conservation Service
PDP	Priority Development Project
RCB	Reinforced Concrete Box
RCP	Reinforced Concrete Pipe
SCAMP	Southern California Aerial Mapping Project
SCCWRP	Southern California Coastal Water Research Project
SD	San Diego
SDRWQCB	San Diego Regional Water Quality Control Board
S _p	Sediment Supply Potential
SSURGO	Soil Survey Geographic Database
TMDL	Total Maximum Daily Load
USGS	United States Geological Survey
WMA	Watershed Management Area
WMAA	Watershed Management Area Analysis
WQIP	Water Quality Improvement Plan
WURMP	Watershed Urban Runoff Management Plan

1. Introduction

1.1. Background

On May 8, 2013 the California Regional Water Quality Control Board, San Diego Region adopted Order No. R9-2013-0001; NPDES No. CAS 0109266, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region (Regional MS4 Permit). The Regional MS4 Permit, which became effective on June 27, 2013, replaces the previous MS4 Permits that covered portions of the Counties of San Diego, Orange, and Riverside within the San Diego Region. There were two main goals for the Regional MS4 Permit:

1. To have more consistent implementation, as well as improve inter-agency communication (particularly in the case of watersheds that cross jurisdictional boundaries), and minimize resources spent on the permit renewal process.
2. To establish requirements that focused on the achievement of water quality improvement goals and outcomes rather than completing specific actions, thereby giving the Copermittees more control over how their water quality programs are implemented.

To achieve the second goal, the Regional MS4 Permit requires that Water Quality Improvement Plans (WQIPs) be developed for each Watershed Management Area (WMA) within the San Diego Region. As part of the development of WQIPs, the Regional MS4 Permit provides Copermittees an option to perform a Watershed Management Area Analysis (WMAA) through which watershed-specific requirements for structural BMP implementation for Priority Development Projects can be developed for each WMA. This report presents the Copermittees' approach and results for the regional elements of the WMAA developed for the San Diego County area.

1.2. Watershed Management Area Analysis (WMAA)

The Regional MS4 Permit, through inclusion of the WMAA, provides an optional pathway for Copermittees to develop an integrated approach for their land development programs by promoting evaluation of multiple strategies for water quality improvement and development of watershed-scale solutions for improving overall water quality in the watershed. The WMAA comprises the following three components as indicated in the Regional MS4 Permit:

1. Perform analysis and develop Geographic Information System (GIS) layers (maps) by gathering information pertaining to the physical characteristics of the WMA (referred to herein as WMA Characterization). This includes, for example, identifying potential areas of coarse sediment supply, present and anticipated future land uses, and locations of physical structures within receiving streams and upland areas that affect the watershed hydrology (such as bridges, culverts, and flood management basins).
2. Using the WMA Characterization results, compile a list of candidate projects that could potentially be used as alternative compliance options for Priority Development Projects. Such projects may include, for example, opportunities for stream or riparian area

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rehabilitation, opportunities for retrofitting existing infrastructure to incorporate storm water retention or treatment, or opportunities for regional BMPs, among others. Prior to implementing these candidate projects the Copermittees must demonstrate that implementing such a candidate project would provide greater overall benefit to the watershed than requiring implementation of the onsite structural BMPs. Note, compilation or evaluation of potential projects was not performed as part of this regional effort. Identification and listing of candidate projects will be performed for each WMA through the WQIP process for WMAs that elect to submit the optional WMAA as part of the WQIP.

3. Additionally, using the WMA Characterization maps, identify areas within the watershed management area where it is appropriate to allow for exemptions from hydromodification management requirements that are in addition to those already allowed by the Regional MS4 Permit for Priority Development Projects. The Copermittees shall identify such cases on a watershed basis and include them in the WMAA with supporting rationale to support claims for exemptions.

1.3.Scope of Work for Regional WMAA

In July 2013, the Copermittees elected to fund a regional effort to develop elements of the regional WMAA for the 9 San Diego-area WMAs within the County of San Diego that are currently subject to the Regional MS4 Permit, which include:

- Santa Margarita River (for portion in San Diego County)
- San Luis Rey River
- Carlsbad
- San Dieguito River
- Los Peñasquitos
- Mission Bay & La Jolla Watershed
- San Diego River
- San Diego Bay
- Tijuana River (for portion in San Diego County)

The regional-level information developed through this effort is intended to provide consistency across WMAs and serve as the foundation for developing watershed-specific information for each WMA to be developed through the WQIP process. The regional effort scope of work included:

1. Development of GIS map layers that characterize the WMAs using data previously collected, readily available, and provided by the Copermittees, including:
 - a. Description of dominant hydrologic processes, such as areas where infiltration or overland flow likely dominates;
 - b. Description of existing streams in the watershed, including bed material and composition, and if they are perennial or ephemeral;

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- c. Current and anticipated future land uses;
 - d. Potential coarse sediment yield areas; and
 - e. Locations of existing flood control structures and channel structures, such as stream armoring, constrictions, grade control structures, and hydromodification or flood management basins.
2. Development of a Microsoft® Excel (Excel) template for use by Copermittees to compile lists of candidate projects for an optional alternative compliance program.
 3. Development of additional criteria and analyses to support reinstating the following proposed exemptions that were originally developed in the approved 2011 Final Hydromodification Management Plan but not included in the Regional MS4 Permit unless provided by the Copermittees in the WMAA. In addition, development of the associated Hydromodification Applicability/Exemption Mapping.
 - a. Exempt River Reaches including:
 - i. San Diego River;
 - ii. Otay River;
 - iii. San Dieguito River;
 - iv. San Luis Rey River; and
 - v. Sweetwater River
 - b. Stabilized Conveyance Systems Draining to Exempt Water Bodies
 - c. Highly Impervious/Highly Urbanized Watersheds and Urban Infill, and
 - d. Tidally Influenced Lagoons (where data/study provided)

The scope of work for the regional effort excluded performing analysis within the following areas unless data was readily available, as Copermittees do not have jurisdiction over these areas:

1. State Lands;
2. U.S. Departments of Defense land;
3. U.S. National Forest land;
4. U.S. Department of Interior land and
5. Tribal land

Additional description of excluded areas, for the purposes of the Regional WMAA, is indicated in Section 2.3 Land Uses.

1.4. Project Process

The process for developing the Regional WMAA included close coordination with the Land Development Workgroup (LDW) at key points during the project. The LDW is composed of the 21 San Diego-area Copermittees and serves to develop and implement regional land development plans and programs necessary to support the requirements of the Regional MS4 Permit. The consultant team (Geosyntec Consultants and Rick Engineering Company) presented

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preliminary project assumptions and methodologies proposed to be used to develop the Regional WMAA to meet the requirements of the Regional MS4 Permit in December 2013. The consultant team incorporated workgroup feedback from this meeting and subsequently presented the preliminary Regional WMAA project results to the LDW in March 2014, again to receive direction and incorporate input on the preliminary results. Subsequently, the draft report was released to the public in July 2014, by a public workshop that included Consultation Panel members from each of the WMAs on July 29, 2014. This version of the report including all of the input described above is being issued for optional inclusion into the respective WQIP Provision B.3 submittals to the SDRWQCB in December 2014.

1.5. Report Organization

This report is organized as follows:

- Chapter 1 provides the project background and purpose;
- Chapter 2 describes the technical basis for characterizing the WMA;
- Chapter 3 describes the template that can be used by Copermittees to compile the list of candidate projects;
- Chapter 4 summarizes the analyses performed to support reinstating select exemptions from hydromodification control requirements for PDPs;
- Chapter 5 presents the WMAA conclusions;
- Chapter 6 presents the references used for the WMAA;
- Attachment A presents the exhibits and additional supporting information for watershed management area characterization;
- Attachment B presents the exhibits and additional supporting information for hydromodification management applicability/exemptions;
- Attachment C expands on the structure of the geodatabase that hosts the GIS data developed by the WMAA; and
- Attachment D provides a crosswalk between the Regional MS4 Permit requirements for WMAA and this report.

1.6. Terms of Reference

The work described in this report was conducted by Geosyntec Consultants (Geosyntec) and Rick Engineering Company (RICK) on behalf of the County of San Diego and the regional Copermittees.

2. Watershed Management Area Characterization

Watershed health and function are strongly influenced by hydrological and geomorphological processes occurring in the watershed. Both hydrological response and geomorphological response of the watershed are dependent on a variety of physical characteristics of the watershed. To this end, the Regional MS4 Permit specifies a set of data that is required to adequately characterize overall watershed processes as a foundation to enhancing integration and effectiveness of watershed management and water quality programs. The following GIS map layers were developed to characterize the hydrological and geomorphological processes within the San Diego Bay WMA:

- Dominant Hydrologic Processes: A description of dominant hydrologic processes, such as areas where infiltration or overland flow likely dominates;
- Stream Characterization: A description of existing streams in the watershed, including bed material and composition, and if they are perennial or ephemeral;
- Land Uses: Current and anticipated future land uses;
- Potential Critical Coarse Sediment Yield Areas; and
- Physical Structures: Locations of existing flood control structures and channel structures, such as stream armoring, constrictions, grade control structures, and hydromodification or flood management basins.

These GIS layers can be used to:

- Identify the nature and distribution of key macro-scale watershed processes;
- Identify potential opportunities and constraints for regional and sub-regional storm water management facilities that can play a critical role in meeting water quality, hydromodification, water supply, and/or habitat goals within the watershed;
- Assist with determining the most appropriate management actions for specific portions of the watershed; and
- Suggest where further study is appropriate.

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2.1.Dominant Hydrologic Processes

The Regional MS4 Permit identifies in the provisions related to the WMAA that a description of dominant hydrologic processes within the watershed must be developed, with GIS layers (maps) as output. The Permit specifically calls for processes “*such as areas where infiltration or overland flow likely dominates.*” These particular aspects of the hydrological mechanics of watersheds are particularly important when attempting to understand the macro-scale opportunities for locating projects that take advantage of either capturing overland flow for treatment or for infiltration.

Investigation of the dominant hydrologic processes in the San Diego-area watersheds indicates that evapotranspiration (ET) is the most dominant hydrologic process for the region based on review of a published study (Sanford and Selnick, 2013). ET is the sum of evaporation and plant transpiration in the hydrologic cycle that transports water from land surfaces to the atmosphere. This conclusion is supported by comparing the 30-year average annual rainfall for the study area (San Diego County east of the peninsular divide) of between 15 and 18 inches per year (San Diego County, 2005) to the average annual ET rates. According to the California Irrigation Management Information System (CIMIS) Reference Evapotranspiration Map (CIMIS, 1999), the study area (within Zones 4, 6, and 9) experiences annual reference ET of 46.6, 49.7 and 59.9 inches, respectively. Therefore, theoretically, if all of the annual precipitation for the San Diego-area watersheds remained stationary where it fell and did not either infiltrate or runoff to local waterbodies where it would be conveyed downstream ultimately to the ocean, it all would be consumed by ET. As such, the effect of ET on the overall hydrologic processes within the San Diego watersheds is a function of the temporal scale over which it acts. Precipitation events often produce runoff in these watersheds, particularly in the urbanized portions, based on the topography and land cover that tend to accelerate the conveyance of runoff downstream rather than collecting, storing, or spreading out that then would maximize the effect of ET.

Because this study is focused on developing information and mapping for the portion of the hydrologic process that informs watershed management decisions, i.e., locating beneficial projects in areas of greatest opportunity, the next tier of dominant hydrologic processes are studied and mapped by this project. As such, the study area was characterized, based on the methodology described in the following section, according to the predicted fate of runoff within the watersheds being either overland flow or infiltration after considering the effects of ET (as well as an intermediate category of interflow). Areas that were mapped as overland flow do not necessarily preclude infiltration but rather indicate the dominant expected process that runoff would experience if not intercepted for the express purpose of infiltrating storm water runoff. The Model BMP Design Manual will provide more detailed guidance and procedures for determining the potential for infiltrating captured storm water at the project level irrespective of the mapping produced in the WMAA. To reiterate, the WMAA mapping is to provide macro-scale processes for high-level analysis and to inform decisions affecting regional scales. Furthermore, the Model BMP Design Manual will indicate the degree to which site-scale BMPs can expect to benefit from ET or how ET is considered in the sizing of BMPs. In brief, typical storm water BMPs only store water for a few days and therefore are not really capable of significant volume disposal through ET. However, pervious area dispersion (i.e., directing storm water runoff to flat areas for spreading and infiltration) has appreciable benefits with regard to ET and is a practice promoted in the BMP Design Manual.

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The processes of interest are further defined as follows:

Overland flow: This process can be thought of as the inverse of infiltration; precipitation reaching the ground surface that does not immediately soak in must run over the land surface (thus, “overland” flow). It reflects the relative rates of rainfall intensity and the soil’s infiltration capacity: wherever and whenever the rainfall intensity exceeds the soil’s infiltration capacity, some overland flow will occur. Most uncompacted, vegetated soils have infiltration capacities of one to several inches per hour at the ground surface, which exceeds the rainfall intensity of even unusually intense storms. In contrast, pavement and hard surfaces reduce the effective infiltration capacity of the ground surface to zero, ensuring overland flow regardless of the meteorological attributes of a storm, together with a much faster rate of runoff relative to vegetated surfaces.

Infiltration and groundwater recharge: These closely linked hydrologic processes are most apparent near ephemeral and perennial conveyances in the San Diego region. Their widespread occurrence is expressed by the common absence of surface-water channels on even steep (undisturbed) hillslopes. Thus, on virtually any geologic material on all but the steepest slopes (or bare rock), infiltration of rainfall into the soil is inferred to be widespread, if not ubiquitous. With urbanization, changes to the process of infiltration are also quite simple to characterize: some (typically large) fraction of that once infiltrating water is now converted to overland flow.

Interflow: Interflow takes place following storm events as shallow subsurface flow (usually within 3 to 6 feet of the surface) occurring in a more permeable soil layer above a less permeable substrate. In the storm response of a stream, interflow provides a transition between the rapid response from surface runoff and much slower stream discharge from deeper groundwater. In some geologic settings, the distinction between “interflow” and “deep groundwater” is artificial and largely meaningless; in others, however, there is a strong physical discrimination between “shallow” and “deep” groundwater movement. Development reduces infiltration and thus interflow as discussed previously, as well as reducing the footprint of the area supporting interflow volume.

The datasets used, methodology for creating the dominant hydrologic processes maps, and the results are described in the sections below.

2.1.1. Datasets Used for identifying dominant hydrologic processes

The following datasets were used in the analysis:

Dataset	Source	Year	Description
Elevation	USGS	2013	1/3 rd Arc Second (~10 meter cells) digital elevation model for San Diego County
Soils Data	SanGIS	2013	NRCS (SSURGO) Database for San Diego County downloaded from SanGIS
Land Cover	SanGIS	2013	Ecology-Vegetation layer for San Diego County downloaded from SanGIS

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Dataset	Source	Year	Description
Geology	Kennedy, M.P., and Tan, S.S.	2002	Geologic Map of the Oceanside 30'x60' Quadrangle, California, California Geological Survey, Regional Geologic Map No. 2, 1:100,000 scale.
	Kennedy, M.P., and Tan, S.S.	2008	Geologic Map of the San Diego 30'x60' Quadrangle, California, California Geological Survey, Regional Geologic Map No. 3, 1:100,000 scale.
	Todd, V.R.	2004	Preliminary Geologic Map of the El Cajon 30'x60' Quadrangle, Southern California, United States Geological Survey, Southern California Aerial Mapping Project (SCAMP), Open File Report 2004-1361, 1:100,000 scale.
	Jennings et al.	2010	"Geologic Map of California," California Geological Survey, Map No. 2 – Geologic Map of California, 1:750,000 scale
Groundwater Basins	SanGIS	2013	Groundwater Basins in San Diego County downloaded from SanGIS

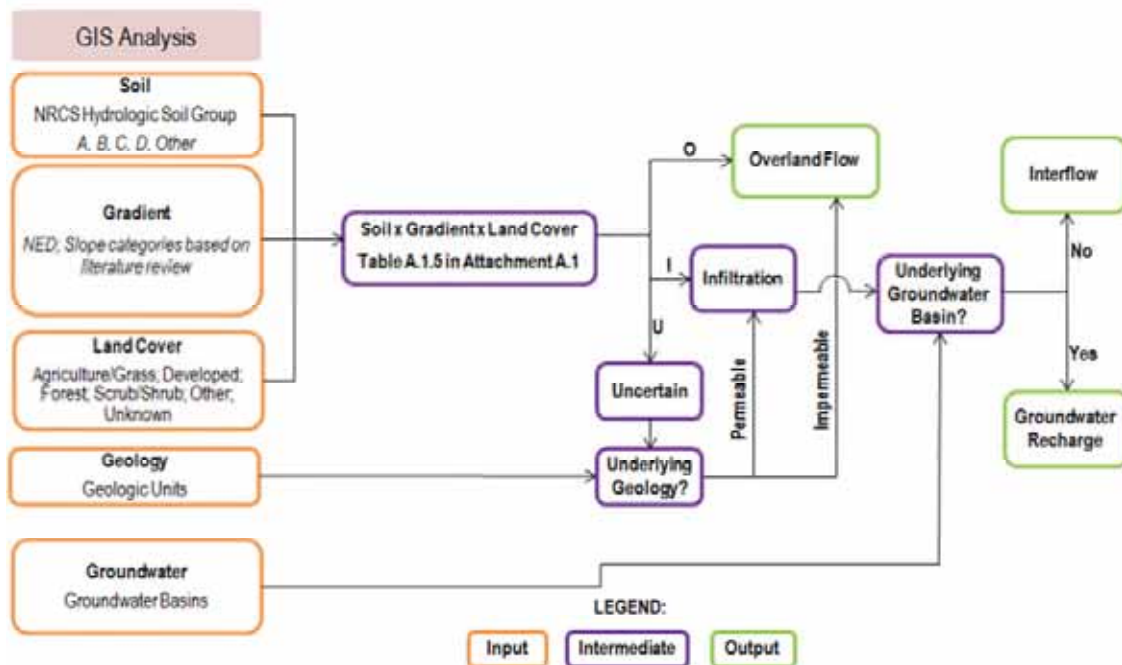
2.1.2. Methodology/Assumptions/Criteria for identifying dominant hydrologic processes

The methodology used to describe dominant hydrologic processes is based on recommendations included in the Southern California Coastal Water Research Project's (SCCWRP) Technical Report 605 titled "Hydromodification Screening Tools: GIS-Based Catchment Analyses of Potential Changes in Runoff and Sediment Discharge" (SCCWRP, 2010). The foundation for this analysis was to incorporate the Report's concept of grouping common hydrologic attributes into Hydrologic Response Units (HRUs). The report states the following:

"Grouping common hydrologic attributes across a watershed into a tractable number of Hydrologic Response Units (HRUs: a term first used by England and Holtan 1969) has become a well-established approach for condensing the near-infinite variability of a natural watershed into a tractable number of different elements. The normal procedure for developing HRUs is to identify presumptively similar rainfall-runoff characteristics across a watershed by combining spatially distributed climate, geology, soils, land use, and topographic data into areas that are approximately homogeneous in their hydrologic properties (Green and Cruise 1995, Becker and Braun 1999, Beven 2001, Haverkamp et al. 2005). As noted by Beighley et al (2005), this process of merging the landscape into discrete HRUs is a common and effective method for reducing model complexity and data requirements. Using watershed characteristics to predict runoff is the explicit task of hydrologic models, and there is a host of such models available for application to hydromodification evaluation. For purposes of "screening," however, the goal is simplicity and ease of application even if the precision of the resulting analysis is crude."

The following process describes the methodology used to define Hydrologic Response Units (HRUs) and then relate the HRUs to the dominant hydrologic processes (i.e., overland flow, interflow, and groundwater recharge) in the San Diego Bay WMA.

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The first step is to define the HRUs. Once these are defined, the remaining steps determine the dominant hydrologic process.

1. **Integrate data sets used to determine HRU:** Categories for soil type, gradient, and land cover were defined based on readily available GIS datasets for the region and classifications found in relevant literature, as indicated below. The different combinations of these three categories comprise the distinct HRUs.
 - **Soil Categories:** based on National Resource Conservation Service (NRCS) Hydrologic Soil Group (HSG) classifications, which are commonly used to describe runoff/infiltration potential of soils on a regional scale. These categories include: A, B, C, and D. HSG A soils have the lowest runoff potential, while HSG D soils have the highest runoff potential.
 - **Gradient Categories:** based on slope ranges found in a review of relevant literature identified in Chapter 6. The spatial processing of the slope categories utilized the United States Geologic Survey (USGS) National Elevation Dataset (NED). Slopes were grouped (bins) into the following ranges: 0% to 2%; 2% to 6%; 6% to 10%; and greater than 10%. The 2% and 6% slope thresholds were based on slope ranges included in Table A.1.1 (McCuen, 2005) presented in Attachment A.1. This table provides runoff coefficients as a function of slope, soil group, land cover, and return period and was used for subsequent steps in the mapping effort. The 10% slope threshold was used in SCCWRP's Technical

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Report 605 (SCCWRP, 2010) and is a logical cutoff since slopes steeper than 10% are assumed to be dominated by overland flow.

- **Land Cover Categories:** were defined using the Ecology Vegetation GIS map layer developed by the City of San Diego, the County of San Diego and SANDAG and downloaded from SanGIS (2013). The vegetation categories in the GIS layer were grouped (Table A.1.2 in Attachment A.1) to match the following categories used in SCCWRP's Technical Report 605 (SCCWRP, 2010): Agriculture/Grass; Developed; Forest; Scrub/Shrub, Other (Water), and Unknown.
2. **Evaluate Land Cover:** Land cover categories for Agriculture/Grass, Forest, Scrub/Shrub and Other were related to land use categories defined in Table A.1.1 as shown in Table A.1.3 in Attachment A.1. Relating a land use category for the Developed land cover category was not necessary because all Developed cover was assumed to have overland flow as its dominant hydrologic process.
 3. **Determine Hydrology Characteristics for Land Covers:** For each of the land cover/land use categories listed in Table A.1.3, the ratio of precipitation lost to evapotranspiration (i.e. an evapotranspiration coefficient) was estimated using Table A.1.1 using the process described below. Since precipitation is considered to be the sum of the resulting runoff, infiltration, and evapotranspiration, the coefficients for these three hydrologic pathways sum to one, as indicated below.

$$\text{Runoff Coefficient} + \text{Infiltration Coefficient} + \text{Evapotranspiration Coefficient} = 1$$
 - i) **Estimate Evapotranspiration:** To estimate the evapotranspiration (ET) coefficient for each land cover, first the runoff coefficient was identified in Table A.1.1 for the highest runoff potential (i.e., Group D soil and 6%+ slope) and most common storm conditions (i.e., storm recurrence intervals less than 25 years). The infiltration for these high runoff conditions was assumed to be negligible, resulting in an infiltration coefficient of zero. Since the sum of the three coefficients should sum to one, the ET coefficient was assumed to be the remaining difference (i.e., ET Coefficient = 1 – Runoff Coefficient). The ET coefficient calculated for the highest runoff potential was then applied to all soil types and slopes within that land use category. The calculated ET coefficient for each applicable HRU is provided in Table A.1.4 in Attachment A.1. The ET coefficient for HRUs that have a Developed land cover or a gradient greater than 10% were not calculated since these HRUs were assumed to have overland flow as the dominant hydrologic process.
 - ii) **Estimate Infiltration:** The infiltration coefficient for each applicable HRU (i.e., combination of soil, gradient, and land cover) was estimated by subtracting both the runoff coefficient, provided in Table A.1.1, and the ET coefficient, calculated in step 3(i), from one (i.e., Infiltration Coefficient = 1 – Runoff Coefficient – ET Coefficient). The calculated infiltration coefficient for each applicable HRU is provided in Table A.1.4 in Attachment A.1.
 - iii) **Estimate Runoff:** For each applicable HRU, the runoff coefficient was divided by

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the infiltration coefficient to obtain a ratio representing the potential for runoff or infiltration. The higher the ratio, the greater the potential for runoff to be a more dominant hydrologic process than infiltration. Similarly, the lower the ratio, the greater the potential for infiltration to be a more dominant hydrologic process than runoff. The calculated runoff to infiltration ratios are provided in Table A.1.4 in Attachment A.1.

4. **Associate Runoff and Infiltration to HRUs:** The following designations were assigned to each applicable HRU based on the runoff to infiltration ratio (i.e., runoff coefficient/infiltration coefficient). These designations were based on best engineering judgment with the underlying assumption that if a runoff or infiltration coefficient is more than 50% greater than its counterpart, then the prevailing process is considered dominant.
 - HRUs with runoff to infiltration ratios greater than 1.5 (3:2 ratio) were assumed to have relatively high runoff and overland flow was considered its dominant hydrologic process. These HRUs are designated by the letter “O” (Overland flow is dominant process) in Tables A.1.4 and A.1.5 in Attachment A.1.
 - HRUs with runoff to infiltration ratios less than 0.67 (2:3 ratio) were assumed to have relatively high infiltration and its dominant hydrologic process was either interflow or groundwater recharge, based on analysis described in subsequent steps. These HRUs are designated by the letter “I” (Interflow is dominant process) in Tables A.1.4 and A.1.5.
 - For HRUs with runoff to infiltration ratios between, and including, 1.5 and 0.67 it was uncertain whether it was dominated by overland flow or infiltration. These HRUs are designated by the letter “U” (Dominant process is uncertain) in Tables A.1.4 and A.1.5.
 - For HRUs that have a Developed land cover or a gradient greater than 10%, the runoff to infiltration ratios were not calculated because these HRUs were assumed to have overland flow as the dominant hydrologic process. These HRUs are designated by the letter “O” (Overland flow is dominant process) in Table A.1.5.
5. **Uncertain HRUs Assignment:** For HRUs with an uncertain designation (“U”) in Table A.1.5 in Attachment A.1, the underlying regional geology (Kennedy and Tan, 2002 & 2008; Todd, 2004 and Jennings et al., 2010) was used to evaluate whether overland flow or infiltration were dominant. If the underlying geology was considered impermeable, then these uncertain areas were considered to have overland flow as its dominant hydrologic process. If the underlying geology was considered permeable, then these uncertain areas were considered to be dominated by infiltration. The determination of whether a geologic unit is impermeable or permeable was based on desktop evaluation and the best professional judgment of a Certified Engineering Geologist (CEG). This analysis was performed in GIS and is illustrated in the flowchart above.

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6. **Associate Infiltration HRUs with Known Groundwater Basins:** For HRUs with relatively high infiltration and have a designation of “I” in Table A.1.5 in Attachment A.1, the presence or absence of a regional groundwater basin (SanGIS, 2013) underlying these areas determined whether the dominant hydrologic process was designated as interflow or groundwater recharge. The groundwater recharge hydrologic process was assigned as dominant for those applicable areas which had an underlying groundwater basin. The interflow hydrologic process was assigned as dominant for those applicable areas which did not have an underlying groundwater basin directly below it. This analysis was performed in GIS and is illustrated in the flowchart above.
7. **Resulting HRU Data:** The resulting GIS map of dominant hydrologic processes was reviewed by engineering professionals familiar with the hydrology in the County of San Diego to confirm that the mapping is consistent with their experience working in the region.

2.1.3. Results for identifying dominant hydrologic processes

The resulting GIS map showing the spatial distribution of dominant hydrologic processes (i.e., overland flow, interflow, and groundwater recharge) within the San Diego Bay WMA is provided in Attachment A.1. An ArcMap document file which presents the results from each step of the methodology is included in Attachment C, as well as a Google Earth KMZ file. Based on this analysis, overland flow is the predominant hydrologic process in all this WMA, which is consistent with the experience of engineering professionals familiar with the hydrology of the County of San Diego.

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Summary of Deliverables for Dominant Hydrologic Processes

Format	Item	Description	Location
Report	Figure	"Dominant Hydrologic Processes"	Attachment A.1
GIS	Map Group Title	Hydrologic Processes	Attachment C.1
	Map Layer Title	Soil Land Cover Slope Hydrologic Response Unit Initial Rating Permeability Groundwater Basin Dominant Hydrologic Processes	
	Geodatabase Feature Dataset	HydrologicProcesses	
	Geodatabase Feature Class	HRUAnalysis	
	Geodatabase Geometry Type	Polygon	
KMZ ¹	KMZ File Name	Dominant Hydrologic Processes	Attachment C.2
¹ To enhance the utilization of this data, the Dominant Hydrological Processes map is provided in both traditional GIS file format (ESRI software license purchase required) and as a Google Earth KMZ (Keyhole Markup Language/Zipped) file that can be viewed with the free download version of Google Earth (http://www.google.com/earth/).			

2.1.4. Limitations for identifying dominant hydrologic processes

The resulting GIS map layer only lists the dominant hydrological process (i.e., an HRU assigned a dominant process of overland flow can also experience small amounts of infiltration) and provides a useful, rapid framework to perform screening-level analysis that is appropriate for watershed-scale planning studies. When more precise estimates are required for a particular site and subarea it is recommended that this analysis be augmented with site-specific analysis.

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2.2.Stream Characterization

For the purpose of WMAA, the Regional MS4 Permit requires a description of existing streams in the watershed, including bed material and composition, and if they are perennial or ephemeral. Under the Regional WMAA, this analysis was prepared for 27 streams throughout the San Diego Region agreed upon by the consultant team and Copermittees. Within the San Diego Bay WMA, stream characterization and detailed mapping is provided for Chollas Creek, Sweetwater River – Reach 1 (San Diego Bay to Sweetwater Reservoir), Sweetwater River – Reach 2 (Sweetwater Reservoir to Loveland Reservoir), Otay River, and Jamul / Dulzura Creek as shown on the exhibit titled "Watershed Management Area Streams" located in Attachment A.2.

2.2.1. Datasets Used for stream characterization

The following data were referenced for the purpose of stream characterization:

- USGS National Hydrography Dataset, downloaded from USGS November 2013
- USGS 7.5-minute quadrangles, compiled image of quadrangles covering San Diego County, various dates
- Floodplains: "National Flood Hazard Layer," provided by Federal Emergency Management Agency October 2012
- Various datasets provided by Copermittees depicting existing storm water conveyance infrastructure within their jurisdictions.
- Aerial photography by Digital Globe dated 2012

2.2.2. Methodology/Assumptions/Criteria for stream characterization

The analysis was prepared by digitizing each of the 27 streams based on review of data listed above. Within the pre-existing datasets depicting streams, floodplains, or infrastructure, no single dataset included a complete, accurate alignment of each stream. Digitizing the streams based on review of all of the data listed above allowed creation of GIS linework with a continuous corrected alignment for each stream. The following data were recorded as GIS attributes for each stream as the stream was digitized:

- River name
- Reach type (engineered or natural, constrained or un-constrained)
- Bed material
- Bank material
- Hydrographic category (perennial or intermittent)

The attributes listed above were collected manually based on interpretation of the reference data. Assumptions used in making the interpretations are listed below. The **Hydrographic Category** section below will provide the rationale as to why perennial and intermittent were the hydrographic categories chosen for this WMAA and not perennial and ephemeral.

Note that stream classification was not prepared within areas of Federal/State/Indian lands unless data was readily available. Stream lines were prepared within these areas for continuity, but some data fields were not populated within these areas.

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Reach Type

Streams were classified as either engineered or natural, and either constrained or un-constrained. See the exhibit titled, "Watershed Management Area Streams by Reach Type" in Attachment A.2. The purpose of this exercise was to identify whether the stream has been modified by human activity within the stream itself, which may include addition of crossing structures, stabilization of banks, dredging, or any other human activity. This aids the identification of physical structures including stream armoring, constrictions, grade control, and other modifications as required by the Regional MS4 Permit.

Classification of the streams as either “**engineered**” or “**natural**” was based on the following criteria:

Engineered

- A classification of "engineered" was assigned where the stream itself has been modified by human activity.
- All culvert/bridge/pipe crossings either provided in the Copermittees' storm water conveyance system data or clearly visible on the aerial photo have been assigned as engineered within the limits of the crossing.
- If the Copermittees did not provide storm water conveyance system data for the dirt road crossings/dip sections the streams have been assigned as engineered within the limits of the crossing. These crossings may or may not have culverts.
- If the Copermittees' storm water conveyance system data stated the facility is a detention or desilting basin, they were assigned as engineered.
- Golf courses have been assigned as engineered.
- If aerial photography showed large water bodies (lake, pond, irrigation pond, etc.) they were assigned as engineered.
- If the storm water conveyance system data provided by the Copermittees has identified the stream as “rockbs”, the assumption has been made that these streams have rocks on their bottom and the sides (“bs”), and have been assigned as engineered.
- Sand mining operations have been assigned as engineered. Sand mining is an operation that is in continuous flux and does not typically result in a discrete, engineered geometry in any given channel cross section until restoration is implemented at the conclusion of the sand mining operation. It is assigned as engineered to acknowledge human alteration of the stream.

Natural

- Streams that have no apparent alteration within the stream itself by human activity have been assigned as natural.

Classification of the streams as either “**constrained**” or “**un-constrained**” was based on the following criteria:

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Constrained

- All culvers/bridge/pipe crossings either provided in the Copermittes' storm water conveyance system data or clearly visible on the aerial photo have been assigned as constrained.
- If the Copermittes did not provide storm water conveyance system data for the dirt road crossings/dip sections the streams have been assigned as constrained. These crossings may or may not have culverts.
- If the Copermittes' storm water conveyance system data stated the facility is a detention or desilting basin, they were assigned as constrained.
- Golf courses have been assigned as constrained if located within the Federal Emergency Management Agency (FEMA) floodway based on the "National Flood Hazard Layer" data.
- The USGS National Hydrographic Dataset in their hydrographic category had assigned some reaches as artificial paths. In these situations and if the aerial photography shows large water bodies (lake, pond, irrigation pond, etc.) these streams have been assigned as constrained.
- Sand mining operations located within the FEMA floodway based on the "National Flood Hazard Layer" have been assigned as constrained.

Un-constrained

- Golf courses have been assigned as un-constrained if not located within the FEMA floodway based on the "National Flood Hazard Layer" data.
- Sand mining operations not located within the FEMA floodway based on the "National Flood Hazard Layer" data have been assigned un-constrained.
- If the stream is located within the FEMA floodway based on the "National Flood Hazard Layer" and there is available land in the floodway fringe (the area between the floodway and the 100-year floodplain) the area has been assigned un-constrained. Note that there may be only one side or both sides of the stream with available land in the floodway fringe therefore a note was added as to which side of the stream is constrained and un-constrained.
- If the stream is located within a FEMA 100-year floodplain based on the "National Flood Hazard Layer" data with no floodway and the FEMA floodplain width is not within an existing development or bordered by roads have been assigned as un-constrained.

Bed Material and Bank Material

The following bed and bank materials were identified:

- Concrete
- Riprap
- Pipe / culvert
- Earth

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The assumptions made to identify the streams bed and bank materials were based on the following criteria:

- If the data provided by the Copermittees provided information about the stream bed and bank material, the provided data was used for the bed and bank material.
- Generally the data provided by the Copermittees did not identify the crossing type (pipe, box culvert, bridge with or without piers, etc.) or the material (RCP, RCB, earth, riprap, concrete, etc.). In that case, all culvert/bridge/pipe crossings were assigned as pipe/culvert for the bed and bank material.
- If the Copermittees did not provide data for the dirt road crossings/dip sections the bed and bank material have been assigned as pipe/culvert. These crossings may or may not have culverts.
- If the Copermittees' storm water conveyance system data stated the facility is a detention or desilting basin, the bed and bank material have been assigned as earth.
- If aerial photography showed large water bodies (lake, pond, irrigation pond, etc.) they were assigned as earth bed and bank material. The USGS National Hydrographic Dataset in their hydrographic category had assigned some of these types of reaches as artificial paths.
- Sand mining operations within the stream have been assigned as earth for bed and bank material.
- If the Copermittees did not provide data for the stream material the bed and bank material have been assigned based on the aerial photography.

See exhibits titled, "Watershed Management Area Streams by Bed Material" in Attachment A.2.

After stream bed and bank material was classified, earthen reaches were further classified by geologic group. This was accomplished by intersecting the streams with the geologic group layer that had been prepared for use in the dominant hydrologic process and potential coarse sediment yield analyses. The result is displayed in exhibits titled, "Watershed Management Area Streams by Geologic Group" in Attachment A.2.

Hydrographic Category

Streams were classified as "perennial" or "intermittent." See exhibits titled, "Watershed Management Area Streams by Hydrographic Category" in Attachment A.2. Classification was obtained from the USGS National Hydrography Dataset (NHD). The definitions of these categories in the USGS National Hydrography Dataset are:

- **Perennial:** Contains water throughout the year, except for infrequent periods of severe drought.
- **Intermittent:** Contains water for only part of the year, but more than just after rainstorms and at snowmelt.

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While the specific Regional MS4 Permit language requested classification of perennial or ephemeral, rather than perennial or intermittent, the data that was referenced in order to classify streams did not include "ephemeral" streams. For reference, the USGS National Hydrography Dataset definition of "ephemeral" is: "contains water only during or after a local rainstorm or heavy snowmelt." None of the stream reaches in the study were classified as ephemeral in the NHD dataset, therefore none are classified as ephemeral in the WMAA product. The City of San Diego provided a map titled "City of San Diego Stream Survey" dated April 3, 2013 prepared by AMEC that shows streams that are "dry" and streams that are "flowing". This information in conjunction with the other parameters listed in this section was used to determine if a stream was perennial or intermittent.

USGS NHD includes hydrographic category classification for many of the streams. However data was not available for all reaches of all streams. In order to classify reaches of streams that did not already contain this data in NHD, these assumptions were made:

- The USGS NHD information for the stream hydrographic category has been used when available.
- When USGS NHD has "artificial paths" for portions of the stream, the hydrographic category of the upstream portion of the stream have been assigned to the stream unless other assumptions took precedence.
- If aerial photography shows large waterbody (lake, pond, irrigation pond, etc.) perennial has been assumed for the hydrographic category.
- For ponded areas shown on the aerial photography and if the USGS 7.5-minute quadrangles shows cross hatching for the area, intermittent has been assigned unless the upstream portion of the stream was assigned as perennial pursuant to the USGS National Hydrography Dataset then assigned perennial for the ponded area.
- USGS has a dashed line for intermittent streams. USGS has a solid line for perennial streams. In some situations this information was used to assist in the determination of assigning perennial or intermittent to a stream.

2.2.3. Results for stream characterization

The 27 streams and data are contained in a GIS file titled "SD_Regional_WMAA_Streams" located in Attachment C. The streams are shown in watershed maps included in Attachment A.2.

Summary of Deliverables for Stream Characterization

Format	Item	Description	Location
Report	Title of Figures	• "Watershed Management Area Streams" • "Watershed Management Area Streams by Hydrographic Category" • "Watershed Management Area Streams by Bed Material" • "Watershed Management Area Streams by Geologic Group" • "Watershed Management Area Streams by Reach"	Attachment A.2

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Format	Item	Description	Location
		Type"	
GIS	Map Group Title	Not Grouped	Attachment C.1
	Map Layer Title	SD_Regional_WMAA_Streams	
	Geodatabase Feature Dataset	Streams	
	Geodatabase Feature Class	SD_Regional_WMAA_Streams	
	Geodatabase Geometry Type	Line	
KMZ ¹	KMZ File Name	SD_Regional_WMAA_Streams	Attachment C.2
¹ To enhance the utilization of this data, the Stream Characterization map is provided in both traditional GIS file format (ESRI software license purchase required) and as a Google Earth KMZ (Keyhole Markup Language/Zippped) file that can be viewed with the free download version of Google Earth (http://www.google.com/earth/).			

In addition to the 27 streams that were subject of detailed analysis, NHD streams have been included on maps and within the geodatabase for reference. The NHD stream alignments have not been corrected and in some cases may be inconsistent with the existing infrastructure. The NHD streams are contained in a GIS file titled, "SD_NHD_Streams."

2.2.4. Limitations for stream characterization

- Only a desktop analysis was performed and no field verification was conducted.
- Infrastructure is only based on storm water conveyance system data provided by Copermittees or clearly visible on aerial photography. If the Copermittee used a numbering or lettering system for describing bed and bank material for example, since the metadata was not provided the bed and bank material could not be verified.
- In some instances concrete channels cannot be identified on aerial photography if it is filled with sediment and/ or vegetation.

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2.3.Land Uses

For the purpose of the WMAA, the Regional MS4 Permit requires a description of current and anticipated future land uses. This is presented in the final GIS deliverable as "Land Use Planning" and includes the following representations of land uses in the watersheds: existing land uses, planned land uses, developable lands, redevelopment and infill areas, floodplains, Multiple Species Conservation Program (MSCP) designated areas, and areas not within the Copermittees' jurisdictions (tribal lands, state lands, and federal lands).

2.3.1. Datasets Used for land uses

The following existing regional datasets were referenced to meet this requirement:

- Municipal boundaries: "Municipal_Boundaries" dated August 2012, available from SanGIS/SANDAG
- Ownership: "Parcels" dated December 2013, available from SanGIS/SANDAG
- Existing land use: "SANGIS.LANDUSE_CURRENT" dated December 2012, available from SanGIS/SANDAG (existing land use)
- Planned land use: "PLANLU" (Planned Land Use for the Series 12 Regional Growth Forecast (2050)), dated December 2010, available from SanGIS/SANDAG
- Developable land: "DEVABLE" (Land available for potential development for the Series 12 Regional Growth Forecast), dated December 2010, available from SanGIS/SANDAG
- Redevelopment and infill areas: "REDEVINF" (Redevelopment and infill areas for the Series 12 Regional Growth Forecast), dated December 2010, available from SanGIS/SANDAG
- Floodplains: "National Flood Hazard Layer" provided by Federal Emergency Management Agency October 2012
- Multiple Species Conservation Program (MSCP), total of four datasets available from SanGIS/SANDAG: "MHPA_SD," dated 2012, (Multiple Habitat Planning Areas for City of San Diego); "MSCP_CN," dated 2009 (designations of the County of San Diego's Multiple Species Conservation Program South County Subregional Plan); "MSCP_EAST_DRAFT_CN," dated 2009 (draft East County MSCP Plan); and "Draft_North_County_MSCP_Version_8.0_Categories," dated 2008 (draft North County MSCP Plan)

2.3.2. Methodology/Assumptions/Criteria for land uses

The existing regional datasets for existing land use, planned land use, developable land, redevelopment and infill areas, floodplains, and MSCP designated areas were referenced with no modifications. Areas not within the Copermittees' jurisdictions (tribal lands, state lands, and federal lands) were compiled from SanGIS parcel data (December 2013) based on the "ownership" value. The owners listed below were excluded from the Copermittees jurisdictions and represent the "Federal/State/Indian" layer, which is displayed on various maps included in Attachment A.2.

- Bureau of Land Management
- California Department of Fish and Game
- Indian Reservations
- Military Reservations

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- Other Federal
- State
- State of California Land Commission
- State Parks
- U.S. Fish and Wildlife Service
- U.S. Forest Service

When available, relevant data from these areas was included in analyses (e.g., developable land areas within Federal/State/Indian areas). Stream lines were prepared within these areas for continuity. However, stream classification (e.g., bed and bank material) was not prepared within these areas unless data was readily available (e.g., hydrographic category data available from NHD)

2.3.3. Results for land uses

The existing regional datasets are compiled into the Geodatabase in a group titled, "Land Use Planning." Current and anticipated future land uses are depicted in watershed maps included in Attachment C. Federal/State/Indian Lands are also referenced on all other map exhibits included in Attachment A.2.

Summary of Deliverables for Land Uses

Format	Item	Description	Location
Report	Title of Figures	• "Existing Land Use" • "Planned Land Use" • "Developable Land" • "Redevelopment and Infill Areas"	Attachment A.3
GIS	Map Group Title	Land Use Planning	Attachment C.1
	Map Layer Title	Municipal Boundaries Federal/State/Indian Lands SanGIS_ExistingLandUse SanGIS_PlannedLandUse SanGIS_DevelopableLand SanGIS_RedevelopmentandInfill FEMA Floodplain MHPA_SD MSCP_CN MSCP_EAST_DRAFT_CN Draft_North_County_MSCP_Version_8_Categories	
	Geodatabase Feature Dataset	LandUsePlanning	
	Geodatabase Feature Class	SanGIS_MunicipalBoundaries Federal_State_Indian_Lands SanGIS_ExistingLandUse SanGIS_PlannedLandUse	

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Format	Item	Description	Location
		SanGIS_DevelopableLand SanGIS_RedevelopmentandInfill FEMA_NFHL SanGIS_MHPA_SD SanGIS_MSCP_CN SanGIS_MSCP_EAST_DRAFT_CN SanGIS_Draft_North_County_MSCP_Version_8_Categories	
	Geodatabase Geometry Type	Polygon	
KMZ ¹	KMZ File Name	Municipal Boundaries Federal/State/Indian Lands Floodplains Due to file size limitations, SanGIS land use datasets were not converted to KMZ.	Attachment C.2
¹ To enhance the utilization of this data, the Land Uses map is provided in both traditional GIS file format (ESRI software license purchase required) and as a Google Earth KMZ (Keyhole Markup Language/Zipped) file that can be viewed with the free download version of Google Earth (http://www.google.com/earth/).			

2.3.4. Limitations

Some jurisdictions may have compiled GIS land use layers that include more detailed or more current information than the regional datasets available from SanGIS. SanGIS layers were selected for the Regional WMAA to provide consistent land use characterization region-wide, and to provide for repeatability of GIS analyses when a land use layer is required for input data. The definition of non-Copermittee areas identified in this document as "Federal/State/Indian Lands" is for the Regional WMAA. Some WQIPs may define non-Copermittee areas differently.

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2.4.Potential Critical Coarse Sediment Yield Areas

The Regional MS4 Permit identifies in the provisions related to the WMAA that potential coarse sediment yield areas within the watershed be identified, with GIS layers (maps) as output. With regard to the function and importance of coarse sediment, SCCWRP Technical Report 667 titled “Hydromodification Assessment and Management in California” states the following:

“Coarse sediment functions to naturally armor the stream bed and reduce the erosive forces associated with high flows. Absence of coarse sediment often results in erosion of in-channel substrate during high flows. In addition, coarse sediment contributes to formation of in-channel habitats necessary to support native flora and fauna.”

This report identifies the potential critical coarse sediment yield areas for the San Diego Bay WMA in compliance with this permit provision. The applied datasets and methodologies for identifying the coarse sediment yield areas, along with their respective results, are described in the sections below.

2.4.1. Datasets Used for identifying potential critical coarse sediment yield areas

The following datasets were used in the analysis

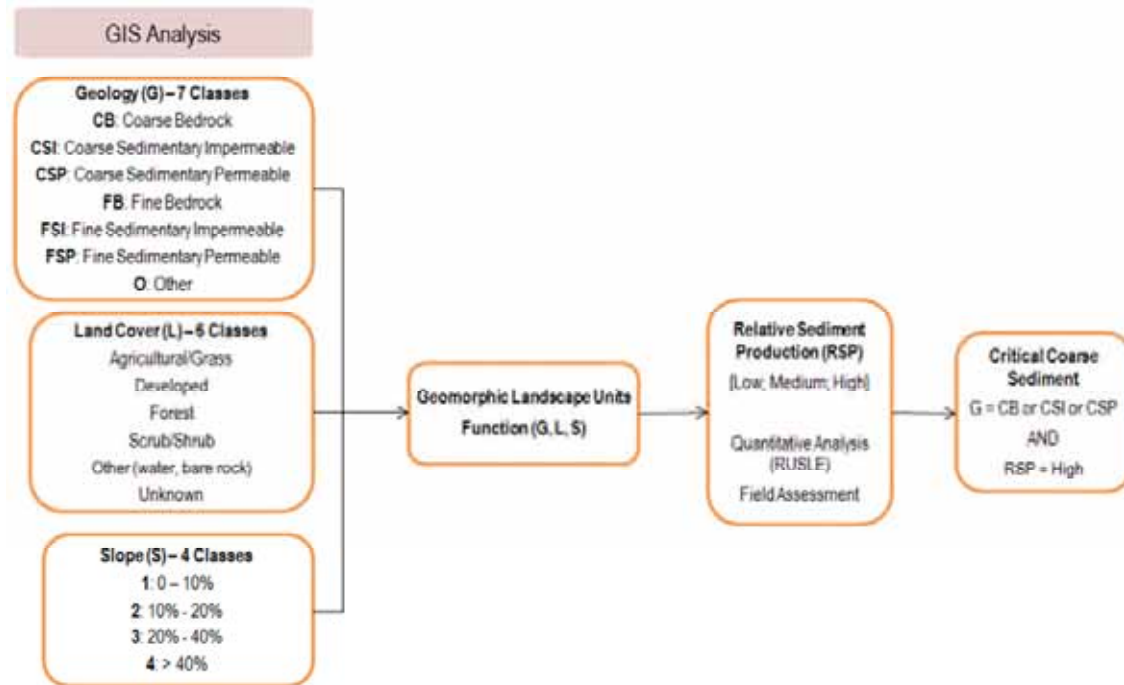
Dataset	Source	Year	Description
Elevation	USGS	2013	1/3 rd Arc Second (~10 meter cells) digital elevation model for San Diego County
Land Cover	SanGIS	2013	Ecology-Vegetation layer for San Diego County downloaded from SanGIS
Geology	Kennedy, M.P., and Tan, S.S.	2002	Geologic Map of the Oceanside 30’x60’ Quadrangle, California, California Geological Survey, Regional Geologic Map No. 2, 1:100,000 scale.
	Kennedy, M.P., and Tan, S.S.	2008	Geologic Map of the San Diego 30’x60’ Quadrangle, California, California Geological Survey, Regional Geologic Map No. 3, 1:100,000 scale.
	Todd, V.R.	2004	Preliminary Geologic Map of the El Cajon 30’x60’ Quadrangle, Southern California, United States Geological Survey, Southern California Areal Mapping Project (SCAMP), Open File Report 2004-1361, 1:100,000 scale.
	Jennings et al.	2010	“Geologic Map of California,” California Geological Survey, Map No. 2 – Geologic Map of California, 1:750,000 scale

2.4.2. Methodology/Assumptions/Criteria for identifying potential critical coarse sediment yield areas

The methodology used to identify coarse sediment yield areas is based on Geomorphic

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Landscape Unit (GLU) methodology presented in the SCCWRP Technical Report 605 titled “Hydromodification Screening Tools: GIS-Based Catchment Analyses of Potential Changes in Runoff and Sediment Discharge” (SCCWRP, 2010). Geomorphic Landscape Units characterize the magnitude of sediment production from areas through three factors judged to exert the greatest influence on the variability on sediment-production rates: geology types, hillslope gradient, and land cover. The GLU approach provides a useful, rapid framework to identify sediment-delivery attributes of the watershed. The process to integrate these factors into GLUs is indicated in the flow chart below.



The following steps were used to define Geomorphic Landscape Units (GLUs), which were then related to the coarse sediment and critical coarse sediment yield areas in the San Diego Bay WMA.

1. **Integrate data sets used to determine GLU:** Categories for geology, gradient, and land cover were defined based on readily available GIS datasets for the region and classifications found in relevant literature listed in Chapter 6. The different combinations of these categories make up distinct GLUs.
 - **Geologic Categories:** based on methodology listed in Attachment A.4.1 of Attachment A.4. Resulting geologic categories from this analysis are: Coarse Bedrock (CB), Coarse Sedimentary Impermeable (CSI), Coarse Sedimentary Permeable (CSP), Fine Bedrock (FB), Fine Sedimentary Impermeable (FSI), Fine Sedimentary Permeable (FSP), and Other (O). An exhibit showing the regional geology groupings is presented in Attachment A.4.

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- **Land cover categories:** defined using the Ecology Vegetation GIS map layer developed by the City of San Diego, the County of San Diego and SANDAG which were downloaded from SanGIS (2013). The vegetation categories in the GIS layer were grouped (Table A.1.2 in Attachment A.1) to match the following categories used in SCCWRP's Technical Report 605 (SCCWRP, 2010): Agriculture/Grass; Developed; Forest; Scrub/Shrub, Other (Water) and Unknown.
 - **Gradient Categories:** based on slope ranges found in a review of relevant literature (GLU methodology applied in California) listed in Chapter 6. The spatial processing of the slope categories utilized the USGS National Elevation Dataset (NED). Slope ranges used include: 0% to 10%, 10% to 20%, 20% to 40%, and greater than 40%.
2. **GLU Union Results:** GIS mapping exercise for the study area resulted in 166 GLUs within the 9 WMAs in San Diego County. Table A.4.2 in Attachment A.4 provides the list of the 166 GLUs.

For implementing hydromodification management performance standards in the Regional MS4 Permit, the Copermittees need to identify Critical Coarse Sediment Yield areas in the study region. To provide information on the identification of Critical Coarse Sediment yield, the study assumed that critical coarse sediment would be generated from GLUs that are composed of geologic units likely to generate coarse sediment (based on the methodology listed in Step 3) and have the potential for high relative sediment production (as estimated using the methodology listed in Step 4).

3. **Define Pertinent Geologic groups:** the geologic groups (Attachment A.4.1) considered in this study to have the potential to generate coarse sediment are Coarse Bedrock (CB), Coarse Sedimentary Impermeable (CSI), and Coarse Sedimentary Permeable (CSP). An exhibit showing the regional geologic grouping is presented in Attachment A.4.
4. **Relate GLU to Sediment Production:** For assigning GLUs with a relative sediment production, the following methodology was utilized:
- Conducted quantitative analysis to assign relative sediment production. Analysis was performed based on the assumption that sediment production from an area is proportional to the soil loss from the area, as evaluated using standard soil loss equation. Detailed analysis steps are documented in Attachment A.4.2;
 - To validate the quantitative assignment above, a qualitative field assessment was conducted for 40 sites. Site selection and findings from the field assessment is documented in Attachment A.4.3.
 - The result of the field assessment indicated a 65% match between field conditions and the quantitative assignments. The mismatches are attributed to differences in percent land cover as assumed for the quantitative analysis and those observed in the field. As such, the quantitative assignments were considered to be valid for the purposes of assigning relative sediment production.

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2.4.3. Results for identifying potential critical coarse sediment yield areas

The resulting GIS maps showing the spatial distribution of geologic grouping and critical coarse sediment yield areas within the San Diego Bay WMA are provided in Attachment A.4. An ArcMap document which presents the results from each step of the methodology is included in Attachment C. Based on this analysis it was estimated that 9.9 % of the study area is a potential critical coarse sediment yield area.

As a result of the regional-scale datasets, and commensurate data resolution, used to map the potential critical coarse sediment yield areas, some areas may have been mapped that in reality do not produce critical coarse sediment as they are existing developed areas. As such, an opportunity for jurisdictions to incorporate more refined data into the preliminary WMAA GIS dataset based on local knowledge and review of current aerial images was provided. The City of National and the County of San Diego provided augmented data in the San Diego Bay WMA for their respective jurisdictional areas.

Summary of Deliverables for Potential Critical Coarse Sediment Yield Areas

Format	Item	Description	Location
Report	Figures	"Geologic Grouping" "Potential Critical Coarse Sediment Yield Areas"	Attachment A.4
GIS	Map Group Layer Name	Potential Coarse Sediment Yield	Attachment C.1
	Map Layer Title	Geologic Grouping Land Cover Slope Category Geomorphic Landscape Unit Potential Coarse Sediment Yield Area Relative Sediment Production Potential Critical Coarse Sediment Yield Area	
	Geodatabase Feature Dataset	PotentialCoarseSedimentYield	
	Geodatabase Feature Class	GLUAnalysis PotentialCoarseSedimentYieldAreas PotentialCriticalCoarseSedimentYieldAreas	
	Geodatabase Geometry Type	Polygon	
KMZ ¹	KMZ File Name	Potential Critical Coarse Sediment Yield Areas	Attachment C.2

¹ To enhance the utilization of this data, the Geomorphic Landscape Unit Analysis is provided in both traditional GIS file format (ESRI software license purchase required) and as a Google Earth KMZ (Keyhole Markup Language/Zipped) file that can be viewed with the free download version of Google Earth (<http://www.google.com/earth/>).

2.4.4. Limitations for identifying potential critical coarse sediment yield areas

The resulting GIS layers were developed using regional datasets and provide a useful, rapid framework to perform screening-level analysis that is appropriate for watershed-scale planning studies. The methodology used to identify potential coarse sediment yield areas does not account for instream sediment supply and sediment production from mass failures like landslides which

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are difficult to estimate on a regional scale without performing extensive field investigation. This data set also does not account for potential existing impediments that may hinder delivery of coarse sediment to receiving waters or downstream locations within the watershed as this was beyond the scope of a regional study. Where more precise estimates are required for a particular site or subarea it is recommended that this analysis be augmented with site-specific analysis. It is also recognized that this regional data set is a function of the inherent data resolution and therefore may not conform to all site conditions, or does not reflect changes to particular areas that have occurred since the underlying data was developed. As such, the WMAA data for the potential critical coarse sediment yield areas should be verified in the field according to the procedures outlined in the Model BMP Design Manual and/or jurisdiction specific BMP Design Manual.

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2.5. Physical Structures

The Regional MS4 Permit requires the Copermittees to identify information regarding locations of existing flood control structures and channel structures, such as stream armoring, constrictions, grade control structures, and hydromodification or flood management basins with GIS layers (maps) as output, for each WMA being analyzed for the purpose of developing watershed-specific requirements for structural BMP implementation. This study identified the physical structures using a desktop-level analysis for the stream(s) identified in Section 2.2 in compliance with this permit provision.

2.5.1. Approach for identifying physical structures

The intent of this portion of the WMAA project was to provide an initial assessment of the structures of interest for the stream(s) identified in Section 2.2. This desktop-level analysis was conducted primarily as a visual survey of aerial imagery and FEMA flood insurance study (FIS) profiles where available. The collected information was entered into a GIS layer for inclusion into the overall WMAA geodatabase containing the characterization layers required by the Regional MS4 Permit. To support overall WMA characterization, the information derived in this task provides insight into water and sediment movement through the watershed (SCCWRP, 2012), the opportunities and limitations for infrastructure retrofits and also informs efforts to identify appropriate locations for habitat or riparian area rehabilitation in relation to proximate infrastructure. Specific information regarding how the survey was performed and the attributes of the generated data is presented in Attachment A.5. Note that concrete channels, pipes/culverts, riprap or other artificial stream armoring, and basins have also been identified in the linework generated for the streams (see Section 2.2).

2.5.2. Results for identifying physical structures

The resulting GIS mapping provided in Attachment A.5 shows the spatial locations of the physical structures within the mapped stream(s).

Summary of Deliverables for Physical Structures

Format	Item	Description	Location
Report	Figure	Watershed Management Area Streams by Reach Type with Channel Structures	Attachment A.5
GIS	Map Group Layer Name	Channel Structures	Attachment C.1
	Map Layer Title	Channel Structures	
	Geodatabase Feature Dataset	ChannelStructures	
	Geodatabase Feature Class	ChannelStructures	
	Geodatabase Geometry Type	Point	
KMZ ¹	Kmz File Name	ChannelStructures	Attachment C.2

¹ To enhance the utilization of this data, the Physical Structures map is provided in both traditional GIS file format (ESRI software license purchase required) and as a Google Earth KMZ (Keyhole Markup Language/Zipped) file that can be viewed with the free download version of Google Earth (<http://www.google.com/earth/>).

3. Template for Candidate Project List

The Regional MS4 Permit requires each WMA to use the results from the WMA characterization to compile a list of candidate projects that could potentially be used as alternative compliance options for Priority Development Projects should an agency or jurisdiction opt to develop an alternative compliance program. Copermittees must first conclude that implementing such a candidate project would provide greater overall benefit to the watershed than requiring implementation of structural BMPs onsite prior to implementing these candidate projects as alternative compliance projects.

The Copermittees elected to identify potential candidate projects as a separate effort from this regional project, and therefore the process for identifying candidate projects is not documented in this report. Instead, this project only developed a template, in a spreadsheet format, for use by the Copermittees to compile lists of potential candidate projects. The template is intended to enhance regional consistency of the information that is gathered for candidate projects. The template spreadsheet file was distributed to the Copermittees on January 28, 2014. A table of the template components is indicated below:

Column	Primary Heading	Secondary Heading	Guidance for Completing the Project List
A	Project Identifier	-	Unique identifier for the project.
B	Watershed Management Area	-	Dropdown menu to select the watershed management area the project is located in
C	Hydrologic Area (HA)	-	Dropdown menu to select the hydrologic area the project is located in Select a WMA in column B for HA (Column C) dropdown menu to activate.
D	Hydrologic Subarea (HSA)	-	Dropdown menu to select the hydrologic subarea the project is located in. Select a HA in column C for HSA (Column D) dropdown menu to activate.
E	Jurisdiction	-	Dropdown menu to select the jurisdiction the project is located in. Select a HSA in column D for Jurisdiction (Column E) dropdown menu to activate.
F	Project Name	-	Indicate the name of the project.
G	Ownership	Type	Dropdown menu to select if the project is a public project, private project, or public-private partnership.
H	Ownership	Ownership Information	List the details for the owner.
I	Project Location	Address	List the address of the project site.
J	Project Location	APN	List the APN of the parcel.
K	Project Location	Latitude	List the latitude of the project site.
L	Project Location	Longitude	List the longitude of the project site.

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Column	Primary Heading	Secondary Heading	Guidance for Completing the Project List
M	Project Origination/ Originator	Name	List the name of the report/organization/individual that provided the idea for the project. Potential origination sources: WQIP, WMAA, JURMPs, WURMPs, CLRPs, IRWM, MSCP, MHPA, Other.
N	Project Origination/ Originator	Contact Information	Link or report title if the proposed project is from a report [or] contact information if from an organization/individual.
O	Project Category	-	Drop Down menu to select the project category; In addition to the 6 project categories explicitly listed in the Regional MS4 Permit, the drop down menu also has a category "Other project types allowed by the MS4 Permit". Example for "Other" project types are agency CIP programs such as Green Streets, LID conversions (medians, parks), agency filter installation, etc.
P	Specific Project Type	-	List the subcategory of the project; for example, list Regional BMP type (i.e. infiltration basin, wetland, etc.).
Q	Potential Pollutant	-	Identify the potential pollutant(s) that can be treated by the proposed project.
R	Project Size & Parameters	Contributing Drainage Area (acres)	List the contributing drainage area to the project.
S	Project Size & Parameters	Parcel Size (acres)	List the size of the parcel the project is located on.
T	Project Size & Parameters	Project Footprint (acres)	List the size of the project footprint.
U	Project Size & Parameters	Parameters (with units as necessary)	Parameters needed to quantify benefits from the project; i.e. for an infiltration basin, list the water quality volume, long-term infiltration rate, depth of the basin, etc.
V	Regulatory Requirement	-	Indicate if the project is proposed to meet particular regulatory requirement such as TMDL, etc.
W	Project Timeline	-	Indicate if a project must be implemented by certain date to meet a grant deadline or other time commitment.
X	Other Notes	-	List any other relevant notes; for example, when retrofitting existing infrastructure project category is selected, input parameters needed to quantify benefits from existing infrastructure into this column as these will be needed to estimate additional benefits that can be used for alternative compliance. If N/A is selected in any dropdown menus, add additional explanation in here

4. Hydromodification Management Applicability/Exemptions

Hydromodification, which is caused by both altered storm water flow and altered sediment flow regimes, is largely responsible for degradation of creeks, streams, and associated habitats in the San Diego Region. The purpose of the hydromodification management requirements in the Regional MS4 Permit is to maintain or restore more natural hydrologic flow regimes to prevent accelerated, unnatural erosion in downstream receiving waters.

In some cases, priority development projects may be exempt from hydromodification management requirements if the project site discharges runoff to receiving waters that are not susceptible to erosion (e.g., a lake, bay, or the Pacific Ocean) either directly or via hardened systems including concrete-lined channels or existing underground storm drain systems.

The March 2011 Final Hydromodification Management Plan (HMP) identified certain exemptions from hydromodification management requirements by presenting "HMP applicability criteria." The Regional MS4 Permit maintains some of these HMP applicability criteria. However, some of the applicability criteria are not included under the Regional MS4 Permit unless the area or receiving water is mapped in the WMAA. The intent of this Section is to provide mapping of areas exempt from hydromodification management requirements, and provide supporting technical analyses for exemptions that are recommended by the WMAA.

4.1. Additional Analysis for Hydromodification Management Exemptions

This section documents additional analysis performed to further evaluate the following exemptions that were already approved by the San Diego Regional Board with the 2011 Final HMP. This study only provides additional analysis, data, and rationale for supporting or eliminating the following existing exemptions and does not propose or study any new exemptions.

- Exempt River Reaches
- Stabilized Conveyance Systems Draining to Exempt Water Bodies
- Highly Impervious Watersheds and Urban Infill and
- Tidally Influenced Lagoons

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4.1.1. Exempt River Reaches

4.1.1.1. History

The March 2011 Final HMP, approved by the SDRWQCB under the 2007 MS4 Permit, provides the following exemption from hydromodification management requirements under Section 6.1, HMP Applicability Requirements:

- *Figure 6-1, Node 5 – Potential exemptions may be granted for projects discharging runoff directly to an exempt receiving water, such as the Pacific Ocean, San Diego Bay, an exempt river system (detailed in Table 6-1), or an exempt reservoir system (detailed in Table 6-2).*

Exempt river systems/reaches from the 2011 Final HMP:

River	Downstream Limit	Upstream Limit
Otay River	Outfall to San Diego Bay	Lower Otay Reservoir Dam
Sweetwater River	Outfall to San Diego Bay	Sweetwater Reservoir Dam

Exemptions related to runoff discharging directly to the above river reaches were based on the flow duration analysis performed for the San Diego River in the Final HMP and the Technical Advisory Committee (formed to provide input on the development of the Final HMP) members' opinion (based on field observations and years of historical perspective) that the above river reaches have very low gradients, were depositional (aggrading), have very wide floodplain areas when in the natural condition and that the effects of cumulative watershed impacts to these reaches is minimal provided that properly sized energy dissipation is provided at outfalls to the rivers.

4.1.1.2. Status under 2013 Regional MS4 Permit

Under the Regional MS4 Permit, exempt river reaches would not qualify for exemption from hydromodification management controls unless the optional WMAA is developed with additional rationale/analyses to support reinstating exemptions to these river reaches. Additional analysis performed as part of the WMAA to evaluate hydromodification management control exemptions to the previously exempt reaches is presented below.

4.1.1.3. Research, Approach and Results

Hydromodification impacts can be caused due to increase in flows, changes in sediment transport capacity and changes in sediment supply to the streams (SCCWRP, 2012). In order to evaluate the cumulative impacts due to development and determine if hydromodification management exemptions can be reinstated for the river reaches that were exempt in the previous permit term erosion potential (Ep) analysis was used to evaluate the increase in flows and changes in sediment transport capacity. In addition, sediment supply potential (Sp) analysis was used to evaluate the changes in sediment supply in this study. In regards to Ep analysis SCCWRP Technical Report 667 "Hydromodification Assessment and Management in California" states:

"The underlying premise of the erosion potential approach advances the concept of flow duration control by addressing in-stream processes related to sediment transport. An

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erosion potential calculation combines flow parameters with stream geometry to assess long term (decadal) changes in the sediment transport capacity. The cumulative distribution of shear stress, specific stream power and sediment transport capacity across the entire range of relevant flows can be calculated and expressed using an erosion potential metric, Ep (e.g., Bledsoe, 2002)."

The approach used in this study is explained in detail in Attachment B.1.1.1. The following WMA characterization maps developed in Section 2 were used to select inputs for the exempt river reach analysis:

- Planning land use layers from Section 2.3 were used to estimate the existing impervious area and identify the developable parcels in each watershed. A GIS exercise was performed to identify the developable parcels in each watershed that will be exempt from hydromodification management requirements if the exemption is granted.
- Stream type classification analysis from Section 2.2 was used to select a conservative cross section (segments that are assigned naturally constrained) to be used in analysis for each watershed
- GLU analysis and its associated quantitative analysis described in Section 2.4 were used to determine Sp metric for each watershed. In this study coarse sediment supply changes were limited to changes in hill slope erosion between existing condition and future condition (for parcels that are proposed to be exempt from hydromodification management) of the watershed. It was assumed that the changes in instream sediment supply between existing and future condition for these large depositional river systems are very minimal.

Selection of inputs for the analysis is explained in detail in Attachment B.1.1.2 and results from the analysis are presented in Attachment B.1.1.3 in tabular format. The Ep analysis performed in this study does not account for the following Regional MS4 permit requirements as a conservative assumption. If accounted for, it will result in a smaller Ep than what is currently reported in Attachment B.1.1.3:

- New development priority development projects including projects that are proposed to be exempt from hydromodification management requirements through this WMAA study must implement retention BMPs to the extent feasible if alternative compliance option is not selected or not available.
- Redevelopment priority development projects must mitigate to the pre-developed condition

4.1.1.4. Recommendation

Based on the results from this study reported in Attachment B.1.1.3, the flow duration analysis performed in the Final HMP, and the Technical Advisory Committee (TAC) recommendations provided during the Final HMP development, it is recommended that hydromodification management exemption be reinstated for projects discharging runoff directly to the following exempt river reaches:

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River	Downstream Limit	Upstream Limit
Otay River	Outfall to San Diego Bay	Interstate 805
Sweetwater River	Outfall to San Diego Bay	Sweetwater Reservoir Dam

Each municipality must define/approve “direct discharge” based on the project site conditions. To qualify for the potential exemption, the outlet elevation must be between the river bottom elevation and the 100-year floodplain elevation and properly designed energy dissipation must be provided. Mapping of these exempt river reaches is presented in Attachment B.2.

Additional studies to establish a site-specific allowable Ep metric for the Otay River from East of Interstate 805 to Lower Otay Reservoir Dam, more closely representing actual measured and observed characteristics of this river system, may result in allowing hydromodification management exemptions not currently supported by this desktop assessment which was based on an allowable Ep metric from literature. However, any future proposed HMP exemptions would need to be approved through the WQIP Annual Update process (Regional MS4 Permit Section F.1.2.c.).

4.1.1.5. Limitations

The analysis and associated recommendations as presented above were based on instream erosion as the primary consideration to support reinstatement of exemptions from hydromodification management controls for discharges directly to these river reaches. While it is recognized that other factors contribute to adverse impacts (e.g., salinity imbalance, pollutants) to instream habitat and resulting biotic integrity, hydromodification management control has traditionally been considered an “umbrella process” that encompasses most of the highest risk stressors (percent sands and fines present, channel alteration, and riparian disturbance) to physical habitat. Beyond demonstrating that instream erosion is not anticipated as a result of reinstating hydromodification management control exemptions for discharges to these river reaches, a focused method for correlating physical and biotic integrity to modified hydrological conditions has not been performed in this analysis, as an assessment method has not yet been developed.

The current assessment methods may yield inconclusive results when attempting to identify causal relationships between degraded instream habitat solely due to increased flows and erosive force from hydromodification. A causal assessment recently conducted in the lower reaches of the San Diego River, conducted as a partnership between the Southern California Coastal Water Research Project (SCCWRP), the City of San Diego, the County of San Diego, and the San Diego RWQCB, focused on stressors potentially responsible for known biological impairment of the river. Once the data of the causal assessment become available, it may be useful in classifying the potential stressors such as altered physical habitat as likely, unlikely, or an uncertain cause to biological impairment.

With respect to adverse impacts to habitat as a result of pollutants entrained in storm water discharges, these areas will still be subject over time to the pollutant control requirements of the Regional MS4 Permit as areas develop or redevelop. The current requirements obligate development to maximize retention of the design storm volume which will mitigate a portion of the volume that would otherwise be controlled with hydromodification management BMPs. In

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some cases, this offsetting of volume reduction through pollutant control BMPs may exceed the HMP volumes. In addition, the development that occurs within the exempted watershed areas is still required to provide any applicable flood control measures. Risk of flooding as a result of exemption from hydromodification controls is unlikely as the control thresholds are significantly lower (order of magnitude) than flood control requirements implemented to protect life and property.

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4.1.2. Stabilized Conveyance Systems Draining to Exempt Water Bodies

There are no stabilized conveyance systems currently recommended for exemption from hydromodification management requirements in the San Diego Bay WMA. If engineered conveyance systems that are stabilized with materials other than concrete, such as riprap, turf reinforcement mat, or vegetation, including rehabilitated stream systems, are identified as potential candidates for exemption, they may be studied and may be recommended exempt if they meet specific criteria presented in the Regional WMAA for this exemption. Refer to the Regional WMAA for the criteria and an example study that was prepared for Forester Creek in the San Diego River WMA. However, any future proposed HMP exemptions would need to be approved through the WQIP Annual Update process (Regional MS4 Permit Section F.1.2.c.).

4.1.3. Highly Impervious/Highly Urbanized Watersheds and Urban Infill

Based on evaluation of the highly impervious/highly urbanized watershed and urban infill exemptions presented in the March 2011 Final HMP, and comparison with more recent research prepared for the Ventura County Hydromodification Control Plan (Ventura County HCP) (Final Draft dated September 2013), resurrection of these exemptions from the March 2011 Final HMP was not recommended by the Regional WMAA. The research prepared in support of the Ventura County HCP determined lower thresholds of additional impervious area (ranging from 0.44% to 1.65%) than the limit presented in the San Diego County Final HMP dated March 2011 (3%). No areas within the San Diego Bay WMA are currently recommended for highly impervious/highly urbanized watershed or urban infill exemption.

4.1.4. Tidally Influenced Lagoons

There are no tidally influenced lagoons recommended for exemption from hydromodification management requirements in the San Diego Bay WMA. Refer to the Regional WMAA for further information regarding this exemption.

5. Conclusions

5.1. Watershed Management Area Characterization

The WMA Characterization data was developed using available regional data to further understand the macro-scale watershed characteristics and processes in the San Diego Bay WMA. The Regional MS4 Permit allows for flexibility in complying with land development requirements when using the information developed in the WMAA to improve water quality planning and implementation associated with land development. This dataset will assist with identifying the opportunities and constraints for projects and management decisions based on a watershed-scale (rather than piecemeal project identification without context within the watershed) and provides Copermittees the ability to exercise the option to create an alternative compliance program that offers the opportunity to develop watershed-specific alternatives to universal onsite structural BMP implementation. The characterization data includes:

Characterization Data	Utilization Potential
Dominant Hydrologic Process: • Overland flow • Infiltration • Interflow	• Identify areas for enhanced infiltration or collection of storm water for treatment • Implement management measures that correspond to pre-development conditions – promotes long-term channel stability and health • Increases understanding of the natural functioning of the watershed and what has been (or is at risk of being) altered by urbanization.
Stream Characterization: • Reach type • Bed material • Bank material • Hydrographic category • Channel Structures	• Preliminary dataset that can be used to conduct stream power evaluations • Identify channel systems for preservation or restoration • Identification of appropriate space for channel processes to occur (e.g., flood plain connectivity) • Insight to sensitivity of receiving stream reach • Indicates the features within channels that affect water and sediment movement through the watershed

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Characterization Data	Utilization Potential
Land Use: - Existing - Future	- Foresight (identifies relative risks, opportunities, or constraints) in comparing future to existing land uses, i.e., areas that may be more/less vulnerable to adverse impacts to changes in storm water runoff associated with development - Encourage infill development
Potential Critical Coarse Sediment Yield Areas	- Preservation of areas or function that contributes critical sediment within the watershed to stream armoring/stability - Assist with identifying potentially susceptible stream reaches that require uninterrupted coarse sediment supplies to remain stable - Dual goal of open space conservation

Regarding the identification of the potential critical coarse sediment yield areas in the WMAA using readily available regional datasets, it is anticipated that when more precise estimates for potential critical coarse sediment yield areas are required for a particular site or subarea that this regional study will be augmented with site-specific analysis. Development projects must avoid critical sediment yield areas or implement measures that allow critical coarse sediment to be discharged to receiving waters, such that there is no net impact to the receiving water to meet the requirements of the Regional MS4 permit. As such, projects should consult the Model BMP Design Manual and/or jurisdiction specific BMP Design manual for options to meet the Regional MS4 Permit requirements. It is anticipated that the data will not be static but will be enhanced over time through future studies or field assessments that will refine what is currently a macro-level data set.

5.2.Template for Candidate Project List

It is anticipated the Copermittees that elect to develop alternative compliance programs will conduct a separate exercise to nominate potential candidate projects for inclusion into the WQIPs using the template developed for this project.

5.3.Hydromodification Management Exemptions

Attachment B.2 presents hydromodification management applicability/exemption mapping for the San Diego Bay WMA. The mapping includes receiving waters that are exempt based on the Regional MS4 Permit or recommended exempt based on studies.

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Receiving waters that are **exempt** based on the Regional MS4 Permit include:

- The Pacific Ocean
- San Diego Bay
- Lakes and Reservoirs
- Existing underground storm drains or concrete-lined channels draining directly to San Diego Bay or the ocean

Receiving waters or conveyance systems that are **recommended exempt** in the San Diego Bay WMA based on studies that were prepared as part of the Regional WMAA or prepared by others and provided for this purpose include:

- Otay River from Outfall at San Diego Bay to Interstate 805
- Sweetwater River from San Diego Bay to Sweetwater Reservoir Dam
- Existing underground storm drains or concrete-lined channels discharging directly to the above receiving waters. These systems were identified based on MS4 data provided by the Copermitees via the data call. These systems may not represent all discharges to the above receiving waters. Additional systems may be considered exempt if there is no evidence of erosion at the outfall of the conveyance system, and any other criteria determined by the local jurisdiction.

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San Diego Bay Watershed Management Area Analysis ATTACHMENTS



Lake Henshaw

October 3, 2014

Prepared for:
San Diego County Copermittees



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ATTACHMENT A
WATERSHED MANAGEMENT AREA
CHARACTERIZATION

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ATTACHMENT A.1

DOMINANT HYDROLOGICAL PROCESS

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A.1 Dominant Hydrological Process

Table A.1.1: Runoff Coefficients versus Land Use, Hydrologic Soil Group (A, B, C, D), and Slope Range

Land Use	A			B			C			D		
	0-2%	2-6%	6% ^a	0-2%	2-6%	6% ^a	0-2%	2-6%	6% ^a	0-2%	2-6%	6% ^a
Cultivated land	0.08 ^a	0.13	0.16	0.11	0.15	0.21	0.14	0.19	0.26	0.18	0.23	0.31
	0.14 ^b	0.18	0.22	0.16	0.21	0.28	0.20	0.25	0.34	0.24	0.29	0.41
Pasture	0.12	0.20	0.30	0.18	0.28	0.37	0.24	0.34	0.44	0.30	0.40	0.50
	0.15	0.25	0.37	0.23	0.34	0.45	0.30	0.42	0.52	0.37	0.50	0.62
Meadow	0.10	0.16	0.25	0.14	0.22	0.30	0.20	0.28	0.36	0.24	0.30	0.40
	0.14	0.22	0.30	0.20	0.28	0.37	0.26	0.35	0.44	0.30	0.40	0.50
Forest	0.05	0.08	0.11	0.08	0.11	0.14	0.10	0.13	0.16	0.12	0.16	0.20
	0.08	0.11	0.14	0.10	0.14	0.18	0.12	0.16	0.20	0.15	0.20	0.25
Residential lot size 1/8 acre	0.25	0.28	0.31	0.27	0.30	0.35	0.30	0.33	0.38	0.33	0.36	0.42
	0.33	0.37	0.40	0.35	0.39	0.44	0.38	0.42	0.49	0.41	0.45	0.54
Residential lot size 1/4 acre	0.22	0.26	0.29	0.24	0.29	0.33	0.27	0.31	0.36	0.30	0.34	0.40
	0.30	0.34	0.37	0.33	0.37	0.42	0.36	0.40	0.47	0.38	0.42	0.52
Residential lot size 1/3 acre	0.19	0.23	0.26	0.22	0.26	0.30	0.25	0.29	0.34	0.28	0.32	0.39
	0.28	0.32	0.35	0.30	0.35	0.39	0.33	0.38	0.45	0.36	0.40	0.50
Residential lot size 1/2 acre	0.16	0.20	0.24	0.19	0.23	0.28	0.22	0.27	0.32	0.26	0.30	0.37
	0.25	0.29	0.32	0.28	0.32	0.36	0.31	0.35	0.42	0.34	0.38	0.48
Residential lot size 1 acre	0.14	0.19	0.22	0.17	0.21	0.26	0.20	0.25	0.31	0.24	0.29	0.35
	0.22	0.26	0.29	0.24	0.28	0.34	0.28	0.32	0.40	0.31	0.35	0.46
Industrial	0.67	0.68	0.68	0.68	0.68	0.69	0.68	0.69	0.69	0.69	0.69	0.70
	0.85	0.85	0.86	0.85	0.86	0.86	0.86	0.86	0.87	0.86	0.86	0.88
Commercial	0.71	0.71	0.72	0.71	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
	0.88	0.88	0.89	0.89	0.89	0.89	0.89	0.89	0.90	0.89	0.89	0.90
Streets	0.70	0.71	0.72	0.71	0.72	0.74	0.72	0.73	0.76	0.73	0.75	0.78
	0.76	0.77	0.79	0.80	0.82	0.84	0.84	0.85	0.89	0.89	0.91	0.95
Open space	0.05	0.10	0.14	0.08	0.13	0.19	0.12	0.17	0.24	0.15	0.21	0.28
	0.11	0.16	0.20	0.14	0.19	0.26	0.18	0.23	0.32	0.22	0.27	0.39
Parking	0.85	0.86	0.87	0.85	0.86	0.87	0.85	0.86	0.87	0.85	0.86	0.87
	0.95	0.96	0.97	0.95	0.96	0.97	0.95	0.96	0.97	0.95	0.96	0.97

^a Runoff coefficients for storm recurrence intervals less than 25 years.

^b Runoff coefficients for storm recurrence intervals of 25 years or longer.

Source: Table 7-9 in *Hydrologic Analysis and Design* (McCuen, 2005)

Table A.1.2: Land Cover Grouping

Id	SanGIS Legend	SanGIS Grouping	Land Cover Grouping
1	42000 Valley and Foothill Grassland	Grasslands, Vernal Pools, Meadows, and Other Herb Communities	Agricultural/Grass
2	42100 Native Grassland		Agricultural/Grass
3	42110 Valley Needlegrass Grassland		Agricultural/Grass
4	42120 Valley Sacaton Grassland		Agricultural/Grass

Id	SanGIS Legend	SanGIS Grouping	Land Cover Grouping
5	42200 Non-Native Grassland	Grasslands, Vernal Pools, Meadows, and Other Herb Communities	Agricultural/Grass
6	42300 Wildflower Field		Agriculture/Grass
7	42400 Foothill/Mountain Perennial Grassland		Agriculture/Grass
8	42470 Transmontane Dropseed Grassland		Agriculture/Grass
9	45000 Meadow and Seep		Agriculture/Grass
10	45100 Montane Meadow		Agriculture/Grass
11	45110 Wet Montane Meadow		Agriculture/Grass
12	45120 Dry Montane Meadows		Agriculture/Grass
13	45300 Alkali Meadows and Seeps		Agriculture/Grass
14	45320 Alkali Seep		Agriculture/Grass
15	45400 Freshwater Seep		Agriculture/Grass
16	46000 Alkali Playa Community		Agriculture/Grass
17	46100 Badlands/Mudhill Forbs		Agriculture/Grass
18	Non-Native Grassland		Agriculture/Grass
19	18000 General Agriculture	Non-Native Vegetation, Developed Areas, or Unvegetated Habitat	Agriculture/Grass
20	18100 Orchards and Vineyards		Agriculture/Grass
21	18200 Intensive Agriculture		Agriculture/Grass
22	18200 Intensive Agriculture - Dairies, Nurseries, Chicken Ranches		Agriculture/Grass
23	18300 Extensive Agriculture - Field/Pasture, Row Crops		Agriculture/Grass
24	18310 Field/Pasture		Agriculture/Grass
25	18310 Pasture		Agriculture/Grass
26	18320 Row Crops		Agriculture/Grass
27	12000 Urban/Developed		Developed
28	12000 Urban/Developed		Developed
29	81100 Mixed Evergreen Forest	Forest	Forest
30	81300 Oak Forest		Forest
31	81310 Coast Live Oak Forest		Forest
32	81320 Canyon Live Oak Forest		Forest
33	81340 Black Oak Forest		Forest
34	83140 Torrey Pine Forest		Forest
35	83230 Southern Interior Cypress Forest		Forest
36	84000 Lower Montane Coniferous Forest		Forest
37	84100 Coast Range, Klamath and Peninsular Coniferous Forest		Forest

Id	SanGIS Legend	SanGIS Grouping	Land Cover Grouping
38	84140 Coulter Pine Forest	Forest	Forest
39	84150 Bigcone Spruce (Bigcone Douglas Fir)-Canyon Oak Forest		Forest
40	84230 Sierran Mixed Coniferous Forest		Forest
41	84500 Mixed Oak/Coniferous/Bigcone/Coulter		Forest
42	85100 Jeffrey Pine Forest		Forest
43	11100 Eucalyptus Woodland	Non-Native Vegetation, Developed Areas, or Unvegetated Habitat	Forest
44	60000 RIPARIAN AND BOTTOMLAND HABITAT	Riparian and Bottomland Habitat	Forest
45	61000 Riparian Forests		Forest
46	61300 Southern Riparian Forest		Forest
47	61310 Southern Coast Live Oak Riparian Forest		Forest
48	61320 Southern Arroyo Willow Riparian Forest		Forest
49	61330 Southern Cottonwood-willow Riparian Forest		Forest
50	61510 White Alder Riparian Forest		Forest
51	61810 Sonoran Cottonwood-willow Riparian Forest		Forest
52	61820 Mesquite Bosque		Forest
53	62000 Riparian Woodlands		Forest
54	62200 Desert Dry Wash Woodland		Forest
55	62300 Desert Fan Palm Oasis Woodland		Forest
56	62400 Southern Sycamore-alder Riparian Woodland		Forest
57	70000 WOODLAND	Woodland	Forest
58	71000 Cismontane Woodland		Forest
59	71100 Oak Woodland		Forest
60	71120 Black Oak Woodland		Forest
61	71160 Coast Live Oak Woodland		Forest
62	71161 Open Coast Live Oak Woodland		Forest
63	71162 Dense Coast Live Oak Woodland		Forest
64	71162 Dense Coast Love Oak Woodland		Forest

Id	SanGIS Legend	SanGIS Grouping	Land Cover Grouping
65	71180 Engelmann Oak Woodland	Woodland	Forest
66	71181 Open Engelmann Oak Woodland		Forest
67	71182 Dense Engelmann Oak Woodland		Forest
68	72300 Peninsular Pinon and Juniper Woodlands		Forest
69	72310 Peninsular Pinon Woodland		Forest
70	72320 Peninsular Juniper Woodland and Scrub		Forest
71	75100 Elephant Tree Woodland		Forest
72	77000 Mixed Oak Woodland		Forest
73	78000 Undifferentiated Open Woodland		Forest
74	79000 Undifferentiated Dense Woodland		Forest
75	Engelmann Oak Woodland		Forest
76	52120 Southern Coastal Salt Marsh	Bog and Marsh	Other
77	52300 Alkali Marsh		Other
78	52310 Cismontane Alkali Marsh		Other
79	52400 Freshwater Marsh		Other
80	52410 Coastal and Valley Freshwater Marsh		Other
81	52420 Transmontane Freshwater Marsh		Other
82	52440 Emergent Wetland	Grasslands, Vernal Pools, Meadows, and Other Herb Communities	Other
83	44000 Vernal Pool		Other
84	44320 San Diego Mesa Vernal Pool		Other
85	44322 San Diego Mesa Claypan Vernal Pool (southern mesas)	Non-Native Vegetation, Developed Areas, or Unvegetated Habitat	Other
86	13100 Open Water		Other
87	13110 Marine		Other
88	13111 Subtidal		Other
89	13112 Intertidal		Other
90	13121 Deep Bay		Other
91	13122 Intermediate Bay		Other
92	13123 Shallow Bay		Other
93	13130 Estuarine		Other
94	13131 Subtidal		Other
95	13133 Brackishwater		Other

Id	SanGIS Legend	SanGIS Grouping	Land Cover Grouping
96	13140 Freshwater	Non-Native Vegetation, Developed Areas, or Unvegetated Habitat	Other
97	13200 Non-Vegetated Channel, Floodway, Lakeshore Fringe		Other
98	13300 Saltpan/Mudflats		Other
99	13400 Beach		Other
100	21230 Southern Foredunes	Dune Community	Scrub/Shrub
101	22100 Active Desert Dunes		Scrub/Shrub
102	22300 Stabilized and Partially-Stabilized Desert Sand Field		Scrub/Shrub
103	24000 Stabilized Alkaline Dunes		Scrub/Shrub
104	29000 ACACIA SCRUB		Scrub/Shrub
105	63000 Riparian Scrubs	Riparian and Bottomland Habitat	Scrub/Shrub
106	63300 Southern Riparian Scrub		Scrub/Shrub
107	63310 Mule Fat Scrub		Scrub/Shrub
108	63310 Mulefat Scrub		Scrub/Shrub
109	63320 Southern Willow Scrub		Scrub/Shrub
110	63321 Arundo donnx Dominant/Southern Willow Scrub		Scrub/Shrub
111	63330 Southern Riparian Scrub		Scrub/Shrub
112	63400 Great Valley Scrub		Scrub/Shrub
113	63410 Great Valley Willow Scrub		Scrub/Shrub
114	63800 Colorado Riparian Scrub		Scrub/Shrub
115	63810 Tamarisk Scrub		Scrub/Shrub
116	63820 Arrowweed Scrub		Scrub/Shrub
117	31200 Southern Coastal Bluff Scrub	Scrub and Chaparral	Scrub/Shrub
118	32000 Coastal Scrub		Scrub/Shrub
119	32400 Maritime Succulent Scrub		Scrub/Shrub
120	32500 Diegan Coastal Sage Scrub		Scrub/Shrub
121	32510 Coastal form		Scrub/Shrub
122	32520 Inland form (> 1,000 ft. elevation)		Scrub/Shrub
123	32700 Riversidian Sage Scrub		Scrub/Shrub
124	32710 Riversidian Upland Sage Scrub		Scrub/Shrub
125	32720 Alluvial Fan Scrub		Scrub/Shrub
126	33000 Sonoran Desert Scrub		Scrub/Shrub
127	33100 Sonoran Creosote Bush Scrub		Scrub/Shrub
128	33200 Sonoran Desert Mixed Scrub		Scrub/Shrub
129	33210 Sonoran Mixed Woody Scrub		Scrub/Shrub

Id	SanGIS Legend	SanGIS Grouping	Land Cover Grouping
130	33220 Sonoran Mixed Woody and Succulent Scrub	Scrub and Chaparral	Scrub/Shrub
131	33230 Sonoran Wash Scrub		Scrub/Shrub
132	33300 Colorado Desert Wash Scrub		Scrub/Shrub
133	33600 Encelia Scrub		Scrub/Shrub
134	34000 Mojavean Desert Scrub		Scrub/Shrub
135	34300 Blackbush Scrub		Scrub/Shrub
136	35000 Great Basin Scrub		Scrub/Shrub
137	35200 Sagebrush Scrub		Scrub/Shrub
138	35210 Big Sagebrush Scrub		Scrub/Shrub
139	35210 Sagebrush Scrub		Scrub/Shrub
140	36110 Desert Saltbush Scrub		Scrub/Shrub
141	36120 Desert Sink Scrub		Scrub/Shrub
142	37000 Chaparral		Scrub/Shrub
143	37120 Southern Mixed Chaparral		Scrub/Shrub
144	37120 Southern Mixed Chapparral		Scrub/Shrub
145	37121 Granitic Southern Mixed Chaparral		Scrub/Shrub
146	37121 Southern Mixed Chaparral		Scrub/Shrub
147	37122 Mafic Southern Mixed Chaparral		Scrub/Shrub
148	37130 Northern Mixed Chaparral		Scrub/Shrub
149	37131 Granitic Northern Mixed Chaparral		Scrub/Shrub
150	37132 Mafic Northern Mixed Chaparral		Scrub/Shrub
151	37200 Chamise Chaparral		Scrub/Shrub
152	37210 Granitic Chamise Chaparral		Scrub/Shrub
153	37220 Mafic Chamise Chaparral		Scrub/Shrub
154	37300 Red Shank Chaparral		Scrub/Shrub
155	37400 Semi-Desert Chaparral		Scrub/Shrub
156	37500 Montane Chaparral		Scrub/Shrub
157	37510 Mixed Montane Chaparral		Scrub/Shrub
158	37520 Montane Manzanita Chaparral		Scrub/Shrub
159	37530 Montane Ceanothus Chaparral		Scrub/Shrub
160	37540 Montane Scrub Oak Chaparral		Scrub/Shrub
161	37800 Upper Sonoran Ceanothus Chaparral		Scrub/Shrub
162	37830 Ceanothus crassifolius Chaparral		Scrub/Shrub
163	37900 Scrub Oak Chaparral		Scrub/Shrub
164	37A00 Interior Live Oak Chaparral		Scrub/Shrub

Id	SanGIS Legend	SanGIS Grouping	Land Cover Grouping
165	37C30 Southern Maritime Chaparral	Scrub and Chaparral	Scrub/Shrub
166	37G00 Coastal Sage-Chaparral Scrub		Scrub/Shrub
167	37K00 Flat-topped Buckwheat		Scrub/Shrub
168	39000 Upper Sonoran Subshrub Scrub		Scrub/Shrub
169	Diegan Coastal Sage Scrub		Scrub/Shrub
170	Granitic Northern Mixed Chaparral		Scrub/Shrub
171	Southern Mixed Chaparral		Scrub/Shrub
172	11000 Non-Native Vegetation	Non-Native Vegetation, Developed Areas, or Unvegetated Habitat	Unknown
173	11000 Non-Native VegetationVegetation		Unknown
174	11200 Disturbed Wetland		Unknown
175	11300 Disturbed Habitat		Unknown
176	13000 Unvegetated Habitat		Unknown
177	Disturbed Habitat		Unknown

Table A.1.3: Related Land Cover and Land Use Categories

Land Cover per San Diego County	Land Use per Table A.1.1
Agriculture/Grass	Meadow
Forest	Forest
Scrub/Shrub	Average (Meadow, Forest)
Unknown/Other	Meadow

Table A.1.4: Applicable Hydrologic Response Unit Calculations

Land Cover	Soil	Gradient	Runoff Coeff.	ET Coeff.	Infiltration Coeff.	Runoff/ Infiltration Ratio	Hydrologic Process Designation
Agriculture/Grass	A	0-2%	0.10	0.60	0.30	0.33	I
Agriculture/Grass	A	2-6%	0.16	0.60	0.24	0.67	U
Agriculture/Grass	A	6-10%	0.25	0.60	0.15	1.67	O
Agriculture/Grass	B	0-2%	0.14	0.60	0.26	0.54	I
Agriculture/Grass	B	2-6%	0.22	0.60	0.18	1.22	U
Agriculture/Grass	B	6-10%	0.30	0.60	0.10	3.00	O
Agriculture/Grass	C	0-2%	0.20	0.60	0.20	1.00	U
Agriculture/Grass	C	2-6%	0.28	0.60	0.12	2.33	O
Agriculture/Grass	C	6-10%	0.36	0.60	0.04	9.00	O
Agriculture/Grass	D	0-2%	0.24	0.60	0.16	1.50	U
Agriculture/Grass	D	2-6%	0.30	0.60	0.10	3.00	O
Agriculture/Grass	D	6-10%	0.40	0.60	0.00	infinite	O

Land Cover	Soil	Gradient	Runoff Coeff.	ET Coeff.	Infiltration Coeff.	Runoff/ Infiltration Ratio	Hydrologic Process Designation
Forest	A	0-2%	0.05	0.80	0.15	0.33	I
Forest	A	2-6%	0.08	0.80	0.12	0.67	U
Forest	A	6-10%	0.11	0.80	0.09	1.22	U
Forest	B	0-2%	0.08	0.80	0.12	0.67	U
Forest	B	2-6%	0.11	0.80	0.09	1.22	U
Forest	B	6-10%	0.14	0.80	0.06	2.33	O
Forest	C	0-2%	0.10	0.80	0.10	1.00	U
Forest	C	2-6%	0.13	0.80	0.07	1.86	O
Forest	C	6-10%	0.16	0.80	0.04	4.00	O
Forest	D	0-2%	0.12	0.80	0.08	1.50	U
Forest	D	2-6%	0.16	0.80	0.04	4.00	O
Forest	D	6-10%	0.20	0.80	0.00	infinite	O
Scrub/Shrub	A	0-2%	0.08	0.70	0.23	0.33	I
Scrub/Shrub	A	2-6%	0.12	0.70	0.18	0.67	U
Scrub/Shrub	A	6-10%	0.18	0.70	0.12	1.50	U
Scrub/Shrub	B	0-2%	0.11	0.70	0.19	0.58	I
Scrub/Shrub	B	2-6%	0.17	0.70	0.14	1.22	U
Scrub/Shrub	B	6-10%	0.22	0.70	0.08	2.75	O
Scrub/Shrub	C	0-2%	0.15	0.70	0.15	1.00	U
Scrub/Shrub	C	2-6%	0.21	0.70	0.10	2.16	O
Scrub/Shrub	C	6-10%	0.26	0.70	0.04	6.50	O
Scrub/Shrub	D	0-2%	0.19	0.70	0.12	1.50	U
Scrub/Shrub	D	2-6%	0.23	0.70	0.07	3.29	O
Scrub/Shrub	D	6-10%	0.30	0.70	0.00	infinite	O

Hydrologic Process Designation: I = Interflow; O = Overland Flow; U = Uncertain

Table A.1.5: Hydrologic Response Unit Designations

Land Cover	Slope	Soil Type				
		A	B	C	D	Other (fill/water)
Agriculture/ Grass/Unknown/ Other	0-2%	I	I	U	U	U
	2-6%	U	U	O	O	U
	6-10%	O	O	O	O	O
	>10%	O	O	O	O	O
Developed	0-2%	O	O	O	O	O
	2-6%	O	O	O	O	O
	6-10%	O	O	O	O	O
	>10%	O	O	O	O	O
Forest	0-2%	I	U	U	U	U
	2-6%	U	U	O	O	U
	6-10%	U	O	O	O	U
	>10%	O	O	O	O	O
Scrub/Shrub	0-2%	I	I	U	U	U
	2-6%	U	U	O	O	U
	6-10%	U	O	O	O	U
	>10%	O	O	O	O	O

Hydrologic Process Designation: I = Interflow; O = Overland Flow; U = Uncertain

ATTACHMENT A.2
STREAM CHARACTERIZATION

DRAFT

San Diego Bay Watershed - HU 908.00, 909.00, & 910.00, 441 mi2

San Diego Bay Watershed - HU 908.00, 909.00, & 910.00, 441 mi2

Watershed Management Area Streams by Bed Material

San Diego Bay Watershed - HU 908.00, 909.00, & 910.00, 441 mi2

Watershed Management Area Streams by Reach Type

San Diego Bay Watershed - HU 908.00, 909.00, & 910.00, 441 mi2



Watershed Management Area Streams by Geologic Group

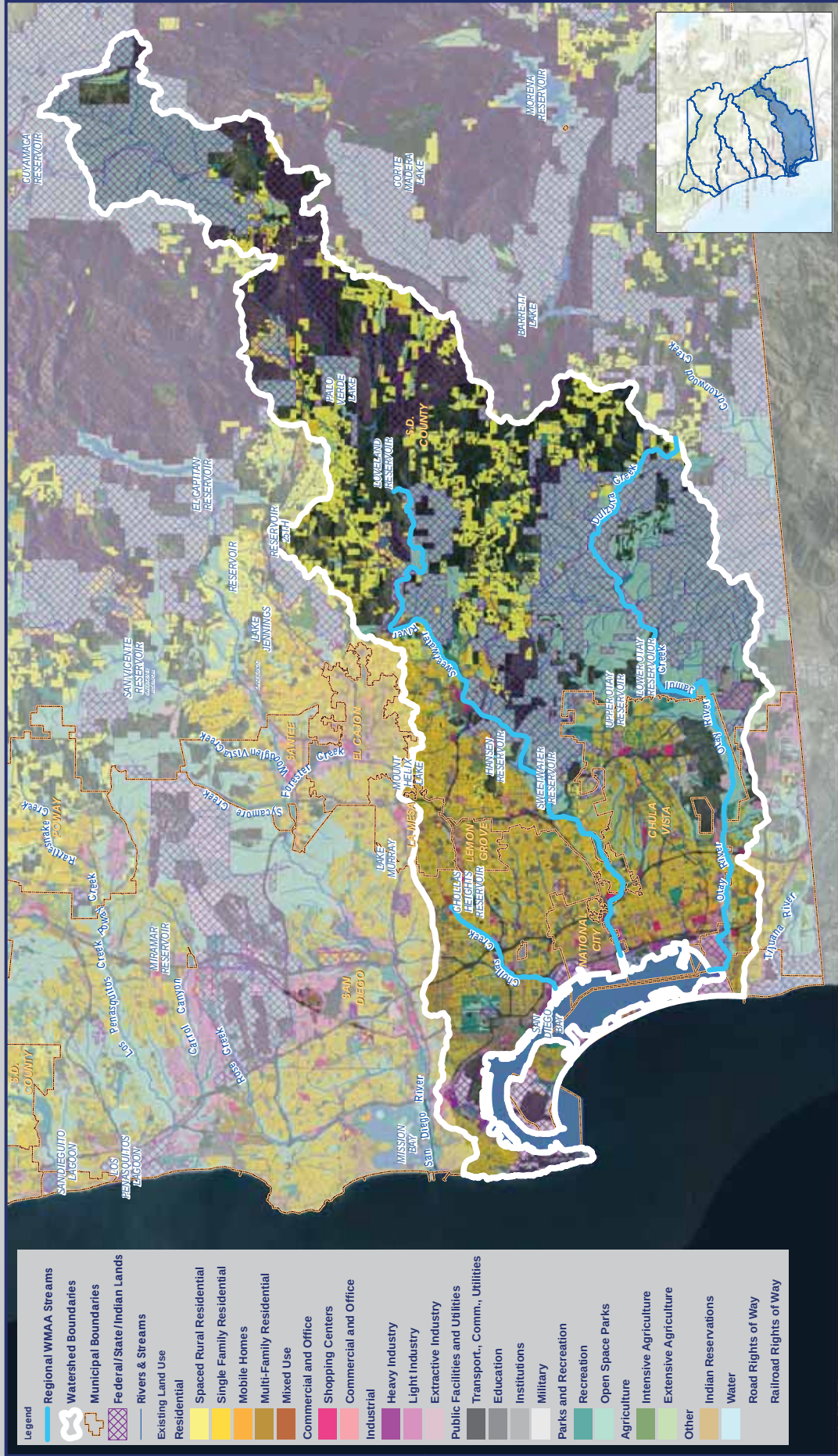
San Diego Bay Watershed - HU 908.00, 909.00, & 910.00, 441 mi2

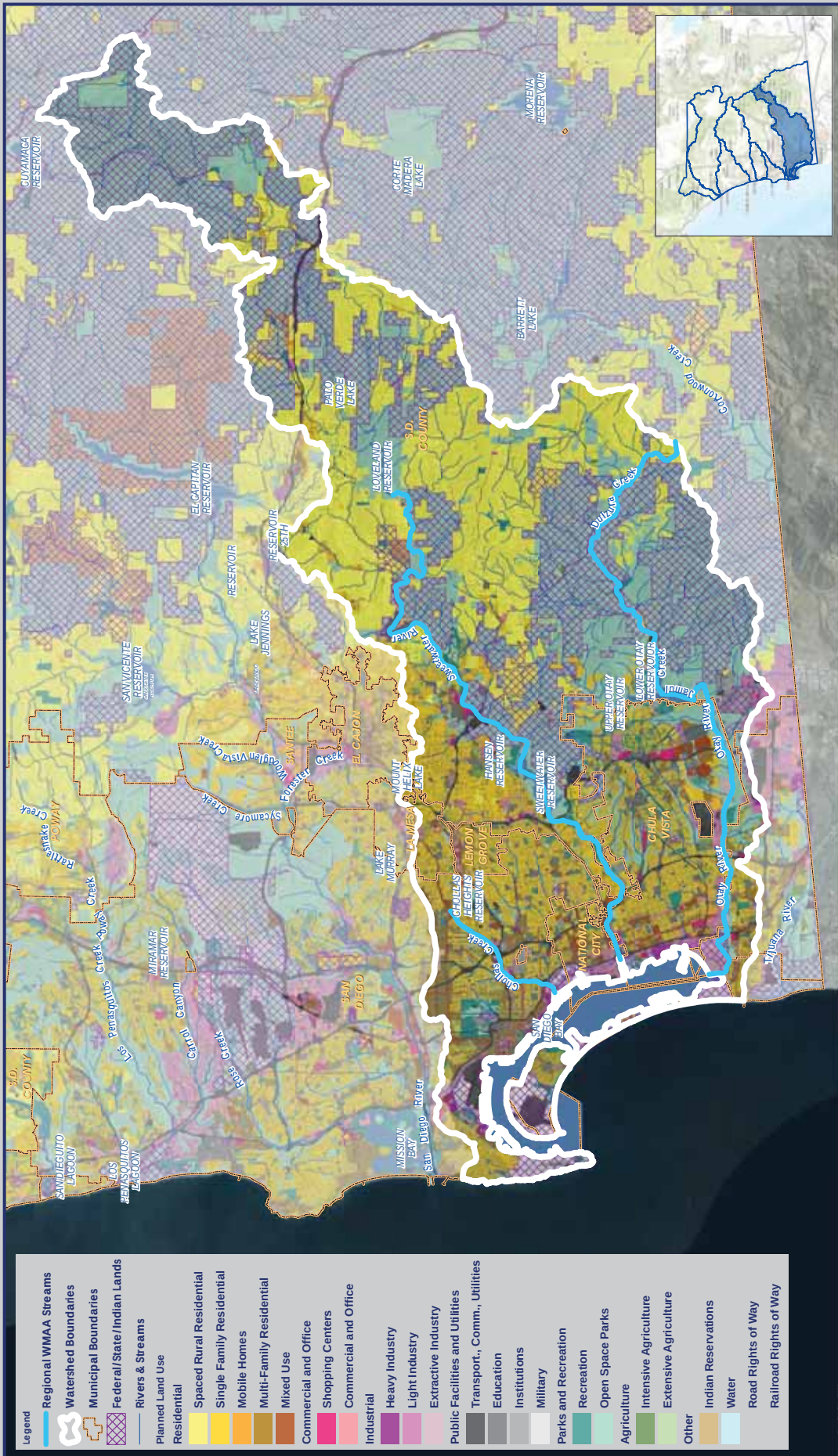
Exhibit Date: Sept. 8, 2014

ATTACHMENT A.3

LAND USES

DRAFT



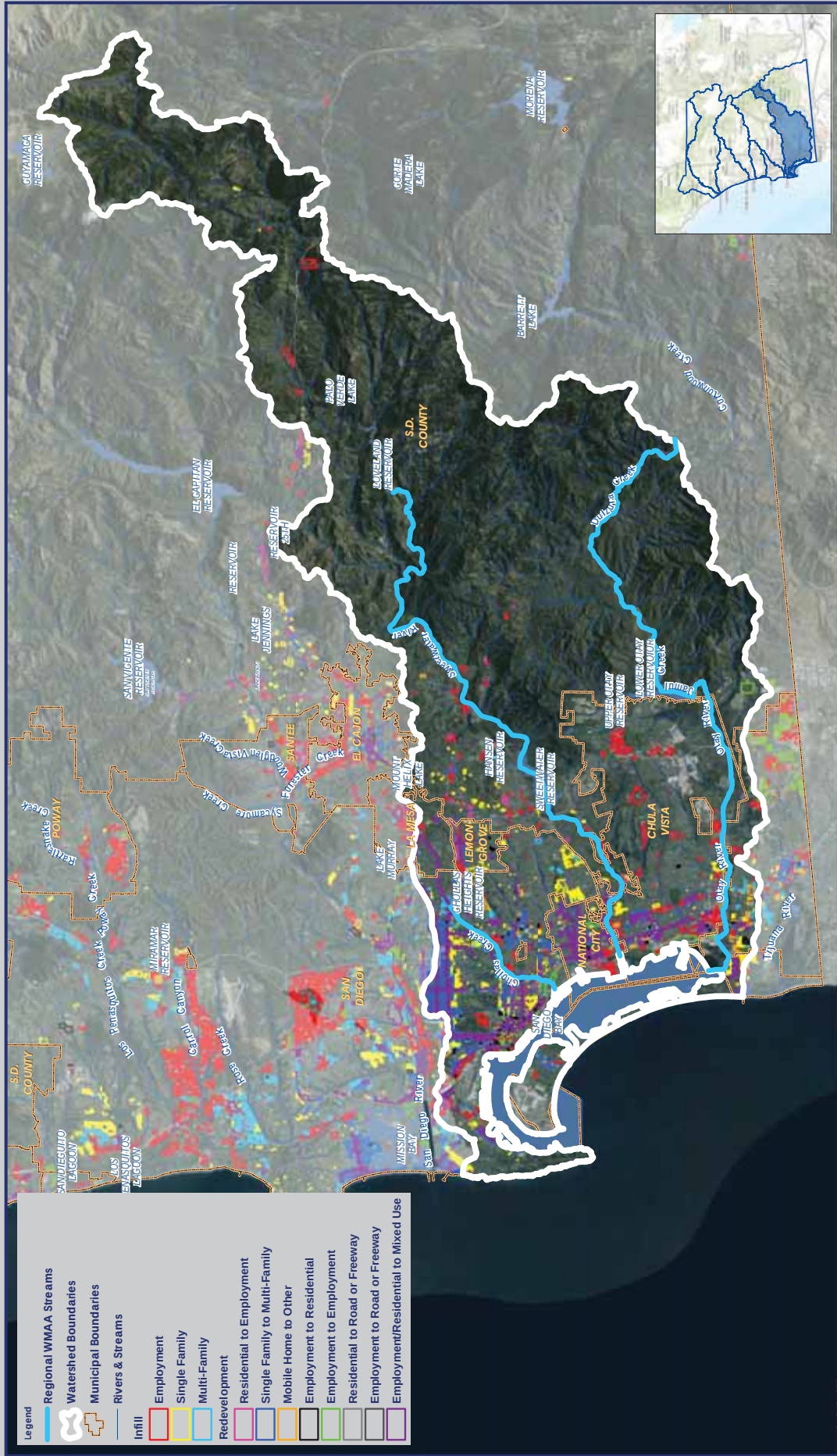


Planned Land Use

San Diego Bay Watershed - HU 908.00, 909.00, & 910.00, 441 mi2

Exhibit Date: Sept 8, 2014





Redevelopment and Infill Areas

San Diego Bay Watershed - HU 908.00, 909.00, & 910.00, 441 mi2

ATTACHMENT A.4
POTENTIAL CRITICAL COARSE SEDIMENT YIELD AREAS

DRAFT

A.4.1 Geology Grouping

Geologic grouping was based on the mapped geologic unit as determined by published geologic mapping information. The following describes the methodology utilized to determine bedrock or sedimentary characteristics, anticipated grain size, and suitability for infiltration. A complete list of the various geologic maps used in this evaluation is listed in Chapter 6.

Due to the various mapped scales of the published data and differing mapped unit names, the geologic units were initially compiled into similar categories where possible. For example, the Lindavista Formation is mapped as unit Ql on geologic maps at a scale of 1:24,000 but correlates to the same unit Qvop8 on geologic maps at a scale of 1:100,000. Following the compilation of geologic unit names, the units were differentiated between crystalline bedrock and sedimentary formations based on geologic characterization and material behavior. The Point Loma Formation for example, is a Cretaceous-age sandstone, but it was classified as a “coarse bedrock” unit due to its indurated and resistant nature.

For each site location, the predominant geologic units were then described as “coarse” or “fine” based on typical weathering characteristics of the bedrock units, or primary grain size of the sedimentary units. For example, granodiorite or tonalite crystalline rock typically weathers to a coarse material such as a silty sand and therefore was classified as “coarse,” compared to a gabbro which generally weathers to a sandy clay and was characterized as “fine.” Sedimentary formations can be more variable, such as the Mission Valley Formation. In this case, the Mission Valley Formation was characterized as “coarse” since the unit is predominantly comprised of sandstone even if it does contain localities of siltstone and claystone within the unit.

To further characterize the sedimentary formations, these units were evaluated for suitability of infiltration. Since no field investigations were performed for this evaluation to determine permeability, the differentiation between impermeable and permeable were based on the age of the geologic unit with the assumption that relatively younger sedimentary units of Pleistocene-age or younger (<1.6 mya) would be more susceptible to surface water infiltration. Geology grouping of different map units is presented in Table A.4.1

Table A.4.1 Geologic grouping for different map units

Map Unit	Map Name	Anticipated Grain size of Weathered Material	Bedrock or Sedimentary	Impermeable/ Permeable	Geology Grouping
gr-m	Jennings; CA	Coarse	Bedrock	Impermeable	CB
grMz	Jennings; CA	Coarse	Bedrock	Impermeable	CB
Jcr	El Cajon 30' x 60'	Coarse	Bedrock	Impermeable	CB
Jhc	El Cajon 30' x 60'	Coarse	Bedrock	Impermeable	CB
Jsp	El Cajon 30' x 60'	Coarse	Bedrock	Impermeable	CB
Ka	El Cajon 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kbm	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kbp	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kcc	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kcg	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kcm	El Cajon 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kcp	El Cajon 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kd	San Diego & Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kdl	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kg	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kgbf	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kgd	San Diego & Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kgdf	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kgh	San Diego 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kgm	El Cajon 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kgm1	El Cajon 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kgm2	El Cajon 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kgm3	El Cajon 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kgm4	El Cajon 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kgp	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kgr	El Cajon 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kgu	San Diego 30' x 60'	Coarse	Bedrock	Impermeable	CB
Khg	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Ki	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kis	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kjd	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
KJem	El Cajon 30' x 60'	Coarse	Bedrock	Impermeable	CB
KJld	El Cajon 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kjv	El Cajon 30' x 60'	Coarse	Bedrock	Impermeable	CB

Map Unit	Map Name	Anticipated Grain size of Weathered Material	Bedrock or Sedimentary	Impermeable/ Permeable	Geology Grouping
Klb	El Cajon 30' x 60'	Coarse	Bedrock	Impermeable	CB
Klh	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Klp	El Cajon 30' x 60'	Coarse	Bedrock	Impermeable	CB
Km	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kmg	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
KmGP	El Cajon 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kmm	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kpa	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kpv	El Cajon 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kqbd	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kr	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Krm	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Krr	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kt	San Diego & Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Ktr	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kvc	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kwm	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kwp	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Kwsr	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
m	Jennings; CA	Coarse	Bedrock	Impermeable	CB
Mzd	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Mzg	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Mzq	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Mzs	Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
sch	Jennings; CA	Coarse	Bedrock	Impermeable	CB
Kp	San Diego & Oceanside 30' x 60'	Coarse	Bedrock	Impermeable	CB
Ql	El Cajon 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
QTf	El Cajon 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Ec	Jennings; CA	Coarse	Sedimentary	Impermeable	CSI
K	Jennings; CA	Coarse	Sedimentary	Impermeable	CSI
Kccg	San Diego 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Kcs	San Diego 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Kl	San Diego, Oceanside & El Cajon 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Ku	Jennings; CA	Coarse	Sedimentary	Impermeable	CSI

Map Unit	Map Name	Anticipated Grain size of Weathered Material	Bedrock or Sedimentary	Impermeable/ Permeable	Geology Grouping
Qvof	Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvop8a	San Diego 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvop9a	San Diego 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Tmsc	San Diego 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Tmss	San Diego 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Tp	San Diego & El Cajon 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Tpm	San Diego 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Tsc	San Diego 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Tscu	San Diego 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Tsd	San Diego & El Cajon 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Tsdcg	San Diego 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Tsdss	San Diego 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Tsm	Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Tso	Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Tst	San Diego, Oceanside & El Cajon 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Tt	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Tta	Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Tmv	San Diego, Oceanside & El Cajon 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Tsi	Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvoa	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvoa11	Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvoa12	Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvoa13	Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvoc	Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvop	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvop1	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvop10	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvop10a	San Diego 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvop11	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI

Map Unit	Map Name	Anticipated Grain size of Weathered Material	Bedrock or Sedimentary	Impermeable/ Permeable	Geology Grouping
Qvop11a	San Diego 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvop12	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvop13	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvop2	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvop3	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvop4	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvop5	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvop6	San Diego 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvop7	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvop8	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qvop9	San Diego 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Tsa	Oceanside 30' x 60'	Coarse	Sedimentary	Impermeable	CSI
Qof	Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qof1	Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qof2	Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Q	Jennings; CA	Coarse	Sedimentary	Permeable	CSP
Qa	Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qd	Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qf	Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qmb	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qop	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qw	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qyf	Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qt	El Cajon 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qoa1-2	Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qoa2-6	Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qoa5	Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qoa6	Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qoa7	Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP

Map Unit	Map Name	Anticipated Grain size of Weathered Material	Bedrock or Sedimentary	Impermeable/ Permeable	Geology Grouping
Qoc	Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qop1	Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qc	El Cajon 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qu	El Cajon 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qoa	San Diego, Oceanside & El Cajon 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qop2-4	San Diego 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qop3	Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qop4	Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qop6	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qop7	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qya	San Diego, Oceanside & El Cajon 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Qyc	San Diego & Oceanside 30' x 60'	Coarse	Sedimentary	Permeable	CSP
Mzu	San Diego & Oceanside 30' x 60'	Fine	Bedrock	Impermeable	FB
gb	Jennings; CA	Fine	Bedrock	Impermeable	FB
JTRm	El Cajon 30' x 60'	Fine	Bedrock	Impermeable	FB
Kat	Oceanside 30' x 60'	Fine	Bedrock	Impermeable	FB
Kc	El Cajon 30' x 60'	Fine	Bedrock	Impermeable	FB
Kgb	Oceanside 30' x 60'	Fine	Bedrock	Impermeable	FB
KJvs	El Cajon 30' x 60'	Fine	Bedrock	Impermeable	FB
Kmv	El Cajon 30' x 60'	Fine	Bedrock	Impermeable	FB
Ksp	El Cajon 30' x 60'	Fine	Bedrock	Impermeable	FB
Kvsp	Oceanside 30' x 60'	Fine	Bedrock	Impermeable	FB
Kwmt	Oceanside 30' x 60'	Fine	Bedrock	Impermeable	FB
Qv	Jennings; CA	Fine	Bedrock	Impermeable	FB
Tba	San Diego 30' x 60'	Fine	Bedrock	Impermeable	FB
Tda	Oceanside 30' x 60'	Fine	Bedrock	Impermeable	FB
Tv	Oceanside 30' x 60'	Fine	Bedrock	Impermeable	FB
Tvsr	Oceanside 30' x 60'	Fine	Bedrock	Impermeable	FB
Kgdfg	Oceanside 30' x 60'	Fine	Bedrock	Impermeable	FB
Ta	San Diego 30' x 60'	Fine	Sedimentary	Impermeable	FSI
Tes	Oceanside 30' x 60'	Fine	Sedimentary	Impermeable	FSI
Td	San Diego & Oceanside	Fine	Sedimentary	Impermeable	FSI

Map Unit	Map Name	Anticipated Grain size of Weathered Material	Bedrock or Sedimentary	Impermeable/ Permeable	Geology Grouping
	30' x 60'				
Td+Tf	San Diego 30' x 60'	Fine	Sedimentary	Impermeable	FSI
Qls	San Diego, Oceanside & El Cajon 30' x 60'	Fine	Sedimentary	Impermeable	FSI
Tm	Oceanside 30' x 60'	Fine	Sedimentary	Impermeable	FSI
Tf	San Diego, Oceanside & El Cajon 30' x 60'	Fine	Sedimentary	Impermeable	FSI
Tfr	El Cajon 30' x 60'	Fine	Sedimentary	Impermeable	FSI
To	San Diego & El Cajon 30' x 60'	Fine	Sedimentary	Impermeable	FSI
Qpe	San Diego & Oceanside 30' x 60'	Fine	Sedimentary	Permeable	FSP
Mexico	San Diego 30' x 60'	NA	NA	Permeable	Other
Kuo	San Diego 30' x 60'	NA (Offshore)	NA	Permeable	Other
Teo	San Diego & Oceanside 30' x 60'	NA (Offshore)	Sedimentary	Permeable	Other
Tmo	Oceanside 30' x 60'	NA (Offshore)	Sedimentary	Permeable	Other
Qmo	San Diego 30' x 60'	NA (Offshore)	Sedimentary	Permeable	Other
QTso	San Diego 30' x 60'	NA (Offshore)	Sedimentary	Permeable	Other
af	San Diego & Oceanside 30' x 60'	Variable, dependent on source material	Sedimentary		Other

A.4.2 Quantitative Analysis

Soil loss estimates for each Geomorphic Landscape Unit were estimated using the Revised Universal Soil Loss Equation (RUSLE; Renard et al. 1997) listed below:

$$A = R \times K \times LS \times C \times P$$

Where

A = estimated average soil loss in tons/acre/year

R = rainfall-runoff erosivity factor

K = soil erodibility factor

LS = slope length and steepness factor

C = cover-management factor

P = support practice factor; assumed 1 for this analysis

Regional datasets used to estimate the inputs required to estimate the soil loss from each GLU are listed in table below:

Dataset	Source	Download year	Description
RUSLE – R Factor	SWRCB	2014	Regional R factor map was downloaded from ftp://swrcb2a.waterboards.ca.gov/pub/swrcb/dwq/cgp/Risk/RUSLE/RUSLE_R_Factor/
RUSLE – K Factor	SWRCB	2014	Regional K factor map was downloaded from ftp://swrcb2a.waterboards.ca.gov/pub/swrcb/dwq/cgp/Risk/RUSLE/RUSLE_K_Factor/
RUSLE – LS Factor	SWRCB	2014	Regional LS factor map was downloaded from ftp://swrcb2a.waterboards.ca.gov/pub/swrcb/dwq/cgp/Risk/RUSLE/RUSLE_LS_Factor/
RUSLE – C Factor	USEPA	2014	Regional C factor map was downloaded from http://www.epa.gov/esd/land-sci/emap_west_browser/pages/wemap_mm_sl_rusle_c_qt.htm#mapnav

GIS analysis was used to calculate the area weighted estimate of R, K, LS and C factors using the regional datasets listed in the table above. For the developed land cover the C factor was then adjusted to 0 from the regional estimate to account for management actions implemented on developed sites (e.g. impervious surfaces). Soil loss estimates ranged from 0 to 15.2 tons/acre/year.

For evaluating the degree of relative risk to a stream solely arising from changes in sediment and/or water delivery SCCWRP Technical Report 605, 2010 states:

“The challenge in implementing this step is that presently we have insufficient basis to defensibly identify either low-risk or high-risk conditions using these metrics. For example, channels that are close to a threshold for geomorphic change may display significant morphological changes under nothing more than natural year-to-year variability in flow or sediment load.

- *Acknowledging this caveat, we nonetheless anticipate that changes of less than 10% in either driver are unlikely to instigate, on their own, significant channel changes. This value is a conservative estimate of the year-to-year variability in either discharge or sediment flux that can be accommodated by a channel system in a state of dynamic equilibrium. It does not “guarantee,” however, that channel change may not occur—either in response to yet modest alterations in water or sediment delivery, or because of other urbanization impacts (e.g., point discharge of runoff or the trapping of the upstream sediment flux; see Booth 1990) that are not represented with this analysis.*
- *In contrast, recognizing a condition of undisputed “high risk” must await broader collection of regionally relevant data. We note that >60% reductions in predicted sediment production have resulted in both minimal (McGonigle) and dramatic (Agua Hedionda) channel changes, indicating that “more data” may never provide absolute guidance. At present, we suggest using predicted watershed changes of 50% or more in either runoff (as indexed by change in impervious area) or sediment production as provisional criteria for requiring a more detailed evaluation of both the drivers and the resisting factors for channel change, regardless of other screening-level assessments. Clearly, however, only more experience with the application of such “thresholds,” and the actual channel conditions that accompany them, will provide a defensible basis for setting numeric standards.”*

The following criterion was developed using the suggestions listed above and then used to assign relative sediment production rating to each GLU:

- Low: Soil Loss < 5.6 tons/acre/year [GLUs that have a soil loss of 0 to 5.6 tons/acre/year produces around 10% of the total coarse sediment soil loss from the study area]
- Medium: 5.6 tons/acre/year < Soil Loss < 8.4 tons/acre/year
- High: > 8.4 tons/acre/year [GLUs that have a soil loss greater than 8.4 tons/acre/year produces around 42% of the total coarse sediment soil loss from the study area]

Results from the quantitative analysis are summarized in Table A.4.2.

Table A.4.2 Relative Sediment Production for different Geomorphic Landscape Units

Geomorphic Landscape Unit (GLU)	Area (acres)	K	LS	C	R	A	Relative Sediment Production	Critical Coarse Sediment
CB-Agricultural/Grass-1	52883	0.20	4.67	0.14	50	6.5	Medium	No
CB-Agricultural/Grass-2	40633	0.21	5.19	0.14	56	8.3	Medium	No
CB-Agricultural/Grass-3	32617	0.22	6.04	0.14	57	10.6	High	Yes
CB-Agricultural/Grass-4	11066	0.23	7.38	0.14	57	13.5	High	Yes
CB-Developed-1	39746	0.22	3.77	0	49	0	Low	No
CB-Developed-2	32614	0.22	4.28	0	50	0	Low	No
CB-Developed-3	15841	0.22	4.86	0	49	0	Low	No
CB-Developed-4	1805	0.22	5.63	0	48	0	Low	No
CB-Forest-1	32231	0.20	6.38	0.14	39	6.8	Medium	No
CB-Forest-2	38507	0.20	7.20	0.13	45	8.8	High	Yes
CB-Forest-3	55303	0.20	8.14	0.13	48	10.6	High	Yes
CB-Forest-4	38217	0.20	9.95	0.14	50	13.6	High	Yes
CB-Other-1	1036	0.20	5.52	0.13	45	6.5	Medium	No
CB-Other-2	317	0.20	6.46	0.13	45	7.9	Medium	No
CB-Other-3	296	0.20	6.96	0.14	43	8.3	Medium	No
CB-Other-4	111	0.21	6.84	0.14	41	8.2	Medium	No
CB-Scrub/Shrub-1	88135	0.20	5.66	0.14	33	5.3	Low	No
CB-Scrub/Shrub-2	143694	0.20	6.51	0.14	37	6.8	Medium	No
CB-Scrub/Shrub-3	246703	0.21	7.33	0.14	41	8.4	Medium	No
CB-Scrub/Shrub-4	191150	0.21	8.28	0.14	42	9.8	High	No
CB-Unknown-1	1727	0.21	5.32	0.13	44	6.3	Medium	No
CB-Unknown-2	1935	0.21	5.95	0.13	44	7.1	Medium	No

Geomorphic Landscape Unit (GLU)	Area (acres)	K	LS	C	R	A	Relative Sediment Production	Critical Coarse Sediment
CB-Unknown-3	1539	0.22	6.21	0.13	44	7.7	Medium	No
CB-Unknown-4	278	0.22	6.61	0.13	44	8.4	High	Yes
CSI-Agricultural/Grass-1	14609	0.34	2.72	0.14	39	4.8	Low	No
CSI-Agricultural/Grass-2	9059	0.37	3.61	0.14	47	8.7	High	Yes
CSI-Agricultural/Grass-3	10096	0.38	3.99	0.14	47	9.8	High	Yes
CSI-Agricultural/Grass-4	2498	0.37	4.33	0.14	47	10.5	High	Yes
CSI-Developed-1	82371	0.28	2.51	0	39	0	Low	No
CSI-Developed-2	22570	0.30	2.66	0	41	0	Low	No
CSI-Developed-3	13675	0.30	2.89	0	40	0	Low	No
CSI-Developed-4	3064	0.27	3.20	0	39	0	Low	No
CSI-Forest-1	449	0.27	4.26	0.13	43	6.6	Medium	No
CSI-Forest-2	611	0.25	5.11	0.13	44	7.5	Medium	No
CSI-Forest-3	716	0.29	4.43	0.13	44	7.4	Medium	No
CSI-Forest-4	348	0.30	4.49	0.13	43	7.6	Medium	No
CSI-Other-1	319	0.31	2.50	0.13	32	3.2	Low	No
CSI-Other-2	83	0.27	3.01	0.13	39	4.3	Low	No
CSI-Other-3	45	0.28	3.03	0.13	39	4.5	Low	No
CSI-Other-4	13	0.24	4.01	0.14	39	5.2	Low	No
CSI-Scrub/Shrub-1	9051	0.26	3.53	0.13	39	4.7	Low	No
CSI-Scrub/Shrub-2	10802	0.27	4.36	0.13	41	6.3	Medium	No
CSI-Scrub/Shrub-3	28220	0.26	4.82	0.13	41	6.7	Medium	No
CSI-Scrub/Shrub-4	20510	0.26	5.52	0.13	41	7.8	Medium	No
CSI-Unknown-1	5292	0.28	2.38	0.13	36	3.1	Low	No

Geomorphic Landscape Unit (GLU)	Area (acres)	K	LS	C	R	A	Relative Sediment Production	Critical Coarse Sediment
CSI-Unknown-2	2074	0.29	2.98	0.13	40	4.5	Low	No
CSI-Unknown-3	2171	0.27	3.04	0.13	39	4.2	Low	No
CSI-Unknown-4	676	0.26	3.04	0.13	38	3.8	Low	No
CSP-Agricultural/Grass-1	59327	0.22	3.01	0.14	44	4.0	Low	No
CSP-Agricultural/Grass-2	8426	0.23	3.81	0.14	42	5.2	Low	No
CSP-Agricultural/Grass-3	2377	0.24	4.05	0.14	41	5.6	Low	No
CSP-Agricultural/Grass-4	291	0.22	6.28	0.14	52	10.1	High	Yes
CSP-Developed-1	85283	0.27	2.10	0	42	0	Low	No
CSP-Developed-2	7513	0.26	2.77	0	42	0	Low	No
CSP-Developed-3	2317	0.27	2.70	0	40	0	Low	No
CSP-Developed-4	272	0.27	2.76	0	38	0	Low	No
CSP-Forest-1	14738	0.22	4.52	0.14	44	6.0	Medium	No
CSP-Forest-2	3737	0.22	5.99	0.14	45	8.2	Medium	No
CSP-Forest-3	1858	0.21	6.42	0.14	45	8.5	High	Yes
CSP-Forest-4	484	0.21	7.62	0.14	48	10.2	High	Yes
CSP-Other-1	7404	0.23	2.61	0.14	39	3.2	Low	No
CSP-Other-2	343	0.24	3.68	0.13	40	4.8	Low	No
CSP-Other-3	126	0.24	3.76	0.13	40	4.9	Low	No
CSP-Other-4	17	0.24	4.19	0.13	39	5.3	Low	No
CSP-Scrub/Shrub-1	22583	0.23	3.75	0.14	41	4.8	Low	No
CSP-Scrub/Shrub-2	8938	0.24	5.63	0.14	40	7.1	Medium	No
CSP-Scrub/Shrub-3	7186	0.23	6.15	0.13	39	7.5	Medium	No
CSP-Scrub/Shrub-4	2609	0.22	7.16	0.14	43	9.3	High	Yes

Geomorphic Landscape Unit (GLU)	Area (acres)	K	LS	C	R	A	Relative Sediment Production	Critical Coarse Sediment
CSP-Unknown-1	6186	0.25	2.63	0.13	40	3.4	Low	No
CSP-Unknown-2	744	0.27	3.49	0.13	39	4.8	Low	No
CSP-Unknown-3	350	0.28	3.32	0.13	38	4.5	Low	No
CSP-Unknown-4	78	0.28	3.26	0.13	40	4.5	Low	No
FB-Agricultural/Grass-1	6103	0.25	5.49	0.14	49	9.2	High	No
FB-Agricultural/Grass-2	7205	0.25	5.87	0.14	51	10.1	High	No
FB-Agricultural/Grass-3	6730	0.24	6.43	0.14	53	11.3	High	No
FB-Agricultural/Grass-4	2586	0.22	8.62	0.14	57	15.2	High	No
FB-Developed-1	10116	0.28	3.94	0	46	0	Low	No
FB-Developed-2	9075	0.28	4.41	0	45	0	Low	No
FB-Developed-3	5499	0.27	4.72	0	44	0	Low	No
FB-Developed-4	785	0.27	5.08	0	43	0	Low	No
FB-Forest-1	3780	0.21	7.24	0.13	39	8.0	Medium	No
FB-Forest-2	7059	0.21	7.53	0.13	43	8.8	High	No
FB-Forest-3	13753	0.22	8.02	0.13	43	9.7	High	No
FB-Forest-4	8899	0.26	9.63	0.13	35	11.5	High	No
FB-Other-1	172	0.26	5.72	0.13	44	8.6	High	No
FB-Other-2	75	0.26	5.97	0.13	38	7.7	Medium	No
FB-Other-3	76	0.28	6.27	0.13	34	7.6	Medium	No
FB-Other-4	36	0.31	6.70	0.13	33	8.6	High	No
FB-Scrub/Shrub-1	10297	0.24	6.94	0.14	36	8.3	Medium	No
FB-Scrub/Shrub-2	25150	0.25	7.24	0.14	38	9.0	High	No
FB-Scrub/Shrub-3	70895	0.25	7.89	0.13	38	10.0	High	No

Geomorphic Landscape Unit (GLU)	Area (acres)	K	LS	C	R	A	Relative Sediment Production	Critical Coarse Sediment
FB-Scrub/Shrub-4	70679	0.26	9.05	0.14	39	12.1	High	No
FB-Unknown-1	654	0.30	5.33	0.13	37	7.6	Medium	No
FB-Unknown-2	829	0.29	5.26	0.13	40	7.9	Medium	No
FB-Unknown-3	1062	0.29	5.54	0.13	39	8.2	Medium	No
FB-Unknown-4	299	0.28	6.02	0.13	38	8.4	High	No
FSI-Agricultural/Grass-1	8462	0.32	3.91	0.13	24	3.9	Low	No
FSI-Agricultural/Grass-2	4979	0.33	4.29	0.13	31	5.7	Medium	No
FSI-Agricultural/Grass-3	4808	0.34	4.26	0.13	34	6.3	Medium	No
FSI-Agricultural/Grass-4	1055	0.35	4.11	0.13	36	6.7	Medium	No
FSI-Developed-1	9953	0.29	3.09	0	34	0	Low	No
FSI-Developed-2	4972	0.31	3.22	0	37	0	Low	No
FSI-Developed-3	3350	0.29	3.30	0	36	0	Low	No
FSI-Developed-4	763	0.28	3.31	0	37	0	Low	No
FSI-Forest-1	186	0.33	4.62	0.13	37	7.2	Medium	No
FSI-Forest-2	217	0.35	4.47	0.13	39	7.9	Medium	No
FSI-Forest-3	262	0.37	4.71	0.13	40	9.2	High	No
FSI-Forest-4	111	0.36	4.73	0.13	40	9.2	High	No
FSI-Other-1	266	0.31	3.11	0.13	24	2.9	Low	No
FSI-Other-2	81	0.30	3.29	0.13	25	3.1	Low	No
FSI-Other-3	56	0.31	3.04	0.13	27	3.2	Low	No
FSI-Other-4	15	0.29	3.57	0.13	33	4.4	Low	No
FSI-Scrub/Shrub-1	2241	0.27	4.46	0.13	29	4.5	Low	No
FSI-Scrub/Shrub-2	3911	0.28	4.96	0.13	31	5.7	Medium	No

Geomorphic Landscape Unit (GLU)	Area (acres)	K	LS	C	R	A	Relative Sediment Production	Critical Coarse Sediment
FSI-Scrub/Shrub-3	7590	0.29	5.05	0.13	34	6.3	Medium	No
FSI-Scrub/Shrub-4	3502	0.30	5.14	0.13	37	7.5	Medium	No
FSI-Unknown-1	1117	0.29	2.83	0.13	27	3.0	Low	No
FSI-Unknown-2	780	0.30	3.44	0.13	32	4.3	Low	No
FSI-Unknown-3	855	0.29	3.41	0.13	31	4.0	Low	No
FSI-Unknown-4	285	0.28	3.21	0.13	32	3.7	Low	No
FSP-Agricultural/Grass-1	13	0.22	2.22	0.13	40	2.5	Low	No
FSP-Agricultural/Grass-2	3	0.22	2.59	0.13	40	3.0	Low	No
FSP-Agricultural/Grass-3	2	0.22	2.69	0.13	40	3.2	Low	No
FSP-Agricultural/Grass-4	0	0.20	2.94	0.12	40	2.9	Low	No
FSP-Developed-1	180	0.26	2.85	0	40	0	Low	No
FSP-Developed-2	13	0.25	2.69	0	40	0	Low	No
FSP-Developed-3	8	0.21	2.25	0	40	0	Low	No
FSP-Developed-4	0	0.21	2.29	0	40	0	Low	No
FSP-Forest-1	8	0.22	2.29	0.14	40	2.9	Low	No
FSP-Forest-2	5	0.20	2.22	0.14	40	2.5	Low	No
FSP-Forest-3	0	0.20	2.22	0.14	40	2.5	Low	No
FSP-Other-1	1307	0.20	2.38	0.14	40	2.7	Low	No
FSP-Other-2	34	0.21	2.36	0.14	40	2.7	Low	No
FSP-Other-3	8	0.22	2.56	0.13	40	3.0	Low	No
FSP-Other-4	0	0.43	4.35	0.12	40	9.3	High	No
FSP-Scrub/Shrub-1	147	0.23	2.68	0.14	40	3.3	Low	No
FSP-Scrub/Shrub-2	18	0.23	2.55	0.14	40	3.3	Low	No

Geomorphic Landscape Unit (GLU)	Area (acres)	K	LS	C	R	A	Relative Sediment Production	Critical Coarse Sediment
FSP-Scrub/Shrub-3	4	0.20	2.23	0.14	40	2.6	Low	No
FSP-Scrub/Shrub-4	0	0.20	1.70	0.12	40	1.7	Low	No
FSP-Unknown-1	40	0.20	1.87	0.13	40	1.9	Low	No
FSP-Unknown-2	5	0.20	1.99	0.12	40	2.0	Low	No
FSP-Unknown-3	1	0.20	2.39	0.12	40	2.4	Low	No
O-Agricultural/Grass-1	2433	0.20	2.93	0.14	34	2.8	Low	No
O-Agricultural/Grass-2	112	0.21	3.44	0.14	32	3.2	Low	No
O-Agricultural/Grass-3	30	0.23	3.89	0.13	32	3.8	Low	No
O-Agricultural/Grass-4	1	0.26	6.47	0.13	37	7.9	Medium	No
O-Developed-1	8327	0.27	1.37	0	39	0	Low	No
O-Developed-2	474	0.25	2.12	0	40	0	Low	No
O-Developed-3	157	0.26	3.07	0	41	0	Low	No
O-Developed-4	26	0.24	3.89	0	41	0	Low	No
O-Forest-1	235	0.22	6.15	0.13	43	7.6	Medium	No
O-Forest-2	67	0.21	5.07	0.13	45	6.6	Medium	No
O-Forest-3	45	0.21	5.43	0.13	47	7.3	Medium	No
O-Forest-4	20	0.20	5.95	0.13	59	9.0	High	No
O-Other-1	9362	0.25	3.86	0.13	36	4.3	Low	No
O-Other-2	344	0.24	3.32	0.13	35	3.5	Low	No
O-Other-3	120	0.23	4.86	0.13	35	5.0	Low	No
O-Other-4	37	0.22	5.64	0.13	39	6.6	Medium	No
O-Scrub/Shrub-1	688	0.22	4.83	0.13	40	5.7	Medium	No
O-Scrub/Shrub-2	224	0.22	5.80	0.13	36	6.3	Medium	No

Geomorphic Landscape Unit (GLU)	Area (acres)	K	LS	C	R	A	Relative Sediment Production	Critical Coarse Sediment
O-Scrub/Shrub-3	209	0.22	6.47	0.13	41	7.5	Medium	No
O-Scrub/Shrub-4	96	0.22	6.62	0.13	44	8.2	Medium	No
O-Unknown-1	1236	0.28	1.60	0.12	26	1.5	Low	No
O-Unknown-2	62	0.27	1.48	0.13	36	1.8	Low	No
O-Unknown-3	15	0.29	3.52	0.13	38	4.9	Low	No
O-Unknown-4	7	0.34	3.87	0.12	40	6.6	Medium	No

GLU Nomenclature: Geology – Land Cover – Slope Category

Geology Categories:

- CB Coarse Bedrock
- CSI Coarse Sedimentary Impermeable
- CSP Coarse Sedimentary Permeable
- FB Fine Bedrock
- FSI Fine Sedimentary Impermeable
- FSP Fine Sedimentary Permeable
- O Other

Slope Categories:

- 1 0%-10%
- 2 10% - 20%
- 3 20% - 40%
- 4 > 40%

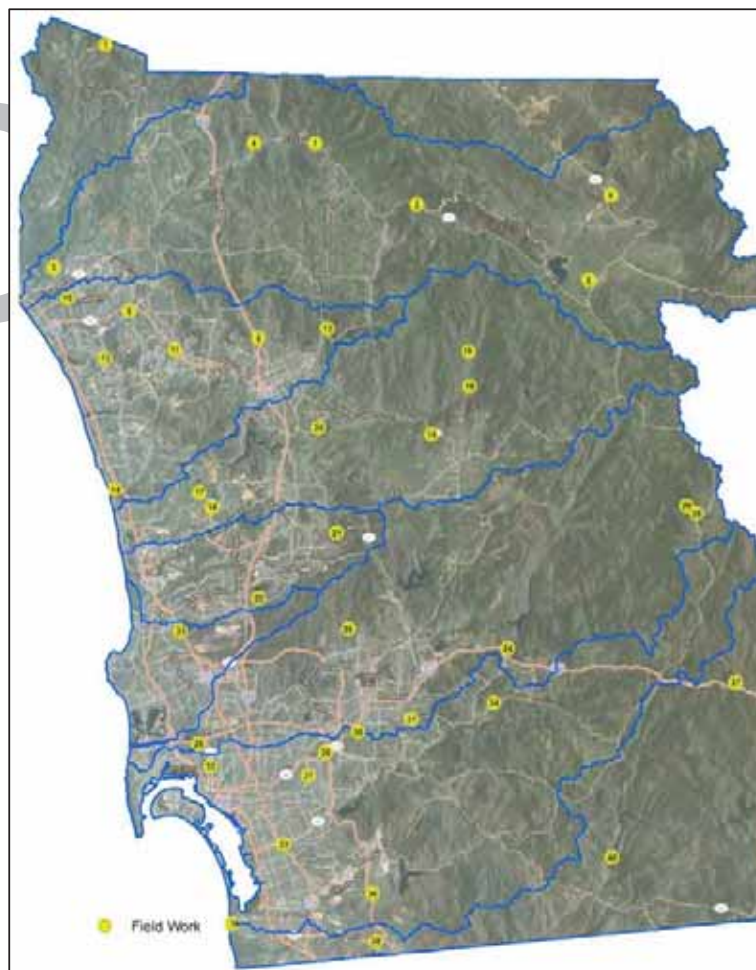
A4.3 Field Assessment

Site Selection:

Forty locations were selected from the study region for field assessment. Sites were selected such that they are accessible by existing road network based on review of satellite imagery and are uniformly distributed considering the following criteria:

- Geologic grouping
- Land cover
- Slope category
- WMA
- Jurisdiction

Yellow circles in the figure below shows the 40 locations for which field assessment was performed.



Pre-Field Activities

Prior to conducting field activities, the consultant team reviewed available published geologic information at each site location and prepared satellite imagery of each site using Google Earth™. Pre-field activities consisted of evaluating site access at each location using aerial imagery and logistics were coordinated based on regional site location to maximize field efficiency.

Site Reconnaissance

Site reconnaissance was performed at forty locations between 22 January and 7 February 2014 by a team of geologists. The reconnaissance consisted of:

- Visual soil classification,
- Assessing existing vegetative cover (0-100%),
- Qualitative assignment of existing sediment production (low, medium, and high) [based on existing vegetative cover],
- Qualitative assignment of potential sediment production (low, medium, and high)[assuming there is 0% vegetative cover], and
- Identifying existing erosional features.

Descriptions and visual classifications of the surficial materials were based on the Unified Soil Classification System (USCS). Underlying geologic units were confirmed where exposed formations were observed within the individual site limits.

SITE AND GEOLOGIC CONDITIONS

Our knowledge of the site conditions has been developed from a review of available geologic literature, previous geologic and geotechnical investigations by the consultant team in the study region, professional experience, site reconnaissance, and field investigations performed for this study.

Surface Conditions

Site locations were sited in open space with the exception of sites ID-27, -30, and -31 which were situated within developed areas with paved streets and sidewalks. The surface conditions at the site locations were characterized by sloping terrain varying from relatively flat (< 5%) to very steep slopes (> 40%). At the time of our reconnaissance the natural hillsides along the areas of interest were covered by varying degrees of moderate to dense growth scrub brush, low grasses, and scattered trees.

Existing erosional and geomorphic features at each site location were identified where possible. The observed erosional features included notable drainages, rilling, scour, and sediment accumulation. Observed geomorphic features included areas of minor slope instability and surficial slumping. Several sources of ground disturbance were identified during the site reconnaissance included active grading operations and bioturbation.

An evaluation of the existing and potential sediment production for each site was determined based on surface conditions. Sediment production was assigned as “high, medium, or low” based on the existing conditions and consultant team’s professional experience.

Surficial Deposits

Surficial deposits, including topsoil, alluvium, colluvium, slopewash, and residual soils are present in portions of the study area within the natural drainages and mantling the slope areas. The composition and grain size of these materials are variable depending on the age, parent sources, and mode of deposition.

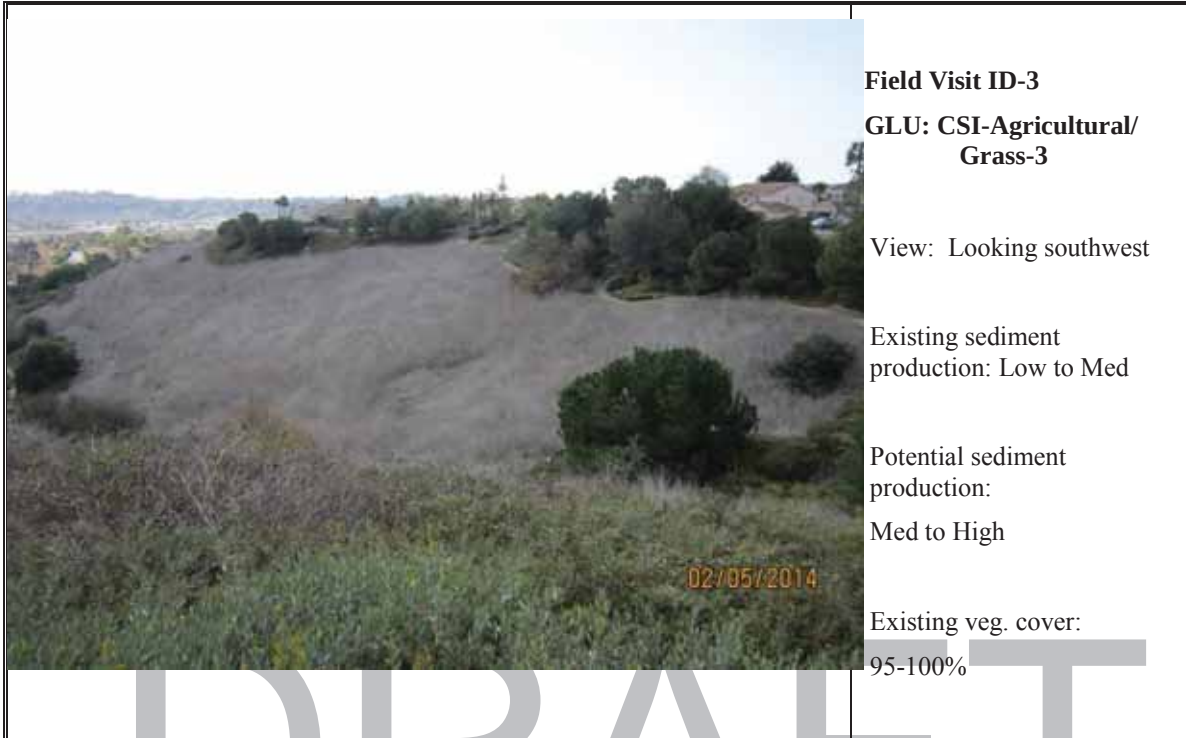
Geologic Conditions

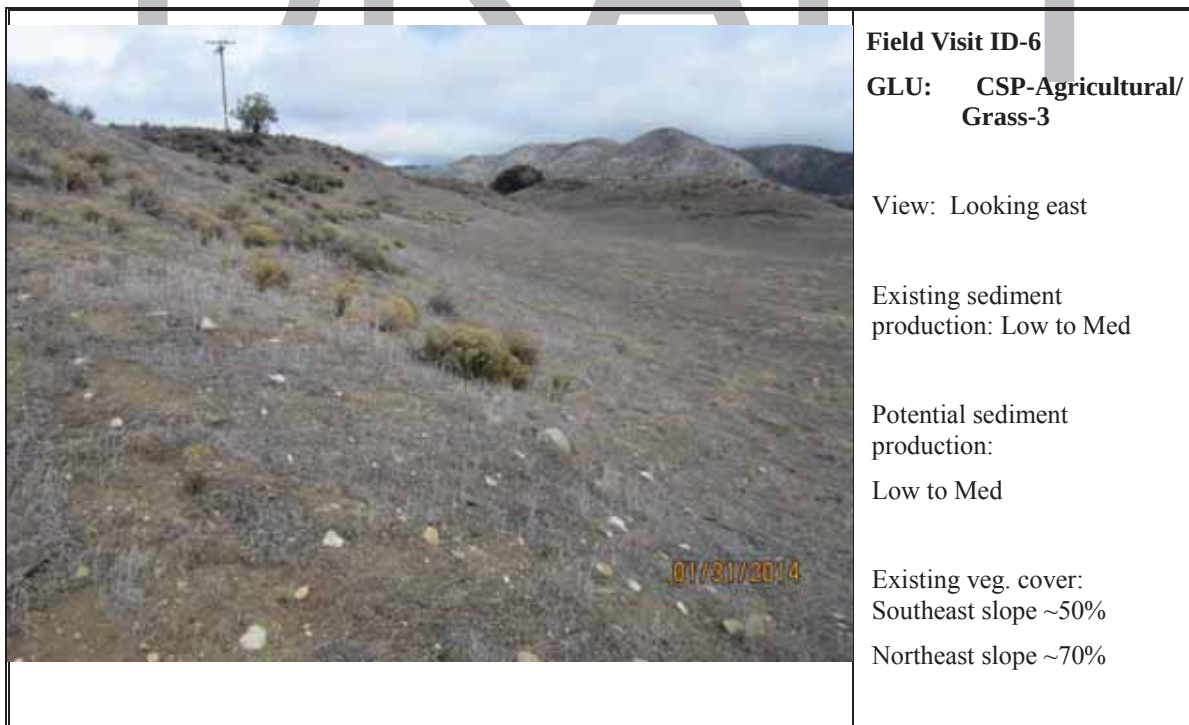
Our knowledge of the subsurface conditions at the site locations is based on a review of available published geologic information, professional experience, site reconnaissance, previous explorations and geotechnical investigations performed by the consultant team in the study region.

DRAFT

Field Assessment Photo Log

	Field Visit ID-1 GLU: CB-Scrub/Shrub-4 View: Looking southwest Existing sediment production: Med Potential sediment production: High Existing veg. cover: 90%
	Field Visit ID-2 GLU: CB-Forest-4 View: Looking north Existing sediment production: Med Potential sediment production: High Existing veg. cover: 95%







Field Visit ID-7

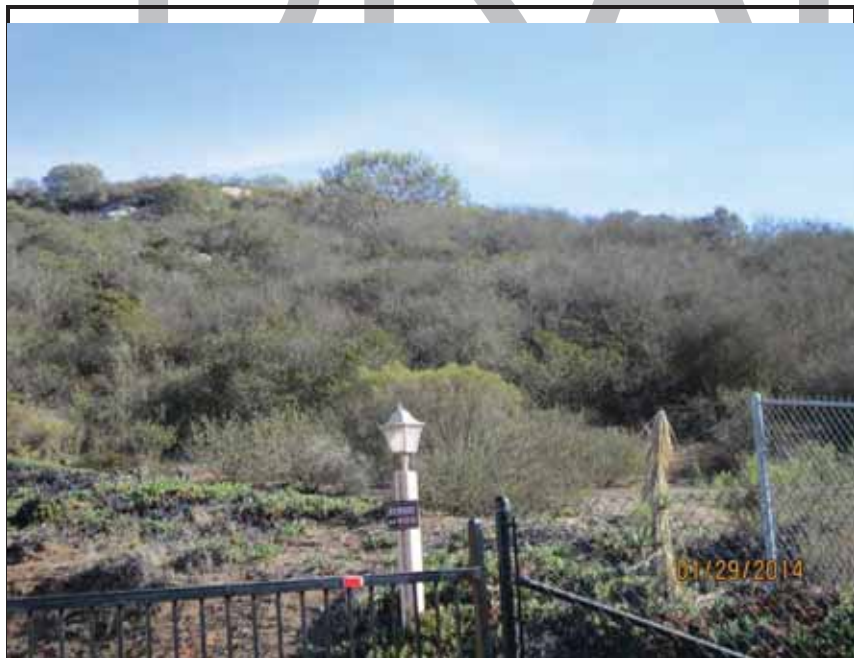
GLU: CSP-Forest-3

View: Looking east

Existing sediment
production: Med to High

Potential sediment
production: High

Existing veg. cover: 75-80%



Field Visit ID-8

GLU: CB-Scrub/Shrub-3

View: Looking southeast

Existing sediment
production: Low to Med

Potential sediment
production:
Med to High

Existing veg. cover: 90-95%



Field Visit ID-9

**GLU: CB-Agricultural/
Grass-2**

View: Looking northwest

Existing sediment
production: Low to Med

Potential sediment
production: Med

Existing veg. cover: 70%



Field Visit ID-10

GLU: CSI-Unknown-2

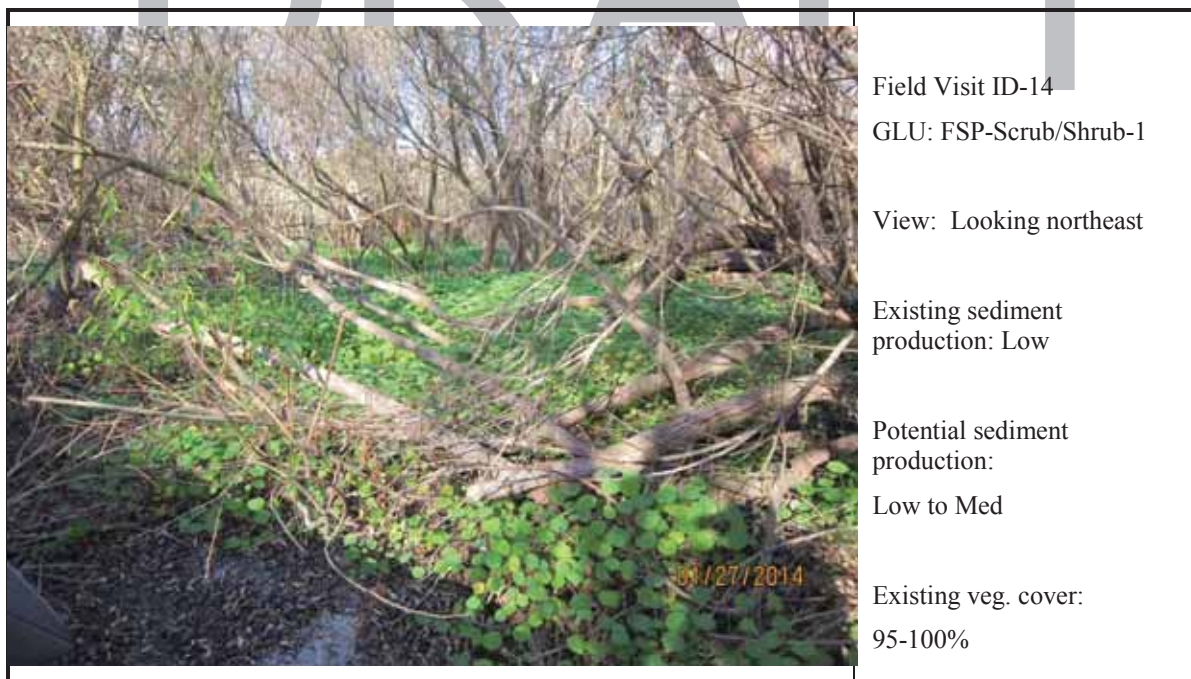
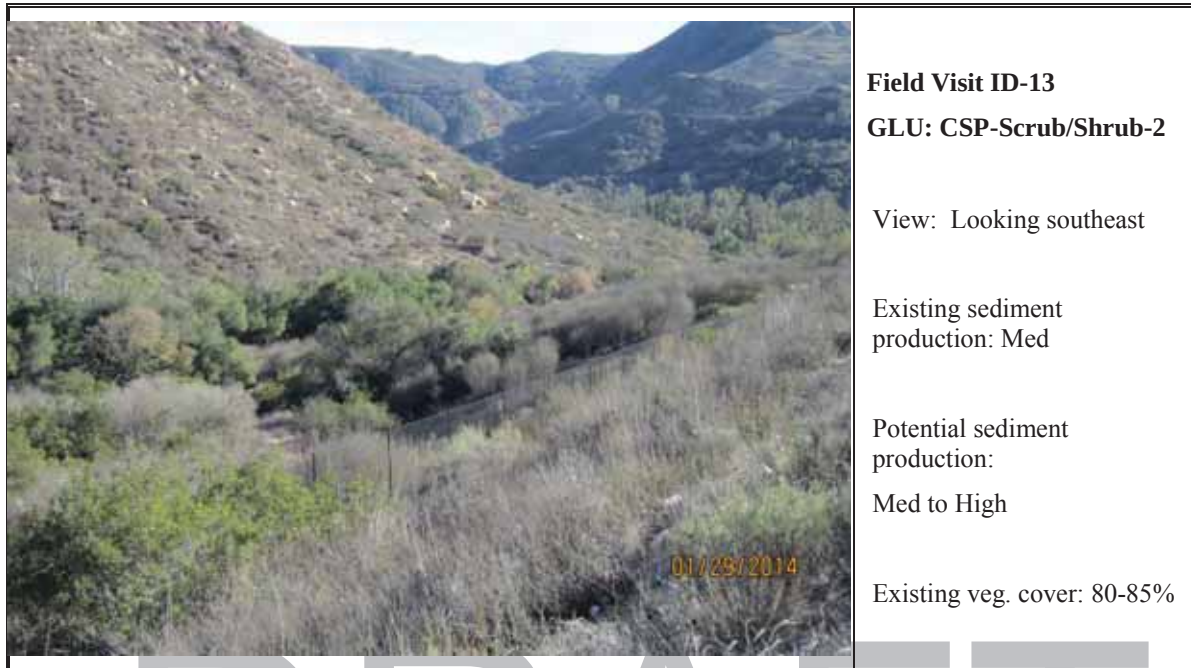
View: Looking north

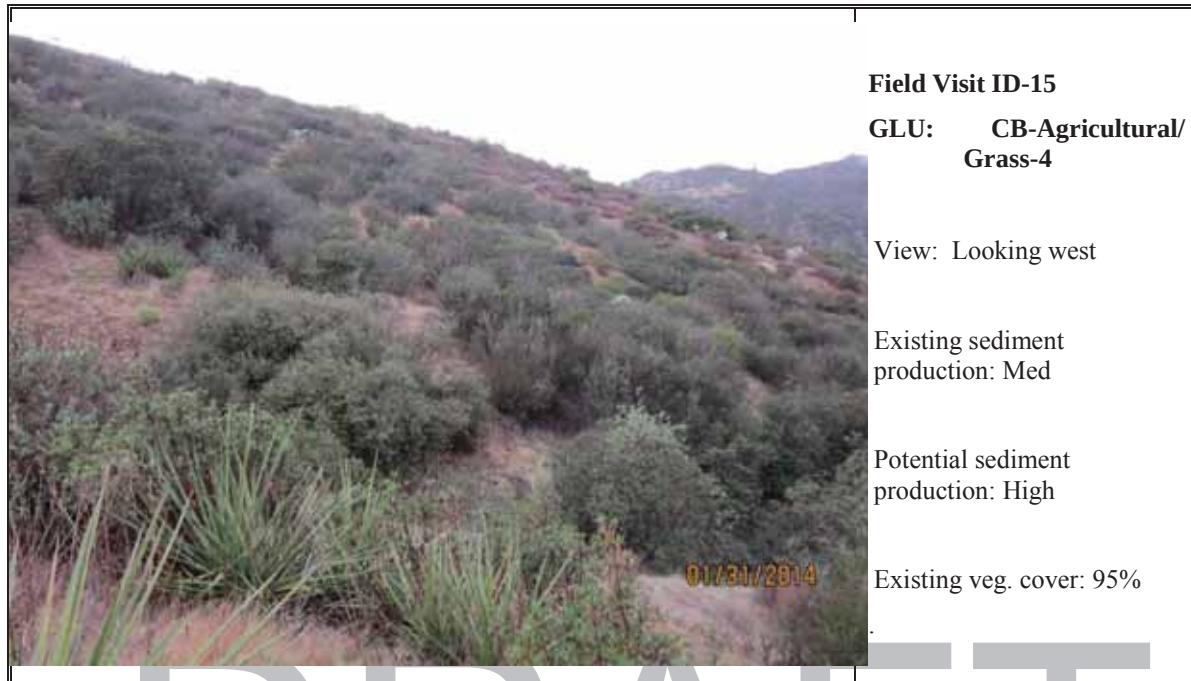
Existing sediment
production: Med to High

Potential sediment
production: High

Existing veg. cover: 75%







Field Visit ID-15

**GLU: CB-Agricultural/
Grass-4**

View: Looking west

Existing sediment
production: Med

Potential sediment
production: High

Existing veg. cover: 95%



Field Visit ID-16

**GLU: CB-Agricultural/
Grass-3**

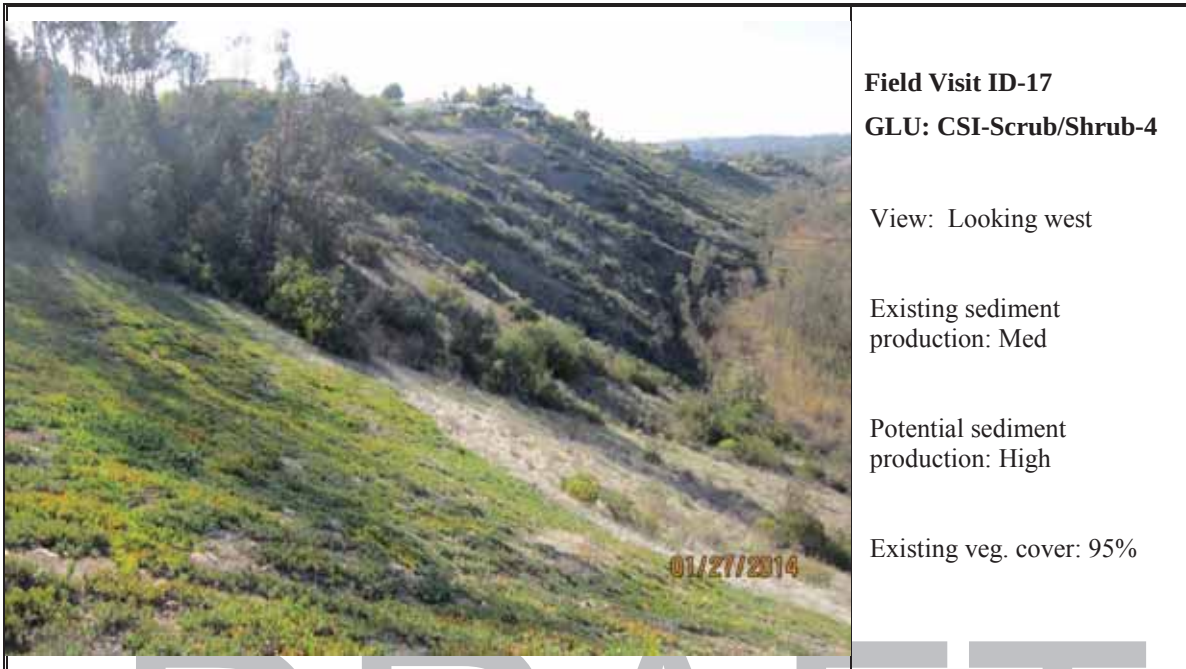
View: Looking south

Existing sediment
production: High*

Potential sediment
production: High

Existing veg. cover: 90-95%

* Area was burned in 2014 fires after the field assessment so existing sediment production was adjusted to High (based on potential sediment production) from Medium





Field Visit ID-19

GLU: CSP-Scrub/Shrub-3

View: Looking southwest

Existing sediment
production: Low to Med

Potential sediment
production:
Med to High

Existing veg. cover: 60%



Field Visit ID-20

GLU: CSP-Unknown-1

View: Looking southeast

Existing sediment
production: Low

Potential sediment
production: Med

Existing veg. cover: 95%



Field Visit ID-21

GLU: CB-Unknown-3

View: Looking northwest

Existing sediment
production: Low to Med

Potential sediment
production:
Med to High

Existing veg. cover: 50-60%



Field Visit ID-22

GLU: CSI-Forest-3

View: Looking east

Existing sediment
production: Low

Potential sediment
production: Med

Existing veg. cover: 60%



Field Visit ID-23

GLU: CSI-Scrub/Shrub-1

View: Looking north

Existing sediment
production: Low

Potential sediment
production: Low

Existing veg. cover: 80%



Field Visit ID-24

GLU: CB-Unknown-4

View: Looking northeast

Existing sediment
production: Low to Med

Potential sediment
production: High

Existing veg. cover: 80%



Field Visit ID-25

**GLU: CSI-Agricultural/
Grass-4**

View: Looking east

Existing sediment
production: Low

Potential sediment
production: Med-High

Existing veg. cover: 95%



Field Visit ID-26

GLU: CSI-Scrub/Shrub-3

View: Looking east

Existing sediment
production: Low

Potential sediment
production: Med

Existing veg. cover: 100%



Field Visit ID-27

GLU: CSP-Developed-2

View: Looking north

Existing sediment
production: Low

Potential sediment
production: Low

Existing veg. cover: 30-35%



Field Visit ID-28

**GLU: CSP-Agricultural/
Grass-2**

View: Looking north

Existing sediment
production: Low

Potential sediment
production: Med

Existing veg. cover: 90-95%



Field Visit ID-29

GLU: FB-Forest-3

View: Looking northwest

Existing sediment
production: Med

Potential sediment
production: High

Existing veg. cover: 80-85%



Field Visit ID-30

GLU: CB-Developed-4

View: Looking northeast

Existing sediment
production: Low

Potential sediment
production: Med

Existing veg. cover: 70%



Field Visit ID-31

GLU: CSI-Developed-3

View: Looking north

Existing sediment
production: Low

Potential sediment
production: Low

Existing veg. cover: 30-35%



Field Visit ID-32

GLU: CSI-Unknown-3

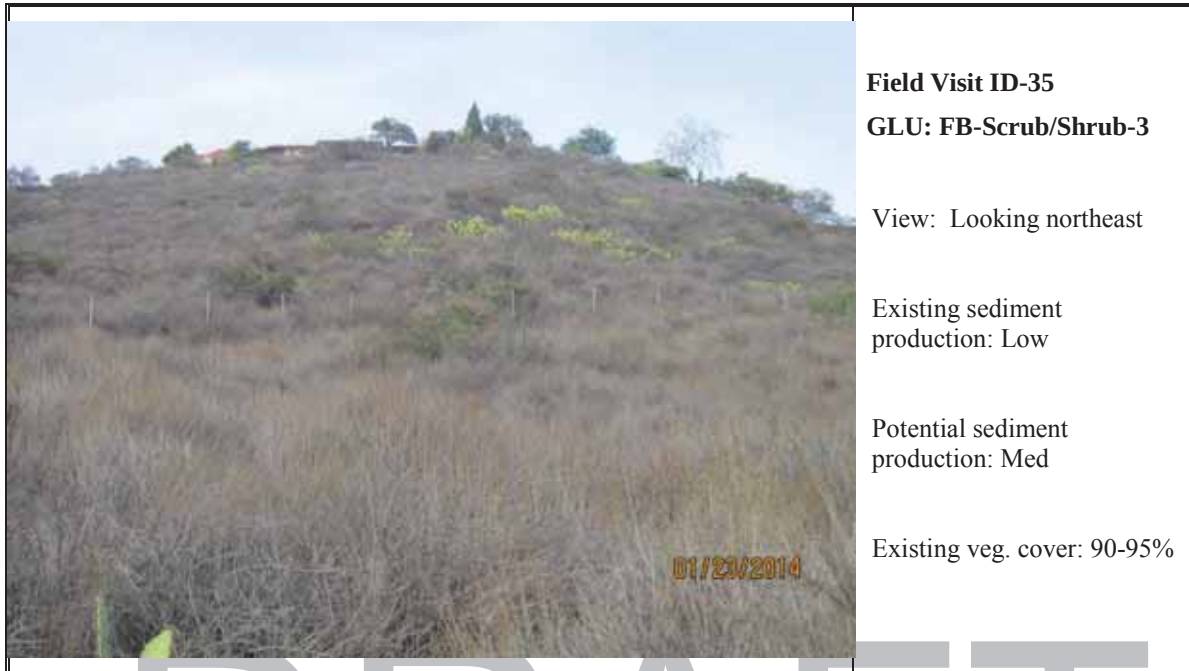
View: Looking west

Existing sediment
production: Low to Med

Potential sediment
production: Med

Existing veg. cover: 70-75%







Field Visit ID-37

GLU: CB-Forest-3

View: Looking southeast

Existing sediment
production: Med-High

Potential sediment
production: High

Existing veg. cover: 75-80%



Field Visit ID-38

**GLU: CSI-Agricultural/
Grass-1**

View: Looking northeast

Existing sediment
production: Low

Potential sediment
production: Med

Existing veg. cover: 85%



Field Visit ID-39

GLU: CSP-Developed-1

View: Looking west

Existing sediment
production: Low

Potential sediment
production: Low

Existing veg. cover: 30-35%



Field Visit ID-40

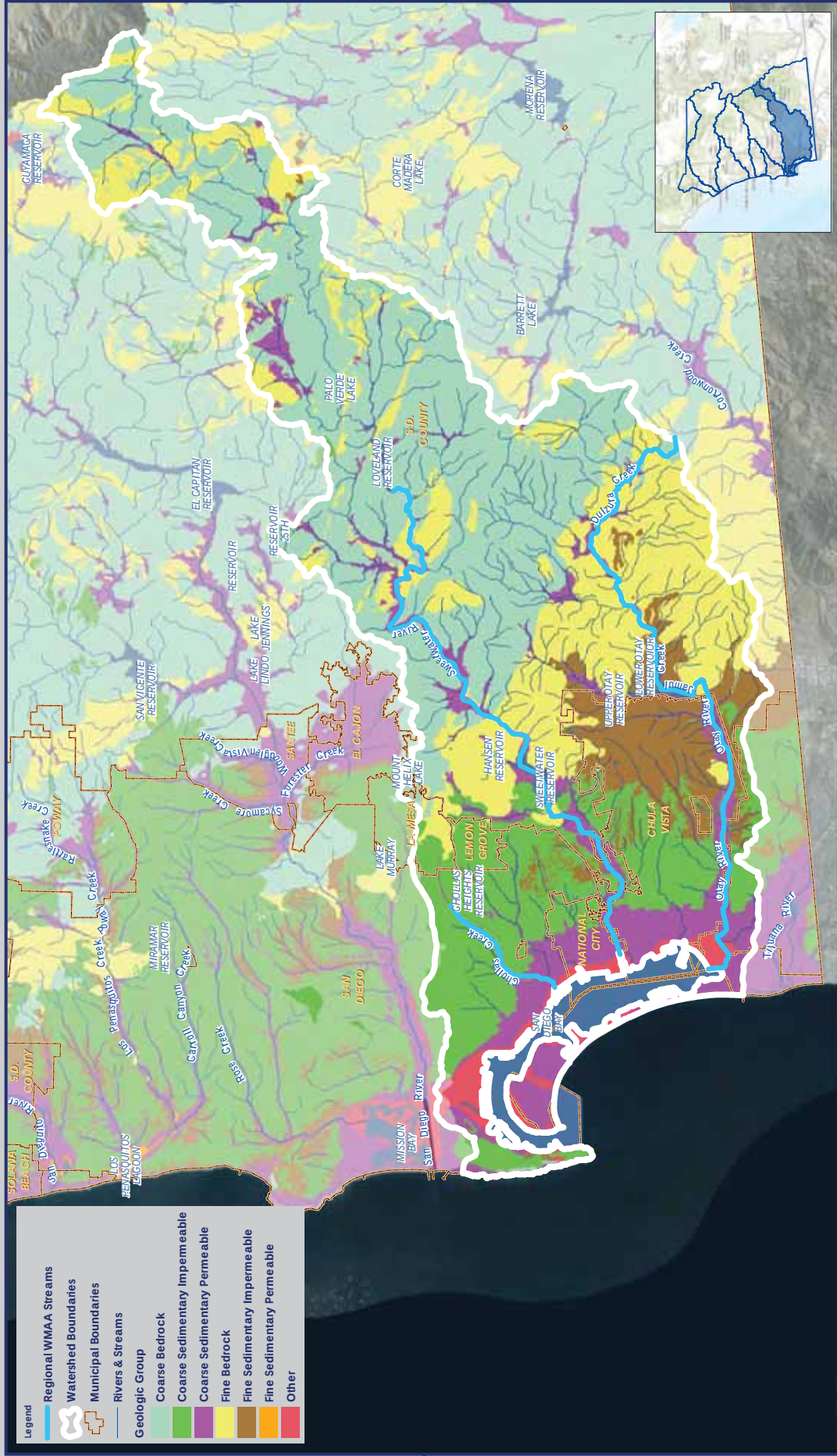
GLU: CSP-Scrub/Shrub-4

View: Looking south

Existing sediment
production: Med

Potential sediment
production: High

Existing veg. cover: 90-95%



Potential Critical Coarse Sediment Yield Areas

San Diego Bay Watershed - HU 908.00, 909.00, & 910.00, 441 mi2

ATTACHMENT A.5
PHYSICAL STRUCTURES

DRAFT

A.5 Physical Structures

The desktop-level analysis to identify existing physical structures within the nine watershed management areas within the San Diego region utilized the following GIS data sources:

- ESRI ArcMap, Google Earth, and Google Maps products
- Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) Flood Profiles and FEMA Flood Insurance Rate Map (FIRM)
- National Flood Hazard Layer (NFHL)
- Municipal master drainage plans (as provided)
- San Diego Geographic Information Source (SanGIS) Municipal Boundaries and Hydrologic Basins
- United States Geological Survey (USGS) National Hydrography Dataset (NHD) California data
- Stream data generated as indicated in Section 2.2

The following documents the process used to identify the physical structures along the reaches and the resulting GIS data:

- The process began by importing the data sources indicated above into a single ArcMap document that served as a master map file from which all further analysis proceeded.
- The data were screened and selected for inclusion as appropriate to the project scope.
- Point features were placed along river reach line segments to coincide with visually identified structures, utilizing different feature symbols according to the type of infrastructure.
- In the case of levees, the point was placed at the downstream-most end of the FEMA NFHL Shapefile. All point features generated in this task appear in the GIS shapefile.
- Municipal boundaries intersecting river reaches were identified to identify the applicable municipal drainage plan data.
- Point feature attributes and associated information for Physical Structures GIS shapefile is indicated in Table A.5.1 below.

Table A.5.1: Structure Identification Point Feature Attribute Development and Information

Attribute	Description
Struct_ID	The Structure ID field provides a six-digit identification number based upon the structure's specific location within a watershed. The first three digits in the code reflect the structure's Hydrologic Unit (HU) Basin number (ranging between 902-911 for Region 9, as defined in the Water Quality Control Plan for the San Diego Basin). The subsequent three digits reflect the structure's location along the reach, ascending along the channel from the headwaters to tailwaters (ranging between 001-999, beginning at the confluence and increasing in the upstream direction).

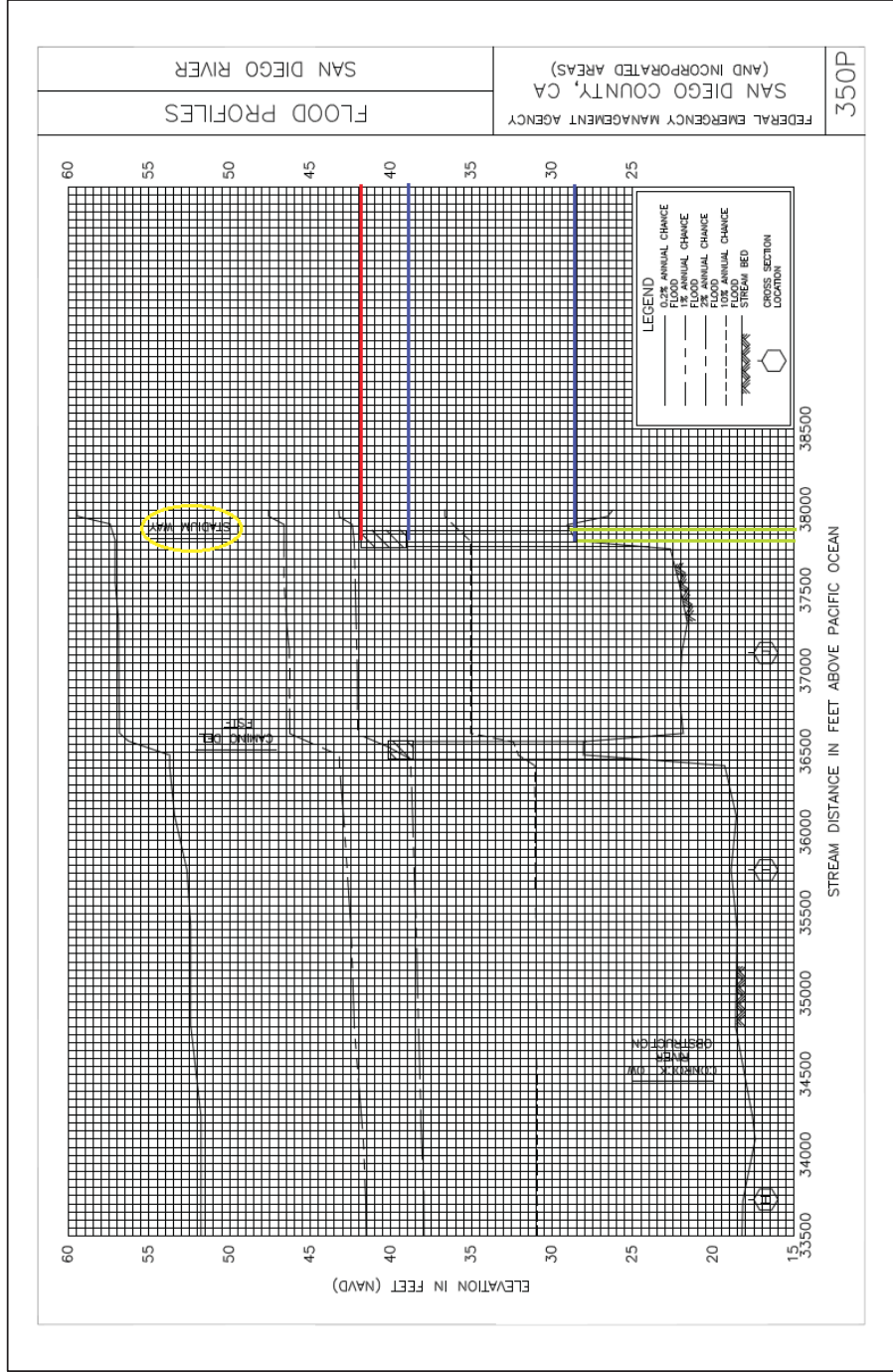
Attribute	Description
WMA	The Watershed Management Area field provides the name of the watershed in which the structure exists. The WMA corresponds with the HU identified in the first three digits in the Struct_ID (e.g., 911, Tijuana Watershed).
Channel_ID	The Channel ID field provides the name of the channel in which the structure exists.
Struct_Typ	The Structure Type field classifies known structures as one of the following types: Bridge, Culvert, Dam, Energy Dissipater, Flood Management Basin, Flood Wall, Grade Control, Levee, Pipeline, Weir.
Struct_Dtl	The Structure Detail field provides known quantitative information for multi-section culverts.
Struct_Mtl	The Structure Material field provides known qualitative information for structure material composition.
Struct_Shp	The Structure Shape field provides known geometric information for culvert shapes, and is classified as one of the following types: Arch, Box, Pipe.
Jurisd_ID	The Jurisdiction ID field, when applicable, provides the known separate structure identification number developed and utilized by the jurisdiction or entity responsible for creating and distributing the coinciding structure Shapefile data used for this analysis. This number was copied from the coinciding external Shapefile data attribute field best representing a unique jurisdiction or entity-based identification number (external Shapefile data received from regional WMAA data call; for jurisdictional information, see "Other" attribute field). Coinciding external Shapefile data was used to determine various structure attributes.
Plan_ID	The Plan ID field, when applicable, provides the known structure plan number corresponding with the Jurisdiction ID. This number was copied from the coinciding external Shapefile data attribute field best representing a unique plan number received from the regional WMAA data call (external Shapefile data received from regional WMAA data call; for jurisdictional information, see "Other" field). Coinciding external Shapefile data was used to determine various structure attributes.
Diameter	The Diameter field, when applicable, provides the known diameter (in US feet) for culverts.
Length	The Length field, when applicable, provides the known length (in US feet) for select structure types. When lengths were determined using FEMA FIS Flood Profiles, the scaled horizontal distances along the indicated roadway or channel slope were used.
Width	The Width field, when applicable, provides the known width (in US feet) for select structure types.
Height	The Height field, when applicable, provides the known height (in US feet) for select structure types. When heights were determined using FEMA FIS Flood Profiles, the scaled vertical distances from channel bed to indicated roadway bottom were used.
US_Invert	The Upstream Invert field, when applicable, provides the known upstream invert elevation (in US feet) for select structure types.
DS_Invert	The Downstream Invert field, when applicable, provides the known downstream invert elevation (in US feet) for select structure types.

Attribute	Description
RD_EL_NAVD	The Roadway Elevation (NAVD) field, when applicable, provides the known roadway elevation (in US feet, NAVD) for select structure types. When roadway elevations were determined using FEMA FIS Flood Profiles, the horizontal projection onto the vertical grid scales were used.
Loc_Descr	The Location Description field, when applicable, provides information for structures crossing a known roadway. In nearly all cases, Google Earth imagery was used to determine the roadway name.
Other	The Other field is used to convey any information not present within the preceding fields. Typically, "other" information includes jurisdictional, plan, and supplemental dimensions for a given structure.

Example Structure Identification

The following example demonstrates the structure identification process for a discrete structure (ID 907029) along the San Diego River. The San Diego River is located in the San Diego River watershed (WMA 907). Scanning the river from lower to higher reached, a new point feature was placed at the road crossing over the San Diego River as indicated in Figure A.5.1. Select attributes of this particular structure were available from the FEMA NFHL as displayed in the highlighted boxes in Figure A.5.1. Additional attributes such as the culvert height, length, roadway elevation, and name were also determined from the FIS Flood Profile as indicated in Figure A.5.2. Satellite imagery (e.g., Google) was used to verify the existence of structure. In this case, the most current Google Map data indicated that the culvert still exists and that the roadway name has been changed to Qualcomm Way. When structures could not be verified with satellite imagery, the structure identification was based solely upon the information provided or readily available and was not physically verified in the field. Figure A.5.3 displays an example of imagery used to identify structures.

Figure A.5.2: Typical FEMA FIS Flood Profile



Legend: roadway elevation (red), roadway name (yellow), culvert height (blue), culvert width (green)

Figure A.5.3: Google Map Imagery for Structure Identification



The following bridge structure dimensional attributes were included in the point feature attributes:

- length 110 feet
- height 10 feet
- roadway elevation 41.9 feet

The attribute table associated with the identified structure included in the GIS shapefile is indicated in Table A.5.2.

Table A.5.2: Structure 907029 Attribute Table

Attribute	Description
Struct_ID	907029
WMA	San Diego
Channel_ID	San Diego River
Struct_Typ	Culvert
Struct_Dtl	
Struct_Mtl	
Struct_Shp	
Jurisd_ID	06073C_118
Plan_ID	06073C_06073C_FIRM1
Diameter	0
Length	110
Width	0
Height	10
US_Invert	0
DS_Invert	0
RD_EL_NAVD	41.9
Loc_Descr	Qualcomm Way
Other	Info from FEMA NFHL shapefile data/FIS FP V.9-350P



Watershed Management Area Streams with Channel Structures

San Diego Bay Watershed - HU 908.00, 909.00, & 910.00, 441 mi2

ATTACHMENT B
HYDROMODIFICATION MANAGEMENT
APPLICABILITY/EXEMPTIONS

DRAFT

ATTACHMENT B.1
EXEMPT RIVER REACHES

DRAFT

B.1.1 Exempt River Reaches

B.1.1.1 Approach for Exempt River Reach Analysis

The approach selected in this cumulative hydromodification impacts study accounts for: (1) hydrology, (2) channel geometry, (3) bed and bank material, and (4) sediment supply. The selected approach compares long-term changes in sediment transport capacity, or in-stream work, and sediment supply for the existing and future development conditions. The ratio of future/existing condition transport capacity, or work, is termed Erosion Potential (Ep). The ratio of future/existing condition bed sediment supply is termed Sediment Supply Potential (Sp). To calculate Ep, the hydrology, channel geometry, and bed/bank materials are characterized for the existing and future conditions. To calculate Sp, the sediment supply factor is characterized for the existing and future conditions.

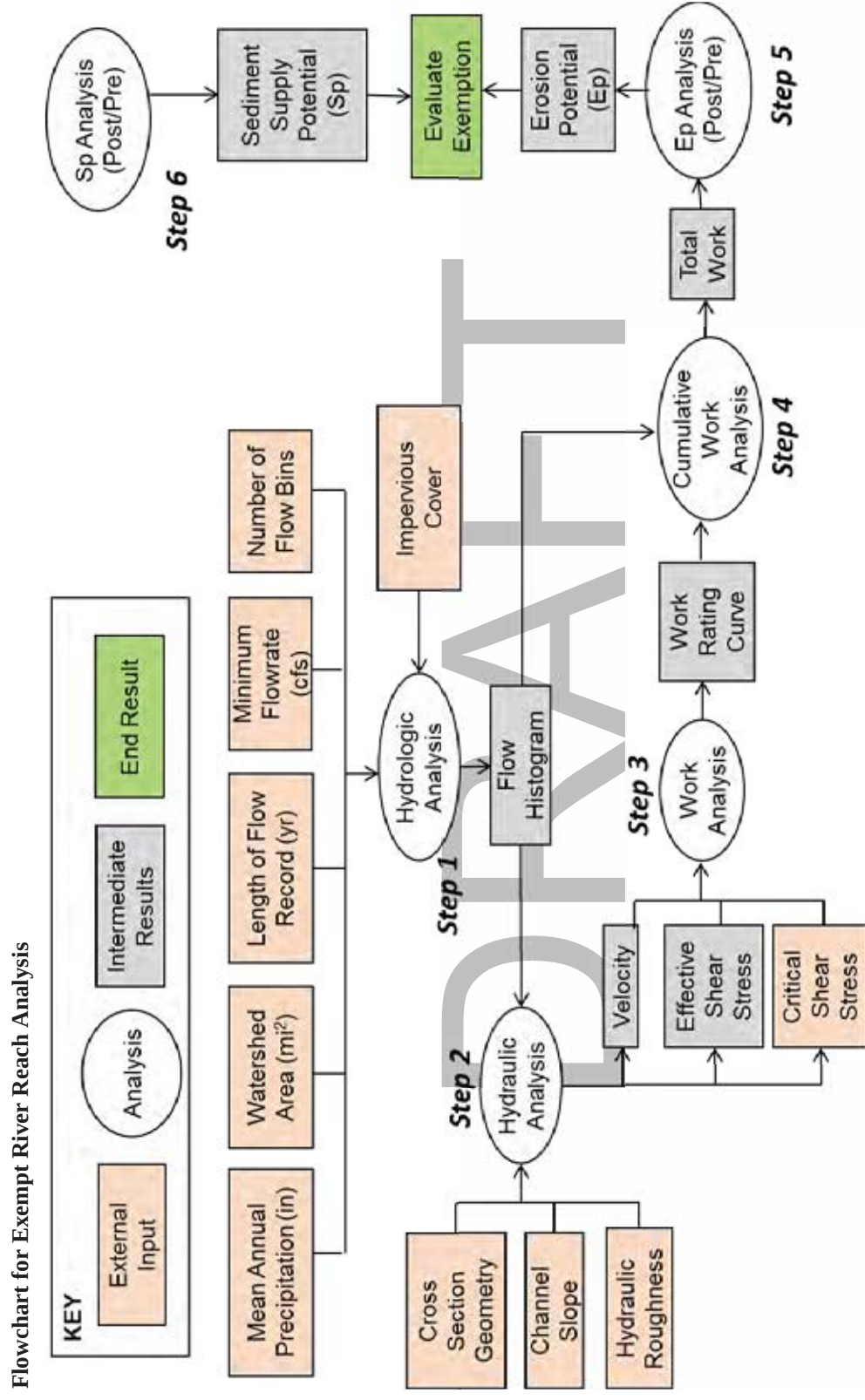
The findings in this study propose exemption for a given river reach if the analysis satisfies the following criteria:

- $Ep < 1.05$ when $d_{50} < 16$ mm or $Ep < 1.20$ when $d_{50} > 16$ mm, and;
- $Sp > 0.90$

The following bullet points provide basis for the criteria listed above:

- For Ep
 - According to the Journal of Hydrology article titled Channel Enlargement in Semiarid Suburbanizing Watersheds: A Southern California Case Study (Hawley and Bledsoe, 2013): *“The threshold corresponding to the presence/absence of headcutting varied based on substrate type, and was roughly quantified as a sediment-transport ratio greater than ~1.20 in systems with a median grain size > 16mm, and [Ep] ~ 1.05 when $d_{50} < 16$ mm”*
- For Sp
 - Soar and Thorne (2001) indicate that a greater than 10% reduction in sediment supply can have potentially significant effects on stream stability.
 - SCCWRP Technical Report 605, 2010 states that changes of less than 10% in either driver (Water delivery and sediment are the drivers in this report) are unlikely to instigate, on their own, significant channel changes.

The flow chart summarizing the analysis procedure is presented below.



B.1.1.2 Selection of Inputs for Exempt River Reach Analysis

The following steps were implemented for each river reach:

- Step 1 – Hydrologic Analysis:
 - Due to limited flow data, a flow duration equation developed for Southern California (Hawley and Bledsoe, 2011) was used to estimate existing and future flow histograms for each watershed.
 - The change in impervious cover between existing and future development conditions was estimated using the developable land use layer from Section 2.3.
 - A desktop-level GIS exercise was performed to manually assign land use classifications if the parcel in the developable land use layer directly discharges into the analyzed reach. Results are summarized in Section B.1.13.
 - Assumptions for percent imperviousness for each land use type were based on the information provided in the San Diego County Imperviousness Study (County of San Diego, 2010).
 - The table below presents the input parameters used to construct flow histograms, as well as the estimated channel slope at the critical cross section.

Exempt River Reach	Area (sq. miles)	Mean Annual Precipitation (in)	Length of Daily Flow Record (Years)	Channel Slope (ft/ft)
Otay River – West of Interstate 805	46	12	30	0.0026
Sweetwater River	72	12	30	0.0033

- Step 2 – Hydraulic Analysis: The reach type classification from Section 2.2 was used to identify the critical cross section along the reach for Ep analysis. A critical flow rate of $0.5Q_2$ was assigned to estimate the critical shear stress for the analyzed cross section. Flow rates below $0.5Q_2$ were assumed to perform no work on the reach.
- Step 3 – Work Analysis: The simplified effective work equation shown below is used to calculate the work done for each flow bin.

$$W = (\tau - \tau_c)^{1.5} V$$

Where

W = Work (dimensionless)

τ = effective Shear Stress [lb/ft²]

τ_c = Critical Shear Stress [lb/ft²]

V = Flow Velocity [ft/s]

- Step 4 – Cumulative Work Analysis: Cumulative work is a measure of the long-term total work or sediment transport capacity performed at a given stream location. Cumulative work incorporates both discharge magnitude and flow duration distributions for the full range of simulated flow rates. Cumulative work is calculated by multiplying work and duration for each bin. Total work is calculated through summation of work from all flow bins.
- Step 5 – Ep Analysis: Ep is calculated by dividing the total work of the future condition

by that of the existing condition. The existing river reaches analyzed appear relatively stable and have not experienced excessive geomorphic instability due to the alteration of the drainage areas. Given the stable condition of the existing channels, the existing condition was used as the baseline condition instead of natural. Results from the Ep analysis are presented in Section B.1.1.3.

- Step 6 – Sp Analysis: Coarse Sediment Supply Potential for each watershed was estimated using the quantitative results from Section 2.4. First, the watershed coarse sediment soil loss was estimated for all GLUs producing coarse sediment. Then, the future-condition coarse sediment soil loss was estimated by subtracting the approximate exempt parcel soil loss from the existing soil loss. Sp is ultimately calculated by dividing the future coarse sediment soil loss by the existing coarse sediment soil loss. Results from Sp analysis are presented in Section B.1.1.3.

Steps 1 to 5 were performed in Excel and Steps 1 and 6 were executed in GIS. Ep estimates for the exempt river reaches are included in this attachment.

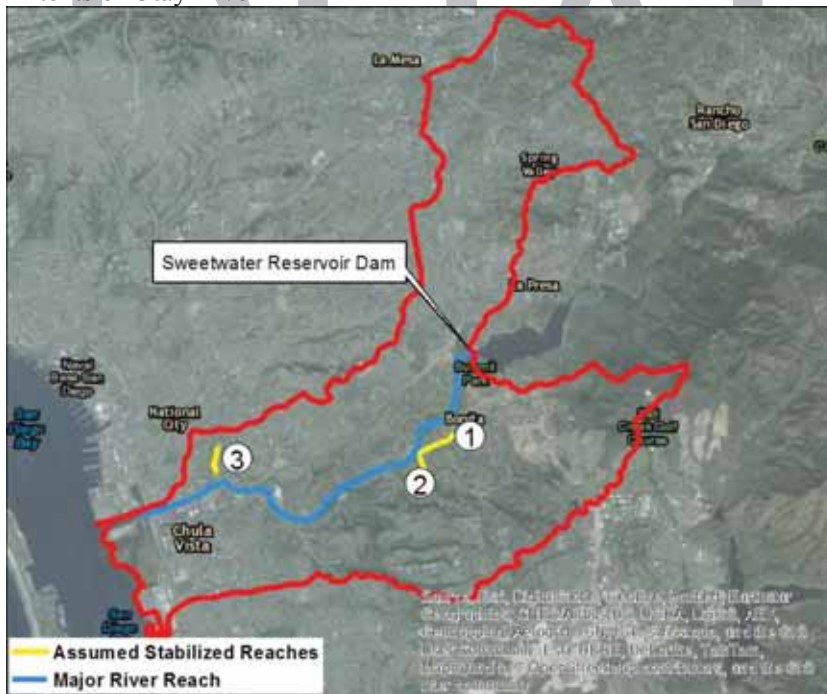
Exempt river reach extents are shown in the figures below. Figures also indicate the tributaries assumed to be stable for performing the erosion potential analysis as a conservative approach to approximate potential HMP exempt flows that may enter the river reach being analyzed.

For a PDP draining to one of the assumed stable tributaries shown in the following exempt reach figures, the PDP applicant shall verify and document that the assumed stable tributary is a stabilized conveyance system by using the methodology presented in section 4.1.2 prior to claiming exemption from hydromodification management requirements.

For a PDP draining to a tributary not shown in the figures below to be considered for exemption, a stability analysis using the section 4.1.2 methodology is to be conducted for the given tributary. If the stability analysis determines the tributary is stable, then the exempt river reach analysis indicated in section 4.1.1 shall be performed by adding the additional stabilized tributary to the current list of tributaries shown in the figures below to confirm that the reach satisfies the Ep and Sp criteria.



Extents of Otay River



Extents of Sweetwater River and extents of assumed Stabilized Reaches: 1) Sunnyside Channel;
 2) Long Canyon Channel; and 3) National City Gold Course Channel

The table below presents the summary of the developable land in each of the five watersheds with the exempt river reach and the estimated developable area that will be exempted from hydromodification management area requirements if the exempt river reach exemption is reinstated. This area will still be subject to the pollutant control requirements from the regional MS4 permit.

Exempt River Reach	Developable Land		
	Total (acres)	Area exempt (acres)	Exempt (%)
Otay River – West of Interstate 805	4,310	68	2%
Sweetwater River	1,332	255	19%

B.1.1.3 Results from Exempt River Reach Analysis

Results from Erosion potential analysis are presented below:

Exempt River Reach	Area (acres)	Impervious Area (acres) [%]			Ep (Post/Pre) [Criteria<1.05]
		Pre	Post	Increase	
Otay River – West of Interstate 805	29,571	9,428[31.8]	9,473[32.0]	45[0.2]	1.01
Sweetwater River	26,596	10,566[39.7]	10,663[40.1]	97[0.4]	1.03

Results from coarse sediment supply potential analysis are presented below:

Exempt River Reach	Soil Loss (tons/yr.)			Sp (Post/Pre) [Criteria>0.90]
	Pre	Exempt Parcels	Post [Pre – Exempt Parcels]	
Otay River – West of Interstate 805	24,402	38	24,364	1.00
Sweetwater River	16,672	601	16,071	0.96

Based on the results from the analysis it is recommended that exemption be reinstated for Otay River west of Interstate 805 and Sweetwater River.

Erosion Potential Analysis for Otay River - West of 1805

Channel Slope	0.0026	ft/ft
Estimated Q_2	133	cfs
0.5 Q_2	66.5	cfs
Critical Shear	0.135	lb/sq. ft
Y	62.4	lb/ft ³

Erosion Potential (Ep)

1.01

Existing Condition		Future Condition	
Tributary Area	A	sq mi	46
Mean Annual Precip	MAP	in/yr	12.0
Length of Daily Flow Record	Yr	yr	30
Imperviousness	Impov	mi ² /mi ²	0.3188
Maximum Flow of Record	Qmax	cfs	1236.9
Minimum Flow of Record	Qmin	cfs	0.01
10-year peak flow	Q10	cfs	3405.1
Coefficient of DDF	day1	days & cfs	15110.20
Exponent of DDF	day2	days & cfs	-0.91
Number of Bins	N _B	--	25
Bin Size	H _{Binlog}	--	0.489

Bin Number	Lower Bound of Bin Number $B_{lower\log(cfs)}$	Upper Bound of Bin $B_{upper\log(cfs)}$	Flow $Q(cfs)$	Hydraulic Radius $R(ft)$	Flow Velocity $v(ft/s)$	Shear Stress $\tau(psf)$	Work W	Duration	Cumulative Work $W*duration$
1	0.006	0.010	0.01	0.03	0.18	0.005	0.000	1169806	0.00
2	0.010	0.016	0.01	0.03	0.18	0.005	0.000	751154	0.00
3	0.016	0.027	0.02	0.04	0.22	0.006	0.000	482330	0.00
4	0.027	0.043	0.03	0.05	0.24	0.008	0.000	309713	0.00
5	0.043	0.071	0.06	0.06	0.29	0.010	0.000	198872	0.00
6	0.071	0.115	0.09	0.07	0.32	0.011	0.000	127699	0.00
7	0.115	0.188	0.15	0.08	0.36	0.013	0.000	81998	0.00
8	0.188	0.306	0.25	0.10	0.41	0.016	0.000	52653	0.00
9	0.306	0.498	0.40	0.12	0.46	0.019	0.000	33809	0.00
10	0.498	0.812	0.66	0.14	0.52	0.023	0.000	21709	0.00
11	0.812	1.324	1.07	0.17	0.59	0.028	0.000	13940	0.00
12	1.324	2.158	1.74	0.21	0.66	0.034	0.000	8951	0.00
13	2.158	3.517	2.84	0.25	0.75	0.041	0.000	5748	0.00
14	3.517	5.733	4.62	0.30	0.85	0.049	0.000	3691	0.00
15	5.733	9.344	7.54	0.36	0.96	0.058	0.000	2370	0.00
16	9.344	15.230	12.29	0.43	1.08	0.070	0.000	1522	0.00
17	15.230	24.825	20.03	0.52	1.22	0.084	0.000	977	0.00
18	24.825	40.465	32.64	0.62	1.38	0.101	0.000	627	0.00
19	40.465	65.956	53.21	0.75	1.56	0.122	0.000	403	0.00
20	65.956	107.507	86.73	0.94	1.82	0.153	0.004	259	1.12
21	107.507	175.233	141.37	1.18	2.11	0.191	0.029	166	4.74
22	175.233	285.626	230.43	1.46	2.44	0.237	0.080	107	8.50
23	285.626	465.563	375.59	1.80	2.81	0.292	0.175	68	12.02
24	465.563	758.856	612.21	2.15	3.16	0.349	0.313	44	13.77
25	758.856	1236.916	997.89	2.57	3.56	0.417	0.534	28	15.08

Erosion Potential Analysis for Sweetwater River

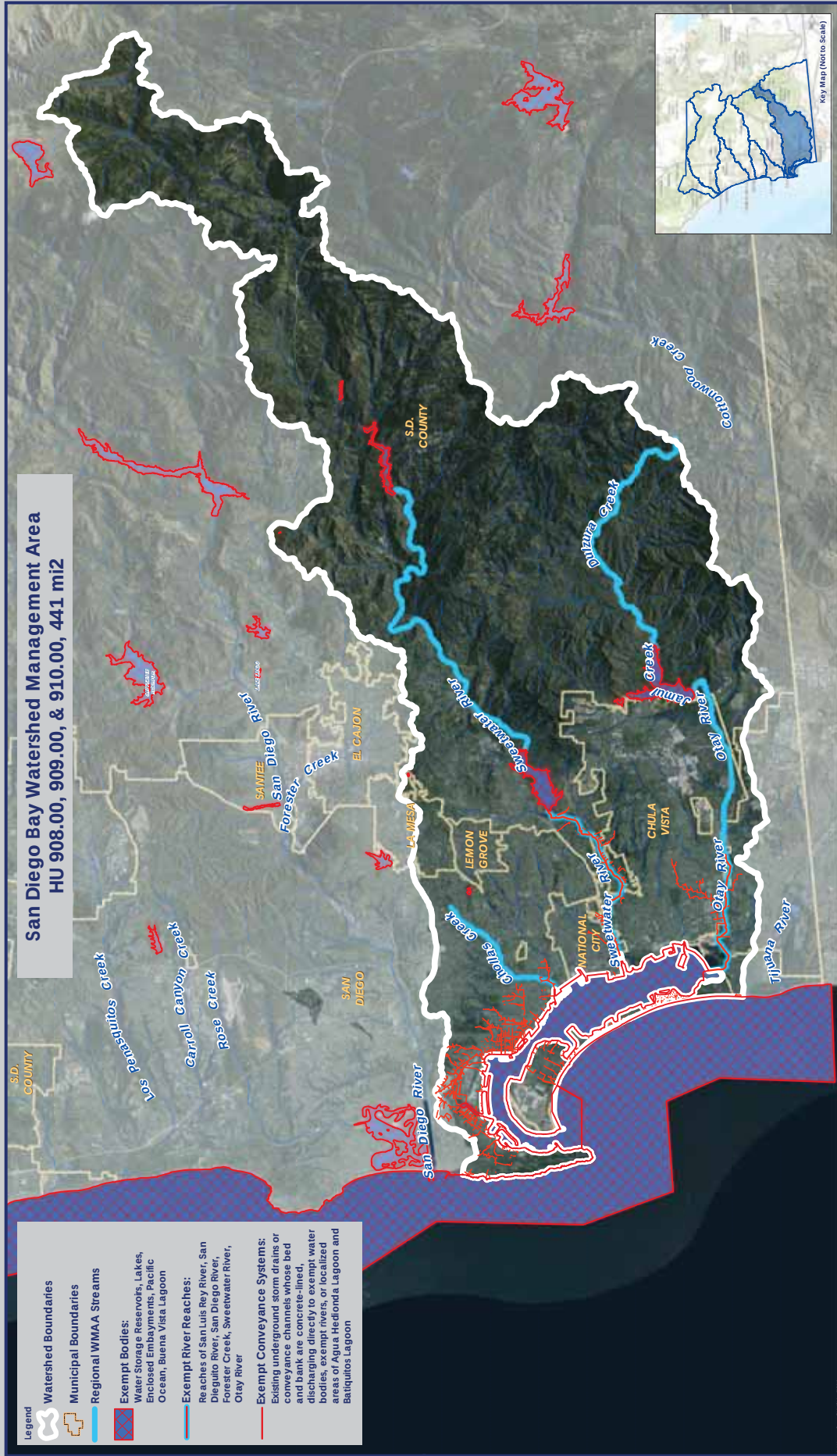
Erosion Potential (Ep)	1.025

Channel Slope	0.0033	ft/ft
Estimated Q ₂	110	cfs
0.5Q ₂	55	cfs
Critical Shear	0.136	lb/sq. ft
Y	62.4	lb/ft ³

	A	Existing Condition	Future Condition
Tributary Area	sq mi	42	42
Mean Annual Precip	in/yr	12.0	12.0
Length of Daily Flow Record	Yr	30	30
Imperviousness	Imperv mi ² /mi ²	0.397	0.401
Maximum Flow of Record	Q _{max} cfs	1114.9	1114.9
Minimum Flow of Record	Q _{min} cfs	0.01	0.01
10-year peak flow	Q ₁₀ cfs	3105.6	3105.6
Coefficient of DDF	day1 days & cfs	40664.46	42754.73
Exponent of DDF	day2 days & cfs	-1.01	-1.01
Number of Bins	N _B	25	25
Bin Size	H _{Bin}	0.484	0.484

Bin Number	Lower Bound of Bin Number $B_{lower\ bin}(cfs)$	Upper Bound of Bin Number $B_{upper\ bin}(cfs)$	Flow $Q\ (cfs)$	Hydraulic Radius $R\ (ft)$	Flow Velocity $v\ (ft/s)$	Shear Stress $\tau\ (psf)$	Work W	Duration	Cumulative Work $W*duration$	Duration	Cumulative Work $W*duration$
1	0.006	0.010	0.01	0.03	0.18	0.006	0.000	5155264	0.00	5553785	0.00
2	0.010	0.016	0.01	0.03	0.18	0.006	0.000	3168799	0.00	3394387	0.00
3	0.016	0.026	0.02	0.03	0.22	0.006	0.000	1947774	0.00	2082094	0.00
4	0.026	0.043	0.03	0.04	0.24	0.008	0.000	1197243	0.00	1277143	0.00
5	0.043	0.069	0.06	0.05	0.29	0.010	0.000	735912	0.00	783391	0.00
6	0.069	0.113	0.09	0.06	0.32	0.012	0.000	452345	0.00	480527	0.00
7	0.113	0.183	0.15	0.07	0.36	0.014	0.000	278044	0.00	294752	0.00
8	0.183	0.297	0.24	0.08	0.40	0.016	0.000	170906	0.00	180799	0.00
9	0.297	0.481	0.39	0.10	0.46	0.021	0.000	105051	0.00	110901	0.00
10	0.481	0.781	0.63	0.12	0.51	0.025	0.000	64572	0.00	68026	0.00
11	0.781	1.268	1.02	0.14	0.58	0.029	0.000	39691	0.00	41727	0.00
12	1.268	2.057	1.66	0.17	0.66	0.035	0.000	24397	0.00	25595	0.00
13	2.057	3.339	2.70	0.20	0.74	0.041	0.000	14996	0.00	15700	0.00
14	3.339	5.419	4.38	0.24	0.83	0.049	0.000	9218	0.00	9630	0.00
15	5.419	8.795	7.11	0.29	0.94	0.060	0.000	5666	0.00	5907	0.00
16	8.795	14.273	11.53	0.35	1.06	0.072	0.000	3483	0.00	3623	0.00
17	14.273	23.165	18.72	0.42	1.20	0.086	0.000	2141	0.00	2223	0.00
18	23.165	37.595	30.38	0.51	1.36	0.105	0.000	1316	0.00	1363	0.00
19	37.595	61.014	49.30	0.63	1.57	0.130	0.000	809	0.00	836	0.00
20	61.014	99.022	80.02	0.78	1.81	0.161	0.007	497	3.50	513	3.61
21	99.022	160.707	129.86	0.70	1.67	0.144	0.001	306	0.38	315	0.39
22	160.707	260.818	210.76	0.71	1.69	0.146	0.002	188	0.33	193	0.34
23	260.818	423.291	342.05	0.81	1.85	0.167	0.010	115	1.16	118	1.19
24	423.291	686.974	555.13	1.04	2.19	0.214	0.048	71	3.40	73	3.48
25	686.974	1114.916	900.95	1.35	2.61	0.278	0.140	44	6.10	45	6.23

ATTACHMENT B.2
HYDROMODIFICATION MANAGEMENT EXEMPTION
MAPPING
DRAFT



Receiving Waters and Conveyance Systems Exempt from Hydromodification Management Requirements

ATTACHMENT C
ELECTRONIC FILES

DRAFT

Electronic Folder titled “San Diego Bay_WMAA_Attachment C Electronic_Data.zip” Contents:

1. ArcMap 10.0 and 10.1 map files created for purpose of viewing Regional WMAA data
 - WMAA_08_SanDiegoBay_Data_2014_0908_v10.mxd
 - WMAA_08_SanDiegoBay_Data_2014_0908_v101.mxd
2. ESRI Geodatabase titled " WMAA_08_SanDiegoBay_Data_2014_0908_v10.gdb" containing the following data:
 - WatershedBoundaries
 - o Watershed_Boundaries
 - HydrologicProcesses
 - o HRUAnalysis
 - Streams – description of existing streams in the watershed
 - o SD_Regional_WMAA_Streams (streams selected for detailed analysis)
 - o SD_NHD_Streams (portion of NHD dataset included for reference)
 - LandUsePlanning
 - o SanGIS_ExistingLandUse
 - o SanGIS_PlannedLandUse
 - o SanGIS_DevelopableLands
 - o SanGIS_RedevelopmentandInfill
 - o SanGIS_MunicipalBoundaries
 - o Federal_State_Indian_Lands
 - o SanGIS_MHPA_SD
 - o SanGIS_MSCP_CN
 - o SanGIS_MSCP_EAST_DRAFT_CN
 - o SanGIS_Draft_North_County_MSCP_Version_8_Categories
 - PotentialCoarseSedimentYield
 - o GLUAnalysis
 - o PotentialCoarseSedimentYieldAreas
 - o MacroLevelPotentialCriticalAreas
 - o PotentialCriticalCoarseSedimentYieldAreas
 - ChannelStructures
 - o ChannelStructures
 - HydromodExemptions
 - o Exempt_Systems
 - o Exempt_Bodies
 - Floodplains: included for reference
 - o FEMA_NFHL
 - Baselayers: included for reference
 - o SanGIS_Lakes
 - o link to ESRI World Imagery (internet connection is required to access ESRI World Imagery basemap)

Electronic Folder titled “San Diego Bay_WMAA_Attachment C Electronic_Data.zip” Contents, continued:

3. Google Earth – KMZ file titled:
“WMAA_08_SanDiegoBay_Data_2014_0908_GoogleEarth.kmz”, containing the following data:
- WatershedBoundaries
 - Streams
 - SD Regional WMAA Streams (streams selected for detailed analysis)
 - SD NHD Streams (portion of NHD dataset included for reference)
 - LandUsePlanning
 - Municipal Boundaries
 - Federal/State/Indian Lands
 - ChannelStructures
 - HydromodExemptions
 - Exempt_Systems
 - Exempt_Bodies
 - Floodplains: included for reference
 - FEMA Floodplain
 - Dominant Hydrologic Processes
 - Potential Critical Coarse Sediment Yield Areas

Notes:

- Open a map file (with extension .mxd) using ArcMap to view the data.
- All data contained in the geodatabase is loaded into the map.

ATTACHMENT D

REGIONAL MS4 PERMIT CROSSWALK

DRAFT

Table below provides a linkage between the Regional MS4 Permit requirements for WMAA and this report.

Regional MS4 Permit Provision	Regional WMAA Report
B.3.b.(4)(a)	Chapter 2; Section 5.1; Attachment A and Attachment C
B.3.b.(4)(a)(i)	Section 2.1; Attachment A.1 and Attachment C
B.3.b.(4)(a)(ii)	Section 2.2; Attachment A.2 and Attachment C
B.3.b.(4)(a)(iii)	Section 2.3; Attachment A.3 and Attachment C
B.3.b.(4)(a)(iv)	Section 2.4; Attachment A.4 and Attachment C
B.3.b.(4)(a)(v)	Section 2.5; Attachment A.5 and Attachment C
B.3.b.(4)(b)	Chapter 3 and Section 5.2
B.3.b.(4)(c)	Chapter 4; Section 5.3; Attachment B and Attachment C

DRAFT

Project Identifier	Watershed Management Area	Jurisdiction	Ownership		Project Location			Project Size & Parameters				Other Notes
			Owner Information	Address	APN	Latitude (X-Coordinate)	Longitude (Y-Coordinate)	Contributing Drainage Area (acres)	Parcel Size (acres)	Project Footprint (acres)	Parameters (with units as necessary)	
Public Parcels Identified as Suitable for Further Assessment to Determine Feasibility of Retrofitting with Green Infrastructure												
Parcels on this list that are 0.25 acres or greater have been assessed using broad assumptions necessary for computer modeling and were found to be potentially effective as an opportunity for contributing to load reduction goals. Considerable further assessment would be required before determining any of these sites to be viable retrofit sites for implementation of Green Infrastructure. That assessment includes verifying public ownership, determining if land use agreements and financing can be established, assessing feasibility based upon further investigation of physical site constraints at a project design level, and determining that construction and necessary approvals, including approvals from regulatory agencies other than the City of San Diego, can be completed within the time constraints in the Municipal Storm Water Permit that pertain to Alternative Compliance.												
1	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4774900300 47749	6308163.79165121	1847315.49213554	TBD	55.95	TBD	TBD	TBD
2	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5834001700	6322642.22823807	1837110.96043261	TBD	9.27	TBD	TBD	TBD
3	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4714023000	6302432.41154181	1854512.55101967	TBD	6.65	TBD	TBD	TBD
4	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5810601300	6317920.14101291	1840355.21876514	TBD	7.77	TBD	TBD	TBD
5	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4714222800	6303702.05737099	1854491.89574020	TBD	7.78	TBD	TBD	TBD
6	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4722712400 47227	6305076.63571853	1854236.86292751	TBD	5.88	TBD	TBD	TBD
7	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4742801700	6315776.28377000	1854032.29942100	TBD	0.16	TBD	TBD	TBD
8	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4716520500 47165	6300221.00604964	1852469.08170506	TBD	9.41	TBD	TBD	TBD
9	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4722100400 47223	6307734.63605171	1855157.07249383	TBD	27.27	TBD	TBD	TBD
10	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5491110800	6309453.28945452	1838843.65591611	TBD	0.95	TBD	TBD	TBD
11	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5810602100	6318224.32465950	1840343.09259259	TBD	5.67	TBD	TBD	TBD
12	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4760923000	6299330.26910209	1850570.48593975	TBD	6.31	TBD	TBD	TBD
13	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5501701700 55011	6293175.50000000	1834031.32716049	TBD	1.29	TBD	TBD	TBD
14	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4476123600	6296951.34977687	1852632.45529333	TBD	7.04	TBD	TBD	TBD
15	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5473110100 54723	6302420.12596618	1838057.37037037	TBD	1.92	TBD	TBD	TBD
16	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4714612300	6300149.56025701	1854086.51164094	TBD	0.25	TBD	TBD	TBD
17	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5491020700 54910	6313186.12274909	1839520.27160494	TBD	0.39	TBD	TBD	TBD
18	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4713011200	6301306.03458332	1854994.29325790	TBD	0.07	TBD	TBD	TBD
19	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5474032700 54763	6298979.80686657	1835985.02715130	TBD	0.27	TBD	TBD	TBD
20	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4716630100	6301089.43428564	1852593.09017057	TBD	6.32	TBD	TBD	TBD
21	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5410700100	6300901.98715887	1845283.67119255	TBD	0.18	TBD	TBD	TBD
22	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4675420700	6311638.12950395	1857588.70724691	TBD	1.14	TBD	TBD	TBD
23	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5812901100	6317588.07400038	1836691.97475682	TBD	0.56	TBD	TBD	TBD
24	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5476004700 54747	6302506.21782202	1835350.40134864	TBD	40.42	TBD	TBD	TBD
25	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4547621200	6298117.42486931	1854066.11111111	TBD	5.60	TBD	TBD	TBD
26	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4714321900	6304579.31033034	1854590.87733339	TBD	0.14	TBD	TBD	TBD
27	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4714020800	6302143.12491611	1854535.49141477	TBD	0.14	TBD	TBD	TBD
28	SDB - Chollas	City of San Diego	Central S D H C F N M A L L C	TBD	4472422300	6295383.08852145	1855337.76737389	TBD	0.14	TBD	TBD	TBD
29	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5464300400	6297973.18470094	1834909.24441138	TBD	6.27	TBD	TBD	TBD
30	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5424800900	6304715.80761563	1841181.38116475	TBD	0.25	TBD	TBD	TBD
31	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5510803500 55108	6299186.62325200	1834192.73020400	TBD	1.27	TBD	TBD	TBD
32	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4712410900	6300497.67666461	1855096.33129026	TBD	0.15	TBD	TBD	TBD

33	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4712510500	6301188.92383047	1855392.49967468	TBD	TBD	0.14	TBD	TBD
34	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4538110100	6293781.07842333	1848918.40740741	TBD	TBD	7.62	TBD	TBD
35	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5461750100	6294189.37613036	1836175.03701751	TBD	TBD	1.85	TBD	TBD
36	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4713920700	6301483.99263174	1854596.42030339	TBD	TBD	0.14	TBD	TBD
37	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5455210900	6292150.28066420	1836697.08024691	TBD	TBD	0.16	TBD	TBD
38	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4463842500	6292880.11505922	1854014.74957699	TBD	TBD	0.31	TBD	TBD
39	SDB - Chollas	City of San Diego	Central S D H C F N A L L C	TBD	4464332500	6292842.93808917	1853810.21172118	TBD	TBD	0.17	TBD	TBD
40	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5507804000	6294433.19193600	1832653.34665100	TBD	TBD	2.72	TBD	TBD
41	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5480403900	6304910.90634516	1839116.97801122	TBD	TBD	0.59	TBD	TBD
42	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4674900300	6313322.24980421	1858577.23581306	TBD	TBD	7.37	TBD	TBD
43	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4725010700.47250107	6306236.53136869	1853109.39611542	TBD	TBD	0.30	TBD	TBD
44	SDB - Chollas	City of San Diego	San Diego Metropolitan Transit Development Board	TBD	5480201900.54802019	6304504.12048885	1839138.03042861	TBD	TBD	2.45	TBD	TBD
45	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4476123700	6296591.34450217	1852484.92306331	TBD	TBD	1.89	TBD	TBD
46	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4714912700	6302282.58929843	1854099.09513882	TBD	TBD	0.14	TBD	TBD
47	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4474913100	6297317.04450800	1853545.17984300	TBD	TBD	0.27	TBD	TBD
48	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4674900400	6312494.98218359	1858252.74013411	TBD	TBD	1.96	TBD	TBD
49	SDB - Chollas	City of San Diego	Redevelopment Agency Of City Of San Diego	TBD	4474311100	6297179.43384005	1853909.8642859	TBD	TBD	0.17	TBD	TBD
50	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5480101600	6303590.09479680	1840041.16317826	TBD	TBD	4.10	TBD	TBD
51	SDB - Chollas	City of San Diego	Central S D H C F N A L L C	TBD	4471812300	6295728.15683950	1856107.28899522	TBD	TBD	0.14	TBD	TBD
52	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5810951800	6319877.86425918	1840149.25814804	TBD	TBD	0.12	TBD	TBD
53	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5512001600.55120016	6297564.30178000	1833202.99606200	TBD	TBD	1.21	TBD	TBD
54	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5492400800	6310770.09738674	1837031.91351499	TBD	TBD	9.41	TBD	TBD
55	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4721611300	6304789.96162501	1854857.00061418	TBD	TBD	0.07	TBD	TBD
56	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4732804100	6310577.97949882	1854353.26387737	TBD	TBD	0.12	TBD	TBD
57	SDB - Chollas	City of San Diego	Central S D H C F N A L L C	TBD	4464332400	6292845.27027339	1853758.64710301	TBD	TBD	0.17	TBD	TBD
58	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	5455422300	6293400.48014500	1836642.86499000	TBD	TBD	2.64	TBD	TBD
59	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5811901000	6315853.00095340	1839214.16049383	TBD	TBD	0.19	TBD	TBD
60	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4714500900	6306055.70173567	1847359.80128172	TBD	TBD	7.20	TBD	TBD
61	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5455910100	6290110.50051805	1835445.64340743	TBD	TBD	18.33	TBD	TBD
62	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4764911700.47649117	6300249.55590778	1847889.81481680	TBD	TBD	0.57	TBD	TBD
63	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5505201900	6293843.79849272	1832266.08468506	TBD	TBD	0.39	TBD	TBD
64	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5813202100	6317978.99727365	1836993.29293827	TBD	TBD	7.04	TBD	TBD
65	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4721611200	6304790.41654112	1854882.00185634	TBD	TBD	0.07	TBD	TBD
66	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5512313500	6297589.47161747	1832879.73410519	TBD	TBD	0.18	TBD	TBD
67	SDB - Chollas	City of San Diego	San Diego Metropolitan Transit Development Board	TBD	5481210200	6309025.91572072	1838846.29487347	TBD	TBD	0.14	TBD	TBD
68	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4713212700	6302996.00532283	1855441.29540480	TBD	TBD	0.12	TBD	TBD
69	SDB - Chollas	City of San Diego	Central S D H C F N A L L C	TBD	4474712500	6295796.41683686	1853358.33687735	TBD	TBD	0.17	TBD	TBD
70	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4547521500.45475215	6297933.39157129	1854338.65089522	TBD	TBD	0.56	TBD	TBD
71	SDB - Chollas	City of San Diego	San Diego Redevelopment Agency	TBD	4547631500.45476315	6298278.47550588	1853705.56407160	TBD	TBD	0.81	TBD	TBD
72	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5810404600	6316791.40397169	1840357.06694378	TBD	TBD	0.01	TBD	TBD
73	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4776900100	6306383.79243533	1848313.85802469	TBD	TBD	0.86	TBD	TBD
74	SDB - Chollas	City of San Diego	Central S D H C F N A L L C	TBD	4474021000	6295263.31066077	1853998.65187169	TBD	TBD	0.16	TBD	TBD
75	SDB - Chollas	City of San Diego	Central S D H C F N A L L C	TBD	4474112400	6295810.17135689	1854065.65611683	TBD	TBD	0.16	TBD	TBD
76	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4713920800	6301483.23834666	1854553.94506678	TBD	TBD	0.10	TBD	TBD
77	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4764912400	6300255.16863736	1848203.21246497	TBD	TBD	0.16	TBD	TBD
78	SDB - Chollas	City of San Diego	San Diego Metropolitan Transit Development Board	TBD	5490712100.54907121	6311616.34944541	1839396.39023403	TBD	TBD	1.70	TBD	TBD
79	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4720410700	6306081.80650438	1856172.82405368	TBD	TBD	0.20	TBD	TBD
80	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5454922900	6305189.72696022	1841000.16919403	TBD	TBD	0.02	TBD	TBD
81	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5510501100	6298560.03400000	1833403.16900000	TBD	TBD	1.37	TBD	TBD
82	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4717323400.47173234	6299824.69970384	1851972.08377683	TBD	TBD	0.36	TBD	TBD
83	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5452402100	6293571.82738493	1839147.83530945	TBD	TBD	0.25	TBD	TBD

84	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4472601600	6296660.00978388	1855325.02469136	TBD	11.59	TBD	TBD	TBD
85	SDB - Chollas	City of San Diego	State Of California	TBD	5302021300	6302003.69565559	1837313.61002308	TBD	0.26	TBD	TBD	TBD
86	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5810202700	6316227.82597809	1840122.36535951	TBD	0.03	TBD	TBD	TBD
87	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4720410600	6306159.95267667	1856201.03474208	TBD	0.24	TBD	TBD	TBD
88	SDB - Chollas	City of San Diego	San Diego Community College District	TBD	5475611400	6300343.84336918	1835376.54579734	TBD	1.79	TBD	TBD	TBD
89	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5831320100	6322151.42929177	1839197.17632923	TBD	0.15	TBD	TBD	TBD
90	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4764912200	6300251.30924571	1848103.40236070	TBD	0.15	TBD	TBD	TBD
91	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5481422000 54814	6303865.33375000	1837133.50950000	TBD	0.36	TBD	TBD	TBD
92	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4474011800	6294971.07978370	1854160.84241955	TBD	4.64	TBD	TBD	TBD
93	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4773413500	6307531.71694841	1848711.62962963	TBD	3.65	TBD	TBD	TBD
94	SDB - Chollas	City of San Diego	Central S D H C F N M A L L C	TBD	4473422800	6296202.68182768	185477.33127878	TBD	0.16	TBD	TBD	TBD
95	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5510601500	6298715.39105611	1834659.99226152	TBD	1.82	TBD	TBD	TBD
96	SDB - Chollas	City of San Diego	San Diego Metropolitan Transit Development Board	TBD	5472005300	6301969.13044953	1838496.15736042	TBD	0.14	TBD	TBD	TBD
97	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5500610500	6293324.71268657	1834379.50000000	TBD	0.10	TBD	TBD	TBD
98	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4763531000	6298646.38591607	1848349.60493827	TBD	0.40	TBD	TBD	TBD
99	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5442023100	6313359.60907758	1840592.93470600	TBD	0.81	TBD	TBD	TBD
100	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4713010900	6301304.68550000	1854919.27500000	TBD	0.07	TBD	TBD	TBD
101	SDB - Chollas	City of San Diego	City Of San Diego Redevelopment Agency	TBD	4714524000	6299778.95338121	1853932.25178368	TBD	0.12	TBD	TBD	TBD
102	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5450612800 54506	6293265.77500495	1841036.92592593	TBD	0.32	TBD	TBD	TBD
103	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4765804400	6304270.01746440	1848740.86024088	TBD	0.60	TBD	TBD	TBD
104	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5470311600	6300628.55724634	1840273.51716478	TBD	2.97	TBD	TBD	TBD
105	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4713011100	6301305.58500000	1854969.28750000	TBD	0.07	TBD	TBD	TBD
106	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4715300100	6304401.92087378	1853757.10850000	TBD	0.13	TBD	TBD	TBD
107	SDB - Chollas	City of San Diego	United States Of America	TBD	5505001300 55050	6292657.95205447	1830808.38366049	TBD	5.10	TBD	TBD	TBD
108	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5513422800	6298365.49837345	1831742.30459967	TBD	0.16	TBD	TBD	TBD
109	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4547632900	6298418.91942062	1854192.14776382	TBD	0.05	TBD	TBD	TBD
110	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	4547632900	6293947.88893867	1853642.83333333	TBD	0.13	TBD	TBD	TBD
111	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4773413400	6306171.93584708	1848836.83095258	TBD	0.25	TBD	TBD	TBD
112	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4674841500	6312962.86894874	1858677.68778395	TBD	0.44	TBD	TBD	TBD
113	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5405401900 5404	6294867.24425559	1843399.28965093	TBD	2.40	TBD	TBD	TBD
114	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4541613100	6297886.41352367	1851976.20090880	TBD	0.37	TBD	TBD	TBD
115	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5414603300	6302877.19199870	1841373.37812195	TBD	26.12	TBD	TBD	TBD
116	SDB - Chollas	City of San Diego	City Of San Diego Redevelopment Agency	TBD	4474310600	6297182.05192778	1854140.51844343	TBD	0.16	TBD	TBD	TBD
117	SDB - Chollas	City of San Diego	City Of San Diego Redevelopment Agency	TBD	5482423000	6304334.63350000	1836802.40350001	TBD	1.13	TBD	TBD	TBD
118	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	4773413400	6306171.93584708	1848836.83095258	TBD	0.25	TBD	TBD	TBD
119	SDB - Chollas	City of San Diego	City Of San Diego Redevelopment Agency	TBD	4547631400	6298303.56488948	1853780.69185010	TBD	0.23	TBD	TBD	TBD
120	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4717201400	6299025.30039804	1851741.02305680	TBD	0.18	TBD	TBD	TBD
121	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5412351000	6302578.38939010	1844009.42592593	TBD	9.55	TBD	TBD	TBD
122	SDB - Chollas	City of San Diego	Pacific Bell Telephone Co	TBD	4474121300	6296144.07458703	1853758.24724275	TBD	0.13	TBD	TBD	TBD
123	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4713011000	6301305.13442455	1854944.28153230	TBD	0.07	TBD	TBD	TBD
124	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5481210300	6308709.47407426	1838777.03299049	TBD	0.95	TBD	TBD	TBD
125	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4762910800	6300081.87132976	1849234.71668653	TBD	0.09	TBD	TBD	TBD
126	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4762910700	6300080.76521216	1849272.78383210	TBD	0.08	TBD	TBD	TBD
127	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4544813100	6296860.89048156	1848997.65059630	TBD	0.16	TBD	TBD	TBD
128	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5500110100	6289820.05266204	1834659.05555556	TBD	0.20	TBD	TBD	TBD
129	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4720221200	6305882.54596959	1856516.87654321	TBD	0.84	TBD	TBD	TBD
130	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5810935600	6320372.78856344	1840325.30447529	TBD	0.15	TBD	TBD	TBD
131	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5424800300	6304301.83442575	1841394.42720374	TBD	1.07	TBD	TBD	TBD
132	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5475202700	6298375.38550699	1835467.55614377	TBD	0.64	TBD	TBD	TBD
133	SDB - Chollas	City of San Diego	City Of San Diego Redevelopment Agency	TBD	5481500700	6304313.85002819	1837139.25243210	TBD	0.26	TBD	TBD	TBD
134	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	4717202200	6299185.50019568	1851788.77290998	TBD	0.16	TBD	TBD	TBD

135	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5495830100	6309315.95503840	1836276.37647840	TBD	4.88	TBD	TBD	TBD
136	SDB - Chollas	City of San Diego	City Of San Diego Redevelopment Agency	TBD	5516301000	6298892.34221176	1832869.32657257	TBD	0.02	TBD	TBD	TBD
137	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5452400400	6293681.88029019	1839430.09662453	TBD	0.03	TBD	TBD	TBD
138	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5394843600	6291261.21675272	1842423.91298738	TBD	0.59	TBD	TBD	TBD
139	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4544820900	6297084.67430521	1849122.72501056	TBD	0.32	TBD	TBD	TBD
140	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5424801600	6304713.47491006	1841094.86322632	TBD	0.32	TBD	TBD	TBD
141	SDB - Chollas	City of San Diego	United States Of America	TBD	5504800100	6290201.78795261	1832524.25925926	TBD	2.06	TBD	TBD	TBD
142	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5471023800	6299264.14767829	1839636.51614014	TBD	0.22	TBD	TBD	TBD
143	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	5391621100	6291650.62643537	1845533.21921266	TBD	0.16	TBD	TBD	TBD
144	SDB - Chollas	City of San Diego	San Diego Metropolitan Transit Development Board	TBD	5481210400	6308757.81287010	1838868.79241216	TBD	0.26	TBD	TBD	TBD
145	SDB - Chollas	City of San Diego	City Of San Diego Redevelopment Agency	TBD	5516300900	6299098.61350000	1833039.48549999	TBD	0.02	TBD	TBD	TBD
146	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5395003500	6292931.11255540	1842167.27377597	TBD	4.16	TBD	TBD	TBD
147	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4774401500	6307792.45311782	1848315.15075979	TBD	1.72	TBD	TBD	TBD
148	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5461401100	6295327.43767746	1839274.18086027	TBD	7.29	TBD	TBD	TBD
149	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5453330700	6293480.80092593	1838902.85802469	TBD	0.84	TBD	TBD	TBD
150	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5462710100	6295067.99170841	1835950.92610518	TBD	0.12	TBD	TBD	TBD
151	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4465130100	6293644.36250000	1851578.25000000	TBD	0.02	TBD	TBD	TBD
152	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5441910600	6312012.68681143	1841003.18760825	TBD	0.34	TBD	TBD	TBD
153	SDB - Chollas	City of San Diego	City Of San Diego(Memorial Park)	TBD	5455920100	6290740.66586294	1835458.66666667	TBD	17.98	TBD	TBD	TBD
154	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5424201000	6303728.08429723	1841787.32646483	TBD	3.66	TBD	TBD	TBD
155	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5456730700	6292759.00000000	1834743.29012346	TBD	0.06	TBD	TBD	TBD
156	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5512310500	6297387.48830548	1832879.84900322	TBD	0.18	TBD	TBD	TBD
157	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5504623100	6296589.78589707	1832778.34567901	TBD	0.19	TBD	TBD	TBD
158	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5504624600	6296403.41276700	1832740.73898500	TBD	0.31	TBD	TBD	TBD
159	SDB - Chollas	City of San Diego	City Of San Diego Redevelopment Agency	TBD	5506007300	6295054.01394712	1832174.40123457	TBD	0.01	TBD	TBD	TBD
160	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5480602400	6308017.66523800	1838707.19957300	TBD	0.63	TBD	TBD	TBD
161	SDB - Chollas	City of San Diego	Central S D H C F N M A L L C	TBD	5391710600	6292019.00894406	1845898.64606525	TBD	0.16	TBD	TBD	TBD
162	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5811903300	6316345.10488305	1839141.01681205	TBD	0.04	TBD	TBD	TBD
163	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5386200300	6288990.47465887	1834811.75925926	TBD	1.64	TBD	TBD	TBD
164	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5480602500	6308174.35466500	1838725.18031400	TBD	0.64	TBD	TBD	TBD
165	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5383603600	6288432.50876620	1835864.82033615	TBD	4.11	TBD	TBD	TBD
166	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4735802700	6313284.54743363	1852394.38817278	TBD	0.06	TBD	TBD	TBD
167	SDB - Chollas	City of San Diego	United States Postal Service	TBD	5480602000	6307099.53306450	1838791.78417496	TBD	3.89	TBD	TBD	TBD
168	SDB - Chollas	City of San Diego	San Diego Metropolitan Transit Development Board	TBD	5453911900	6292826.34595866	1837685.45444535	TBD	0.28	TBD	TBD	TBD
169	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4464934200	6293584.00071473	1852118.56167284	TBD	0.01	TBD	TBD	TBD
170	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5453911500	6292557.15564591	1837700.04601235	TBD	0.02	TBD	TBD	TBD
171	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4464932600	6293572.57699620	1852131.71648350	TBD	0.02	TBD	TBD	TBD
172	SDB - Chollas	City of San Diego	City Of San Diego	TBD	4546122500	6297206.94062288	1848211.96994102	TBD	0.23	TBD	TBD	TBD
173	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5480602300	6307871.25059200	1838689.21883200	TBD	0.85	TBD	TBD	TBD
174	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5456615100	6292108.18445335	1834967.25110629	TBD	6.49	TBD	TBD	TBD
175	SDB - Chollas	City of San Diego	United States Of America	TBD	5504910100	6290752.00000000	1832521.45061728	TBD	3.92	TBD	TBD	TBD
176	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	5504211000	6290802.84357176	1833280.54665436	TBD	0.17	TBD	TBD	TBD
177	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5471020400	6299202.91646574	1839637.45997623	TBD	0.06	TBD	TBD	TBD
178	SDB - Chollas	City of San Diego	Nextel Of California Inc <L>- Arya Santosh K&Saroj	TBD	5473242100	6301969.63627900	1837266.56380700	TBD	0.00	TBD	TBD	TBD
179	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5503603600	6294436.73911500	1833166.91049600	TBD	0.00	TBD	TBD	TBD
180	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5475202900	6298681.42454100	1834973.91547600	TBD	0.01	TBD	TBD	TBD
181	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5471020200	6299140.90883327	1839638.68257798	TBD	0.11	TBD	TBD	TBD
182	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5471020300	6299177.62681978	1839637.98159085	TBD	0.06	TBD	TBD	TBD
183	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5450620300	6293029.15300867	1840900.11106161	TBD	0.25	TBD	TBD	TBD
184	SDB - Chollas	City of San Diego	City Of San Diego	TBD	5512310200	6297089.63874132	1832917.64810750	TBD	0.18	TBD	TBD	TBD
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186	SDB - Chollas	City of San Diego	City of San Diego	TBD	5453911300	6292675.47942765	1837847.22750617	TBD	0.03	TBD	TBD	TBD
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188	SDB - Chollas	City of San Diego	City of San Diego	TBD	5507803900	6294944.45023395	1832495.46147994	TBD	0.12	TBD	TBD	TBD
189	SDB - Chollas	City of San Diego	City of San Diego	TBD	5512310100	6297024.69491857	1832898.67415742	TBD	0.05	TBD	TBD	TBD
190	SDB - Chollas	City of San Diego	City of San Diego	TBD	5504621200	6296685.90186081	1832829.65914690	TBD	0.15	TBD	TBD	TBD
191	SDB - Chollas	City of San Diego	City of San Diego	TBD	5470121200	6290909.84495076	1839813.54623670	TBD	0.08	TBD	TBD	TBD
192	SDB - Chollas	City of San Diego	City of San Diego	TBD	5470121400	6299243.84069348	1839810.88730090	TBD	0.10	TBD	TBD	TBD
193	SDB - Chollas	City of San Diego	City of San Diego	TBD	5512310400	6297335.99113676	1832880.03687609	TBD	0.16	TBD	TBD	TBD
194	SDB - Chollas	City of San Diego	City of San Diego	TBD	5504622600	6296794.27464303	1832787.98765432	TBD	0.02	TBD	TBD	TBD
195	SDB - Chollas	City of San Diego	San Diego Metropolitan Transit Development Board	TBD	5472005100	6301785.18931723	1838231.23654843	TBD	0.11	TBD	TBD	TBD
196	SDB - Chollas	City of San Diego	San Diego Unified School District	TBD	5425630600	6304484.14285500	1840373.79364400	TBD	0.03	TBD	TBD	TBD
197	SDB - Chollas	City of San Diego	City of San Diego	TBD	5470121200	6299146.61929587	1839812.66046346	TBD	0.11	TBD	TBD	TBD
198	SDB - Chollas	City of San Diego	City of San Diego Redevelopment Agency	TBD	5511502700	6299252.52144489	1833095.78860576	TBD	0.01	TBD	TBD	TBD
199	SDB - Chollas	City of San Diego	City of San Diego	TBD	5470121300	6299197.12297393	1839811.85422276	TBD	0.10	TBD	TBD	TBD
200	SDB - Chollas	City of San Diego	San Diego Metropolitan Transit Development Board	TBD	5480601800	6307499.30544722	1838899.18747165	TBD	1.44	TBD	TBD	TBD
201	SDB - Chollas	City of San Diego	City of San Diego	TBD	5407205100	6294490.08010456	1843148.63580247	TBD	0.08	TBD	TBD	TBD
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206	SDB - Chollas	City of San Diego	City of San Diego	TBD	5407203700	6294558.21547283	1843463.31105673	TBD	0.07	TBD	TBD	TBD
207	SDB - Chollas	City of San Diego	City of San Diego	TBD	5461121100	6294992.47599398	1838772.44975536	TBD	0.08	TBD	TBD	TBD
208	SDB - Chollas	City of San Diego	City of San Diego	TBD	5472021500	6313919.14224691	1836859.13217862	TBD	0.03	TBD	TBD	TBD
209	SDB - Chollas	City of San Diego	City of San Diego	TBD	5472702100	6300606.68070509	1837622.94073613	TBD	0.11	TBD	TBD	TBD
210	SDB - Chollas	City of San Diego	City of San Diego	TBD	5450711800	6294573.19613950	1840921.81427015	TBD	0.08	TBD	TBD	TBD
211	SDB - Chollas	City of San Diego	City of San Diego	TBD	5480602800	6308485.16440000	1838707.19957300	TBD	0.14	TBD	TBD	TBD
212	SDB - Chollas	City of San Diego	City of San Diego	TBD	5480901700	6306566.62869910	1838808.76334132	TBD	0.01	TBD	TBD	TBD
213	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	5502313900	6290356.07393988	1833281.64197531	TBD	0.25	TBD	TBD	TBD
214	SDB - Chollas	City of San Diego	City of San Diego	TBD	5450711900	6294534.89664579	1840930.51286765	TBD	0.11	TBD	TBD	TBD
215	SDB - Chollas	City of San Diego	Central San Diego Housing Commission F H A L L C	TBD	5502314000	6290278.21695963	1833282.32549286	TBD	0.25	TBD	TBD	TBD
216	SDB - Chollas	City of San Diego	City of San Diego	TBD	5450713100	6294510.17425550	1840999.80628553	TBD	0.17	TBD	TBD	TBD
217	SDB - Chollas	City of San Diego	San Diego Housing Commission	TBD	5433500600	6309770.97911671	1842964.22574958	TBD	0.21	TBD	TBD	TBD
218	SDB - Chollas	City of San Diego	United States Of America	TBD	5504920300	6290845.96877845	1832148.74171703	TBD	1.05	TBD	TBD	TBD

Public Parcels Identified as Suitable for Further Assessment to Determine Feasibility of Retrofitting

Parcels on this list have been assessed using broad assumptions necessary for computer modeling and were found to be potentially effective as an opportunity for contributing to load reduction goals. Considerable further assessment would be required before determining any of these sites to be viable retrofit. That assessment includes verifying public ownership, determining if land use agreements and financing can be established, assessing feasibility based upon further investigation of physical site constraints at a project design level, and determining that construction and necessary approvals, including approvals from regulatory agencies other than the City of San Diego, can be completed within the time constraints in the Municipal Storm Water Permit that pertain to Alternative Compliance.

219	SDB - Chollas	City of San Diego	City of San Diego	TBD	4538212800	N/A	N/A	TBD	1.24	TBD	TBD	Canyon Site
220	SDB - Chollas	City of San Diego	City of San Diego	TBD	5411900400	N/A	N/A	TBD	0	TBD	TBD	Canyon Site
221	SDB - Chollas	City of San Diego	City of San Diego	TBD	5812001600	N/A	N/A	TBD	5.93	TBD	TBD	Canyon Site
222	SDB - Chollas	City of San Diego	City of San Diego	TBD	5423331600	N/A	N/A	TBD	29.17	TBD	TBD	Canyon Site
223	SDB - Chollas	City of San Diego	City of San Diego	TBD	5410800900	N/A	N/A	TBD	3.51	TBD	TBD	Canyon Site
224	SDB - Chollas	City of San Diego	City of San Diego	TBD	4765810200	N/A	N/A	TBD	5.76	TBD	TBD	Canyon Site
225	SDB - Chollas	City of San Diego	City of San Diego	TBD	5433300800	N/A	N/A	TBD	33.65	TBD	TBD	Canyon Site
226	SDB - Chollas	City of San Diego	City of San Diego	TBD	5395612100	N/A	N/A	TBD	0.54	TBD	TBD	Canyon Site
227	SDB - Chollas	City of San Diego	City of San Diego	TBD	4538010900	N/A	N/A	TBD	0	TBD	TBD	Canyon Site

228	SDB - Chollas	City of San Diego	City of San Diego	TBD	5811903500	N/A	N/A	TBD	2.86	TBD	TBD	Canyon Site

Project Concept for Green Streets Retrofits – Quantity and Location of Suitable City Streets To-Be-Determined												
The City of San Diego is in the process of identifying potential public street locations that could feasibly be retrofitted with Green Infrastructure and provide a meaningful contribution to pollutant load reduction goals. As locations become verified for feasibility and effectiveness, funding mechanisms under an Alternate Compliance program could potentially be used to fill gaps in construction and maintenance funding necessary for the project to go forward. This is pending the ability to establish suitable legal mechanisms and verify that approvals and construction can be completed within the time constraints in the Municipal Storm Water Permit that pertain to Alternative Compliance.												
229	SDB - Chollas	City of San Diego	City of San Diego	TBD	N/A	N/A	N/A	TBD	101.7	TBD	TBD	Green Street TBD

APPENDIX K
San Diego Bay
Watershed Management Area
Water Quality Improvement Plan
—
Monitoring and
Assessment Program

Submitted to the
San Diego Regional Water Quality Control Board
by the San Diego Bay Responsible Parties

June 2015



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Acronyms and Abbreviations

Acronym or Abbreviation	Definition
%	percent
<	less than
µg/L	micrograms per liter
303(d)	Clean Water Act Section 303(d) list of impaired waters
AB	(California) Assembly Bill
AB411	California Assembly Bill 411: Beach Safety Act
ABLM	Ambient Bay and Lagoon Monitoring
Airport Authority	San Diego County Regional Airport Authority
Bacteria TMDL	San Diego Regional Water Quality Control Board Resolution Number R9-2010-0001, <i>Revised TMDL for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)</i>
Bight '08	Southern California Bight Monitoring (2008)
Bight '13	Southern California Bight Monitoring (2013)
BMI	benthic macroinvertebrate
BMP	best management practice
BOD	biological oxygen demand
CIP	Capital Improvement Project
CLRP	Comprehensive Load Reduction Plan
Copermittee	Operator of a municipal separate storm sewer system in San Diego County that is party to the Municipal Permit.
CRAM	California Rapid Assessment Method
CTR	California Toxics Rule
CWA	Clean Water Act

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
DEH	San Diego County Department of Environmental Health
FIB	fecal indicator bacteria
Focused Priority Condition	Focused Priority Water Quality Condition
FY	fiscal year
HA	Hydrologic Area
Highest Priority Condition	Highest Priority Water Quality Condition
HMP	Hydromodification Management Plan
HSA	Hydrologic Sub-Area
HU	Hydrologic Unit
IB	Imperial Beach
IBI	Index of Biological Integrity
IC/ID	illicit connection and/or illicit discharge
IDDE	illicit discharge detection and elimination
IGP	Industrial General Permit
ILACSD	I Love a Clean San Diego
JRMP	Jurisdictional Runoff Management Program (2013 Municipal Permit)
LID	Low-Impact Development
MEP	maximum extent practicable
MLS	mass loading station
MS4	municipal separate storm sewer system
MST	microbial source tracking

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
Municipal Permit	San Diego Regional Water Quality Control Board Order Number R9-2013-0001, <i>National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region</i>
NA	not applicable
NAL	non-storm water action level
NPDES	National Pollutant Discharge Elimination System
O&G	oil and grease
OPP	Office of Pesticide Programs
PGA	pollutant-generating activity
pH	measure of hydrogen ion
PWQC	Priority Water Quality Condition
QA/QC	quality assurance and quality control
QAPP	Quality Assurance Project Plan
REC-1	Contact Water Recreation (beneficial use)
Regional Board	San Diego Regional Water Quality Control Board
RHMP	Regional Harbor Monitoring Program
RP	Responsible Party. Responsible Parties include parties subject to the Bacteria TMDL and participating in this Water Quality Improvement Plan Monitoring and Assessment Program, specifically the Copermitees in the San Diego Bay WMA.
SAL	storm water action level
SCCWRP	Southern California Coastal Water Research Project
Sediment Control Plan	State Water Board's Water Quality Control Plan for Enclosed Bays and Estuaries of California – Part I Sediment Quality

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
SHELL	Shellfish Harvesting (beneficial use)
SISP	Shelter Island Shoreline Park
SIYB	Shelter Island Yacht Basin
SMC	Southern California Stormwater Monitoring Coalition
SQO	California Sediment Quality Objective
SR-MLS	Sweetwater River Mass Loading Station
SSID	stressor/source identification
State	State of California
State Board	State Water Resources Control Board
SWAMP	Surface Water Ambient Monitoring Program
TBD	to be determined
TIE	Toxicity identification evaluation
TMDL	total maximum daily load
TRE	Toxicity reduction evaluation
TWAS	temporary watershed assessment station
USEPA	United States Environmental Protection Agency
WER	Water Effect Ratio
WLA	Waste Load Allocation
WMA	Watershed Management Area
WQBEL	water quality-based effluent limits
WQO	water quality objective
WURMP	Watershed Urban Runoff Management Program

K.1 INTRODUCTION

The San Diego Regional Water Quality Control Board (Regional Board) develops and enforces water quality objectives and implements plans to protect the area's waters. On May 8, 2013, the Regional Board adopted a new Municipal Permit¹ to regulate discharges from Municipal Separate Storm Sewer Systems (MS4s) (Regional Board, 2013). The Municipal Permit established a new, watershed-based approach by which the Copermittees plan and implement storm water programs. The new approach requires that jurisdictions' storm water programs address the priority receiving water conditions, focusing efforts toward measureable improvements in receiving water quality. The San Diego Bay watershed Water Quality Improvement Plan describes the priority conditions and goals to improve water quality, and identifies strategies to be implemented to assist in meeting the goals. The Municipal Permit requires that a Water Quality Improvement Plan be developed for the San Diego Bay Watershed Management Area (WMA). Provision D of the Municipal Permit requires that a Monitoring and Assessment Program be developed as part of the Water Quality Improvement Plan to assess impacts of MS4 discharges on receiving water conditions.

This section provides background information on the Monitoring and Assessment Program, including the purpose, the watershed background, the applicable Copermittees, and the anticipated program schedule. Collection and assessment of monitoring data guide future implementation of management actions by Responsible Parties (RPs) (described in Section 1.3) as part of the Water Quality Improvement Plan process. Monitoring during wet and dry weather is conducted to collect observational and analytical data. These data are used to help RPs determine whether receiving water conditions are improving, degrading, or staying the same.

K.1.1 Purpose of the Monitoring and Assessment Program

Monitoring data collection and assessment provide the vehicle to help the RPs determine whether the goals of the Highest Priority Conditions and Focused Priority Conditions are being met or whether the RPs' programs may need to be adapted to achieve the intended outcomes. RPs assess the data, in combination with their management actions, to determine what actions are improving receiving water conditions and where additional actions are necessary to improve conditions. The Municipal Permit supports this outcome-based approach, as implemented and adapted through the Water Quality Improvement Plan process.

The Monitoring and Assessment Program incorporates requirements of Provision D of the Municipal Permit, along with the specific monitoring and assessment requirements for applicable Total Maximum Daily Loads (TMDLs) listed in Attachment E of the Municipal Permit and specific monitoring for focused priority conditions.

¹ *National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region* (Municipal Permit) (Order Number R9-2013-0001) (Regional Board, 2013).

As stated in Provision D of the Municipal Permit:

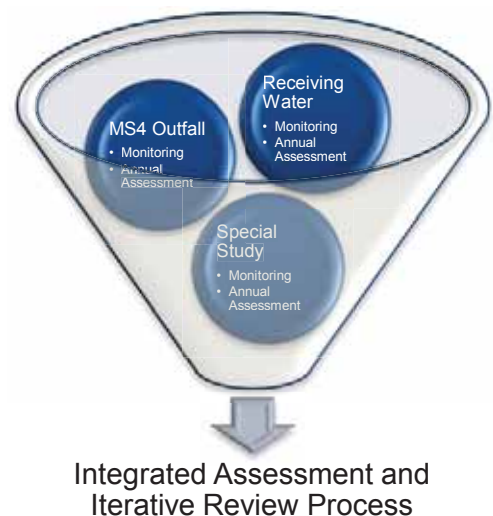
“The purpose of this provision is for the Copermittees to monitor and assess the impact on the conditions of receiving waters caused by discharges from the Copermittees’ MS4s under wet weather and dry weather conditions. The goal of the Monitoring and Assessment Program is to inform the Copermittees about the nexus between the health of receiving waters and the water quality condition of the discharges from their MS4s. This goal will be accomplished through monitoring and assessing the conditions of the receiving waters, discharges from the MS4s, pollutant sources and/or stressors, and effectiveness of the water quality improvement strategies implemented as part of the Water Quality Improvement Plans.”

The RPs in the San Diego Bay WMA have developed an integrated Monitoring and Assessment Program that:

- (1) Measures the progress toward addressing the Highest Priority Conditions and Focused Priority Conditions;
- (2) Assesses the progress toward achieving the Water Quality Improvement Plans numeric goals and schedules; and
- (3) Evaluates each RP’s overall efforts to implement the Water Quality Improvement Plan.

The Monitoring and Assessment Program for the San Diego Bay WMA includes three major monitoring components:

- (1) Receiving water monitoring, which measures the long-term health of the watershed;
- (2) MS4 outfall monitoring, which promotes the elimination of dry weather flows from MS4 outfalls and investigates the improvement of the quality of the flows that exit the MS4 outfalls during rain events; and
- (3) Special studies, which are designed to research regional issues and answer questions specific to Highest and Focused Priority Conditions.



Each of these components has elements that are applicable to the Highest and Focused Priority Conditions in the WMA. The Assessment Program includes an annual analysis of the monitoring data and an integrated analysis that combines all previously performed evaluations at the end of the Municipal Permit term. The program also reviews metrics collected through programmatic assessments and strategic implementation.

K.1.2 Watershed Background

The San Diego Bay WMA encompasses a 444-square-mile area (approximately 284,500 acres) that extends eastward from the San Diego Bay for more than 50 miles to the Laguna Mountains. The WMA ranges in elevation from sea level at San Diego Bay to a maximum elevation of approximately 6,000 feet above sea level at the eastern boundary. Most of the WMA land area lies north of the Tijuana River WMA, south of the San Diego River WMA, west of the Anza Borrego WMA, and east of the Pacific Ocean. The Municipal Permit defines the San Diego Bay WMA as containing three hydrologic units (HUs): (1) the Pueblo San Diego (Pueblo) HU 908, (2) the Sweetwater River (Sweetwater) HU 909, and (3) the Otay River (Otay) HU 910.

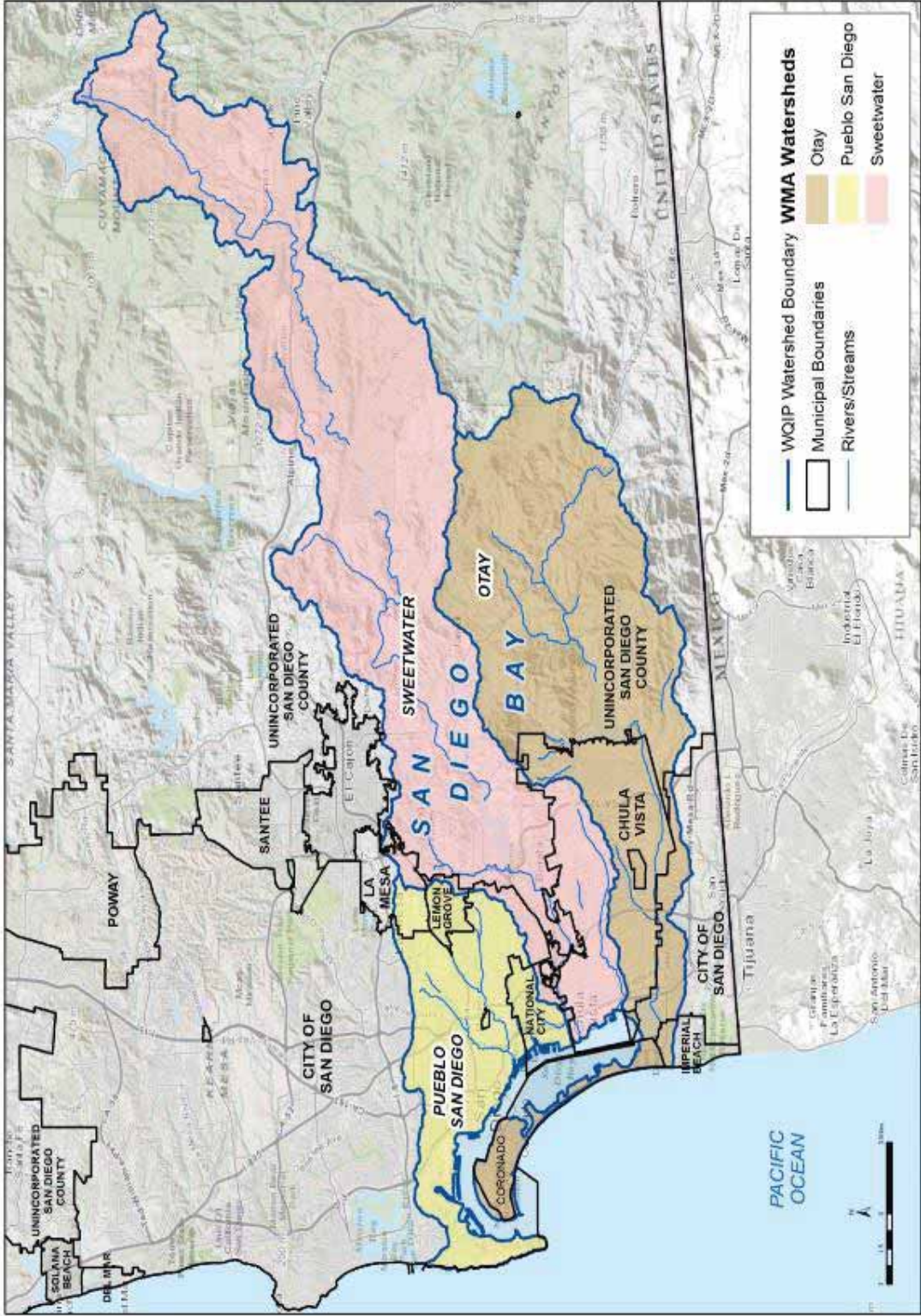
Previous efforts through the Watershed Urban Runoff Management Program (WURMP) focused on watershed collaboration to identify and address Highest and Focused Priority Conditions in the WMA, and to develop and implement activities that include pollutant load reduction and abatement, educational activities, and public participation.

The Municipal Permit continues the watershed-based approach to water quality management by focusing on providing consistent implementation, improving interagency communication and collaboration, and establishing requirements that focus on attaining water quality improvement goals. The emphasis is on watershed quality outcomes rather than fulfillment of prescriptive activities that were required in the previous permit. This approach assesses the WMA in its entirety, as well as at the subwatershed and jurisdictional level. The outcome-based adaptive management process supports the use of scientific tools to answer management questions that lead to implementation actions in the WMA. The goal of the Water Quality Improvement Plan is to reduce pollutants and other stressors from the RPs' MS4 discharges to support the Clean Water Act's objective to protect, preserve, enhance, and restore the water quality and designated beneficial uses of waters of the state.

Figure K1-1 presents the San Diego Bay WMA, along with Highest and Focused Water Priority Conditions.

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Figure K1-1
San Diego Bay WMA



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K.1.3 Responsible Parties

Water Quality Improvement Plan development and implementation is a collaborative effort by all of the RPs. The RPs in the San Diego Bay WMA include the County of San Diego, the San Diego Unified Port District (Port of San Diego), the San Diego County Regional Airport Authority (Airport Authority), and the Cities of Chula Vista, Coronado, Imperial Beach, La Mesa, Lemon Grove, National City, and San Diego. The Copermitees within the San Diego Bay WMA are collectively referred to throughout this document as RPs.

Table K1-1 provides an overview of the three HUs and the jurisdictions within the watershed.

Table K1-1
San Diego Bay WMA Jurisdictional Breakdown (by Hydrologic Area [HA])

RP	San Diego Bay WMA								
	Pueblo			Sweetwater River			Otay River		
	908.1	908.2	908.3	909.1	909.2	909.3	910.1	910.2	910.3
Airport Authority		✓							
Chula Vista				✓				✓	✓
County		✓		✓	✓	✓		✓	✓
Coronado							✓		
Imperial Beach							✓	✓	
La Mesa		✓		✓					
Lemon Grove		✓		✓					
National City			✓	✓					
Port of San Diego	✓	✓	✓	✓			✓		
San Diego	✓	✓	✓	✓				✓	

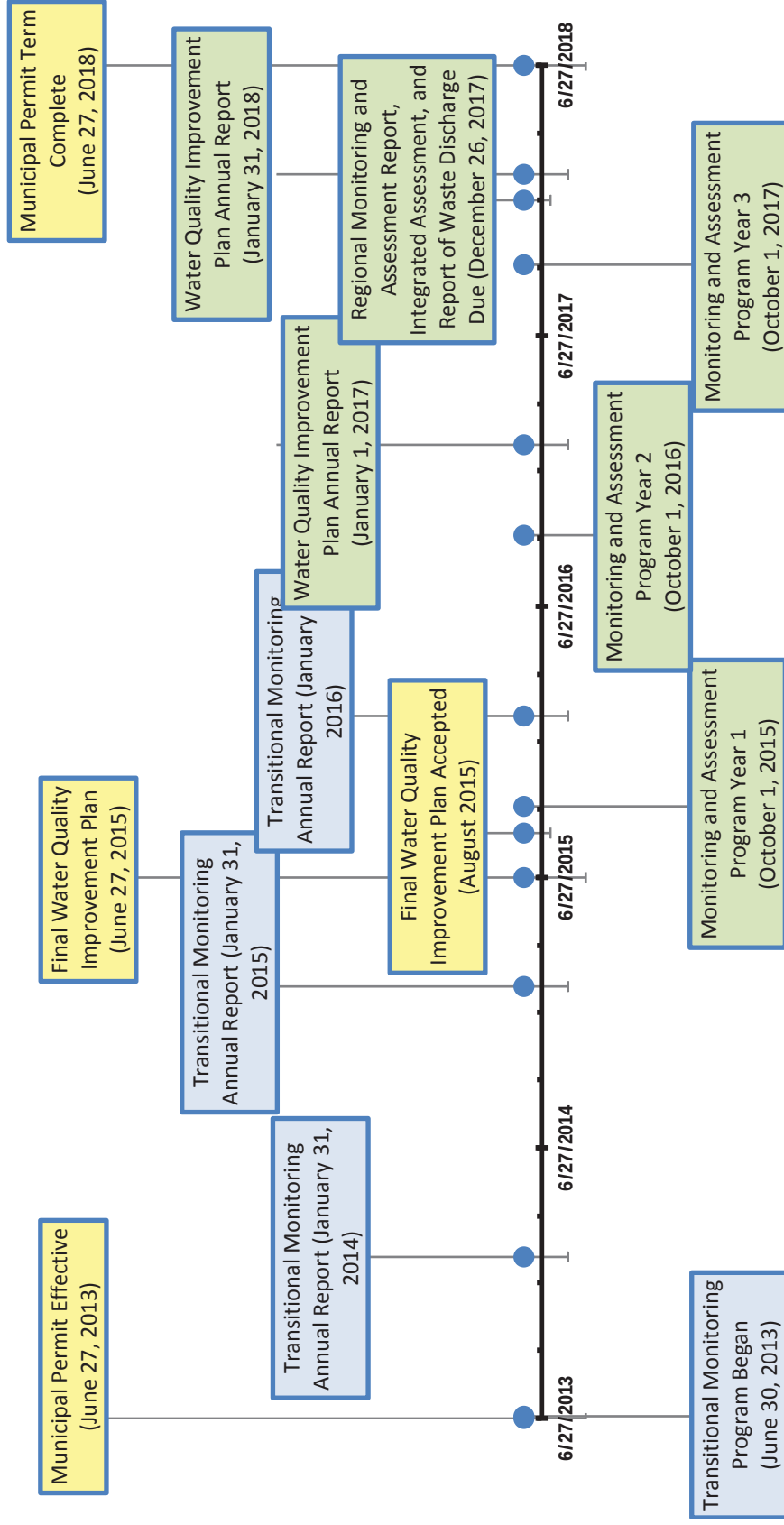
K.1.4 Monitoring and Assessment Program Schedule

The Municipal Permit was adopted in June 2013. Since adoption of the Municipal Permit, the RPs have implemented a regional transitional monitoring program. Per the Municipal Permit, the transitional monitoring program remains in place until Regional Board approval of the Final Water Quality Improvement Plan, which includes a 30-day public comment period. When the Final Water Quality Improvement Plan is approved by the Regional Board, RPs implement the Monitoring and Assessment Program jurisdictionally, on a watershed-wide basis, and regionally, as applicable. Approval of the Final Water Quality Improvement Plan is anticipated in summer 2015. The transitional monitoring program is anticipated to continue until the end of the monitoring year (September 30, 2015). The RPs expect to implement the Monitoring and Assessment Program beginning October 1, 2015.

Annual monitoring assessments are to be included as part of the Water Quality Improvement Plan Annual Report. Six months prior to the end of the Municipal Permit term, the RPs are to submit a regional monitoring and assessment report in collaboration with other Copermitees in the San Diego Region. At the same time, the RPs also submit the Report of Waste Discharge, which includes an integrated assessment of both this Monitoring and Assessment Program and RPs respective Jurisdictional Runoff Management Programs (JRMPs).

Figure K1-2 presents the general program timeline for Monitoring and Assessment, including reporting.

Figure K1-2
Monitoring and Assessment Program Timeline



Note:
Yellow boxes indicate general permit milestones. Blue boxes indicate transitional monitoring milestones. Green boxes indicate monitoring milestones included as part of this Monitoring and Assessment Program.

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K.2 MONITORING APPROACH

K.2.1 General Information on Types of Monitoring

The San Diego Bay Water Quality Improvement Plan Monitoring Program has three major components:

- General permit-required monitoring (monitoring requirements prescribed in Provision D of the Municipal Permit);
- Highest and Focused Priority Condition monitoring (monitoring intended to inform programs and assess progress toward the goals outlined in the Water Quality Improvement Plan Second Interim Deliverable); and
- Additional monitoring (TMDL monitoring, where the TMDL is not a Highest or Focused Priority Condition, and special studies).

Each program component may include various types of monitoring elements, from visual observations used to identify illicit discharges, to flow-weighted composite sample collection. While monitoring may include water sample collection, it may also include other sampling types such as counting the number of trash pieces on a stream bank, collecting sediment or algae grab samples, or measuring physical changes in channel width and depth.

Table K2-1 presents an overview of planned monitoring activities for the San Diego Bay WMA, including key monitoring elements, sampling types, monitoring locations, and monitoring frequency by program. Figure K2-1 presents an overview of the San Diego Bay WMA's various monitoring programs and station locations, including the Long-Term Receiving Water Monitoring, the MS4 Outfall Monitoring, the Highest and Focused Priority Condition programs, and Additional Monitoring Programs.

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Table K2-1
Water Quality Improvement Plan
Monitoring Overview

Monitoring Programs		Weather (Wet or Dry)	Monitoring Elements	Sample Type(s)	Highest or Focused Priority Condition Addressed or Contributed to by Monitoring Program					Permit Schedule ¹					
					Chollas Creek Bacterial/Metals	Airport Metals	Riparian	Physical Aesthetics	Swimmable Waters	2013- 2014	2014- 2015	2015- 2016	2016- 2017	2017- 2018	
General Permit-Required Monitoring															
Receiving Water Monitoring	Long-Term Receiving Water Monitoring	Dry	Chemistry, FIB, toxicity (chronic), visual observations, field measurements	Time-weighted water composite, water grab, visual observations, <i>in-situ</i> measurements	—	—	—	—	—	●	—	—	—	—	
			Trash Assessment	Visual observations, <i>in-situ</i> measurements	—	—	—	✓	—	—	—	—	—		
			Hydromodification (channel conditions, discharge points, habitat integrity, evidence and estimate of erosion and habitat impacts)	Visual observations, <i>in-situ</i> measurements	—	—	—	—	—	●	—	—	—		
			Bioassessment (BMI taxonomy, algae taxonomy, physical habitat characteristics)	Per SWAMP protocols	—	—	—	✓	—	—	●	—	—	—	
			General: chemistry, FIB, toxicity (chronic), field measurements	Flow-weighted water composite	—	—	—	—	—	—	●	—	—	—	
	Regional Monitoring	Dry	Chemistry, toxicity, bioassessment	Visual observations, <i>in-situ</i> measurements	—	—	—	—	✓	—	●	—	—	—	—
			TBD (year 1 was under SMC bioassessment)	Sediment grab, per SWAMP protocols	✓	—	✓	✓	—	✓	—	—	—	—	—
			Stormwater Monitoring Coalition (SMC)	Per SMC Protocols	—	—	✓	✓	—	—	●	TBD	TBD	TBD	TBD

Notes:

AB411 = Assembly Bill 411; BMI = benthic macroinvertebrate; BOD = biological oxygen demand; CRAM = California Rapid Assessment Method; FIB = fecal indicator bacteria; HMP = Hydromodification Monitoring Program; IBI = Index of Biological Integrity; ICID = illicit connection and/or illicit discharge; MST = microbial source tracking; NA = not applicable; O&G = oil and grease; PWOC = Priority Water Quality Condition; RHMP = Regional Harbor Monitoring Program; SMC = Southern California Stormwater Monitoring Coalition; SWAMP = Surface Water Ambient Monitoring Program; TBD = to be determined

- Monitoring has been or will be conducted.
- Monitoring will not be conducted.
- Cells marked as TBD will be determined before the submittal of the full Water Quality Improvement Plan. The TBD has been assigned if the program has not been developed or monitoring plans are not complete.
- The California Assembly Bill 411 (AB411) program monitoring has been conducted for a number of years during the dry season by the County of San Diego Department of Environmental Health will be tracked and incorporated into bacteria-related receiving water assessments. Monitoring under AB411 is not required under Provision D of the Municipal Permit, but bacteria monitoring is required as part of the Bacteria TMDL (Municipal Permit Attachment E.6), AB411 monitoring may be used to augment RP monitoring and will be reviewed as part of the data assessment.
- Conducted under the Ambient Bay and Lagoon Monitoring (ABLM) Program, as part of Bight '13.
- If <125 outfalls, 80% must be monitored twice annually.
- Airport monitoring for metals will be conducted as part of the Industrial General Permit monitoring. Additional constituents are monitored under that program, but only metals is included here because that is the focused priority condition.
- Monitoring is paired. Receiving Water and MS4 Outfall will be monitored the same day.

Table K2-1 (continued)
Water Quality Improvement Plan Monitoring Overview

Monitoring Programs		Weather (Wet or Dry)	Monitoring Elements	Sample Type(s)	Highest or Focused Priority Condition Addressed or Contributed to by Monitoring Program					Permit Schedule ¹				
					Chollas Creek Bacteria/Metals	Airport Metals	Riparian	Physical Aesthetics	Swimmable Waters	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Regional Monitoring (cont.)	Hydromodification Monitoring Program (HMP)	Wet	Rain gauge analysis; stream gauge analysis; channel assessments; flow monitoring; sediment transport monitoring	Visual observations, <i>in-situ</i> measurements	—	—	✓	—	•	•	•	TBD	TBD	
	Sediment Quality Monitoring	Dry	Chemistry, toxicity, bioassessment	Sediment grab, visual observations, <i>in-situ</i> measurements	—	—	✓	—	• ³	•	•	•	•	
Sediment Quality Monitoring	Regional Harbor Monitoring Program (RHMP)	Dry	Field parameters, chemistry, toxicity, bioassessment, trash assessment	Water grab, sediment grab, visual observations, <i>in-situ</i> measurements	✓	—	—	✓	•	—	—	—	—	
	MS4 Field Screening	Dry	Visual: flow condition/estimation, trash, IC/IDs, Station condition descriptions (see Municipal Permit Table D-5)	Visual observations ³	✓	✓	✓	✓	•	•	•	•	•	
MS4 Outfall	MS4 Outfall	Dry	Chemistry, FIB, toxicity (chronic), visual observations, field measurements	Water grab, visual observations, <i>in-situ</i> measurements	✓	✓	✓	✓	•	•	•	•	•	
	MS4 Outfall	Wet	Chemistry, FIB, toxicity (chronic), visual observations, field measurements	Time-weighted or flow-weighted water composite, water grab, visual observations, <i>in-situ</i> measurements	✓	✓	✓	✓	•	•	•	•	•	

Notes:

- AB411 = Assembly Bill 411; BMI = benthic macroinvertebrate; BOD = biological oxygen demand; CRAM = California Rapid Assessment Method; FIB = fecal indicator bacteria; HMP = Hydromodification Monitoring Program; IBI = Index of Biological Integrity; IC/ID = illicit connection and/or illicit discharge; MST = microbial source tracking; NA = not applicable; O&G = oil and grease; PWOC = Priority Water Quality Condition; RHMP = Regional Harbor Monitoring Program; SMC = Southern California Stormwater Monitoring Coalition; SWAMP = Surface Water Ambient Monitoring Program; TBD = to be determined
- Monitoring has been or will be conducted.
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 - Conducted under the Ambient Bay and Lagoon Monitoring (ABLM) Program, as part of Bight¹³.
 - If <125 outfalls, 80% must be monitored twice annually.
 - Airport monitoring for metals will be conducted as part of the Industrial General Permit monitoring. Additional constituents are monitored under that program, but only metals is included here because that is the focused priority condition.
 - Monitoring is paired. Receiving Water and MS4 Outfall will be monitored the same day.

Table K2-1 (continued)
Water Quality Improvement Plan Monitoring Overview

Monitoring Programs		Weather (Wet or Dry)	Monitoring Elements	Sample Type(s)	Highest or Focused Priority Condition Addressed or Contributed to by Monitoring Program					Permit Schedule ¹					
					Chollas Creek Bacteria/Metals	Airport Metals	Riparian	Physical Aesthetics	Swimmable Waters	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	
Highest and Focused Priority Condition Monitoring															
Highest and Focused Priority Condition Monitoring	Highest Priority	Chollas Creek Metals TMDL	Metals (copper, lead, and zinc), pesticides, FIB	Flow-weighted water composite	✓	—	—	—	—	•	•	•	•	•	
		Chollas Creek Bacteria TMDL (part of the 20 Beaches and Creeks TMDL)	Dry	FIB, visual observations, field measurements (optional)	Water grab, visual observations, <i>in-situ</i> measurements	✓	—	—	—	—	•	•	•	•	•
			Wet	FIB, visual observations, field measurements (optional)	Water grab, visual observations, <i>in-situ</i> measurements	✓	—	—	—	—	•	•	•	•	•
	Airport Metals	Dry	Metals (total and dissolved)	Water grab	—	✓	—	—	—	•	•	•	•	•	
		Wet	Metals (total and dissolved)	Flow-weighted water composite, water grab	—	✓	—	—	—	•	•	•	•	•	
	Riparian Area Monitoring – Paradise Creek	Dry	Bioassessment (CRAM)	Water grab, Physical Habitat (pHab), So Cal IBI	—	—	✓	—	—	—	TBD	•	•	•	•
		Physical Aesthetics Monitoring – Sweetwater and Otay ⁶	Dry	Trash Assessment	Visual observations, <i>in-situ</i> measurements	—	—	—	✓	—	—	—	•	•	•
	Wet (Post-storm)		Trash Assessment	Visual observations, <i>in-situ</i> measurements	—	—	—	—	✓	—	—	•	•	•	•
	Swimmable Waters Monitoring – Beaches (Otay River) ⁶		Dry ²	FIB	Water grab	—	—	—	—	✓	•	•	•	•	•
		Wet	FIB	Water grab	—	—	—	—	—	✓	—	•	•	•	•

Notes:

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Table K2-1 (continued)
Water Quality Improvement Plan Monitoring Overview

Monitoring Programs		Weather (Wet or Dry)	Monitoring Elements	Sample Type(s)	Highest or Focused Priority Condition Addressed or Contributed to by Monitoring Program					Permit Schedule ¹				
					Chollas Creek Bacteria/Metals	Airport Metals	Riparian	Physical Aesthetics	Swimmable Waters	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Additional Monitoring Programs														
		See Regional Board Investigative Order No. No. R9-2011-0036.												
Additional TMDL Monitoring	Shelter Island Yacht Basin Dissolved Copper TMDL – Receiving Water Monitoring				✓	✓					•	•	•	•
	Shelter Island Yacht Basin Dissolved Copper TMDL – MS4 Outfall Monitoring	Dry	Dissolved Copper	Water grab, visual observations, <i>in-situ</i> measurements										
		Wet	Dissolved Copper	Time-weighted or flow-weighted water composite, water grab, visual observations, <i>in-situ</i> measurements	✓	✓					•	•	•	•
	Shelter Island Shoreline Park Bacteria TMDL	Dry	FIB	Water grab	–	–	–	–	✓		•	•	•	•
		Wet	FIB	Water grab	–	–	–	–	✓					

Notes:

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Table K2-1 (continued)
Water Quality Improvement Plan Monitoring Overview

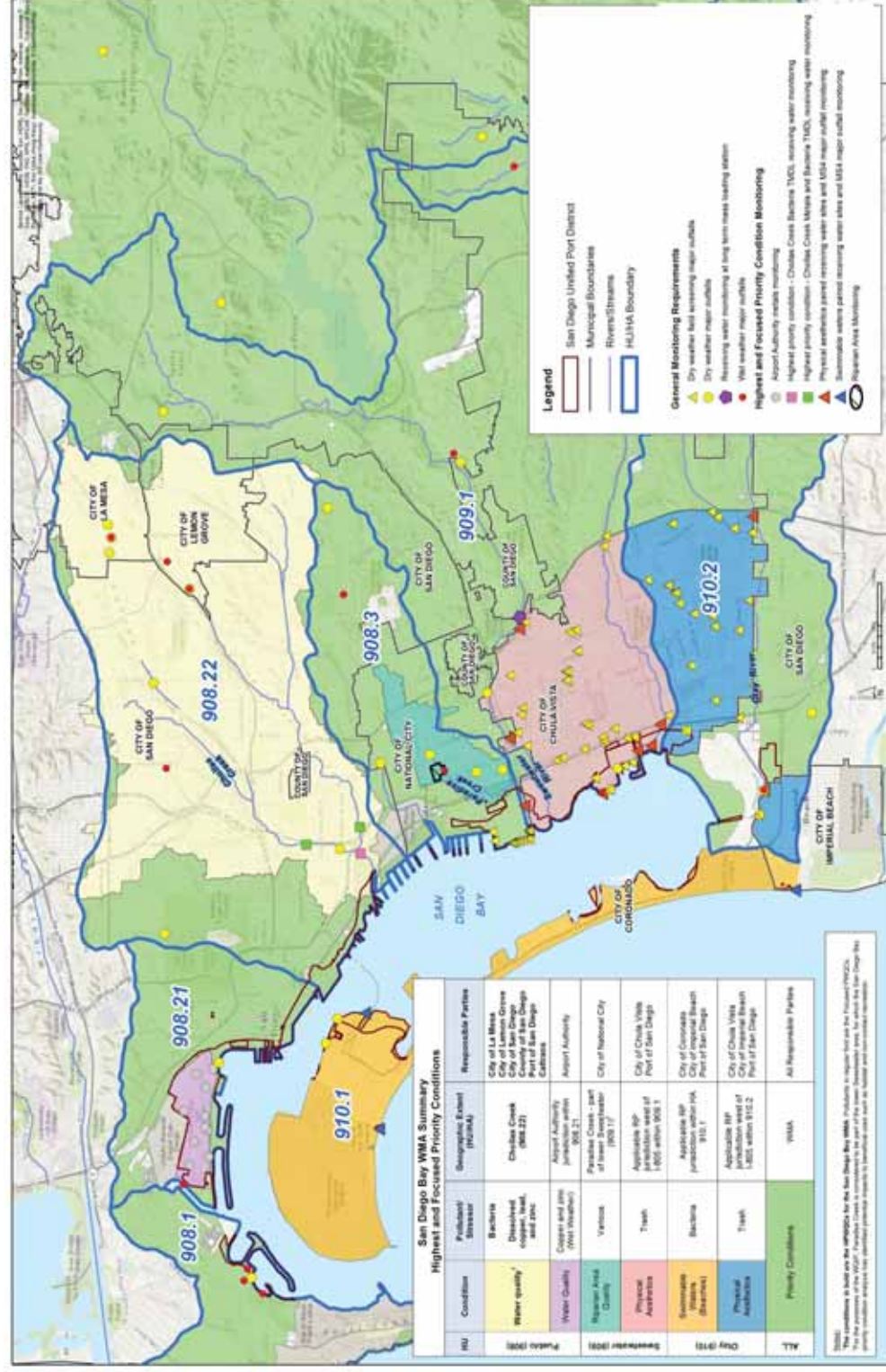
Monitoring Programs		Weather (Wet or Dry)	Monitoring Elements	Sample Type(s)	Highest or Focused Priority Condition Addressed or Contributed to by Monitoring Program					Permit Schedule ¹				
					Chollas Creek Bacteria/Metals	Airport Metals	Riparian	Physical Aesthetics	Swimmable Waters	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Special Study Monitoring and AB411 Monitoring	Regional Special Study	Dry	Chemistry, FIB, instantaneous flow (streams only), bioassessment	Water grab, per SWAMP protocols	✓	—	✓	—	✓	•	—	—	—	—
		Wet	Chemistry, FIB, field measurements, flow and precipitation (duration of storm), Toxicity	Pollutograph water grabs	✓	—	✓	—	✓	•	•	TBD	—	—
	WMA Special Study	Dry	Trash Assessment, pHab	Grab, visual observation	✓	—	✓	✓	✓	TBD	TBD	TBD	TBD	TBD
	Focused Special Study	Dry	Trash Assessment	Grab, visual Observation	✓	—	✓	✓	✓	•	•	•	•	•
	Highest Special Study	Wet	Metals, Pesticides, FIB	Flow-weighted water composites, water grabs	✓	—	—	—	—	•	•	TBD	TBD	TBD
	Beach Water Quality (AB411) ²	Dry	FIB	Water grab	—	—	—	—	✓	•	•	•	•	•
	Focused Priority Special Study	Dry	Metals (selenium)	Water grab	—	—	✓	—	—	•	•	TBD	TBD	TBD
	Wet													

Notes:

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- Airport monitoring for metals will be conducted as part of the Industrial General Permit monitoring. Additional constituents are monitored under that program, but only metals is included here because that is the focused priority condition.
- Monitoring is paired. Receiving Water and MS4 Outfall will be monitored the same day.

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Figure K2-1
Comprehensive Map of San Diego
Bay WMA Monitoring Program



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K.2.2 General Permit-Required Monitoring

The Municipal Permit includes general monitoring requirements that are not directly related to RPs' selected Highest and Focused Priority Conditions. General Municipal Permit-required monitoring is applicable to all Copermitees, regardless of watershed or effective TMDLs. Where overlap is available, general monitoring requirements may be used to fulfill monitoring elements for Highest and Focused Priority Conditions. Upon completion of the transitional monitoring program, which is being implemented until the Water Quality Improvement Plan is approved by the Regional Board, general monitoring requirements applicable to the San Diego Bay WMA include:

- Long-Term Receiving Water Monitoring;
- Regional Monitoring Program Participation, including:
 - Southern California Stormwater Monitoring Coalition (SMC) Regional Monitoring;
 - Southern California Bight Monitoring (Bight '13); and
 - Hydromodification Regional Monitoring Program;
- Sediment Quality Monitoring; and
- MS4 Outfall Monitoring.

Additional information about each monitoring component is provided in Section K.3.

K.2.3 Highest and Focused Priority Condition Monitoring

Monitoring is designed to answer management questions regarding Highest and Focused Priority Conditions. In addition to general permit-required monitoring, RPs monitor receiving waters and the MS4, where applicable, to provide data for assessment of progress toward the goals selected by RPs. Highest and Focused Priority Conditions include:

- Chollas Creek Metals and Bacteria TMDLs (Highest);
- Airport Metals (Focused);
- Riparian Area (Focused);
- Physical Aesthetics –Trash (Focused); and
- Swimmable Waters – Bacteria (Focused).

Additional information about each monitoring component is provided in Section K.4. and Attachment A1.

K.2.4 Additional Monitoring Program Components: Other TMDLs, Special Studies, and AB411 Monitoring

Additional monitoring programs include TMDL compliance monitoring, per Attachment E of the Municipal Permit, and monitoring selected by RPs to collect data for special studies. Additional monitoring addresses both WMA-specific and regional goals, and includes:

- San Diego Regional Reference Streams and Beaches Studies (Regional);
- San Diego Bay Debris Special Study (WMA);
- Jurisdictional Boundary Special Study for Metals, Pesticides, and Bacteria (WMA);
- Riparian Area Special Study (WMA); and
- San Diego County Beach Water Quality (Assembly Bill [AB]411) Monitoring.

Additional information about each monitoring component is provided in Section 5.

K.3 GENERAL PERMIT-REQUIRED MONITORING

This section provides an overview of general monitoring requirements per Provision D of the Municipal Permit. General permit-required monitoring incorporates receiving water and MS4 monitoring, which are monitoring elements common to all Copermittees under the Municipal Permit and, at the same time, may be watershed and jurisdiction specific. The San Diego Bay WMA RPs are required to implement receiving water monitoring at one long-term monitoring station and to participate in certain regional monitoring programs, including, but not limited to, Bight '13 monitoring. Each Copermittee is also required to monitor MS4 outfalls within its jurisdiction in each WMA. This section includes receiving water monitoring and MS4 monitoring required under the Municipal Permit for the San Diego Bay WMA.

K.3.1 Receiving Water Monitoring

The purpose of the receiving water monitoring program is to characterize trends in the chemical, physical, and biological conditions of a receiving water to determine whether beneficial uses are protected, maintained, or enhanced. This program is designed to meet the requirements set forth in Provision D.1 of the Municipal Permit. Long-term monitoring occurs during both wet and dry conditions for water quality and physical and biological integrity, along with sediment quality monitoring, and is part of the continued participation in a regional monitoring program. The Municipal Permit (Attachment E) also stipulates how TMDL monitoring requirements are to be incorporated into the receiving water monitoring program. Receiving water monitoring comprises several types of data collection activities for the San Diego Bay WMA:

- (1) Long-Term Receiving Water Monitoring: includes a broad set of monitoring activities designed to characterize receiving water quality during dry and wet weather at one representative “mass loading station” over an extended (multi-year) time frame, and monitored once during the Municipal Permit term.
- (2) Regional Monitoring Participation: includes continuing participation in regional monitoring programs that are applicable to the San Diego Bay WMA, including the Bight '13 program and SMC Regional Monitoring.
- (3) Sediment Quality Monitoring: involves monitoring of sediments from receiving waters, including San Diego Bay, which is named in the state’s Sediment Control Plan for enclosed bays and estuaries.

The monitoring approach for each of these data collection activities is described below.

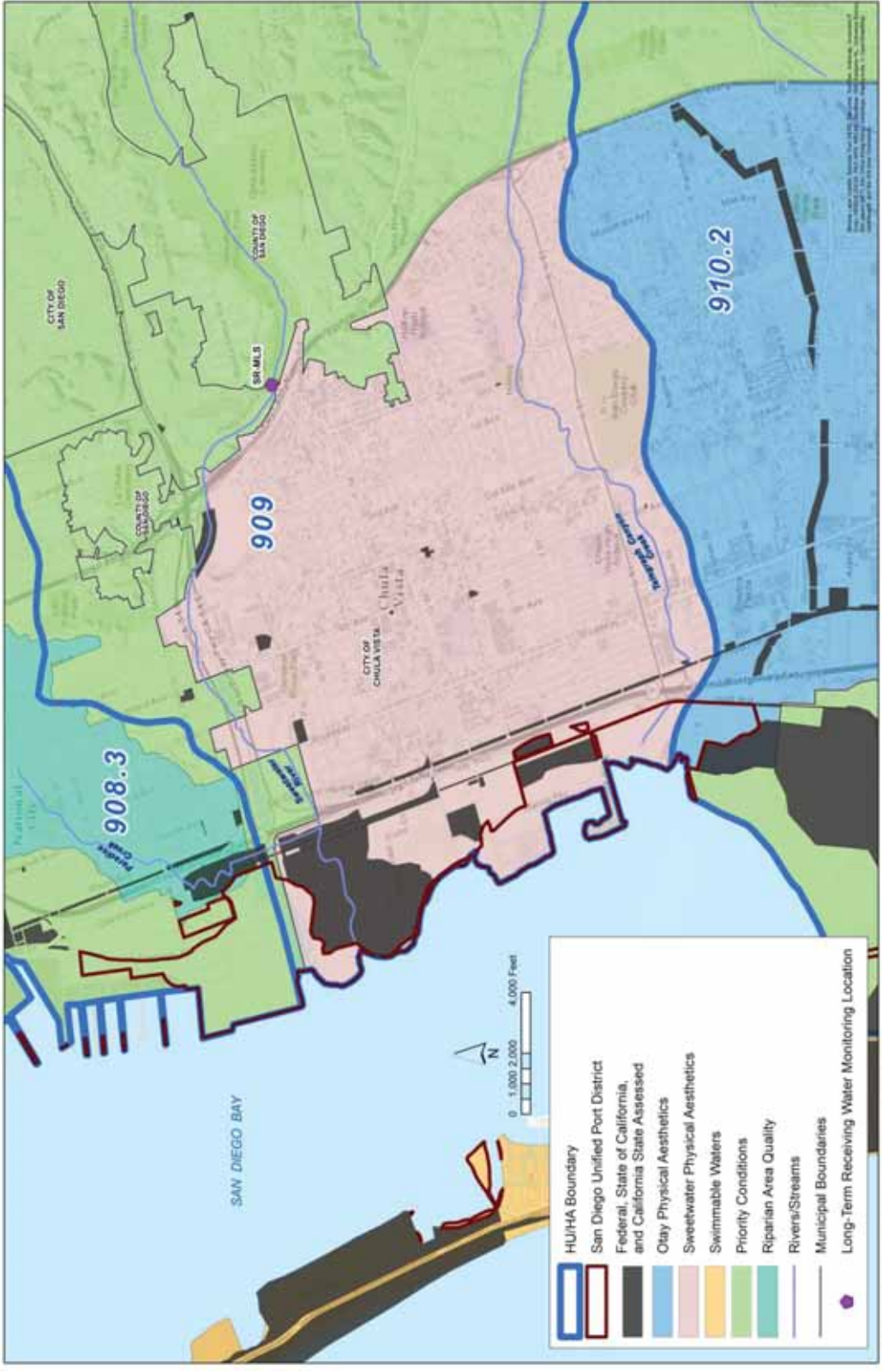
K.3.1.1 Long-Term Receiving Water Monitoring

Dry and wet weather monitoring was performed at the Sweetwater River Mass Loading Station (SR-MLS) under the transitional monitoring program to fulfill the permit requirements for long-term receiving water monitoring in the San Diego Bay WMA. RPs have monitored SR-MLS since 2001. The SR-MLS was selected as the long-term receiving water monitoring station because it is a developing HU and limited data are available, signifying the need for additional data in the Sweetwater HU. Long-term receiving water monitoring tracks the overall health of the receiving water and is designed to answer the following questions:

- Are conditions in the receiving water protective, or likely protective, of beneficial uses?
- What are the extent and magnitude of the current or potential receiving water problems?
- Are the conditions in the receiving water getting better or worse?

SR-MLS was monitored three times during dry weather and three times during wet weather during the current permit cycle. Figure K3-1 presents the location of the SR-MLS monitoring station.

Figure K3-1
Sweetwater MLS Long-Term Receiving
Water Station



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K.3.1.1.1 Dry Weather Receiving Water Monitoring (Municipal Permit Provision D.1.c)

Dry weather monitoring at the SR-MLS comprises three field events per permit term. The dry weather events are spread throughout one year during the Municipal Permit term to the maximum extent practicable as follows:

- Event 1—During dry season (May 1 through September 30),
- Event 2—During wet season (October 1 through April 30)², and
- Event 3—At-large dry weather event.

Dry weather sampling occurs on dry weather days when there is measureable flow at the location. During the wet season, samples are collected after an antecedent dry period of at least 72 hours with less than 0.1 inch of rainfall.

Data collection for each of the three dry weather events includes:

- Field observations (as listed in Municipal Permit Table D-1);
- Field measurements (as listed in Municipal Permit Table D-2);
- Laboratory analytical chemistry (constituents relating to Highest Priority Conditions, Clean Water Act Section 303(d) listings (303(d) list), TMDL Load Reduction Plans, Permit non-storm water action levels [NALs], and constituents listed in Municipal Permit Table D-3); and
- Toxicity testing (chronic testing for three freshwater species for fresh waters and one marine species for salt waters, as listed in Municipal Permit Table D-4).

In addition to water quality monitoring, bioassessment and hydromodification monitoring are also performed at the SR-MLS once each during the Municipal Permit term:

- Bioassessment, including benthic macroinvertebrate taxonomy and calculation of Index of Biological Integrity (IBI), algae taxonomy and calculation of IBI, and physical habitat characterization; and
- Hydromodification monitoring, including observations regarding channel characteristics, discharge points, and habitat integrity, photo documentation of erosion or habitat impacts, measurements of erosion, and identification of known or suspected causes of erosion or habitat impacts.

Attachment A details the monitoring methods, including constituent lists and quality assurance practices for long-term receiving water monitoring.

² Dry weather sample must be preceded by a ≥72-hour antecedent dry period following a rainfall event of >0.1 inch and must occur after the first wet weather event of the season.

K.3.1.1.2 Wet Weather Receiving Water Monitoring (Municipal Permit Provision D.1.d)

Wet weather monitoring has been conducted at the SR-MLS monitoring location during three storm events during one wet season (October 1 to April 30). Storms resulting in greater than 0.1 inch of precipitation are targeted for analysis. The storm events during the permit term are spread throughout the wet season to the maximum extent practicable as follows:

- Event 1—First wet weather event of wet season (October 1—April 30);
- Event 2—Event occurring after February 1; and
- Event 3—Additional wet weather event.

Wet weather sampling occurs on wet weather days when there is measureable flow at the location. Samples are to be collected after an antecedent dry period of 72 hours with greater than 0.1 inch of rainfall.

Data collection for each of the three wet weather events includes:

- Field observations, including description of monitoring station, rainfall parameters, field conditions, flow rates, and presence/assessment of trash;
- Field measurements (as listed in Municipal Permit Table D-2)
- Laboratory analytical chemistry (constituents relating to Highest Priority Conditions, 303(d) listings, TMDL Load Reduction Plans, Permit storm water action lists [SALs], and constituents listed in Municipal Permit Table D-3); and
- Toxicity testing (chronic testing for three freshwater species for fresh waters and one marine species for salt waters, as listed in Municipal Permit Table D-4).

During wet weather events, water samples are analyzed for conventional constituents, nutrients, metals, pesticides, bacteria, field parameters, and toxicity, when applicable, and are collected by flow-weighted composite samples. A flow-weighted composite sample consists of a mixture of constant-volume aliquots collected at variable time intervals. The resulting composite represents the average concentration throughout the hydrograph. Chronic toxicity can be collected by a composite sample or a grab sample, as determined by each jurisdiction.

During each wet weather monitoring event, field observations, including presence/absence of trash and station conditions, are recorded consistently with Table D-2 of the Municipal Permit.

For further details on monitoring methods, please refer to Attachment A.

K.3.1.2 Regional Monitoring Participation

Regional monitoring includes several separate studies to evaluate various aspects of receiving water health on a regional scale. The data may be used by RPs to answer the following questions:

- Are conditions in the receiving water protective, or likely protective, of beneficial uses?
- What are the extent and magnitude of the current or potential receiving water problems?

RPs have and/or will participate in the following regional programs:

- Bight '13

The Bight '13 program is a multi-agency collaborative effort conducted by SCCWRP to assess the ecological condition of the Southern California Bight from a cross-regional perspective. The core program consists of monitoring of sediment chemistry, sediment toxicity, benthic infauna, demersal fish, and epibenthic invertebrates. The goal of the Bight '13 program is to answer three primary questions:

- What are the extent and magnitude of direct impact from contaminants?
- How do the extent and magnitude of the environmental impact vary by habitat?
- What is the trend in the extent and magnitude of direct impacts from contaminants?

- Regional Harbor Monitoring Program (RHMP)

The Regional Harbor Monitoring Program (RHMP) was developed by the Port of San Diego, the City of San Diego, the City of Oceanside, and the County of Orange (RHMP Agencies) in response to a July 24, 2003, request by the Regional Board under §13225 of the California Water Code. The RHMP is a comprehensive effort to survey the general water and sediment quality and condition of aquatic life and to determine whether beneficial uses are being protected and attained in Dana Point Harbor, Oceanside Harbor, Mission Bay, and San Diego Bay. The program is composed of a core monitoring program completed every five years and supplemented with focused special studies. The special studies are determined by assessing the chemical, biological, and toxicological results of the core monitoring program. Compliance with the RHMP goals is accomplished in part through participation in the region-wide Bight '13 monitoring program managed by the Southern California Coastal Water Research Project (SCCWRP).

Sediment and water quality were monitored in San Diego Bay, Mission Bay, Oceanside Harbor, and Dana Point Harbor. The harbors are partitioned into five

strata, composed of freshwater-influenced, shallow, deep, industrial/port, and marina areas. A total of 75 sites were randomly selected among the four harbors, with 15 monitoring stations allotted per stratum. Freshwater-influenced areas in San Diego Bay are located at the mouths of major watersheds, including Sweetwater Channel and Chollas Creek. There were nine freshwater-influenced sites in San Diego Bay during Bight '13. As described in Section 3.1.3, RHMP sediment monitoring data are used to fulfill part of the Municipal Permit's sediment monitoring requirements.

- SMC Regional Monitoring

The Stormwater Monitoring Coalition Stream Survey is a collaborative effort of leading storm water and multiple state, federal, and local regulatory agencies in southern California. In 2009, the SMC began assessing the health of streams in these watersheds by monitoring stream conditions using multiple indicators of ecological health. The initial five-year study documented the condition of perennial wadeable streams in the region and set a baseline for monitoring regional trends.

The Southern California Stream Survey is designed to generate the data to answer three key management questions:

- (1) What is the condition of streams in southern California?
- (2) What stressors are associated with poor condition?
- (3) Are conditions changing over time?

In 2015, a new five-year program extended the initial survey to answer key management questions about the impacts of storm water on stream conditions. The objective is to create a comprehensive monitoring design that integrates many elements of the individualized monitoring programs that currently exist within the region. Through re-allocation of Municipal Permit-required monitoring efforts, this survey is intended to provide valuable data about regional conditions in a cost-effective way. This integrated regional monitoring program is designed to be collaborative, so that each individual program can assess its local geography, and then contribute its portion to the whole region to address large-scale management needs and provide answers to the public about the health of southern California's streams and rivers.

- Hydromodification Regional Monitoring Program

Copermittees have developed a regional Hydromodification Management Plan (HMP) to address impacts to beneficial uses and stream habitat from increased erosive force caused by an increase in runoff discharge rates and volume from all Priority Development Projects (County of San Diego, 2011). Monitoring consists of channel sediment transport assessments, and continuous flow monitoring of pre-project, post-project, and reference conditions.

K.3.1.3 Sediment Quality Monitoring

Sediment quality monitoring is designed to assess compliance with the sediment quality receiving water limits applicable to enclosed bays and estuaries in accordance with the State Water Board's Water Quality Control Plan for Enclosed Bays and Estuaries of California – Part I Sediment Quality (Sediment Control Plan) (State Water Board, 2009). Sediment quality monitoring is performed in compliance with Municipal Permit Provision D.1.e.(2), Sediment Control Plan Section VII.D requires National Pollutant Discharge Elimination System (NPDES) Phase I storm water dischargers to conduct monitoring at least twice per permit term, unless monitoring stations are shown to consistently be unimpacted. Section VII.E provides general guidelines for conducting sediment monitoring, and refers to the specific monitoring parameters and assessments that are required per Sediment Control Plan Section V.

Sediment quality monitoring is performed as part of the Water Quality Improvement Plan in compliance with Municipal Permit Provision D.1.e.(2), which requires preparation of a Sediment Monitoring Plan that satisfies the requirements of the state's Sediment Control Plan, including the following elements:

- (1) The elements required under Sections VII.D and VII.E of the Sediment Control Plan,
- (2) A Quality Assurance Project Plan (QAPP), and
- (3) A schedule for completion of sample collection, analysis, and reporting.

These elements, as well as the details for sediment monitoring methods and protocols, are largely covered in the Sediment Monitoring Plan that was prepared for this purpose by the San Diego Copermittees (Attachment B).

Sediment quality monitoring employs the following general approach to meet the requirements of the Permit:

- (1) Conduct initial monitoring within each qualifying water body per the requirements of the state's Sediment Control Plan. These data are used to assess the degree of potential impact at each site using the California Sediment Quality Objective (SQO) multiple-line-of-evidence approach in accordance with the assessment criteria specified in Sediment Control Plan Section V. These scores are derived using multiple metrics from three key lines of evidence: (1) sediment chemistry data, (2) toxicity data, and (3) benthic community data. Sites are then categorized as un-impacted, likely un-impacted, possibly impacted, likely impacted, or clearly impacted.

- (2) Confirm and characterize pollutant related impacts for any sites that are considered possibly impacted, likely impacted, or clearly impacted, following an integration of all lines of evidence. In accordance with Sediment Control Plan criteria, the data assessment in this phase is required to determine whether the score(s) indicate potential impacts due to toxic pollutants (e.g., freshwater-related contaminant sources from the MS4), or non-toxic pollutants (e.g., physical habitat, freshwater inundation, legacy contaminants, or other potential factors). This phase is considered the first phase of the level stressor/source identification (SSID) based on existing data. The requirements of this phase are dependent on the site as categorized in the previous phase as follows:
 - (a) Stations deemed to be possibly, likely, or clearly impacted based on initial monitoring for which the impact or impairment is determined to likely not be caused or contributed to by MS4 discharges are monitored once more in the current Municipal Permit term. Follow-up monitoring is required to verify the findings from the first round of monitoring.
 - (b) If results from the follow-up monitoring are consistent (possibly impacted), or un-impacted, no additional follow-up is required during the current Municipal Permit term.
 - (c) If the second round of sampling reclassifies the station as likely or clearly impacted, an additional follow-up investigation may be needed or suspended pending future routine SQO monitoring. In this circumstance, results of the analytical assessments are discussed with the Regional Board staff to determine whether/where any SSID studies should be undertaken, and to identify major elements of the approach for any identified studies. Prior to additional investigation, a site-specific Sediment Assessment Work Plan is prepared that outlines specific steps and methodologies to be taken.
 - (d) Stations deemed by assessment to be likely or clearly impacted by MS4 discharges require additional follow-up investigation and this is deemed the first phase of SSID. A site-specific Sediment Assessment Work Plan is prepared that outlines specific steps and methodologies to be taken. Per the Sediment Control Plan, SSID comprises three steps: (1) confirmation and characterization of pollutant impacts, (2) pollutant identification, and (3) source identification and management actions.
- (3) In the annual Sediment Monitoring Report, describe the planned follow-up monitoring, including any planned SSID studies, and revisions the Sediment Monitoring Plan, accordingly.

During the transitional monitoring phase (2013-2015), the RHMP, in coordination with the Bight '13 program, may satisfy all or a portion of the requirements of the state's Sediment Control Plan (adopted in 2009) for monitoring of sediments in San Diego Bay.

There were a total of 60 sediment sampling sites monitored in San Diego Bay as part of the RHMP. Of those, nine were designated as freshwater influenced locations; eight of them were in or near the Sweetwater Channel, and one site was near a storm in the Laurel Hawthorn embayment. According to Municipal Permit Provision D.1.e(2), sediment monitoring is required to assess compliance with sediment quality receiving water limits applicable to MS4 discharges to enclosed bays and estuaries. Therefore, of the RHMP sites monitored, the freshwater-influenced sites are considered most applicable to evaluate or be representative of MS4 discharges. Following completion of RHMP data assessment and reporting, the RPs are to determine whether follow-up monitoring is needed for Bight '13 freshwater-influenced sites or whether additional monitoring locations are needed to improve representation of other areas in San Diego Bay that are influenced by freshwater. For example, the Otay River is a major source of freshwater to south San Diego Bay, but has not been monitored under the regional Bight '08 or Bight '13 programs.³

The analysis is in progress and is focused on the most recent Bight '13/RHMP 2013 "freshwater-influenced" monitoring stations within areas from the Chollas Creek and Sweetwater watersheds in San Diego Bay in 2013 through the RHMP. Additional sediment monitoring data are also available for eight locations in or near Chollas Creek or Sweetwater Channel, and one site located near a stormdrain in the Laurel Hawthorne embayment. These data were collected from prior monitoring programs, including the Southern California Bight Monitoring (2008) (Bight '08)/RHMP efforts in 2008. The RHMP/Bight '08 data are to be used in conjunction with the Bight '13/RHMP 2013 data to assess consistency both temporally and spatially for the same "freshwater-influenced" areas, when possible. Discussions with Regional Board staff are to be held to provide the results of the analytical assessments; determine whether SSID studies should be undertaken, and identify major elements of the approach for any identified studies.

The Sediment Monitoring Plan (Attachment B) is considered to be the template from which modifications are made as the assessment and analytical steps described above are completed. Additions include specifications for monitoring stations and methods reflecting the results of the analytical assessments.

Final quality assurance and quality control (QA/QC) and analysis of the data collected for RHMP in 2013 are currently underway, and thus the data results are not currently available for decision-making purposes. A draft RHMP report containing these results is due to be submitted to the RHMP agencies in the summer of 2015. The schedule of implementation shown in the Sediment Monitoring Plan (Attachment B) reflects the pending data and is to be amended upon completion of the analytical assessments described above to include the planned follow-up monitoring.

³ Additional, more intensive investigative and TMDL-related efforts are ongoing at the mouth of Chollas Creek, one of the major sources of freshwater in San Diego Bay. Additional monitoring of this site through the MS4 Program may be duplicative and thus not warranted depending on the timing of future activities.

K.3.2 MS4 Outfall Monitoring

Section K.3.1 described Municipal Permit requirements for long-term receiving water monitoring. This section describes Municipal Permit requirements for MS4 outfall monitoring. The purpose of the MS4 outfall monitoring program is to evaluate the potential contribution from MS4 discharges to the receiving water quality. This program is designed to meet requirements set forth in Provision D.2 of the Municipal Permit. The MS4 outfall monitoring program has both dry and wet weather monitoring components.

The outfall monitoring program seeks to answer the question:

- Do non-storm water or storm water discharges from the MS4 cause or contribute to receiving water quality problems?

The MS4 Outfall Discharge Monitoring component involves the following types of data collection activities for the San Diego Bay WMA:

- Dry Weather MS4 Outfall Field Screening: involves inspection of major outfalls during dry weather conditions to identify and prioritize persistently flowing outfalls.
- MS4 Outfall Dry Weather Monitoring: monitors up to five persistently flowing outfalls semi-annually by each jurisdiction during dry weather.
- MS4 Outfall Wet Weather Monitoring: monitors one wet weather MS4 outfall discharge monitoring station that is representative of storm water discharges from land uses in the San Diego Bay WMA for each RP annually during the wet season.

The monitoring approach for each of these data collection activities is described below.

Table K3-1 provides the number of major outfalls to be monitored under each component of the MS4 Outfall Monitoring Program by RP. Additional information is available in Attachment A.

**Table K3-1
Number of Major MS4 Outfalls per Jurisdiction**

Jurisdiction	Number of Outfalls		
	Total Major Outfalls for Dry Weather Field Screening	Dry Weather Monitoring (Persistently Flowing Outfalls) ³	Wet Weather Monitoring
Airport Authority ⁴	0 ²	0(0)	0
Chula Vista	184 ¹	5(5)	1
Coronado	7 ²	5(1)	1
Imperial Beach	2 ²	2(2)	1
La Mesa	3 ²	0(0) ⁶	1
Lemon Grove	4 ²	1(1)	1
National City	5 ²	5(5)	1
City of San Diego	502 ⁵	5(5)	1
County of San Diego	57 ²	5(5)	1
Port of San Diego	65 ²	5(2)	1

Notes:

1. For Responsible Parties with fewer than 500 but more than 125 major MS4 outfalls in the watershed, 100% of major outfalls must be screened once per year.
2. For RPs with fewer than 125 major outfalls in the WMA, 80% of total major outfalls presented in the table must be screened twice per year.
3. Parenthesis indicates the number of persistent flowing outfalls monitored under this program. Jurisdictions with less than five persistently flowing outfalls may still monitor five outfalls during dry weather for additional data collection.
4. The Airport Authority has two major outfalls that are tidally influenced and cannot be safely screened or monitored. The nearest safe upstream access points will be screened/monitored as a proxy.
5. The City of San Diego has 502 outfalls within the City jurisdiction. The City of San Diego in accordance with D.2.a(2).(a).(iv) is required to screen 500 sites City wide once per year. The City is not required to screen 500 sites within each watershed.
6. No persistently flowing outfalls have been identified within La Mesa's jurisdiction within the San Diego Bay WMA.

K.3.2.1 Dry Weather MS4 Outfall Field Screening

The purpose of the MS4 Outfall Dry Weather Monitoring Program is to evaluate the potential contribution from MS4 discharges to receiving water quality during dry weather conditions and to effectively eliminate non-storm water discharges. The dry weather MS4 outfall monitoring component has two phases. For the first phase, each RP performs a field screening of a certain number of outfalls, based on the total number of outfalls in its jurisdiction. Using this outfall review, the RPs prioritize the persistently flowing outfalls on the basis of their potential to impact receiving water quality. For the second phase, the highest priority dry weather MS4 outfalls are then monitored, using more in-depth methods than those used in the field screening program.

Dry Weather Field Screening

Field screening consists of visual monitoring of all MS4 outfalls to identify and eliminate sources of persistently flowing non-storm water discharges. Dry weather MS4 outfall discharge field screening is designed to answer the following questions:

- Which non-storm water discharges are transient and which are persistent?
- Which discharges should be investigated as potential illicit connection/illicit discharges?

Each RP continues to perform a field screening of a certain number of outfalls on an annual basis to maintain an up-to-date inventory of persistently flow outfalls and to initiate follow-up IC/ID investigations to identify and possibly mitigate the source(s). The frequency of field screening varies from once to twice per year on a jurisdictional basis and is dependent on the number of major outfalls.

The frequency of field screening is determined on a jurisdictional basis and is dependent on the number of major outfalls. Provision D.2.b(1) of the Municipal Permit outlines three categories as the basis for frequency, as described below:

- For 0-125 major outfalls, 80 percent of major outfalls 2 times per year
- For 125-500 major outfalls, all major outfalls 1 time per year
- For 500+ major outfalls, at least 500 major outfalls 1 time per year

Field screening activities are conducted during dry weather with an antecedent dry period of at least 72 hours with less than 0.1 inch of rainfall. Field observations include flow condition (pooled, ponded, flowing, or no flow), an estimate of flow, characteristics of flow and water, likely source(s), the presence of trash, or evidence or signs of illicit connections or illegal dumping. Follow-up investigations are employed on the basis of jurisdictional illicit connection and/or illicit discharge (IC/ID) programs.

The dry weather outfall screening involves two sets of activities:

- Conduct field inspections, and
- Identify/prioritize persistent non-storm water discharges.

Field Inspections

Based on the jurisdictional inventory of major outfalls, each RP may inspect up to 500 outfalls annually within its jurisdiction, and 80 percent of major outfalls in the San Diego Bay WMA twice a year.

Inspections are performed during dry weather conditions (defined as having an antecedent dry period of at least 72 hours following any storm event producing measurable rainfall greater than 0.1 inch). Visual observations (as listed in Municipal Permit Table D-5) are recorded during inspections.

Identification/Prioritization of Persistent Discharges

Persistent discharges are defined as those with evidence of flow present during three consecutive dry weather inspections.

Persistently flowing discharges are assigned a priority “according to potential threat to receiving water quality” (per Municipal Permit Provision D.4.b.(1)(c)) based on the following criteria:

- Persistent flow (defined as evidence of flow in each of three most recent inspections);
- Representative of discharges to Highest or Focused Priority Condition receiving waters;
- Connectivity/proximity to receiving water;
- Representativeness of urban land uses (commercial, industrial, residential, mixed use); and
- Prior water quality data (especially if NALs are exceeded).

The prioritized list of persistently flowing outfalls is maintained and adjusted as needed on the basis of subsequent inspections and on the results of the dry weather outfall monitoring as described below.

K.3.2.2 MS4 Outfall Dry Weather Monitoring

Each jurisdiction ranked its outfalls independently on the basis of its Highest or Focused Priority Conditions, pollutant-generating activities (PGAs), and available resources. RPs considered the following factors to prioritize persistently flowing outfalls:

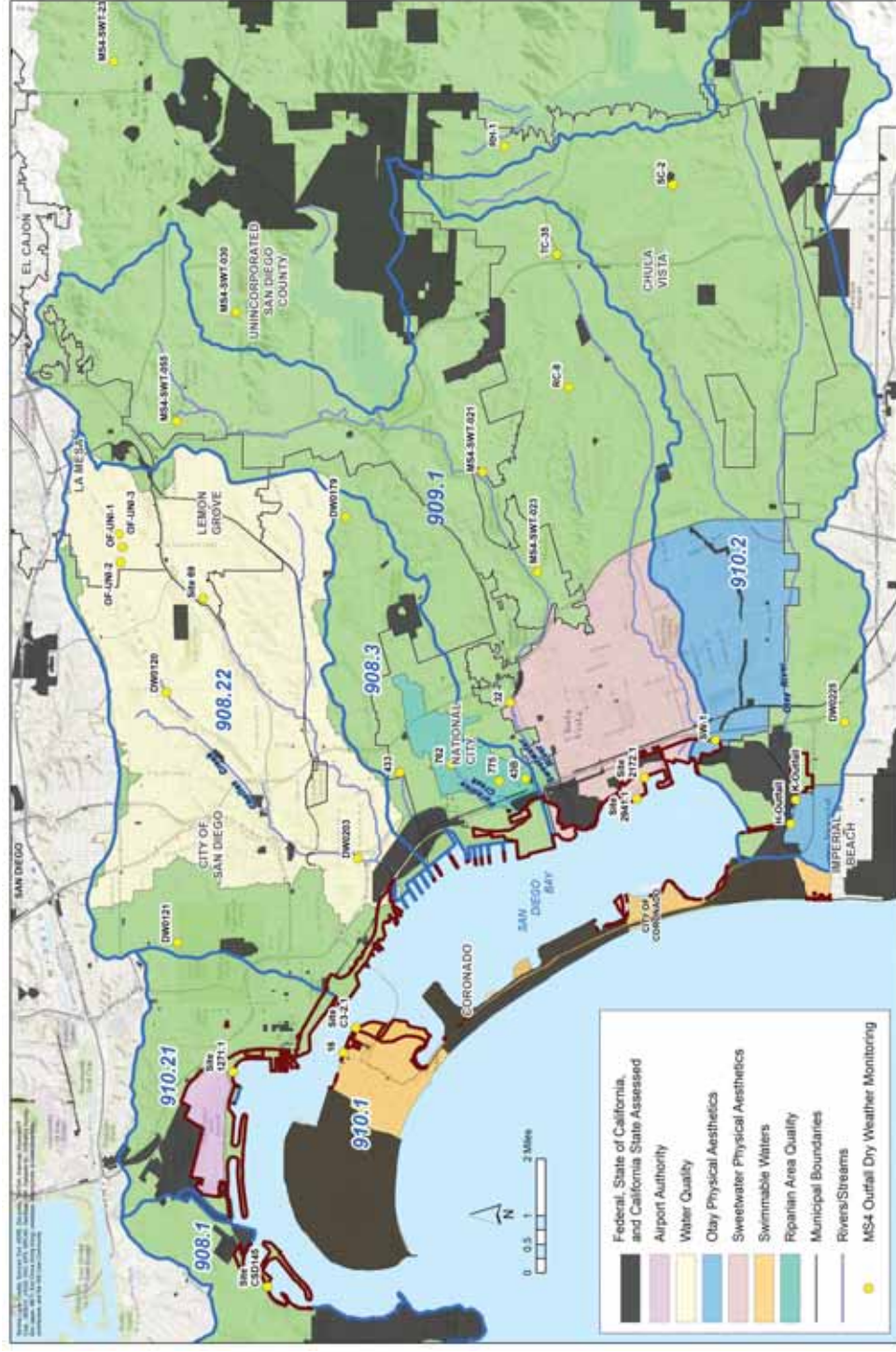
- Potential to contribute to a Highest or Focused Priority Condition,
- Historical monitoring or inspection data,
- Controllability,
- Surrounding land uses/potential sources, and
- Flow rate.

Up to five major outfalls are selected from the prioritized lists of persistent non-storm water discharges generated by each jurisdiction for major outfalls within the San Diego Bay WMA. Where a jurisdiction identifies fewer than five persistently flowing dry weather stations, all of the persistently flowing stations are monitored. Sites to be monitored during dry weather are mapped in Figure K3-2.

Using this prioritized list, Participating Parties focus resources on abating identified sources to mitigate flow at the highest priority locations. Monitoring is performed semi-annually and consists of the following elements:

- Field observations,
- Field measurements, and
- Laboratory analytical chemistry.

Figure K3-2
MS4 Outfall Dry Weather (Persistent)
Monitoring Stations



Note:
No outfalls in the City of La Mesa have persistent flow.
Only 2 of the Ports Outfalls are persistent, but five are monitored.

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K.3.2.3 MS4 Outfall Wet Weather Monitoring

The purpose of this program is to identify pollutants in storm water discharges from the MS4s, guide pollutant source identification efforts, and track progress in achieving the Water Quality Improvement Plan goals. The RPs' locations for the wet weather MS4 outfall discharge monitoring component are chosen to be representative of the residential, commercial, industrial, and mixed-use land uses within the San Diego Bay WMA. These locations are monitored during one storm event annually. The wet weather MS4 outfall discharge monitoring is designed to answer the following questions:

- Do wet weather discharge concentrations at MS4 outfalls meet Municipal Permit action levels?
- What is the relative contribution of MS4 outfalls to priority water quality conditions during wet weather?
- How do representative MS4 outfalls discharge concentrations, loads, and flows change over time?

A total of 10 outfalls are monitored once per year during a storm event with greater than 0.1 inch of rainfall. During each event, observational and hydrologic data are recorded, including duration of the storm, rainfall estimates, and estimated or measured flow rates and volumes. Grab samples are collected to analyze for pH, temperature, specific conductivity, dissolved oxygen, turbidity, hardness, and indicator bacteria. A composite sample must be collected and analyzed for constituents contributing to the Highest or Focused Priority Conditions, 303(d) list impairments, TMDLs, and SALs. When historical data demonstrate or justify that analysis of a constituent is not necessary for a particular waterbody or outfall, then it will be removed from the constituent list.

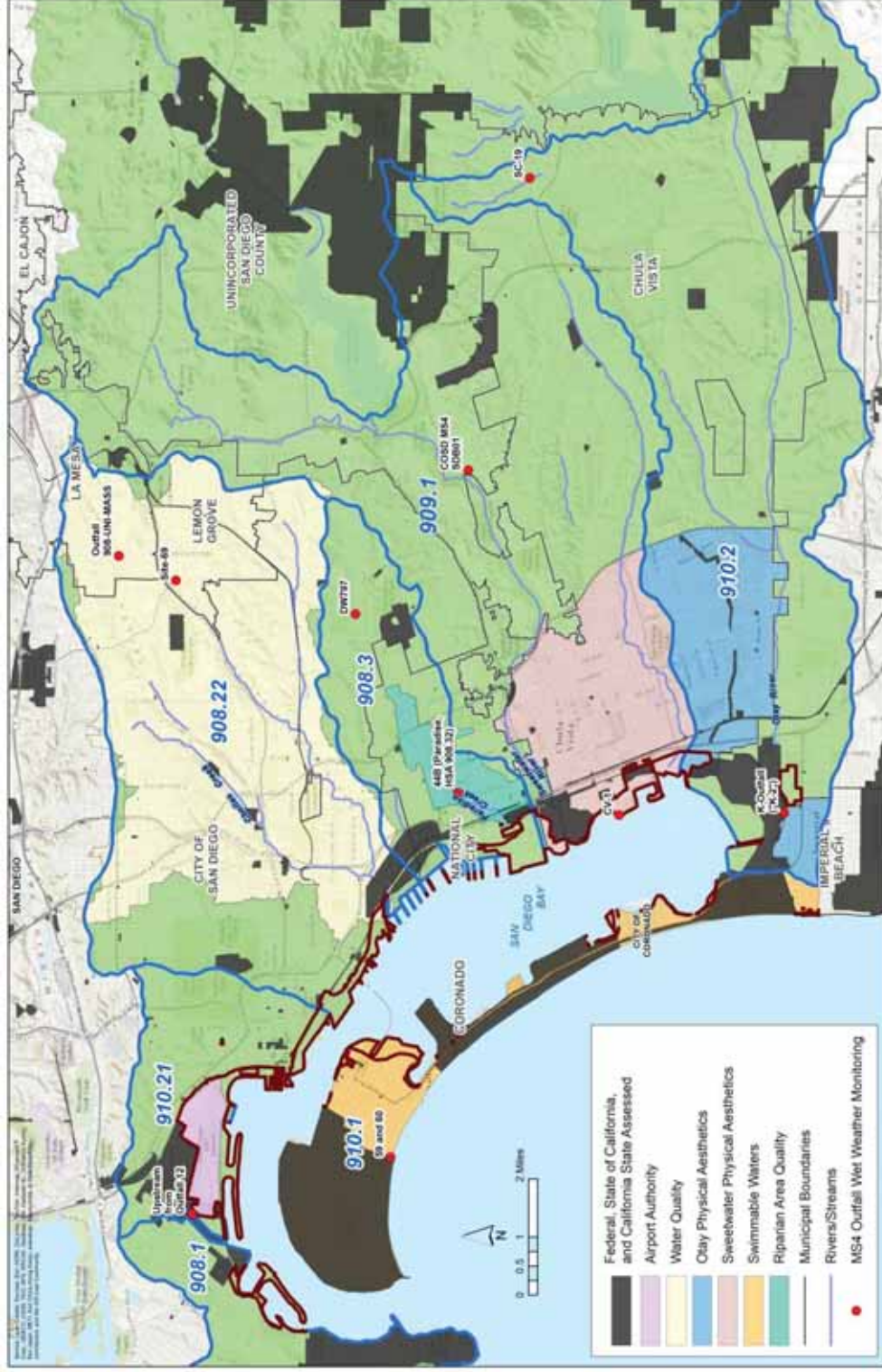
One monitoring event per year is performed during the wet season (October 1–April 30). The following monitoring elements will be included for each site:

- Field observations,
- Field measurements, and
- Laboratory analytical chemistry.

Wet weather MS4 outfall monitoring stations are selected that are representative of storm water discharges from land uses in the San Diego Bay WMA, including at least one wet weather MS4 outfall discharge monitoring station for each RP within the WMA. Sites to be monitored during wet weather are mapped in Figure K3-3.

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Figure K3-3
 MS4 Outfalls Wet Weather Discharge
 Monitoring Stations



Note:
 Outfalls 59 and 60 are co-located in the same headwall.

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K.4 HIGHEST AND FOCUSED PRIORITY CONDITION-SPECIFIC MONITORING

Receiving water monitoring is planned to address Highest and Focused Priority Conditions in the following areas:

- Water quality monitoring for the Highest Priority Condition in accordance with the Chollas Creek TMDLs for metals and bacteria;
- Monitoring for metals at the San Diego International Airport;
- Monitoring to characterize riparian area quality in Paradise Creek, via the California Rapid Assessment Method (CRAM);
- Trash monitoring for physical aesthetics in the Sweetwater and Otay HUs; and
- Bacteria monitoring of swimmable waters in Otay HU.

The monitoring approach for each of these Highest and Focused Priority Conditions is described below.

K.4.1 Chollas Creek Metals and Bacteria TMDLs

The Chollas Creek Metals TMDL is intended to identify and reduce dissolved copper, lead, and zinc in Chollas Creek. The Bacteria TMDL is intended to address levels of indicator bacteria in Chollas Creek. Final TMDL compliance requirements of both TMDLs are intended to be protective of beneficial uses in Chollas Creek. Water quality composite samples are collected for dissolved metals during wet weather at the Chollas Creek mass loading stations (MLSs). Water quality grab samples are collected for indicator bacteria during wet and dry weather at the Chollas Creek MLSs and one tidal location. Receiving water and major outfall monitoring locations are mapped in Figure K4-1.

K.4.1.1 Chollas Bacteria TMDL Receiving Water Monitoring

Dry weather bacteria monitoring occurs weekly during the dry season (April 1 through September 30) and monthly during the wet season at the Chollas Creek MLSs and one tidal location, provided in Table K4-1. Wet weather monitoring is conducted at the Chollas Creek MLSs and one tidal location during up to three storm events of each wet season.

Additional information is available in the Chollas Creek TMDL Monitoring Plan (Attachment C).

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Figure K4-1
 Chollas Creek TMDL Monitoring
 Locations



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**Table K4-1
 Bacteria TMDL Receiving Water Monitoring Stations**

Station Name	Station Type	Waterbody	HU	Latitude	Longitude
SD8(1)	North Chollas Creek MLS	Chollas Creek	Pueblo (908)	32.70493	-117.12132
DPR3	South Chollas Creek MLS	Chollas Creek	Pueblo (908)	32.69130	-117.11682
CTL(1)	Chollas Tidal	Chollas Creek	Pueblo (908)	32.69120	-117.12354

K.4.1.2 Chollas Metals TMDL Receiving Water Monitoring

Chollas Metals TMDL monitoring is conducted annually during wet weather at the Chollas Creek MLSs. Flow-weighted composite samples are collected for copper, lead, and zinc during three wet weather events each year at the Chollas Creek MLS stations provided in Table K4-2.

**Table K4-2
 Chollas Creek Metals TMDL Receiving Water Monitoring Stations**

Station Name	Station Type	Waterbody	HU	Latitude	Longitude
SD8(1)	North Chollas Creek MLS	Chollas Creek	Pueblo (908)	32.70493	-117.12132
DPR3	South Chollas Creek MLS	Chollas Creek	Pueblo (908)	32.69130	-117.11682

Additional Information is available in the Chollas Creek TMDL Monitoring Plan (Attachment C).

K.4.1.3 Outfall Monitoring

The Chollas Creek Bacteria TMDL does not require outfall monitoring at this time. The Chollas Creek Metals TMDL requires outfall monitoring.

Per Municipal Permit Attachment E.4:

“The Responsible Copermittees (City of La Mesa, City of Lemon Grove, City of San Diego, County of San Diego, San Diego Unified Port District) must monitor the effluent of the MS4 outfalls discharging to Chollas Creek for dissolved copper, lead, and zinc, and calculate or estimate the monthly and annual...loads, in accordance with the requirements of Provisions D.2, D.4.b.(1), and D.4.b.(2) of this Order.

...dry and wet weather discharge concentrations may be calculated based on a flow-weighted average across all major MS4 outfalls along a water body segment or within a jurisdiction if samples are collected within a similar time period.”

Time-weighted composite samples are collected for copper, lead, and zinc during one wet weather event annually at the major outfall stations provided in Table K4-3.

**Table K4-3
Chollas Creek Metals TMDL Major Outfall Monitoring Stations**

Jurisdiction ¹	Station Name	HA or HSA	Latitude	Longitude
City of La Mesa	Outfall 908-UNI-MASS	908.22	32.754663	-117.043269
City of Lemon Grove	Site 69	908.22	32.7347	-117.05626
City of San Diego	DW0124	908.22	32.740608	-117.101952

Notes:

HA = Hydrologic Area; HSA = Hydrologic Sub-Area; TBD = to be determined

1. The Port and the County of San Diego do not have any major MS4 outfalls in the Chollas Creek HSA.

Additional Information is available in the Chollas Creek TMDL Monitoring Plan (Attachment C).

K.4.2 Airport Authority Metals Monitoring

Monitoring at the Airport is performed under a monitoring program that was designed to simultaneously comply with both the Industrial general permit and the Municipal Permit. Metals have been and continue to be analyzed as part of the monitoring suite. Prior to July 2015, nine sites were monitored during two storm events each year. However, recent changes to the Industrial General Permit that take effect after July 2015 require that four storm events are to be monitored: two between July and December, and two between January and June. The current sampling site locations are being reevaluated, and final site selection has not yet been completed. The current sampling site locations are presented in Figure K4-2. Additional information is available in Attachment A.

Figure K4-2
 Airport Authority Monitoring
 Locations



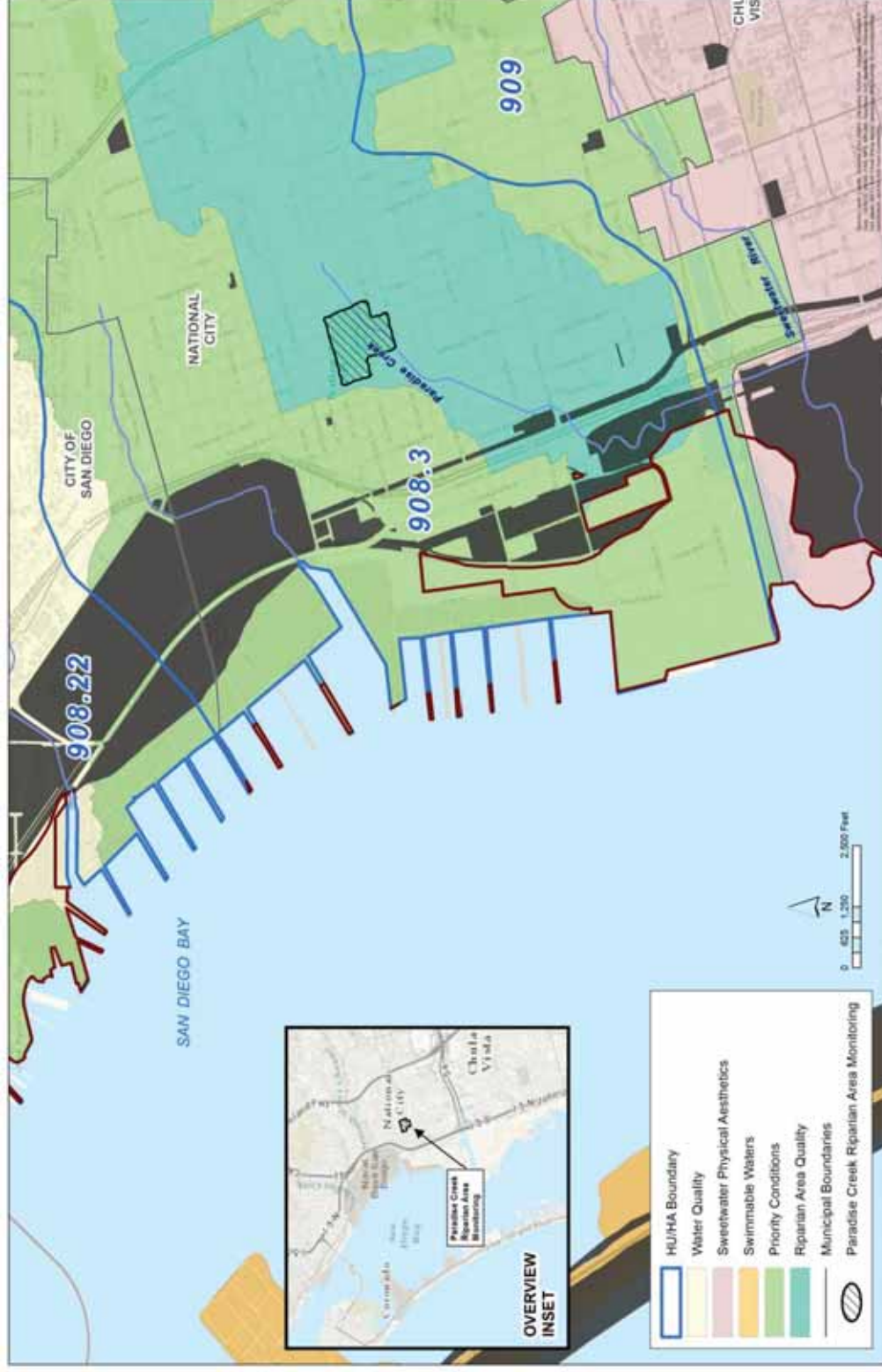
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K.4.3 Paradise Creek – Riparian Area Quality

Riparian area monitoring is performed by the City of National City along the reach of Paradise Creek within Kimball Park. The CRAM is used to assess riparian habitat during three dry weather events during the Municipal Permit term. A map of the monitoring location is presented in Figure K4-3.

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Figure K4-3
Paradise Creek – Riparian Area
Monitoring Location



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K.4.4 Physical Aesthetics – Sweetwater and Otay Rivers

Physical aesthetics is a Focused Priority Condition in the Sweetwater and Otay HUs. Because physical aesthetics monitoring and Focused Priority Condition monitoring are similar in nature, Focused Priority Condition monitoring programs for both HUs are covered in this section. Nine sites are monitored for trash in the Sweetwater HU and three sites are monitored for trash in the Otay HU. Monitoring is conducted during two dry weather events (one dry season [May to September], one wet season [October to April]) and one wet weather event [event within three days following a storm event with at least 0.2 inch of precipitation]) annually.

Table K4-4 presents the RP monitoring approach, frequency, and timing of physical aesthetics monitoring for the San Diego Bay WMA. Additional details are available in Attachment A. Figure K4-4 presents the locations of the monitoring sites.

Table K4-4
Physical Aesthetics (Trash) Monitoring

	Wet Weather Monitoring	Dry Weather Monitoring, Dry Season	Dry Weather Monitoring, Wet Season
Monitoring Approach	- Inspect predetermined transect of 2-25 feet (standard area) from major outfall MS4 sites. - Assess major outfall MS4 site when assessing receiving water	- Inspect predetermined transect of 2-25 feet (standard area) away from major outfall MS4 sites. - Assess major outfall MS4 site when assessing receiving water	- Perform MS4 inspections at 12 locations. - Inspect predetermined transect of 2-25 feet (standard area) away from major outfall MS4 sites. - Assess major outfall MS4 site when assessing receiving water
Frequency (Number of Monitoring Events)	Annually inspect after one wet weather event during wet season	Annual inspection	Annual inspection
Timing of monitoring	Sample within 72 hours of a storm	During dry season (April 1 – October 31)	During dry periods, 72 hours or more after storm event

Trash assessments are conducted visually, using standardized field sheets based on the inspection field sheets used in the San Diego Bay Debris Study (Attachment F) and the Dry Weather Monitoring program (Attachment A). Assessments are included with wet or dry weather receiving water monitoring events for receiving water and major MS4 outfalls. The monitoring locations are receiving waters within 2 to 25 feet of an MS4 outfall. Thus, the site is evaluated as a receiving water/MS4 outfall monitoring location.

Many third-party groups, including San Diego Coastkeeper, I Love a Clean San Diego (ILACSD), and other volunteer agencies, conduct cleanup events and trash assessments in the San Diego Bay WMA. Information collected from these programs, where applicable and collected in accordance with a quality assurance plan, may be used to augment data collected by the RPs.

Figure K4-4
 Physical Aesthetics – Sweetwater and
 Otay Monitoring Locations



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K.4.5 Otay Hydrologic Unit – Swimmable Waters

The following sites are monitored in HA 910.1 for bacteria indicators:

- One site is bay side: Tidelands Park, and
- Two sites are ocean side: North Beach and at Imperial Beach (IB) Pier.

Table K4-5 presents the RP monitoring approach, frequency, and timing of swimmable waters receiving water monitoring for the San Diego Bay WMA, including data to be collected by the RPs in this HA.

**Table K4-5
Swimmable Waters Monitoring Summary**

	Receiving Water Wet Weather Monitoring	Receiving Water Dry Season, Dry Weather Monitoring	Receiving Water Wet weather season, Dry Weather Monitoring	MS4 Monitoring
Monitoring Approach	Monitor at Tidelands Park and North Beach sites	• Tidelands Park and IB Pier¹ sites: Current San Diego County Department of Environmental Health (DEH) sites. (No additional monitoring to be done by RPs at these sites during this period) • North Beach: Past DEH site and City of Coronado's current transitional wet and dry monitoring location and dry weather MS4 major outfall monitoring location	• Expand DEH's dry weather monitoring to occur during the wet weather season. • Monitoring at Tidelands Park and North Beach sites² • IB Pier site¹	• Paired Sampling: Perform MS4 monitoring at all beach sites at same time as monitoring receiving water quality • Sample three wet weather events during wet season at Tidelands Park in conjunction with receiving water, if feasible
Frequency (Number of Monitoring Events)	Annually sample three wet weather events during wet season at Tidelands Park and North Beach sites	• Tidelands Park site: Weekly • North Beach: Past DEH site and City of Coronado's current transitional wet and dry monitoring location and dry weather MS4 major outfall monitoring location	• Monthly at Tidelands Park and North Beach sites² (November 1 – March 31)	Inspect MS4 monthly, year round

Table K4-5 (continued)
Swimmable Waters Monitoring Summary

	Receiving Water Wet Weather Monitoring	Receiving Water Dry Season, Dry Weather Monitoring	Receiving Water Wet weather season, Dry Weather Monitoring	MS4 Monitoring
Timing of monitoring	Sample within 72 hours of a storm (consistent with Bacteria I TMDL ⁴)	During dry weather season (April 1 – October 31)	During dry periods, 72 hours or more after storm event	Take sample at MS4 if there is flow/discharge

Notes:

1. Imperial Beach Pier: The Pacific shoreline of the Coronado HA 910.1 already has an established monitoring plan to assess the receiving water conditions through the South Bay Ocean Outfall Waste Discharge Requirements in Order R9-2014-0071 for the City of San Diego and Order R9-2014-0009 for the International Boundary and Water Commission. These permits establish a joint receiving water monitoring program for the South Bay Ocean Outfall and include weekly surf zone bacteria monitoring at 3 location along the Coronado HA 910.1. These locations include S12 Carnation Ave (Camp Surf), S8 Silver Strand State Beach, and S9 Avenida del Sol (Hotel del Coronado). In addition, the County of San Diego Department of Environmental Health performs AB411 beach water quality monitoring throughout the year for public health along the Pacific shoreline of the Coronado HA 910.1. The existing beach water quality monitoring is sufficient to assess swimmable waters along the Pacific shoreline of the Coronado HA 910.1 and the San Diego Bay WMA Copermittees are to utilize these data for the Water Quality Improvement Plan Monitoring and Assessment Annual Report.

2. South Bay Ocean Outfall Sites: Weekly surf zone bacteria monitoring at three locations along the Coronado HSA 910.1. These locations include S12 Carnation Ave (Camp Surf), S8 Silver Strand State Beach, and S9 Avenida del Sol (Hotel del Coronado).

⁴Regional Board. 2010. *Revised TMDL for Indicator Bacteria, Project I—Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)*. Resolution No. R9-2010-0001. Approved February 10, 2010.

http://www.waterboards.ca.gov/sandiego/water_issues/programs/tmdls/docs/bacteria/updates_022410/2010-0210_Bactil_Resolution&BPA_FINAL.pdf.

RPs utilize existing monitoring samples conducted under the AB411 program to augment sample collection. The existing beach water quality monitoring data are sufficient and are to be used to assess swimmable waters along the Pacific shoreline of the Coronado HSA 910.1. The San Diego Bay RPs are to utilize the data, as well as additional data collected, at the existing monitoring locations for the annual Water Quality Improvement Plan Monitoring and Assessment Report.

The Pacific Ocean shoreline of the Coronado HA 910.1 already has an established monitoring plan to assess the receiving water conditions through the South Bay Ocean Outfall Waste Discharge Requirements in Order R9-2014-0071 for the City of San Diego and Order R9-2014-0009 for the International Boundary and Water Commission. These permits establish a joint receiving water monitoring program for the South Bay Ocean Outfall and include weekly surf zone bacteria monitoring at three locations along the Coronado HSA 910.1. These locations include S12 Carnation Ave (Camp Surf), S8 Silver Strand State Beach, and S9 Avenida del Sol (Hotel del Coronado). In addition, the County of San Diego Department of Environmental Health (DEH) performs AB411 beach water quality monitoring from April 1 through October 31 for public health along the Pacific Ocean shoreline of the Coronado HSA 910.1. The existing beach water quality monitoring data are sufficient to assess swimmable waters along the Pacific shoreline of the Coronado HSA 910.1 and the San Diego Bay WMA RPs utilize this data for the annual Water Quality Improvement Plan Monitoring and Assessment report.

Additional details are available in Attachment A. A map of the monitoring locations is presented in Figure K4-5.

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Figure K4-5
 Swimmable Waters – Otay Monitoring
 Locations



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K.5 ADDITIONAL MONITORING PROGRAMS

Additional monitoring programs included in this section are additional TMDL monitoring programs that were not selected as the Highest Priority Condition and Special Studies required under Municipal Permit Provision D.3 and other pertinent monitoring programs.

K.5.1 TMDLs

The purpose of TMDL monitoring programs is to track progress toward achieving compliance with interim and final numeric targets. Compliance monitoring is designed to meet the receiving water monitoring requirements of the TMDL. TMDL provisions, schedules, and monitoring requirements are provided in Attachment E of the Municipal Permit. Compliance monitoring, including wet and dry weather sampling (as applicable), is conducted each year at the compliance monitoring locations located in the San Diego Bay WMA.

The following San Diego Bay WMA TMDL monitoring programs are included in the Water Quality Improvement Plan:

- Highest Priority Conditions (see Section 4.1)
 - Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (including Chollas Creek). Resolution No. R9-2010-0001 (Chollas Creek Bacteria TMDL);
 - Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek, Tributary to San Diego Bay. Resolution No. R9-2007-0043 (Chollas Creek Metals TMDL);
- Additional TMDLs that require monitoring
 - Total Maximum Daily Load for Dissolved Copper in Shelter Island Yacht Basin, San Diego Bay. Resolution No. R9-2005-0019 (Shelter Island Copper TMDL), discussed in Section 5.1.1;
 - Total Maximum Daily Loads for Indicator Bacteria, Baby Beach in Dana Point Harbor and Shelter Island Shoreline Park (SISP) in San Diego Bay. Resolution No. R9-2002-0123 (Shelter Island Shoreline Park Bacteria TMDL or SISP Bacteria TMDL, discussed in Section 5.1.2); and
 - Total Maximum Daily Loads for Diazinon in Chollas Creek Watershed. Resolution No. R9-2002-0123. (Chollas Creek Diazinon TMDL, discussed in Section 5.2.3).

K.5.1.1 Shelter Island Copper TMDL

The Shelter Island Copper TMDL is intended to identify and implement actions to reduce dissolved copper loads discharging into the Shelter Island Yacht Basin. Final TMDL compliance requirements are intended to be protective of beneficial uses in the San Diego Bay and Shelter Island Yacht Basin (SIYB). Figure K5-1 presents the MS4 Outfall monitoring locations.

Figure K5-1
Shelter Island Copper TMDL MS4
Monitoring Locations



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K.5.1.1.1 Receiving Water Monitoring

As stated in the “*Total Maximum Daily Load for Dissolved Copper in Shelter Island Yacht Basin, San Diego Technical Report*” (Regional Board, 2005), the primary source of copper loading to the SIYB was determined to be passive leaching from boats in the marinas and yacht clubs, and not from MS4 discharges. Receiving water stations are monitored under Investigative Order No. R9-2011-0036 and submitted to the Regional Board by the Port of San Diego in an annual report separate from the Water Quality Improvement Plan Annual Report.

K.5.1.1.2 Outfall Monitoring

The Shelter Island Copper TMDL is intended to identify and implement actions to reduce dissolved copper loads discharging into the Shelter Island Yacht Basin. The Shelter Island Copper TMDL requires outfall monitoring. Per Municipal Permit Attachment E.2,

“The Responsible Copermittee (City of San Diego) must monitor the effluent of its MS4 outfalls for dissolved copper, and calculate or estimate the monthly and annual dissolved copper loads, in accordance with the requirements of Provisions D.2, D.4.b.(1), and D.4.(b)(2).”

Pollutograph samples are collected for copper during three storm events annually at the outfall stations provided in Table K5-1.

**Table K5-1
 Shelter Island Copper TMDL Outfall Monitoring Stations**

Jurisdiction	Station Name	HA or HSA	Latitude	Longitude
City of San Diego	Outfall 1	908.10	32°42'57.71"N	117°14'7.80"W
City of San Diego	Outfall 2	908.10	32°43'14.89"N	117°13'55.80"W
City of San Diego	Outfall 3	908.10	32°43'11.69"N	117°13'45.22"W

Note:

HA = Hydrologic Area; HSA = Hydrologic Sub-Area

Flow monitoring also is conducted during wet weather at Outfall 2. Time-weighted composite samples are collected from Outfall 2 during three dry weather events. Tidal influence, jurisdictional boundaries, and lack of observed dry weather flows prevent the additional monitoring at Outfalls 1 and 3.

Figure K5-1 maps the monitoring locations. Additional Information is available in the City of San Diego's Shelter Island Yacht Basin Dissolved Copper TMDL Monitoring Plan (Attachment D).

K.5.1.2 Shelter Island Shoreline Park Bacteria TMDL

The SISP Bacteria TMDL is intended to address levels of indicator bacteria at the shoreline of San Diego Bay at SISP. Final TMDL compliance requirements are intended to be protective of beneficial uses at SISP.

Analysis of the results of bacteria monitoring done through the County of San Diego DEH under the AB411 program and by the Port of San Diego is intended to assist with final TMDL compliance requirements. The data assist in making a case for the removal of SISP from the 303(d) list. Through the AB411 program, receiving water monitoring is conducted weekly from April through October each year. Receiving water monitoring is also conducted by the Port of San Diego from November through March during dry weather.

In addition, monthly visual observation monitoring of outfalls within the vicinity of SISP beach is conducted during dry weather by the Port of San Diego. Outfall monitoring is conducted at low tide to identify unauthorized discharges of non-storm water to and from the MS4 that may impact receiving water quality. If non-storm water discharges are observed, samples are collected and analyzed to determine whether concentrations of indicator bacteria are elevated above water quality objectives.

Figure K5-2 maps the monitoring locations. Additional information is available in the SISP Bacteria TMDL Monitoring Plan (Attachment E).

K.5.2 Special Studies and AB411 Monitoring

Special studies, per Municipal Permit Provision D.3, are required in the San Diego Bay WMA and regionally. Special studies are selected to further investigate the Highest and Focused Priority Conditions and to meet requirements of Municipal Permit Provision D.3. The special studies include a regional special study and a special study specific to the San Diego Bay WMA, as well as additional studies applicable to the Focused Priority Conditions. RPs participating in the San Diego Bay WMA special studies are presented in Table K5-2.

Figure K5-2
 Shelter Island Shoreline Park
 Monitoring Locations



Note:
 Figure leveraged from SISP Bacteria TMDL Monitoring Plan (Attachment E). Some nearby MS4 drains in the Shelter Island Shoreline Park are visually monitored for flow.

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**Table K5-2
Overview of Special Studies**

RP	Special Study				
	San Diego Regional Reference Streams and Beaches (Regional)	San Diego Bay Debris Study (WMA)	Pueblo-San Diego Hydrologic Unit: Creek Refuse Assessment Program (WMA)	Chollas Jurisdictional Boundary Study (WMA)	Riparian Area Special Study (WMA)
City of Chula Vista	✓	✓			✓
City of Coronado	✓	✓			✓
City of Imperial Beach	✓	✓			✓
City of La Mesa	✓	✓		✓	✓
City of Lemon Grove	✓	✓		✓	✓
City of National City	✓	✓			✓
Port of San Diego	✓	✓			✓
Airport Authority	✓	✓			✓
City of San Diego	✓	✓	✓	✓	✓
County of San Diego	✓	✓			✓

Note:

RPs are required to participate in watershed and regional level special studies, per the Municipal Permit.

K.5.2.1 San Diego Regional Reference Streams and Beaches Studies (Regional Scale)

The San Diego Regional Reference Stream Study serves as the regional special study for the San Diego Bay WMA. The study is currently being conducted by the San Diego and Orange County Copermittees and fulfills the regional special study requirement in Municipal Permit Provision D.3.(a). The goal of this project is to collect the data necessary to derive reasonable and accurate numeric targets for bacteria, nutrients, and heavy metals by referencing natural, local conditions. The study develops numeric targets that account for natural sources to establish the concentrations or loads from streams in a minimally disturbed or reference condition. This study provides a scientific basis for evaluating bacteria compliance levels in the Bacteria TMDL. The results of this study are used to support the forthcoming reopener of the recently adopted Bacteria

TMDL and to support numeric targets in future TMDLs for bacteria, nutrients, and metals.

The San Diego Regional Stream Reference Study addresses the following questions (Southern California Coastal Water Research Project [SCCWRP], 2013):

- How does the Water Quality Objective (WQO) attainment vary between summer dry weather, winter dry weather, and wet weather?
- How does the WQO exceedance frequency vary by hydrologic factors, including:
 - Size of storm (wet weather only)?
 - Discharge flow rate and volume (wet and dry weather)?
 - Beginning versus end of storm season (wet weather only)?
- How does the WQO exceedance frequency vary by input factors such as:
 - Size of catchment?
 - Geology?
- How does the WQO exceedance frequency vary by biotic and abiotic factors, including:
 - Algal cover and/or biofilms?
 - Water quality (temperature, pH, conductivity, dissolved oxygen, total suspended solids concentration)?

A total of six locations have been selected for wet weather monitoring and up to 10 locations were selected for dry weather monitoring. Sites were selected to represent 95 percent undeveloped land uses (reference conditions), two major geologic settings, and the target catchment sizes. Wet weather sampling frequency at the six locations consists of three targeted events throughout the wet season (October 1 through April 31). Dry weather sampling frequency consists of weekly sampling for up to 40 weeks at flowing locations during winter and summer dry weather periods. Dry weather sampling occurs if there has been no measurable rainfall for at least 72 hours.

K.5.2.2 Trash – San Diego Bay Debris Special Study (WMA Scale)

The San Diego Bay Debris Study is a multi-agency project conducted by the SCCWRP that is being leveraged in coordination with several ongoing studies, including the Regional Harbor Monitoring Program, Shallow Water Habitat Bioaccumulation Study, the Bight '13 Debris Survey, and the Stormwater Monitoring Coalition Regional Watershed Monitoring Program. The study is being supported through in-kind services, project-directed contributions from stakeholders, and participation by local volunteers who all have an interest in better understanding trash issues in San Diego Bay and its contributing watersheds.

The San Diego Bay Debris Study is a comprehensive bay-wide study to help managers understand the current extent and magnitude of plastic-based debris accumulation and takes into account seasonal changes to better understand the plastic debris conditions throughout San Diego Bay and its upland contributing areas. The intent of the San Diego Bay Debris Study is to quantify the abundance and amount of plastic debris in a variety of bay habitats, including:

- Open water areas throughout the bay from the north to south side of the bay;
- Enclosed area such as ports and marinas;
- Intertidal areas, including mudflats, salt marshes, sandy beaches, and the protective rip-rap shoring; and
- Upland areas in the contributing riverine habitats.

The goal of the San Diego Bay Debris Study is to develop a baseline trash assessment of the bay habitats that includes identifying the most abundant type of plastic items, evaluating where the plastic accumulates in greatest quantities, evaluating plastic items that are preferentially transported to the bay during wet weather conditions, and determining whether the plastics that reach the open waters of the bay affect fish communities. Attachment F presents the work plan for the study. The general approach adopted for the San Diego Bay Debris Study follows the question-driven approach of the San Diego Region Framework for Monitoring and Assessment. Standard metrics for quantitative and qualitative assessment of trash were identified as part of the study, the anticipated transport mechanism, and potential original source. Standard field assessment methodologies are also established for consistency.

Members of the San Diego Bay Debris Study Work Group are also actively involved in outreach programs to help disadvantaged communities understand the importance of reducing trash in the environment. Through funding provided by the National Science Foundation, members of the Work Group, along with middle school and high school aged volunteer students, are contributing their time and effort to help collect data for this study.

K.5.2.3 Trash – Pueblo San Diego Hydrologic Unit: Creek Refuse Assessment Program Special Study (WMA Scale)

The City of San Diego is conducting a special study to improve identification of trash sources in the Chollas Creek and Paleta Creek watersheds with the intent of guiding future watershed planning efforts and implementing cost-effective best management practices (BMPs) to reduce trash (San Diego Bay Debris Study Workgroup, 2014). The special study comprises a two-tiered approach to identify sources, locate areas that disproportionately accumulated trash, and assess whether watershed locations are showing reductions in trash over time. The first stage of the special study includes a comprehensive and detailed technical evaluation of the existing storm-drain-based Creek Refuse Assessment Program trash data collected from 2007 to 2013. The second stage of the special study includes a comprehensive assessment of the north

and south forks of Chollas Creek to locate areas that disproportionately accumulate trash and identify additional sources.

The goals of the special study are to:

- Identify high-priority sites that accumulate trash disproportionately,
- Prioritize management efforts to target the sources and land uses that generate the most trash, and
- Communicate the successes of the ongoing assessment program and focus management planning on the remaining high-priority areas.

K.5.2.4 Chollas – Jurisdictional Boundary Study (WMA Scale)

The purpose of this special study is to acquire additional data to support TMDL water quality monitoring data in the lower drainages of Chollas Creek for diazinon (per the Chollas Creek Diazinon TMDL), dissolved metals (Chollas Creek Metals TMDL), and Bacteria (Chollas Creek Bacterial TMDL) TMDL compliance programs (State Water Quality Control Board [State Board] Resolution No. R9-2004-0277, Resolution No. R9-2007-004, and Resolution No. R9-2010-0001, respectively). Water quality monitoring is conducted in the north and south forks of Chollas Creek to determine whether a potential pollutant source area can be identified. The data are also used to evaluate and compare the upper drainage area (special study jurisdictional boundaries) with the lower drainage area (compliance MLSs).

As part of the Chollas Creek Comprehensive Load Reduction Plan (CLRP), the Chollas Creek Jurisdictional Boundary Study is an ongoing special study conducted in the two upper-fork drainages of the Chollas Creek HSA near the jurisdictional boundaries of the Cities of San Diego and La Mesa and Cities of San Diego and Lemon Grove. For dissolved metals (copper, lead, and zinc), flow-weighted composite samples and grab samples are collected during two storm events annually. Monitoring is conducted at the downstream jurisdictional boundaries of the City of La Mesa (LM-1) and the City of Lemon Grove (LG-1). Continuous flow data are also collected throughout the wet season. Water quality samples are analyzed for toxicity and dissolved metals, in addition to other constituents, such as diazinon and indicator bacteria. Analytical results are compared with applicable water quality criteria set forth in the approved TMDLs for the Chollas Creek HSA, pesticide criteria of the California Department of Fish and Wildlife and the United States Environmental Protection Agency (USEPA) Office of Pesticide Programs (OPP) Aquatic Life Benchmarks. The Jurisdictional Boundary Study is anticipating completion of data collection during 2014.

K.5.2.5 Riparian Area (WMA Scale)

Paradise Creek is listed on the 2010 Clean Water Act 303(d) list of impaired water bodies with a selenium impairment. The Surface Water Ambient Monitoring Program (SWAMP) data collected in 2005 and 2006 indicated that selenium results exceeded the WQO of 5 micrograms per liter (µg/L) in four of four samples. Beneficial uses of Paradise Creek include warm freshwater habitat, wildlife habitat, and non-contact water recreation. Elevated selenium levels pose a threat to warm freshwater habitat. While no TMDL has been established for Paradise Creek, this water body is of great importance to the City of National City because it runs through the center of the city, directly through Kimball Park at City Hall. Paradise Creek is one of the few urban creeks within the Pueblo San Diego Watershed that has not been completely channelized or undergrounded. Paradise Creek is also a tributary to Paradise Marsh, which is part of the Sweetwater Marsh National Wildlife Refuge.

The objective of Paradise Creek selenium monitoring is to collect additional selenium data in the portion of the creek adjacent to Kimball Park within National City that would support the removal of the selenium 303(d) listing in the future.

The sites selected for monitoring are presented in Table K5-3.

Table K5-3
Paradise Creek Monitoring Locations

Site	Location	Latitude	Longitude
KP-2	Paradise Creek, adjacent to Kimball Park, east of footbridge (approximately 175 feet), within depressed area of channel	32.67036	-117.10223
KP-2.1	Paradise Creek, adjacent to Kimball Park, upstream of Site KP-2	32.67068	-117.10220
KP-2.2	Paradise Creek, adjacent to Kimball Park, upstream of Site KP-2.1	32.66963	-117.10275
KP-3	Paradise Creek, adjacent to Kimball Park, approximately 125 feet west of D Ave parking lot	32.67128	-117.10172
KP-4	Paradise Creek, adjacent to Kimball Park, just downstream of three outlet pipes/culvert (upstream-most point of creek segment)	32.67146	-117.10133

Approximately 50 grab samples were collected by field personnel between January and June 2014, during dry and wet weather, to represent various conditions of the creek. Because four samples collected from Paradise Creek have exceeded the WQO in the past, at least 48 samples must have selenium values below the WQO to remove the Paradise Creek from the 303(d) list, according to the Regional Board's Water Quality Control Policy for Developing California's CWA Section 303(d) list.

K.5.2.6 San Diego County Beach Water Quality (AB411) Monitoring

In 1997, the California State Assembly passed a resolution to amend the state's Health and Safety Code Section 115880, known as Assembly Bill 411 (AB411). AB411 required the testing of the ocean receiving waters adjacent to all public beaches for microbiological contamination, including total coliform, fecal coliform, and *Enterococcus* bacteria. AB411 criteria established a monitoring program whereby receiving waters at public beaches were required to be sampled weekly from April 1 through October 31 within a given calendar year. The purpose of including the AB411 program data in this monitoring and assessment plan is to utilize the data to augment RPs efforts when possible. For example, the AB411 data are directly applicable to the SISF Bacteria TMDL and Swimmable Waters Focused Priority Condition monitoring approach.

San Diego County DEH implements the Beach and Bay Water Quality Monitoring Program to support the statewide program funded by the AB411. The purpose of this monitoring program is to advise the public of potential health risks that could occur with water contact recreation at local beaches. DEH posts a health advisory notice or closes a beach when fecal indicator bacteria (FIB) results are above contact water recreational use (REC-1) water quality standards. There are four AB411 beach monitoring stations in the San Diego Bay WMA.

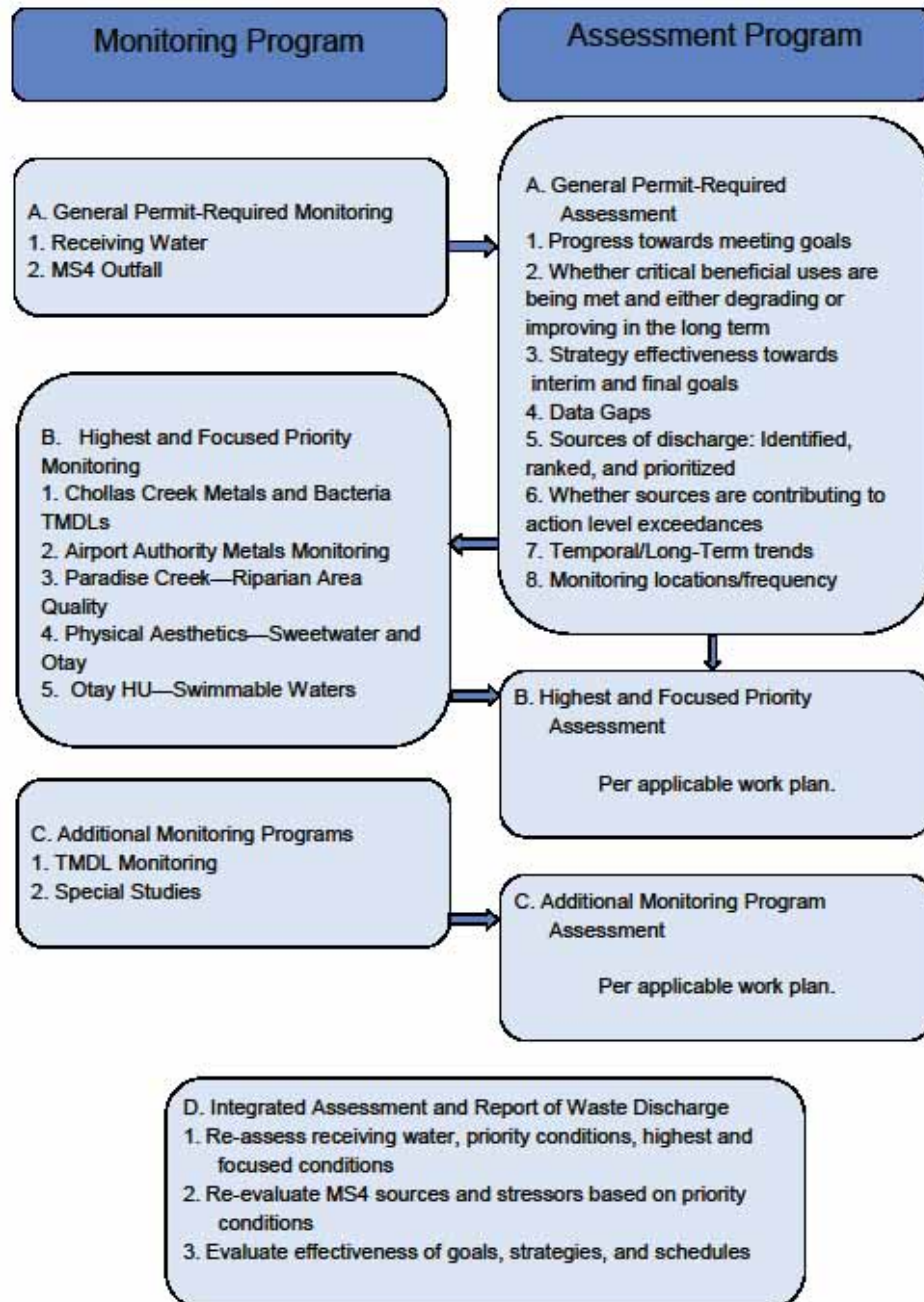
K.6 ASSESSMENT PROCESS AND APPROACH

The assessment portion of the Monitoring and Assessment Program evaluates the data collected under the monitoring programs described in Sections 3 through 5, as well as the information collected as part of the JRMP. The data collected from these programs are used to assess the progress toward achieving the Water Quality Improvement Plan numeric goals and schedules and to measure the progress toward addressing the Highest and Focused Priority Conditions. Programmatic assessment includes:

- General permit-required assessment (assessment requirements prescribed in Provision D of the Municipal Permit),
- Highest and Focused Priority Condition assessment (analysis intended to inform programs and assess progress toward the goals outlined in the Water Quality Improvement Plan Second Interim Deliverable),
- Additional assessment (assessments toward achieving the Waste Load Allocations (WLAs) outlined in applicable TMDLs, where the TMDL is not a Highest or Focused Priority Condition, and special studies assessments); and
- An integrated assessment (an assessment incorporating data collected from the assessments above, requirements as part of the JRMP program(s) under Provision E of the Municipal Permit, and additional regional assessment requirements required under Provision F of the Municipal Permit).

Figure K6-1 presents an overview of the general approach for assessment of monitoring data.

**Figure K6-1
 Monitoring and Assessment Approach**



K.7 GENERAL PERMIT-REQUIRED ASSESSMENT

The Municipal Permit includes general assessment requirements unrelated to RPs' selected Highest and Focused Priority Conditions. General permit-required assessment is applicable to all Copermitees, regardless of watershed or effective TMDLs. General permit-required assessment requirements applicable to the San Diego Bay WMA include:

- Receiving water assessments; and
- MS4 outfall discharge assessments.

K.7.1 Receiving Water Assessment

The receiving water data collected as part of this monitoring and assessment plan are to be assessed in the Report of Waste Discharge. The assessment of receiving waters involves evaluating the physical, chemical, and biological conditions of the receiving waters and sediments. The RPs must assess the status and trends of receiving water quality conditions in coastal waters, enclosed bays, harbors, estuaries, and streams in the San Diego Bay WMA. This includes a review of the following common elements as appropriate for that reporting year, including receiving water monitoring data, Jurisdictional Runoff Management Program data, and other available data.

Prior to completing the assessments, each RP must compile available relevant receiving water and jurisdictional program data, as applicable, in regionally consistent formats to complete the non-storm water discharges reduction assessments including, but not limited to, the following:

Monitoring and Assessment Program Data (Watershed, Regional, and Jurisdictional)	Jurisdictional Runoff Mangement Program Data (Jurisdictional)	Other Relevant Information
• Wet and dry weather chemical, biological, and physical data collected under Long-term receiving water, regional monitoring, sediment monitoring, and focused priority conditions monitoring programs • Other available and relevant wet and dry weather data at receiving water locations collected under programs such as TMDL or special studies • Relevant historical wet and dry weather data at receiving water locations • Follow-up field investigations of source(s) of flow based on receiving water observations and field screening (IDDE) • Reports or notifications of illicit discharges, illicit connections, or other sources of non-storm water from hotlines or other sources • Results of Toxicity Identification Evaluations (TIEs) or Toxicity Reduction Evaluations (TREs), if applicable	• Reports or notifications of illicit discharges, illicit connections, or other sources of non-storm water from hotlines or other sources • Follow-up field investigations of source of flow based on complaints or inspection results • Review of inventories or land use data • Construction, commercial, industrial, municipal, and residential inspections • Outreach programs • Relevant historical records • Capital Improvement Projects (CIPs) • Results of enforcement response, based on Enforcement Response Plans • Review of inventories or land use data • Green infrastructure • Multiuse treatment areas • Water quality improvement BMPs • New jurisdictional ordinances	• New regulations or policies • Basin Plan Amendments • Publicly available data • Scientific studies conducted by outside agencies

Once each RP's jurisdictional data are compiled in regional formats, data are to be compiled for the San Diego Bay WMA for a watershed assessment. Table K7-1 presents the minimum elements to be included in the receiving water quality assessment per Provision D.4.a(2), example evaluation process and suggested output for each element.

Table K7-1
Receiving Water Assessment Evaluation Process and Suggested Outputs

Receiving Water Assessments per Provision D.4.a(2)	Example Process of Evaluation	Suggested Output(s)
Assessment 1: Determine whether or not the conditions of the receiving waters are meeting the numeric goals established pursuant to Provision B.3.a D.4.a(2)(a)	1. Compare water quality data from TMDL compliance locations collected from current and past monitoring years to TMDL interim and final numeric goals 2. Compare MLS data to that of previous years	Categorize goals as met, partially met, or currently not met, or alternative categories more specific to the relevant goal(s)
Assessment 2: Identify the most critical beneficial uses that must be protected to promote the overall health of the receiving water D.4.a(2)(b)	1. Use multiple lines of evidence prioritization methodology from applicable Water Quality Improvement Plan section to evaluate current state of receiving water quality conditions using more recent and updated data, including: a. Compare water quality data from receiving water locations collected from current and past monitoring years to water quality benchmarks. b. Consider publicly available data c. Consider current regulatory drivers d. Evaluate MS4 contribution.	Status of and potential changes to Priority Conditions, High Priority Conditions, and Focused Priority Conditions

Table K7-1 (continued)
Receiving Water Assessment Evaluation Process and Suggested Outputs

Receiving Water Assessments per Provision D.4.a(2)	Example Process of Evaluation	Suggested Output(s)
Assessment 3: Evaluate whether or not the critical beneficial uses from Assessment 2 are being protected D.4.a(2)(c)	1. For Priority Water Quality Conditions and High Priority Water Quality Conditions, compare current and historical data to water quality benchmarks and calculate a frequency of exceedances. (completed as part of Assessment 2. Evaluate seasonal or temporal patterns in available water quality and flow data to determine when those critical beneficial uses are supported or impaired.	Categorize Priority Conditions, High Priority Conditions, and Focused Priority Conditions as protected, likely protected, possibly impacted, likely impacted, or clearly impacted, or alternative categories depending on type of beneficial use.
Assessment 4: Identify short-term or long-term improvements or degradation of those critical beneficial uses D.4.a(2)(d)	1. Compare current and historical data to water quality benchmarks. 2. Calculate a frequency of exceedances for each monitoring year.	Statistical analysis of trends and recommended programmatic changes or enhancements
Assessment 5: Identify data gaps in the monitoring data needed to assess the provisions above D.4.a(2)(e)	1. Review assessment methodology and determine additional data needed to improve evaluation and better characterize general health of beneficial uses.	List of potential modifications to the monitoring, Jurisdictional Runoff Management Plan activities, or strategies

Note:

Regional formats, data evaluation processes, and suggested outputs are provided as an example only and are subject to change on the basis of program refinements and lessons learned from implementation of program elements as part of the adaptive management process.

K.7.2 MS4 Outfall Discharge Assessments

The second assessment to be presented in the Water Quality Improvement Plan Annual Report is the review of the MS4 outfall discharge assessments. This includes evaluating the dry weather field screening, wet and dry weather outfall monitoring data, and data collected under the Jurisdictional Runoff Management Program Illicit Discharge Detection and Elimination (IDDE) program. Details of these separate assessments are provided below. RPs assess their MS4 monitoring programs individually and on a watershed-wide basis annually as part of the San Diego Bay WMA Water Quality Improvement Plan Annual Report.

K.7.2.1 Dry Weather Outfall Assessments / Illicit Discharges

In addition to dry weather outfall field screening and monitoring, each RP must assess and report the progress of its IDDE program (required pursuant to Municipal Permit Provision E.2) toward effectively prohibiting non-storm water and illicit discharges into the MS4s within its jurisdiction. Prior to completing the assessments, each jurisdiction must compile available relevant data, as applicable, in a regionally consistent format to complete the non-storm water discharge reduction assessment including, but not limited to, the following:

Monitoring Data:	JRMP Data:
•Field screening visual observations in per Municipal Permit Provision D.2.a(1) •Non-storm water monitoring, including water quality, observations, field measurements, and flow estimates perMunicipal Permit Provision D.2.a(2) •Relevant historical dry weather data •Reports or notifications of illicit discharges, illicit connections, or other sources of non-storm water from hotlines or other sources •Follow-up field investigations of source of flow •Review of MS4 outfall inventories, drainage areas, or changes in land use	•Reports or notifications of illicit discharges, illicit connections, or other sources of non-storm water from hotlines or other sources •Follow-up field investigations of source of flow or pollutants •Review of MS4 outfall inventories, drainage areas, or changes in land use •Construction, commercial, industrial, municipal, and residential inspections •Enforcement response actions, per the applicable Enforcement Response Plans •Outreach programs •Relevant historical records •Localized or regional structural BMPs contributing to discharge reductions, as applicable

Table K7-2 presents the minimum elements to be included in the non-storm water pollutant discharges reduction assessment per Provision D.4.b(1), example evaluation process, and suggested output for each element.

Table K7-2
Dry Weather MS4 Outfall Assessment Evaluation Process and Suggested Outputs

Non-storm Water Assessments per Provision D.4.b(1)	Example Process of Evaluation	Suggested Output(s)
Assessment 1: Progress toward effectively prohibiting non-storm water and illicit discharges into the MS4 within each jurisdiction D.4.b(1)(c)(i)/ D.4.b(1)(b)	1. Categorize flows as dry, persistent, transient, or undetermined based on historic and current field screening data 2. For transient and persistent flows, identify the known and suspected controllable sources, as feasible, and which sources were reduced or eliminated 3. Based on two previous steps, evaluate any modifications to field screening locations or frequency necessary to identify and eliminate sources of persistent flows. Reprioritization of outfalls may occur if one of the following conditions is met: a. Non-storm water discharges have been effectively eliminated for three consecutive monitoring events or b. Source(s) of the persistent flows have been identified as not an illicit or a source of pollutants or c. Pollutants in the persistent flow do not exceed NALs or d. The threat to water quality has been reduced by the RP	Number of sources reduced and eliminated Updated MS4 outfall inventory to reflect current flow status, outfalls removed or added from field screening program List of programmatic modifications.

Table K7-2 (continued)
Dry Weather MS4 Outfall Assessment Evaluation Process and Suggested Outputs

Non-storm Water Assessments per Provision D.4.b(1)	Example Process of Evaluation	Suggested Output(s)
Assessment 2: Rank and prioritize MS4 outfalls D.4.b(1)(c)(ii)	1. Assess threat to receiving water quality from major MS4 outfalls based on available water quality data. Compare dry weather water quality data to relevant NALs, Highest and Focused Priority Conditions (water quality objectives, 303(d) List or ESAs), and discharge prohibitions, as applicable 2. Identify pollutants from sources or land uses known to exist within the area, drainage basin, or watershed that discharges to the portion of MS4 within its jurisdiction 3. Rank MS4 outfalls according to threat to water quality using the metrics established under the transitional monitoring program	Revised prioritized list of major MS4 outfalls List of modifications to major MS4 outfalls monitored under Provision D.2.b Revised prioritization metrics, as applicable
Assessment 3: Identify known and suspected sources contributing to numeric action limit exceedances at highest-ranked MS4 outfalls D.4.b(1)(c)(iii)	1. Compare dry weather water quality data from major outfalls to relevant NALs (completed in Assessment 2) 2. For those exceeding NALs, use visual observation, inspection data, land use data, complaints, and other reports to identify potential sources in the outfall drainage area.	List of known and suspected sources for each highest-ranked MS4 outfall Summary of NAL exceedances per HU, and applicable follow-up actions List of follow-up actions and whether those actions have resulted in lower pollutant concentrations or identification of confirmed or suspected sources, if data are available Revise internal follow-up procedures, as necessary, to increase effectiveness of follow-up actions as part of adaptive management.

Table K7-2 (continued)
Dry Weather MS4 Outfall Assessment Evaluation Process and Suggested Outputs

Non-storm Water Assessments per Provision D.4.b(1)	Example Process of Evaluation	Suggested Output(s)
Assessment 4: Estimate volumes and loads of non-storm water discharges D.4.b(1)(c)(iv)	1. Compile dry weather water quality and flow data from major MS4 outfalls with persistent flow per jurisdiction. 2. Annual rainfall data representative of the watershed to define wet versus dry days for the monitored year. 3. Calculate or estimate annual non-storm water volume and pollutant loads collectively discharged from each jurisdiction's major MS4 outfalls to receiving waters 4. Estimate the percent contribution from each known source for each MS4 outfall (as identified in Assessment 3). 5. Calculate or estimate annual non-storm water volume and pollutant loads collectively discharged from non-storm water not subject to the RP's legal authority	Total estimated volume or load of non-storm water discharges per jurisdiction and by HU
Assessment 5: Identify data gaps D.4.b(1)(c)(vi)	1. Review assessment methodology and determine additional data needed to improve evaluation and identify and eliminate non-storm water discharges.	List of potential modifications to the monitoring, Jurisdictional Runoff Management Program activities, or strategies

Note:

Regional formats, data evaluation processes, and suggested outputs are provided as an example only and are subject to change based on program refinements and lessons learned from implementation of program elements as part of the adaptive management process.

K.7.2.2 Wet Weather Outfall Assessments / Illicit Discharges

The RPs must assess and report the progress of the water quality improvement strategies implemented as part of the Water Quality Improvement Plan and the Jurisdictional Runoff Management Program toward reducing pollutants in storm water discharges from the MS4s. This is designated as the Wet Weather MS4 Outfall Discharge Monitoring Program.

Table K7-3 presents the minimum elements to be included in storm water pollutant discharges reduction assessment per Municipal Permit Provision D.4.b(2), example process, and suggested outcome for each element.

Prior to completing the assessments, each RP must compile available relevant data, as applicable, in a regionally consistent format to complete the storm water discharge reduction assessments, including, but not limited to, the following:

Monitoring Data:	JRMP Data:
• Storm water monitoring, including water quality, observations, field measurements, and flow estimates per Municipal Permit Provisions D.2.a(3) and D.2.c • Land use data • Reports or notifications of illicit discharges, illicit connections, or other sources of non-storm water from hotlines or other sources • Follow up field investigations of source of flow • Annual WMA rainfall data, if not collected	• reports or notifications of illicit discharges, illicit connections, or other sources of non-storm water from hotlines or other sources • follow-up field investigations of source of flow • review of inventories or land use data • construction, commercial, industrial municipal, and residential inspections • Outreach programs

Table K7-3 presents the minimum elements to be included in the storm water pollutant discharge reduction assessment per Municipal Permit Provision D.4.b(2), example evaluation process, and suggested output for each element.

Table K7-3
Wet Weather MS4 Outfall Assessment Evaluation Process and Suggested Outputs

Storm Water Assessments per Provision D.4.b(2)	Example Process of Evaluation	Suggested Output(s)
Assessment 1: Estimate volumes and loads of storm water discharges D.4.b(2)(b)/ D.4.b(2)(c)(i)	1. Compile wet weather water quality and flow data from monitored outfalls for the monitoring year. 2. Use annual rainfall data representative of the watershed to define wet versus dry days for the monitored year. 3. Calculate or estimate annual non-storm water volume and pollutant loads collectively discharged from each jurisdiction's monitored MS4 outfalls to receiving waters 4. Estimate the percent contribution from each land use type within each hydrologic subarea. 5. Evaluate modifications to wet weather MS4 monitoring locations or frequency necessary to identify pollutants in storm water discharges in the WMA	Total estimated volume or load of non-storm water discharges per jurisdiction and for the San Diego Bay WMA
Assessment 2: Identify known and suspected sources contributing to SAL exceedances at highest-ranked MS4 outfalls D.4.b(2)(c)(ii)	1. Compare wet weather water quality data from major outfalls to relevant SALs 2. For those exceeding SALs, use visual observation, inspection data, land use data, reports to identify potential sources in the outfall drainage area 3. Re-evaluate strategies and update other assumptions under the adaptive management approach	Summary of SAL exceedances per HU, and applicable follow-up actions List of known and suspected wet weather point sources for each highest ranked MS4 outfall, as applicable List of follow-up actions and whether those actions have resulted in lower pollutant concentrations or identification of confirmed or suspected sources, if data are available Revise internal follow-up procedures, as necessary, to increase effectiveness of follow-up actions as part of adaptive management.

Table K7-3 (continued)
Wet Weather MS4 Outfall Assessment Evaluation Process and Suggested Outputs

Storm Water Assessments per Provision D.4.b(2)	Example Process of Evaluation	Suggested Output(s)
Assessment 5: Identify data gaps D.4.b(1)(c)(vi)	1. Review assessment methodology and determine additional data needed to improve evaluation and identify and eliminate non-storm water discharges.	List of potential modifications to the monitoring, Jurisdictional Runoff Management Program activities and response actions, or strategies

K.7.2.3 Report of Waste Discharge Assessment Process

Table K7-4 presents the ROWD Assessment process.

Table K7-4
Report of Waste Discharge Assessment

ROWD Assessments (once per permit term)		Example Process of Evaluation	Suggested Output(s)
Non-storm water Assessments	Assessment 1: Identification of reductions and progress in achieving reduction in non-storm water and illicit discharges in the WMA D.4.b(1)(c)(v)[a]	1. Compile number of sources non-storm water and illicit discharges reduced and eliminated by all jurisdictions in the WMA over the permit term. 2. Assess progress by comparing to previous permit terms.	Percent (%) increase or decrease in number of sources reduced or abated for the entire WMA this permit term
	Assessment 2: Assess effectiveness of strategies toward reducing or eliminating non-storm water and pollutant loads from the MS4 to receiving waters by Jurisdiction D.4.b(1)(c)(v)[b]	1. Compare data from pre- and post- project or focused area to evaluate potential effects of enhanced Water Quality Improvement Plan strategies, as available 2. If possible, estimate the pollutant load reduction attributable to specific water quality strategies.	Summary of pre-project (baseline) data and post-project data Summary of load reductions per jurisdiction by HU for highest and focused priorities List of strategies that may support pollutant load reductions and those that don't, based on data collected
	Assessment 3: Identify modifications necessary to increase the effectiveness of strategies toward reducing or eliminating non-storm water and pollutant loads from the MS4 to receiving waters by Jurisdiction D.4.b(1)(c)(v)[c]	1. Review assessment methodology and determine additional data needed to improve evaluation and identify and eliminate non-storm water discharges.	List of potential modifications to the Monitoring and Assessment Program, Jurisdictional Runoff Management Program activities, or strategies Recommendations for programmatic adjustments of strategies and schedules

Table K7-4 (continued)
Report of Waste Discharge Assessment

ROWD Assessments (once per permit term)		Example Process of Evaluation	Suggested Output(s)
Storm Water Assessments	Assessment 1: Identify reductions and progress in achieving pollutant load reductions from different land uses in the WMA D.4.b(2)(c)(iii)[a]	1. Compile total estimated volume or load of non-storm water discharges by drainage area, land use, or other relevant assessment metric for the WMA over the permit term 2. Assess progress by comparing pollutant loads by land use over a period of three years to determine short-term trends over the five years of implementation.	% allocation of volume or load based on % of land use per HU and by WMA Trend analysis, if sufficient data points are available, based on % allocation of volume or load
	Assessment 2: Identify modifications necessary to increase the effectiveness of strategies toward reducing or eliminating storm water and pollutant loads from the MS4 to receiving waters in the WMA to the maximum extent practicable (MEP) D.4.b(2)(c)(iii)[b]	1. Compare data from pre-post project or focused area to control area to evaluate potential effects of enhanced Water Quality Improvement Plan strategies. 2. If possible, estimate the pollutant load reduction attributable to specific water quality strategies.	Summary of pre-project (baseline) data and post-project data Summary of load reductions per jurisdiction by HU for highest and focused priorities List of strategies that may support pollutant load reductions and those that don't, based on data collected
	Assessment 3: Identify modifications necessary to increase the effectiveness of strategies toward reducing or eliminating non-storm water and pollutant loads from the MS4 to receiving waters by Jurisdiction D.4.b(2)(c)(iii)[c]	1. Review assessment methodology and determine additional data needed to improve evaluation and identify and eliminate non-storm water discharges.	List of potential modifications to the monitoring, Jurisdictional Runoff Management Program activities, or strategies Recommendations for programmatic adjustments of strategies and schedules

K.8 HIGHEST AND FOCUSED PRIORITY CONDITIONS ASSESSMENT

The assessment of additional receiving water and MS4 outfall monitoring data provides an indication of whether the goals associated with Highest and Focused Priority Conditions are being met. Additional monitoring includes:

- Assessment of water quality (metals and bacteria) in Chollas Creek;
- Evaluation of metals at the San Diego International Airport;
- Characterization of riparian area quality in Paradise Creek, via CRAM;
- Assessment of physical aesthetics in the Sweetwater HU and Otay HU via trash monitoring; and
- Assessment of swimmable waters in the Otay HU via bacteria monitoring.

Highest and Focused Priority Conditions have individual assessment metrics, depending on the strategies, that are evaluated in the integrated assessment at the end of the permit term. Additional information on the integrated assessment is available in Section K.10.1.

Standard assessment methods as prescribed by the CRAM and Trash Assessment Methodologies are also used to provide a scientifically based assessment of the quantitative and qualitative data collected. The assessment of the CRAM data includes a review of the riparian buffer zone, local hydrology, physical structure, and biotic structure. The evaluation of the physical aesthetics is based on visual trash assessment data, and includes characterization of trash-generating areas based on land use, source identification and prioritization based on the amount and type of trash, identification of persistent pathways where trash enters creeks, and recommendations for management efforts targeted to reduce trash. The assessment of swimmable waters in the Otay HU includes the comparison of bacteria data with the appropriate water quality objectives and the beach score card metrics that are to be developed.

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K.9 ADDITIONAL PROGRAM ASSESSMENT

K.9.1 TMDL Assessment

TMDL monitoring data for the five TMDLs in the San Diego Bay WMA continue to be evaluated under separate TMDL annual reports because different RPs are involved with different TMDLs. Each TMDL has its own specific assessment requirements that are detailed in the appropriate monitoring plan or Quality Assurance Project Plan.

The annual reporting schedule for the TMDLs is to be modified as needed to allow for the incorporation of the TMDL annual reports into the Water Quality Improvement Plan Annual Report. A summary of the TMDLs is to be incorporated into the main body of the Water Quality Improvement Plan Annual Report. The results of the TMDL monitoring for the Highest Priority Conditions in Chollas Creek are used where appropriate to assess the progress toward achievement of goals and to determine whether the critical beneficial uses are being protected. Over time, the data collected as part of the five TMDL monitoring programs are analyzed to determine whether the strategies established by the Water Quality Improvement Plan are contributing to the achievement of goals. This analysis requires a number of years of data to see the impact of the Water Quality Improvement Plan strategies.

K.9.2 Special Studies Assessments

As part of the Water Quality Improvement Plan Annual Report, the San Diego Bay WMA RPs evaluate the results and findings from the special studies described in their respective attachments. They use the resulting data to (1) assess their relevance to the RPs' characterization of receiving water conditions, (2) understand sources of pollutants and/or stressors, and (3) control and reduce the discharges of pollutants from the MS4 outfalls to receiving waters. As with the other monitoring programs, the results of the special studies assessment may warrant modifications of or updates to the Water Quality Improvement Plan.

The San Diego Bay WMA special studies attempt to answer questions concerning the natural reference concentration of bacteria and other pollutants in the region, analyze area trash levels and jurisdictional loads in relation to the highest priority and perform stream bioassessment using the CRAM method, and evaluate selenium concentrations in the San Diego Bay WMA. The special studies help guide the implementation of the strategies for the Highest and Focused Priority Conditions. Each special study has its own assessment methods and metrics.

Future special studies related to BMP effectiveness that are implemented by the RPs in the San Diego Bay WMA are included in this assessment. RPs may select to report the results of BMP effectiveness studies that are being performed in other WMAs if they relate to the Highest or Focused Priority Conditions and if results are expected to be transferrable to strategies planned for the San Diego Bay WMA.

K.9.2.1 San Diego Regional Reference Streams and Beaches Studies

The Regional Reference Stream and Beach Studies are currently ongoing. The assessment of the study data helps to determine concentration or loads from minimally disturbed or reference conditions. The information provides the basis for reasonable numeric targets that are appropriate for the San Diego region. When the results from this study are finalized and published, they are to be incorporated into the Annual Water Quality Improvement Plan Annual Report as well as the Report of Waste Discharge. The reference area information provides a foundation for the analysis of regional beneficial use attainment.

K.9.2.2 Trash – San Diego Bay Debris Special Study

The goal of the San Diego Bay Debris Study is to develop a baseline trash assessment of the bay habitats that includes identifying the most abundant type of plastic items, evaluating where the plastic accumulates in greatest quantities, evaluating plastic items that are preferentially transported to the bay during wet weather conditions, and determining whether the plastics that reach the open waters of the bay affect fish communities. By measuring the types of debris that are present during dry weather and preferentially transported to the bay during wet weather, the San Diego Bay Debris Study provides the opportunity to better target management decisions on the most important types of plastics.

The analysis of the overall plastic debris quantities is an important component for establishing a benchmark of the most abundant types of plastic and being able to measure changes in the plastics quantities over time. The plastics data that are to be collected for the San Diego Bay Debris Study include a substantially expanded list of items beyond the data collected during previous SMC and Bight '08 regional monitoring programs to capture a greater level of detail about the most prevalent types of plastic items.

The intent of the San Diego Bay Debris Study is to quantify the abundance and amount of plastic debris in a variety of bay habitats, including:

- Open water areas throughout the bay from the north to south side of the bay;
- Enclosed area such as ports and marinas;
- Intertidal areas, including mudflats, salt marshes, sandy beaches, and the protective rip-rap shoring; and
- Upland areas in the contributing riverine habitats.

The primary data analyses that are to be performed to answer the study questions include the following:

- (1) How do the quantities and types of debris in different habitats vary during dry and wet season?
 - (a) What are the quantities and types of debris found in San Diego Bay habitats?
 - (b) What are the quantities and types of debris found in watersheds flowing to San Diego Bay?
 - (c) How do the quantities and types of trash in different San Diego Bay habitats vary by summer and winter dry season?
 - (d) What are the quantities and types of trash in San Diego Bay following the first storms of the wet season?
- (2) What types of riverine debris do wet weather flows transport to the bay?
- (3) What species caught in the bay has ingested plastic pieces?

The general approach adopted for the San Diego Bay Debris Study follows the question-driven approach of the San Diego Region Framework for Monitoring and Assessment.

K.9.2.3 Trash – Pueblo San Diego HU: Creek Refuse Assessment Program Special Study

The analyses of the Pueblo San Diego Hydrologic Unit data provide an opportunity to improve the characterization of site conditions, assess land use contributions, better describe important trash sources, and evaluate the general extent to which sites are showing trash decreases over time. The results are also intended to prioritize the trash conditions to help identify the important sources and pathways of the most abundant types of trash among the land use categories that have the largest amount of trash.

The assessment approach for the trash data included six components as follows:

- (1) Evaluating volumes of various types of trash (food packaging, household items, etc.) to identify the most abundant types of trash;
- (2) Evaluating the overall extent of site conditions and determining the trash volumes in each condition rating category;
- (3) Calculating mean trash volumes and mapping the geographic distribution of the sites to identify locations that accumulate large amounts of trash;
- (4) Evaluating the overall trash volumes among various land use and demographic categories to determine association between land scale attributes and sites containing large amounts of trash;

- (5) Characterizing additional sources and pathways for trash; and
- (6) Evaluating which sites have trash (presence/absence) to determine the proportion of the overall number of sites that may need further management.

K.9.2.4 Chollas – Jurisdictional Boundary Study for Metals and Bacteria

The Chollas Jurisdictional Boundary Study has been ongoing since 2012. The study is designed to characterize the upper drainage areas (special study sites) in relation to the lower drainage areas (which comprise the Chollas Metals and Bacteria TMDL compliance sites). Results from the two drainage areas are to be compared with the California Toxics Rule (CTR) objectives for dissolved metals through application of both default and site-specific Water Effect Ratios (WERs). The study is designed to fill data gaps regarding priority water problems and potential pollutant sources in the Chollas Creek HSA. Further analysis under the Water Quality Improvement Plan monitoring program allows refinement of previous findings and helps to identify and prioritize problem drainage areas.

K.9.2.5 Riparian Area

The Paradise Creek Selenium Special Study is ongoing. The assessment of the study data helps to determine whether removal of selenium in Paradise Creek from the 303(d) list is appropriate. The selenium 303(d) listing is associated with an impairment to warm freshwater habitat beneficial use. The information collected in the special study will provide the required data set for a delisting analysis for selenium. When the results from this study are finalized and published, they will be incorporated into the Water Quality Improvement Plan Annual Report and the Report of Waste Discharge.

K.9.3 Data Gaps

During the development of the Priority Conditions, Sources, and Potential Strategies of the Water Quality Improvement Plan, the RPs identified data gaps in either receiving water or MS4 data related to the priority water quality conditions in the San Diego Bay WMA. This Monitoring and Assessment Program begins to address a number of these data gaps, as described in Table K9-1 below. As part of the iterative process, the priorities of the various water quality will be re-evaluated as the data gaps are filled, and may be elevated or demoted as the data indicate.

**Table K9-1
Data Gaps Addressed by MAP**

HA/HSA	Water Body	Pollutant Category	Data Gap Identified	Monitoring Program Components Addressing the Data Gap(s)
Pueblo HU				
San Diego Mesa 908.2	Chollas Creek	Lead	MS4 data and source not identified in 303(d)-listing	Chollas Creek Highest Priority Condition Monitoring (Section K.4.1) and MS4 Outfall Monitoring (Section K.3.2).
		Trash	MS4 data	Pueblo San Diego Hydrologic Unit: Creek Refuse Assessment Program Special Study (K.5.2.3) and MS4 Outfall Monitoring (Section K.3.2).
	Mouth of Chollas Creek	PAHs	MS4 data and source not identified in 303(d)-listing	Chollas Creek Highest Priority Condition Monitoring (Section K.4.1) and MS4 Outfall Monitoring (Section K.3.2).
		PCBs		
		Chlordane		
Sweetwater HU				
Lower Sweetwater 909.1	Lower Sweetwater River (below Sweetwater Reservoir)	Bacteria	Receiving Water data	Long-Term Receiving Water Monitoring (Section K.3.1) and MS4 Outfall Monitoring (Section K.3.2).
		TDS	MS4 data	
Lower Sweetwater 909.1 (continued)	Lower Sweetwater River (below Sweetwater Reservoir) (continued)	Trash	Receiving Water and MS4 data	Long-Term Receiving Water Monitoring (Section K.3.1), MS4 Outfall Monitoring (Section K.3.2), and Physical Aesthetics Focused Priority Monitoring (Section K.4.4).
Otay HU				
Coronado 910.1	Pacific Ocean Shoreline at Carnation Ave and Camp Surf Jetty	Bacteria	Receiving Water data	Swimmable Waters Focused Priority Monitoring (Section 4.5) and AB411 monitoring program
	Pacific Ocean Shoreline at Tidelands Park	Bacteria	Receiving Water data	

Note:

PAH = polycyclic aromatic hydrocarbon; PCB = polychlorinated biphenyl; TDS = total dissolved solids

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K.10 INTEGRATED ASSESSMENT

The RPs integrate the data collected as part of the Monitoring and Assessment Program, along with information collected during the implementation of the JRMP. The integrated assessment evaluates the main components of the Water Quality Improvement Plan and follows the assessment process outlined in the Municipal Permit. The priority water quality conditions are re-evaluated using the receiving water and MS4 outfall discharge assessments on the basis of the methodology presented in Attachment A. The compliance pathways that comprise the goals and schedules in the Water Quality Improvement Plan are reviewed on the basis of the results of the receiving water and MS4 outfall discharge assessments, along with data collected as part of the JRMP. This evaluation highlights the progress in achieving the compliance goals. Finally, both water quality monitoring data and maintenance and observational data related to BMP effectiveness are used to assess the strategies implemented by the RPs. Table K10-1 summarizes the assessment program components.

**Table K10-1
Integrated Assessment Components**

Water Quality Improvement Plan Components	Municipal Permit Assessment Methodology	Evaluation Assessment
Highest and Focused Priority Conditions	<u>Re-assess receiving water, priority, and Highest and Focused Priority Conditions.</u> (1) Re-evaluate the receiving water conditions per methodology and any new methodology provided in Attachment A. (2) Re-evaluate the impacts of MS4 discharges on receiving waters per methodology provided in Attachment A. (3) Identify beneficial uses in receiving waters that must be protected per Receiving Water Assessment. <u>Re-evaluate MS4 sources and stressors based on potentially new Priority and Highest Priority Conditions.</u> (4) Re-evaluate the identification of MS4 sources and/or stressors performed in Section 3.	• Receiving Water Assessments • MS4 Outfall Discharge Assessments
Goals and Schedules (Compliance Pathways)	<u>Evaluate effectiveness of goals.</u> (1) Evaluate the progress toward achieving interim and final numeric goals for protecting impacted beneficial uses in receiving waters.	• Receiving Water Assessments • MS4 Outfall Discharge Assessments • JRMP Assessments

Table K10-1 (continued)
Integrated Assessment Components

Water Quality Improvement Plan Components	Municipal Permit Assessment Methodology	Evaluation Assessment
Strategies	<u>Evaluate effectiveness of strategies and actions.</u> (1) Identify the non-storm water and storm water pollutant loads from the MS4 outfalls based on the MS4 Outfall Discharge Assessment. (2) Identify the non-storm water and storm water pollutant load reductions, or other improvements that are necessary to attain the interim and final numeric goals. (3) Identify the non-storm water and storm water pollutant load reductions, or other improvements, that are necessary to demonstrate that non-storm water and storm water discharges are not causing or contributing to exceedances of receiving water limitations. (4) Evaluate the progress of the strategies toward achieving interim and final numeric goals for protecting beneficial uses in receiving waters.	• MS4 Outfall Discharge Assessments • Special Studies Assessments for BMP Effectiveness • JRMP Assessments

Strategies developed within the Water Quality Improvement Plan are incorporated into individual RP programs through implementation of their respective JRMPs. Each RP is implementing programs that are focused on addressing the Highest and Focused Priority Conditions within the San Diego Bay WMA. While implementation of these programs has been ongoing in many cases, refinements to the programs provide additional focus on the particular water quality issues identified in the Water Quality Improvement Plan. Over time, RPs utilize various assessment methods to determine which program refinements are effective and which are not. In some cases, the program effectiveness assessment results may provide useful information leading to adaption of elements of the Water Quality Improvement Plan. Where new information is applicable, it may be used to modify goals, strategies, schedules, and the Monitoring and Assessment Program.

The Municipal Permit also contains specific assessments to be performed during preparation of the Report of Waste Discharge. The assessments are longer term in nature, occurring only once during the Municipal Permit cycle. Because the updates to the Water Quality Improvement Plan are required to undergo a full public participation process per Municipal Permit Provision F.2.c, including reconvening the Consultation Panel, modifications will proactively consider input from the public and the Regional Board. Adaptation of Water Quality Improvement Plan elements also considers new regulations or policies as appropriate. In the Report of Waste Discharge preparation, all elements of the Water Quality Improvement Plan are eligible for modifications through the required adaptive management processes. Elements to be evaluated include the water quality conditions (i.e., priorities), goals and accompanying schedules, strategies and accompanying schedules, and the Monitoring and Assessment Program. Of particular interest for the integrated assessment to be performed during this Municipal Permit cycle is a review of the performance-based goals. These goals are to be reviewed during the development the Report of Waste Discharge.

The process for selecting the Highest and Focused Priority Conditions is documented in the Section 2 of the Water Quality Improvement Plan. Given the relatively short duration of the remainder of this Municipal Permit term after expected approval of the Water Quality Improvement Plan, the priority water quality conditions selected during the development of the Water Quality Improvement Plan remain for the duration of the current permit term. They are modified only on the basis of new information assessed as part of the Report of Waste Discharge. Data collected during the Municipal Permit term are used to update the analysis of the priority water quality conditions on the basis of the methodology described in Attachment A and implemented in Section 2.

RPs will evaluate the progress toward achieving the interim and final numeric goals as part of the preparation of the Report of Waste Discharge. The Water Quality Improvement Plan interim goals identified for the current permit term are provided in Tables K10-2 through K10-6, along with the related assessment metric for each.

Table K10-2
Assessment of Goals for Chollas Creek, Current Permit Term

Jurisdiction	Numeric Goal	Unit of Measure	Assessment Period and Fiscal Year	Assessment Method
			Current Permit Term	
PERFORMANCE MEASURES – WET AND DRY WEATHER				
	Performance Metrics		FY18	
City of La Mesa	Design, Construct, and Maintain Low-Impact Development (LID) Retrofits	Linear Feet	Approximately 4,540 linear feet of bioretention areas will replace impervious asphalt along University Avenue between La Mesa Boulevard and Harbison Avenue.	Calculate the exact number of linear of feet of bioretention areas installed.
City of San Diego	Develop green infrastructure policy, attain City Council approval, and construct green infrastructure BMPs to improve water quality during wet and dry weather	Acres Baseline: 0 acres treated in 2002, the year used as baseline in the Bacteria TMDL	44.6 acres of drainage area treated through construction of 5 green infrastructure BMPs	Verify number of acres of drainage area treated from completed green infrastructure BMPs using information from final design drawings.
PERFORMANCE MEASURES – WET WEATHER				
	Performance Metrics		FY18	
City of Lemon Grove	Reduction in Bacteria	Restaurant Used Cooking Oil Bins Stored in Covered Areas Protected from Run-On	75 percent (%) ¹	Percent of Restaurant Used Cooking Oil Bins Stored in Covered Areas Protected from Run-On as based on the baseline to be developed during the FY16 Annual Report

Table K10-2 (continued)
Assessment of Goals for Chollas Creek, Current Permit Term

Jurisdiction	Numeric Goal	Unit of Measure	Assessment Period and Fiscal Year	Assessment Method
			Current Permit Term	
City of Lemon Grove (continued)	OR			
	Municipal Facility Retrofits for Reduction of Bacteria and Metals	Redirect parking lot runoff to pervious area	2 municipal facilities retrofitted (drainage area/facility TBD during site selection in FY16)	Number of facilities retrofitted and the calculated drainage area for those facilities
		Redirect Roof Downspouts to Pervious Area	2 municipal facilities retrofitted (drainage area/facility TBD during site selection in FY16)	
PERFORMANCE MEASURES – DRY WEATHER				
	Performance Metrics		FY18	
City of Lemon Grove	Non-Storm Water Flow Reduction Programs	Install smart irrigation systems at municipal facilities	8 Cal-Sense smart irrigation systems installed	Number of Cal-Sense smart systems installed
City of San Diego	Implement runoff reduction programs including targeted education and outreach, enhanced inspections, rebates ² , and increased enforcement	Volume Reduction Baseline: Historical dry weather monitoring data will be used to establish a baseline in the first Water Quality Improvement Plan Annual Report	10% reduction in prohibited ³ dry weather flow from baseline measured at persistently flowing outfalls in the WMA	Percent reduction in the amount of dry weather flow measured from City of San Diego dry weather monitoring locations

Notes:

- These data have not been directly recorded in past inspection programs. The City's current BMP requirements state that bins must be kept clean but do not always require coverage. Based on discussion with inspection staff, it is estimated that about 20-30% of used oil cooking bins are stored in covered areas protected from run-on.
 - City of San Diego rebates include grass replacement, rainwater harvesting, downspout disconnect, and micro-irrigation.
 - Does not include allowable discharges as defined in Provision A and Provision E.2.a of the MS4 Permit.
- % = percent; FY = fiscal year; TBD = to be determined

Table K10-3
Assessment of Goals for Water Quality (Copper and Zinc) Within Airport
Authority Jurisdiction (908.21), Current Permit Term

Jurisdiction	Numeric Goal	Unit of Measure	Assessment Period and Fiscal Year	Assessment Method
			Current Permit Term FY17 or FY16 as Noted	
Airport Authority	MS4 Discharges Jurisdiction-wide	% of Samples	Dissolved Copper = 71% (FY17)	Comparison of sample results to the IGP NALs and calculation of percent exceedance
	% of Samples With Concentrations Exceeding Industrial General Permit (IGP) NALs		Dissolved Zinc = 62% (FY17)	
	OR			
	MS4 Discharges Sub-basins 1, 3, and 5 (total or assess individually)	% Load Reduction	Dissolved Copper = 20% (FY17)	Review of dissolved copper and zinc loads from Sub-basins 1, 3, and 5 and a calculation of load reduction based on a baseline value set during the first Water Quality Improvement Plan Annual Report.
	% Load Reduction		Dissolved Zinc = 20% (FY17)	
	OR			
	MS4 Discharges Sub-basins 1, 3, and 5 (in total)	Acres/ Week	34 Acres/Week (Current Frequency) (FY16)	Confirmation of implementation of street sweeping frequency.
	Area Treated with Street Sweeping			
MS4 Discharges Sub-basins 1, 3, and 5 (in total)	Square Feet/ Week	Average of 10,000 Square Feet per Week (Current Frequency) (FY16)	Confirmation of implementation of area treated.	
Area Treated with Rubber Removal and/or Power Washing				

Table K10-4
Assessment of Goals for Riparian Area Habitat in Paradise Creek (909.1),
Current Permit Term

Jurisdiction	Numeric Goal	Unit of Measure	Assessment Period and Fiscal Year	Assessment Method
			Current Permit Term FY17 or FY16 as Noted	
City of National City	Receiving Water Removal of 303(d) Selenium Listing	303(d) Listed Segment	Complete Selenium Water Quality Monitoring (FY16) Collect and analyze 48 samples for selenium, with zero exceedances of the water quality objective ¹	Summary of the completed monitoring program, including sampling locations, number of samples taken, and summary of results.
	Restore Native Riparian Vegetation and Wetlands	Remove Concrete Bottom from Paradise Creek	1,000 Linear Feet (FY17)	Total number of linear feet of concrete bottom removed.
		Wetland Restoration	6,000 Square Feet (FY17)	Total square feet of wetland restored.
		Native Plants Replacing Turf, Invasive Plants, or Existing Impervious Area	45,000 Square Feet (FY17)	Total square feet of native plan replacement.
		Provide Treatment for Tributary Urbanized Areas	130 Treated Acres (FY17)	Total acres of treated area.

Note:

1. These numbers are designed such that the when analyzed together with the historical data upon which the current 303(d) listing is based, the entire data set (current study data plus historical data) meets the delisting criteria in the State listing policy (State Board, 2004).

Table K10-5
Assessment of Goals for Physical Aesthetics in Lower Sweetwater HA (909.1) and
Otay River HA (910.2), Current Permit Term

Jurisdiction	Numeric Goal	Unit of Measure	Assessment Period and Fiscal Year	Assessment Method
			Current Permit Term FY18	
City of Chula Vista and Port of San Diego (909.1) City of Chula Vista, City of Imperial Beach, and Port of San Diego (910.2)	MS4 Discharges % Optimal ¹ Trash Assessment Scores	MS4 Outfalls Assessed for Trash	60%	Comparison to the baseline determined in the first Annual Report that includes the RPs' cumulative number of site visits of major MS4 outfalls in the Focused Priority Condition area for dry weather and MS4 outfall monitoring during FY12 through FY14
	OR			
	MS4 Discharges % Jurisdictional High Volume Trash Drainage Area Treated for Trash ²	Feasible Drainage Area for BMP retrofit	10%	An assessment is needed to incorporate review of all available trash and source assessment data, drainage areas, and potential locations in high-volume trash-generating areas to feasibly implement structural control BMPs to identify or verify high-volume trash areas and % area feasible to retrofit with trash BMPs

Notes:

- Historically, an optimal score was given to sites meeting the following requirements: "On first glance, no trash visible. Little or no trash (<10 pieces) evident when evaluated area is closely examined for litter and debris." This definition may change in the future and will be noted in Water Quality Improvement Plan updates.
- These values are based on best available information and current jurisdictional knowledge. A feasibility study is required to determine where BMP retrofits can be implemented.

Table K10-6
Assessment of Goals for Swimmable Waters (Beaches) in the Coronado HA
(910.1), Current Permit Term

Jurisdiction	Numeric Goal	Unit of Measure	Assessment Period and Fiscal Year	Assessment Method
			Current Permit Term FY18	
City of Coronado and Port of San Diego	Receiving Water Removal of 303(d) Indicator Bacteria Listings for Recreation Water Contact (REC-1 Beneficial Use)	% of Samples Exceeding WQOs Tidelands Park	Baseline = 15% First Interim Goal (current Municipal Permit term) = Maintain 15% Final Goal = Maintain 15% and delist Tidelands Park	Comparison to the baseline identified in the San Diego Bay Water Quality Improvement Plan.

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ATTACHMENT A1. LONG-TERM RECEIVING WATER MONITORING PROGRAM – MONITORING PLAN

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ACRONYMS AND ABBREVIATIONS

Acronym or Abbreviation	Definition
>	less than
<	greater than
AFDM	ash-free dry mass
APHA	American Public Health Association
AWWA	American Water Works Association
BMI	benthic macroinvertebrate
BOD	biochemical oxygen demand
BSA	bovine serum albumin
Caltrans	California Department of Transportation
CDFG	California Department of Fish and Game
CEDEN	California Environmental Data Exchange Network
COC	chain of custody
cm ²	square centimeter
CRAM	California Rapid Assessment Method
CSBP	California Stream Bioassessment
EDD	electronic data deliverable
EDTA	ethylenediaminetetraacetic acid
ELAP	Environmental Laboratory Accreditation Program
GIS	geographic information system
GPS	Global Positioning System
IBI	Index of Biological Integrity
ID	identification
m	meter
mL	milliliter
MLS	Mass Loading Station
mm	millimeter
MS4	municipal separate storm sewer system
MS4 Permit	San Diego Regional Water Quality Control Board Order Number R9-2013-0001, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region
NPDES	National Pollutant Discharge Elimination System

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
PBO	piperonyl butoxide
pH	hydrogen ion concentration
PVC	polyvinyl chloride
O/E	observed to expected
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RWQCB	Regional Water Quality Control Board
SAFIT	Southwest Association of Freshwater Invertebrate Taxonomists
SCCWRP	Southern California's Coastal Water Research Project
SDCRC	San Diego County Regional Copermittees
SR-MLS	Sweetwater River Mass Loading Station
SDWQCB	San Diego Regional Water Quality Control Board
SMC	Stormwater Monitoring Coalition
SOP	standard operating procedure
SPE	solid phase extraction
STS	sodium thiosulfate
SWAMP	Surface Water Ambient Monitoring Program
TIE	toxicity identification evaluation
TMDL	total maximum daily load
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
USGS	U.S. Geological Survey
WEF	Water Environment Federation
WMA	Watershed Management Area

A.1 INTRODUCTION

The purpose of this Monitoring Plan is to describe the long-term receiving water monitoring, as required by the San Diego Regional Water Quality Control Board (RWQCB) Order No. R9-2013-0001, *National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges From the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds Within the San Diego Region*, hereafter referred to as the MS4 Permit. The goal of the San Diego Bay WMA Receiving Water Monitoring Program is to characterize current conditions and assess progress in the receiving waters, and effectiveness of water quality improvement strategies implemented as part of the San Diego Bay WMA Water Quality Improvement Plan.

A.1.1 Program Overview

The Receiving Water Monitoring Plan includes the following monitoring to satisfy the requirements of Provision D of the MS4 Permit:

- Long-term dry and wet weather receiving water monitoring at one mass loading station (MLS) in accordance with the MS4 Permit (Provisions D.1.a, b, c, and d)
- Rapid stream bioassessment and in accordance with the MS4 Permit (Provision D.1.c.(5)) which includes Regional monitoring participation in the Stormwater Monitoring Coalition (SMC) Regional Monitoring Program and Southern California Bight Regional Monitoring Program (Provision D.1.e.(1))
- Dry weather hydromodification monitoring in accordance with the MS4 Permit (Provision D.1.c.(6))
- Toxicity identification evaluation/toxicity reduction evaluation, if appropriate

The MS4 Permit identifies the Responsible Parties (RPs) for the San Diego Bay WMA. The RPs will collaborate to support the monitoring and reporting activities described in this plan are:

- Airport Authority
- City of Chula Vista
- County of San Diego
- City of Coronado
- City of Imperial Beach
- City of La Mesa
- City of Lemon Grove
- City of National City

- Port of San Diego
- City of San Diego
- Caltrans¹

A.1.2 Monitoring Locations

The San Diego Bay WMA RPs have selected the Sweetwater River Mass Loading Station (MLS) (SR-MLS) as the long-term receiving water monitoring location. Location details are provided in Table A1-2. A map of the location is presented in Figure A1-1.

Table A1-1
List of Receiving Water Monitoring Locations for the MS4 Permit Term

Station Name	Waterbody	HU	Latitude	Longitude
SR-MLS	Sweetwater River	Sweetwater (909)	32.650720	-117.063592

¹ The California Department of Transportation (Caltrans) is not listed in the Municipal Permit as a Copermittee, but is participating voluntarily in the development of the Water Quality Improvement Plan as a Chollas Creek TMDL Responsible Party. Caltrans' participation is limited to an 864-acre area within the Chollas Creek Hydrologic Sub-Area (HSA) in the Pueblo HU.

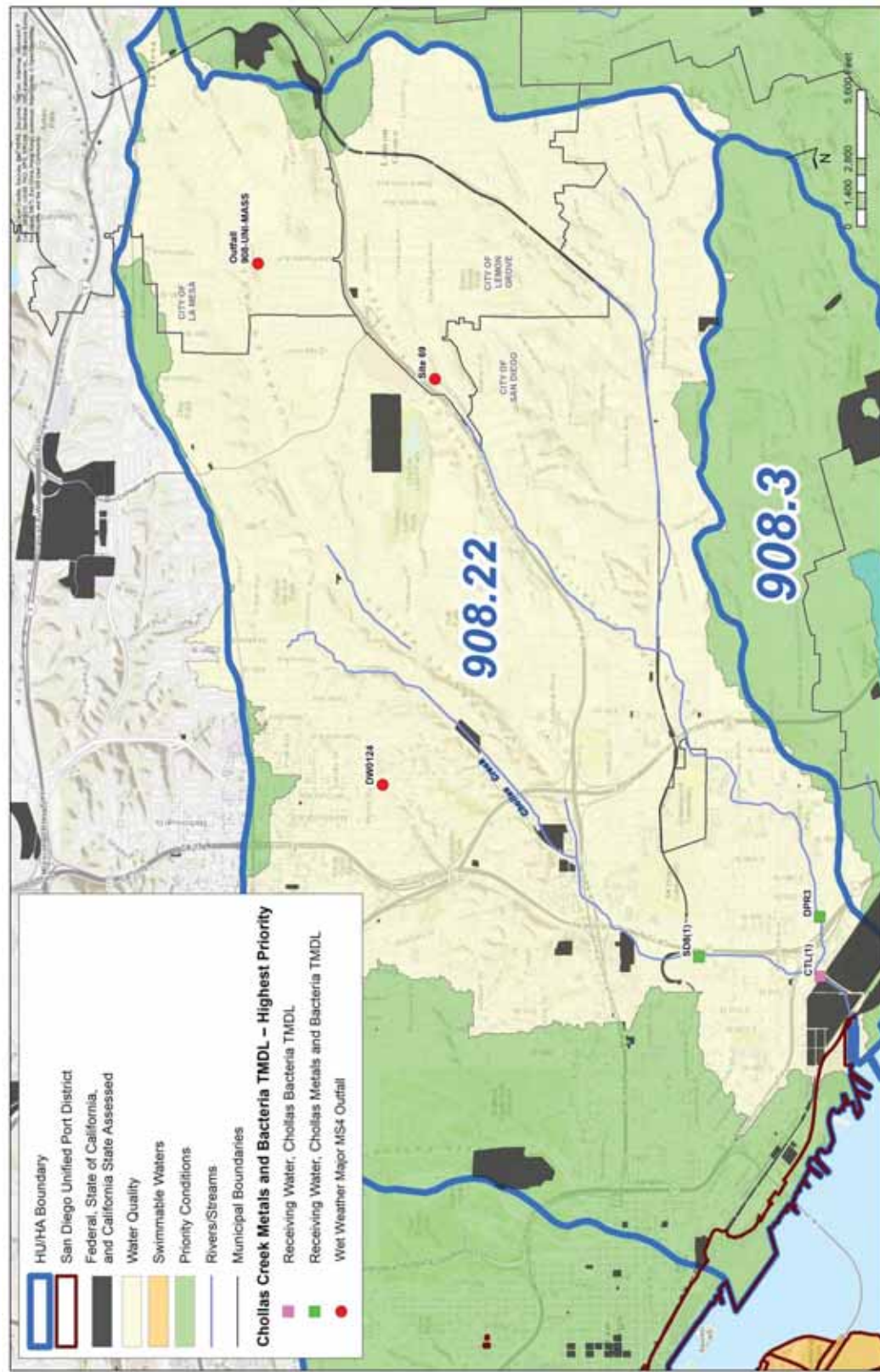


Figure A1-1
Receiving Water Monitoring Location
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A.1.3 Monitoring Methods

This section describes monitoring methods and procedures used to implement the long-term receiving water monitoring program. Long-term receiving water monitoring will be conducted at the MLS for the San Diego Bay WMA, in accordance with the MS4 Permit (Provisions D.1.b, c, and d). Seasonal mobilization and demobilization activities will include the following:

- Equipment will be installed and maintained at SR-MLS to perform flow monitoring and sampling. The monitoring year is defined as October 1 through September 30.
- Flow monitoring data will be collected at SR-MLS throughout the monitoring season to estimate the annual watershed loads.
- Monitoring equipment at SR-MLS will be removed upon completion of the required monitoring (approximately June 30)
- Because safety and quality are integral parts of data collection, team safety meetings and quality reviews will be conducted to ensure that safe and reliable business practices are used during the implementation of this program.

A.1.3.1 Water Quality Sampling

This section discusses the sampling procedures and analytical methods for water quality sampling. All sampling and analyses conducted for long-term receiving water monitoring locations will be in accordance with applicable United States Environmental Protection Agency (USEPA) regulations and guidance. Attachment A5 provides a complete list of constituents, methods, sample volumes, holding times, and target reporting limits for the San Diego Bay WMA Receiving Water Monitoring Program.

A.1.3.1.1 Dry Weather

Each long-term monitoring location will be monitored during three dry weather events: once during September prior to the start of the wet season, once during the wet season, and once in May or June after the end of the wet season. Dry weather monitoring will be conducted in days with less than 0.1 inches of rainfall and 72 hours of antecedent dry conditions.

In the event that dry weather flow is not observed at a station during the September monitoring event prior to the start of the wet season, the first dry weather sampling event will occur during non-storm events (e.g., at least 72 hours after a storm event) if dry weather flow is observed during the wet season.

A.1.3.1.2 Wet Weather

The long-term station will be monitored during three wet weather events: during the first viable rainfall event of the wet season on or after October 1, during one event at least 30 days after the first rainfall event, and during one rainfall event after February 1.

Storm events will be considered viable for mobilization if they are predicted to produce at least 0.10 inch of rainfall in the drainage area with at least a 70 percent chance of rainfall. Each storm of at least 0.1 inch of rainfall must be separated by a minimum of 72 hours, and the forecast storm volume within ± 50 percent of the average storm volume and duration for the region. These mobilization criteria must be met at least 24 hours prior to the anticipated onset of rainfall. For the purposes of these criteria, storm forecasts will be obtained from the National Weather Service website (<http://www.wrh.noaa.gov/sgx/>).

A.1.3.1.3 Flow Monitoring

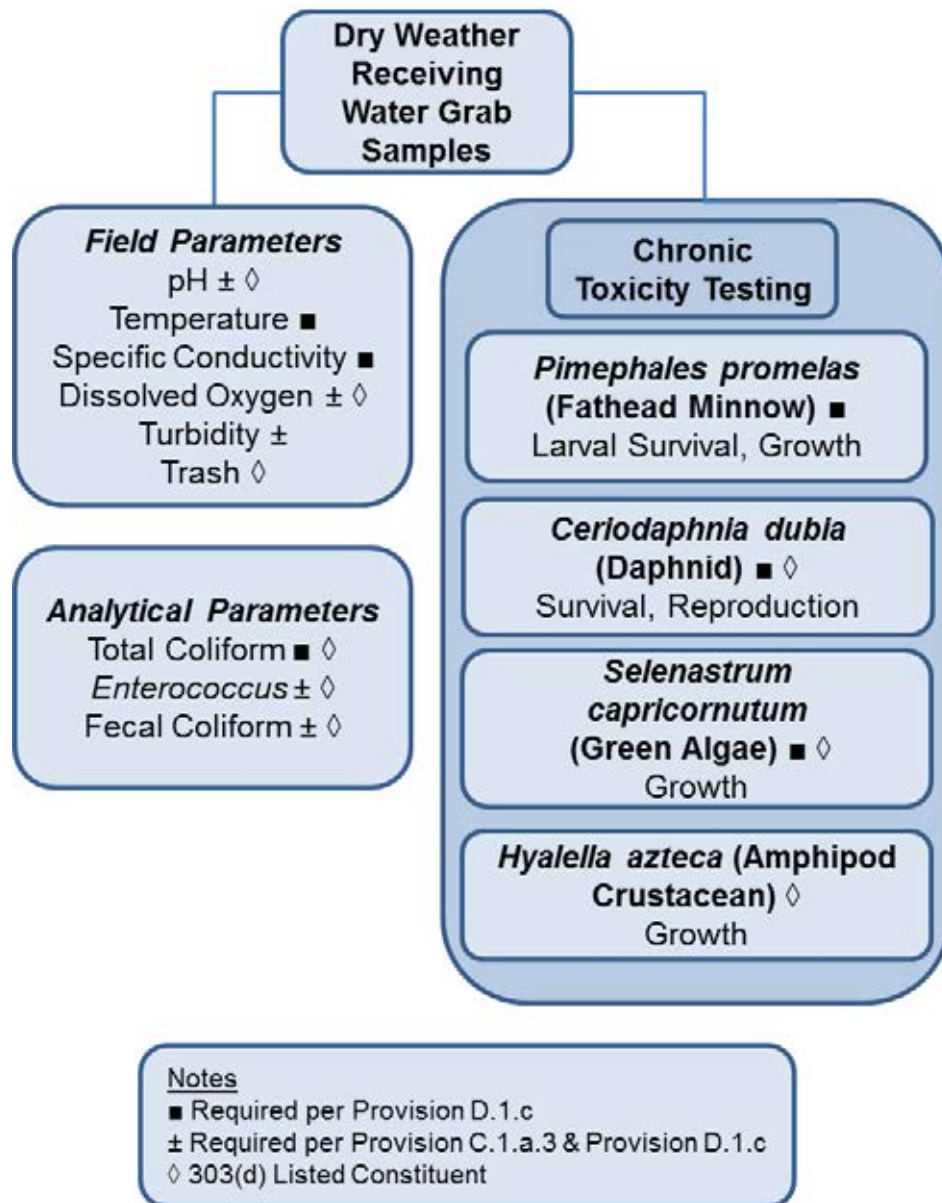
Flow rates will be monitored using American Sigma (or comparable) flowmeters with an ultrasonic sensor, bubbler, or submerged pressure transducer as the primary measuring device. The primary sensor will continuously measure stage (i.e., stream height) and relay that information to the flowmeter. The flowmeter will continually calculate flow rates by inserting the stage information into the preprogrammed discharge equation. Using this system, the flowmeter will be able to actuate the sampler to achieve a flow-weighted composite sample. Sampling and flow equipment will be monitored remotely, and data will be transferred to a permanent data system by cellular modem or manual download.

Equipment installed and used for monitoring during dry weather will remain in place during the course of the monitoring year. The monitoring year is October 1 through September 30. Continual flow data will be downloaded remotely from each station once every two weeks to verify equipment functionality and to reduce data gaps, ensure accuracy, and identify maintenance and calibration needs. Flow data will be entered into the data management system. Equipment will be maintained throughout this period to ensure that it is in proper working order. Additional flow monitoring details, including methods used for stream rating and channel surveys, are provided in Attachment A.

A.1.3.1.4 Grab Samples

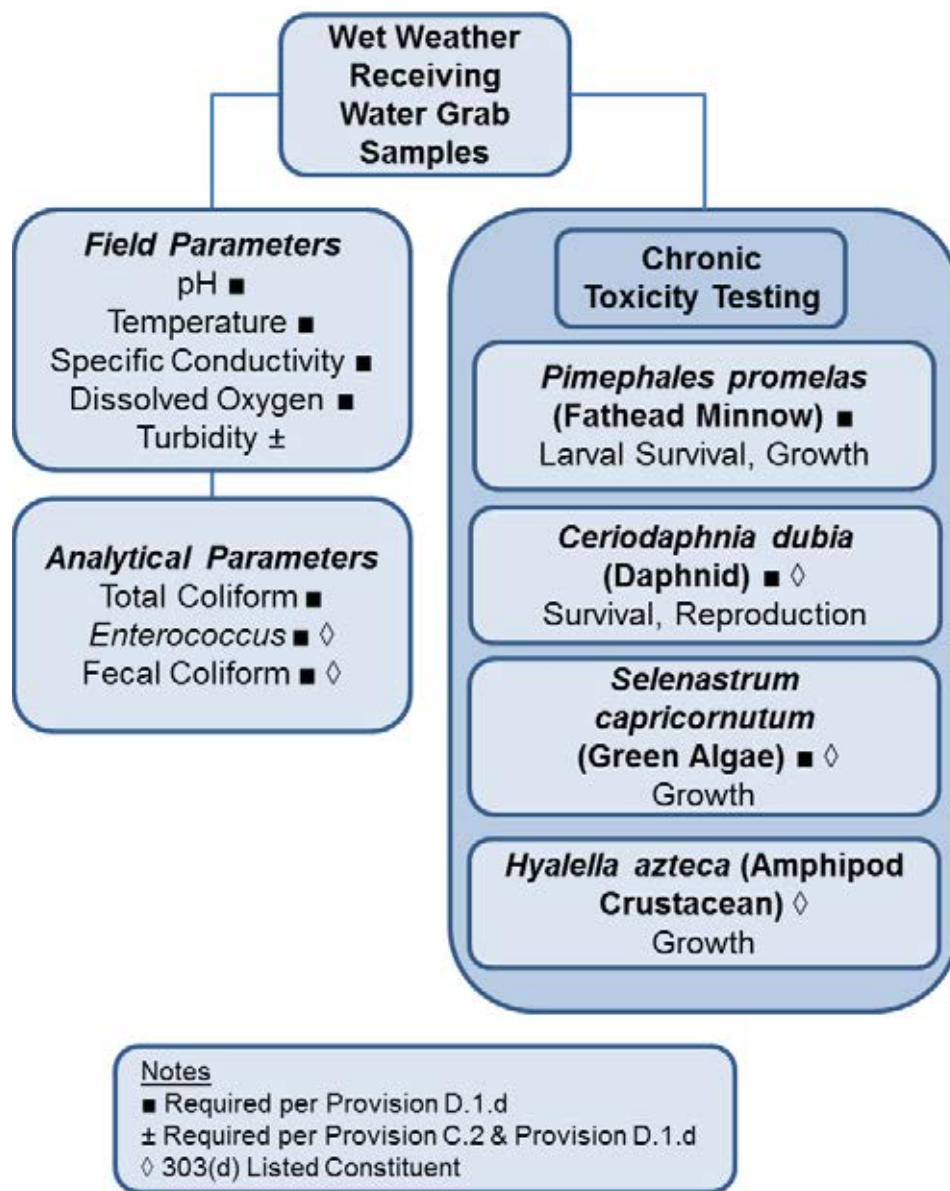
Grab samples will be collected for those constituents that are not amenable to composite sampling. Per the Permit, the constituents to be collected as grab samples are indicated in Figure A1-2 and Figure A1-3 and include:

- Temperature
- Hydrogen ion concentration (pH)
- Specific conductance
- Dissolved oxygen
- Turbidity
- Total coliform
- Fecal coliform
- *Enterococcus*



Note: This figure describes detailed monitoring procedures and analytical methods that are illustrative and may be revised on the basis of site-specific environmental conditions and equivalent alternate analytical methods.

Figure A1-2
Dry Weather Receiving Water Monitoring Grab Samples



Note: This figure describes detailed monitoring procedures and analytical methods that are illustrative and may be revised on the basis of site-specific environmental conditions and equivalent alternate analytical methods.

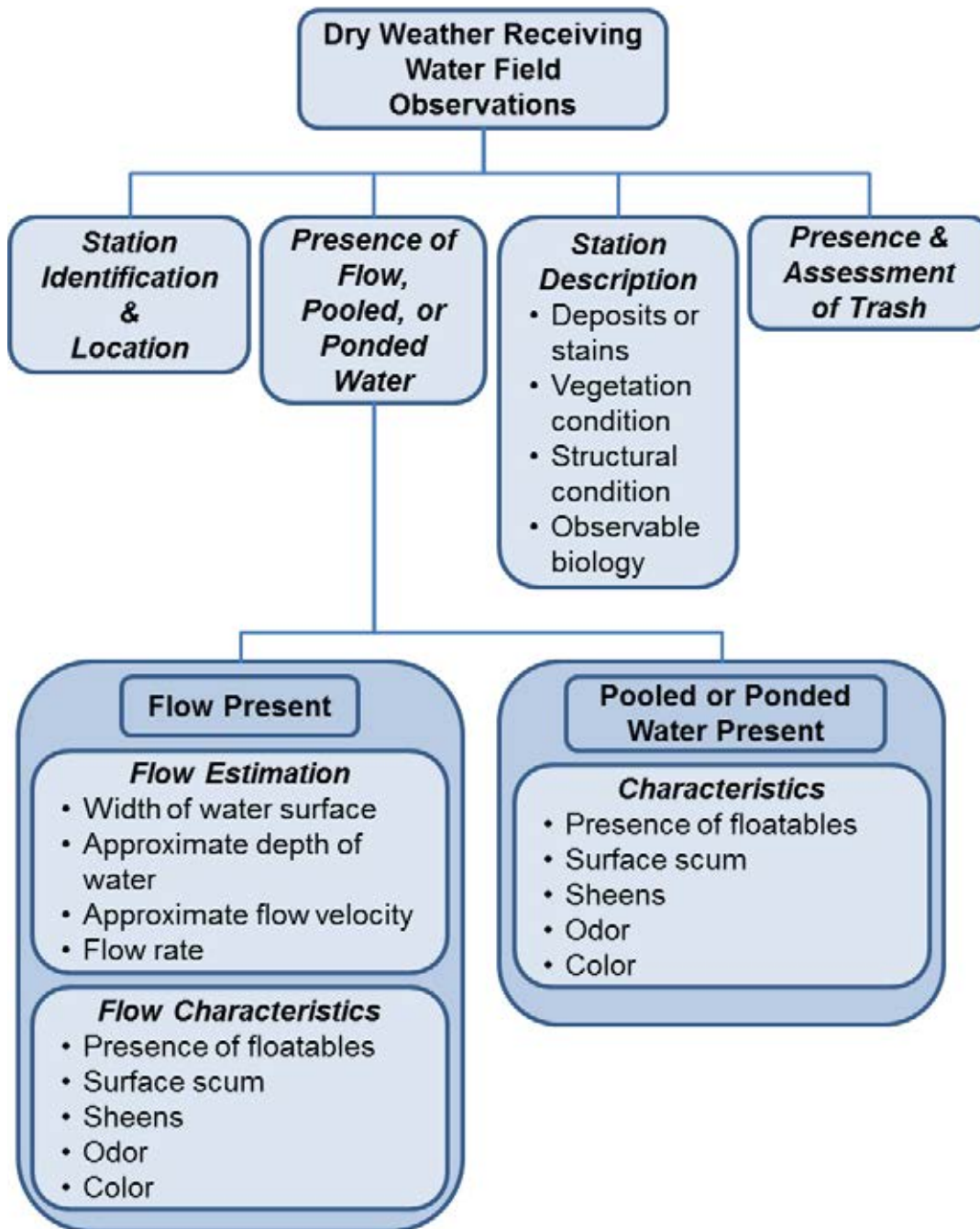
Figure A1-3
Wet Weather Receiving Water Monitoring Grab Samples

Samples will be collected from the horizontal and vertical center of the channel if possible and will be kept clear of uncharacteristic floating debris.

Microbiology samples will be collected using sterile techniques. Nitrile or latex-type gloves will be worn during sample handling. During the sample event, a 100-milliliter (mL) sterile bacteria bottle will be used to collect the sample directly from the receiving water. Care will be employed to not allow contact with area structures or bottom sediments. The container will be opened only for the time needed to collect the sample and will be closed immediately following sample collection. If it is suspected that the container was compromised at any time, the sample container will be discarded, and a new sample will be collected using a new sample bottle. The sample must be filled only to the 100-mL mark on the sample bottle (not over-topped or under-filled).

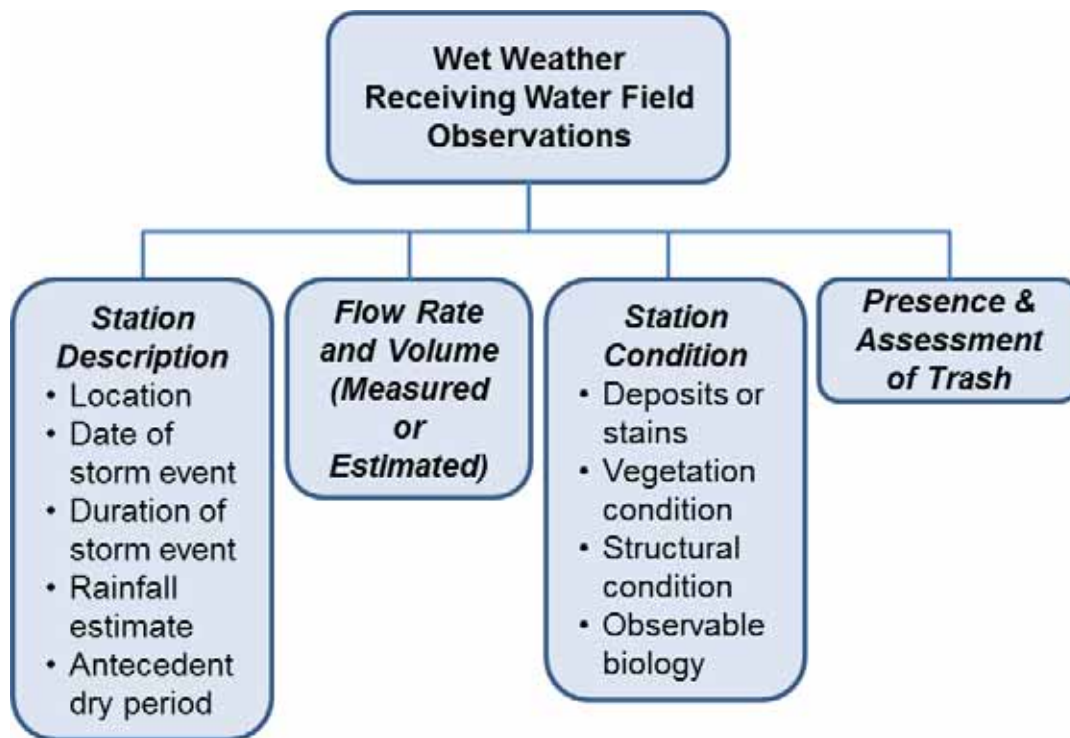
Field measurements will be performed for pH, specific conductance, temperature, dissolved oxygen, and turbidity using an YSI 6600 series water quality probe or similar device. Calibration of the instruments will be conducted prior to each sampling event in accordance with the manufacturer's specifications and calibrated following each sampling event. Calibration records will be kept on file.

A field observation data sheet will be completed for each sample collected to be representative of station conditions. Field observations include trash assessments, which will be performed at each station in accordance with the *Monitoring Workplan for the Assessment of Trash in San Diego County* (San Diego County Regional Copermittees [SDCRC], 2007a). Narrative field observation requirements are outlined in Figure A1-4 and Figure A1-5.



Note: This figure describes detailed monitoring procedures and analytical methods that are illustrative and may be revised on the basis of site-specific environmental conditions and equivalent alternate analytical methods.

Figure A1-4
Dry Weather Receiving Water Field Observations



Note: This figure describes detailed monitoring procedures and analytical methods that are illustrative and may be revised on the basis of site-specific environmental conditions and equivalent alternate analytical methods.

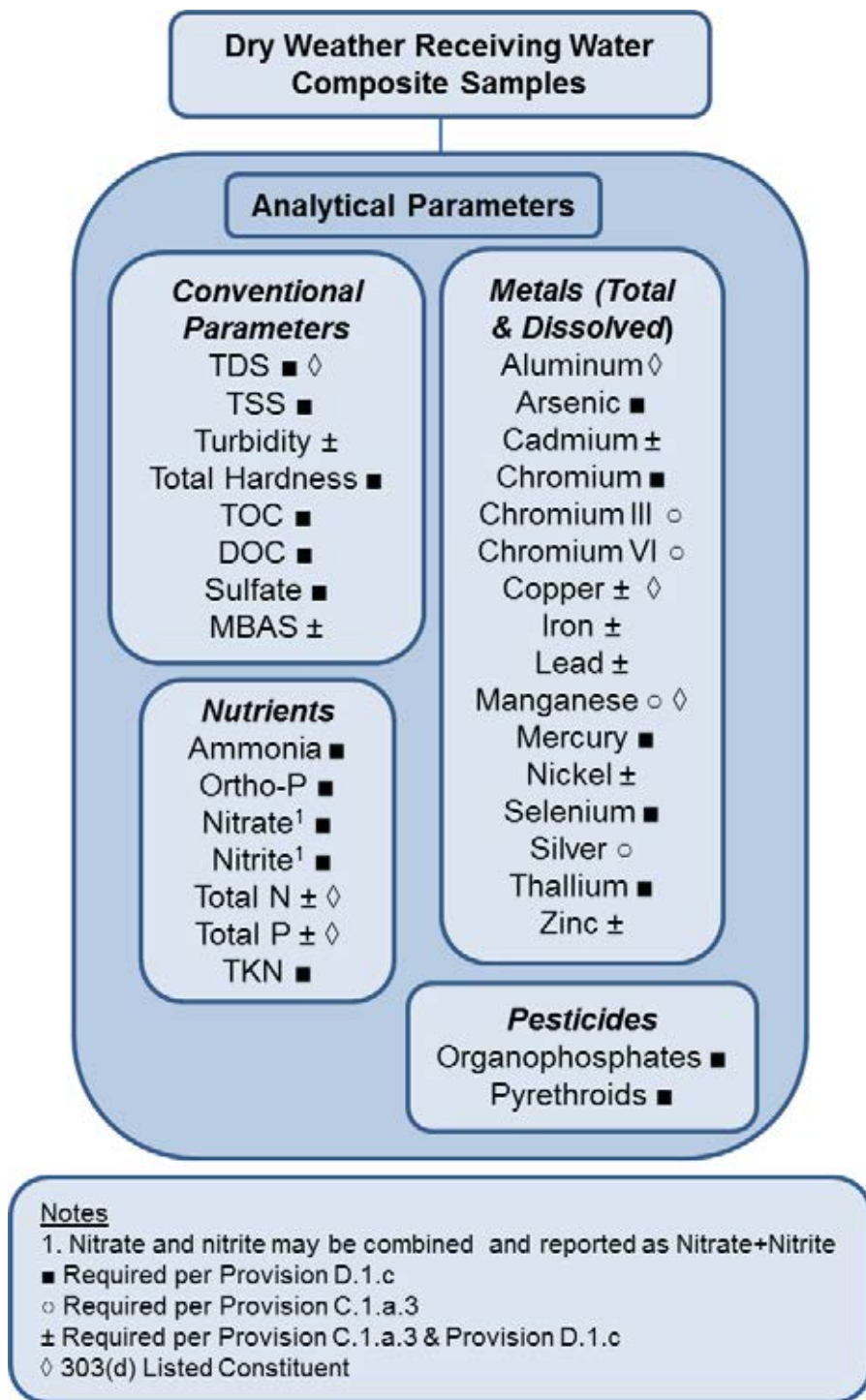
Figure A1-5
Wet Weather Receiving Water Field Observations

A.1.3.2 Composite Samples

A single flow-weighted composite sample will be collected at each station during the dry weather and wet weather monitoring events. During the monitoring event, sample aliquots will be collected in proportion to the rate of flow (i.e., flow-weighted) using automated equipment and Teflon-lined tubing. Dry weather flow-weighted composite samples will be collected over a typical 24-hour period, with a minimum of three sample aliquots collected per hour. Wet weather flow-weighted composite samples will be collected by taking sample aliquots across the hydrograph of the storm event. Based on the anticipated size of the storm, a flow-proportioned pacing will be programmed into the automated sampling equipment. The first sample aliquot will be taken at or shortly after the time that stormwater runoff begins, and each subsequent aliquot of equal volume will be collected every time the pre-selected flow volume (flow-proportional pacing) discharges past the monitoring location. Some variation may occur depending on actual storm intensity and duration.

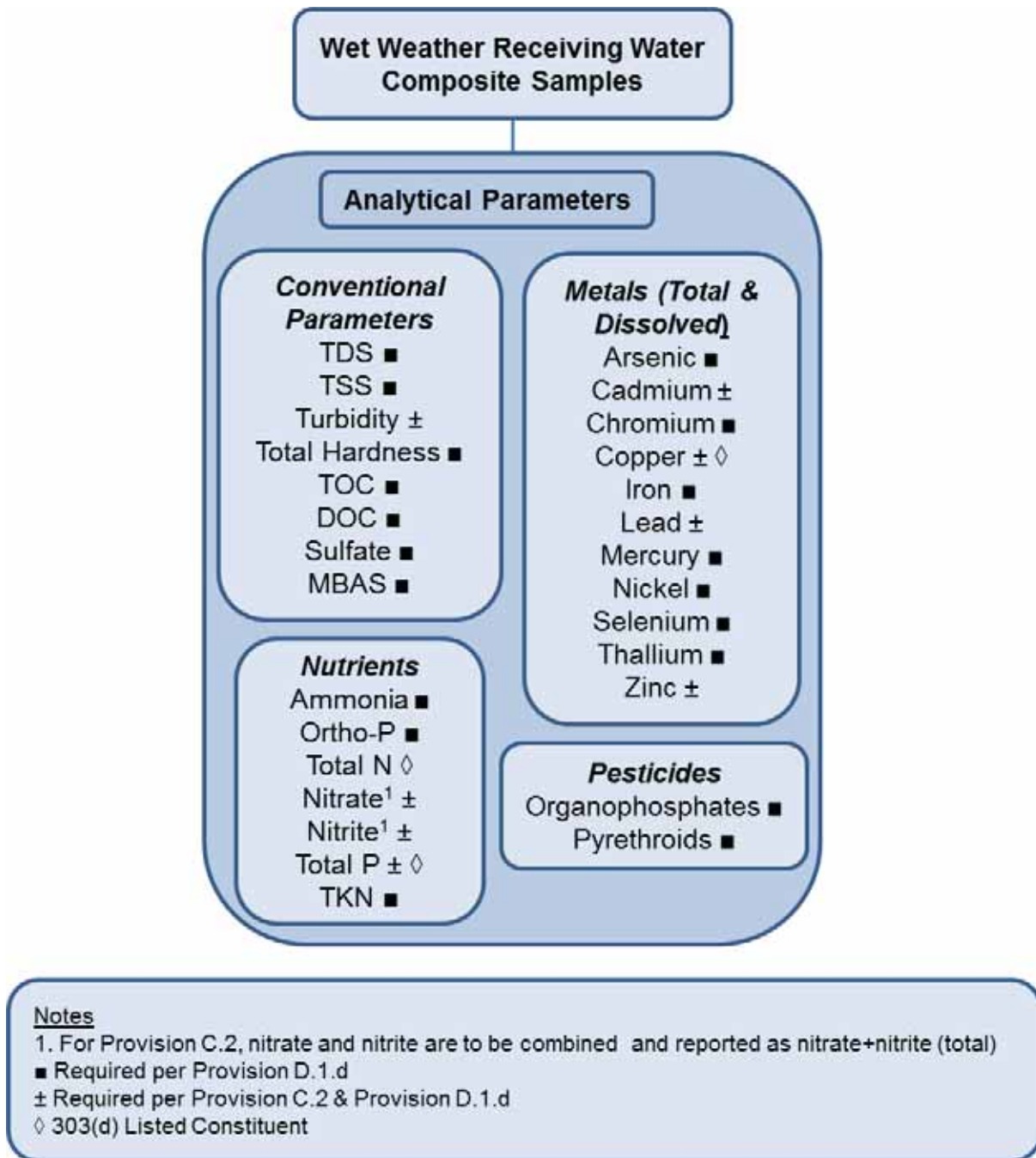
Flow-weighted water samples will be collected in pre-cleaned 20-liter (L) borosilicate graduated glass bottles. Sample bottles will be properly labeled with sample identification (ID), date, and time; sealed with a pre-cleaned rubber stopper; and preserved on ice for transport to the laboratory or consultant for sample compositing. Approximately 19 L of sample water will be contained in a “full” bottle. If flow rate sampling adjustments are made during a sampling event, the volume of sample to be used in sample compositing from the various bottles will differ for a given monitoring location to ensure that the final composite sample is properly flow-weighted. To ensure that a representative sample is used, samples should be agitated and mixed prior to pouring out any liquid. A 1000-mL glass graduated cylinder will be used to measure any sample volume that will be composited if it is less than the full amount contained within a 19-L sample bottle. The mixing will be done between transfers of liquid. Samples will be agitated continuously using a pre-cleaned glass stir bar as they are poured into the large pre-cleaned containers. After all of the samples from a specific station have been added to the compositing container, subsampling may begin. Subsamples for chemical analyses will be poured into glass containers with Teflon® lids.

The flow-weighted composite samples will be analyzed for all the constituents not identified for grab sampling. Figure A1-6 and Figure A1-7 outlines the constituent requirements for composite samples. The complete list of constituents for the San Diego Bay WMA for dry weather and wet weather is provided in Attachment A5.



Note: This figure describes detailed monitoring procedures and analytical methods that are illustrative and may be revised on the basis of site-specific environmental conditions and equivalent alternate analytical methods.

Figure A1-6
Dry Weather Receiving Water Monitoring Composite Samples



Note: This figure describes detailed monitoring procedures and analytical methods that are illustrative and may be revised on the basis of site-specific environmental conditions and equivalent alternate analytical methods.

Figure A1-7
Wet Weather Receiving Water Monitoring Composite Samples

A.1.3.3 Sample Analysis

Samples will be analyzed for the bacteria, chemistry, toxicity, and general field parameters provided in Attachment A5. Attachment A5 includes the methods and target reporting limits for each constituent. Chemical, toxicity, and bacterial analysis of samples will be performed by a laboratory certified for the appropriate fields of testing by the California Environmental Laboratory Accreditation Program (ELAP). The laboratory(s) will also be a participant in the SMC Intercalibration Program.

General physical and chemical constituents will be analyzed by accredited laboratories, with the exception of field-measured constituents (i.e., pH, specific conductance, temperature, turbidity, and dissolved oxygen). Field measurements will be collected by field staff during sampling activities using an YSI 6600 series water quality probe or similar type device.

A.1.3.4 Quality Assurance/Quality Control

Quality assurance (QA) and quality control (QC) for sampling processes will include proper collection of the samples to minimize the possibility of contamination. All samples will be collected in laboratory-supplied, laboratory-certified, contaminant-free sample bottles. Field staff will wear powder-free nitrile or similar gloves at all times during sample collection.

QC samples will be collected to ensure that valid data are collected. Depending on the parameter, QC samples will consist of blanks and duplicate samples to remain compliant with Surface Water Ambient Monitoring Program (SWAMP) protocols. QC requirements will be reviewed and discussed with the appropriate staff to verify the proper working order of equipment, refresh monitoring personnel in monitoring techniques, and determine whether the data quality objectives are being met.

The QA objectives for analyses conducted by the participating analytical laboratories are detailed in their Laboratory QA Manuals. The objectives for accuracy and precision involve all aspects of the testing process, including the following:

- Methods and standard operating procedures (SOPs)
- Calibration methods and frequency
- Data analysis, validation, and reporting
- Internal QC
- Preventive maintenance
- Procedures to ensure data accuracy and completeness

The results of the laboratory QC analyses will be reported with the final data. Any QC samples that fail to meet the specified QC criteria in the methodology will be identified,

and the corresponding data will be appropriately qualified in the final report. All QA/QC records for the various testing programs will be kept on file for review by regulatory agency personnel.

A.1.3.4.1 Training and Certification

All field personnel will have current and relevant experience in all aspects of standard field monitoring, including use of relevant field equipment such as field instruments and monitoring equipment. Field personnel will be trained and will have experience in the sample collection and handling/storage, and chain-of-custody procedures. Proper field sampling and sample-handling techniques will be reviewed prior to sampling, and only those staff with proficiency will be permitted to conduct the field work. Training will be documented in the health and safety plan for each member of the field team.

All personnel are responsible for complying with the QA/QC requirements that pertain to their organizational/technical functions. Each technical staff member must have a combination of experience and education to adequately demonstrate a specific knowledge of his or her particular function and a general knowledge of laboratory operations, test methods, QA/QC procedures, and records management.

A.1.3.4.2 Chain-of-Custody Procedures

Samples will be considered to be in custody if they are (1) in the custodian's possession or view, (2) retained in a secured place (under lock) with restricted access, or (3) placed in a container and secured with an official seal such that the sample could not be reached without breaking the seal. The principal documents used to identify samples and to document possession will be chain-of-custody (COC) records, field logbooks, and field tracking forms. COC procedures will be used for samples throughout the collection, transport, and analytical process.

COC procedures will be initiated during sample collection. A COC record will be provided with each sample or group of samples. Each person who will have custody of the samples will sign the form and ensure that the samples will not be left unattended unless properly secured. Documentation of sample handling and custody includes the following:

- Sample identifier
- Sample collection date and time
- Any special notations on sample characteristics or analysis
- Initials of the person collecting the sample
- Date the sample was sent to the analytical laboratory
- Shipping company and waybill information

Completed COC forms will be placed in a plastic envelope and kept inside the cooler containing the samples. Once delivered to the analytical laboratory, the COC form will be signed by the person receiving the samples. The condition of the samples will be noted and recorded by the receiver. COC records will be included in the final reports prepared by the analytical laboratories and are considered an integral part of the report.

A.1.3.4.3 Field Quality Control

For all conventional water quality analyses except field measurements performed on grab samples, field blanks and field duplicates will be analyzed in accordance with SWAMP guidelines.

For toxicity testing, only field duplicates will be collected. The use of controls and reference toxicant testing are QA/QC measures that have been put in place to identify changes in test organism sensitivity due to stress or other factors.

A.1.3.4.4 Equipment Calibration

All instruments used for field and laboratory analyses will be calibrated in accordance with the manufacturer's specifications. Calibration of the flow monitoring and sampling equipment will be conducted immediately prior to deployment or use and will be field verified during each data download or sampling event. The calibrations will be conducted in accordance with the manufacturer's specifications.

Field measurements for pH, specific conductance, dissolved oxygen, turbidity, and temperature will be made using an YSI 6600 series water quality probe or similar probe in accordance with the manufacturer's specifications. The YSI 6600 series water quality probe will be calibrated with calibration solutions, and it will be verified that the expiration date has not been exceeded.

A.1.3.4.5 Equipment Decontamination and Cleaning

QA/QC for sampling processes begins with proper collection of the samples to minimize the possibility of contamination. All water samples will be collected in laboratory-certified, contaminant-free bottles. Appropriate sample containers and field measurement and sampling gear will be transported to the sampling location in clean storage containers. Field measurements will be taken and recorded using the appropriate decontaminated equipment. If sampling poles are used for collecting water samples, they will be decontaminated between sampling locations.

A.1.3.5 Toxicity Identification Evaluations

Provision D.1.c(4)(f) of the Permit requires that the Copermittees discuss the need for conducting a Toxicity Identification Evaluation (TIE)/Toxicity Reduction Evaluation (TRE) if chronic toxicity is detected in receiving waters. A TIE is a set of procedures to identify specific chemicals or conditions responsible for toxicity; a TRE is a study designed to identify causative agents of effluent or ambient toxicity, isolate its sources, evaluate effectiveness of toxicity control options, and confirm reduction of toxicity. A

work plan that outlines the process to identify chronic toxicity and prioritize the need to implement a TIE/TRE based on the magnitude and persistence of chronic toxicity is included as Appendix G.

Toxicity identification evaluations (TIEs), if necessary, will be conducted in compliance with Provisions D.1.c.(4)(f) and D.1.d.(4) of the MS4 Permit and used to determine the causative agent(s) of toxicity. The Copermittees have budgeted for three Phase I TIEs in the event that assessment under Provision D.4.a.(2) indicates the need for a TIE. TIEs will be conducted in accordance with the guidelines for characterizing chronically toxic effluents (USEPA, 1991; USEPA, 1992; USEPA, 1993a; USEPA, 1993b).

Phase I TIE testing involves manipulating the sample(s) using the methods in Table A1-2.

Treatment blanks will be created for each TIE treatment to determine the effects of the manipulation on laboratory dilution water. The results of these blanks will be used to determine whether any changes in toxicity of the control (dilution water) are impacted by the chemical or physical manipulation of the sample. A baseline test, run concurrently with the TIE treatments, will be performed to assess the toxicity of the unmanipulated sample(s). Baseline tests are intended to confirm the presence of toxicity in the sample and to benchmark the toxicity for comparison to toxicity in TIE treatments.

Table A1-2
Phase I TIE Manipulations

Physical and Chemical Manipulation (Test) on Water Samples	Purpose of Test
Filtration	Detects filterable compounds (e.g., total suspended solids [TSS] related)
Aeration	Detects volatile, oxidizable, sublutable, or spargeable compounds
Ethylenediaminetetraacetic acid (EDTA) addition	Detects cationic metals (e.g., cadmium)
Sodium thiosulfate (STS) addition	Detects oxidative compounds (e.g., chlorine)
Solid phase extraction (SPE) over C18 column, followed by methanol elution	Detects non-polar organics and some surfactants
Piperonyl butoxide (PBO) addition	Detects organophosphate pesticides and pyrethroids
Carboxyl esterase addition	Detects pyrethroids
Bovine serum albumin (BSA) addition	Protein BSA is used as a control for the carboxyl esterase
Temperature reduction	Increases toxicity of pyrethroid pesticides
pH reduction	Detects pH-dependent toxicants (e.g., ammonia or sulfides)

A.1.3.6 Dry Weather Hydromodification Monitoring

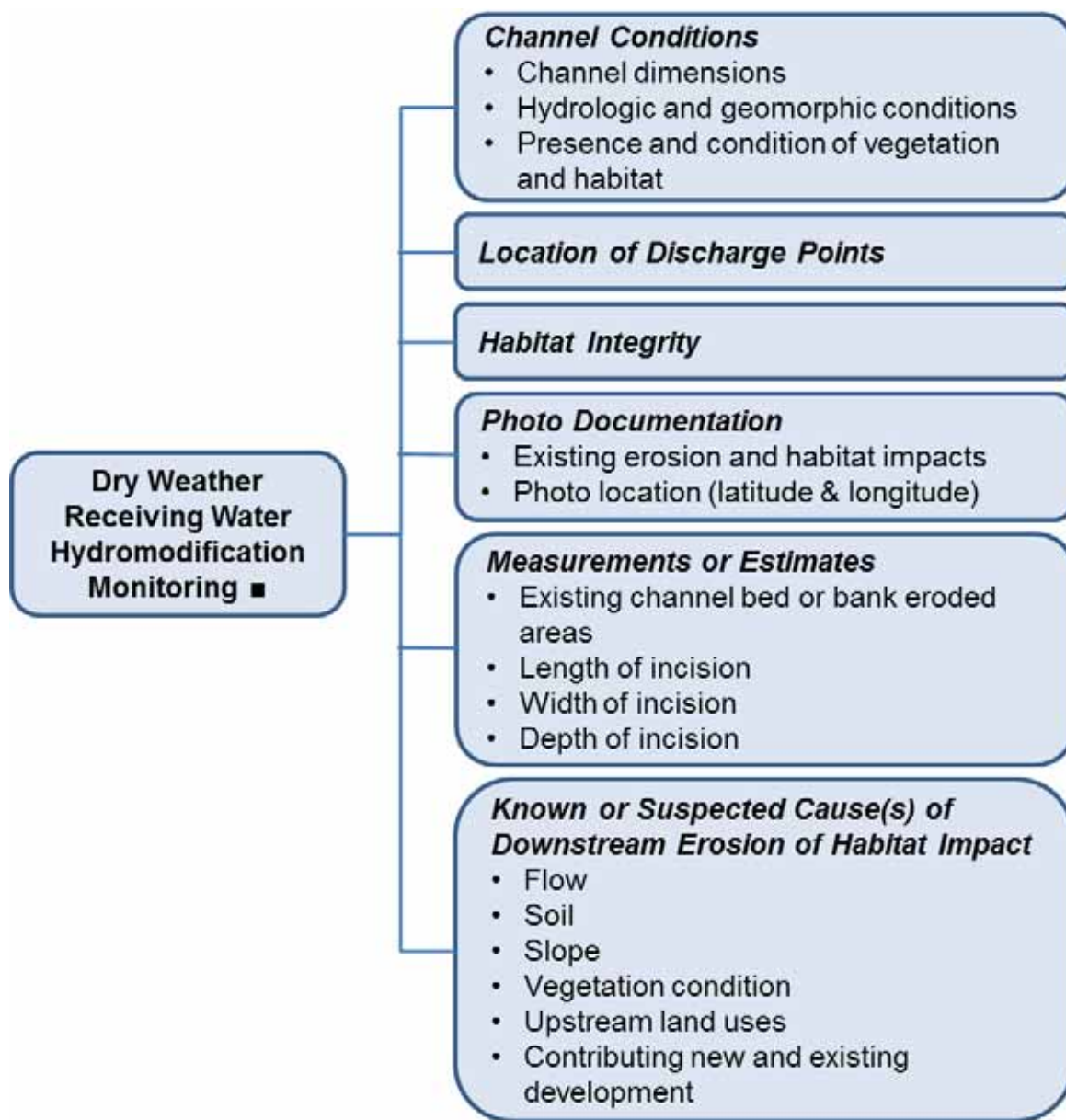
This section describes the sampling and data collection methods for the dry weather receiving water hydromodification monitoring requirements as outlined in Provision D.1.c.(6) of the MS4 Permit.

In addition to the hydromodification monitoring conducted as part of the Copermittees' Hydromodification Management Plans, hydromodification monitoring for SR-MLS is required at least once during the MS4 Permit term. The Copermittees must collect the following hydromodification monitoring observations and measurements within an appropriate domain of analysis during at least one dry weather monitoring event for each long-term receiving water monitoring location:

- Channel conditions, including: Channel dimensions, hydrologic and geomorphic conditions, and presence and condition of vegetation and habitat
- Location of discharge points
- Habitat integrity
- Photo documentation of existing erosion and habitat impacts, with location (i.e., latitude and longitude coordinates) where photos were taken
- Measurement or estimate of dimensions of any existing channel bed or bank eroded areas, including length, width, and depth of any incisions
- Known or suspected cause(s) of existing downstream erosion or habitat impact, including flow, soil, slope, and vegetation conditions, as well as upstream land uses and contributing new and existing development

The monitoring will coincide with the spring receiving water dry weather monitoring event in May or June and the dry weather receiving water bioassessment monitoring. The domain of analysis at each long-term monitoring location for dry weather hydromodification monitoring will be within the same reach of the channel as that used for dry weather bioassessment monitoring.

Figure A1-8 provides an outline of the hydromodification monitoring requirements and the methods for each assessment category. Detailed methods for each assessment category are described in the following sections.



Note: This figure describes detailed monitoring procedures and analytical methods that are illustrative and may be revised on the basis of site-specific environmental conditions and equivalent alternate analytical methods.

Figure A1-8
Dry Weather Receiving Water Hydromodification Monitoring

A.1.3.6.1 Channel Dimensions

Channel surveys will be conducted at each monitoring location to gather basic hydraulic measurements of the receiving water channels. Channel surveys will be conducted using a DeWalt self-leveling rotary laser. The cross-section survey involves placing endpoints at the highest point of the channel on each bank. A measuring tape will be stretched between the endpoints such that the zero end of the tape is attached to the

endpoint on the left bank of the channel (looking downstream). Channel depth will be measured across the channel from a stadia rod that is vertical and level from the channel bottom. The channel thalweg surveys will be conducted for the reach upstream and downstream of the cross-section. The average channel slope will be calculated from the survey data.

A.1.3.6.2 Hydrologic and Geomorphic Conditions

The geomorphic assessment will be conducted to characterize the susceptibility of the channel and gather basic hydraulic measurements of the receiving water channels. The geomorphic assessment comprises the channel survey and the Southern California Coastal Water Research Project (SCCWRP) channel assessment tool. The SCCWRP Field Manual (Bledsoe et al., 2010) will be used to assess the vertical and lateral susceptibility of the receiving water channels. The domain of analysis for each monitoring location is derived from the desk and field components of the screening tool and will be within reach of the channel used for dry weather bioassessment monitoring. A suite of field measurements will also be made to characterize the channel bed and banks, and overall stability state. Sediment samples will be collected to characterize bed materials. Fixed-interval pebble counts will be performed for each reach where the channel bed is composed of gravel or coarser material (Bunte and Abt, 2001), and channel beds composed of fine material will be noted as sand or cohesive materials (bed gradations are not required for channels with D50 less than (<) 2 millimeters [mm]).

A.1.3.6.3 Presence and Condition of Vegetation and Habitat Integrity

The presence and condition of vegetation and habitat integrity will be determined from the data collected during dry weather bioassessment monitoring. For dry weather bioassessment monitoring, the sampling will follow the protocols previously outlined in Section 2.5. Physical habitat quality assessments of the monitoring locations using the California Rapid Assessment Method (CRAM) will provide a numerical summary score of the physical conditions for each monitoring location. This method involves assessing the quality of the in-stream habitat features as well as the buffer zones (250 meters perpendicular to flow from each bank and 500 meters upstream and downstream of the monitoring reach), hydrologic source quality, and biotic structure quality. For each monitoring reach sampled, the physical habitat of the stream and its adjacent banks will be assessed to provide a record of the overall physical condition of the reach. Parameters such as substrate complexity, channel alteration and human influence, frequency of riffles, and width and quality of riparian zones will provide a more comprehensive understanding of the condition of the stream. Additionally, specific characteristics of the sampled riffles will be measured, including substrate size classes, stream depth, gradient, sinuosity, and flow volume. A final CRAM score will be calculated that can range from 25 to 100 points, with higher scores indicating higher quality conditions. CRAM ratings of good, fair, and poor are defined by the score (i.e., for the CRAM score range of 25-100, <50=low, 50-75=moderate, and >75=high).

A.1.3.6.4 Photo Documentation

A channel survey will be conducted and photographs will be used to document the conditions in the receiving water channels, including any existing erosion and habitat impacts. Photographs will be taken using a digital camera with a built-in Global Positioning System (GPS), altimeter, and compass. Photo documentation will be conducted using the general procedures outlined in San Diego Water Board Stream Photo Documentation Procedures for 401 Water Quality Certifications Standard Operating Procedure.

The following information will be recorded for each photograph:

- Project name
- General location
- Photographer and team members
- Photo number
- Date
- Time

At a minimum, photographs will be taken of the following:

- Long view up or down the stream (from stream level) showing changes in the stream bank and vegetation
- Long view and medium view of streambed changes (e.g., thalweg, gravel, meanders)
- Long views from a bridge or other elevated position
- Medium and close views of structures and plantings
- Medium views of bars and banks, with a person (preferably holding a stadia rod) in view for scale
- Close views of streambed with a ruler or other common object in the view for scale

A.1.3.6.5 Dimensions of Bed or Bank Eroded Areas

Measurements or estimates of dimensions of any bed or bank eroded areas, including length, width, and depth of any incisions, will be conducted during the channel survey. Bed or bank eroded areas will be documented with photographs as described in the channel survey section above.

A.1.3.6.6 Location of Discharge Points/Known or Suspected Causes of Erosion or Habitat Impact

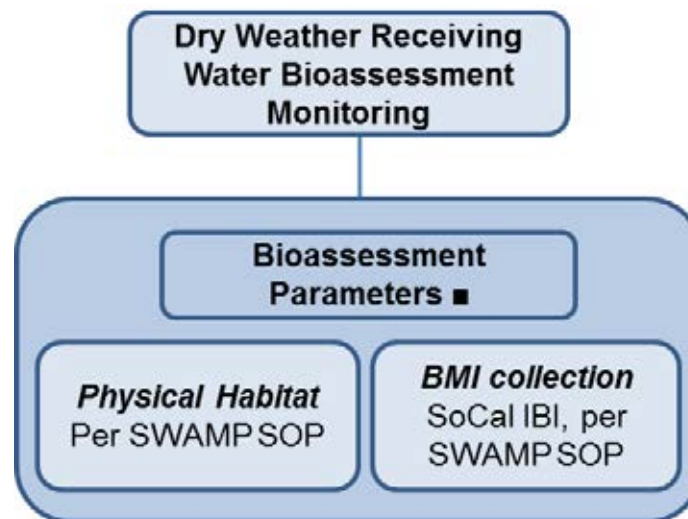
Known or suspected cause(s) of existing downstream erosion or habitat impact, including flow, soil, slope, and vegetation conditions, as well as upstream land uses and contributing new and existing development, will be assessed during a GIS desktop exercise and the SCCWRP channel assessment tool.

A.1.3.7 Dry Weather Receiving Water Bioassessment Monitoring

Dry weather receiving water bioassessment monitoring will be conducted in accordance with the MS4 Permit (Provisions D.1.a.(1), D.1.a.(3)(a), D.1.c.(5), and D.1.e.(1)(a)). Dry weather receiving water bioassessment monitoring will include bioassessment at each long-term receiving water monitoring location and participation in the SMC Regional Monitoring Program. Bioassessment surveys will be conducted during the spring/summer dry season bioassessment index period, typically from May through July. Benthic macroinvertebrates (BMIs) and physical habitat data will be collected following the *SWAMP Bioassessment Procedures: Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California* (Ode, 2007) using the reach-wide benthos method. Benthic algae (i.e., periphyton) monitoring will be conducted in accordance with the *SWAMP Standard Operating Procedures for Collecting Stream Algae Samples and Associated Physical Habitat and Chemical Data for Ambient Bioassessments in California* (Fetscher et al., 2009). Samples will be collected and processed for ash-free dry mass (AFDM), chlorophyll-a analysis, and periphyton taxonomy. Reach-wide algal cover will be quantified as part of the SWAMP physical habitat assessment. Physical habitat quality of the monitoring locations will be quantified using CRAM for estuarine wetlands (Collins et al., 2013).

The SWAMP sampling protocol includes the collection of stream BMI and also assesses the physical quality and condition of the streambed and banks in detail. (Note: A physical habitat index based on the SWAMP procedure has not been developed at the time of this report). CRAM assessments incorporate broader buffer zone and land use attributes than do SWAMP assessments, and also provide a numerical quality score for each monitoring location. BMIs reside in streams for periods ranging from a month to several years, and have varying sensitivities to the multiple stressors associated with urban runoff. Using species-specific tolerance values and community species composition, numerical biometric indices are calculated, allowing for comparison of relative habitat health among streams in a region. By assessing the invertebrate community structure of a stream, a cumulative measure of stream habitat health and ecological response is obtained.

The data include a taxonomic listing of all BMIs identified in the surveys, and calculation of the biological metrics listed in the California Stream Bioassessment Procedure (CSBP). Additionally, calculation of two indices that rate the overall BMI community quality will be performed. These include the Index of Biotic Integrity (IBI) (Ode et al., 2005) and the observed to expected (O/E) ratio of taxa (Hawkins, Western Center for Monitoring and Assessment, 2010). Figure A1-9 provides an outline of the bioassessment monitoring requirements.



Note: This figure describes detailed monitoring procedures and analytical methods that are illustrative and may be revised on the basis of site-specific environmental conditions and equivalent alternate analytical methods.

Figure A1-9
Dry Weather Receiving Water Bioassessment Monitoring

A.1.3.7.1 2015 SMC Regional Monitoring Program

The 2015 SMC Regional Monitoring Program is currently being developed. The SMC Bioassessment Technical Workgroup is working to determine which components of the 2009-2013 SMC Regional Monitoring Program were effective tools for achieving the program's goals and what monitoring elements may be suspended or added for future assessments. Beginning in 2015, SMC will confirm the monitoring locations under this program.

A.1.3.7.2 Monitoring Reach Delineation

Using SWAMP methodology, every monitoring reach is 150 meters in length and will be sampled from downstream to upstream. If a portion of a reach is inaccessible, the reach length may be reduced to as little as 100 meters. The bioassessment reaches are placed as closely as possible to the water quality and flow monitoring locations.

A.1.3.7.3 Macroinvertebrate Sample Collection

BMI samples will be collected at evenly spaced 15-meter transects for a total of 11 transects in the 150-meter reach. The samples will be collected in an alternating margin-center-margin pattern. Collections will be made using a 1-foot-wide, 0.5-millimeter (mm)-mesh, D-frame kick-net. A 1-square-foot area upstream of the net will be sampled by disrupting the substrate and scrubbing the cobble and boulders, so that the organisms will be dislodged and swept into the net by the current. The duration of the sampling generally ranges from 1 to 3 minutes, depending on the substrate complexity. Every monitoring location will be sampled from downstream to upstream. The samples will be combined into a single composite sample for the reach, transferred to 1-quart jars, preserved with 95 percent ethanol, and returned to the laboratory for processing. Photographs will be taken of every monitoring location.

A.1.3.7.4 Multihabitat Periphyton Sample Collection

Periphyton (benthic algae) will be collected using the reach-wide procedure and within the same transects used for BMI collection, but offset 1 meter upstream to avoid disturbed substrate. Depending on the substrate type and the stream habitat, one of three sampling devices will be used to collect the substrate sample: a 12.6-square centimeter (cm²) rubber delimiter, a 4-centimeter (cm) diameter polyvinyl chloride (PVC) delimiter, or a syringe scrubber.

After all transects are sampled, the subsamples will be composited. The macroalgae will be gathered and separated from the composited liquid. A subsample of the macroalgae will be taken for the soft-bodied taxonomic identification sample. The composite liquid volume will be recorded, and the remaining macroalgae will be finely cut up and thoroughly mixed with the composite liquid. The homogenized sample will be used for the diatom taxonomic identification sample, as well as the two filtered biomass samples. The diatom and soft-bodied algae samples will be fixed accordingly before being delivered to the laboratory for taxonomic identification. Taxonomic identification will be performed by a qualified taxonomist. The remaining homogenized portion of the composite will be filtered in the field, and the filters will be placed on ice and/or frozen until delivery to the chemistry laboratory for chlorophyll-a and ash-free dry mass analysis.

A separate soft-bodied algae sample will be collected for qualitative taxonomic identification. The qualitative sample consists of a composite of all soft-bodied algae found within the reach. The sample will be left unpreserved and put on ice or refrigerated until delivery to the laboratory for taxonomic identification. Qualitative taxonomic identifications will be performed by a qualified taxonomist for the receiving water and SMC monitoring locations.

A.1.3.7.5 Physical Habitat Quality Assessment

For each monitoring reach sampled, the physical habitat of the stream and its adjacent banks will be assessed to provide a record of the overall physical condition of the reach. Parameters such as substrate complexity, channel alteration and human influence, frequency of riffles, and width and quality of riparian zones will provide a more comprehensive understanding of the condition of the stream. Additionally, specific characteristics of the sampled riffles will be measured, including substrate size classes, stream depth, gradient, sinuosity, and flow volume.

CRAM assessments of each monitoring location also will be performed. This method assesses the quality of the in-stream habitat features as well as the buffer zones (250 meters perpendicular to flow from each bank and 500 meters upstream and downstream of the monitoring reach), hydrologic source quality, and biotic structure quality. A final CRAM score will be calculated that can range from 25 to 100 points, with the higher scores indicating higher quality conditions.

Water quality measurements will be taken at each of the monitoring locations using a YSI Model 6600 (or comparable) data sonde. Measurements will include water temperature, specific conductance, pH, and dissolved oxygen. Samples will be collected for laboratory analysis following the protocols outlined in the SMC Regional Monitoring Program Workplan. Stream flow velocity will be measured with a Marsh-McBirney Model 2000 (or comparable) portable flowmeter, or will be visually estimated when the water is too shallow for the flowmeter.

A.1.3.7.6 Laboratory Processing and Analysis

Laboratory processing of BMI samples will follow the SWAMP Bioassessment Procedures: *Standard Operating Procedures for Laboratory Processing and Identification of Benthic Macroinvertebrates in California* (Woodward et al., 2012). At the laboratory, samples are poured over a No. 35 standard testing sieve (0.5-mm stainless-steel mesh), and the ethanol is retained for reuse. The sample is gently rinsed with fresh water, and large debris such as wood, leaves, or rocks are removed. The sample is transferred to a tray marked with grids approximately 50 cm² in size. One grid is randomly selected, and the sample material contained within that grid is removed and processed. In cases where the test organisms appear extremely abundant, a fraction of the grid may be removed.

The material from the grid is examined under a stereomicroscope, and all the invertebrates are removed, sorted into major taxonomic groups, and placed in vials containing 70 percent ethanol. If there are less than 600 test organisms in the grid, another grid is selected and processed. This process is repeated until 600 organisms are removed from the sample, or until the entire sample is sorted. Organisms from a grid in excess of 600 are also removed, counted, and recorded as “remaining test organisms,” so that estimated total organism abundance and density for the sample can be calculated. Terrestrial organisms, vertebrates, water-column associated organisms (e.g., copepods), and nematodes are not removed from the samples. Processed

material from the sample is placed in a separate jar and labeled “sorted,” and the unprocessed material is returned to the original sample container and archived. Sorted material is retained for QA purposes. All organisms are identified to Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT) standard taxonomic effort Level II (SAFIT, 2006).

A.1.3.7.7 Quality Assurance/Quality Control

QA/QC procedures for the Bioassessment Monitoring and SMC Program will be consistent with those outlined in Section 2.2.4. In addition, QA of the benthic infauna sample sorting will be performed on all of the samples to ensure at least a 90 percent removal rate of organisms. Organisms removed during sorting QA also will be identified. Taxonomic QA will be performed on 10 percent of the samples.

A.1.4 Data Management, Assessment, and Reporting

The Monitoring and Assessment Annual Report, which will be submitted to the RWQCB on January 31 annually, will include descriptions of monitoring conducted during the applicable monitoring year.

A.1.4.1 Data Management

Field Data Records and Analytical Data Reports will be sent to and kept by the Program Manager or specified contracted agency. Data will be submitted in a standardized California Environmental Data Exchange Network (CEDEN)-compatible format to the County of San Diego for their records.

The agency selected to conduct field efforts will review all Field Data Log Sheets for completeness, maintain the original hardcopies, and scan electronic copies (*.pdf) for storage in the project file. The field crew will retain the original Field Data Log Sheets. Summaries of sampling events will be emailed to the County of San Diego on a basis deemed appropriate by the County of San Diego.

The laboratories will provide data in electronic format (*.pdf copies of lab reports and an electronic data deliverable [EDD]). Formal analytical results will be submitted to contracted agency and/or the County of San Diego in *.pdf format and as an EDD within three weeks of submittal of samples. The contracted agency will review all lab reports and EDDs for accuracy and completeness. If necessary, the contracted agency will convert the submitted EDDs into a CEDEN-compatible format. Laboratories will retain original COC forms. The laboratories will also retain copies of the preliminary and final data reports.

In addition to providing formal results within three weeks of submittal of samples, the laboratories will report the results of indicator bacteria analyses via call or email upon completion or as soon as practical, especially if initial results indicate an exceedance of water quality objectives.

A.1.4.2 Assessment and Reporting

The assessment of receiving waters involves evaluating the physical, chemical, and biological conditions of the receiving waters and sediments. The RPs must assess the status and trends of receiving water quality conditions in coastal waters, enclosed bays, harbors, estuaries, and streams in the San Diego Bay WMA. This assessment includes evaluation of both dry weather and wet weather conditions. The receiving water assessment to be presented in the Water Quality Improvement Plan Annual Report will:

- Assess whether or not the conditions of the receiving waters are meeting the numeric goals established in Water Quality Improvement Plan
- Identify the most critical beneficial uses that must be protected to ensure the overall health of the receiving water
- Evaluate whether or not those critical beneficial uses are being protected
- Identify short-term and/or long-term improvements or degradation of those critical beneficial uses
- Consider whether or not the strategies established in the Water Quality Improvement Plan contribute toward progress in achieving the interim and final numeric goals of the Water Quality Improvement Plan
- Identify data gaps in the monitoring data needed to assess the provisions above

Attachment A

Stream Rating and Channel Survey Details

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Stream Ratings

The flow rate at each of the monitoring locations will be determined by stream stage (water level) sensors that are typically secured to the bottom of the channel. To quantify flow rates on the basis of stream stage, a relationship between flow and stage will be derived using the standardized stream rating protocols developed by the U.S. Geological Survey (USGS) (Rantz, 1982; Oberg et al., 2005). Instantaneous flow measurements will be taken at various stages at each of the monitoring locations. The measurements will be combined to produce and calibrate the rating curve for each monitoring location.

To accurately measure flow in streams, the following elements are needed to develop the rating curves:

- An accurate survey of the stream channel cross-section and longitudinal slope
- Accurate level measurements based on a fixed point
- Measurements of velocity and flows at several points throughout the rating curve, including low flow, mid flow, and peak flow conditions

To measure instantaneous flows during low flow and base flow conditions, two velocity measurement instruments are typically used—a Marsh-McBirney Model 2000 Portable Flowmeter connected by a cable to an electromagnetic open channel velocity sensor and the SonTek (YSI) FlowTracker Acoustic Doppler Velocimeter. The FlowTracker is a high-precision, shallow-water flowmeter that measures velocity in three dimensions and features an automatic discharge computation.

To make an instantaneous flow measurement, a tape measure is stretched across the stream, perpendicular to flow and secured on both banks of the stream. The tape is positioned so that it is suspended approximately 1 foot above the surface of the water. The distance on the tape directly above the waterline (i.e., where the water meets the bank) is recorded as the initial point. The first measurement is made at the first point where there is adequate water depth (i.e., at least 0.2 foot) and measurable velocity. At this point, three measurements are made, including water depth, velocity, and distance from the bank (the initial point). Subsequent depth, velocity, and distance measurements are made incrementally across the entire width of the channel. Data from the field measurements are entered into a computer model that calculates the stream's cross-sectional profile from the depth and distance from bank measurements. Total flow across the channel is determined by integrating the velocity measurements over the cross-sectional surface area of the stream channel. The result is an instantaneous flow measurement in cubic feet per second.

A StreamPro Acoustic Doppler Current Profiler (ADCP) is used to measure mid- and high-stage flow conditions. The StreamPro ADCP is the USGS instrument of choice for measuring flows nationwide (Oberg et al., 2005). The instrument is pulled across the stream either by walking across a bridge or attaching the unit to a tagline. Data are collected in real time and transmitted by a wireless data link to a PC. Data can be viewed in real time and are typically post-processed following the field event in the office.

Rating curves are extended to high stream stages not measured using site-specific survey information and the Chézy–Manning formula (Linsley et al., 1982). The Chézy–Manning formula is an empirical formula for open channel flow, or flow driven by gravity, as follows:

$$Q = (1.486 / n) A R^{2/3} S^{1/2}$$

where:

- Q = flow
- n = Manning Roughness coefficient
- A = cross-sectional area
- R = hydraulic radius
- S = hydraulic slope

The hydraulic radius is derived as follows:

$$R = A / P$$

where:

- A = cross-sectional area of flow (ft²)
- P = wetted perimeter (ft)

The Chézy–Manning formula was developed for conditions of uniform flow in which the water surface profile and energy gradient are parallel to the streambed and the area, hydraulic radius, and depth remain constant throughout the reach. Field surveys of the channel geometry of each MLS will be conducted to compute the channel characteristics for each station.

Channel Surveys

Channel surveys will be conducted at each monitoring location to gather basic hydraulic measurements of the receiving water channels and to derive stream discharge using the Chézy–Manning formula. Channel surveys will be conducted using a DeWalt self-leveling rotary laser. The cross-section survey involves placing endpoints at the highest point of the channel on each bank. A measuring tape is stretched between the endpoints such that the zero end of the tape is attached to the endpoint on the left bank of the channel (looking downstream). Channel depth is measured across the channel from a stadia rod that is vertical and level from the channel bottom. The channel thalweg surveys are conducted for the reach upstream and downstream of the cross-section. The average channel slope is calculated from the survey data.

Channel survey data are used with the Chézy–Manning formula to produce a rating curve for each sampling location. Each rating curve is calibrated using instantaneous flow measurements by adjusting the formula roughness coefficient.

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Attachment B
Toxicity Identification Evaluation/Toxicity Reduction Evaluation
Implementation Work Plan

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Toxicity Identification Evaluation / Toxicity Reduction Evaluation Implementation Draft Work Plan

Prepared for:

San Diego County Regional Copermittees

Prepared by:

Weston Solutions, Inc.
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January 16, 2015



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 LIST OF ACRONYMS

2007 Permit	RWQCB Order No. R9-2007-0001
2013 Permit	RWQCB Order No. R9-2013-0001
BMP	best management practice
BSA	bovine serum albumin
CLRP	Comprehensive Load Reduction Plan
Copermittees	San Diego Regional Copermittees
EDTA	ethylenediaminetetraacetic acid
IWC	instream waste concentration
JRMP	Jurisdictional Runoff Management Plan
LC ₅₀	median lethal concentration
LID	low impact development
MAP	Monitoring and Assessment Plan
MEP	maximum extent practicable
MS4	multiple separate storm sewer system
NOEC	no observed effect concentration
NPDES	National Pollutant Discharge Elimination System
PBO	piperonyl butoxide
QA/QC	quality assurance/quality control
RWQCB	Regional Water Quality Control Board
SMC	Stormwater Monitoring Coalition
SPE	solid phase extraction
STS	sodium thiosulfate
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
TIE	toxicity identification evaluation
TMDL	Total Maximum Daily Load
TRE	toxicity reduction evaluation
TST	Test of Significant Toxicity
USEPA	United States Environmental Protection Agency
WMA	Watershed Management Area
WQIP	Water Quality Improvement Plan
WURMP	Watershed Urban Runoff Management Program

 UNITS OF MEASURE

ppt	parts per thousand
%	percent
<	less than
>	greater than

1.0 INTRODUCTION

In May of 2013, San Diego Regional Water Quality Control Board (RWQCB) Order No. R9-2013-0001 (2013 Permit) was adopted. Provision B of the 2013 Permit requires Copermittees in each Watershed Management Area (WMA) to develop a Water Quality Improvement Plan (WQIP) which, per Provision B.4, incorporates a Monitoring and Assessment Program (MAP). Also, per Provision D.1.c.(4)(f), *“If chronic toxicity is detected in receiving waters, the Copermittees must discuss the need for conducting a TIE/TRE in the assessments required under Provision D.4.a.(2), and develop a plan for implementing the TIE/TRE to be incorporated in the Water Quality Improvement Plan.”*

A toxicity identification evaluation (TIE) is defined by the 2013 Permit as *“A set of procedures for identifying the specific chemical(s) responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.”* A toxicity reduction evaluation (TRE) is defined as *“A study conducted in a step-wise process designed to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. The first steps of the TRE consist of the collection of data relevant to the toxicity, including additional toxicity testing, and an evaluation of facility operations and maintenance practices and best management practices. A TIE may be required as part of the TRE, if appropriate.”*

This Work Plan outlines the process used to identify chronic toxicity in receiving waters, as well as guidance to prioritize the need to implement a TIE/TRE based on the magnitude and persistence of chronic toxicity. The Work Plan refers to the appropriate references for detailed sampling and analytical/toxicity test methods specific to the TIE/TRE treatment process. An example of a potential TRE decision process for receiving water samples (Stormwater Monitoring Coalition (SMC) Model Monitoring Technical Committee, 2004) is presented in Figure A-1. The process should be modified on location-specific and pollutant-specific basis, and a detailed work plan should be developed for the implementation of a pollutant reduction program once the specific pollutant(s) causing toxicity exceedances are identified.

This Work Plan focuses primarily on the implementation of the TIE/TRE process, recognizing the limitations of utilizing TRE guidance developed for point source discharges. Receiving water stations potentially capture pollutants from many sources with runoff flows and contaminant concentrations likely more variable than those from point source discharges. However, with modifications to the TRE guidance developed for point source discharges, a TRE may be conducted to attempt to identify sources of toxicity, propose mitigation measures for these sources, and conduct follow-up studies to confirm toxicity reduction. Any activities that result in consistently reducing toxicity to an acceptable level may be considered TRE activities (USEPA 2001).

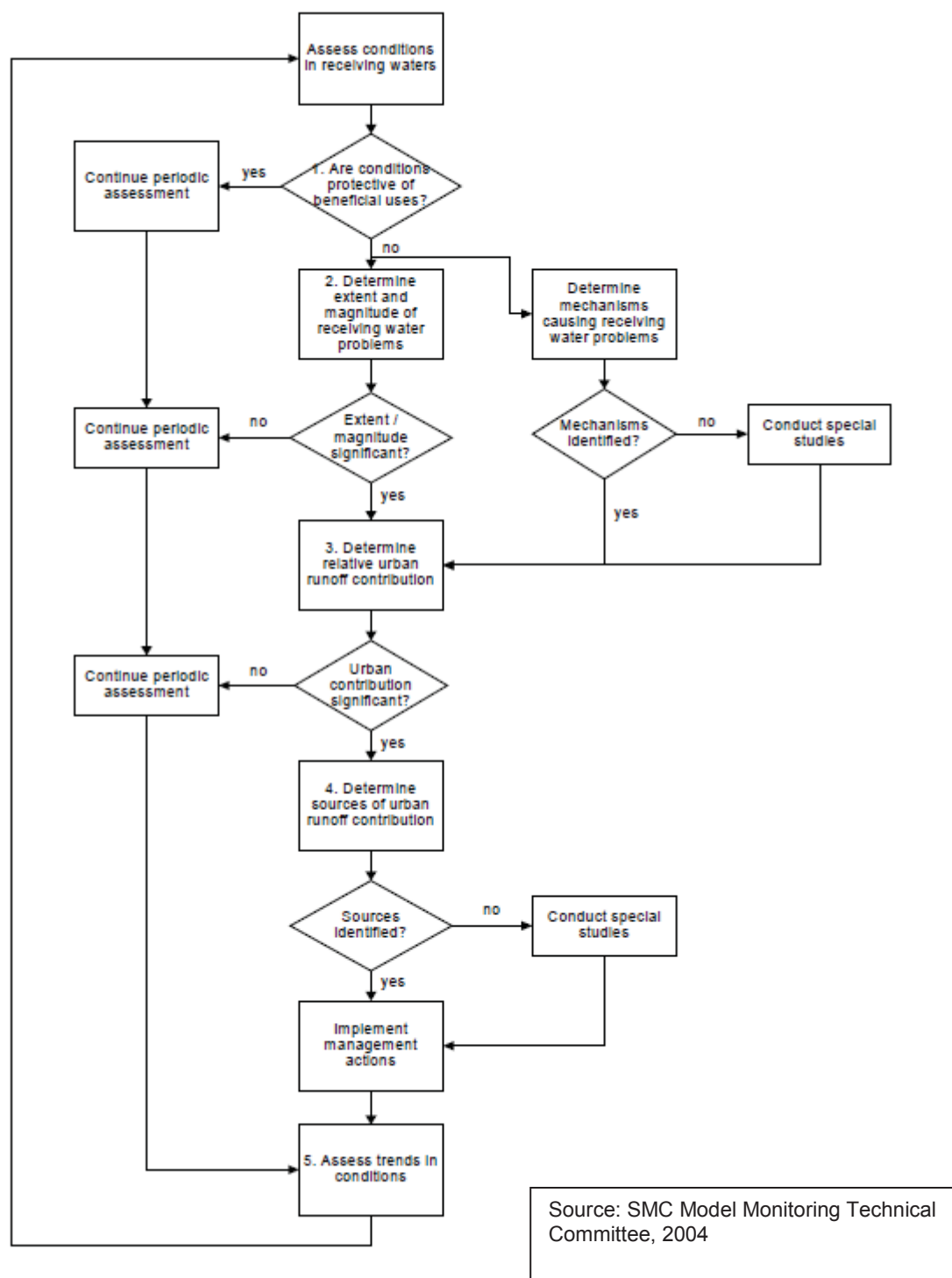


Figure A-1. Example Receiving Water Monitoring and TIE/TRE Decision Framework

2.0 RECEIVING WATER TOXICITY TESTING

Receiving water monitoring is conducted by the San Diego Regional Copemitees (Copemitees) in accordance with Provision D of the 2013 Permit and chronic toxicity is one of the parameters evaluated in both wet and dry weather receiving water samples. Under the long-term monitoring requirements of the 2013 Permit, chronic toxicity tests are conducted in accordance with Provision D.1.c.(4)(e) as summarized in **Table A-1**. Toxicity is evaluated using the Test of Significant Toxicity (TST) as outlined in the *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (USEPA, 2010). The TST approach assigns a Pass or Fail result based on whether the organism response observed at the chronic instream waste concentration (IWC) of 100 percent (%) receiving water is significantly different from that in the control treatment. When chronic toxicity is observed in receiving water samples (i.e., the sample receives a “Fail” based on the TST), implementation of a TIE/TRE process following the phased approach described in subsequent sections will be considered, as appropriate.

Table A-1. Transitional and Long-Term Receiving Water Toxicity Tests

Organism	Endpoint	Toxicity Threshold	USEPA Protocol
Monitoring in accordance with Order No. R9-2013-0001, Salinity < 1 ppt			
<i>Ceriodaphnia dubia</i>	Chronic survival and reproduction	Pass/Fail	EPA-821-R-02-013
<i>Selenastrum capricornutum</i>	Chronic growth		
<i>Pimephales promelas</i>	Chronic survival and growth		
Monitoring in accordance with Order No. R9-2013-0001, Salinity ≥ 1 ppt			
<i>Strongylocentrotus purpuratus</i>	Chronic development	Pass/Fail	EPA-600-R-95-136

3.0 TIE/TRE PROCESS

Information and Data Acquisition

Prior to initiating the TIE/TRE process, an evaluation of sampling and toxicity testing procedures should be conducted to assess whether toxicity may have been introduced during these procedures or errors may have been made. This may include a review of the following:

- Sampling equipment decontamination procedures
- Field and laboratory logs
- Laboratory reports

If all test acceptability criteria are met and no errors are identified, Copermittees will consider implementing the TIE/TRE process. Conducting a TIE is often the first step to identifying the toxicant.

TIE Testing

TIEs may be conducted in accordance with USEPA guidance for characterizing, identifying, and confirming toxicity (USEPA 1991, 1992, 1993a, and 1993b). Priority may be given to stations exhibiting significant and persistent toxicity that has not previously been characterized and where analytical results indicate that a specific toxicant may be causing or contributing to toxicity. The sample may be evaluated for TIE suitability using the following assessments:

- Presence of Persistent Toxicity: toxicity is considered persistent if more than 50% of samples (generally during a monitoring year) collected at a station receive a “Fail” based on the test of significant toxicity (TST).
- Magnitude of Toxicity: based on past experience, a 50% response rate (i.e. 50% of test organisms respond in a 100% receiving water sample) can provide a reasonable opportunity for a successful TIE.
- Previous Characterization: TIEs are generally prioritized for receiving water stations where previous TIEs have not characterized the pollutant(s) causing toxicity. However, TIE/TRE procedures should not be ruled out for previously characterized stations since contributor(s) to toxicity may change over time.

The TIE approach is divided into three phases, as described in USEPA (1991) and summarized as follows:

- Phase I – characterizes the physical/chemical nature of the constituent(s) which cause or contribute to toxicity. Such characteristics as solubility, volatility and filterability are determined without specifically identifying the toxicants.
- Phase II – utilizes methods to specifically identify toxicants.
- Phase III – utilizes methods to confirm the suspected toxicants.

Phase I (characterization) manipulations of receiving water samples generally include those presented in **Table A-2**.

Table A-2. Phase I TIE Receiving Water Sample Manipulations

Physical and Chemical Manipulations on Receiving Water Samples	Purpose of Test
Baseline	Confirms toxicity is still present in the sample at time of TIE testing
Filtration	Detects particulates or particulate-bound toxicants
Aeration	Detects volatile, oxidizable, sublutable, or spargeable compounds
Ethylenediaminetetraacetic acid (EDTA) addition	Detects cationic metals (e.g., cadmium)
Sodium thiosulfate (STS) addition	Detects oxidative compounds (e.g., chlorine)
Solid phase extraction (SPE) over C18 column (may be followed by methanol elution)	Detects non-polar organics and some surfactants (methanol elution adds toxicity back to sample)
Piperonyl butoxide (PBO) addition	Detects organophosphate pesticides and pyrethroids
Carboxyl esterase addition*	Hydrolyzes pyrethroids
Bovine serum albumin (BSA) addition	Protein BSA is used as a control for the carboxyl esterase
Temperature reduction	Increases toxicity of pyrethroid pesticides
pH adjustment	Detects pH-dependent toxicants (e.g., ammonia and sulfides)

* Carboxylesterase addition has been used in recent studies to help identify pyrethroid-associated toxicity (Wheelock et al., 2004; Weston and Amweg, 2007). However, this treatment is experimental in nature and should be used along with other pyrethroid-targeted TIE treatments (e.g., PBO addition).

Adjustments may be made to these TIE protocols if specific contaminants are suspected to be contributing to toxicity. For example, total dissolved solids (TDS) controls and/or mock effluents to mimic TDS concentrations observed in samples are often added to the treatments listed in **Table A-2** if ionic imbalance or elevated TDS are suspected. Toxicity due to ionic imbalance occurs when ion concentrations are not within the tolerance range of the selected test organism; utilizing *S. purpuratus* for toxicity tests conducted for samples with salinity > 1 ppt may help to alleviate this common issue, especially during dry weather.

Phase II and III TIEs may be necessary, depending whether the Phase I determination of toxicant class is sufficient for identifying pollutants for outfall monitoring and/or identifying source control measures. If necessary, Phase II and III procedures may include toxicant removal and add-back, serial additions, and/or toxicant spiking experiments in accordance with USEPA 1993a and 1993b.

It should be noted that, due to intermittent toxicity and/or toxicity resulting from multiple toxicants, TIEs are not always conclusive. In such cases, conducting toxicity tests with additional organisms (SMC Model Monitoring Technical Committee, 2004) and/or serially identifying toxicants (USEPA, 2001) may help characterize observed toxicity. When a receiving water sample exhibits persistent toxicity of a high magnitude, as is generally the case when TIEs are conducted, TIEs are typically successful (USEPA, 2001).

Toxicity Source Evaluation

Once any toxicants have been identified during the TIE process, Copermittees must discuss the need for conducting a TRE. The following sections provide an outline for developing specific monitoring elements intended to focus the effort in locating the source(s) of the pollutant(s).

If urban runoff is suspected as a significant source of the pollutant(s) characterized by a TIE to be a contributor to toxicity at a receiving water station, source identification procedures may need to be considered. An evaluation of chemistry and bioassessment data for the receiving water station and chemistry data for upstream outfalls may help to confirm whether urban runoff is a significant source of the pollutant(s) causing toxicity and may justify further source identification procedures.

More comprehensive source identification procedures, if warranted, may include compiling descriptions of all potential sources to the receiving water station, determining actual sources and their relative magnitudes, and quantitatively estimating loads from these sources. A model for a source identification investigation study is outlined in the *Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California* (SMC Model Monitoring Technical Committee, 2004) and more detailed source identification study methodology is outlined in USEPA (1993c) and by Pitt (2004). The general approach may include a combination of the components presented in **Figure A-2**.

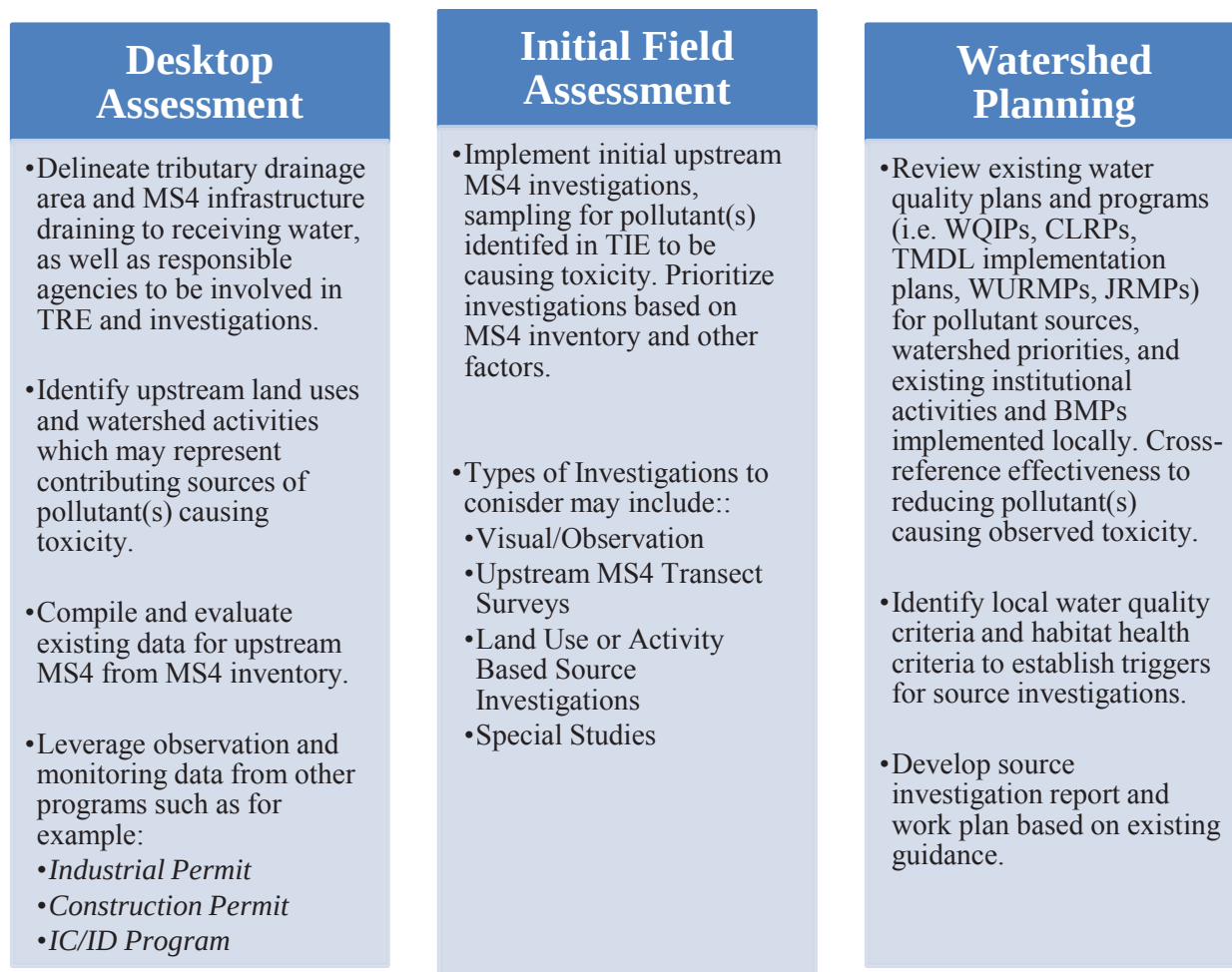


Figure A-2. The Toxicity Source Evaluation Approach

Source identification efforts may coordinate with monitoring and assessment activities necessary for compliance with the following Provisions:

- Provision A.4.a.(2) – If it is determined that discharges from the MS4 are causing or contributing to a new exceedance of an applicable water quality standard not addressed by the WQIP, update the WQIP with the water quality improvement strategies implemented or to be implemented, the implementation schedule, and the monitoring and assessment program updates intended to track progress toward achieving compliance.
- Provision B.2.d – identify and prioritize known and suspected sources of stormwater and non-stormwater pollutants from MS4 outfalls that contribute to the highest priority water quality conditions, as identified in the WQIP.
- Provision B.3 – identify water quality improvement goals and strategies to address the highest priority water quality conditions, as identified in the WQIP.
- Provision D.2.b – perform dry weather MS4 outfall monitoring to identify non-storm water flows and illicit discharges within its jurisdiction and to prioritize these discharges for investigation and elimination.

- Provision D.2.c – perform wet weather MS4 outfall monitoring to identify pollutants in storm water discharges from the MS4, guide pollutant source identification efforts, and determine compliance with applicable Total Maximum Daily Loads (TMDLs).
- Provision D.3 – conduct special studies related to the highest priority water quality conditions. Provision D.3.c specifies that special studies related to pollutant and/or stressor source identification should include a compilation of known information on the pollutant and/or stressor, an identification of data gaps intended to be filled by the studies, and a monitoring plan which includes, among other required elements, a prioritization of sources of the pollutant and/or stressor.
- Provision E.2 – implement a program to detect and eliminate illegal discharges and improper disposal into the MS4.

If no source can be identified as a major contributor to receiving water toxicity, more intensive follow-up studies may be required.

Toxicity Control Evaluation

Using the results from the TRE elements conducted to this point, alternatives for reducing receiving water toxicity may be identified and the most feasible approach(es) may be selected. Pollution Prevention measures are designed to target pollutants and wastes before they are generated, while Source Controls are designed to reduce or eliminate pollutants before entering the MS4. These measures may include outreach, incentive programs, regulatory controls, and enforcement activities, as well as broader “true source controls” that must be implemented at a national or state level (e.g., product regulation). Institutional Programs, such as street sweeping, MS4 cleaning and repair, and other institutional services are typically maintenance activities implemented by agencies at various targeted frequencies to meet pollutant load reduction goals and minimum National Pollutant Discharge Elimination System (NPDES) Permit compliance criteria. Treatment Controls include structural systems designed to remove pollutants from stormwater and non-stormwater flows and may include a variety of low impact development (LID) and best management practices (BMPs) (e.g., infiltration-type, bioremediation, treatment trains, etc.). These BMPs are intended to protect receiving waters by eliminating or reducing the discharge of pollutants to the maximum extent practicable (MEP). Advantages and disadvantages of BMP alternatives should be considered, and appropriate BMPs should be selected based on site-specific conditions and pollutant(s) of concern. An integrated approach using a combination of Pollution Prevention measures, Institutional Programs, and Treatment Controls may be appropriate if more than one pollutant is identified to be causing or contributing to toxicity, or if the source is unknown. These three components of the toxicity control evaluation are shown in **Figure A-3**.

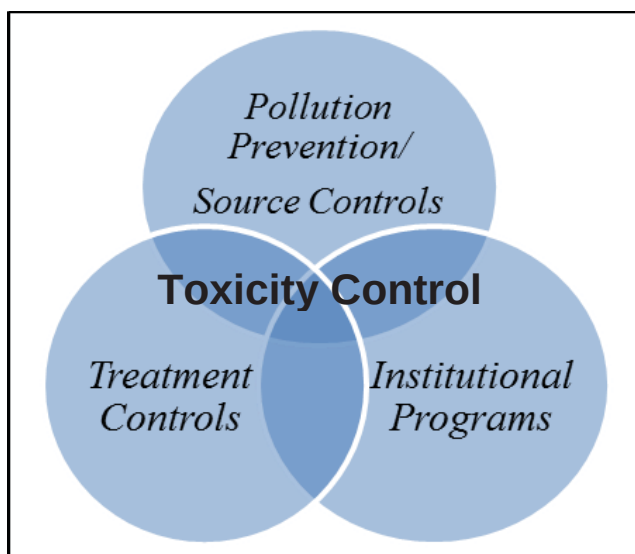


Figure A-3. Components of Toxicity Control Evaluation

Toxicity Control Implementation

Once the selected toxicity control method(s) are implemented, monitoring may be continued and possibly accelerated to confirm that toxicity reduction objectives are being met. Depending on the location and pollutant(s) being evaluated, some of this monitoring may be satisfied by Permit-required monitoring of receiving water and outfall locations (see Section 0).

Compliance with the monitoring and assessment requirements of the 2013 Permit, including Provision D.1.c.(4)(f) which requires the implementation of the TIE/TRE process described in this Work Plan, is intended to meet the discharge and receiving water limitations outlined in the 2013 Permit to the MEP. Updates to the monitoring programs developed to comply with these provisions will be incorporated into the WQIP through the adaptive management process outlined in Provisions B.4 and B.5 in order to continually monitor effectiveness and re-evaluate the programs.

Quality Assurance/Quality Control

A quality assurance/quality control (QA/QC) program for the TIE/TRE should be developed in order to ensure reliability of data collected throughout the process. The QA/QC program should include the QA/QC objectives, sample collection and preservation techniques, chain of custody procedures, analytical QA/QC, laboratory equipment maintenance, QA/QC training requirements, documentation and reporting procedures, and corrective action protocols (USEPA, 1993c). In addition, toxicology and analytical laboratories should be experienced and qualified to conduct the TIE/TRE.

TIE/TRE Limitations

There are inherent limitations associated with the TIE/TRE process summarized in this Work Plan, including the difficulty of characterizing intermittent toxicity (USEPA, 1993c) and/or toxicity resulting from multiple toxicants (USEPA, 2001). In addition, existing TRE guidance was developed primarily for point source discharges from wastewater treatment plants whereas receiving waters potentially capture pollutants from many sources and contain contaminants at more variable concentrations than those from a wastewater treatment facility, especially during a storm event.

4.0 REFERENCES

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ATTACHMENT A2. MS4 OUTFALL MONITORING PROGRAM – MONITORING PLAN

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ACRONYMS AND ABBREVIATIONS

Acronym or Abbreviation	Definition
%	percent
<	less than
303(d) list	Clean Water Act Section 303(d) List of Impaired Waterbodies
Bacteria TMDL	A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) To Incorporate Revised Total Maximum Daily Loads for Indicator Bacteria Project I—Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek) (RWQCB, February 10, 2010)
CMP	corrugated metal pipe
CP	concrete pipe
CWA	Clean Water Act
ELAP	California Environmental Laboratory Accreditation Program
GIS	Geographic Information System
IDDE	Illicit Discharge Detection and Elimination
JRMP	Jurisdictional Runoff Management Program
MS4	Municipal Separate Storm Sewer System
MS4 Permit	San Diego Regional Water Quality Control Board Order Number R9-2013-0001, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region
NAL	non-storm water action level
NPDES	National Pollutant Discharge Elimination System
PID	photoionization detector
QA	quality assurance
RCC	reinforced concrete channel
RCP	reinforced concrete pipe
RWQCB	Regional Water Quality Control Board, San Diego Region

ACRONYMS AND ABBREVIATIONS (CONTINUED)

Acronym or Abbreviation	Definition
SAL	storm water action level
SWAMP	Surface Water Ambient Monitoring Program
TBD	to be determined
TKN	total Kjeldahl nitrogen
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WMA	Watershed Management Area
WQBEL	Water Quality Based Effluent Limit
Water Quality Improvement Plan	Water Quality Improvement Plan
WQO	Water Quality Objective
WURMP	Watershed Urban Runoff Management Program

A.2 INTRODUCTION

In May 2013, the San Diego Regional Water Quality Control Board (RWQCB) Order No. R9-2013-0001, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirement for Discharges From The Municipal Separate Storm Sewer Systems (MS4s) Draining The Watersheds Within the San Diego Region (MS4 Permit; RWQCB, 2013) was adopted, replacing RWQCB Order No. R9-2007-0001 (RWQCB, 2007), and became effective June 27, 2013. The MS4 Permit prescribes monitoring programs for the MS4 outfalls during wet and dry weather for the duration of the Permit cycle.

A.2.1 Program Overview

In the San Diego Bay Watershed Management Area (WMA), the Responsible Parties (RPs) are named under the MS4 Permit:

- Airport Authority
- City of Chula Vista
- County of San Diego
- City of Coronado
- City of Imperial Beach
- City of La Mesa
- City of Lemon Grove
- City of National City
- Port of San Diego
- City of San Diego
- Caltrans¹

The Copermittees are required to perform MS4 outfall monitoring in accordance with Provision D of the MS4 Permit. Permit-required MS4 outfall monitoring is composed of two major components:

- Dry Weather MS4 Outfall Discharge Monitoring (Provision D.2.b; RWQCB, 2013)
- Wet Weather MS4 Outfall Discharge Monitoring (Provision D.2.c; RWQCB, 2013)

¹ The California Department of Transportation (Caltrans) is not listed in the Municipal Permit as a Copermittee, but is participating voluntarily in the development of the Water Quality Improvement Plan as a Chollas Creek TMDL Responsible Party. Caltrans' participation is limited to an 864-acre area within the Chollas Creek Hydrologic Sub-Area (HSA) in the Pueblo HU.

The purpose of this monitoring plan is to describe the monitoring and assessment requirements and procedures for the San Diego Bay WMA MS4 Outfall Discharge Monitoring Program required by the MS4 Permit.

A.2.2 Dry Weather MS4 Outfall Discharge Monitoring

This section details the dry weather MS4 outfall monitoring required to comply with the MS4 Permit. Each Copermittee is required to perform dry weather MS4 outfall prioritization and monitoring to aid in the identification of non-storm water and illicit discharges within its respective jurisdictions as required by Provision D.2.b of the MS4 Permit.

A.2.2.1 MS4 Outfall Inventory

The Copermittees have identified the known major MS4 outfalls that discharge directly to receiving waters within their respective jurisdictions within the San Diego Bay WMA. The identified major MS4 outfalls have been geo-located on respective Geographic Information System (GIS) jurisdictional map of the San Diego Bay WMA as required by Provision D.2.a.(1) of the MS4 Permit. Each Copermittee will individually maintain, confirm, and update its respective maps during annual field screening (Provision D.2.a.(2)). The respective jurisdictional MS4 maps contain the following items that, at a minimum, will be confirmed and updated during annual field screening as applicable:

- Segments of the MS4 owned, operated, and maintained by the Copermittee
- Known locations of inlets that discharge and/or collect runoff into the Copermittee's MS4
- Known locations of connections with other MS4s not owned or operated by the Copermittee
- Known locations of MS4 outfalls and private outfalls that discharge runoff collected from areas within the Copermittee's jurisdiction
- Segments of receiving waters within the Copermittee's jurisdiction that receive and convey runoff discharged from the Copermittee's MS4 outfalls
- Locations of the MS4 outfalls within each Copermittee's respective jurisdiction
 - Latitude and longitude of MS4 outfall point of discharge
 - Watershed Management Area
 - Hydrologic subarea
 - Outlet size
 - Accessibility (i.e. safety and without disturbance of critical habitat)
 - Approximate drainage area

- o Classification of whether the MS4 outfall is known to have persistent non-storm water flows, transient non-storm water flows, no non-storm water flows, or unknown non-storm water flows
- Locations of the selected non-storm water persistent flow MS4 outfall discharge monitoring stations within each Copermittee's respective jurisdiction.

Because of their size, geo-located MS4 outfall maps are not included in this monitoring plan. Table A2-1 presents the number of identified major outfalls in the San Diego Bay WMA by Copermittee.

Table A2-1
Number of Identified Major MS4 Outfalls by Copermittee

Jurisdiction	Number of Outfalls Per Year		
	Total Major Outfalls for Dry Weather Field Screening ^{1,2}	Dry Weather Monitoring (Persistently Flowing Outfalls) ³	Wet Weather Monitoring
Airport Authority ^{1,4}	0	0(0)	0
Chula Vista ²	184	5(5)	1
Coronado ¹	7	5(1)	1
Imperial Beach ¹	2	2(2)	1
La Mesa ¹	3	3(0)	1
Lemon Grove ¹	4	1(1)	1
National City ¹	19	5(5)	1
City of San Diego ¹	94	5(5)	1
County of San Diego ¹	57	5(5)	1
Port of San Diego ¹	65	5(2)	1

Notes:

1. For Copermittees with fewer than 125 major outfalls that discharge to receiving waters in the WMA, 80% of major outfalls must be screened twice per year.
2. For Copermittees with more than 125 but fewer than 500 major outfalls that discharge to receiving waters in the WMA, all major outfalls that discharge to receiving waters must be screened once per year.
3. Jurisdictions with less than five persistently flowing outfalls may still conduct field observations at five outfalls during dry weather for additional data collection, as represented by the first number in the column. The second number (in parenthesis) indicates the number of persistent flowing outfalls monitored for analytical under this program, with a maximum of the five highest priority outfalls per jurisdiction, as consistent with Municipal Permit Provision D.2.b(2)(b)(i).
4. The Airport Authority has two major outfalls that are tidally influenced and cannot be safely screened or monitored. The nearest safe upstream access points will be screened/monitored as a proxy.

A.2.2.2 Field Screening

Each Copermittee is required to conduct field screening to determine which non-storm water MS4 outfall discharges are transient flows and which have persistent flows, and to prioritize the non-storm water MS4 discharges that will be investigated and eliminated in accordance with the Illicit Discharge Detection and Elimination (IDDE) program.

A.2.2.2.1 Monitoring Locations and Frequency

Per the requirements of Provision D.2.a.(2).(a) of the MS4 Permit, the number of major outfalls required to be screened is dependent upon the number of known major outfalls present in a Copermittee's inventory. The requirements are as follows:

- For Copermittees with fewer than 125 known major MS4 outfalls that discharge to receiving waters within a given WMA, at least 80 percent of the outfalls are required be visually inspected two times per year during non-storm water conditions. The following Copermittees in the San Diego Bay WMA fall into this category:
 - o Airport Authority
 - o County of San Diego
 - o City of Coronado
 - o City of Imperial Beach
 - o City of La Mesa
 - o City of Lemon Grove
 - o City of National City
 - o Port of San Diego
 - o City of San Diego²
- For Copermittees with 125 major MS4 outfalls or more, but fewer than or equal to 500 that discharge to receiving waters within a WMA, all the outfalls is required be visually inspected at least annually during non-storm water conditions. The following Copermittees in the San Diego Bay WMA fall into this category:
 - o City of Chula Vista

² The City of San Diego has 502 outfalls within the City jurisdiction. The City of San Diego in accordance with D.2.a(2).(a).(iv) is required to screen 500 sites City-wide once per year. The City is not required to screen 500 sites within each watershed.

- For Copermittees with more than 500 major MS4 outfalls that discharge to receiving waters within a WMA, at least 500 outfalls are required to be visually inspected at least annually during non-storm water conditions. Copermittees with more than 500 major MS4 outfalls within a WMA are required to identify and prioritize at least 500 outfalls to be inspected considering the following:
 - o Assessment of connectivity of the discharge to a flowing receiving water
 - o Reported exceedances of non-storm water action levels (NALs) in water quality monitoring data
 - o Surrounding land uses
 - o Presence of constituents listed as a cause for impairment of receiving waters in the WMA listed on the Clean Water Act (CWA) Section 303(d) List (303(d) list);
 - o Flow rate
- For a Copermittee with portions of its jurisdiction in more than one WMA and more than 500 major MS4 outfalls within its jurisdiction, at least 500 major MS4 outfalls within its inventory are required to be visually inspected at least annually during non-storm water conditions. Copermittees with more than 500 major MS4 outfalls in more than one WMA are required to identify and prioritize at least 500 outfalls to be inspected considering the following:
 - o Assessment of connectivity of the discharge to a flowing receiving water
 - o Reported exceedances of NALs in water quality monitoring data
 - o Surrounding land uses
 - o Presence of constituents listed as a cause for impairment of receiving waters in the Watershed Management Area listed on the CWA Section 303(d) List
 - o Flow rate
- Inspections of major MS4 outfalls conducted in response to public reports and staff or contractor reports and notifications may count toward the required visual inspections of MS4 outfall discharge monitoring stations

Based on these criteria, Table A2-2 details the frequency at which Copermitees will inspect major outfalls within the San Diego Bay WMA.

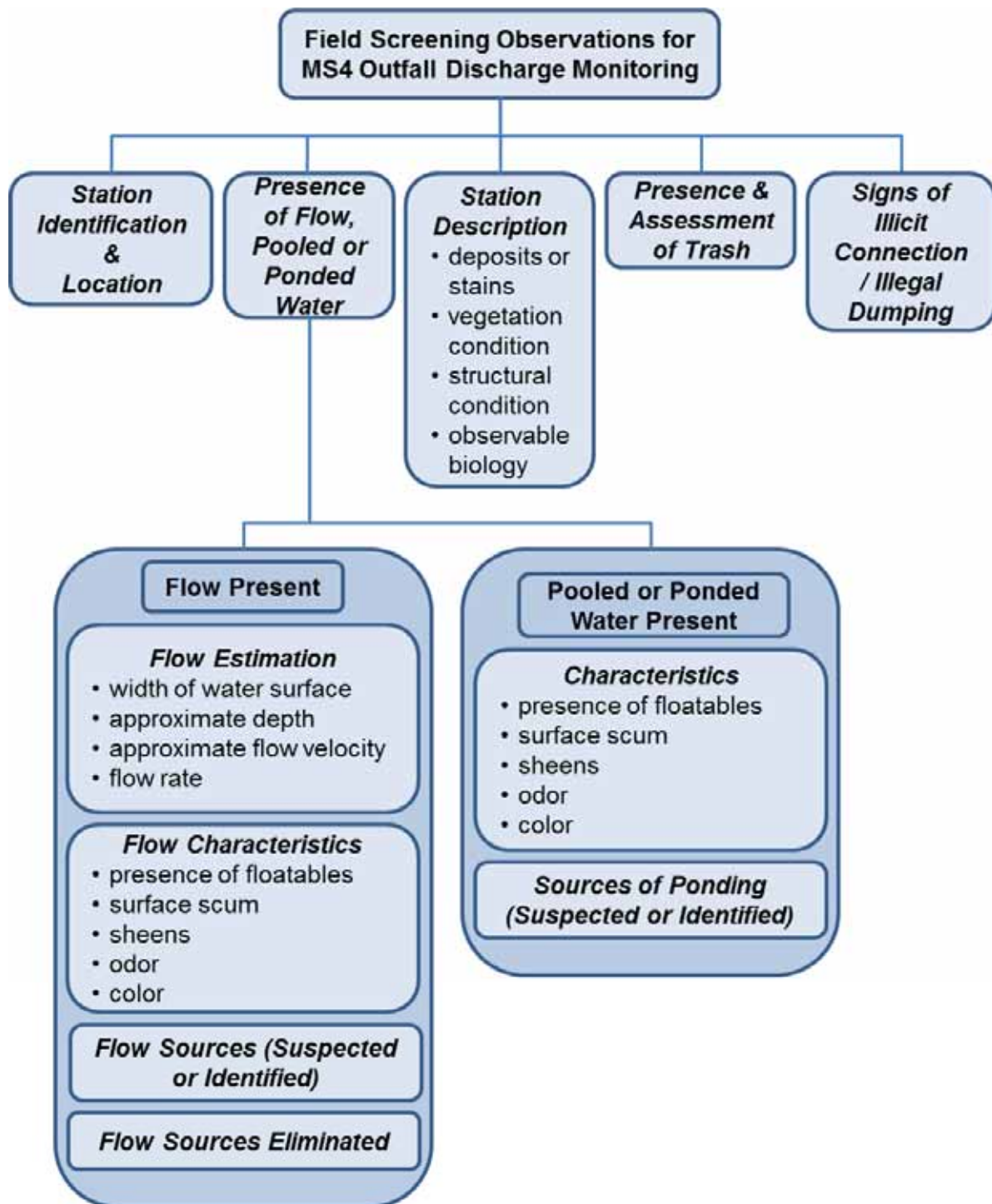
Table A2-2
MS4 Outfall Screening Frequency

Number of Major Outfalls	Major Outfalls Required to be Screened	Frequency of Screening
0-125	80%	2 per year
125-500	100%	1 per year
500+	≥500	1 per year

A.2.2.2.2 Visual Observations

Per the MS4 Permit, during a field screening visual observation inspection, each MS4 outfall selected for screening will be inspected following at least 72 hours of dry weather after any storm event producing greater than 0.10 inch of rainfall within a 24-hour period. Figure A2-1 details the visual observations that will be recorded during each field screening visual observation inspection, per the requirements of Provision D.2.a.(2) of the MS4 Permit.

Flow estimation will be performed as described in Attachment A.



Note: This figure describes detailed monitoring procedures and analytical methods that are illustrative and may be revised on the basis of site-specific environmental conditions and equivalent alternate analytical methods.

Figure A2-1
Dry Weather MS4 Outfall Field Screening

A.2.2.3 Non-Storm Water Persistent Flow MS4 Outfall Discharge Monitoring

Each Copermittee is required to perform non-storm water persistent flow MS4 outfall discharge monitoring to determine whether persistent non-storm water discharges may be impacting receiving water quality.

A.2.2.3.1 Outfall Prioritization

Copermittees must each identify a minimum of the 5 highest priority major MS4 outfalls with non-storm water persistent flows that they will monitor within their respective jurisdictions in the San Diego Bay WMA, in accordance with MS4 Permit Provision D.2.b.(2)(b) (RWQCB, 2013). If a Copermittee has less than 5 major outfalls within the WMA, the Copermittee will monitor all its major MS4 outfalls with persistent flow. The Copermittees selected dry weather MS4 outfall discharge monitoring stations from the inventories developed pursuant to Provision D.2.b.(2)(a) for the San Diego Bay WMA as follows:

- *Based upon the dry weather MS4 outfall discharge field screening monitoring records developed pursuant to Provision D.2.a.(2)(c), each Copermittee must identify and prioritize the MS4 outfalls with persistent flows based on the highest priority water quality conditions identified in the Water Quality Improvement Plan and any additional criteria developed by the Copermittee, which may include historical data and data from sources other than what the Copermittee collects.*

A.2.2.3.2 Monitoring Locations and Frequency

The major MS4 outfalls with non-storm water persistent flows selected by each Copermittee are presented in Table A2-3 and mapped in Figure A2-2.

Each selected major outfall will be monitored least semi-annually. A Copermittee may substitute a next-highest priority major outfall for a selected major outfall in the event that one of the following criteria becomes applicable, until no qualifying major MS4 outfalls remain within the Copermittee's jurisdiction in the San Diego Bay WMA:

- The non-storm water discharges have been effectively eliminated (i.e., no flowing, pooled, or ponded water) for three consecutive non-storm water monitoring events.
- The source of the persistent flows has been identified as a category of non-storm water discharges that does not require an NPDES permit and does not have to be addressed as an illicit discharge because it was not identified as a source of pollutants.
- The constituents in the persistent flow non-storm water discharge do not exceed NALs.
- The source of the persistent flows has been identified as a non-storm water discharge authorized by a separate NPDES permit.

In the event of a substitution, each Copermittee will document the reprioritization of its highest priority persistent flow MS4 outfalls in the Water Quality Improvement Plan Annual Report.

Table A2-3
Selected Major MS4 Outfalls for Non-Storm Water Persistent Flow Monitoring

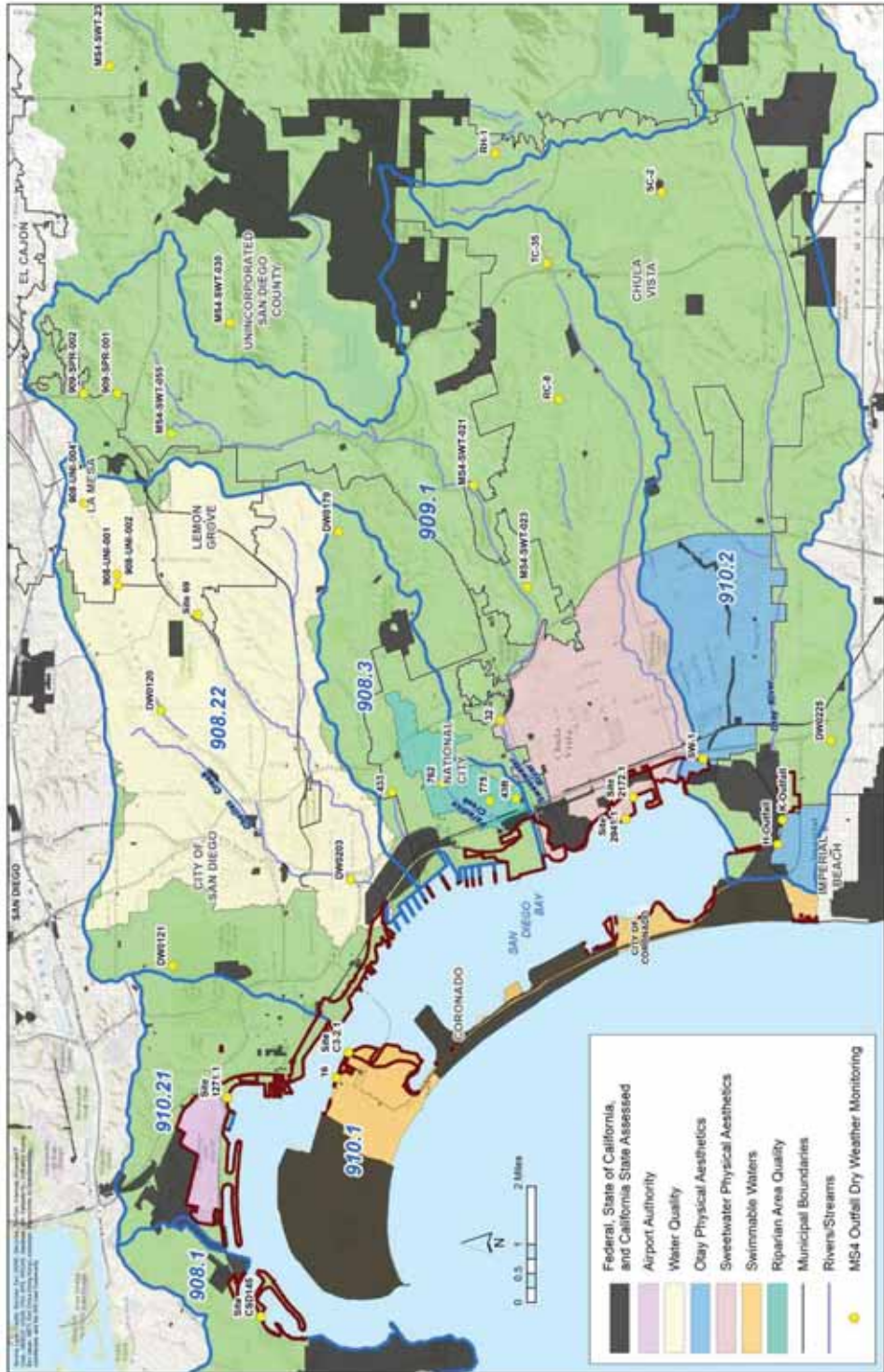
Jurisdiction	Dry Weather Outfall Monitoring Stations	HA or HSA	Latitude	Longitude
City of Chula Vista	RC-8	909.12	32.64437	-117.00262
	RH-1	910.32	32.66018	-116.94133
	SC-2	910.20	32.61855	-116.95102
	SW-1	910.20	32.60811	-117.09231
	TC-35	909.11	32.64729	-116.968793
City of Coronado	Outfall No. 16	910.1	32.70003	-117.17182
City of Imperial Beach	H-outfall	910.1	32.589468	-117.113711
	K-outfall	910.1	32.588304	-117.107516
City of La Mesa ¹	908-UNI-001	908.22	32.75463	-117.04908
	908-UNI-002	908.22	32.75498	-117.04639
	908-UNI-004	908.22	32.76308	-117.02855
	909-SPR-001	909.12	32.75483	-117.00118
	909-SPR-002	909.12	32.76324	-117.00118
City of Lemon Grove	Site 69	908.22	32.7347	-117.05626
City of National City	32	909.12	32.65887	-117.08274
	43B	908.32	32.65496	-117.10223
	433	908.31	32.686076	-117.100612
	762	908.32	32.67344	-117.09848
	775	908.32	32.66158	-117.10284
Port of San Diego ²	Site 2172.1	919.12	32.625611	-117.101921
	Site CSD145	908.1	32.718884	-117.231408
	Site 1271.1	908.21	32.727256	-117.176754
	Site C3-2.1	910.1	32.69697	-117.165551
	Site 2941.1	909.12	32.627538	-117.107337
Airport Authority	None. Both outfalls are tidal.	N/A	N/A	N/A
City of San Diego	DW0120	908.22	32.74385	-117.0802
	DW0203	908.22	32.69642	-117.122397
	DW0179	908.32	32.6995067	-117.0357083
	DW0121	908.22	32.74102	-117.1439
	DW0225	910.20	32.576139	-117.087742
County of San Diego	MS4-SWT-021	909.12	32.66561	-117.02409
	MS4-SWT-023	909.12	32.65221	-117.04956
	MS4-SWT-030	909.21	32.72662	-116.9835
	MS4-SWT-055	909.12	32.74139	-117.01119
	MS4-SWT-235	909.22	32.75674	-116.91961

Note: HA = Hydrologic Area; HSA = Hydrologic Sub-Area; TBD = to be determined

1. None of the outfalls listed for the city of La Mesa have persistent flow, but five outfalls are monitored as part of this program.

2. Only 2 of the Ports Outfalls are persistent, but five are monitored.

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Note:
None of the outfalls listed for the city of La Mesa have persistent flow, but five outfalls are monitored for visual field observations as part of this program.
Only 2 of the Ports Outfalls are persistent, but five are monitored.

Figure A2-2
Selected Major MS4 Outfalls for Non-
Storm Water Monitoring

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A.2.2.3.3 Field Observations

During the monitoring events, field observations will be recorded at each of the selected major outfall persistent flow monitoring sites. Flow estimation will be performed as described in Attachment A.

A.2.2.3.4 Field Monitoring

During the monitoring events, *in-situ* measurements for field monitoring parameters will be collected at each of the selected major outfall persistent flow monitoring sites. Field monitoring parameters include:

- pH
- Temperature
- Specific conductivity
- Dissolved oxygen
- Turbidity

Field monitoring will be documented on a field observation form. Analytical methods and detection limits for field monitoring parameters are provided in Section A.2.2.3.5.2.

A.2.2.3.5 Analytical Monitoring

A.2.2.3.5.1 Sample Collection

During the monitoring events, provided sufficient measurable flow is present, samples will be collected for analysis by an analytical laboratory. Grab samples will be collected according to the procedures described in Attachment B, and will follow Surface Water Ambient Monitoring Program (SWAMP) protocols. Quality assurance and quality control procedures are outlined in Attachment C.

A.2.2.3.5.2 Laboratory Analysis

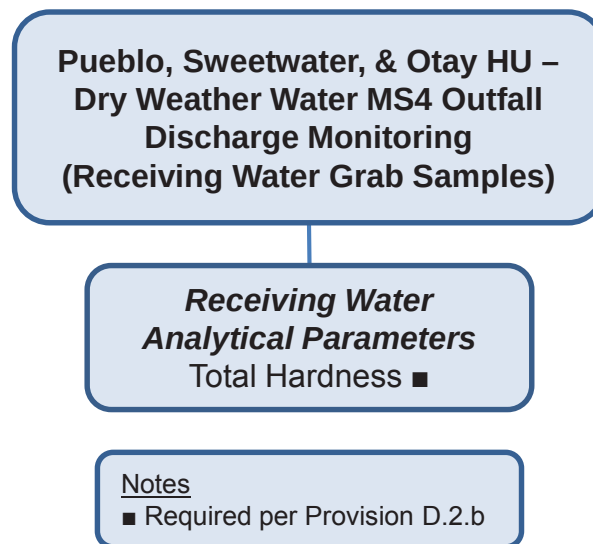
The required analyses are based upon the following five groupings of constituents:

- (1) Constituents contributing to the highest priority water quality conditions identified in the San Diego Bay WMA Water Quality Improvement Plan
- (2) Constituents listed as a cause for impairment of receiving waters in the San Diego Bay WMA as listed on the 303(d) list
- (3) Constituents for implementation plans or load reduction plans (e.g., Bacteria Load Reduction Plans, Comprehensive Load Reduction Plans) developed for the San Diego Bay WMA where the Copermitttees are listed RPs to a Total Maximum Daily Load (TMDL)

(4) Applicable NAL constituents listed in Provision C.1 of the MS4 Permit

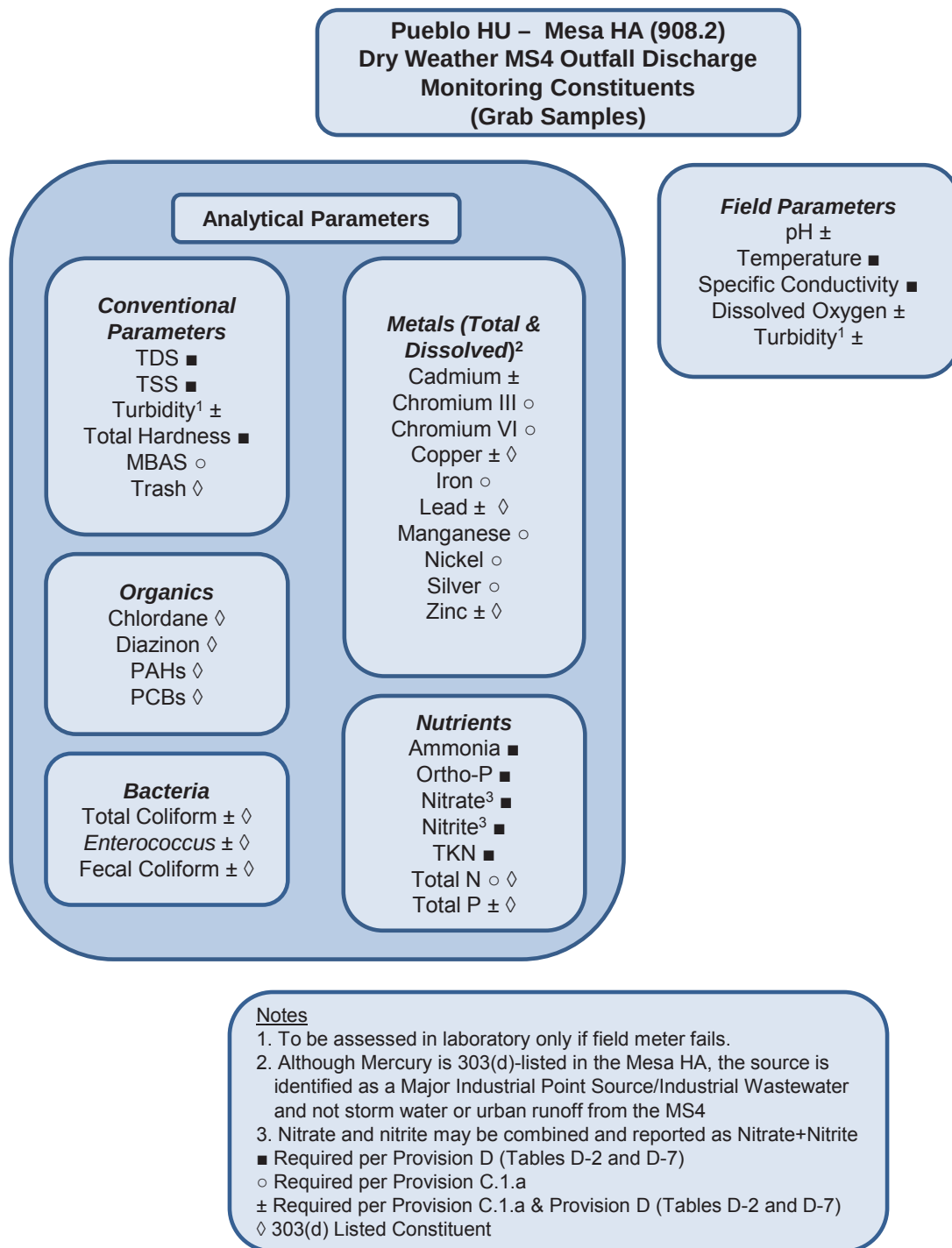
(5) Constituents listed in Table D-7 of the MS4 Permit

Figures A2-3 to A2-7 detail the analyses required for selected MS4 outfall non-persistent flow monitoring. Attachment A5 details the analytes required for MS4 outfall for persistent flow monitoring including analytical methods and detection limits. Analytes that are field measured are not required to be analyzed by a laboratory. Chemical and bacterial analysis of samples will be performed by a laboratory certified for the appropriate fields of testing by the California Environmental Laboratory Accreditation Program (ELAP). The laboratory should also be a participant of the Stormwater Monitoring Coalition's Intercalibration Program. Quality assurance and quality control procedures for laboratory analysis are outlined in Attachment C.



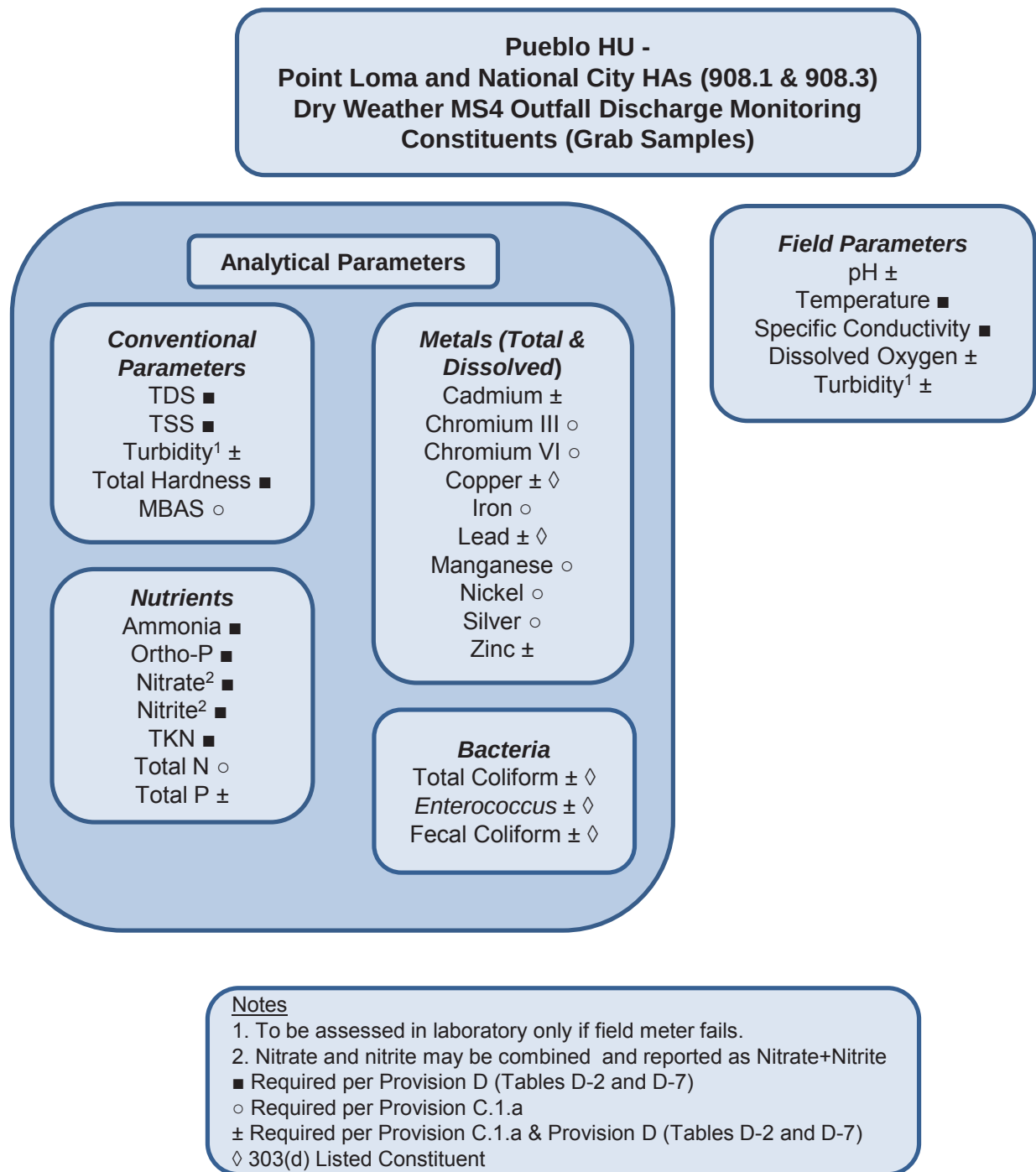
Note: This figure describes detailed monitoring procedures and analytical methods that are illustrative and may be revised on the basis of site-specific environmental conditions and equivalent alternate analytical methods.

Figure A2-3
Pueblo, Sweetwater, & Otay HU – Dry Weather MS4 Outfall Discharge Monitoring
Receiving Water Grab Samples



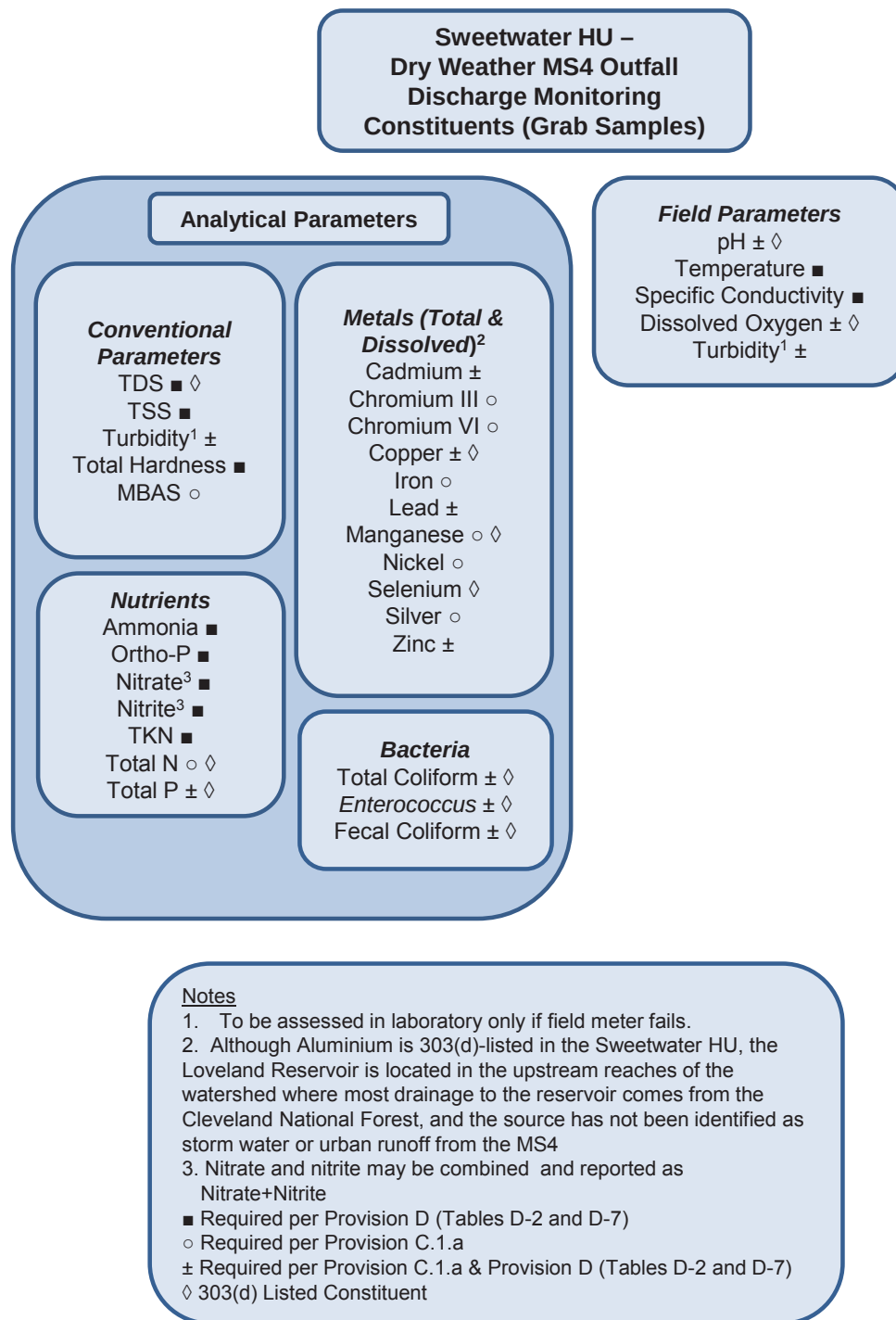
Note: This figure describes detailed monitoring procedures and analytical methods that are illustrative and may be revised on the basis of site-specific environmental conditions and equivalent alternate analytical methods.

**Figure A2-4
 Pueblo HU Dry Weather MS4 Outfall Discharge Monitoring Constituents (Mesa HA)**



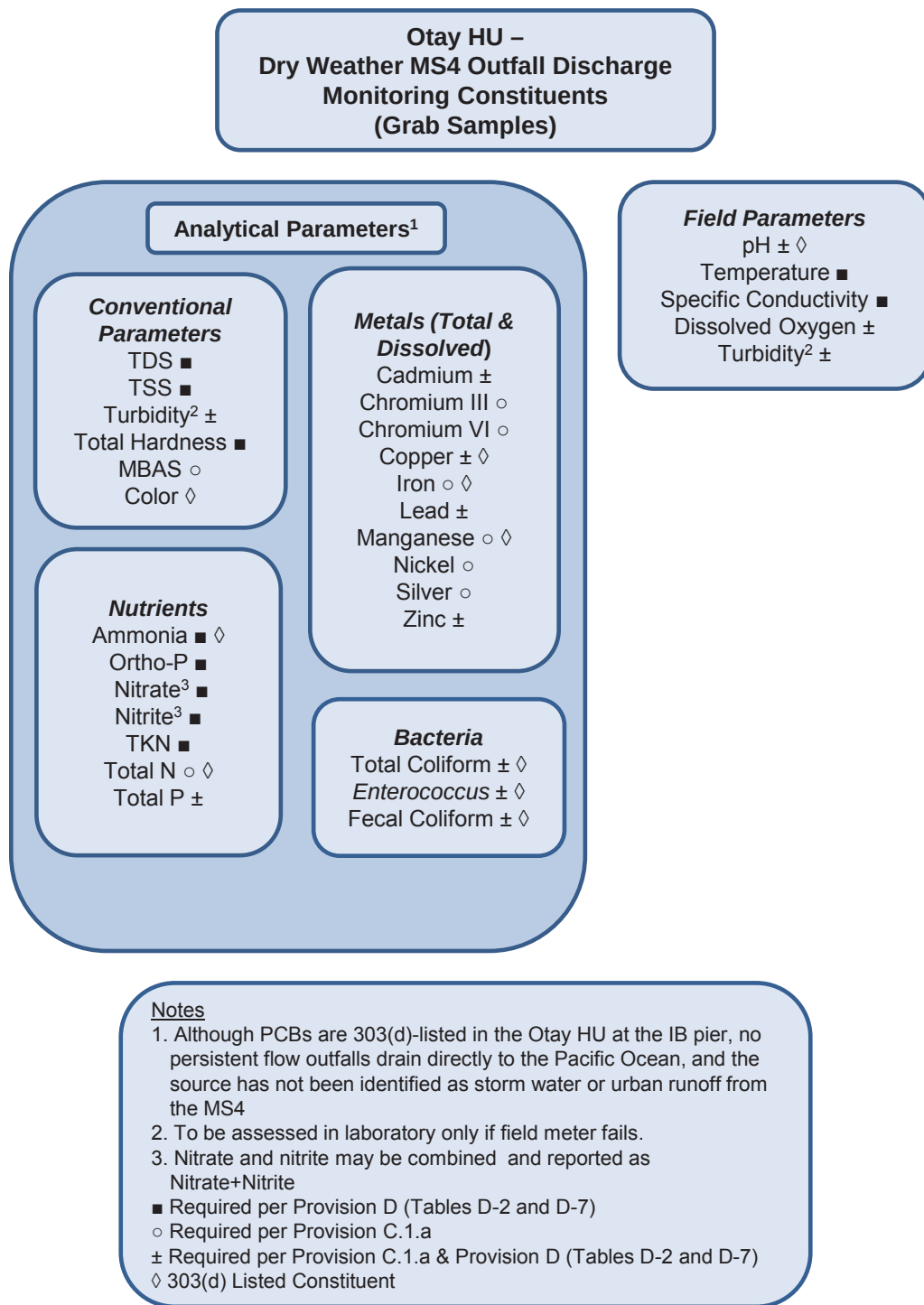
Note: This figure describes detailed monitoring procedures and analytical methods that are illustrative and may be revised on the basis of site-specific environmental conditions and equivalent alternate analytical methods.

**Figure A2-5
 Pueblo HU Dry Weather MS4 Outfall Discharge Monitoring Constituents
 (Point Loma and National City HAs)**



Note: This figure describes detailed monitoring procedures and analytical methods that are illustrative and may be revised on the basis of site-specific environmental conditions and equivalent alternate analytical methods.

Figure A2-6
Sweetwater HU Dry Weather MS4 Outfall Discharge Monitoring Constituents



Note: This figure describes detailed monitoring procedures and analytical methods that are illustrative and may be revised on the basis of site-specific environmental conditions and equivalent alternate analytical methods.

Figure A2-7
Otay HU Dry Weather MS4 Outfall Discharge Monitoring Constituents

A.2.3 Wet Weather MS4 Outfall Discharge Monitoring

This section details the wet weather MS4 outfall monitoring required to comply with the MS4 Permit. Each Copermittee is required to perform wet weather MS4 outfall monitoring to identify pollutants in storm water discharges from the MS4s, guide pollutant source identification efforts, and determine compliance with the Water Quality Based Effluent Limits (WQBELs) associated with the Bacteria TMDL within its respective jurisdiction as required by Provision D.2.c of the MS4 Permit.

A.2.3.1 Storm Water MS4 Outfall Discharge Monitoring

Each Copermittee is required to perform wet weather MS4 outfall prioritization and monitoring to aid in the identification of pollutants in storm water discharges from the MS4s, to guide pollutant source identification efforts, and to determine compliance with the WQBELs associated with the applicable TMDLs within its respective jurisdiction as required by Provision D.2.c of the MS4 Permit.

A.2.3.1.1 Outfall Prioritization

The Copermittees selected wet weather MS4 outfall discharge monitoring stations from the inventories developed pursuant to Provision D.2.a.(3).(a).(1) of the MS4 Permit for the San Diego Bay WMA as follows:

- At least five wet weather MS4 outfall discharge monitoring stations that are representative of storm water discharges from areas consisting primarily of residential, commercial, industrial, and typical mixed-use land uses present within the Watershed Management Area
- At least one wet weather MS4 outfall discharge monitoring station for each Copermittee within the Watershed Management Area

The Copermittees may adjust the wet weather MS4 outfall discharge monitoring locations in the San Diego Bay WMA, as needed, to identify pollutants in storm water discharges from MS4s, to guide pollutant source identification efforts, and to determine compliance with the WQBELs associated with applicable TMDLs in accordance with the highest priority water quality conditions identified in the San Diego Bay WMA Water Quality Improvement Plan.

A.2.3.1.2 Monitoring Locations and Frequency

The monitoring locations for wet weather MS4 outfall monitoring are provided in Table A2-4 and are mapped in Figure A2-8.

Table A2-4
Wet Weather MS4 Outfall Monitoring Locations

Jurisdiction	Wet Weather Outfall Stations	HA or HSA	Latitude	Longitude
City of Chula Vista	SC-19	910.20	32.651985	-116.948903
City of Coronado	Outfall No. 59 & 60	910.10	32.68661	-117.193424
City of Imperial Beach	K-outfall ("K-2")g	910.20	32.58832	-117.10747
City of La Mesa	Outfall 908-UNI-MASS	908.22	32.754663	-117.043269
City of Lemon Grove	Site 69	908.22	32.7347	-117.05626
City of National City	44B (Paradise, HSA 908.32)	908.32	32.66974	-117.10247
Port of San Diego	CV-1	909.12	32.629627	-117.108012
Airport Authority	Upstream from Outfall 12	908.21	32.73635	-117.207699
City of San Diego	DW797	908.32	32.69541	-117.05776
County of San Diego	COSD MS4 SDB01	909.12	32.667388	-117.021871

Notes:

HA = Hydrologic Area; HSA = Hydrologic Sub-Area

Per the requirements of the MS4 Permit, each Copermittee will monitor its wet weather MS4 outfall discharge monitoring station(s) in the San Diego Bay WMA once annually.

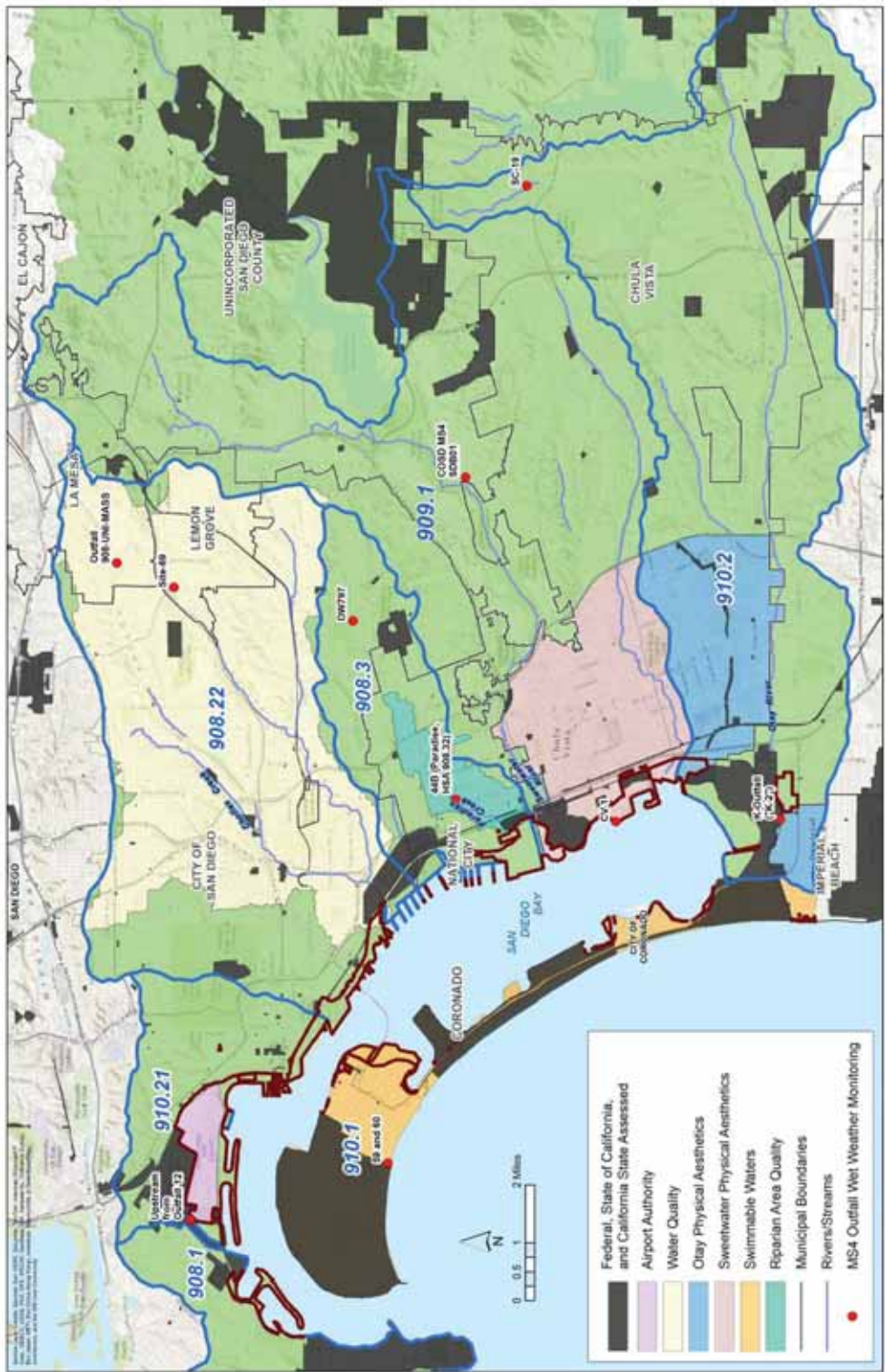


Figure A2-8
Selected MS4 Outfalls Wet Weather
Discharge Monitoring

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A.2.3.1.2.1 Wet Weather Events

For each wet weather monitoring event, the following narrative descriptions and observations will be recorded at each wet weather MS4 outfall discharge monitoring station:

- Station location
- Date and duration of the storm event(s) sampled
- Rainfall estimates of the storm event
- Duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event

Storm events will be considered viable for mobilization if they are predicted to produce at least 0.1 inch of rainfall in the drainage area and at least a 70 percent chance of rainfall. The mobilization criteria must be met at least 24 hours prior to the anticipated onset of rainfall. For the purposes of the criteria, storm forecasts will be obtained from the National Weather Service website (<http://www.wrh.noaa.gov/sgx/>).

A.2.3.1.3 Field Observations

During the wet weather monitoring event, narrative descriptions and field observations will be recorded at each wet weather MS4 outfall discharge monitoring station. Narrative descriptions and observations include the location, date, and duration of the storm event(s) sampled, rainfall estimates for the storm event(s), and the duration between the sampled storm event and the end of the previous measurable (greater than 0.1 inch of rainfall) storm event.

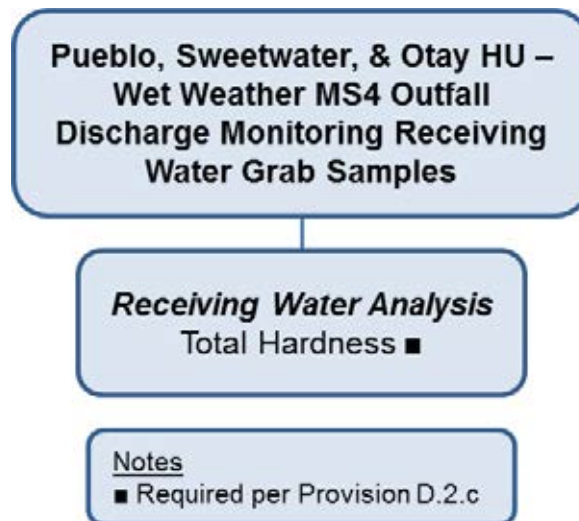
Flow estimation or measurement will be performed as described in Attachment A, using data from nearby United States Geological Survey (USGS) gauging stations, or flow rates may be measured or estimated in accordance with the United States Environmental Protection Agency (USEPA) Storm Water Sampling Guidance Document (EPA-833-B-92-001), Section 3.2.1, or other method proposed by the Copermitees that is acceptable to the RWQCB.

A.2.3.1.4 Field Monitoring

During each wet weather monitoring event, *in-situ* measurements for field monitoring parameters will be collected at each of the selected outfall sites. Field monitoring parameters include:

- pH
- Temperature
- Specific conductivity
- Dissolved oxygen
- Turbidity

Field grab parameters for receiving waters under this program are detailed in Figure A2-9. Additional parameters are presented in Figures A2-10, A2-11, and A2-12. Analytical methods and detection limits for field monitoring parameters are provided in Attachment A5.



Note: This figure describes detailed monitoring procedures and analytical methods that are illustrative and may be revised on the basis of site-specific environmental conditions and equivalent alternate analytical methods.

Figure A2-9
Pueblo, Sweetwater, & Otay HU – Wet Weather MS4 Outfall Discharge Monitoring Receiving Water Grab Samples

A.2.3.1.5 Analytical Monitoring

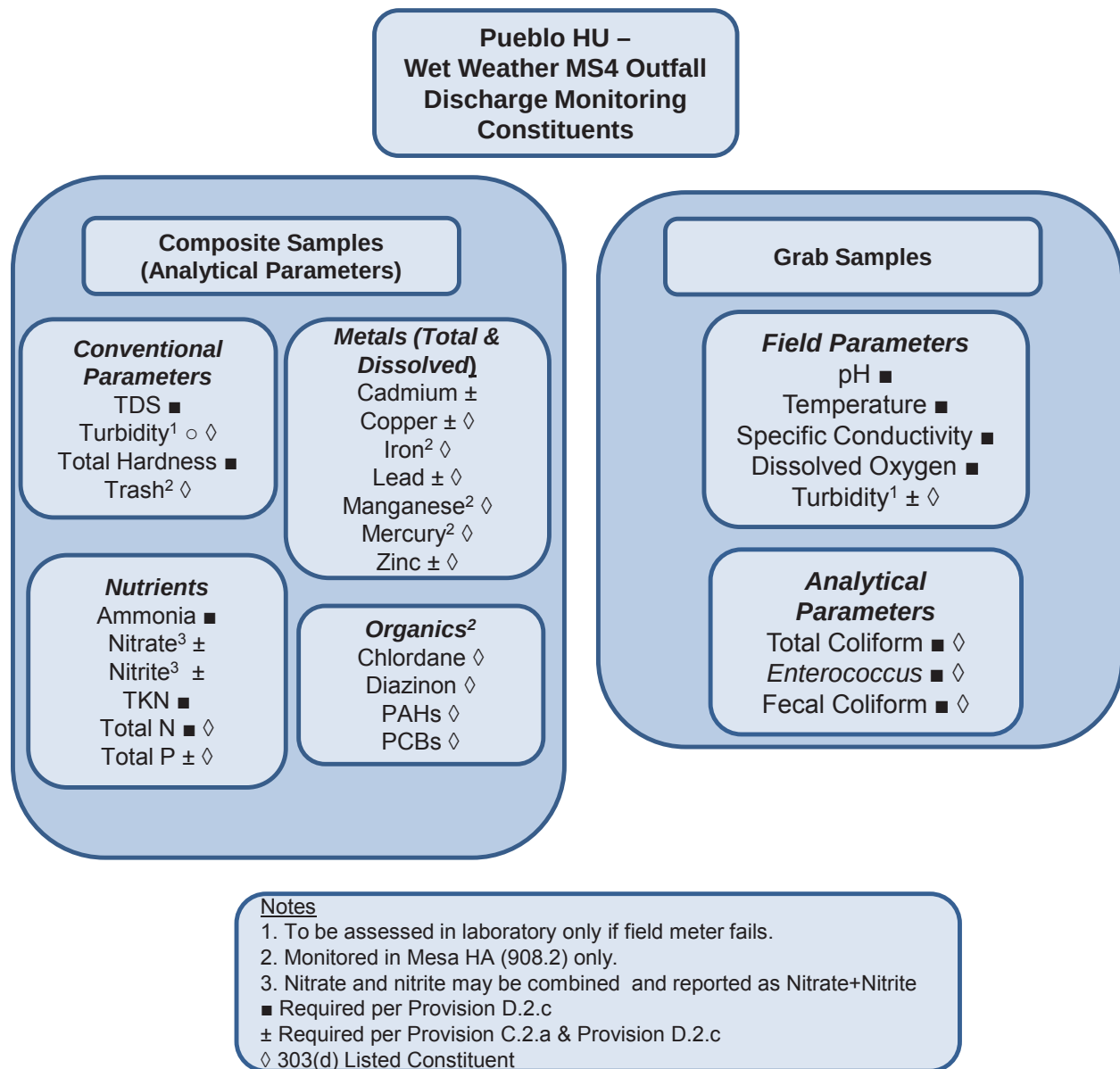
A.2.3.1.5.1 Sample Collection

Samples will be collected as follows:

- Grab samples will be collected for the analytes not amenable to composite sampling. These analytes are noted in Attachment A5. Samples will be collected in accordance with the protocol provided in Attachment A.
- Composite samples will be collected for all other analytes. To ensure the most consistent sample collection method for all sites, the Copermittees will collect a single time-weighted composite at each site.
 - When unattended automated sampling is feasible, time-weighted composites will be collected over the length of the storm event or in the first 24-hour period, whichever is shorter, composed of discrete samples, which may be collected through the use of automated equipment set at the time intervals listed in Attachment B.

- o When unattended automated sampling is not feasible (i.e., security or safety issues), a composite sample will be collected using a minimum of four grab samples, collected during the first 24 hours of the storm water discharge, or for the entire storm water discharge if the storm event is less than 24 hours at the time intervals listed in Attachment B based on the anticipated size of the storm. Some variation may occur depending on the actual storm intensity and duration. After the storm event, the discrete samples will be composited into one time-weighted composite for chemistry analysis.

Figures A2-10, A2-11, and A2-12 detail the analyses required for selected wet weather MS4 outfall monitoring. Attachment A5 details the analytes required for MS4 outfall for persistent flow monitoring including analytical methods and detection limits. All samples will be collected in accordance with SWAMP protocols. An example COC form is included in Attachment C. Quality assurance and quality control procedures are outlined in Attachment C.

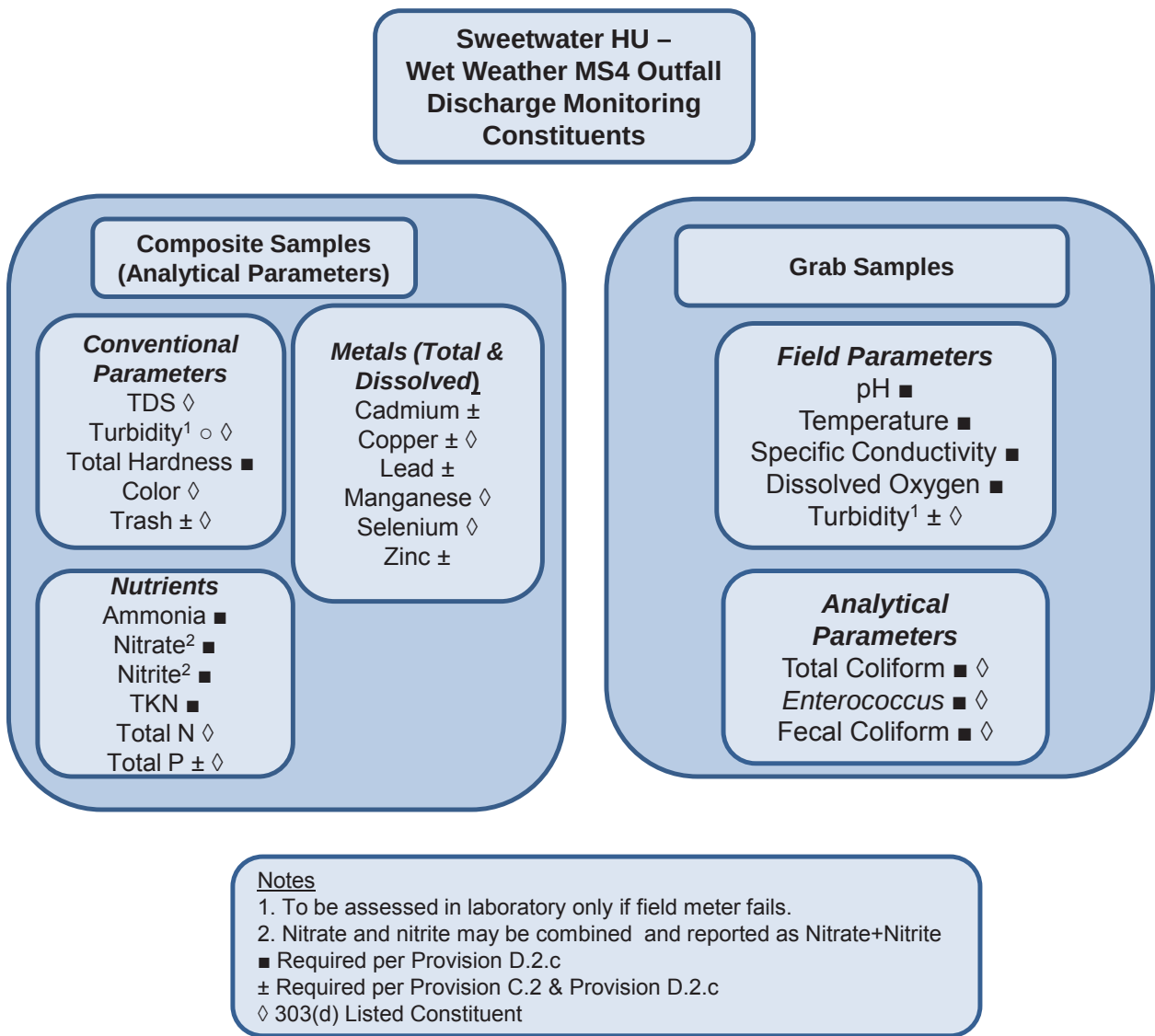


Notes

1. To be assessed in laboratory only if field meter fails.
 2. Monitored in Mesa HA (908.2) only.
 3. Nitrate and nitrite may be combined and reported as Nitrate+Nitrite
 ■ Required per Provision D.2.c
 ± Required per Provision C.2.a & Provision D.2.c
 ◇ 303(d) Listed Constituent

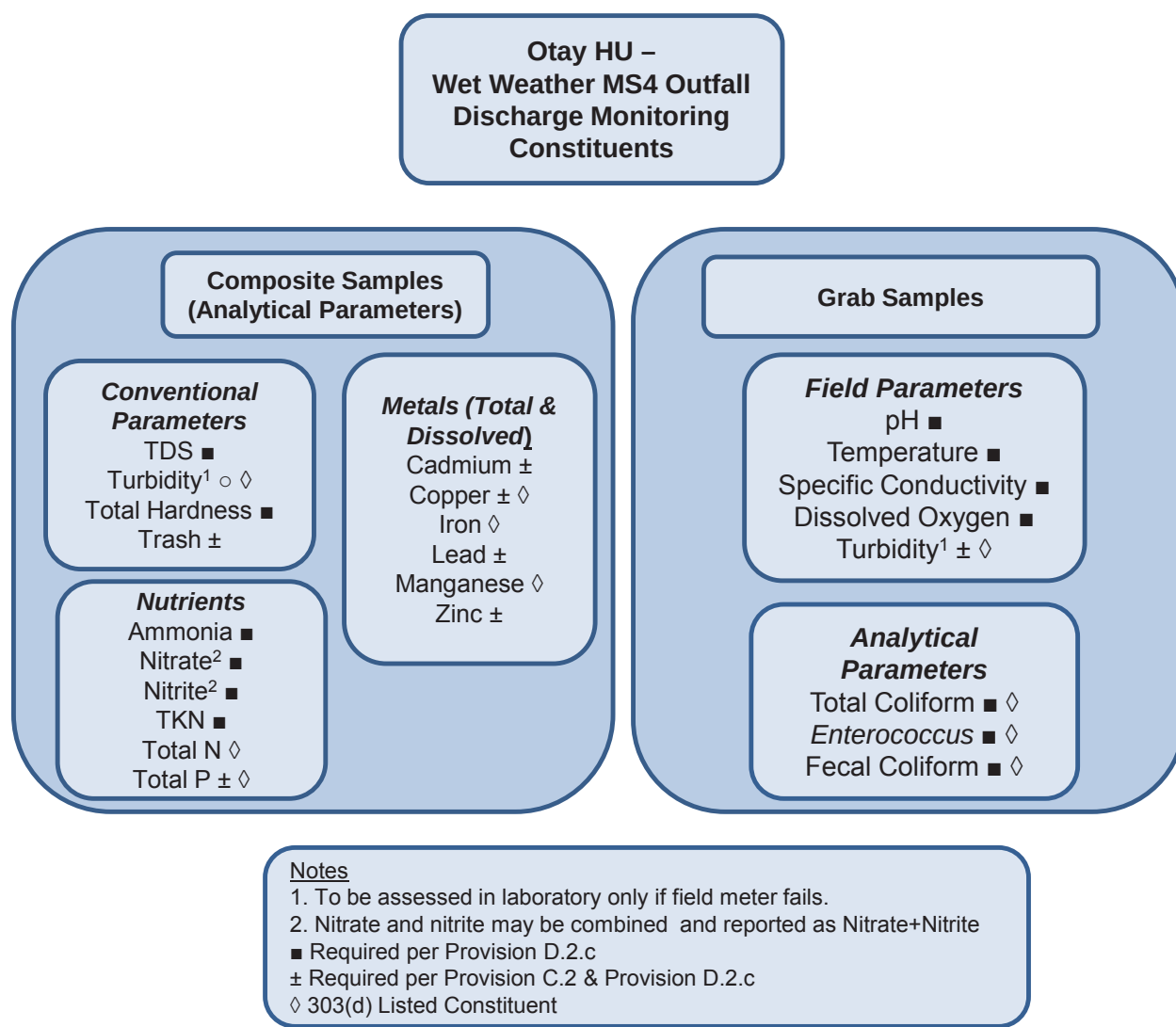
Note: This figure describes detailed monitoring procedures and analytical methods that are illustrative and may be revised on the basis of site-specific environmental conditions and equivalent alternate analytical methods.

**Figure A2-10
Pueblo HU Wet Weather MS4 Outfall Discharge Monitoring Constituents**



Note: This figure describes detailed monitoring procedures and analytical methods that are illustrative and may be revised on the basis of site-specific environmental conditions and equivalent alternate analytical methods.

Figure A2-11
Sweetwater HU Wet Weather MS4 Outfall Discharge Monitoring Constituents



Notes

1. To be assessed in laboratory only if field meter fails.
 2. Nitrate and nitrite may be combined and reported as Nitrate+Nitrite
 ■ Required per Provision D.2.c
 ± Required per Provision C.2 & Provision D.2.c
 ◊ 303(d) Listed Constituent

Note: This figure describes detailed monitoring procedures and analytical methods that are illustrative and may be revised on the basis of site-specific environmental conditions and equivalent alternate analytical methods.

**Figure A2-12
Otay HU Wet Weather MS4 Outfall Discharge Monitoring Constituents**

A.2.3.1.5.2 Laboratory Analysis

The required analyses are based upon the following four groupings of constituents:

- (1) Constituents contributing to the highest priority water quality conditions identified in the San Diego Bay WMA Water Quality Improvement Plan

- (2) Constituents listed as a cause for impairment of receiving waters in the San Diego Bay WMA as listed on the 303(d) list
- (3) Constituents for implementation plans or load reduction plans (e.g., Bacteria Load Reduction Plans, Comprehensive Load Reduction Plans) developed for the San Diego Bay WMA where the Copermittees are listed as RPs under a TMDL
- (4) Applicable storm water action level (SAL) constituents listed in Provision C.2 of the MS4 Permit.

Attachment A5 details the analyses required for wet weather MS4 outfall monitoring, including analytical methods and detection limits. Analytes that are field measured are not required to be analyzed by a laboratory. Chemical and bacterial analysis of samples will be performed by a laboratory certified for the appropriate fields of testing by the California Environmental Laboratory Accreditation Program (ELAP). The laboratory should also be a participant of the Stormwater Monitoring Coalition's Intercalibration Program. Additionally, only one analysis of a collected sample is required. Quality assurance and quality control procedures for laboratory analysis are outlined in Attachment C.

A.2.4 MS4 Outfall Assessment and Monitoring

Each Copermittee must evaluate the data collected pursuant to Provisions D.2.b and D.2.c. Annual reporting assessments are presented in Section D.4.1. Report of Waste Discharge (ROWD) Assessments are presented in Section 4.2.4 of the Water Quality Improvement Plan.

A.2.4.1 Annual Report

The MS4 outfall discharge assessments include evaluating both the dry weather monitoring data associated with the IDDE program collected as part of the Jurisdictional Runoff Management Program (JRMP) and the dry and wet weather monitoring data collected by the Copermittees. Details of the two separate assessments are provided below. Each Copermittee will assess its MS4 monitoring programs and compile results as part of the San Diego Bay WMA Water Quality Improvement Plan Annual Report.

A.2.4.1.1 Dry Weather MS4 Outfall Assessments

Each Copermittee must assess and report the progress of its IDDE program (required pursuant to MS4 Permit Provision E.2) toward effectively prohibiting non-storm water and illicit discharges into the MS4s within its jurisdiction. Additionally, each RP will assess its dry weather MS4 monitoring programs individually and compile results in a regionally agreed upon format annually into a watershed assessment in the San Diego Bay WMA Water Quality Improvement Plan Annual Report. Assessments are presented below and summarized in Table A2-5.

**Table A2-5
Annual Dry Weather MS4 Outfall Assessments**

Assessment	Components	Reporting
Identify known and suspected controllable sources	Identify known and suspected controllable sources (e.g., facilities, areas, land uses, pollutant generating activities) of transient and persistent flows	Provide annually in Water Quality Improvement Plan Annual Report
Identify sources that have been reduced or eliminated	Identify sources of transient and persistent flows that have been reduced or eliminated	
Identify necessary modifications to monitoring locations and frequencies	Identify necessary modifications to monitoring locations and frequencies necessary to identify and eliminate sources of persistent flows	
Rank and prioritize non-storm water discharges	Rank persistently flowing outfalls according to potential threat to receiving water quality	
	Produce/update prioritized list of outfalls	
Identify sources contributing to NAL exceedances	Identify known and suspected sources that may cause or contribute to exceedances	
Estimate volumes and loads of non-storm water discharges	Analyze data collected as part of the MS4 Permit-required dry weather outfall monitoring	
	Use a model or other method to calculate and estimate collective persistent non-storm water discharge volumes and pollutant loads. Specific calculations/estimates include: 1) Annual non-storm water volumes and loads discharged from the Copermittee's major MS4 outfalls to receiving waters within its jurisdiction, with an estimate of the percent contribution from each known source for each MS4 outfall 2) Annual identification and quantification (by volume and pollutant load) of sources of discharged non-storm water not subject to the Copermittee's legal authority	

Table A2-5 (continued)
Annual Dry Weather MS4 Outfall Assessments

Assessment	Components	Reporting
Evaluate progress in achieving non-storm water volume and load reductions	Identify reductions and progress in achieving reductions	Provide minimum once during Permit cycle in Water Quality Improvement Plan Annual Report
	Assess the effectiveness of Water Quality Improvement Plan improvement strategies, with estimates of volume and load reductions attributed to specific strategies when possible	
	Identify modifications necessary to increase the effectiveness of Water Quality Improvement Plan strategies	
Identify data gaps	Identify data gaps in the monitoring data necessary to fulfill assessment requirements	Provide annually in Water Quality Improvement Plan Annual Report

- Identify sources of non-storm water discharges.
 - o Identify the known and suspected controllable sources (e.g., facilities, areas, land uses, and pollutant generating activities) of transient and persistent flows within the Copermittee's jurisdiction in the San Diego Bay WMA.
 - o Identify sources of transient and persistent flows within the Copermittee's jurisdiction in the San Diego Bay WMA that have been reduced or eliminated.
 - o Identify modifications of the field screening monitoring locations and frequencies for the MS4 outfalls in Copermittee's inventory necessary to identify and eliminate sources of persistent flow non-storm water discharges (Provision D.2.b).
 - o The JRMP Annual Report will be used to guide this assessment in the Water Quality Improvement Plan Annual Report. Known and suspected sources will be identified during the implementation of JRMP activities. These activities include the facility inspections that complement the IDDE program and information gathered by the storm water hotline or other public complaints. The JRMP Annual Report now consists of a one-page form that summarizes the JRMP activities in Attachment D of the MS4 Permit, along with supporting information. Section IV of the JRMP Annual Report Form summarizes the findings of the IDDE Program. The back-up that will be provided along with the form may include the following information to help identify sources:
 - Identify the subwatershed of the source or complaint
 - Identify the potential receiving water of the source or complaint
 - Identify the potential pollutant or pollutant category that could be contributed by the source or complaint

- Rank and prioritize non-storm water discharges.
 - Based on the data collected and applicable numeric action levels described in San Diego Bay WMA Water Quality Improvement Plan, the Copermittees must rank the persistently flowing major outfalls in their jurisdictions according to the potential threat to receiving water quality and produce a prioritized list of major MS4 outfalls. The Water Quality Improvement Plan will be updated annually on the basis of these findings and with the goal of implementing (in the order of the ranked priority list) targeted programmatic actions and source investigations to eliminate persistent non-storm water discharges and/or pollutant loads. The list will be reprioritized according to one or more of the following criteria (Provision D.2.b.(2)(b)(ii)):
 - The non-storm water discharges have been effectively eliminated (i.e., there is no flowing, pooled, or ponded water) for three consecutive dry weather monitoring events.
 - The sources of the persistent flows have been identified as a category of non-storm water discharges that do not require an NPDES permit and do not have to be addressed as an illicit discharge because they were not identified as sources of pollutants (i.e., the constituents in the non-storm water discharge do not exceed numeric action level) and the persistent flow can be reprioritized to a lower priority.
 - The constituents in the persistent flow non-storm water discharge do not exceed NALs (Provision C.1).
 - The source(s) of the persistent flows has (have) been identified as a non-storm water discharge authorized by a separate NPDES permit.
 - Where these criteria have not been met but the threat to water quality has been reduced by the Copermittee, the highest priority persistent flow MS4 outfall monitoring stations may be reprioritized accordingly for continued dry weather MS4 outfall discharge field screening monitoring as part of the Dry Weather MS4 Outfall Discharge Field Screening Program.
 - Each Copermittee must document removal or reprioritization of the highest priority persistent flow MS4 outfall monitoring stations identified under the Non-Storm Water Persistent Flow MS4 Outfall Discharge Monitoring Program in the Water Quality Improvement Plan Annual Report. When a Copermittee removes a persistent flow MS4 outfall monitoring station, it will be replaced with the next highest prioritized major MS4 outfall designated by that jurisdiction in the San Diego Bay WMA. If there are no remaining qualifying major MS4 outfalls within its jurisdiction, the number of major MS4 outfalls monitored will be reduced.

- Identify sources contributing to NAL exceedances.
 - For the highest priority major MS4 outfalls with persistent flows that exceed NALs (Provision C1.), each RP must identify the known and suspected sources within its jurisdiction in the San Diego Bay WMA that may cause or contribute to the numeric action limit exceedances and report them annually.
- Estimate volumes and loads of non-storm water discharges.
 - Annually, the RPs must (1) analyze the data collected as part of the Non-Storm Water Persistent Flow MS4 Outfall Discharge Monitoring Program from the highest priority major MS4 outfalls collected in regionally agreed-upon formats, and (2) use a model or another method to calculate or estimate and report the non-storm water volumes and pollutant loads collectively discharged from all the major MS4s outfalls in its jurisdiction that have persistent dry weather flows during the monitoring year. These calculations or estimates must include:
 - The percent contribution from each known source for each MS4 outfall
 - The annual non-storm water volumes and pollutant loads collectively discharged from the Copermittee's major MS4 outfalls to receiving waters within the Copermittee's jurisdiction
 - The annual volumes and pollutant loads for sources of non-storm water not subject to the Copermittee's legal authority that are discharged from the Copermittee's major MS4 outfalls to downstream receiving waters
- Evaluate progress in achieving non-storm water volume and load reductions
 - Based on evaluation of the data collected under the dry weather MS4 outfall monitoring program and annual assessments performed, the following assessments must be performed a minimum of once per Permit cycle:
 - Identify reductions and progress in achieving reductions in non-storm water and illicit discharges to the Copermittee's MS4 system.
 - Evaluate the effectiveness of the water quality improvement strategies being implemented toward reducing or eliminating non-storm water and pollutant loads discharging from the Copermittee's MS4 to receiving waters, with an estimate of the volume and/or pollutant load reductions attributable to specific strategies, if possible.
 - Identify modifications necessary to increase the effectiveness of the Water Quality Improvement Plan strategies being implemented toward reducing or eliminating non-storm water and pollutant loads discharging from the MS4 to receiving waters.

- Identify data gaps
 - Identify gaps in the monitoring data necessary to fulfill annual dry weather MS4 outfall assessment and reporting requirements on an annual basis.

Table A2-6 presents NAL criteria from Municipal Permit provision C.1 and which discharges the NAL criteria are applicable to.

Table A2-6
Non-Storm Water Action Levels

Type of Receiving Water that MS4 Discharges to	Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Municipal Permit Table Reference
Ocean Surf Zone(s)	Total Coliform	MPN/100mL	1,000	N/A	10,000 or 1,000 (if the fecal coliform to total coliform ratio exceeds 0.1)	Table C-1
	Fecal Coliform		200 during any 30-day period		400	
	<i>Enterococci</i>		35		104 (for saltwater designated beaches)	
	Turbidity	NTU	75	N/A	225	Table C-2
Bays, Harbors, and Lagoons/Estuaries ¹	pH	Units	Within the range of 6.0 to 9.0			
	Fecal Coliform	MPN/100mL	200 (with at least 5 samples within a 30-day period)	N/A	If more than 10% of samples exceed 400 within a 30 day period	
	<i>Enterococci</i>		35	N/A	104 (for saltwater designated beaches)	

Table A2-6 (continued)
Non-Storm Water Action Levels

Type of Receiving Water that MS4 Discharges to	Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Municipal Permit Table Reference
Bays, Harbors, and Lagoons/Estuaries ¹ (continued)	Cadmium ²	µg/L	Freshwater – CTR Saltwater - 8	Freshwater – CTR Saltwater - 16	N/A	Tables C-2 and C-3
	Copper		Freshwater – CTR Saltwater – 2.9	Freshwater – CTR Saltwater – 5.8		
	Chromium III ²		Freshwater – CTR Saltwater – N/A	Freshwater – CTR Saltwater - N/A		
	Chromium VI		Freshwater – 8.1 Saltwater - 41	Freshwater – 16 Saltwater - 83		
	Lead		Freshwater – CTR Saltwater – 2.9	Freshwater – CTR Saltwater - 14		
	Nickel ²		Freshwater – CTR Saltwater – 6.8	Freshwater – CTR Saltwater - 14		

Table A2-6 (continued)
Non-Storm Water Action Levels

Type of Receiving Water that MS4 Discharges to	Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Municipal Permit Table Reference
Bays, Harbors, and Lagoons/Estuaries ¹ (continued)	Silver	µg/L	Freshwater – CTR Saltwater – 1.1	Freshwater – CTR Saltwater – 2.2	N/A	Tables C-2 and C-3
	Zinc		Freshwater – CTR Saltwater – 47	Freshwater – CTR Saltwater – 95		
Inland Surface Waters	Dissolved Oxygen	mg/L	Not less than 5.0 in waters with the WARM beneficial use and not less than 6.0 in waters with a COLD beneficial use			Table C-4
	Turbidity	NTU	N/A	20	20	
	pH	Units	Within the range of 6.5 to 8.5			
	Fecal Coliform	MPN/100mL	200 (with at least 5 samples within a 30-day period)	N/A	If more than 10% of samples exceed 400 within a 30 day period	
	<i>Enterococci</i>		33	N/A	61 (for freshwater designated beaches)	
	Total Nitrogen	mg/L	N/A	1.0	1.0	
	Total Phosphorus			0.1	0.1	
	MBAS			0.5	0.5	
	Iron			0.3	0.3	
	Manganese			0.05	0.05	

Table A2-6 (continued)
Non-Storm Water Action Levels

Type of Receiving Water that MS4 Discharges to	Parameter	Units	AMAL	MDAL	Instantaneous Maximum	Municipal Permit Table Reference
Inland Surface Waters (continued)	Cadmium ²	µg/L	Freshwater – CTR	Freshwater – CTR	N/A	Tables C-3 and C-4
	Copper		Freshwater – CTR	Freshwater – CTR		
	Chromium III ²		Freshwater – CTR	Freshwater – CTR		
	Chromium VI		Freshwater – 8.1	Freshwater – 16		
	Lead		Freshwater – CTR	Freshwater – CTR		
	Nickel ²		Freshwater – CTR	Freshwater – CTR		
	Silver		Freshwater – CTR	Freshwater – CTR		
	Zinc		Freshwater – CTR	Freshwater – CTR		

Notes: AMAL – Average Monthly Action Level; MDAL – Maximum Daily Action Level; CTR – California Toxics Rule; mg/L – milligrams per liter; µg/L – micrograms per liter; NTU – Nephelometric Turbidity Units; MPN/100mL – most probable number per 100 milliliters

NALs shaded green, if exceeded, must be compared to the receiving water hardness-based California Toxics Rule (CTR) criteria from 40 CFR 131.38(b)(2). Some NALs are automatically set at the CTR criteria, as indicated by “CTR” in the applicable AMAL or MDAL columns. Exceedance of an NAL where the CTR criteria is applied to a discharge does not constitute a water quality objective exceedance in the downstream receiving water.

1. Applicable NAL standards for freshwater and saltwater are location dependent. The majority of receiving waters in this category in San Diego Bay are likely to be considered brackish or marine where saltwater criteria will apply. However, some estuary locations in the San Diego Bay watershed that are elevated or become separated from tidal influence may be inundated predominantly with freshwater and be classified as such. As a result, both freshwater and saltwater NALs have been included for this category.

2. NAL objectives calculated from the CTR for parameters that are **bolded** must not be higher than the Maximum Contaminant Levels (MCLs) under the California Code of Regulations, Title 22, Division 4, Chapter 15, Article 4, Section 64431. MCLs are secondary drinking water standards that are being applied to MS4 Discharges per Table C-3 of the Municipal Permit; however, exceedance of the MCLs in MS4 discharges does not constitute a water quality exceedance in the downstream receiving water. It is simply the highest allowable NAL standard for these constituents. NALs must not exceed the numeric MCLs for the following constituents: Cadmium (5 µg/L), Chromium III (which is not included in Section 64431, so the total chromium standard of 50 µg/L will be applied), and Nickel (100 µg/L)

The CTR contains sample-specific water quality objectives applicable to dissolved metals in which a calculation is required to determine MDAL/CMC and AMAL/Criteria Continuous Concentrations (CCC) for freshwater criteria. However, Provision C of the municipal permit applies the CTR criteria to total metals, except for Chromium III and Chromium VI, which are listed in their dissolved form. To calculate CTR criteria, receiving water hardness must be available either from sample analytical results or from reliable third party data. The calculations are based on the hardness of the receiving water because hardness can affect how toxic metals are in the water. The placeholder number for receiving water hardness in the CTR is 100 mg/L. However, in the San Diego Bay WMA hardness values are likely to be higher, which is why grab samples in the receiving water are collected. In general, as the hardness increases, the water quality objective increases because the metals are less toxic in the water. Metals concentrations in the receiving water are generally expected to be lower than those in the outfall. It is appropriate to use the receiving water hardness instead of the hardness from the outfall sample because, typically, when an outfall discharges into a receiving water, any metals concentrations from the outfall may be subject to mixing and dilution in the receiving water.

The other site-specific requirement for the CTR calculation is the Water Effect Ratio (WER). There currently is no site-specific WER present for any water body in the San Diego Bay WMA, though a draft WER has been derived for copper and zinc in the Chollas Creek watershed and is currently under review by the State Board and EPA for approval. The placeholder WER of 1 is used for the standard calculation, as is consistent with the CTR, when a site-specific WER has not been established. The CTR criteria have the same number of significant figures as the hardness concentration. Additional information is available at 40 C.F.R. § 131.38. The calculations are as follows:

$$\text{MDAL (CMC)} = \text{WER} \times (\text{Acute Conversion Factor}) \times (\exp\{m_A[\ln(\text{hardness})] + b_A\})$$

$$\text{AMAL (CCC)} = \text{WER} \times (\text{Chronic Conversion Factor}) \times (\exp\{m_C[\ln(\text{hardness})] + b_C\})$$

Specific dissolved metal conversion requirements under the CTR are presented in Table A2-7.

**Table A2-7:
CTR Conversion Requirements**

Constituent	m_A	b_A	m_C	b_C	Conversion Factor for Acute (CMC)	Conversion Factor for Chronic (CCC)
Antimony	-	-			NA ¹	NA ¹
Arsenic	-	-			1.000	1.000
Beryllium	-	-			NA ¹	NA ¹
Cadmium	1.128	-3.6867	0.7852	-2.715	$= 1.136672 - [(\ln \{hardness\}) (0.041838)]$	$= 1.101672 - [(\ln \{hardness\}) (0.041838)]$
Chromium (III)	0.8190	3.688	0.8190	1.561	0.316	0.860
Chromium (VI)	-	-			0.982	0.962
Copper	0.9422	-1.700	0.8545	-1.702	0.960	0.960
Lead	1.273	-1.460	1.273	-4.705	$= 1.46203 - [(\ln \{hardness\}) (0.145712)]$	$= 1.46203 - [(\ln \{hardness\}) (0.145712)]$
Mercury	-	-			NA	NA
Nickel	0.8460	2.255	0.8460	0.0584	0.998	0.997
Selenium	-	-			NA	NA
Silver	1.72	-6.52	NA	NA	0.85	NA ¹
Thallium	-	-			NA ¹	NA ¹
Zinc	0.8473	0.884	0.8473	0.884	0.978	0.986

¹ Aquatic life criterion has not yet been published by the USEPA.

A.2.4.1.2 Wet Weather Outfall Assessments and Illicit Discharges

The Copermittees must assess and report the progress of the water quality improvement strategies implemented as part of the Water Quality Improvement Plan and the JRMP toward reducing pollutants in storm water discharges from the MS4s. This is designated as the Wet Weather MS4 Outfall Discharge Monitoring Program. The assessment of this program will contain the elements provided below and summarized in Table A2-8.

The elements for assessment of this program include the following:

- Estimate volumes and loads of storm water discharges.
 - As part of the Water Quality Improvement Plan Annual Report, the Copermittees must annually analyze the monitoring data collected as part of the Wet Weather MS4 Outfall Discharge Monitoring Program. This includes calculating or estimating the following for each monitoring year:
 - The average storm water runoff coefficient for each land use type within the San Diego Bay WMA.
 - For storm events with measurable rainfall greater than 0.1 inch, the volume of storm water and pollutant loads discharged from the monitored MS4 outfalls to receiving waters within the San Diego Bay WMA.
 - The total flow volume and pollutant loadings discharged from each Copermittee's jurisdiction within the San Diego Bay WMA over the course of the wet season, extrapolated from the data produced from the monitored MS4 outfalls.
 - For storm events with measurable rainfall greater than 0.1 inch, the percent contribution of storm water volumes and pollutant loads discharged from the land use type within (1) each hydrologic subarea with a major MS4 outfall to receiving waters or (2) each major MS4 outfall to receiving waters.
 - Supporting information for calculations required for this assessment is provided in Attachment D.
- Evaluate Water Quality Improvement Plan analysis.
 - The Copermittees will evaluate the Water Quality Improvement Plan analysis on the basis of the wet weather MS4 outfall monitoring data collected and the applicable storm water numeric action levels (Provision C.2). This evaluation will include analyzing and comparing the monitoring data used to develop the Water Quality Improvement Plan, particularly the strategies, on an annual basis. Additionally, the Copermittees will evaluate whether those analyses should be updated as a component of the adaptive management described in the Water Quality Improvement Plan.

Table A2-8
Annual Wet Weather MS4 Outfall Assessments

Assessment	Component	Reporting
Estimate loads and volumes	Calculate or estimate the average storm water runoff coefficient for each land use type	Provide annually in Water Quality Improvement Plan Annual Report
	Calculate or estimate the volume of storm water and pollutant loads discharged from each monitored MS4 outfall for each qualifying storm event	
	Calculate or estimate the total volume and pollutant load discharged from the Copermittee's jurisdiction over the course of the wet season	
	Calculate or estimate the percent contribution of storm water volumes and pollutant loads discharged from each land use type within each hydrologic subarea with a major MS4 outfall or each major MS4 outfall for each qualifying storm event	
Evaluate Water Quality Improvement Plan analysis	Using data and applicable SALs, analyze and compare to the analyses and assumptions used to develop the Water Quality Improvement Plan	
	Evaluate whether analyses and assumptions should be updated as a component of the adaptive management efforts	
Evaluate progress in achieving storm water pollutant reductions	Identify reductions and progress in achieving reductions from different land uses and/or drainage areas	Provide minimum once during Permit cycle in Water Quality Improvement Plan Annual Report
	Assess the effectiveness of Water Quality Improvement Plan improvement strategies, with estimates of volume and load reductions attributed to specific strategies when possible.	
	Identify modifications necessary to increase the effectiveness of Water Quality Improvement Plan strategies	
Identify data gaps	Identify data gaps in the monitoring data necessary to fulfill assessment requirements	Provide annually in Water Quality Improvement Plan Annual Report

- Evaluate progress in achieving storm water pollutant reductions.
 - Based on evaluation of the data collected under the wet weather MS4 outfall monitoring program and annual assessments performed, the following assessments must be performed a minimum of once per Permit cycle:
 - Identify reductions and progress in achieving reductions in storm water discharges to the Copermittee's MS4 system from different land uses and/or drainage areas
 - Evaluate the effectiveness of the water quality improvement strategies being implemented toward reducing pollutants in storm water discharging from the Copermittee's MS4 to receiving waters, with an estimate of the pollutant load reductions attributable to specific strategies, if possible
 - Identify modifications necessary to increase the effectiveness of the Water Quality Improvement Plan strategies being implemented toward reducing pollutants discharging from the MS4 to receiving waters.
- Identify data gaps
 - Identify gaps in the monitoring data necessary to fulfill annual wet weather MS4 outfall assessment and reporting requirements on an annual basis.

A.2.4.2 Data Management and Reporting

Data sharing templates have been developed to support reporting under previous Permit cycles. Copermittees will leverage existing data sharing templates in order to facilitate compilation of WMA-wide datasets for assessment and reporting purposes. Data compiled should be CEDEN-compatible and contain the following categories of information:

- General site description
- Visual observations
- Field measurements
- Laboratory data

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Attachment A

Flow Monitoring and Equipment Calibration Procedures

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Flow Monitoring and Equipment Calibration Procedures

This attachment describes the methodologies and equipment that are proposed to be used to complete flow monitoring and field measurements for the MS4 Outfall Monitoring Program, as well as the installation and maintenance procedures.

Flow estimation and water quality sampling are dynamic processes which may require modification based on current site and channel conditions. Thus, the methodologies presented are subject to modification or substitution in order to meet the requirements of this monitoring program.

Flow Monitoring

Dry Weather MS4 Outfall Flow Monitoring

Field-Based Flow Estimation

During non-storm water screening and MS4 outfall monitoring, flow will be estimated visually and/or manually using one of the methodologies detailed in Section 3.2.2 of the National Pollutant Discharge Elimination System (NPDES) Storm Water Sampling Guidance Document (EPA-833-B-92-001; United States Environmental Protection Agency (USEPA), 1992). These methodologies include, but are not limited to the “float method” and the “bucket and stopwatch method”.

Equipment-Based Flow Estimation

Copermittees may choose to perform optional equipment-based flow monitoring of non-storm water persistent flows. Equipment-based flow estimation procedures are described in Section B.1.2.1.

Wet Weather MS4 Outfall Flow Monitoring

During wet weather MS4 outfall monitoring, the flow rates and volumes will be measured or estimated from the MS4 outfalls. Flow rates will be measured or estimated in accordance with the NPDES Storm Water Sampling Guidance Document Section 3.2.1 (USEPA, 1992), or by another method proposed by the Copermittees that is acceptable to the San Diego RWQCB. Flow monitoring may need to be adapted specifically for tidally influenced sites.

Equipment-Based Flow Estimation

Flow hydrograph and volume estimations will be captured utilizing estimated flow rates in accordance with the Section 3.2.1 of the USEPA document NPDES Storm Water Sampling Guidance Document (USEPA, 1992).

Measurement devices, sensor types, and equipment program settings will be selected on a site specific basis using best professional judgment. Due to flood control concerns typically associated with MS4 outfalls during storm events especially, a primary measurement device such as a weir or flume is unlikely to be selected. Thus, a lower profile secondary flow measurement device, such as an area-velocity sensor or bubbler pressure transducer, is recommended for flow estimation from MS4 Outfalls.

Flow will be monitored at each site to determine the volume of runoff. Flow may be estimated with a Sigma 920 Flow Meter (or similar type device) with an area velocity sensor and pressure transducer (Figure A-1). An area velocity sensor measures water level and velocity. Flow will be calculated based on the cross sectional area of the pipe, level of water, slope, and velocity. Flow may also be estimated using a HOBO level logger (or similar type device) (Figure A-2). The HOBO level logger is a pressure transducer only, and the flow will be estimated based on the area of the pipe, level of water, and slope.

Field teams will mount equipment securely using best professional judgment. Sampler tubing and wiring will be routed through conduits that will be placed between the monitoring locations and the sampling equipment or enclosures. Above-ground instruments will be protected within a site equipment enclosure. Depending on site configuration, enclosures may be semi-permanent (installed before monitoring begins and removed only when the monitoring program ends) or temporary. Exposed conduit, intakes, and sensors will be securely fastened using stainless steel brackets, screws, and anchors (Figure A-3).



Figure A-1
Sigma 910 Flowmeter and Area/Velocity Pressure Sensor



Figure A-2
HOBO Level Logger



Figure A-3
Example of Sensor Installation

The flow meter may be connected to an automated sampler through a 4-20 milliampere (mA) range output. In this configuration, the flow meter provides a method to control or pace the sampler, and store sampling data and other auxiliary data. The flow meter may measure and log estimated flow, rainfall, and sample history.

At each site, the pipe diameter and slope will be measured and recorded. Level and flow measurements will be logged at minimum 5-minute intervals for the duration of the monitoring event when using continuous logging devices. Data downloads will occur after the monitoring event is complete. Due to the velocities and potential for debris to be carried by storm flows, it is possible that the flow sensor may be damaged during storm flows. Damage to a flow sensor may result in a data gap of actual recorded flows. In this event, flows from the respective drainage area will be modeled for any data gaps based on the drainage area and impervious cover.

Data Downloads and Storage

All recorded flow data downloaded to a field computer will be immediately copied to a main office data server. The server will be backed up daily in accordance with standard server practices. Data will also be copied to project folders for QA review and approval prior to moving to the project file.

Equipment Calibration

Field Meter Calibration

Calibration of all field meters will be conducted immediately prior to deployment or use. Water quality probes will be calibrated with specified calibration solutions, and it will be verified that the solution expiration date has not been exceeded. All calibrations will be conducted in accordance with the manufacturer's specifications.

Flow Equipment Calibration

Calibration of flow equipment will be conducted immediately prior to deployment or use using the procedures described in the corresponding operations and maintenance manual.

All level logging equipment will be calibrated on-site and field verified for accuracy with a level measurement tape.

Autosampler Calibration

Calibration of autosampling equipment will be conducted immediately prior to deployment or use using the procedures described in the corresponding operations and maintenance manual.

All autosampling equipment will be calibrated on-site and field verified for aliquot collection accuracy using a graduated flask or beaker.

Attachment B

Sample Collection Procedures

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Sample Collection Procedures

This attachment describes the sampling procedures for the MS4 Outfall Monitoring Program.

Dry Weather MS4 Outfall Sample Collection

For dry weather monitoring events, the Copermittees will collect and analyze grab samples from each dry weather MS4 outfall discharge monitoring station to satisfy the requirements of the MS4 Permit. Analytes that are field measured are not required to be analyzed by a laboratory.

Wet Weather MS4 Outfall Sample Collection

For wet weather monitoring events, the Copermittees will collect and analyze samples from each wet weather MS4 outfall discharge monitoring station to satisfy the following requirements in accordance with the MS4 Permit:

- Analytes that are field measured are not required to be analyzed by a laboratory;
- The Copermittees must implement consistent sample collection methods for regional comparability of data, unless site-specific conditions indicate the need for alternate methods;
- Grab samples may be collected for pH, temperature, specific conductivity, dissolved oxygen, turbidity, and indicator bacteria;
- For all other constituents, composite samples must be collected for a duration adequate to be representative of changes in pollutant concentrations and runoff flows using one of the following techniques:
 - Time-weighted composites collected over the length of the storm event or the first 24 hour period whichever is shorter, composed of discrete samples, which may be collected through the use of automated equipment, or
 - Flow-weighted composites collected over the length of the storm event or a typical 24 hour period, whichever is shorter, which may be collected through the use of automated equipment, or
 - If automated compositing is not feasible, a composite sample may be collected using a minimum of 4 grab samples, collected during the first 24 hours of the storm water discharge, or for the entire storm water discharge if the storm event is less than 24 hours; and
- Only one analysis of the composite of aliquots is required

To ensure the most consistent sample collection method for all sites, the Copermittees will collect a single time-weighted composite at each site. When unattended automated sampling is feasible, time-weighted composites will be collected over the length of the storm event or in the first 24-hour period, whichever is shorter, composed of discrete samples, which may be collected through the use of automated equipment set at the time intervals listed in Table B-1 based on the anticipated size of the storm.

Table B-1
Automated Sample Pacing for Time-Weighted Composites Per Storm Duration

Storm Duration (Hours)	Sample Aliquot Interval (Minutes)	Sample Volume (mL)	Total Sample Aliquots	Total Volume (mL)
2	10	800	12	9,600
4	10	800	24	19,200
6	10	400	36	14,400
8	10	400	48	19,200
12	10	400	72	28,800
16	20	400	48	19,200
20	20	400	60	24,000
24	20	400	72	28,800

mL = milliliter

When unattended automated sampling is not feasible (i.e., security or safety issues), a composite sample will be collected using a minimum of four grab samples, collected during the first 24 hours of the stormwater discharge, or for the entire stormwater discharge if the storm event is less than 24 hours at the time intervals listed in Table B-2 based on the anticipated size of the storm. Some variation may occur depending on the actual storm intensity and duration. After the storm event, the discrete samples will be composited into one time-weighted composite for chemistry analysis.

Table B-2
Grab Sample Pacing for Time-Weighted Composites Per Storm Duration

Storm Duration (Hours)	Sample Aliquot Interval (Minutes)	Sample Volume (mL)	Total Sample Aliquots	Total Volume (mL)
2	20	2,000	6	12,000
4	20	2,000	12	24,000
6	40	2,000	9	18,000
8	40	2,000	12	24,000
12	60	2,000	12	24,000
16	60	2,000	16	32,000
20	120	2,000	10	20,000
24	120	2,000	12	24,000

Automated samples for chemistry will be collected with a Sigma 900MAX autosampler (or similar type device). Teflon-lined tubing will be installed and secured at each monitoring location prior to the wet weather event. The autosampler will be deployed by the field team upon arrival at each site. Samples will be pumped with the autosampler into a clean glass bottle. The sample bottle will be appropriately labeled with the sample identifier (ID), date, and time, and will be preserved on ice for transport to the laboratory. After compositing, samples will be subsampled into the appropriate bottles for analysis. Grab samples will be collected using either the Sigma 900MAX autosampler or a sample bottle connected to a sample pole that will be used to collect the sample directly from the outfall location. Nitrile or latex gloves will be worn during sample handling.

Bacteria samples and field measurements will not be taken from the composite sample; therefore, a grab sample will be collected for bacteria and field measurements during elevated flows. The grab sample will be collected after the second hour of stormwater runoff and before the sixth hour of stormwater runoff. If the stormwater runoff is less than 2 hours, the grab sample will be collected as close to the peak of flow as possible.

Bacteria samples will be collected using sterile techniques. Nitrile or latex type gloves will be worn during sample handling. During the sampling event, a 100-milliliter (mL) sterile bacteria bottle will be secured to a sample pole that will be used to collect the sample directly from the outfall location. Care will be employed to not allow contact with area structures or the bottom sediments. The container will be opened only for the needed time to collect the sample and will then be closed immediately following sample collection. If it is suspected that the container was compromised at any times, the sample container will be discarded, and a new sample will be collected with a new sample bottle. The sample bottle must be filled only to the 100-mL mark on the bottle (not over topped or under filled).

Field parameters will include hydrogen ion concentration (pH), conductivity, temperature, dissolved oxygen (DO), and turbidity. Samples will be collected and the measurements will be made using a YSI Inc. 6600 series water quality probe or similar type device. Calibration of the instruments will be conducted in accordance with Attachment B.

A field observation data sheet will be completed for each sample collected to be representative of site conditions during each sample collection. Chain-of-custody (COC) documentation (Section E.3) will be completed, and samples will be delivered to the respective laboratory to allow for all applicable analyte holding times.

Chain-of-Custody Procedures

Chain-of-custody (COC) procedures will be used for all samples throughout the collection, transport, and analytical process. A copy of a COC form is included in Attachment C. Samples will be considered to be in custody if they are: 1) in the custodian's possession or view, 2) retained in a secured place (under lock) with restricted access, or 3) placed in a container and secured with an official seal so that

the sample cannot be reached without breaking the seal. The principal documents used to identify samples and to document possession will be COC records, field logbooks, and field tracking forms.

The COC procedures will be initiated during sample collection. A COC record will be provided with each sample or group of samples. Each person who had custody of the samples will sign the form and ensure that the samples were not left unattended unless properly secured. Documentation of sample handling and custody will include the following:

- Sample identifier.
- Sample collection date and time.
- Any special notations on sample characteristics or analysis.
- Initials of the person collecting the sample.
- Date the sample was sent to the analytical laboratory.
- Shipping company and waybill information.

Completed COC forms will be placed into a plastic envelope and kept inside the cooler containing the samples. Upon delivery to the analytical laboratory, the COC form will be signed by the person receiving the samples. COC records will be included in the final reports prepared by the analytical laboratories and will be considered an integral part of the laboratory report.

Health and Safety

Field sampling events have the potential for dangerous situations to arise. Field personnel need to be aware of safety hazards and take appropriate precautions. A health and safety tailgate meeting will be held prior to any on-site activity. During this meeting, site-specific hazards will be discussed and addressed appropriately. There are several health and safety issues that pertain to the proposed sampling and equipment installation within any areas.

Traffic Hazards and Traffic Control

Because this study is being conducted in residential areas, traffic control procedures must be employed. All traffic rules and regulations and all traffic control signs and devices should be obeyed. Field personnel should allow for extra time when planning travel routes. Vehicle traffic is a major concern during field monitoring activities. Traffic presents hazards when site workers are working close to roadways and the potential exists to be hit by oncoming traffic, and when driving to, from, and on the site. Driving during rain events also presents hazards as slick roadway conditions exist. It is recommended that safe speeds and distances be maintained to avoid rain-related accidents.

Whenever possible, field personnel should park as far off the road as possible to avoid interfering with any traffic flow and should comply with the following guidelines when working:

- Turn on the vehicle's flashing yellow warning light and hazard lights.
- Put out safety cones to mark off the work area.
- Place yellow barricade around open manhole to clearly mark the area.
- Avoid steep slopes and stream banks.
- Always use a flashlight in the dark.
- Always wear bright orange and reflective safety vests to be more visible.

Confined Space

Several monitoring locations for this project are located in the underground MS4 system. To install, maintain, and uninstall monitoring equipment within the MS4, confined space entry will need to be performed. Confined spaces are defined as any space with only one entry and exit point; therefore, an MS4 is considered a confined space. To perform confined space entry, project personnel must have confined space entry, attendant, and supervisor training, and must have their certificate card. Entering confined spaces presents many health and safety hazards if not performed properly. These hazards include asphyxiation, falls, burns, drowning, engulfment, toxic exposure, and electrocution. A confined space represents the potential for unusually high concentrations of contaminants, explosive atmospheres, limited visibility, physical injury, and restricted movement.

A five-gas meter will be used to monitor the atmosphere within the MS4 prior to any personnel entering the system. If the MS4 is unsafe for entry, field personnel may attempt to ventilate the space. If the MS4 is still determined to be unsafe for entry, then no personnel will enter the MS4. Once the MS4 has been determined to be safe for entry, the personnel may enter. A harness and retrieval system are used for personnel entering the system. When field personnel are in the MS4, continued air monitoring will occur to ensure that the atmosphere remains non-hazardous. Should air monitoring determine at any time that the air is becoming hazardous, field staff will immediately evacuate the confined space.

Weather Hazards

Installation and maintenance activities will be conducted during dry weather periods only. Though the San Diego region is generally mild during the fall season, the most likely safety issue related to weather is excessive heat. Extreme heat can adversely affect monitoring instrument response and reliability, respiratory protection performance, and chemical protective clothing materials. Standard precautions should be taken to mitigate heat exhaustion during field monitoring events.

Storm event monitoring will occur during wet weather. Wet weather conditions increase slipping and tripping hazards, braking distances of vehicles, and the potential for slippage or handling difficulties of field equipment. Rain fills holes and obscures trip-and-fall hazards. Tools and personnel can slip on wet surfaces. Rain and wet weather conditions may decrease visibility and increase the potential for driving accidents. Rain and high humidity may also limit the effectiveness of certain direct-reading instruments (e.g., photoionization detectors (PIDs)).

Attachment C

Quality Assurance/Quality Control Procedures

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QUALITY ASSURANCE / QUALITY CONTROL

Field Quality Assurance/Quality Control

Quality assurance (QA) and quality control (QC) for sampling processes will include proper collection of the samples to minimize the possibility of contamination. All samples will be collected in laboratory-supplied, laboratory-certified, contaminant-free sample bottles. Field staff will wear powder-free nitrile gloves or a similar type of gloves at all times during sample collection.

Target measurement objectives for field quality control samples are provided in Table C-1

Table C-1
Field Quality Control Samples

Sample Type	Measurement Objective			Frequency of Analysis
	Field Duplicate	Field Blank	Equipment Blank	
Conventionals	RPD<25% ^(a)	<RL for target analyte	<RL for target analyte	Per batch of samples submitted to the laboratory ^b
Indicator Bacteria	RPD<25% ^(c)	Negative Response	Negative Response	Per batch of samples submitted to the laboratory ^b
Metals	RPD<25% ^(a)	<RL for target analyte	<RL for target analyte	Per batch of samples submitted to the laboratory ^b
Nutrients	RPD<25% ^(a)	<RL for target analyte	<RL for target analyte	Per batch of samples submitted to the laboratory ^b
Solid Parameters	RPD<25% ^(a)	<RL for target analyte	<RL for target analyte	Per batch of samples submitted to the laboratory ^b
Organics	Per method	<RL for target analyte	<RL for target analyte	Per batch of samples submitted to the laboratory ^b

Notes:

RL = reporting limit.

RPD = relative percent difference.

a. NA if native concentration of either sample<RL.

b. For equipment blanks, the frequency is 10% of the cleaned material. Equipment blanks are only analyzed for TOC and total metals per Section F.1.5

c. Field duplicates are not a current SWAMP requirement for indicator bacteria. However, the collection and analysis of a field duplicate is recommended.

Training

All sampling personnel will be trained according to field sampling standard operating procedures (SOPs). Additionally, the field staff will be made aware of the significance of the project's detection limits and the requirement to avoid contamination of samples at all times.

Field Blank

A field blank will be collected and analyzed to assess contamination from field-related conditions to ensure that positive bias of the sample has not been introduced, and to remain in compliance with the Surface Water Ambient Monitoring Program (SWAMP) protocols. One field blank will accompany each batch of samples submitted to the analytical laboratory.

Field Duplicate

A duplicate sample may be collected and analyzed to assess the variability in sampling and to remain in compliance with the SWAMP protocols. One field duplicate will accompany each batch of samples submitted to the analytical laboratory.

Temperature Blank

A temperature blank will be used to ensure that sample holding temperatures were maintained from sample collection through delivery to the laboratory.

Equipment Blank

The selected analytical laboratory Teflon-lined tubing, silicone pump tubing, silicone bottle stoppers, and stainless steel sample intake strainers. The following blank samples will be created for analysis:

- One blank sample representative of the cleaned silicone and Teflon-lined tubing. Blank water will be passed through at least 10% of cleaned tubing and be representative of both silicone and Teflon-lined tubing.
- One blank representing the bottles and stoppers. Blank water will be passed into/over at least 10% of cleaned bottles and stoppers.

The analytical laboratory will analyze the equipment blanks for total organic carbon and total metals at a minimum. The analytical laboratories will analyze blank water from the cleaned sampling equipment at the same detection level proposed for sample analysis; this will verify that the sampling equipment in contact with sample water is clean and is not a likely source of contamination.

If a blank sample produces an analyte detection above the RL, the equipment will be cleaned and blanked again. Cleaned and blanked sampling equipment will not be deployed for sampling until an acceptable blank analysis has occurred unless directed by the Copermittees.

Inspection/Acceptance of Supplies and Consumables

Sample bottles (provided by the laboratory) and collection equipment will be inspected prior to their use. Procured supplies will be examined for damage prior to use per Table C-2.

Field supplies will be stored at the sampling team's offices; laboratory supplies will be stored at the laboratory. Inspection and testing requirements for laboratory supplies are covered in the laboratory's QA/QC procedures.

Table C-2
Inspection/Acceptance Testing Requirements for Consumables and Supplies

Project-Related Supplies/ Consumables	Inspection/ Testing Specifications/ Source	Acceptance Criteria	Frequency	Responsible Party
Pre-cleaned sample bottles	Closed bottle	Lids screwed on bottles	100%	Sampling Team
Silicone tubing	Laboratory cleaned	Pass blanking analysis	New tubing each season	Laboratory/Sampling Team
Teflon tubing	Laboratory cleaned	Pass blanking analysis	New tubing each season	Laboratory/Sampling Team
Gloves	New box	New box	As needed	Sampling Team

Laboratory Quality Assurance/Quality Control

This section addresses QA/QC activities associated with laboratory analyses. Laboratory QA/QC samples provide information to assess potential laboratory contamination, analytical precision, and accuracy. Analytical quality assurance for this program includes the following:

- Employing analytical chemists trained in the procedures to be followed.
- Adherence to documented procedures, United States Environmental Protection Agency (USEPA) approved methods, and written Standard Operating Procedures (SOPs).
- Calibration of analytical instruments.

- Use of quality control samples, internal standards, surrogates, and Standard Reference Materials (SRMs).
- Complete documentation of sample tracking and analysis.

Internal laboratory quality control checks will include the use of laboratory replicates, method blanks, matrix spikes/matrix spike duplicates (MS/MSDs), and laboratory control samples (LCSs). The quality control checks performed by constituent class is presented in Table C-3. The frequency of the laboratory QA/QC samples will a minimum of once per batch per analyte unless otherwise adjusted by Copermittees.

Table C-3
Laboratory Quality Control Samples by Constituent Class

Laboratory Quality Control	Conventionals	Indicator Bacteria	Inorganic Analytes	Nutrients	Solid Parameters	Synthetic Organic Compounds
Calibration Standard	✓	–	✓	✓	–	–
Calibration Verification	✓	–	✓	✓	–	✓
Laboratory Blank	✓	✓	✓	✓	✓	✓
Reference Material	✓	–	✓	✓	–	✓
Matrix Spike	✓	–	✓	✓	–	✓
Matrix Spike Duplicate	✓	–	✓	✓	–	✓
Laboratory Duplicate	✓	✓	✓	✓	✓	–
Internal Standard	✓	–	✓	–	–	✓
Sterility Checks	–	✓	–	–	–	–
Laboratory Positive Control	–	✓	–	–	–	–
Laboratory Negative Control	–	✓	–	–	–	–
Laboratory Water Control	–	–	–	–	–	–
Conductivity/Salinity Control Water	–	–	–	–	–	–
Additional Control Water	–	–	–	–	–	–
Sediment Control	–	–	–	–	–	–
Reference Toxicant Tests	–	–	–	–	–	–
Tuning	–	–	–	–	–	✓
Surrogate	–	–	–	–	–	✓
Calibration	–	–	–	–	–	✓

Data Quality Objectives

Data quality objectives (DQOs) are quantitative and qualitative statements that define project objectives and specify the acceptable ranges of field sampling and laboratory performance. DQOs include accuracy, precision, and completeness.

Accuracy describes how close the measurement is to its true value. Accuracy is the measurement of a sample of known concentration and comparing the known value against the measured value. The accuracy of chemical measurements will be checked by performing tests on a standard prior to and/or during sample analysis. A standard is a known concentration of a certain solution. Standards can be purchased from chemical or scientific supply companies. Standards might also be prepared by a professional partner (e.g., a commercial or research laboratory). The concentrations of the standards should be within the mid-range of the equipment. Recovery measurements are determined by spiking a replicate sample in the laboratory with a known concentration of the analyte. Accuracy of the project data will be determined by comparing results from MS/MSDs, LCSs, field blanks, and equipment blanks to the accuracy objectives to be developed by Copermittees.

Precision describes how well repeated measurements agree. The evaluation of precision described here applies to repeated measurements and samples collected in the field (field duplicates) or the laboratory (laboratory replicates and MS/MSDs). Precision measurements will be determined by comparing results from field duplicates, laboratory replicates and MSD to the precision objectives specified in Appendix F. Relative Percent Differences (RPDs) will be calculated to determine the precision between duplicate samples. This calculation is presented in Equation 1. Precision objectives will be developed by the Copermittees.

$$RPD = \frac{abs[x_1 - x_2]}{0.5 * (x_1 + x_2)} \quad \text{Equation 1}$$

where:

abs is the absolute value.

x1 is measurement 1.

x2 is measurement 2.

Completeness is the fraction of planned data that must be collected to fulfill the statistical criteria of the project. There are no statistical criteria that require a certain percentage of data. However, the anticipated target is 90%. This accounts for adverse weather conditions, safety concerns, and equipment problems. The project team determined completeness by comparing the number of measurements planned to be collected with the number of measurements actually collected that are deemed valid. An invalid measurement would be one that does not meet the sampling method requirements. Completeness will be measured as a percentage of the number of samples collected that meet the respective DQOs compared to the anticipated number of samples. This calculation is presented in Equation 2.

$$\text{Completeness} = \frac{\text{Actual number of samples collected}}{\text{Project required total samples to be collected}} * 100 \quad \text{Equation 2}$$

Instrument/Equipment Calibration and Frequency

Laboratory equipment will be calibrated based on manufacturer recommendations and in accordance with the method and laboratory SOP. The laboratory SOP is maintained by the respective Laboratory Directors and QA officers, and is available upon request.

Corrective Action

Corrective action will be taken when an analysis is deemed suspect. Reasons a sample may be considered suspect consist of exceedances of the RPD ranges, spike recoveries, and blanks. The corrective action may vary from analysis to analysis, but typically will involve the following:

Check of procedures:

- Review of documents and calculations to identify possible errors.
- Error correction.
- Re-analysis of the sample extract, if available, to see if results can be improved.
- Reprocessing and re-analysis of additional sample material, if it is available.

Malfunctions that occur during data collection and laboratory analyses will be the responsibility of the field crew or laboratory conducting the work, respectively. In the case of field instruments, problems will be addressed through instrument cleaning, repair, or replacement of parts or the instrument, as warranted. Field crews should carry basic spare parts and consumables with them, and have access to spare parts. The laboratories have procedures in place to follow when failures occur, and have identified individuals responsible for corrective action and developed appropriate documentation as needed.

Attachment D

Volume and Load Estimate Calculations

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Calculation of Runoff Volumes and Load Estimations for Assessment and Reporting

The methods to complete the Wet Weather MS4 outfall discharge monitoring assessment, as described in the Transitional Wet Weather MS4 Outfall Monitoring Work Plan prepared by Weston Solutions, are detailed in this section (Weston, 2014)

The assessment methods were formulated with the purpose of providing a means to calculate various parameters required by Section II.D.4.b.(2)(b) of the MS4 Permit based on the MS4 wet weather monitoring data collected during the 2013-2014 and 2014-2015 wet seasons. Section II.D.4.b.(2)(b) of the MS4 Permit states:

- (b) Based on the transitional wet weather MS4 outfall discharge monitoring required pursuant to Provision D.2.a.(3) the Copermittees must assess and report the following:
 - (i) The Copermittees must analyze the monitoring data collected pursuant to Provision D.2.a.(3), and utilize a watershed model or other method, to calculate or estimate the following for each monitoring year:
 - [a] The average storm water runoff coefficient for each land use type within the Watershed Management Area;
 - [b] The volume of storm water and pollutant loads discharged from each of the Copermittee's monitored MS4 outfalls in its jurisdiction to receiving waters within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch;
 - [c] The total flow volume and pollutant loadings discharged from the Copermittee's jurisdiction within the Watershed Management Area over the course of the wet season, extrapolated from the data produced from the monitored MS4 outfalls; and
 - [d] The percent contribution of storm water volumes and pollutant loads discharged from each land use type within each hydrologic subarea with a major MS4 outfall to receiving waters or within each major MS4 outfall to receiving waters in the Copermittee's jurisdiction within the Watershed Management Area for each storm event with measurable rainfall greater than 0.1 inch.
 - (ii) Identify modifications to the wet weather MS4 outfall discharge monitoring locations and frequencies necessary to identify pollutants in storm water discharges from the MS4s in the Watershed Management Area pursuant to Provision D.2.c.(1) (RWQCB, 2013).

Land Use Categorization

Geographic information system (GIS) mapping software, in combination with data from the San Diego Geographic Information Source (SanGIS), will be used to determine the quantities of the various land use types within each monitored outfall drainage area. The SanGIS land use dataset has numerous land use classifications, and the assessment included categorizing the SanGIS land use classifications into several assessment land use categories. The correlations between SanGIS land use data and the assessment land use classes are shown in Table D-1. Table D-2 shows the assessment land use classes along with the San Diego Hydrology Manual (Hydrology Manual) land use types runoff coefficient (Runoff “C”) values.

SanGIS land uses will be grouped into a minimum of four assessment categories listed by the MS4 Permit (e.g., Commercial, Industrial, Residential, and Mixed Land Use). The Commercial land use category will incorporate all “commercial” and most of the “public facility,” “parking lot,” and “commercial recreation” SanGIS classifications. The Industrial land use category will incorporate “industrial,” “airport,” “communications and utilities,” and “terminal” SanGIS classifications. The Residential land use category will incorporate Rural Residential (1 to 4 dwelling units per acre (DU/A)), Single-Family Residential (4.3 to 20 DU/A), and Multi-Family Residential (>20 DU/A). The Multi-Family Residential land use categorization will incorporate high density housing types, such as barracks, dormitories, monasteries, and other group quarters. The Mixed Land Use classification will incorporate the SanGIS classes 9700 (mixed use). These additional land uses will include a combination of roads, parking areas, various types of impervious surfaces (tennis courts, buildings, sidewalks/paved areas), and less than 90% open space (maintained fields and undeveloped lands).

SanGIS land uses classes that are not easily grouped into one of the four main land use categories will be identified as “other” and will undergo further assessment. Two additional land use categories, Open Space and Agriculture, will be used to address less developed regions in San Diego County. In accordance with the Hydrology Manual (County of San Diego, 2003), these land uses will undergo a separate analysis based on the soil type and associated pervious Runoff “C” value.

The Open Space land use category will include open space, vacant and undeveloped land, parks and recreation, and most of the remaining military SanGIS land uses. Given that areas classified as water, bay, lagoon, lake, reservoir, and large pond would likely turn into a sink for runoff storage, water-related land use classifications (9200, 9201, and 9202) will be excluded from this analysis.

Traditionally, Transportation land uses were considered a unique land use classification. The Hydrology Manual does not include unique Runoff “Cs” for roads, freeways, right of ways, and other Transportation land uses. These SanGIS classes will be grouped into a Transportation land use category and assigned a Runoff “C” based on the approximate percentage of impervious cover and associated Runoff “C” listed in the Hydrology Manual.

Table D-1
Assessment Land Use Categories Developed from SanGIS Land Use Classes

Assessment Land Use Category	SanGIS Land Use Classification	
Agriculture	7204	Golf Course
	8001	Orchard or Vineyard
	8002	Intensive Agriculture
	8003	Field Crops
Commercial	1401	Jail/Prison
	1501	Hotel/Motel (Low-Rise)
	1502	Hotel/Motel (High-Rise)
	1503	Resort
	4111	Rail Station/Transit Center
	4114	Parking Lot - Surface
	4115	Parking Lot - Structure
	4116	Park and Ride Lot
	5001	Wholesale Trade
	5002	Regional Shopping Center
	5003	Community Shopping Center
	5004	Neighborhood Shopping Center
	5005	Specialty Commercial
	5006	Automobile Dealership
	5007	Arterial Commercial
	5008	Service Station
	5009	Other Retail Trade and Strip Commercial
	6001	Office (High-Rise)
	6002	Office (Low-Rise)
	6003	Government Office/Civic Center
	6101	Cemetery
	6102	Religious Facility
	6103	Library
	6104	Post Office
	6105	Fire/Police Station
	6108	Mission
	6109	Other Public Services
	6501	UCSD/VA Hospital/Balboa Hospital

Table D-1. (Continued)
Assessment Land Use Categories Developed from SanGIS Land Use Classes

Assessment Land Use Category	SanGIS Land Use Classification	
Commercial (continued)	6502	Hospital - General
	6509	Other Health Care
	6807	School District Office
	7201	Tourist Attraction
	7202	Stadium/Arena
	7203	Racetrack
	7205	Golf Course Clubhouse
	7206	Convention Center
	7207	Marina
	7209	Casino
	9501	Residential Under Construction
	9502	Commercial Under Construction
	9504	Office Under Construction
	7208	Olympic Training Center
	7210	Other Recreation - High
	7607	Residential Recreation
Educational	6801	SDSU/CSU San Marcos/UCSD
	6802	Other University or College
	6803	Junior College
	6804	Senior High School
	6805	Junior High School or Middle School
	6806	Elementary School
	6809	Other School
	9505	School Under Construction

Table D-1. (Continued)
Assessment Land Use Categories Developed from SanGIS Land Use Classes

Assessment Land Use Category	SanGIS Land Use Classification	
Industrial	2001	Heavy Industry
	2101	Industrial Park
	2103	Light Industry - General
	2104	Warehousing
	2105	Public Storage
	2201	Extractive Industry
	2301	Junkyard/Dump/Landfill
	4101	Commercial Airport
	4102	Military Airport
	4103	General Aviation Airport
	4104	Airstrip
	4113	Communications and Utilities
	4120	Marine Terminal
	9503	Industrial Under Construction
Transportation	4112	Freeway
	9507	Freeway Under Construction
	4117	Railroad Right of Way
	4118	Road Right of Way
	4119	Other Transportation
	9506	Road Under Construction
Mixed Use	9700	Mixed Use
Residential: Multi-Family	1200	Multi-Family Residential
	1280	Single Room Occupancy Units (SRO's)
	1290	Multi-Family Residential Without Units
	1300	Mobile Home Park
	1402	Dormitory
	1403	Military Barracks
	1404	Monastery
	1409	Other Group Quarters Facility
Residential: Rural	1000	Spaced Rural Residential

Table D-1. (Continued)
Assessment Land Use Categories Developed from SanGIS Land Use Classes

Assessment Land Use Category	SanGIS Land Use Classification	
Residential: Single-Family	1100	Single Family Residential
	1110	Single Family Detached
	1110	Single Family Detached
	1120	Single Family Multiple-Units
	1190	Single Family Residential Without Units
Open Space	6701	Military Use
	6702	Military Training
	6703	Weapons Facility
	7211	Other Recreation - Low
	7601	Park - Active
	7603	Open Space Park or Preserve
	7604	Beach - Active
	7605	Beach - Passive
	7606	Landscape Open Space
	7609	Undevelopable Natural Area
	9101	Vacant and Undeveloped Land
Water	9200	Water
	9201	Bay or Lagoon
	9202	Lake/Reservoir/Large Pond
Source: SanGIS, 2014		

Table D-2
Assessment Land Use Hydrology Manual Runoff “C” Values

Land Use Type	Hydrology Manual Runoff “C”
Agriculture-A	0.2
Agriculture-B	0.25
Agriculture-C	0.3
Agriculture-D	0.35
Commercial	0.82
Educational	0.58
Industrial	0.87
Mixed Use	0.66
Multi-Family Residential	0.6
Open Space-A	0.2
Open Space-B	0.25
Open Space-C	0.3
Open Space-D	0.35
Rural-Residential	0.41
Single-Family Residential	0.49
Transportation	0.71

Source: County of San Diego, 2003

Stormwater Runoff Coefficient Calculations

Measured flow values will be used in combination with the hydrological features associated with the drainage areas of the monitored outfalls to calculate the average stormwater Runoff “C” for each land use type within the WMA. First, for each monitored outfall, the actual event Runoff “C” will be calculated based on outfall drainage area, rainfall, and measured flow. Next, the Hydrology Manual land use Runoff “C” values and overall outfall drainage area Hydrology Manual Runoff “C” value will be calculated based on the individual land use areas within each monitored outfall drainage area. For each monitored outfall, a correction factor will be calculated based on the comparison between the actual Runoff “C” value and the overall Hydrology Manual Runoff “C” value. The associated correction factor will be applied to the individual land use Runoff “C” values for each outfall. Finally, the WMA individual land use Runoff “C” values will be determined based on the area-weighted average of the monitored outfalls’ individual land use Runoff “C” values. The steps in this process are discussed in more detail in the following paragraphs

The actual Runoff “C” for each outfall will be calculated based on the measured stormwater runoff, rainfall, and overall size of the drainage area. Flow equipment will be installed in each monitored outfall, except in rare cases where it is not feasible, in order to estimate the volume of stormwater runoff for the monitored event. Rainfall data for each event will be obtained from the County of San Diego Automatic Local Evaluation in Real Time (ALERT) System rain gauge database for the gauge nearest to the monitored outfall. The delineation of each monitored outfall drainage area will be performed by the responsible Copermittee. The actual Runoff “C” for each outfall will be calculated using the following formula:

$$Runoff "C"_{Outfall Actual} = \left(\frac{Monitored Storm Water Runoff Volume}{Area \times Rainfall} \right)_{Outfall} (UC)$$

Volume in cubic feet (ft³)

Area in acres

Rainfall in inches (in)

$$UC = Unit Conversion = \left(\frac{1 ft}{12 in} \right) \left(\frac{43,560 ft^2}{1 acre} \right)$$

The Hydrology Manual Runoff “C” for each monitored outfall will be selected based on the guidance found in Section 3 (Rational Method) of the Hydrology Manual. The area-weighted Hydrology Manual Runoff “C” for each monitored outfall will be calculated using the following formula:

$$Runoff "C"_{Outfall HM Calculated} = \frac{\sum (Area_{Outfall LU} \times HM Runoff "C"_{LU})}{\sum Area_{Outfall LU}}$$

Where: LU = land use type

HM = Hydrology Manual

A Runoff “C” correction factor will be calculated for each monitored outfall using the following formula:

$$CF_{Outfall Runoff "C"} = \frac{Runoff "C"_{Outfall Actual}}{Runoff "C"_{Outfall HM Calculated}}$$

Where: CF = correction factor

For each monitored outfall, the calculated correction factor will be applied to the Hydrology Manual land use Runoff “C” values within the applicable drainage area as follows:

$$Runoff "C"_{Outfall LU} = CF_{Outfall Runoff "C"} \times Runoff "C"_{HM LU}$$

The land use type Runoff “C” calculation results for the monitored outfalls within the WMA will be compiled as follows to determine the WMA Runoff “C” value for each land use type:

$$Runoff \text{ "C"}_{WMA LU} = \frac{\sum (Runoff \text{ "C"} \times Area)_{Outfall LU}}{\sum Area_{Outfall LU}}$$

Monitored Outfalls Annual Runoff Volumes and Pollutant Loads Calculations

The annual stormwater runoff volumes and pollutant loads discharged from monitored MS4 outfalls for storm events greater than 0.1 inch of measurable rainfall will be calculated using the actual Runoff “C” values, drainage area sizes, ALERT rain gauge data, and chemistry results obtained from the collection of stormwater samples during the 2013-2014 and 2014-2015 wet seasons. The actual Runoff “C” value and drainage area size for each monitored outfall will be determined as described in Section 5.2. Annual rainfall will be obtained from the ALERT rain gauge database for the gauge nearest to each monitored outfall. The rain gauge data will be analyzed, and rainfall values will be identified and excluded from the annual stormwater volume calculations when precipitation totals do not exceed 0.1 inch over a 24-hour period. The annual volume discharge from each monitored outfall will be calculated as follows:

$$Storm \text{ Water Volume}_{Outfall} = (Runoff \text{ "C"}_{Outfall Actual} \times Area_{Outfall}) \left(\sum Rainfall_{Event} \right) (UC)$$

Where:

$$UC = Unit \text{ Conversion} = \left(\frac{1 \text{ ft}}{12 \text{ in}} \right) \left(\frac{43,560 \text{ ft}^2}{1 \text{ acre}} \right)$$

The pollutant loads discharged from each monitored MS4 outfall will be calculated based on the calculated annual volume and the chemistry results specific to each outfall as follows:

$$Pollutant \text{ Load}_{Outfall} = (Storm \text{ Water Volume} \times Pollutant \text{ Concentration})_{Outfall} (UC)$$

Where:

$$UC = \left(\frac{28.317 \text{ L}}{1 \text{ ft}^3} \right) \left(\frac{1 \text{ g}}{1000 \text{ mg}} \right) \left(\frac{1 \text{ lbs}}{453.592 \text{ g}} \right), \text{ for } \frac{\text{mg}}{\text{L}} \text{ concentration units;}$$

$$UC = \left(\frac{28.317 \text{ L}}{1 \text{ ft}^3} \right) \left(\frac{1 \text{ g}}{10^6 \text{ } \mu\text{g}} \right) \left(\frac{1 \text{ lbs}}{453.592 \text{ g}} \right), \text{ for } \frac{\mu\text{g}}{\text{L}} \text{ concentration units; or}$$

Watershed Management Area Jurisdictional Annual Runoff Volumes and Pollutant Loads Calculations

The total flow volume and pollutant loads discharged from each Copermittee's jurisdiction within the WMA over the course of the wet season will be calculated based on the data produced from monitoring MS4 outfalls during the 2013-2014 and 2014-2015 wet seasons. The WMA Runoff "C" values, calculated as described in Section 5.2, will be used in combination with land use data and ALERT rain gauge data to calculate the total flow volume for each jurisdiction. The annual volumes will be applied to pollutant event mean concentrations (EMCs) in order to estimate the annual pollutant loads conveyed by the MS4 in each Copermittee's jurisdiction. The EMC for each applicable pollutant will be determined by compiling the results from the outfalls monitored in the WMA. More details on the flow volume and pollutant load calculations are provided in the paragraphs that follow.

The total flow volume conveyed by each Copermittee's MS4 will be calculated using the land use data, WMA land use type Runoff "C" values (see Section 5.2), and ALERT rain gauge data. GIS mapping software will be used to determine the quantities of the various land use types for each Copermittee by comparing the WMA boundary with the Copermittees' boundaries. The areas associated with hydrologic subareas (HSAs) without a major outfall will be included in the total area to calculate the assessment required by Section II.D.4.b.(2)(b)(i)[c]; however, an HSA without a major outfall will not be included in the assessment required by Section II.D.4.b.(2)(b)(i)[d].

Properties owned by state or federal agencies and indian reservations will also be excluded from the total jurisdictional WMA area. An ALERT rain gauge located within the WMA will be selected for the volume calculations. In the event that data from more than one ALERT gauge are available for the WMA, the ALERT gauge that has the most representative data related to the monitored outfalls will be selected (i.e., the station closest to the majority of monitored outfalls was selected to perform outfall-specific calculations for more of the outfalls and was also selected for WMA calculations). The ALERT data will be analyzed, and rainfall values will be identified and excluded from the calculations when precipitation totals do not exceed 0.1 inch of rainfall over a 24-hour period. The following formulas will be used to calculate the annual flow volume from each land use type and total flow volume within each Copermittee's jurisdiction in the WMA during the wet season:

$$Storm\ Water\ Volume_{WMAJurisd\ LU} = (Runoff\ "C"_{WMA LU})(Area_{WMA LU})(\sum Rainfall_{Event})(UC)$$

Where:

$$UC = \left(\frac{1\ ft}{12\ in} \right) \left(\frac{43,560\ ft^2}{1\ acre} \right)$$

$$Storm\ Water\ Volume_{WMAJurisd,} = \sum Storm\ Water\ Volume_{WMAJurisd\ LU}$$

The chemistry results obtained from analyzing samples collected at the monitored outfalls during the 2013-2014 and 2014-2015 wet seasons will be evaluated in order to estimate the WMA EMC values for the measured constituents for each general land use type assessed. This evaluation includes estimating each monitored outfall drainage area's EMC values for the measured constituents for each general land use type assessed. The monitored outfalls will be selected, where practical, to have a single primary land use type in order to facilitate the correlation between land use type and pollutant loading; however, due to the general mixed composition of urban development, the drainage areas of the monitored outfalls may typically consist of a combination of land use types (e.g., primarily single-family residential with some commercial, open space, transportation.).

The correlation of measured pollutant concentrations to EMC values for various land use types, therefore, will incorporate the use of published, typical EMC values so that the measured chemistry results will be proportioned to the different land use types within each drainage area. The methods to proportion the measured chemistry results will be similar to the methods to determine the land use type Runoff "C" values (Section 5.2). The measured chemistry results will be the actual EMC values for each monitored outfall drainage area. Typical EMC values will be selected from the literature for each land use type for the measured constituents. Typical overall or comingled EMC values will be calculated for each monitored outfall based on the weighted average of the outfall land use type Runoff "C" values and drainage area land use type areas. The actual EMC values (comingled chemistry results) of the monitored outfall will then be compared to the calculated, typical outfall EMC values in order to determine correction factors for each constituent. For each constituent, the correction factor will then be applied to the typical land use type EMC values for the associated monitored outfall drainage area. The WMA EMC values for the various land use types will be calculated based on corrected land use type EMCs of the monitored outfalls within the WMA, which are weighted by the product of the land use type Runoff "C" values and land use type areas. The following formulas will be used to complete these calculations:

$$EMC_{Outfall Actual} = Sampling Chemistry Result_{Outfall}$$

The overall or comingled outfall typical EMC for each measured constituent will be calculated using the following formula:

$$EMC_{Outfall Calculated} = \frac{\sum (Area_{Outfall LU} \times Runoff "C"_{Outfall LU} \times Typical EMC_{LU})}{\sum (Area_{Outfall LU} \times Runoff "C"_{Outfall LU})}$$

An EMC correction factor will be calculated for each constituent for each monitored outfall using the following formula:

$$CF_{Outfall EMC} = \frac{EMC_{Outfall Actual}}{EMC_{Outfall Calculated}}$$

For each monitored outfall for each constituent, the calculated EMC correction will be applied to the land use type typical EMC value as follows:

$$EMC_{Outfall\ LU} = CF_{Outfall\ EMC} \times Typical\ EMC_{LU}$$

The calculation results for the monitored outfalls within the WMA will be compiled to determine the EMC value for each constituent of each land use type assessed within the WMA.

$$EMC_{WMA\ LU} = \frac{\sum (Runoff\ "C" \times Area \times EMC)_{Outfall\ LU}}{\sum (Area \times Runoff\ "C")_{Outfall\ LU}}$$

The total WMA pollutant load for each constituent within each jurisdiction will be calculated utilizing the follow the formula:

$$Pollutant\ Load_{WMA\ Jurisd,} = \sum (Storm\ Water\ Volume_{WMA\ Jurisd\ LU} \times EMC_{WMA\ LU} \times UC)$$

Where:

$$UC = \left(\frac{28.317\ L}{1\ ft^3} \right) \left(\frac{1\ g}{1000\ mg} \right) \left(\frac{1\ lbs}{453.592\ g} \right), \text{ for } \frac{mg}{L} \text{ concentration units;}$$

$$UC = \left(\frac{28.317\ L}{1\ ft^3} \right) \left(\frac{1\ g}{10^6\ \mu g} \right) \left(\frac{1\ lbs}{453.592\ g} \right), \text{ for } \frac{\mu g}{L} \text{ concentration units; or}$$

$$UC = \left(10 \frac{100\ mL}{L} \right) \left(\frac{28.317\ L}{1\ ft^3} \right), \text{ for } \frac{MPN}{100\ mL} \text{ EMC units;}$$

ATTACHMENT A3. FOCUSED PRIORITY MONITORING PROGRAM – MONITORING PLAN

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ACRONYMS AND ABBREVIATIONS

Acronym or Abbreviation	Definition
BMI	benthic macroinvertebrate
CRAM	California Rapid Assessment Method
HA	Hydrologic Area
IBI	Index of Biological Integrity
ID	identification
MS4	municipal separate storm sewer system
Municipal Permit	San Diego Regional Water Quality Control Board Order Number R9-2013-0001, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Draining the Watersheds Within the San Diego Region
NPDES	National Pollutant Discharge Elimination System
RP	Responsible Party
SOP	standard operating procedure
SWAMP	Surface Water Ambient Monitoring Program
TMDL	total maximum daily load
WMA	Watershed Management Area

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A.3 FOCUSED PRIORITY MONITORING

Focused priority monitoring will be implemented as part of the Water Quality Improvement Plan pursuant to San Diego Regional Water Quality Control Board (Regional Board) Order No. R9-2013-0001, *National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges From the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds Within the San Diego Region*, hereafter referred to as the Municipal Permit. The goal of the San Diego Bay WMA Focused Priority Monitoring Program is to characterize current conditions and assess progress in the receiving waters, and effectiveness of water quality improvement strategies, if applicable to the Focused Priority Conditions implemented as part of the San Diego Bay WMA Water Quality Improvement Plan.

Focused Priority Monitoring includes the following monitoring to satisfy the requirements of Provision B.4 of the Municipal Permit:

- Riparian Area Monitoring – Paradise Creek
 - o City of National City
- Physical Aesthetics Monitoring (Trash) – Sweetwater Hydrologic Area (HA) 909.1 and Otay HA 910.2
 - o City of Chula Vista, City of Imperial Beach, and the Port of San Diego
- Swimmable Waters Monitoring – Otay HA 910.1
 - o City of Coronado, City of Imperial Beach, and Port of San Diego

Other Highest and Focused Priority Conditions have existing monitoring plans and are discussed in MAP Attachment A.5.

A.3.1 Riparian Area Monitoring – Paradise Creek

The goal of riparian area monitoring at Paradise Creek is to assess the cumulative impacts of discharges to benthic invertebrates and algae in the Paradise Creek receiving water. Specific monitoring details are provided below.

A.3.1.1 Assessment Locations

Sampling will be conducted in the City of National City along the reach of Paradise Creek within Kimball Park. Figure A3-1 presents the location of the assessment area.

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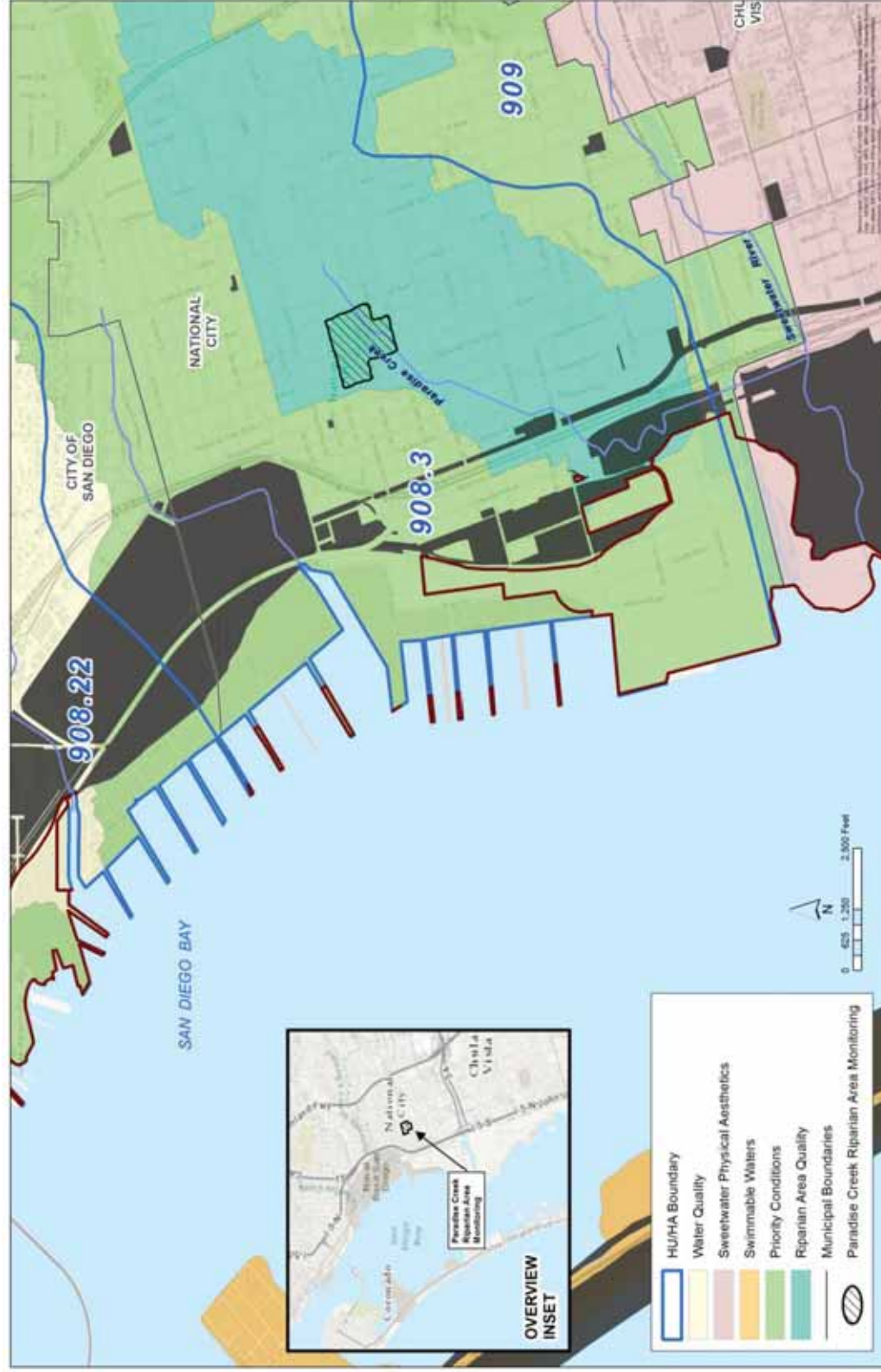


Figure A3-1
 Location of Riparian Area Monitoring

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A.3.1.2 Number of Sampling Events

Three dry weather events will be conducted during the Municipal Permit term.

A.3.1.3 Assessment Method

Habitat assessment will be conducted according to the California Rapid assessment Method (CRAM) for estuarine wetlands.¹

A.3.2 Physical Aesthetics Monitoring – Sweetwater HA 909.1 and Otay HA 910.2

The goal of physical aesthetics monitoring in Sweetwater 909.1 HA and Otay 910.2 HA is to assess and identify receiving waters impacted by trash from the MS4. Specific monitoring details are provided below.

A.3.2.1 Monitoring Approach

Table A3-1 presents a summary of monitoring to be conducted for Physical Aesthetics in the Sweetwater and Otay HAs.

Table A3-1
Physical Aesthetics (Trash) Monitoring – Sweetwater and Otay Rivers

	Wet Weather Monitoring	Dry Season, Dry Weather Monitoring	Wet Weather Season, Dry Weather Monitoring
Monitoring Approach	- Inspect predetermined transect of 2-25 feet (standard area) from major outfall MS4 sites. - Assess major outfall MS4 site when assessing receiving water	- Inspect predetermined transect of 2-25 feet (standard area) away from major outfall MS4 sites - Assess major outfall MS4 site when assessing receiving water	- Perform MS4 inspections at 12 locations - Inspect predetermined transect of 2-25 feet (standard area) away from major outfall MS4 sites - Assess major outfall MS4 site when assessing receiving water
Frequency (Number of Monitoring Events)	Annually inspect after one wet weather event during wet season at 12 locations	Annual inspection at 12 locations	Annual inspection at 12 locations
Timing of monitoring	Sample within 72 hours of a storm	During dry weather season (April 1 – October 31)	During dry periods, 72 hours or more after storm event

¹ Collins, J.N., E.D. Stein, M. Sutula, R. Clark, A.E. Fetscher, L. Grenier, C. Grosso and A. Wiskind. 2007. *California Rapid Assessment Method (CRAM) for Wetlands and Riparian Areas*. Version 5.0. Available from <http://www.cramwetlands.org>.

A.3.2.2 Paired Receiving Water and Outfall Monitoring

There are 12 receiving water sites that will be monitored concurrently with MS4 major outfall monitoring locations in the Focused Priority Condition area. The 12 paired receiving water sites and MS4 major outfall monitoring locations are presented in Table A3-2 and Figure A3-2.

Table A3-3
Paired Receiving Water and MS4 Outfall Stations in Focused Priority Area

Jurisdiction	Site	Location	Hydrologic Subarea	Latitude	Longitude
City of Chula Vista	C-1	West side of Bay Blvd., south of J St., south side of channel, under road, access from gate east side of Bay Blvd.	909.12	32.62116	-117.09449
	ORW-1	South of Rancho Dr., SW corner of Shadow Pines condos, in canyon	910.20	32.59125	-117.03790
	SR-4	South bank of Sweetwater River, between Broadway and Highland	909.12	32.65311	-117.09430
	SV-1	North of I-805, south side of river, south of Plaza Bonita Mall	909.12	32.65076	-117.06646
	SW-4	South of Main St., east side of trolley tracks, across from Otay Valley Regional Park, access from bridge at Hanson Aggregates	910.20	32.59043	-117.08368
	TC-39	West of property at SW corner of L St. and Industrial Blvd., inlet at end of brow ditch between property and I-5	909.11	32.61487	-117.09086
Port of San Diego	2168.1	Outfall off of Pepper Park along Sweetwater Channel	909.12	32.649309005	-117.111502361
	TelegraphCnyn Mouth	Mouth of Telegraph Canyon	909.11	32.617238	-117.096168
	CV1-1.1	North end of Bayside Park in Chula Vista	909.12	32.6295319965	-117.108343322
	2172.1	North end of Chula Vista Marina Basin	909.12	32.6256107322	-117.101921013
	2162.1	South end of Chula Vista Bayfront	909.11	32.6205856513	-117.097457173
City of Imperial Beach	K-Outfall	Southeast side of the south bay	910.20	32.588304	-117.107516

A.3.2.3 Assessment Methods

Trash assessments will be conducted according to methods presented in the MS4 Outfall – Dry Weather Monitoring Program. In addition, the monitoring approach and the methodology will be similar to the following elements of the San Diego Bay Debris Study Work Plan Plan²:

- Characterize habitat conditions (e.g., concrete, riprap, homeless encampment nearby, etc.)
- Record habitat aesthetic rating (optimal to poor)
- Evidence of littering and illegal dumping (yes or no type of answer)
- Assess types of trash present (general categories)

A.3.2.4 MS4 Outfall Monitoring Program Requirements

Sweetwater River (909.1 HA) monitoring locations under this program are within the jurisdiction of the City of Chula Vista and the Port of San Diego. Otay River (910.2 HA) monitoring locations under this program are within the jurisdiction of the City of Chula Vista, the Port of San Diego, and the City of Imperial Beach. There are nine monitoring locations in Sweetwater River (909.1 HA) and three monitoring locations in Otay River (910.2 HA). The 12 paired receiving water sites and MS4 major outfall monitoring locations are presented in Figure A3-2. In addition to the focused monitoring approach identified for the 12 paired locations, the RPs will also continue to assess trash as part of the MS4 Outfall Monitoring Program requirements at other major outfall locations in the Focused Priority Condition area, as presented in Table A3-3 and Figure A3-2.

²San Diego Bay Debris Study Workgroup. 2014. *San Diego Bay Debris Special Study Work Plan*.

Table A3-3
MS4 Outfall Dry Weather Field Screening Stations Inventory in
Focused Priority Area

Jurisdiction ¹	Site	Hydrologic Subarea	Latitude	Longitude
City of Chula Vista	C-2	909.12	32.62139	-117.09394
	C-3	909.12	32.62325	-117.09426
	C-6	909.12	32.62918	-117.09507
	C-7	909.12	32.63428	-117.09706
	C-9	909.12	32.63331	-117.09102
	C-11	909.12	32.63869	-117.07956
	C-12	909.12	32.63869	-117.07956
	C-13	909.12	32.63869	-117.07956
	C-14	909.12	32.63906	-117.07722
	C-15	909.12	32.63843	-117.07739
	C-16	909.12	32.63843	-117.07739
	C-17	909.12	32.63843	-117.07739
	C-18	909.12	32.63599	-117.07208
	C-19	909.12	32.63599	-117.07208
	C-20	909.12	32.63599	-117.07208
	C-22	909.12	32.63633	-117.06676
	C-23	909.12	32.62953	-117.09403
	C-24	909.12	32.62646	-117.09178
	C-25	909.12	32.634	-117.0906
	C-26	909.12	32.63792	-117.06728
	J-1	910.20	32.59239	-117.05917
	J-2	910.20	32.59487	-117.06681
	J-3	910.20	32.60097	-117.0659
	J-7	910.20	32.60622	-117.06266
	J-10	910.20	32.61112	-117.05745

1. For Responsible Agencies with fewer than 500 but more than 125 major MS4 outfalls in the WMA (Chula Vista), 100% of major outfalls must be screened once per year. For Copermittees with fewer than 125 major outfalls in the WMA (Port of San Diego and Imperial Beach), 80% of total major outfalls presented in the table must be screened twice per year.

Table A3-3 (continued)
MS4 Outfall Dry Weather Field Screening Stations Inventory in
Focused Priority Area

Jurisdiction ¹	Site	Hydrologic Subarea	Latitude	Longitude
City of Chula Vista (continued)	J-11	910.20	32.61077	-117.0571
	J-12	910.20	32.61277	-117.0554
	J-13	910.20	32.61275	-117.05539
	J-19	910.20	32.60159	-117.06313
	J-20	910.20	32.60995	-117.06001
	J-21	910.20	32.61802	-117.05405
	ORC-1	910.20	32.60580	-116.97481
	PC-1	910.20	32.59154	-117.04199
	PC-2	910.20	32.59611	-117.04087
	PC-32	910.20	32.6018	-117.03669
	PC-35	910.20	32.60028	-117.03806
	PR-6	910.20	32.61177	-117.03979
	SR-1	909.12	32.64136	-117.0998
	SR-2	909.12	32.63984	-117.09928
	SR-3	909.12	32.64884	-117.09623
	SR-6	909.12	32.65036	-117.08819
	SR-7	909.12	32.64995	-117.08656
	SR-9	909.12	32.65315	-117.07837
	SR-10	909.12	32.65122	-117.09283
	SV-2	909.12	32.64914	-117.06477
	SW-1	910.20	32.60811	-117.09231
	SW-2	910.20	32.5947	-117.0891
	SW-3	910.20	32.60094	-117.08464
	SW-5	910.20	32.59119	-117.081
	SW-6	910.20	32.59124	-117.07315
	TC-2	910.20	32.60702	-117.0758

1. For Responsible Agencies with fewer than 500 but more than 125 major MS4 outfalls in the WMA (Chula Vista), 100% of major outfalls must be screened once per year. For Copermittees with fewer than 125 major outfalls in the WMA (Port of San Diego and Imperial Beach), 80% of total major outfalls presented in the table must be screened twice per year.

Table A3-3 (continued)
MS4 Outfall Dry Weather Field Screening Stations Inventory in
Focused Priority Area

Jurisdiction ¹	Site	Hydrologic Subarea	Latitude	Longitude
City of Chula Vista (continued)	TC-3	909.11	32.62923	-117.04544
	TC-37	909.11	32.6287	-117.04292
	TC-38	909.11	32.61283	-117.0884
Port of San Diego	2185.1	909.12	32.62192051	-117.1004408
	2941.1	909.12	32.62753771	-117.1073369
	2175.1	909.12	32.62392325	-117.1012412
	NCMT030.1	909.12	32.65074241	-117.1203395
	NCMT1008.1	909.12	32.64823422	-117.1176928
	NCMT031.1	909.12	32.64968508	-117.120188
	NCMT032.1	909.12	32.64871894	-117.1199524
	NCMT033.1	909.12	32.64790477	-117.1197531
	NCMT034.1	909.12	32.64801773	-117.1182581
	NCMT035.1	909.12	32.64819461	-117.1178862
	NCMT026.1	909.12	32.65258795	-117.1208761
	NCMT028.1	909.12	32.65166124	-117.1206465
	NCMT1003.1	909.12	32.65224671	-117.120821
	NCMT004.1	909.12	32.65708543	-117.120383
	NC5-1.1	909.12	32.65758987	-117.118102
	CV1-2	909.12	32.63139829	-117.1043923
City of Imperial Beach	H-Outfall	910.20	32.589468	-117.113711

1. For Responsible Agencies with fewer than 500 but more than 125 major MS4 outfalls in the WMA (Chula Vista), 100% of major outfalls must be screened once per year. For Copermittees with fewer than 125 major outfalls in the WMA (Port of San Diego and Imperial Beach), 80% of total major outfalls presented in the table must be screened twice per year.

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Figure A3-2
 Location of Physical Aesthetics
 Monitoring

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A.3.3 Otay HA 910.1 – Swimmable Waters Monitoring

The goal of swimmable waters monitoring in the Coronado HA (910.1) is to assess the status of beaches in this HA by assessing for Indicator Bacteria and determine whether MS4 discharges may potentially be a source. Specific monitoring details are provided below.

A.3.3.1 Monitoring Approach

Samples will be collected and analyzed for Indicator Bacteria according to Department of Environmental Health (DEH) protocols for receiving waters.³ MS4 Outfalls will be sampled according to Section A.2 of this Attachment. Table A3-4 presents a summary of sample collection.

³ <http://www.cdph.ca.gov/healthinfo/environhealth/water/Documents/Beaches/RecommendedMethodsforAB411.pdf>;
http://www.sandiegocounty.gov/content/dam/sdc/deh/lwqd/Beach&Bay/bb_beach_water_quality_info.pdf

**Table A3-4
Swimmable Waters Monitoring**

	Receiving Water Wet Weather Monitoring	Receiving Water Dry Season, Dry Weather Monitoring	Receiving Water Wet weather season, Dry weather monitoring	MS4 Monitoring
Monitoring Approach	Monitor at Tidelands Park and North Beach sites	- Tidelands Park and IB Pier¹ sites: Current San Diego County Department of Environmental Health (DEH) sites. (No additional monitoring to be done by RPs at these sites during this period) - North Beach: Past DEH site and City of Coronado's current transitional wet and dry monitoring location and dry weather MS4 major outfall monitoring location	- Expand DEH's dry weather monitoring to occur during the wet weather season. - Monitoring at Tidelands Park and North Beach sites¹ - IB Pier site	- Perform MS4 monitoring at all beach sites at same time as monitoring receiving water quality - Sample three wet weather events during wet season at Tidelands Park in conjunction with receiving water, if feasible
Frequency (Number of Monitoring Events)	Annually sample three wet weather events during wet season at Tidelands Park and North Beach sites	- Tidelands Park site: Weekly - North Beach: Past DEH site and City of Coronado's current transitional wet and dry monitoring location and dry weather MS4 major outfall monitoring location	Monthly at Tidelands Park and North Beach sites¹ (November 1 – March 31)	Inspect MS4 monthly, year round
Timing of monitoring	Sample within 72 hours of a storm (consistent with Bacteria I TMDL ⁴)	During dry weather season (April 1 – October 31)	During dry periods, 72 hours or more after storm event	Take sample at MS4 if there is flow/discharge

Notes:

1. South Bay Ocean Outfall Sites: Weekly surf zone bacteria monitoring at three locations along the Coronado HSA 910.1. These locations include S12 Carnation Ave (Camp Surf), S8 Silver Strand State Beach, and S9 Avenida del Sol (Hotel del Coronado).

Imperial Beach Pier: The Pacific shoreline of the Coronado HA 910.1 already has an established monitoring plan to assess the receiving water conditions through the South Bay Ocean Outfall Waste Discharge Requirements in Order R9-2014-0071 for the City of San Diego and Order R9-2014-0009 for the International Boundary and Water Commission. These permits establish a joint receiving water monitoring program for the South Bay Ocean Outfall and include weekly surf zone bacteria monitoring at 3 location along the Coronado HA 910.1. These locations include S12 Carnation Ave (Camp Surf), S8 Silver Strand State Beach, and S9 Avenida del Sol (Hotel del Coronado). In addition,

⁴Regional Board. 2010. *Revised TMDL for Indicator Bacteria, Project I—Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)*. Resolution No. R9-2010-0001. Approved February 10, 2010.
http://www.waterboards.ca.gov/sandiego/water_issues/programs/tmdls/docs/bacteria/updates_022410/2010-0210_Bactil_Resolution&BPA_FINAL.pdf.

the County of San Diego Department of Environmental Health performs AB411 beach water quality monitoring throughout the year for public health along the Pacific shoreline of the Coronado HA 910.1. The existing beach water quality monitoring is sufficient to assess swimmable waters along the Pacific shoreline of the Coronado HA 910.1 and the San Diego Bay WMA Copermittees are to utilize these data for the Water Quality Improvement Plan Monitoring and Assessment Annual Report.

A.3.3.2 Sampling Locations

Swimmable waters monitoring has three receiving water monitoring locations that are associated with MS4 outfall locations: one at Tidelands Park in the San Diego Bay, and two locations in the Pacific Ocean at North Beach in Coronado and at the Imperial Beach Pier. Table A3-5 presents the MS4 Outfalls monitoring locations. Figure A3-3 presents the general areas to be monitored as part of the swimmable waters monitoring.

Table A3-5
Swimmable Waters MS4 Outfall Monitoring Locations

Monitoring Area	Site ID	HSA	Latitude	Longitude	Description
North Beach	North Beach Outfall	910.1	32.68665	-117.1934	Major Outfall
	North Beach Ocean	910.1	32.6864	-117.1937	Receiving Water Beach Site (outfall location varies with the tide)
City of Imperial Beach	Imperial Beach Pier	910.2	32.579564	-117.134730	Major Outfall
	EH030*	910.2	32.588304	-117.107516	Receiving Water Beach Site (Major Outfall)
Tidelands Park	1203.1	910.1	32.690395	-117.164465	Tidelands Park outfall -closest to beach
	1206.1	910.1	32.690791	-117.164368	Tidelands Park outfall -second outfall from beach
	1219.1	910.1	32.691713	-117.164085	Tidelands Park outfall -third outfall from beach
	EH-070*	910.1	32.68993	-117.16419	Receiving Water Beach Site (Tidelands Park Beach)

Notes:

Stations in boldface indicate receiving water beach sites where receiving water monitoring and MS4 outfall inspections will be conducted simultaneously.

*Monitoring location is also a DEH AB 411 monitoring site.

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Figure A3-3
 Locations for Swimmable Waters
 Monitoring

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A.3.4 References

- California Department of Public Health. 2000. Recommended Methods for the Analysis of Recreational Marine Water to Comply with AB 411. Accessed January 6, 2015.
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- Regional Board. 2010. *Revised TMDL for Indicator Bacteria, Project I—Twenty Beaches and Creeks in the San Diego Region (including Tecolote Creek)*. Resolution No. R9-2010-0001. Approved February 10, 2010.
http://www.waterboards.ca.gov/sandiego/water_issues/programs/tmdls/docs/bacteria/updates_022410/2010-0210_Bactil_Resolution&BPA_FINAL.pdf.
- San Diego Bay Debris Study Workgroup. 2014. *San Diego Bay Debris Special Study Work Plan*.

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ATTACHMENT A4. MONITORING PLANS FOR EXISTING PROGRAMS

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A.4 EXISTING MONITORING PLAN REFERENCES

The following MAP components will be conducted under existing monitoring plans, as listed:

- Airport Authority Metals Monitoring
 - o Reference: Wet Weather Monitoring Programs
- Bacteria TMDL Monitoring (Chollas Creek)
 - o Reference: Chollas Creek TMDL Monitoring Plan (Appendix K, Attachment C)
- Bight' 13
 - o Reference: Southern California Bight Regional Monitoring Plan
<http://www.sccwrp.org/Documents/BightDocuments/Bight13Documents/Bight13PlanningDocuments.aspx>
- Chollas Creek Metals and Bacteria TMDLs
 - o Reference: Chollas Watershed Comprehensive Load Reduction Plan
<http://www.sandiego.gov/stormwater/plansreports/>
 - o Reference: Chollas Watershed Comprehensive Load Reduction Plan – Phase II
<http://www.sandiego.gov/stormwater/plansreports/>
- Chollas – Jurisdictional Boundary Study for Metals
 - o Reference: Chollas Watershed Comprehensive Load Reduction Plan
<http://www.sandiego.gov/stormwater/plansreports/>
 - o Reference: Chollas Watershed Comprehensive Load Reduction Plan – Phase II
<http://www.sandiego.gov/stormwater/plansreports/>
- Hydromodification Regional Monitoring Program
 - o Reference: Hydromodification Management Plan
http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=182&Itemid=188

- Riparian Area
 - o Reference: City of National City Paradise Creek Selenium Monitoring Plan (Attached as Appendix A.4-A)
 - o Reference: City of National City Paradise Creek Selenium Monitoring QAPP (Attached as Appendix A.4-B)
 - o California Rapid Assessment Method Monitoring Plan (in progress).
- San Diego County Beach Water Quality (AB411) Monitoring
 - o Reference: Beach Water Quality (AB411) Monitoring Guidance
http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=141&Itemid=142
- San Diego Regional Reference Streams and Beaches Studies
 - o Reference: San Diego Reference Stream Survey Workplan
<http://www.sccwrp.org/Documents/ResearchPlan.aspx>
- Sediment Quality Monitoring
 - o Reference: Draft Sediment Monitoring Plan (Appendix K, Attachment B)
- Shelter Island Copper TMDL
 - o Reference: Shelter Island Yacht Basin TMDL Monitoring Plan (Appendix K, Attachment D)
- Shelter Island Shoreline Park Bacteria TMDL
 - o Reference: Shoreline Park Bacteriological Monitoring Plan (Appendix K, Attachment E)
- SMC Regional Monitoring
 - o Reference: Storm Water Monitoring Coalition Regional Monitoring Plan
http://www.waterboards.ca.gov/sandiego/water_issues/programs/swamp/regional.shtml
- Trash – Pueblo San Diego Hydrologic Unit: Creek Refuse Assessment Program Special Study
 - o Reference: Pueblo San Diego Hydrologic Unit: Creek Refuse Assessment Program Special Study Standard Operating Procedure (Attached as Appendix A.4-C)
- Trash – San Diego Debris Special Study
 - o Reference: San Diego Debris Special Study Work Plan (Appendix K, Attachment F)

APPENDIX A.4-A. CITY OF NATIONAL CITY PARADISE CREEK SELENIUM MONITORING PLAN

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City of National City Paradise Creek Selenium Monitoring Plan

(Revised on April 2, 2014)

Background and Purpose

Paradise Creek is on the 2010 Clean Water Act (CWA) 303(d) list of impaired water bodies with a selenium impairment. The SWAMP data collected in 2005 and 2006 indicated selenium results exceeded the water quality objective (WQO) of 5 µg/L in four of four samples. Beneficial uses of Paradise Creek include warm freshwater habitat, wildlife habitat, and non-contact water recreation. Elevated selenium levels pose a threat to warm freshwater habitat. While no TMDL has been established for Paradise Creek, this water body is of great importance to the City of National City (City) since it runs through the center of the city, directly through Kimball Park at City Hall. Paradise Creek is one of the few urban creeks within the Pueblo San Diego Watershed that has not been completely channelized or undergrounded. Paradise Creek is also tributary to Paradise Marsh, which is part of the Sweetwater Marsh National Wildlife Refuge.

The objective of Paradise Creek selenium monitoring is to collect additional selenium data in the portion of the creek adjacent to Kimball Park within the City that would support the removal of the selenium 303(d) listing in the future.

Monitoring Locations

The sites selected for monitoring are presented in Table 1, below, and Figure 1 is a map of the locations.

Table 1. Monitoring Locations

Site	Location	Latitude	Longitude
KP-2	Paradise Creek, adjacent to Kimball Park, east of footbridge (approximately 175 feet), within depressed area of channel	32.67036	-117.10223
KP-2.1	Paradise Creek, adjacent to Kimball Park, upstream of Site KP-2	32.67068	-117.10220
KP-2.2	Paradise Creek, adjacent to Kimball Park, upstream of Site KP-2.1	32.66963	-117.10275
KP-3	Paradise Creek, adjacent to Kimball Park, approximately 125 feet west of D Ave parking lot	32.67128	-117.10172
KP-4	Paradise Creek, adjacent to Kimball Park, just downstream of three outlet pipes/culvert (upstream-most point of creek segment)	32.67146	-117.10133

Figure 1. Monitoring Locations Map



Project Team

Table 2. Project Team

Role	Name	Organization
Project Manager	Stephen Manganiello	City of National City
QA Officer, Contract Project Manager	John Quenzer	D-Max Engineering, Inc.
Field Sampling Lead	Brianna Martin	D-Max Engineering, Inc.
Laboratory Project Manager	Jennifer Beyer	EnviroMatrix Analytical, Inc.

Sampling Procedure

Approximately 50 grab samples will be collected by field personnel between January and June 2014, during dry and wet weather to represent various conditions of the creek. Since four samples collected from Paradise Creek have exceeded the WQO in the past, at least 48 samples must have selenium values below the WQO in order to remove the Paradise Creek from the CWA 303(d) list, according to the SWRCB's Water Quality Control Policy for Developing California's CWA Section 303(d) List.

Because Paradise Creek is tidally influenced, samples will only be collected at low tide to avoid sampling of seawater. Based on recent monitoring of low and high tide conditions of the creek, it is known that tidal influence is typically a major source of water at the lower end of the creek segment in question. Seawater has elevated conductivity and salinity that may interfere with the laboratory selenium testing, which would require sample dilution and therefore higher reporting limits. Higher reporting limits may result in data that is not useful for the stated purposes of this study. A tentative specific conductivity limit of 12 mS/cm has been set as a threshold for deciding whether collected samples should be submitted for laboratory analysis. Samples with conductivity values above this threshold will not be submitted for analysis due to a high possibility that significant dilution will be required, and the resultant data will not meet the selenium target reporting limit for this study.

Specific conductance will be measured with field meters at each site during dry or wet weather sampling. Results will only be used as an indication of tidal influence from the San Diego Bay and will not be otherwise reported. Samples will not be collected if there is evidence of tidal water at the five monitoring locations

Samples will be collected in accordance with standard procedures as specified by the State's SWAMP program in the QAPrP. Samples will be collected directly in pre-cleaned bottles from the lab where possible. Where not possible, clean sampling equipment will be used, and collected water will be transferred to the bottles. Field samplers will wear gloves and will avoid touching the inside of sampling containers and other potential sources of contamination.

Analyses and Methods

The following analyses will be completed at each site visit.

Table 3. Field Tests

Group	Parameter	Accuracy	Precision	Recovery	Target Reporting Limit	Completeness
Field Measurement, Conventional Analytes in Water	Specific Conductivity (mS/cm)	± 2% of functional sensitivity 1% & 2% of range	No SWAMP requirement; ± 2% of functional sensitivity 1% & 2% of range	N/A	0.01 mS/cm	No SWAMP requirement; will use 90%

Notes: Specific conductance will be measured with field meters at each site during dry or wet weather sampling, however, results will only be used as an indication of tidal influence from the San Diego Bay and will not be otherwise reported. FS = functional sensitivity; mS/cm = millisiemens per centimeter.

Table 4. Laboratory Tests

Group	Parameter	Accuracy	Precision	Recovery	Minimum Detection Limit	Target Reporting Limit	Completeness
Laboratory Analysis, Conventional Analytes in Water	Total selenium	Standard Reference Materials (SRM, CRM, PT) within 95% CI stated by provider of material	Laboratory duplicate 20% RPD.	Matrix spike 80% - 120%	0.500 µg/L	1.00 µg/L*	90%

Note: *Although the SWAMP target reporting limit is 0.30 µg/L for selenium, the lowest reporting limit EnviroMatrix Analytical is capable of reliably achieving is 1.0 µg/L. Because the WQO for selenium is 5 µg/L, five times higher than the lab's minimum reporting limit and 10 times higher than the lab's MDL, this project's target reporting limit and minimum detection limit will be suitable for achieving the goals of this project.

Quality Assurance/Quality Control

Duplicates will be completed at a rate of at least five percent (1 per 20 samples) of total project samples. The QA Officer will review all laboratory reports upon receipt to verify compliance with the project requirements. Any discrepancies will be discussed with the Laboratory Project Manager and the overall Project Manager to determine the appropriate response action, which may include attaching a flag or qualifier to the data according to SWAMP data specifications. All data will be recorded in a SWAMP compatible format. The quality assurance procedures listed in the City of National City's Paradise Creek Selenium Monitoring QAPP will be followed.

References

City of National City. *Quality Assurance Project Plan: Paradise Creek Selenium Monitoring*. April 2014. Prepared by D-MAX Engineering, Inc.

State Water Resources Control Board. *Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List*. September 2004.

http://www.swrcb.ca.gov/water_issues/programs/tmdl/docs/ffed_303d_listingpolicy093004.pdf

State Water Resources Control Board. *Quality Assurance Program Plan Version 1.0*. SWAMP. September 2013.

APPENDIX A.4-B. CITY OF NATIONAL CITY PARADISE CREEK SELENIUM QUALITY ASSURANCE PROJECT PLAN

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CITY OF NATIONAL CITY

PARADISE CREEK SELENIUM MONITORING QUALITY ASSURANCE PROJECT PLAN



APRIL 2014

PREPARED FOR:

**CITY OF NATIONAL CITY
Engineering Department
1243 National City Boulevard
National City, CA 91950**

PREPARED BY:

**D-MAX ENGINEERING, INC.
7220 Trade Street, Suite 119
San Diego, CA 92121
(858) 586-6600**



GROUP A: PROJECT MANAGEMENT

1. APPROVAL SIGNATURES

<u>Title:</u>	<u>Name (Affiliation):</u>	<u>Signature:</u>	<u>Date:</u>
<u>Project Manager</u>	<u>Stephen Manganiello (City of National City)</u>	<u></u>	<u></u>
<u>D-MAX Project Manager</u>	<u>Arsalan Dadkhah (D-MAX Engineering, Inc.)</u>	<u></u>	<u></u>
<u>Project Quality Assurance (QA) Officer</u>	<u>John Quenzer (D-MAX Engineering, Inc.)</u>	<u></u>	<u></u>

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ABBREVIATIONS AND ACRONYMS

µg/L	micrograms per liter
°C	Degrees Celsius
Basin Plan	Water Quality Control Plan for the San Diego Basin
BMP	Best Management Practice
CI	Confidence Interval
City	City of National City
CRM	Certified Reference Materials
CWA	Clean Water Act
D-MAX	D-MAX Engineering, Inc.
EC	Electrical Conductivity
ELAP	Environmental Laboratory Accreditation Program
EMA	EnviroMatrix Analytical, Inc.
EPA	U.S. Environmental Protection Agency
FS	Functional Sensitivity
GIS	Geographic Information Systems
mg/L	Milligrams per Liter
mS/cm	Millisiemens per Centimeter
PDL	Practical Detection Limit
PT	Proficiency Test
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QAPrP	Quality Assurance Program Plan
RL	Reporting Limit
RPD	Relative Percent Difference
RWQCB	Regional Water Quality Control Board
SOP	Standard Operating Procedure
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
WQO	Water Quality Objective

3. DISTRIBUTION LIST

<u>Title:</u>	<u>Name (Affiliation):</u>	<u>Telephone No.:</u>	<u>QAPP copies:</u>
Project Manager	Stephen Manganiello (City of National City)	(619) 336-4382	1
D-MAX Project Manager	Arsalan Dadkhah (D-MAX Engineering, Inc.)	(858) 586-6600 x.22	1

4. PROJECT/TASK ORGANIZATION

4.1 Involved Parties and Roles

Table 1. (Element 4) Personnel Responsibilities

Name	Organizational Affiliation	Title	Contact Information (Telephone number, email address)
Stephen Manganiello	City of National City	Project Manager	(619) 336-4382 smanganiello@nationalcityca.gov
Arsalan Dadkhah	D-MAX Engineering, Inc.	D-MAX Project Manager	(858) 586-6600 arsalan@dmmaxinc.com
John Quenzer	D-MAX Engineering, Inc.	QA Officer	(858) 586-6600 jqenzer@dmmaxinc.com
Brianna Martin	D-MAX Engineering, Inc.	Field Activities Coordinator	(858) 586-6600 bmartin@dmmaxinc.com
Jennifer Beyer	EnviroMatrix Analytical, Inc.	QA Director	(858) 560-7717 jbeyer@enviromatrixinc.com

4.2 Quality Assurance Officer Role

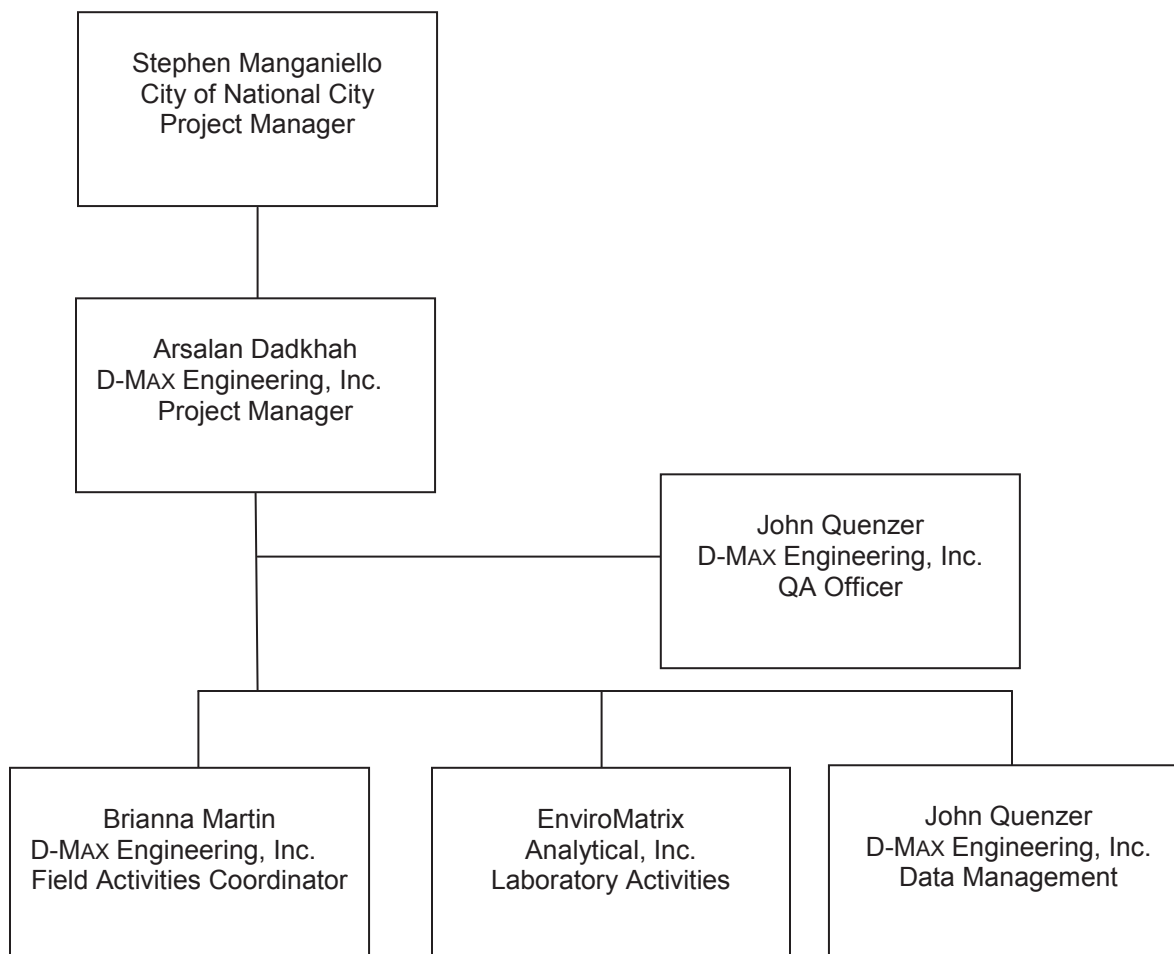
John Quenzer, with D-MAX Engineering, Inc. (D-MAX), will fill the role of the sampling QA Officer and is independent of data generation. This role will include maintaining the official, approved quality assurance and quality control (QA/QC) procedures found in this Quality Assurance Project Plan (QAPP) as part of the monitoring procedures. Mr. Quenzer will also work with Jennifer Beyer, the QA Director for EnviroMatrix Analytical, Inc. (EMA), by communicating all QA/QC issues contained in this QAPP to EMA.

4.3 Persons Responsible for QAPP Update and Maintenance

Changes and updates to this QAPP may be made after a review of the evidence for change by the City's Project Manager or by D-MAX's Project Manager.

4.4 Organizational Chart and Responsibilities

Figure 1. Organizational Chart



5. PROBLEM DEFINITION/BACKGROUND

5.1 Problem Statement

Paradise Creek is on the 2010 Clean Water Act (CWA) 303(d) list of impaired water bodies with a selenium impairment. The Surface Water Ambient Monitoring Program (SWAMP) data collected in 2005 and 2006 indicated selenium results exceeded the water quality objective (WQO) of 5 µg/L in four of four samples. Beneficial uses of Paradise Creek include warm freshwater habitat, wildlife habitat, and non-contact water recreation. Elevated selenium levels pose a threat to warm freshwater habitat. While no Total Maximum Daily Load has been established for Paradise Creek, this water body is of great importance to the City of National City (City) since it runs through the center of the city, directly through Kimball Park at City Hall. Paradise Creek is one of the few urban creeks within the Pueblo San Diego Watershed (908.32) that has not been completely channelized or undergrounded. Paradise Creek is also tributary to Paradise Marsh, which is part of the Sweetwater Marsh National Wildlife Refuge.

5.2 Decisions or Outcomes

The objective of Paradise Creek selenium monitoring is to collect additional selenium data in the portion of the creek adjacent to Kimball Park within the City that would support the removal of the selenium 303(d) listing in the future.

According to the State Water Resources Control Board's *Water Quality Control Policy for Developing California's CWA Section 303(d) List* (2004) for toxicants, the pollutant/water segment combinations should be removed from the 303(d) list if the WQOs or California/National Toxics Rule water quality criteria are not exceeded as follows:

- Using the binomial distribution, waters shall be removed from the section 303(d) list if the number of measured exceedances supports rejection of the null hypothesis as presented in the table below.
- The binomial distribution cannot be used to support a delisting with sample sizes less than 28.

TABLE 4.1: MAXIMUM NUMBER OF MEASURED EXCEEDANCES ALLOWED TO REMOVE A WATER SEGMENT FROM THE SECTION 303(D) LIST FOR TOXICANTS.	
<i>Null Hypothesis: Actual exceedance proportion ≥ 18 percent.</i> <i>Alternate Hypothesis: Actual proportion < 3 percent of the samples</i> <i>The minimum effect size is 15 percent.</i>	
Sample Size	Delist if the number of exceedances equal or is less than
28 – 36	2
37 – 47	3
48 – 59	4
60 – 71	5
72 – 82	6
83 – 94	7
95 – 106	8
107 – 117	9
118 – 129	10

For sample sizes greater than 129, the maximum number of measured exceedances allowed is established where α and $\beta \leq 0.10$ and where $|\alpha - \beta|$ is minimized.

α = Excel® Function BINOMDIST(k, n, 0.18, TRUE)

β = Excel® Function BINOMDIST(n-k-1, n, 1 – 0.03, TRUE)

where n = the number of samples,

k = maximum number of measured exceedances allowed,

0.03 = acceptable exceedance proportion, and

0.18 = unacceptable exceedance proportion.

5.3 Water Quality or Regulatory Criteria

This monitoring is not performed in response to any specific regulatory requirement. However, the water samples collected during storm events will be compared to the pertinent WQOs, as listed in the Water Quality Control Plan for the San Diego Basin 9 (Basin Plan).

6. PROJECT/TASK DESCRIPTION

6.1 Work Statement and Produced Products

Monitoring will be conducted between January and June 2014 at five sites during dry and wet weather to represent various conditions of the creek. The five monitoring sites selected for this project are described below in Table 2.

The sites selected for monitoring are presented in Table 2, below, and Figure 3 at the end of this section displays a map of the sampling locations.

Table 2. (Element 6) Monitoring Locations

Site	Location	Latitude	Longitude
KP-2	Paradise Creek, adjacent to Kimball Park, east of footbridge (approximately 175 feet), within depressed area of channel	32.67036	-117.10223
KP-2.1	Paradise Creek, adjacent to Kimball Park, upstream of Site KP-2	32.67068	-117.1022
KP-2.2	Paradise Creek, adjacent to Kimball Park, upstream of Site KP-2.1	32.67099	-117.10201
KP-3	Paradise Creek, adjacent to Kimball Park, approximately 125 feet west of D Ave parking lot	32.67128	-117.10172
KP-4	Paradise Creek, adjacent to Kimball Park, just downstream of three outlet pipes/culvert (upstream-most point of creek segment adjacent to Kimball Park)	32.67146	-117.10133

6.2 Constituents to be Monitored and Measurement Techniques

Specific conductance will be measured with field meters at each site during dry or wet weather sampling. Results will only be used as an indication of tidal influence from the San Diego Bay and will not be otherwise reported. Samples will not be collected if there is evidence of tidal water at the five monitoring locations. Samples collected at each monitoring site will be transported to EMA, a laboratory certified by the California Department of Health Services, and will be analyzed for total selenium.

6.3 Project Schedule

Note that the project timeline, as shown in Table 3 below, is subject to change, based on work scheduling constraints. D-MAX is responsible for providing data and other supporting documentation for the monitoring component of this project to the City of National City.

Table 2. (Element 6) Project Schedule Timeline

Activity	Date of Initiation	Anticipated Date of Completion	Deliverable	Deliverable Due Date
Wet and dry weather sampling	January 2014	June 2014	Final monitoring report	July 2014
Upload monitoring data to CEDEN	June 2014	July 2014	N/A	N/A

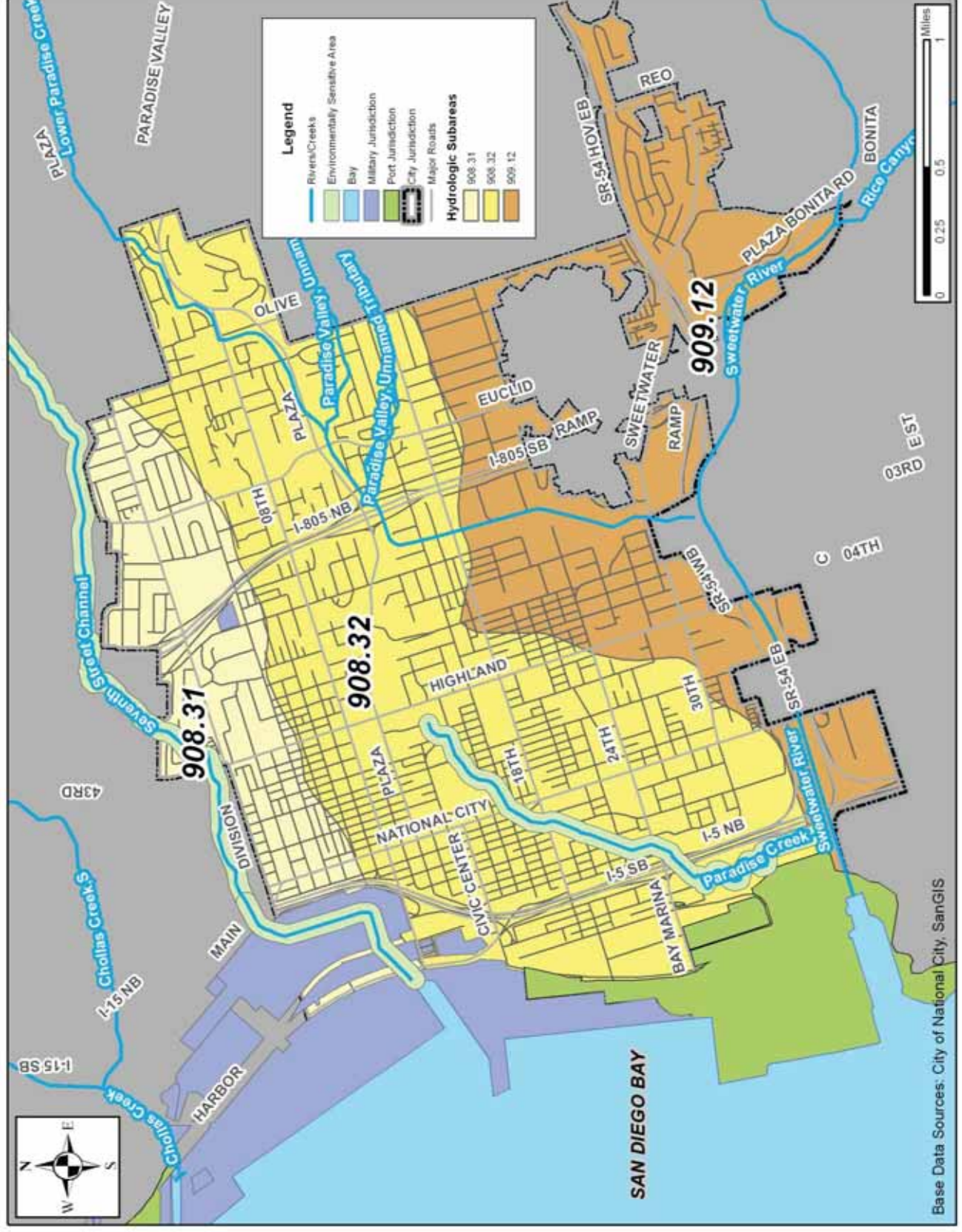
6.4 Geographical Setting

The City of National City is located within the San Diego Bay Watershed and constitutes approximately 1.6 percent of its total area. More specifically, the City is located within two sub-watersheds: Sweetwater Pueblo San Diego and Sweetwater, hydrologic units 908 and 909, respectively. The majority of the southern part of National City drains to the Sweetwater River and ultimately discharges into San Diego Bay. La Paleta Creek (also known as 7th Street Channel) drains the northern part of the City and also discharges into San Diego Bay, while a very small western portion of the City drains directly to the San Diego Bay shoreline. Almost all areas of the City that drain directly to San Diego Bay are within the San Diego Unified Port District. Lastly, the central portion of the City drains to Paradise Creek, a small salt marsh creek, which ultimately discharges into the Sweetwater River. See Figure 2 at the end of this section for a map of the hydrologic subareas encompassing the City of National City.

6.5 Constraints

Constraints may include an abnormally dry wet season. In this case, wet weather sampling may not occur. Also, for safety purposes, wet weather sampling will be limited to daylight hours.

Figure 2. Watershed Map with Hydrologic Subareas



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7. QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

7.1 Data Quality Indicators

Measurement or Analyses Type	Applicable Data Quality Indicators
Field Measurement, Conventional Analytes in Water	Accuracy, Comparability, Completeness, Precision, Representativeness, Sensitivity
Laboratory Analysis, Conventional Analytes in Water	Accuracy, Comparability, Completeness, Precision, Representativeness, Sensitivity

Attachment A includes in depth information about the laboratory assessments and controls for each data quality indicator.

Accuracy measures how close results are to a true or expected value. All instruments will be calibrated according to manufacturer instructions.

Bias is the misrepresentation of a set of data that systematically or persistently skews that data. These will be minimized through routine inspection and calibration of the automatic sampler and flow meter and duplicate samples will be collected at a rate of 5% for quality assurance.

Comparability is the extent to which data can be compared between periods of time within the project or between projects. To ensure comparability within and between years, monitoring conducted as part of this project will use the standardized sampling methods, analytical methods, and units of reporting described in this document.

Completeness is the difference between the planned amount of samples and data and the actual amount collected.

Precision is the degree of agreement among repeated measurements of the same characteristic.

Representativeness is the extent to which measurements actually represent the true condition at the time of sample collection.

Sensitivity is the capability of a method or instrument to discriminate between different levels of the variable of interest. Method sensitivity is dealt with by the inclusion of the required Surface Water Ambient Monitoring Program (SWAMP) Target Reporting Limits, where such values exist.

EMA will retain all QA/QC records for laboratory analyses and D-MAX will retain all QA/QC records for field measurements, including field duplicates of laboratory analyses.

7.2 Field and Laboratory Measurement Quality Objectives Tables

Table 3. (Element 7) Measurement Quality Objectives for Field Data

Group	Parameter	Accuracy	Precision	Recovery	Target Reporting Limit	Completeness
Field Measurement, Conventional Analytes in Water	Specific Conductivity (mS/cm)	± 2% of functional sensitivity 1% & 2% of range	± 2% of functional sensitivity 1% & 2% of range	N/A	0.01 mS/cm	No SWAMP requirement; will use 90%

Notes: Specific conductance will be measured with field meters at each site during dry or wet weather sampling, however, results will only be used as an indication of tidal influence from the San Diego Bay and will not be otherwise reported. FS = functional sensitivity; mS/cm = millisiemens per centimeter.

Table 4. (Element 7) Measurement Quality Objectives for Laboratory Data¹

Group	Parameter	Accuracy	Precision	Recovery	Minimum Detection Limit	Target Reporting Limit	Completeness
Laboratory Analysis, Conventional Analytes in Water	Total selenium	Standard Reference Materials (SRM, CRM, PT) within 95% CI stated by provider of material	Laboratory duplicate 20% RPD.	Matrix spike 80% - 120%	0.5 µg/L	1.0 µg/L *	90%

Notes:

¹ Information in this table is based on SWAMP QAPrP 2013.

SRM= standard reference materials; CRM = certified reference materials; PT = proficiency test; CI = confidence interval; RPD = relative percent difference; µg/L = micrograms per Liter.

*Although the SWAMP target reporting limit is 0.30 µg/L for selenium, the lowest reporting limit EMA is capable of reliably achieving is 1.0 µg/L. Because the WQO for selenium is 5 µg/L, five times higher than the lab's minimum reporting limit and 10 times higher than the lab's MDL, this project's target reporting limit and minimum detection limit will be suitable for achieving the goals of this project.

8. SPECIAL TRAINING/CERTIFICATIONS

8.1 Specialized Training or Certifications

All D-MAX staff members performing sampling are trained in proper sampling techniques under the supervision of project field managers. Training includes a review of the SWAMP standard operating procedures (SOPs) for field measurements and sample collection, detailed information on filling sample bottles for the various types of analysis, handling and storage, chain of custody procedures, GPS use, and sample site confirmation.

All laboratory analysis will be conducted by EMA, certified through the Environmental Laboratory Accreditation Program (ELAP #2564) of the California Department of Public Health (formerly the Department of Health Services, or DOHS). Details of EMA's training are discussed in Section 4 of their internal QA/QC plan and are available in Attachment A of this report.

8.2 Training and Certification Documentation

Documentation of field personnel training is maintained at D-MAX Engineering, Inc. Documentation of laboratory certification can be found in the EMA QA/QC plan, available from the laboratory upon request.

8.3 Training Personnel

There are no training personnel applicable to this project.

Table 5. (Element 8) Specialized Personnel Training or Certification

Specialized Training Course Title or Description	Training Provider	Personnel Receiving Training/ Organizational Affiliation	Location of Records & Certificates
Laboratory certification	California ELAP	EnviroMatrix Analytical, Inc.	Lab QA/QC document (Attachment A)

9. DOCUMENTATION AND RECORDS

D-MAX Engineering, Inc. will maintain all records for the field and laboratory sample analyses. Samples sent to EMA are accompanied by a chain of custody form. The laboratory generates records for sample receipt and storage, analyses, and reporting. The results of the laboratory analyses are transmitted to D-MAX in electronic form.

D-MAX will record all of the sampling data in an electronic database compatible with the SWAMP information management standards. Laboratory analytical reports will also be saved electronically as pdf and Excel files. All field and laboratory electronic files will be backed up within the D-MAX server continuously.

Records of field test results and observations, laboratory analytical reports, sampling locations and GPS coordinates, and photographs of sampling locations will be provided by D-MAX. Electronic and hard copies of this information will be available.

An electronic or hard copy of this QAPP and any updates made to the plan will be distributed to all parties involved. See Section 3 – Distribution List.

Table 6. (Element 9) Document and Record Retention, Archival, and Disposition Information

Records	Identify Type Needed	Retention	Archival	Disposition
Sample Collection Records	Field datasheets	Paper, Electronic (.pdf)	Paper file, Hard disk	5 years
	Chain of custody forms	Paper, Electronic (.pdf)	Paper file, Hard disk	5 years
Field Records	Field datasheets	Paper, Electronic (.pdf)	Paper file, Hard disk	5 years
	Site photographs	Electronic (.jpg)	Hard disk	5 years
Analytical Records	Laboratory reports	Electronic (.pdf)	Hard disk	5 years
	Chain of custody forms	Paper, Electronic (.pdf)	Paper file, Hard disk	5 years
Data Records	Analytical data	Electronic (.mdb or .xls)	Hard disk	5 years
	Field datasheets	Paper, Electronic (.pdf)	Hard disk	5 years
Assessment Records	Calibration log sheets	Paper, Electronic (.pdf)	Paper file, Hard disk	5 years
Data Analysis & Reports	Analysis of data	Electronic	Hard disk	5 years
	Monitoring reports	Electronic (.pdf)	Hard disk	5 years

GROUP B: DATA GENERATION AND ACQUISITION

10. SAMPLING PROCESS DESIGN

Approximately 50 grab samples will be collected by field personnel between January and June 2014, during dry and wet weather to represent various conditions of the creek. Since four samples collected from Paradise Creek have exceeded the WQO in the past, at least 48 samples must have selenium values below the WQO in order to remove the Paradise Creek from the CWA 303(d) list, according to the SWRCB's Water Quality Control Policy for Developing California's CWA Section 303(d) List.

Because Paradise Creek is tidally influenced, samples will only be collected at low tide to avoid sampling of seawater. Based on recent monitoring of low and high tide conditions of the creek, it is known that tidal influence is typically a major source of water at the lower end of the creek segment in question. Seawater has elevated conductivity and salinity that may interfere with the laboratory selenium testing, which would require sample dilution and therefore higher reporting limits. Higher reporting limits may result in data that is not useful for the stated purposes of this study. A tentative specific conductivity limit of 12 mS/cm has been set as a threshold for deciding whether collected samples should be submitted for laboratory analysis. Samples with conductivity values above this threshold will not be submitted for analysis due to a high possibility that significant dilution will be required, and the resultant data will not meet the selenium target reporting limit for this study.

11. SAMPLING METHODS

Field method SOPs are based on *Standard Operating Procedures for Conducting Field Measurements and Field Collections of Water and Bed Sediment Samples in SWAMP* (2007), SOP Procedure Number 1.0.

At each site visit, measurements of specific conductance will be performed once from a grab sample. These measurements will be taken in-situ, where feasible, otherwise a clean sample container, rinsed with distilled water and sample water, will be used. Grab samples will be collected for laboratory analysis for the analytes described in Table 8.

When collecting samples, field personnel will wear clean latex gloves to protect themselves and to prevent contamination of the samples. Samples will be collected by manual grab sampling at an approximate depth of six inches below the water surface, pointing the bottle opening upstream, and avoiding floating debris. In shallow water (less than six inches deep), bottles are filled from the surface of the flowing water. A sterile, triple-rinsed glass beaker, or syringe, may be used when flow depth is very shallow. Field datasheets are completed for each site visit.

Samples for laboratory analysis are stored in an ice cooler at $\leq 6^{\circ}\text{C}$, in appropriate sample containers with appropriate preservatives. All samples are to be transported to the laboratory within the specified holding times. Samples will be acidified for preservation once the laboratory is in custody of the samples.

Table 8, on the following page, lists the analytical parameters assessed to represent water quality. Grab samples taken during wet weather conditions will be analyzed for the same list of parameters. If any of the samples cannot be taken or analyses cannot be performed for any reason, the QA/QC Officer will be notified. Any appropriate corrective actions will be documented.

Table 7. (Element 11) Sample Volumes, Methods, Preservation, and Holding Times

Analytical Parameter	Analytical Method	Minimum Sample Volume	Container Type	Preservation (chemical, temperature, light protected)	Maximum Holding Time
Specific conductance	N/A	N/A	Analyzed in field	N/A	N/A
Total selenium	EPA 200.8	500 mL	Polyethylene bottles	Cool to <6 °C and store in the dark. Acidify with HNO ₃ to pH<2	6 months

Notes: N/A = not applicable; mL = milliliter

12. SAMPLE HANDLING AND CUSTODY

The samples collected during monitoring events are labeled with site location, date, sample time, analysis to be performed, sample preservation (if any) and field sampler's name. For each site visit, the time, date, site, and event type are recorded on a field datasheet (Attachment B). Sample containers are stored and transported at ≤ 6 °C in an ice cooler until processed. Samples are delivered to EMA within specific holding times (Table 8). An example chain-of-custody form is included in Appendix C of Attachment A.

13. ANALYTICAL METHODS AND FIELD MEASUREMENTS

Field and laboratory analytical methods are displayed in tables 9 and 10, respectively. The SOPs for the laboratory methods can be found in Attachment A. Laboratory analyses are performed in accordance with the approved method number listed.

Table 8. (Element 13) Field Analytical Methods

Analyte	Laboratory/ Organization	Analytical Method/SOP	Reporting Limit	Units
Specific Conductance	Field monitoring by D-MAX staff	Hanna Instruments HI 991301 Portable pH/EC/TDS/Temperature Meter	0.01	mS/cm

Notes: mg/L = milligrams per Liter; EC = electrical conductivity; TDS = total dissolved solids; mS/cm = millisiemens per centimeter

Table 9. (Element 13) Laboratory Analytical Methods

Analyte	Laboratory/ Organization	Analytical Method/ SOP	Minimum Detection Limit	Reporting Limit	Units
Total selenium	EMA	EPA 200.8	0.500	1.00	µg/L

Notes: µg/L = micrograms per Liter

14. QUALITY CONTROL

Quality control samples will be collected both in the field and in the lab to verify that valid data are recorded. Proper collection of all samples, using clean disposable gloves and appropriate clean containers and preservative, is primary in ensuring the quality of collected data. Field instruments will be

calibrated prior to each day of sampling, and records will be retained by D-MAX Engineering, Inc. An example calibration log sheet is included in Attachment C.

Field duplicates help quantify intrinsic variability associated with sampling activities. Field duplicate samples will be used to replicate field measurements as well as laboratory analyses. Field duplicates are comprised of a second sample taken at a rate of 5%. There are no specific criteria for field duplicate variability, but these data are evaluated in the data analysis/assessment process.

Laboratory blanks, duplicates, matrix spikes and laboratory control standards are used to ensure proper sample handling, identify bias, check for consistent analysis of samples, and verify correct operation of laboratory equipment. All contract laboratory analysis will be performed in accordance with the guidelines of the QA/QC plan of EnviroMatrix Analytical, Inc.

Table 10. (Element 14) Sampling (Field) Quality Control

Matrix: Water		
Sampling SOP: SWAMP Procedure No. 1.0		
Analytical Parameter(s): Conventional in Water		
Analytical Method/SOP Reference: N/A		
# Sample locations: All locations		
Field QC	Frequency/Number per sampling event	Acceptance Limits
Cooler Temperature	≤ 6 °C	0 – 6 °C
Field Duplicate	5%	RPD<25% (N/A if native concentration of either sample <RL)

Notes: RPD = relative percent difference; RL = reporting limit

Table 11. (Element 14) Analytical Quality Control

Matrix: Water		
Sampling SOP: SWAMP Procedure No. 1.0		
Analytical Parameter(s): Conventional in Water		
Analytical Method/SOP Reference: N/A		
# Sample locations: All locations		
Laboratory QC	Frequency/Number	Acceptance Limits
Laboratory Blank	Per 20 samples or per analytical batch, whichever is more frequent	<RL for target analyte
Laboratory Duplicate	Per 20 samples or per analytical batch, whichever is more frequent	RPD <25% (N/A if native concentration of either sample <RL)
Laboratory Matrix Spike	Per 20 samples or per analytical batch, whichever is more frequent	80-120% recovery
Matrix Spike Duplicate	Per 20 samples or per analytical batch, whichever is more frequent	80-120% recovery RPD <25% for duplicates

Notes: RPD = relative percent difference; RL = reporting limit

If any of the quality control acceptance limits are not met for field measurements or laboratory analysis, the corresponding batch of data will be flagged to be excluded from analysis and the QA Officer for the project will be notified. The QA Officer will determine whether to re-analyze the sample, if holding times have not been exceeded, or to re-sample at the monitoring location(s).

15. INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

Field measurement equipment will be checked for operation in accordance with the manufacturer's specifications prior to sampling. Duplicate or back-up equipment will be available to the field crew. Spare instruments and parts are kept in the field sampling vehicle, at the D-MAX or ADS office in the City of San Diego. Quality control for data collected in the field will be accomplished by proper calibration and care of

the instruments used to take the readings and by proper handling of sampling equipment and containers, as described in Section 16 below.

EMA maintains its equipment in accordance with its QA Program Manual, included as Attachment A. Laboratory instrumentation will be calibrated and maintained by EMA staff under the direction of Jennifer Beyer, QA Director. All corrective actions are documented in logbooks for each instrument or piece of equipment. EMA maintains SOPs for each methodology or procedure used, which are standard EPA methods.

Table 12. (Element 15) Testing, Inspection, Maintenance of Sampling Equipment

Instrument/ Equipment	Maintenance Activity, Testing Activity or Inspection Activity	Responsible Person	Frequency	SOP Reference
Hanna Instruments HI 991301 Portable pH/EC/TDS/ Temperature Meter	Clean, inspect, check with conductivity solution, check/replace batteries	D-MAX field staff	Daily inspection and replacement as necessary	SWAMP Procedure Number 1.0
Field Camera	Clean, inspect, check/replace batteries	D-MAX field staff	Daily inspection and replacement as necessary	SWAMP Procedure Number 1.0

16. INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

The field meters will be calibrated and checked as recommended by the manufacturer. The sensors and membranes of field meters will be kept moist to preserve the instruments' accuracy during field work. EnviroMatrix Analytical, Inc. maintains calibration practices as part of its QA/QC procedures, included in Attachment A.

Table 13. (Element 16) Instrument/Equipment Calibration and Frequency.

Instrument/ Equipment	SOP Reference	Calibration Description and Criteria	Frequency of Calibration	Responsible Person
Hanna Instruments HI 991301 Portable pH/EC/TDS/Temp. Meter	SWAMP Procedure Number 1.0	Calibrate and check with EC 12.88 mS/cm solution	Calibrate and check before each field day, post-field check also for pH	D-MAX field staff

If a field instrument does not pass inspection, the instrument should be recalibrated following its manufacturer's cleaning and maintenance procedures. If measurements continue to fail measurement quality objectives, affected data should not be reported and the instrument should be returned to the manufacturer for maintenance. All troubleshooting and corrective actions should be recorded in the calibration and field data records.

17. INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

Supplies necessary for this project include calibration standard solutions, reagents, and sample collection bottles provided by EnviroMatrix Analytical, Inc. Upon receipt, all supplies are inspected for leaks or broken seals. Supplies are stored in accordance with manufacturer's recommendations in a secure location. If these chemicals do not meet the acceptance criteria or whenever they exceed their manufacturer recommended shelf life, they are disposed of appropriately and replaced. EnviroMatrix Analytical, Inc. maintains its laboratory supplies in accordance to their QA/QC procedures, included as Attachment A of this report.

Table 14. (Element 17) Inspection/Acceptance Testing Requirements for Consumables and Supplies

Project-Related Supplies/ Consumables	Inspection/Testing Specifications	Acceptance Criteria	Frequency	Responsible Individual
Calibration standard solutions	Check containers and seals for breakage; check expiration dates; ensure proper storage	Containers and seals intact; stored closed in proper conditions; shelf life not exceeded	Upon receipt and each use	D-MAX field staff
Reagents	Check containers and seals for breakage; check expiration dates; ensure proper storage	Containers and seals intact; stored closed in proper conditions; shelf life not exceeded	Upon receipt and each use	D-MAX field staff
Sample collection bottles	Check containers and seals for breakage; ensure proper storage	Containers and seals intact; stored closed in proper conditions	Upon receipt and each use	D-MAX field staff

18. NON-DIRECT MEASUREMENTS

Potential non-direct measurements may be made using historical data collected during previous years of creek monitoring. SWAMP data or data obtained from other agencies may also be used. In addition, photo documentation, topographical maps, land use maps, and hydrological maps generated from San Diego Association of Governments GIS database, may be used.

19. DATA MANAGEMENT

Field datasheets will be checked at the end of the sampling period by D-MAX field staff. Electronic data from EMA is also reviewed by D-MAX, following data entry, for completeness, accuracy, and errors in data entry or transcription. Data will be maintained as previously discussed in Element 9. All document and data hard copies will be retained in a project file, and all document and data electronic copies will be stored on a backed up hard disk at the office of D-MAX Engineering, Inc. EnviroMatrix Analytical will also retain records of all transmitted laboratory reports. Data collected from field and laboratory analysis will be formatted and entered into SWAMP's Information Management System by D-MAX.

GROUP C: ASSESSMENT AND OVERSIGHT

20. ASSESSMENTS AND RESPONSE ACTIONS

Laboratory data will be reviewed for consistency as they are received from the laboratory by D-MAX. D-MAX will also conduct an internal review of the collected field data as soon as the data is made available. Further, the City of National City Project Manager will review the data as reported by D-MAX according to the schedule of deliverables as delineated in Table 3. If a reviewer discovers any discrepancy, the reviewer will discuss the observed discrepancy with the appropriate person responsible for the activity (see Figure 1).

EMA has a defined process for corrective action outlined in their QA/QC Plan, which is included in Attachment A. In the case of a discrepancy in the data, the D-MAX QA Officer will consult with EMA and/or the City of National City Project Manager, as appropriate, to discuss whether the information collected is accurate, what were the cause(s) leading to the deviation, how the deviation might impact data quality, and what corrective actions might be considered. Depending on the type of discrepancy, corrective actions may include, but are not limited to, review of data entry practices, additional training for laboratory personnel, or re-sampling.

The City of National City Project Manager has the power to halt all sampling and analytical work if the deviation(s) noted are considered detrimental to data quality of the project.

21. REPORTS TO MANAGEMENT

At each site visit, the field crew will complete a field datasheet. The datasheet contains information regarding site identification, location, and field measurement results. The City of National City will be notified immediately in the event that there is visual or numeric evidence of a significant threat to water quality. Criteria for a significant threat to water quality consist of evidence of an illegal discharge, observation of unusual water color or odor, numeric results significantly above historical data, and best professional judgment. Monitoring results from laboratory analyses will be reviewed after being received from EMA. If any of the laboratory results indicate evidence of a threat to water quality, the City will be notified immediately.

All monitoring data will be prepared and presented to the City of National City Project Manager. Records of sampling locations and GPS coordinates, field measurement results, laboratory analytical reports, and photographs of sampling locations will also be furnished to the City as needed. The monitoring results will be compared to the applicable WQOs listed in the Basin Plan. Statistical analyses, such as medians, means, maximums, and minimums will be conducted as appropriate to provide the City with the capability of comparing the test results with other published results. Table 3 includes a list of deliverables to be submitted to the City throughout the project.

GROUP D: DATA VALIDATION AND USABILITY

22. DATA REVIEW, VERIFICATION, AND VALIDATION

Data generated by project activities will be reviewed against the data quality objectives previously cited in Element 7 and the quality assurance/quality control practices cited in Elements 14, 15, and 16. Data will be separated into three categories: data meeting all data quality objectives, data failing to meet precision or recovery criteria, and data failing to meet accuracy criteria. Data meeting all data quality objectives, but with failures of quality assurance/quality control practices will be set aside to determine the impact of the failure on data quality. Once determined, the data will be moved into either the first category (meeting all data quality objectives) or the last category (failing to meet quality control practices).

Data in the first category is considered usable by the project. Data falling in the last category is considered unusable. Data falling in the second category will be assessed before it is used in the project, but will likely be excluded from the data set for this particular project. If sufficient evidence is found supporting data quality, the data will be moved to the first category, but will be flagged with a "J" as per EPA specifications.

23. VERIFICATION AND VALIDATION METHODS

Generally, data verification will be performed first internally and then later performed by externally. At each sampling event, the D-MAX's field crew will complete a field datasheet (included as Attachment B).

The datasheet, which contains information regarding site identification and location, visual observations, and field measurement results, will be submitted to D-MAX's QA Officer for review upon completion of sampling to ensure the data have been recorded and processed correctly. The field equipment calibration log sheet will also be submitted upon completion of sampling (see Attachment C). The sampling chain-of-custody form will be reviewed by both EMA and D-MAX upon completion of sampling (included in Appendix C of Attachment A).

Monitoring results from laboratory analyses will be reviewed for validity and completeness by D-MAX's QA Officer after being received from EMA. Each lab report will contain a complete list of sample information such as sample matrixes, blanks, duplicates, etc. An example of a lab report is included as Appendix B of Attachment A. All data entry of field and laboratory results will be checked by D-MAX's QA Officer. D-MAX will review all collected field and lab data and the D-MAX QA Officer will review the lab reports, notifying the EMA QA Director in the case of an inconsistency.

If there is any uncertainty of the validated data the issues, a committee composed of the City of National City Project Manager, the D-MAX Project Manager, the D-MAX QA Officer and Data Manager, the EMA Laboratory Manager/QA Director will work to reconcile and correct data as needed. D-MAX will keep the City of National City informed of any pertinent data inconsistencies as they arise. The committee will attempt to reach unanimous consent on any issues, but the City of National City Project Manager will make the determination if agreement cannot be reached. For this project, there are no differences between validation issues and verification issues.

24. RECONCILIATION WITH USER REQUIREMENTS

The project needs adequate numbers of data points, as represented by the completeness data quality objective in order to perform statistical analyses, such as means, medians, maximums, and minimums. The sampling frequencies that have been developed should provide sufficient data points to complete the necessary statistical analyses such as tests for outliers, trends, etc. The data will be presented in either tables or charts to illustrate trends or relationships and will be uploaded to the SWAMP database in the SWAMP compatible format. Data that do not meet the monitoring quality objectives in the SWAMP QAPrP will be flagged and included in analyses on a case-by-case basis. Rejected data will not be used in analyses. Uncertainty of the validated data will be evaluated using the methods described in Element 23.

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Attachment A. Laboratory Quality Assurance Program Manual and Standard Operating Procedures

Attachment B. Field Datasheet

Attachment C. Calibration Log Sheet



ENVIROMATRIX ANALYTICAL, INC.

QUALITY ASSURANCE PROGRAM MANUAL

This document has been prepared by EnviroMatrix Analytical, Inc. (EMA) and is approved by EMA Management. It will be reviewed on an annual basis and modified as necessary.

The material contained herein is not to be disclosed to or made available to any third party without the prior expressed written approval of the EMA Quality Assurance Director.

Document Approval and Release

Leland S. Pitt
President/CEO

 1-9-2013

Dan Verdon
Laboratory Director

 1/9/13

Jennifer Beyer
Q.A. Director

 1/9/13

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1.0 Quality Assurance Policy

The entire EnviroMatrix Analytical, Inc. (EMA) staff is dedicated to providing reliable, superior quality analytical data to our clients. EMA management believes that Quality Assurance is not simply a management function, but that **every individual** in the laboratory is responsible for ensuring the quality of their analytical data. Therefore, each person within the laboratory is fully trained in evaluating data, monitoring control limits, and taking the corrective action necessary to assure a reliable, superior product for all EMA clients.

1.1 Purpose

The purpose of the Quality Assurance Program is to ensure that all information, data, and resulting decisions compiled under a specific task are technically sound, statistically reliable, and properly documented.

The EMA Quality Assurance Program Manual communicates to employees, clients, and certification organizations EMA's quality assurance policies and procedures.

The Quality Assurance Program Manual defines the purpose, organizational structure, and operating principles of the laboratory. The Quality Assurance Program Manual governs all activities and personnel of EMA including all aspects of administration, sample receipt, sample control, sample preparation, inorganic analysis, organic analysis, quality assurance, sample and waste disposal, data entry, and report production. Any deviation from this program must be approved by the Quality Assurance Director.

Quality Assurance is the structure within an organization which plans, designs, and monitors the frequency and methods of the checks, audits, and reviews necessary to identify problems and dictate corrective actions.

Quality Control is the mechanism or activities through which Quality Assurance achieves its goals. It is the methodical maintenance of strict quality through all activities from sample receipt through report generation; including standard preparation, instrument maintenance, calculation, recording of results, etc.

Quality Control is the function and responsibility of each individual within the laboratory.

1.2 General Description

EMA Quality Policy Statement

“The entire EMA staff is committed to consistently providing our clients with data which is statistically reliable, technically sound, and of the highest quality.”

The contents of this Quality Assurance Program Manual describe the activities which are utilized in order to ensure this commitment is maintained.

Written analytical procedures (Standard Operating Procedures – SOP) are used to ensure strict adherence to approved analytical methods throughout the laboratory. Bench-level quality control measures with established acceptance criteria are included in each analytical procedure employed by the laboratory. Laboratory records and quality control data are monitored by management on a regular basis.

This manual describes the Quality Assurance Program adhered to by EMA and has been written by EMA personnel and approved by Management. All EMA staff has received copies of this manual and is required to comply with the program’s stated goals, requirements, and responsibilities. The Quality Assurance Director has been designated to monitor the program and report program findings to the President and the Laboratory Director.

EMA is a State of California Department of Health Services fully accredited laboratory under the Environmental Laboratory Accreditation Program. EMA is evaluated by external audit under this program and certification is granted for a term of two years. Additional information as to the scope and expiration of this certification is presented in Appendix H.

EMA has been granted approval from the United States Department of Agriculture to handle foreign soil. This approval grants EMA permission to import and ship foreign soil as well as soils from Hawaii, Guam, Puerto Rico, and the US Virgin Islands. The approval is granted for a term of three years and expires May 12, 2013, whereupon it will be renewed.

1.3 Objective

The Quality Assurance Program is designed to provide EMA and its clients with accurate and reliable data.

The Quality Assurance Program ensures that EMA produces valid data for all analytical procedures. In order to accomplish this objective, the following criteria must be achieved:

1. All procedures and practices must be accepted by both the client and/or regulatory agency.

2. A program must be in place to monitor, document, and improve the performance of EMA.
3. There must be a mechanism for correcting problems which are determined by the Quality Assurance Program.

Specific objectives of our performance standards are:

1. Laboratory practices and methodologies are routinely updated and developed as new and improved methods and practices become available.
2. Only trained personnel having the appropriate expertise perform assigned tasks.
3. All data is reviewed prior to release to ensure validity, completeness, accuracy, and precision.

1.4 Intended Use of Data

This Quality Assurance Program Manual applies to the generation of analytical data for environmental monitoring and assessment programs. This Quality Assurance Program has been designed to meet the requirements of various federal and state regulatory agencies with which clients need to comply. The data generated under this Quality Assurance Program is provided in support of investigations or monitoring of sites that will have significant environmental impact on the public and private sector.

2.0 Laboratory Organization and Responsibility

EMA is a full-service environmental laboratory specializing in analytical services and is the sole laboratory operating under this quality management system. EMA maintains two locations that include the main facility and one auxiliary laboratory:

Main Facility
4340 Viewdridge Avenue
Suite A
San Diego, CA 92123
858-560-7717

Auxiliary Facility
4380 Viewridge Avenue
Suite B
San Diego, CA 92123
858-430-0379

EMA provides analytical testing services for the environmental industry. Services include:

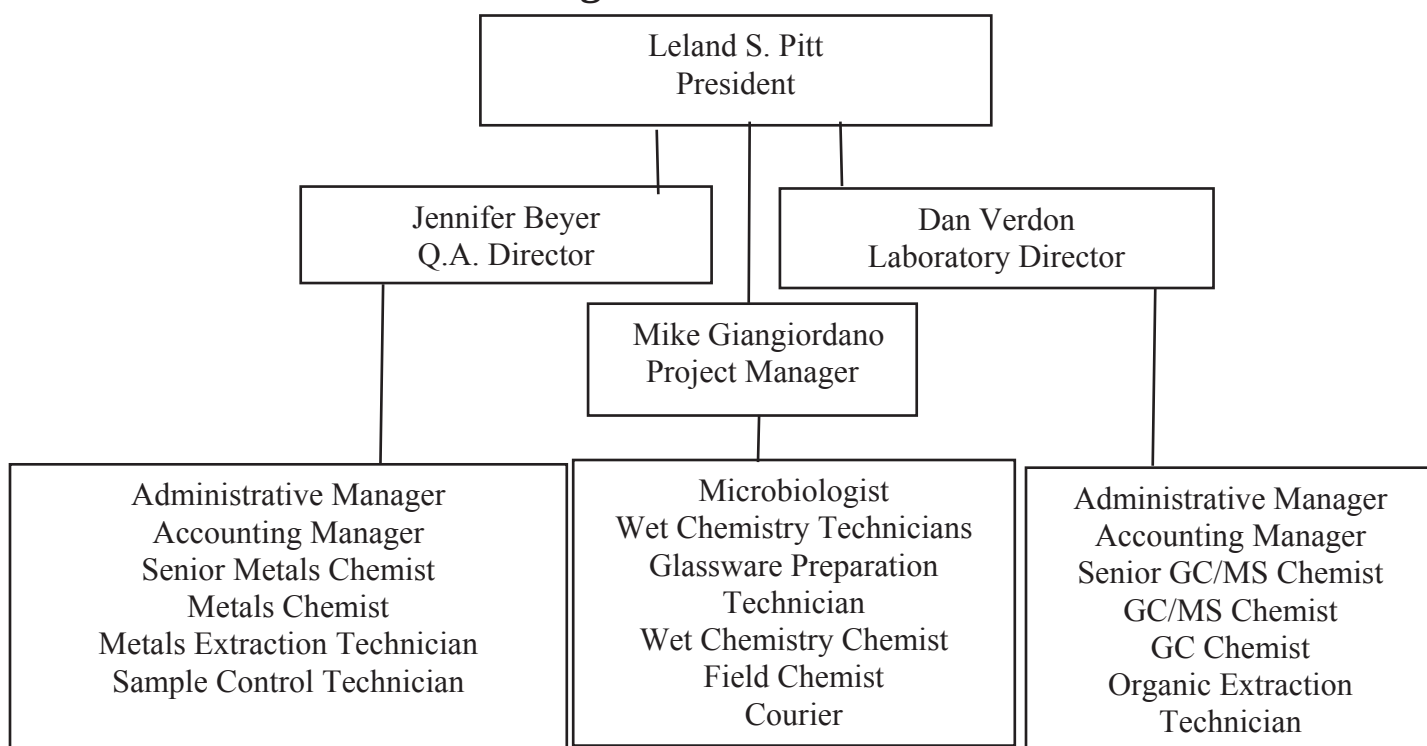
- Classical chemistry (titrametric, gravimetric, colorimetric, infrared, etc.),
- Inorganic chemistry by Atomic Absorption (cold vapor), Inductively Coupled Plasma-Mass Spectrometry, and Inductively Coupled Plasma-Atomic Emission Spectrometry,
- Organic chemistry by Gas Chromatography (GC) and Gas Chromatography/Mass Spectrometry (GC/MS),
- Microbiology by Multiple Tube Fermentation, Presence/Absence Media, and Plate Count.

A list of analytical services and methods performed by EMA is presented in Appendix E.

A list of major instrumentation and equipment used by EMA is presented in Appendix F. EMA has been operating as an analytical laboratory since 1974. EnviroMatrix Analytical, Inc. (EMA) was incorporated in the State of California on July 10, 1992.

The success of the quality assurance program is the responsibility of key laboratory personnel. All laboratory chemists and technicians are vested with the authority to stop work in response to quality related problems. Personnel notify their supervisor and the Quality Assurance Director immediately if any quality related problems or out-of-control events occur. In the temporary absence of their supervisor, lab personnel notify another member of laboratory management.

EnviroMatrix Analytical, Inc. Organizational Chart



2.1 The President

The President of EMA approves overall policy, including the Quality Assurance policy and goals contained in this Quality Assurance Program. The president maintains the ultimate responsibility and authority for quality related matters.

2.2 Laboratory Director

The Laboratory Director is ultimately responsible for the timeliness and reliability of all analytical data.

The Laboratory Director's responsibilities with respect to the Quality Assurance Program are to:

- Supervises all department supervisors and chemistry laboratory personnel;
- Oversee and coordinate instrument and equipment maintenance;
- Review work procedures and daily laboratory practices;
- Training of laboratory personnel;
- Implement and develop new methodologies;
- Oversee the implementation of valid and reliable quality control procedures;
- Oversee the administration of quality control procedures;
- Oversee the implementation of corrective action(s);
- Oversee performance evaluation and auditing;
- Review analytical data and reporting to clients.

2.3 Quality Assurance Director

The Quality Assurance Director is responsible for the operational budgeting, laboratory management, and the Quality Assurance Program activities.

Duties are to:

- Prepare and maintain the financial operational budget;
- Develop mechanisms to carry out quality objectives;
- Administrate quality control procedures;
- Implement corrective action(s);
- Manage a document control numbering system;
- Performance evaluation and auditing;
- Liaison with regulatory agencies;
- Propose Quality Assurance Program amendments, provide feedback, and conduct Quality Assurance training.
- Train and monitor chemists and technicians in implementation of Quality Assurance/Quality Control procedures;
- Review final analytical reports for accuracy and completeness;
- Manages all facets of the EMA safety program.

2.4 Project Managers/Project Coordinators/Sales Manager

The Project Managers and Project Coordinators have responsibilities relating to the Quality Assurance Program. They are to:

- Respond promptly to client needs and inquiries;
- Track project reports to ensure they are delivered on time;
- Communicate any client inquiries or concerns promptly to the appropriate management person (i.e.: President, Vice-President/Laboratory Director, or other Project Manager);
- Ensure that all client inquiries are resolved by continued communication and follow-up;
- Act as client advocate;
- Determine any client project specific quality assurance or deliverable needs and communicate those needs to the laboratory through written and verbal notification;
- Define, document, and communicate work requirements for specific projects to the laboratory through written and verbal notification;
- Communicate changes in project requirements during the course of work to laboratory personnel through written and verbal notification.

2.5 Sample Control Technician (Sample Receiving Coordinator)

The Sample Control Technician is responsible for sample integrity, sample holding time adherence at receipt, proper container usage, proper sample storage, and sample custody.

Duties include to:

- Receives all client samples and enters project and samples into the EMA Laboratory Information Management System (LIMS);
- Labels all client samples and tracks the internal chain-of-custody.
- Prepares preserved sample containers and adds preservatives to incoming samples where indicated (includes documentation of pH for all metal samples);
- Document sample condition as received;
- Inform client, and/or Laboratory Director or chemists of any holding time considerations;
- Maintains internal chain-of-custody through sample control;
- Ensure and document proper sample container type;
- Control sample storage;
- Implement prescribed procedures for sample receipt and log-in;
- Document project-specific requirements or changes in project requirements during the course of work on the daily in-house aging report;
- Maintains logbook of daily verification of all laboratory balances (as well as refrigerator temperatures).

2.6 Department Supervisors/Senior Chemists

The Laboratory Department Supervisors are responsible for the daily operation of their respective area.

Their duties as they relate to the Quality Assurance Program are to:

- Make recommendations for technical decisions to the Laboratory Director;
- Develop, review, and evaluate test procedures;
- Assist in the training and monitoring of chemists and technicians in implementation of Quality Assurance/Quality Control procedures;
- Ensure completion of analytical work within the requested turn-around time and prior to expiration of sample holding time;
- Initiate or respond to required corrective action(s);
- Perform method detection limit and instrument detection limit studies on instruments used.

2.7 Laboratory Chemists and Technicians

The Chemist's duties as they relate to the Quality Assurance Program are to:

- Comply with Quality Assurance Program requirements and method specified Quality Control;
- Maintain a clean and safe working environment;
- Implement any prescribed corrective action(s);
- Utilize only methodologies as approved by EMA and follow EMA Standard Operating Procedures (SOPs);
- Keep accurate laboratory records;
- Routinely check expiration dates of reagents prior to initiating work, and make fresh reagents when necessary.

2.8 Purchasing Agent/Client Services Coordinator/Administrative Assistant

The Purchasing Agent's duties in relation to the Quality Assurance Program are to notify Laboratory Director immediately if incoming purchase requisitions request materials of a different quality or source (vendor) than prior orders. Purchase requisitions that request materials that vary from prior approved materials must have an indication that the Laboratory Director has approved such action.

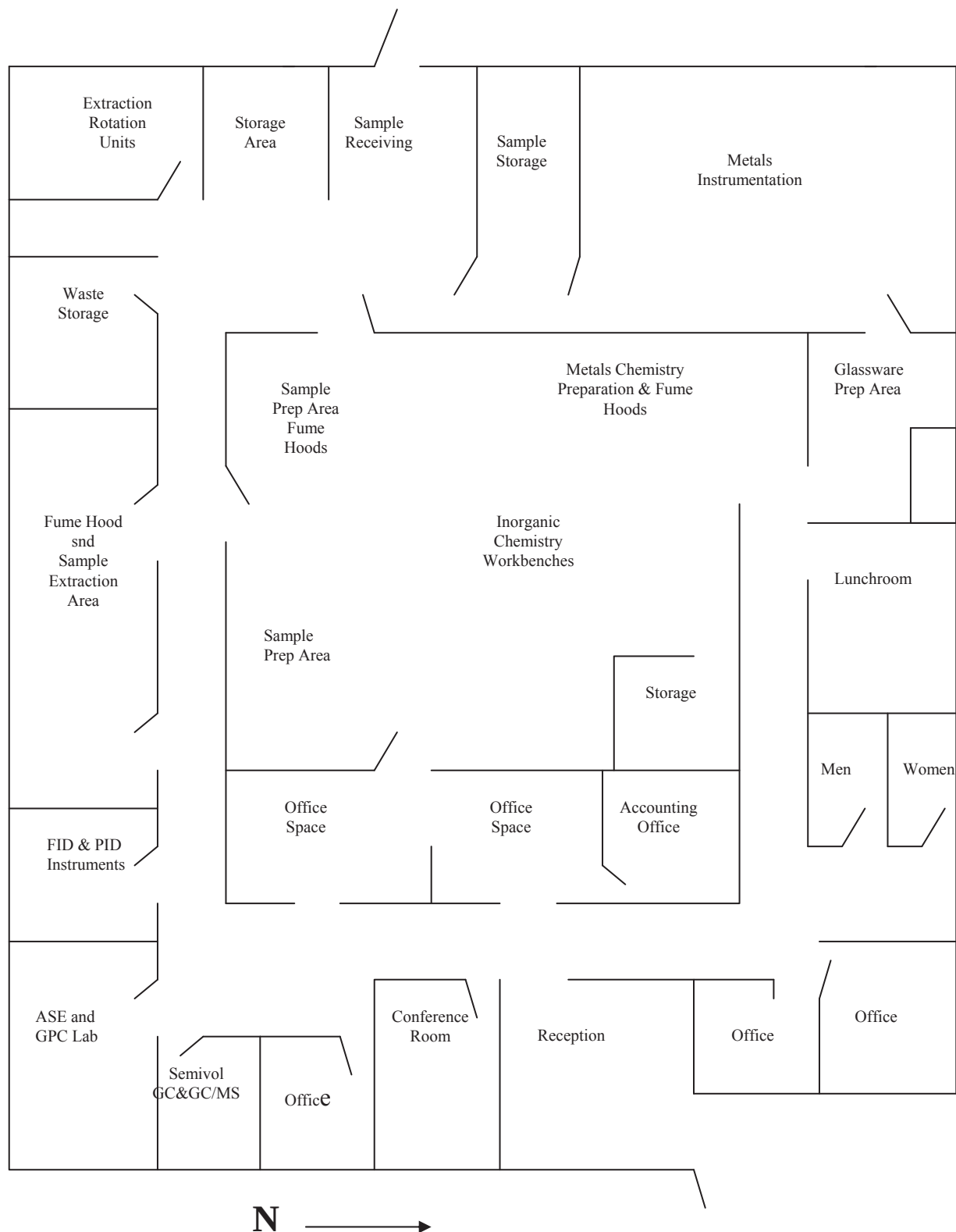
The Client Services Coordinator duties in relation to the Quality Assurance Program are to:

- Ensure completion of report deliverable prior to due date;
- Files and maintains copies of all analytical reports and project information.
- Scans all incoming Chain-Of-Custody forms (COCs) into the EMA Server Files.

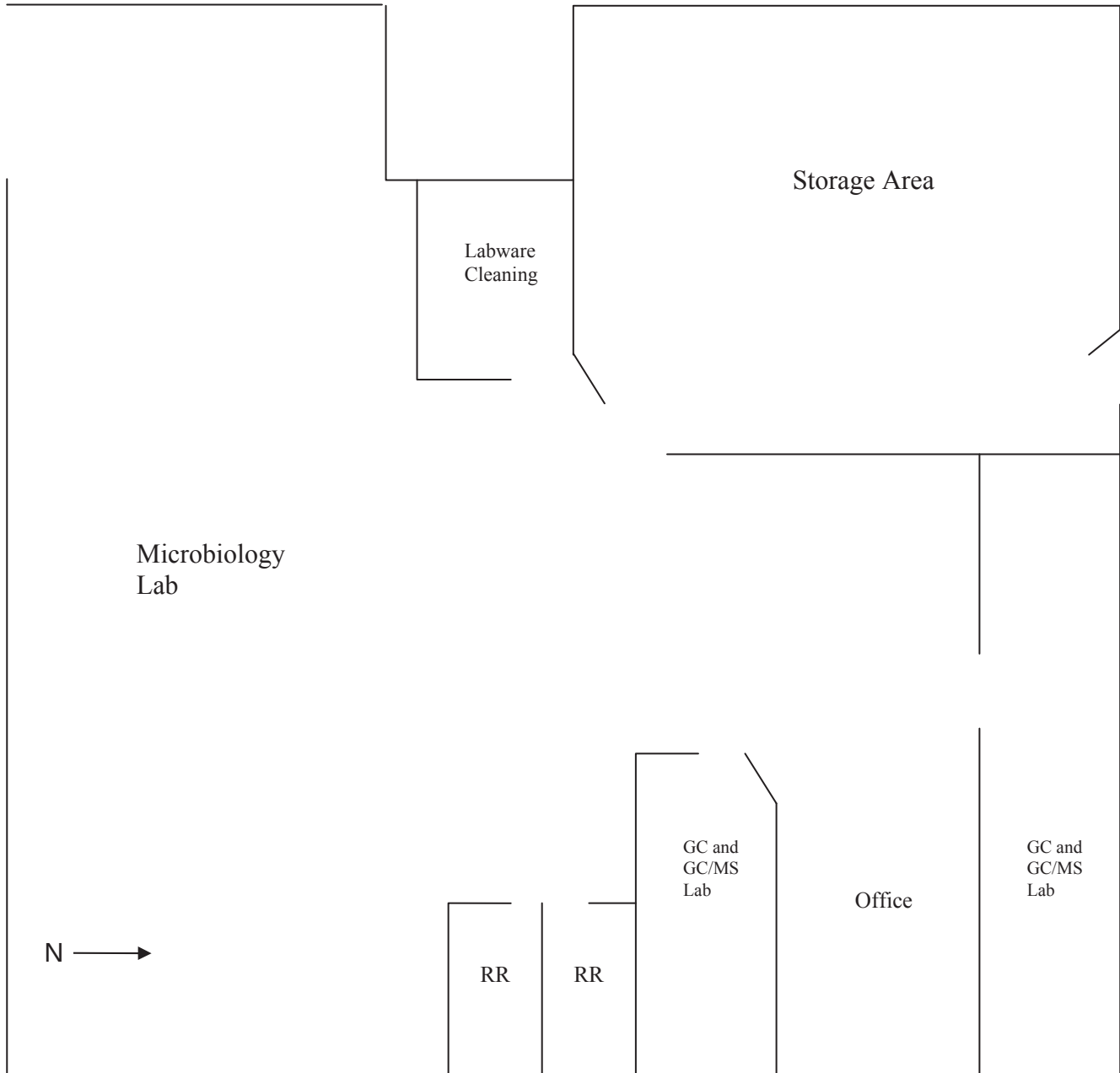
3.0 Facilities

EMA occupies one approximately 6,000 square foot building of which 90% is dedicated to the analytical laboratories. EMA maintains an additional auxiliary laboratory which includes approximately 1800 square foot building within the same business complex of which 65% is dedicated to the analytical laboratories. Separate laboratory areas are dedicated to volatile analyses, semi-volatile analyses, inorganic analyses, microbiological analyses, extraction for organic analyses, digestion for metals analyses, sample receiving/sample preparation, metals analyses, and glassware cleaning.

Facility Map of 4340 Viewridge Ave. Ste. A



Facility Map of 4380 Viewridge Ave. Ste. B



4.0 Personnel Training

EMA provides all personnel with extensive training to assure all employees are provided with the necessary information to make educated, decisive and merited decisions. The guidelines set forth create parameters for all employees to follow that will aid in quality of all laboratory processes.

4.1 Quality Commitment

EMA staff is committed to providing superior service and quality. EMA management believes that achieving excellence requires the dedication of all employees and has established training programs throughout the organization to foster employee involvement and growth.

4.2 Safety Training and Compliance

A formal safety program is established in accordance with local, state and federal requirements. Safety training is provided for all laboratory employees initially upon hire and thereafter on a routine basis. The safety program is maintained by the Safety Officer with the help of the Safety Coordinator and Waste Management Coordinator.

4.3 Qualifications of Laboratory Personnel

EMA is very proud of its highly qualified and professional staff and is committed to furthering the skills of employees at all levels.

Technical training is performed by management and qualified individuals to ensure method proficiency. The staff is updated as to current technical advances at an as-needed basis. All laboratory personnel are required to acknowledge through signature that they have read and understand the SOPs appropriate for their area. All training beyond acknowledgment of SOPs is documented. Continuing qualification of laboratory personnel is demonstrated through systems and performance audits conducted by the Quality Assurance Director. Additionally, Quality Assurance training sessions are conducted by the Quality Assurance Director on a regular basis. External courses and conferences are attended when appropriate. The EMA staff further their expertise through present and past membership in professional organizations such as:

- San Diego Environmental Professionals (SDEP)
- American Council of Independent Laboratories (ACIL)
- Professional Environmental Marketing Association (PEMA)
- Association of Environmental Professionals (AEP)
- San Diego Dry Weather monitoring workgroup
- Stormwater Monitoring Coalition workgroup

All new employees receive a comprehensive orientation to quality assurance, quality control, and safety programs administered by the Quality Assurance Director within approximately the first week of employment. All new personnel, or personnel performing a new analysis, must demonstrate

proficiency through the analysis of Quality Control check samples prior to the analyst conducting independent analysis of client samples.

Copies of all training records, including the results of Precision and Accuracy Studies and single- and double-blind performance evaluations, are maintained in the Quality Assurance program files. Appendix G presents professional profiles of key personnel.

5.0 Quality Assurance Objectives

The objectives of EMA are to supply precise, accurate data reports to clients which are representative of the sample supplied. All data reported are generated and calculated according to recognized standards of the environmental laboratory industry. Data reported by EMA are calculated and reported in units that are consistent with data produced by other organizations. EMA strives to present data reports that are complete and contain all data elements and supporting documentation for the type of deliverable requested by the client.

The precision and accuracy control limits utilized by EMA are based upon limits contained in the published methods. When warranted by EMA's experience with a particular method, more restrictive control limits than those cited in the method are set.

Method performance characteristics are determined prior to method use for analytical methods. This is accomplished through Precision and Accuracy, Method Detection Limit, and Instrument Detection Limit Studies performed according to standard operating procedures. Additionally, Quality Control reference materials are analyzed to verify method performance characteristics. All method performance data is compiled by the individual analyst and is documented and maintained by the Quality Assurance Director in the Quality Assurance program files.

5.1 Data Quality Characteristics

There are five recognized characteristics of data quality. They are:

Accuracy

The degree of agreement of a measurement (or measurement average) with an accepted reference or true value. It is a measure of system bias. It is usually expressed as the difference of "measured" from "true" values, or as a percentage of the difference. The accuracy of laboratory analyses can be evaluated through the concurrent analyses of standard reference materials, if available.

Precision

A measure of agreement among individual measurements of the same property under similar conditions. It is expressed in terms of percent difference between replicates or in terms of the standard deviation.

Completeness

A measure of the amount of valid data obtained compared to the amount expected to be collected under normal conditions; it is usually expressed as a percentage. The completeness objective is calculated on those samples analyzed, not the remainder archived. Data from samples are

considered to be complete if the samples have been properly collected, labeled, stored, prepared, and analyzed and the associated quality control criteria have been met.

Representativeness

Expresses the degree to which data accurately and precisely represents a characteristic of a data population, process condition, or a sample. The samples expected characterization would be compared to that obtained by laboratory analyses to evaluate the representativeness of the data to the expected data.

Comparability

Expresses the confidence with which one data set can be compared to another. To achieve comparability, the data generated will be reported using units specified in the Standard Operating Procedures as appropriate. Analytical results will be comparable to those produced from similar laboratories using the same instrumentation and methodology. This is accomplished through the following practices:

- Demonstrate traceability of standards to NIST or EPA sources.
- Use of standard and approved methodologies.
- Standardized units of measure.
- Standardized Quality Control Acceptance Criteria
- Analysis of Performance Evaluation (PE) samples to demonstrate laboratory performance.

5.2 Completeness, Representativeness, and Comparability

Prior to the results being disseminated, the report is reviewed and evaluated for completeness, representativeness, and comparability.

The report and associated data is evaluated to ensure that it is; sufficient for its intended use, representative of the matrix and conditions being measured, and representative of the method and instrument utilized.

The Laboratory Director will review and approve all EMA reports to clients.

6.0 Sample Custody

The Sample Control Technician is responsible for initiating and maintaining external and internal chain-of-custody, managing and tracking sample storage and distribution, ensuring proper containers, preservation, temperature requirements and adherence to holding time requirements. In the absence of the Sample Control Technician, only properly trained personnel may receive samples with all activities reviewed by the Sample Control Technician or Laboratory Management. All samples received are sent through an additional review process by a qualified employee to ensure the laboratory adheres to the client's needs and representations.

Samples are physical evidence and are handled at EMA according to certain procedural safeguards. The strict adherence to chain-of-custody procedures is critical to legal proceedings and an integral part of a Quality Assurance Program. Chain-of-custody procedures are initiated during sampling events in the field and continued through laboratory analysis, and finally, the ultimate disposal or return of the sample.

EMA chain-of-custody procedures ensure traceability through proper sample handling, Quality Control procedures and internal chain-of-custody. The components of the chain-of-custody procedure include chain-of-custody documentation forms and unique sample identification numbers.

The National Enforcement Investigations Center of EPA defines custody of evidence in the following ways:

1. In a person's physical possession,
2. In view of the person after possession has taken place,
3. Secured by that person so that the sample cannot be tampered with, or
4. Secured by that person in an area which is restricted to unauthorized personnel.

6.1 Laboratory Custody Procedures

EMA has implemented the following standard operating procedures with regard to laboratory internal chain-of-custody:

- Samples are stored in a secure area except when being analyzed or prepared.
- Non-employee access to the laboratory is controlled through the use of limited access points at the facility. Outside personnel can access the building either through the front reception area or the sample receiving area.
- The designated Sample Control Technician controls access to the sample storage area.
- Samples remain in secured sample storage until removed for sample preparation or analysis.
- Each sample container is assigned a unique identifier and this identifier is used to track the sample location and status throughout the analytical process, storage and disposal.
- After the sample is assigned an identifier and logged in, sample tracking is utilized to trace the transfer of the sample from the Sample Control Technician to the chemists.
- Sample tracking is maintained through the internal chain-of-custody program in the EMA LIMS in order to document sample location and responsible party within the laboratory.
- All samples are to be returned to the Sample Control Technician and documented within the chain-of-custody program in the LIM system.
- Any remaining samples are archived in locked storage areas, returned to the client, or disposed of properly as required by the client and federal and state regulations.

The Sample Control Technician is responsible for ensuring that all samples are maintained in a secure area while being logged-in.

Internal sample chain-of-custody is maintained through sample tracking program in the EMA LIMS. This program is used to log samples in and out of sample storage and indicate sample custody at all times. It is the responsibility of all personnel to document when a sample is in their custody.

Coolers containing samples are received through the sample receiving/sample management area. Upon sample receipt at the laboratory, samples are assigned a unique identification number and entered into the sample receipt logbook. All samples are entered into the EMA LIM system. Details include client name, laboratory identification number, parameters requested, date received, date and time sampled, date due and relinquishing parties.

For sample shipments that contain a temperature blank (i.e.: a separate water-filled container for verifying receipt temperature), the temperature of the water in the designated bottles will be obtained using an NIST calibrated thermometer. The thermometer will be inserted into the temperature blank as soon as possible after sample receipt; once equilibrium is reached the temperature will be recorded. In the event that there is no temperature blank present, the temperature of the samples are taken with a probe which indicates the temperature of the sample bottles. The temperature or condition of the samples on receipt will be recorded on the associated chain-of-custody.

If samples are not received within the temperature requirements or if the samples are received outside of the protocol holding time requirements, the client will be contacted and notified of the discrepancy. In the event the client cannot be contacted, the samples will be processed on an as received basis. The discrepancy is noted on the chain-of-custody.

The samples are carefully removed from the shipping container. The condition of the samples will be noted on the associated chain-of-custody form (intact, broken, leaking, etc.). The client will be contacted immediately if there is evidence of damage. Broken/damaged sample bottles will be transferred to the EMA waste drums. The coolers containing the broken samples will be rinsed several times with water; the water will be transferred to the waste drums if necessary.

The Sample Control Technician will verify agreement between the labeled sample containers and the chain-of-custody. In the event of a discrepancy, the client will be contacted immediately.

The samples will be visually inspected to determine that adequate sample volume was collected for the parameters requested, correct sample containers were utilized, and proper preservation was indicated on the label. This will be documented on the chain-of-custody form. Any problems will warrant immediate client contact.

All liquid samples requiring any metals analysis must be verified to have a $\text{pH} < 2$. The Sample Control Technician will maintain a logbook which will contain pH upon receipt, amount of acid added (if necessary) and pH of sample after 24 hours. Samples with $\text{pH} < 2$ are ready for analysis. Those which are above the required pH must be maintained at a pH of 2 or below for at least 24 hours.

If a problem is not resolved with the client during sample delivery, the client will be notified by telephone to clarify any discrepancies found during sample log-in and stipulate corrective actions. All samples that are affected by the problem are placed in the appropriate contaminant free refrigerator and maintained at 4°C until resolved. A record of the telephone call will be kept with the chain-of-custody information in the LIMS system.

If no problems are observed, the samples are placed in sample storage areas controlled by the Sample Control Technician until analysis. Maximum holding times for samples are observed and strict sample control is maintained by the Sample Control Technician.

In the absence of the Sample Control Technician, only personnel who have been trained in sample receipt and sample custody procedures have access to samples in the sample control area.

Controlled custody of digestates and extracts is maintained by transfer documentation on extraction/digestion log forms. Digestates and extracts are stored for thirty days after analysis and are promptly disposed of thereafter.

6.2 Chain-of-custody

To trace sample possession from the time of collection, a chain-of-custody record is completed and accompanies the sample(s).

The chain-of-custody contains the following information:

- Client sample identification number;
- Signature of the collector and any person who has had the sample in their possession;
- Date and time collected;
- Sample type;
- Client name and address,
- Inclusive date of possession;
- Analyses requested;
- Intact seals present on sample containers (if applicable);
- Sample condition when received (temperature, proper container, etc.);
- Samples properly preserved, as applicable;
- Time and date sample was received and by whom.

The chain-of-custody establishes the documentation and control necessary to identify and trace a sample from sample collection to final analysis. It includes sample labeling to ensure proper identification of each sample, secure custody, and provides the recorded support information for potential litigation.

Chain-of-custody forms are used to document the integrity of all samples. To maintain a record of sample collection, transfer between personnel, shipment and receipt by the laboratory, a chain-of-custody form will be filled out for each sample or batch of samples provided by the client.

Whenever the possessions of the samples are transferred, the individual relinquishing the sample(s) signs and records the date and time of sample transfer on the chain-of-custody document. The individual receiving the sample(s) repeats the procedure. This record represents the official documentation for all sample custody transfers until the samples have arrived at the laboratory.

A copy of the chain-of-custody is provided to the client when samples are logged in at the laboratory.

7.0 Sample Security, Storage, and Disposal

The Sample Control Technician is responsible for ensuring that samples are maintained in secured storage areas under the appropriate conditions and are properly disposed of once deemed suitable.

7.1 Sample Security

Samples are kept in secured storage areas except during laboratory analysis. All laboratory personnel who receive samples are responsible for the care and custody of samples from the time each sample is received into that person's possession until the sample is returned to the Sample Control Technician.

The following security measures are employed:

- Doors to the sample storage area are secured at all times.
- Authorized personnel escort all visitors and deliveries through the laboratory from the rear receiving area or the main reception area.
- Laboratory personnel are responsible for the control and maintenance of sample integrity while they have custody of samples.

Information provided by the client about samples, recorded on the chain-of-custody or project documents, is available to analysts and can prove useful guidance when analyzing samples. EMA policies prohibit disclosure of confidential client information to third parties. All laboratory personnel are instructed to maintain confidentiality of client project information.

7.2 Sample Storage

Once samples are logged into the sample tracking system, the Sample Control Technician is responsible for ensuring the following procedures:

- Water samples for volatile analyses are stored in a separate refrigerator reserved only for volatile samples to avoid contamination. Solid samples that are to be analyzed for volatile organic compounds are to be sub-sampled prior to any other analyses being performed on those samples.
- Samples for microbiological analyses are delivered to the analyst and processed immediately. These samples are not stored due to method recommendations.

- Samples are stored in a secured area.
- Samples are removed from the shipping container or cooler and stored in their original containers unless damaged.
- Damaged samples are documented and reported to the Project Manager.
- Sample storage areas are kept secured and tidy at all times.
- Samples are removed from storage only by authorized personnel trained in sample custody procedures.
- Standards are not stored with samples.

7.3 Sample and Waste Disposal

Upon completion of the analysis, any remaining sample will be placed into long-term storage, returned to the client, or disposed of in compliance with all applicable federal, state, and local laws. All samples disposed of are documented in the LIM system by the Sample Control Technician.

When sample analysis and all Quality Control checks have been completed and a final report has been issued, the unused sample will be stored for a period of no less than one week after the sample report was received (30 days maximum if storage space allows; longer archival available with nominal fee).

Any unused portions requested by the client shall be returned.

Laboratory waste is collected in individual laboratory areas in appropriate satellite containers labeled with water-proof labels. Labels identify the hazardous waste collected and all pertinent information from the Material Safety Data Sheets (MSDS). When filled, containers are taken to the Hazardous Waste Room and composited into larger containers for storage until transport to a designated disposal facility. The Safety Officer works with the waste transporters to obtain disposal of waste which meets regulatory standards.

Non-hazardous waters may be disposed of in sink drains as permitted by a wastewater permit granted from the City of San Diego Metropolitan Wastewater Department.

7.4 Sample Preservation and Holding Times

It is critical to sample integrity and data validity that EMA analyze samples within the method stated holding times. EMA follows regulatory guidelines for sample preservation and holding time requirements as specified by the method references. Sample holding time begins with the collection of the sample.

Appendix A contains the Sample Holding Times and Preservation Requirements which identifies holding time requirements by method and parameter for water and soil/wastes.

Adherence to holding time requirements is maintained through several laboratory policies:

- When a sample holding time is identified in terms of hours, the chain-of-custody must indicate the time of sampling.
- The Sample Control Technician verbally notifies the appropriate analyst immediately upon receipt of samples with holding times of 72 or less hours.
- All laboratory personnel receive a daily in-house aging report listing the status of requested analyses for current samples.
- All data is subject to supervisory review and audits in which adherence to holding time requirements are monitored.
- Time of analysis is reported with analytical results when requested.

Accurate sample preservation is critical for following procedural guidelines dictated by recognized standards of the environmental laboratory industry. Preservation of samples is noted in the LIM system and if contradictory to the standardized procedure noted within the chain-of-custody. All liquid samples to be analyzed for metals must be documented in a designated logbook, recording the pH of the sample upon arrival. Liquid samples for metals analysis must be at a pH of 2 or below. Additional acid may be needed to accomplish this requirement (with an adjustment period of 24 hours before analysis). Occasionally samples will come in unpreserved whereupon the Sample Receiving Technician must sub-sample into correct containers pertaining to requested analyses.

8.0 Material Procurement and Control

Only chemicals and supplies of the quality specified in the appropriate method or Standard Operating Procedure shall be used for analyses. Purchase requisitions require review by the Laboratory Director for suitability prior to being issued. The Laboratory Director is responsible for ensuring that the materials being ordered are of the appropriate grade/quality for the methodologies.

The Purchasing Agent verifies that materials ordered are of the same grade/quality previously ordered and are requested from an approved vendor. If any deviations are noted the Purchasing Agent immediately notifies the Laboratory Director for approval/disapproval prior to placing order.

Upon receipt of orders, the purchase order is compared to the grade of material shipped to ensure that the correct quality/grade was received prior to acceptance by the laboratory.

8.1 Containers and Reagents

EMA provides required bottles, ultra-pure water (for use for trip blanks), coolers, sampling instructions, labels, ice packs, and chain-of-custody forms for sample collection. EMA utilizes EPA approved, pre-cleaned glassware for sample collection. Sample container preservatives are certified free from analytes of interest and contaminants. Compliance certificates that indicate freedom from contamination are maintained by the Sample Control Technician for each lot number of preservative and sample container.

Sample containers and preservatives are fully traceable to their sources and lot numbers through use of a logbook maintained by the Sample Control Technician. Containers provided to clients are labeled with the date the containers were prepared. All container and preservative lot numbers used

for each day are recorded in a container preparation logbook along with the date that the preservative lot number was in use.

Upon request, EMA will provide trip blanks to clients.

8.2 Calibration Standards and Reagents

The chemicals and reagents used by EMA are selected with care. Reagent lot numbers are recorded for every analytical batch processed. Analytical reagent grade is the minimum quality used within the laboratory. Ultra pure/trace metal free acids are employed for low detection limit metals analysis. Pesticide grade solvents are used for all organic extractions. The extraction solvents are treated to all steps of the sample preparation and analysis process.

The following acceptance criteria applies to solvents:

- No analyte present at concentrations equal to or greater than one-half the reported detection limit.
- No non-analyte peak present in the test chromatogram greater than 10% of the closest internal standard for GC/MS analysis or which would interfere with the identification and quantitation process for GC analysis.

Records showing the reagent lots employed are maintained for all analyses. The method blank serves as a continual verification of the quality of the reagents as well as the quality of the analytical laboratory environment.

8.3 Equipment Procurement

Only equipment and supplies of the quality specified in the appropriate method or Standard Operating Procedure shall be used for analyses. Purchase requisitions require review by the Laboratory Director for suitability prior to purchase orders being issued. The Laboratory Director is responsible for ensuring that the materials being ordered are of appropriate grade/quality for the methodologies.

Upon receipt of orders, the purchase order and requisition are compared to the grade of the material shipped to ensure that the correct quality/grade was received prior to acceptance by the laboratory. The Sample Control Technician is responsible for receiving products and is required to date and initial the invoice as verification of material acceptance.

9.0 Analytical Procedures

EMA utilizes methodologies from the following accepted standard references:

- Methods for the Chemical Analysis of Water and Wastes,
- EPA-600/4-79-020, Revised 1983.
- Test Methods for Evaluating Solid Waste, EPA-SW-846, Revised 1996.

- Federal Register, 40 CFR Part 136, 2000.
- California Code of Regulations, Title 22, Divisions 4 and 4.5.

Additional methods are taken from:

- Inland Testing Manual, EPA 823-B-98-004, February 1998.
- Recommended Guidelines for Measuring Metals, Organics Compounds in Puget Sound Marine Water, Sediment and Tissue Samples, and related QA/QC Guideleines.
- LUFT Field Manual for Leaking Underground Fuel Tanks, DHS, Rev. March 1989.
- Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998.
- American Society for Testing and Materials (ASTM).
- The United States Geological Survey (USGS).
- Association of Official Analytical Chemists (AOAC).
- NIOSH Analytical Manual.
- Air Resources Board Manual.

Additionally, EMA has developed proprietary in-house methods for some parameters.

Clients are notified by EMA Project Managers through written and/or verbal communication when non-standard or significantly modified methods are to be used. Written or documented verbal client approval is required prior to use of new, non-standard, or significantly modified methods for client sample analysis. In the absence of client direction, selection of a method to be used for analysis is determined by the Laboratory Director.

Each data report issued by EMA includes a reference to the exact method employed for the analysis.

As new methods become promulgated and the laboratory demonstrates capability of performing new methods, SOPs are revised and updated accordingly to replace existing methods. Only the most recent revision for a method is used. Revised SOPs issued to personnel are accompanied by a form which personnel sign and date indication that they have read and understand the procedure.

Capability of performing an analytical method must be demonstrated prior to client sample analysis for all new and modified methods, This is accomplished through personnel training, QC Check sample analysis, Method Detection Limit, Instrument Detection Limit and Precision and Accuracy Studies.

Method capability data is maintained by the Quality Assurance Director in the Quality Assurance program files. The Quality Assurance Director is also responsible for ensuring that the laboratory staff is aware of the most current version for all methods.

10.0 Calibration Procedures

Calibration procedures are required in all areas of a laboratory setting. It is an essential component of quality control providing the correctness (or lack thereof) of laboratory procedures and instrumentation/equipment, to ensure that all aspects of data processing are of the utmost integrity.

10.1 Calibration Procedures and Frequencies

Instrument calibration is critical to generating accurate analytical data. EMA maintains strict controls on the calibration procedures for the various types of analytical equipment. Each instrument is calibrated prior to sample analysis in accordance with method criteria. The specific criteria for calibration can be found in each method SOP. Corrective action must be taken to remedy any out-of-control situations prior to analysis of any samples. Deviations from stated criteria are not acceptable.

Initial demonstration of capability for each instrument and analyst must be conducted before analysis of any samples. This includes performing instrument detection limit (IDL) and method detection limit (MDL) studies as well as having each analyst demonstrate proficiency to perform the method and obtain acceptable results for each analyte. IDL and MDL studies are updated according to each instrument SOP, occurring yearly in some cases or when major changes to the instrumentation are involved.

Instruments are calibrated in accordance with the appropriate analytical method and the manufacturer instructions. The analytical methods cite the appropriate calibration procedures and frequencies. In the event that the calibration specifications are not listed, a minimum correlation coefficient (R^2) of 0.99 or better is required.

Prior to the ongoing of analysis of samples, instruments are either calibrated or their calibrations verified. Calibration curves of signal versus concentration are generated on each analytical instrument. Calibration curves are established for each analyte of interest.

Most methods use either four or five (with a minimum of two) different calibration points for standardization. Current calibration curves are evaluated daily using a continuing calibration curve verification standard (CCV) or a laboratory control sample (LCS) or laboratory blank spike (LBS).

It is EMA's policy to validate all new standards against existing standards prior to use. The new standard's response factor (RF) should be within 10% of the previous standard's RF.

Hardcopy records of all instrument calibrations are maintained in the individual laboratory areas. These records are reviewed and are included in internal audits.

When calibration acceptance criteria or guidelines are available in a method, those criteria, or that of which is more stringent, are utilized. In the absence of method-stated criteria or guidelines, calibration acceptance criteria or guidelines from a similar method are considered to be technically sound.

10.2 Laboratory Standards and Reagents

Analytical standards utilized for method calibration and preparation of quality control samples are traceable to standard reference materials, or a certificate of analyses provided by the manufacturer.

Standards are purchased from approved and reputable commercial vendors such as Aldrich, Fisher Scientific, Supelco, etc. for use in all laboratory analyses. Certificates of analysis and expiration date information are received with standards and are maintained by each analyst.

Standards and reagents are dated upon opening, and the date of expiration recorded (expiration dates are determined by the vendor or indicated in the individual method SOP). This procedure establishes the order of use and eliminates the possibility of exceeding shelf life. A stock or working standard will be assigned an expiration date of the component with the shortest time of expiration.

Standards are protected from degradation, deterioration and contaminations based upon storage requirements and are stored properly to ensure chemical compatibility and integrity.

Each analytical batch corresponds to a sample preparation log (i.e., bench sheet) where all applicable reagent and standard lot numbers are recorded. Control check samples are analyzed with each analytical batch for all analytical procedures to ensure that the reagents used have not degraded or become contaminated.

Stock and working standard solutions are prepared fresh as required by their stability, and are checked regularly for signs of deterioration. Standards are properly labeled as to name, concentration, date prepared, solvent/medium, signature of person preparing the standard, and expiration date. Standards are traceable to analytical batches through the use of standard preparation logs and recorded dates on extraction/preparation logs.

The laboratory has established the following guidelines for the preparation of analytical standards:

1. Laboratory chemists who prepare standards are trained and experienced in calibration and the use of analytical measuring techniques.
2. Analytical reagent grade materials are utilized in preparation of standards.
3. Analytical measurement tools are calibrated to obtain accurate measurements.
4. All data generated are documented immediately in the appropriate standard preparation notebook.
5. Standards are properly labeled and referenced to standard preparation notebooks.

Laboratory contamination is minimized through implementation of a standard operation procedure (SOP) for glassware and lab-ware cleaning. The SOP is followed to ensure the removal of all traces of parameter(s) of interest and contaminants that could interfere with analysis.

Three grades of reagent water are used in the laboratory:

1. City water - The tap water used in the laboratory is supplied from the City of San Diego water supply. Its primary use is for the washing of glassware.
2. De-ionized water - This water is produced by passing tap water through a demineralization system. This water is used for some STLC preparations and as the final rinse for laboratory glassware.
3. Ultra-pure distilled water - This higher quality water is provided to the laboratory by an external supplier and meets specifications for Type I ASTM Reagent Water. This water is used for preparing inorganic and organic reagent blanks, reagent, solutions and standards.

Ultra-pure distilled waters are analyzed upon receipt of a new lot number to make sure that they meet pH and conductivity criteria for ASTM Type I and II Reagent Waters.

10.3 General Laboratory Equipment Calibration Requirements

Laboratory equipment requiring calibration, but not operational calibration, is checked on a routine basis for accuracy. These include; balances, ovens, refrigerators, freezers, automatic pipettes, and thermometers. Additionally, calibration is also performed and documented following maintenance and repair to show a return to control.

Each piece of support equipment is calibrated for every day of use. Calibration is documented in calibration logbooks for each piece of equipment. Acceptance criteria and correction factors observed are stated below or found in the support documents for individual pieces of support equipment. All out-of-control measurements and their resulting actions are documented on a corrective action form. The Laboratory Director and Quality Assurance Director are notified immediately of the out-of-control event. Non-compliant equipment is not used in the process of analyzing client samples. All out-of-compliance monitoring and corrective action measures are documented.

Equipment is calibrated against a standard traceable to NBS or other recognized physical or chemical constants. Calibration procedures are specified by the manufacturer, regulatory agency or method SOP. Procedures provide step-by-step detail for obtaining and documenting results. The data are kept on file in the laboratory and allow traceability to data generated under each equipment calibration. Calibration due dates are maintained by the Quality Assurance Director to maintain proper calibration intervals.

Balances

The calibration of balances are verified before each use with standard Class-S calibration referenced weights to within 0.001 grams of "true weight," and are calibrated annually by a licensed specialist across the full weight range of the balance.

Ovens/Furnace

Oven temperatures will be recorded during each use. The required temperature tolerance is $\pm 2^{\circ}\text{C}$ at the operating range of 60 - 300° C for ovens and 500 - 1500°C for furnaces. If the temperature is found to be out-of-control during analysis, the results of that analysis will not be reported and the analysis will be repeated after the oven has stabilized for 8 hours.

Refrigerators/freezers

The temperature in all the refrigerators shall be recorded each working day in the refrigerator logs and maintained at 0 - 6°C. In cases where temperatures are out of these limits, the temperature will be adjusted accordingly with the Lab Director's approval. Freezer control limits are -14°C ± 2°C.

Thermometers

Every thermometer must be checked annually against an NBS thermometer of equal or greater precision. The procedures of ASTM E77-92 for calibration are followed. Errors in temperature indications of the thermometer should not exceed the scale errors as expressed in Table 1 of ASTM E1-83.

Pipets

All automatic pipets are given a unique identification marker and calibrated on a weekly and quarterly basis according to ASTM gravimetric methods and acceptance criteria.

Syringes

Calibration certificates from the manufacturer and frequent replacement of syringes ensure accuracy of measurements.

10.4 Sample Storage Temperature Monitoring

Maintaining appropriate temperature during sample storage is of critical importance in the task of attaining valid data. The following procedures must be followed in order to maintain and monitor appropriate sample storage temperatures.

Upon sample receipt, samples for analysis are transferred to the appropriate storage refrigerators. A daily temperature check is performed to verify refrigerator temperature and these temperature readings are recorded on a log sheet for that refrigerator. Each refrigerator has a unique identification number and a separate Daily Temperature Log is maintained for each refrigerator. The thermometer in each refrigerator is immersed in a liquid such as glycerin or water. If a daily temperature reading exceeds the $4^{\circ} \pm 2^{\circ}\text{C}$ acceptance criterion, all project samples will be transferred to another refrigerator that is documented to be within the acceptable temperature range. The problem will be corrected, and corrective actions will be documented for the faulty refrigerator.

11.0 Analytical Requirements

Analytical instruments are calibrated at regular intervals recommended by the manufacturer and as required by ASTM, EPA, or other standard methods. Calibration of all equipment used and documentation of the calibration will be performed by individual chemists/ technicians as assigned by the Laboratory Director or by independent calibration firm.

11.1 GC/MS System Calibration

The gas chromatograph/mass spectrometer (GC/MS) systems are calibrated for mass and then tuned using specific instrument and method parameters. They are then calibrated for quantitation using the internal standard technique. Specific methods impose variations and/or different acceptance criteria on both the tuning and the calibration practices. These specific requirements are followed per the particular method Standard Operating Procedure.

Mass Calibration and Tuning:

The calibration of each instrument is verified at frequencies specified in the methods. Calibration and tuning the GC/MS systems is instrument specific and includes the following:

- GC/MS mass calibration using perfluorotributylamine (PFTBA);
- The tune of each system is checked using 4-bromofluorobenzene (BFB) for determinations of volatiles and with dactafluorotriphenylphosphine (DFTPP) for determination of semi-volatiles;
- The required ion abundance criteria must be met before determination of any analytes.

The background subtraction performed per the methodologies is straightforward and designed to eliminate column bleed or instrument background ions. Background subtraction actions resulting in spectral distortions for the sole purpose of meeting special requirements are contrary to the objectives of quality assurance and are unacceptable.

11.2 Gas Chromatography System Calibration

The gas chromatography systems are calibrated using either the external or internal standard techniques. The specific acceptance criterion varies for different methods and can be located in the method in question or the EMA Standard Operating Procedure.

External Standard Calibration Procedure

For each analyte, or group of analytes, five or more concentration levels of standard are prepared by adding aliquots of one or more stock standards to volumetric flasks. The standard solutions are then diluted to volume with the appropriate solvent for the method. The lowest concentration standard should be at the concentration of the method detection limit (MDL). The other concentrations should define the working range of the system.

Each of the calibration standards are injected into the GC system using the same technique employed for actual environmental sample extracts. (i.e., 1-5 ul liquid injections, purge & trap, etc.) A series of calibration factors (CFs) are calculated for each analyte, at each standard concentration. The calibration curve is a plot of the relative response vs. the amount injected.

The CF = amount injected/total response (area). Multi-response (multi-peak) compounds use the total area of all peaks for quantitation or the average concentration of several peaks.

Each of the calibration standards is injected into the GC system using the same technique as actual samples. A series of response factors (RFs) are calculated for each analyte, at each standard concentration for the mass peak of interest for each analyte. The linearity (%RSD) is to be determined and compared to the method requirement. If the criterion is not met, the standard analyses must be repeated if quantitation of unknown samples is desired.

If the quantitation criteria are not met, in certain cases, the documentation of the ability to detect the minimum detectable concentration is sufficient to determine the presence or absence of target compounds with "estimated only" concentrations provided or a qualitative determination only.

The working average calibration factor or calibration curve must be verified each working day by the injection of a continuing calibration curve verification standard (CCV). The frequency of verification is detector dependent and varies from once per day to an average of once every five samples. If the response of any analyte is outside the acceptable response for the specified method, a new calibration curve must be prepared for that analyte.

Internal Standard Calibration Procedure:

For each analyte, or group of analytes, five concentration levels of standards are prepared by adding aliquots of one or more stock standards to volumetric flasks. In addition, a known and constant amount of one or more internal standards (IS) is added to each volumetric flask and they are then diluted to volume with an appropriate solvent. The lowest concentration should be at the method detection limit. The other concentrations should define the working range of the system.

Each of the calibration standards is injected into the GC system using the same technique as actual samples. A series of response factors (RFs) are calculated for each analyte, at each standard concentration for the mass peak of interest for each analyte. The linearity (%RSD) is to be determined and compared to the method requirement. If the criterion is not met, the standard analyses must be repeated if quantitation of unknown samples is desired.

The working average response factor must be verified on each working day by the analysis of continuing calibration verification (CCV) standard. The frequency of verification is method specific.

If the response of any analyte is outside the acceptable response for the specified method, a corrective action must be taken before the analysis continues.

If the quantitation criterion is not met, in certain cases, the documentation of the ability to detect the minimum detectable concentration is sufficient to determine the presence or absence of target compounds with "estimated only" concentrations provided or a qualitative determination only.

11.3 Inductively Coupled Plasma – Optical Emission Spectroscopy (ICP-OES) and ICP-Mass Spectroscopy Calibration

The ICP-OES system is calibrated daily by an external standard calibration process. The ICP-MS is calibrated daily using an external and internal standard method calibration process. The calibration specifications may vary from method to method and can be found in the particular reference or EMA SOP for that method.

Daily Standard Calibration Procedures:

For each analyte, or group of analytes, a calibration curve is generated by preparing standards from one or more stock solutions according to the method outlined in the appropriate EMA SOP. Continuing calibration standards, containing the same analyte(s) as the calibration standards are prepared in the same manner at an appropriate concentration within the calibration curve for the specified method.

Before the analysis and determination of elemental concentrations of interest can be determined, the instrument must be calibrated. This is done by creating a calibration curve from the measurement of emission for standard solutions and a blank. To ensure calibration correctness, an initial calibration verification solution (ICV) is analyzed immediately after calibration. The ICV must be prepared from a second source vendor, i.e.; source different from calibration stock standards. Continuation of calibration validation is monitored through the use of a continuing calibration verification (CCV) solution. The CCV standard is analyzed after every 10 samples. Laboratory control samples, matrix control samples, and duplicates are also used to verify calibration and method preparation techniques. Results are generally accepted if they have a percent relative deviation (%RSD) of ≤ 20 . If this criterion is not met, the sample or standard analysis must be repeated.

Results from continuing calibration standards must fall within the method specified acceptance limits. If this criterion is not met, the standard analysis must be repeated. If upon reanalysis, the standard again fails to meet this criterion, a corrective action must be taken, and the entire standardization procedure must be repeated (after source of error is indicated and resolved).

12.0 Detection and Reporting Limits

Detection levels are determined to signify the smallest amount of an analyte that can be detected in a given procedure and within a stated confidence level. These levels (limits) are defined by their purpose, ranging from levels of instrument noise, to method confidence.

12.1 Method Detection Limits

The method detection limit is the minimum concentration of a substance that can be measured with 99% confidence that the analyte concentration is greater than zero. A constituent is added to soil and water matrices to make a concentration near (within one to five times) the expected detection limit. Seven or more replicates of this sample are processed through the entire analytical method.

The MDL is determined using the standard deviation of the replicates. EMA performs Method Detection Limit Studies (MDLs) accordingly, based on each individual method criteria and for all new or modified methods. The results of all MDL studies will be reviewed by the Laboratory Director for approval before client samples are analyzed. For all analysis, the MDLs may not be higher than the regulatory limits for that parameter of interest, (taking into consideration the instrument and method limitations). MDLs must be performed for new or modified analytical methods before the analysis of client samples. All MDL data and documentation are maintained by the QA Director in the QA program files. Experimentally derived MDLs are evaluated by the QA Director and checked against method specific MDL guidelines to ensure method performance comparable to that of peer laboratories.

12.2 Instrument Detection Limits

EMA performs Instrument Detection Limit Studies (IDLs), for initial setup and verification for an analytical instrument and any time there is a major change in or maintenance of instrumentation for a particular method. A standard with a concentration near (within one to three times) the expected instrument detection limit is made. Seven aliquots of this standard is analyzed each day on three non-consecutive days and the IDL is calculated using the pooled standard deviation. The IDL is the minimum concentration of a substance that can be identified by an instrument with 99% confidence that the analyte concentration is greater than zero.

12.3 Reporting Limits

Reporting limits take into account the sample size, matrix effects, and any dilution factors. The Reporting Limit is always greater than or equal to the MDL.

Reporting Limits are evaluated by the QA Director to verify that reporting limits are greater than or equal to the experimentally determined MDL and less than or equal to project-specific reporting limit requirements.

12.4 Practical Quantitation Limits

The practical quantitation limit (PQL) is the lower limit of concentration or amount of substance that must be present before a method is considered to provide quantitative results.

13.0 Analytical Quality Control

When a referenced method contains definitive acceptance criteria and performance criteria or guidelines for QC and calibration samples, those criteria, or more stringent criteria are required by the method SOP. Data is reviewed by the analyst to SOP criteria and accepted or rejected on that basis. When QC and calibration criteria are not listed in the method, criteria from similar methods are considered technically sound for that method.

Documenting that an approach is technically sound belongs to the analyst developing a method and is reviewed for technical merit by the Laboratory Director.

13.1 Quality Control Checks

Method blanks, laboratory control samples, and matrix spikes are required for every analytical batch. Additional QC and calibration checks may be required. The corresponding frequency and performance acceptance criteria are specified in each individual method's SOP. In the absence of SOP instruction, the Laboratory Director is consulted.

The procedures used in the laboratory to ensure analytical data quality include:

Matrix Spike, Matrix Spike Duplicate, and Duplicates - are analyzed with every analytical batch or once in twenty samples, whichever is greater. Analytes stipulated by the method or applicable regulations are spiked into the matrix spike and matrix spike duplicate sample. Selection of the sample to be spiked and/or split depends on the information required and the variety of conditions within a typical sample matrix. In some situations, requirements of the site being sampled may dictate that the person sampling select a sample to be spiked and/or split based on a pre-visit evaluation or on-site inspection. This does not preclude the laboratory's spiking a sample of its own selection. In most cases, the laboratory's selection is based on the attempt to determine the extent of matrix bias or interference on the analyte recovery and sample to sample precision.

Trip Blanks - Analysis of a sealed ultrapure water sample which accompanied samples during transit, collection, and storage. The trip blank measures cumulative contamination derived from the travel blank source water, sample transit, the sample site, and the sample storage.

Field Blank - Similar to a trip blank; the field blank is opened during the sample collection process to measure the same contamination that the trip blank measures as well as the volatile airborne contaminants which may be present at the sample location that will not infiltrate the closed sample container.

Rinse Blank - Pure water which has been poured over field sampling equipment prior to sample collection to determine the possibility of equipment contamination. The rinse blank should be collected prior to use of equipment at each sampling point. It measures the possible combined contamination associated with field sampling equipment, rinse blank source water, sample transit, the sample site, and sample storage.

Source Water Blank - Analysis of the water used to prepare the rinse blanks which measure the background contaminants present in the water used for the rinse blanks.

Laboratory Water Blank - The water used to prepare trip blanks sent out by the laboratory (stored at the laboratory). They are analyzed only if the trip blank demonstrates contamination. The laboratory blank water measures contaminants derived from the laboratory pure water and laboratory sample storage facilities.

Instrument Blank - Laboratory pure water or other pure solvent analyzed at the initiation of an analytical run sequence by an instrument or between high level samples. It measures contamination

which may be present in the instrument from carry-over following the analysis of a high level sample. If contamination is present, the chemist must perform maintenance on the instrument prior to analyzing client samples.

Method Blank/Reagent Blank - Laboratory pure water that has been processed exactly the same as sample as dictated by the method procedure. It contains all of the method reagents and measures combined contamination from the laboratory pure water, the instrument, the reagents, and the sample preparation steps. This type of blank is important in distinguishing between low level field contamination and lab contamination.

Surrogates – A pure compound added to a sample in the laboratory just before processing (according to the appropriate analytical methods) which provide information on the sample extraction procedure and/or the purge efficiency. Surrogate spike recoveries should fall within the control limits set by the laboratory in accordance with the procedures specified in the method.

Laboratory Control Spike and Laboratory Control Spike Duplicate – A certified standard reference material that is spiked into a reagent blank. It is carried through all steps of sample preparation to demonstrate method performance inclusive of sample preparation steps.

Reference Standards/Reference Samples - Purchased reference standards and matrix standards are used routinely to evaluate method/analyst performance. These standards are purchased from reputable sources with certified true values.

Calibration Blanks - A standard prepared in the same manner as other standards except that it contains no analyte. Calibration blanks are used to verify a calibration curve at a low concentration.

Calibration Verification Samples – A standard used to determine the state of calibration of an instrument between periodic calibrations, or after every 10 samples of analysis, depending on method.

Internal Standards - An element or compound that is not an analyte which is added to a prepared sample and is used to quantitate analytes.

Post Digestion Spikes - Post digestion spikes are performed when a new matrix is analyzed. An analyte of interest is spiked into a sample after digestion and analyte recoveries are determined based on the analyte concentration observed.

Interference Check Samples - One or more standards with high concentrations of interfering analytes are analyzed to check compensation for interferences.

Method of Standard Additions - A sample is analyzed and then an aliquot is spiked with the analyte of interest and re-analyzed. The original sample concentration is derived based on the recovery of the standard addition sample. This practice allows for compensation for some matrix effects.

Instrument Adjustment - Requirements and procedures are instrument and method specific. Analytical instrumentation is tuned and aligned in accordance with requirements which are specific to the instrumentation procedures employed. Additionally, EMA has service contracts with instrument manufacturers. All adjustments are documented in the instrument logbook.

Calibration - Performed in accordance with the manufacturers' requirements and the procedures specified in the applicable method. All calibration procedures are documented.

Gases – Only ultra-high purity gases, filtered on line through a 5-micron molecular sieve are used. All carrier gases also flow through an oxygen removal system and a hydrocarbon trap.

Analytical batches - A unique analytical batch number is assigned to each and every set of samples and their corresponding QC Checks. These batch numbers are created by the individual chemist or technician according to standard operating procedures and are documented in notebooks. The QC requirements and number of samples composing an analytical batch vary for each method and are specified in the individual method SOP. An analytical batch consists of a group of samples with similar matrices, which are analyzed together with the same preparation sequence and the same lots of reagents. They are prepared and analyzed within the same time period or in continuous sequential time periods. An analytical batch consists of no more than 20 samples.

Certified Reference Materials – When project requirements call for analysis of certified reference materials (CRMs), applicable CRMs are purchased through the National Institute for Standards & Technology (NIST) or other applicable vendor.

13.2 Control Chart Monitoring

Control charts are used to monitor real-time and long term assessment of data quality. Control charts for each analyte of control are prepared for both water and soil matrices. For organic analyses, the analytes which are charted are those analytes required to be present in the spiking solution based upon the current SW-846 methodology.

Each control chart consists of a center line, an upper and lower warning limit, and an upper and lower control limit. For each chart, a minimum of 20 points is included. Control charts are updated periodically to ensure quality control of analytical methods.

- The center line of the control chart is the mean of the time ordered points.
- The upper/lower control limit is defined as the mean plus/minus 3 times the standard deviation of the points.
- The upper/lower warning limits are defined as the mean plus/minus 2 times the standard deviation of the mean.

A laboratory method will be considered out of statistical control when the following are observed from the control charts:

- Any one point is outside the control limits.

- Any three consecutive points are outside the warning limits.
- Any eight consecutive points are on the same side of the centerline.
- Any six consecutive points are such that each point is larger or smaller than its immediate predecessor
- Any obvious cyclic pattern is seen in the points.

The Laboratory and Quality Assurance Directors generate the control charts using the EMA LIMS system. Out-of-control events will illicit the response of direct notification to the appropriate departmental supervisor whereby an investigation will occur. If it is determined to be an out-of-control event, and not a possible random error, corrective actions such as instrument recalibration and sample reanalysis will be taken. Corrective actions are determined on a case-by-case incidence. All corrective actions shall be documented and maintained in the QA program files.

14.0 Project Documentation

Guidelines set forth by the EPA and other regulatory bodies maintain that a comprehensive set of documentation pertaining to each sample must be thorough and complete. At EMA, Inc. our clients are ensured that all pertinent information, including project parameters scripted by the client, are included in our records for traceability and comparative reasons.

14.1 Recording Raw Data

Laboratory data can be generated in the following ways: instrument generation of electronic data files, local generation of data using instrument software and in-house spreadsheets, and manual recording of observed measurements. Reporting forms are completed by the individual analyst. Raw data is maintained in completed notebooks or data packages. Reduced raw data will be checked for error by peer review, Senior Chemists/Supervisors, and the Laboratory Director and subject to spot checks during internal audits by the QA Director.

14.2 Project Documentation Storage

There are two document categories associated with a project. The first is the project file. This file contains the following documents:

- Contracts, purchase orders, task orders, and other work authorization
- Correspondence and documentation of telephone conversations
- Project Plans and Project QA Plans (if provided)
- Project specific Statements of Work (SOWs), (if applicable)
- Project related internal laboratory correspondence

This file is under the custody of the Project Manager/Q.A. Director and available to all whom may need to retrieve the information. A majority of the information is stored in the EMA LIMS system for direct access.

The second category of document storage pertains to the analytical data gathered for the specific project. The files maintained for this sort of information include a copy of the final project report/QC report, copies of any bench sheets and raw data, as well as references to the file location of the original raw data. These files are kept throughout the lab and are under the custody of all those involved in the data process. The files will be stored in an accessible format for 5 years.

14.3 Communication of Project Requirements

Upon receipt of samples, the Sample Control Technician notes any project-specific requirements on the chain-of-custody and verbally notifies chemists and technicians of any requirements that differ from “standard” methods. These requirements are also documented on the daily in-house aging report issued to all personnel.

When project managers receive notice of changes to project requirements during the course of work, they communicate these changes verbally to the affected chemists or technicians and in a written communication log which is attached to the project documents. They also notify the Sample Control Technician, who documents the changes on the daily in-house aging report issued to all personnel.

15.0 Data Reduction, Validation and Reporting

Data reduction includes all processes that change either the form of expression (i.e.: units) or the quantity of the data values (rounding). Data reduction often involves statistical and mathematical analysis of data and usually results in a reduced subset of the original data set (i.e.: an average of three data points). Wherever employed, mathematical procedures will be verified for accuracy of computation.

All data are generated and reduced in accordance with the method SOPs. The data can be reduced by:

1. Manual computation directly found on an instrument/analysis logbook page or data sheet or
2. Computer processing of raw data via direct instrument linkage or manual entry.

The analyst who generates the data is directly responsible for ensuring that the computations are correct and complete and that all data reduction is documented appropriately for subsequent data review and validation. Any additional equations used in the data reduction process are required to be evident in the documentation. The computations are reviewed on a regular basis for accuracy by the Laboratory Director.

The analyst is responsible for verifying that the data reduction is correct for the project, sample numbers, calibration RFs and/or correlation coefficients, units, detection limits, dilution factors, volumes/weights used and moisture correction (when applicable).

15.1 Laboratory Data

All sample preparation activities are documented by the chemist or technician performing the work in laboratory notebooks or laboratory worksheets. These serve as the primary record for subsequent data reduction.

Laboratory data is generated in the following ways: instrument generation of electronic data files, local generation of data using instrument software and in-house spreadsheets, manual recording of observed measurements. Consistent data collection is achieved through the existence and use of SOPs.

Outputs from all instruments are monitored for readability and consistency. If clarity is less than desired, corrective actions are undertaken to rectify the output based on instrument manufacturers' recommendations.

Laboratory forms, data sheets, logbooks, and reporting forms have a standard format to ensure that all pertinent information is recorded consistently. These forms are generated by the QA Director and are regularly monitored to ensure compliance with established requirements.

Analysts have control over and access to all data they have generated. Limited access policies, including password codes for computer generated data access, maintain security of data.

Data are checked for accuracy and precision by the chemist, the QA Director, and the Laboratory Director. The validity of data shall be supported by the maintenance and inspection of the following records:

- Description of calibration
- Documentation of traceability of standards
- Documentation of analytical methodologies (SOPs) and QC Methodology
- Method blank results to check for contamination and interference
- Laboratory Control Sample results will be inspected as to whether they fall inside the acceptable control limits.

15.2 Laboratory Data Validation and Reporting

Data validation is the systematic process of data evaluation for acceptance or rejection based upon a set of criteria. It is a systematic procedure of reviewing a body of data against a set of criteria to provide assurance of validity prior to its intended use.

Chemistry data validation is performed by the Chemist, Departmental Supervisor, the Laboratory Director, and the QA Director. Validation is accomplished through routine audits of the data collection and flow procedures and by monitoring of QC sample results.

Data validation includes dated and signed entries by chemists on the worksheets and laboratory notebooks used for all samples; the use of sample tracking and numbering systems to track the

progress of the sample in the laboratory; and the use of quality control criteria to reject or accept specific data.

The raw data is compared with the report forms for agreement. The raw data and/or report forms are compared to the final LIMS generated report for agreement. This review is the final assessment of completeness and accuracy of the data. If there is a discrepancy of any type, the standard procedure for verification and confirmation is followed.

If raw data does not agree with the forms, the cause will be determined, the source of the problem will be corrected, and all incorrect data from the point of error will be corrected. A corrective action form will be completed to indicate the corrective action for the results and/or laboratory samples affected. Audit trails are maintained for data changes through analytical batch preparation records.

After all appropriate changes are made; another review of the data in question is performed. This will ensure that forms and raw data agree.

15.3 Data Collection and Flow Audits

Data collection and flow audits are performed routinely and include:

- Review of sample documents for completeness
- Daily review of test results
- Daily review of performance indicators and QC sample results
- Random calculation checks
- Review of all reports prior to and subsequent to data entry
- Review and approval of final report by Laboratory Director

15.4 Data Review

Data review is performed prior to release of the data to the client. It is performed as soon as possible after data acquisition in order to provide sufficient time for corrective action if required.

In the data review process, the data undergo a minimum of two separate reviews. The data are compared to information such as the expected characteristics of the sample, the sample preparation steps, and QC sample data to evaluate the validity of the results.

Corrective action is minimized through the development and implementation of routine internal system controls. Chemists are provided with specific criteria that must be met for each procedure, operation, or measurement system.

In order to prevent transcription errors, all stages of data deliverable preparation are subject to audit, peer review, and supervisory review.

Supporting material, such as chromatograms are compiled by the analyst and incorporated into the data deliverables by the data processor.

The final deliverable is reviewed for transcription and typographical errors by the Laboratory Director prior to release to the client.

15.5 Documentation

Upon completion of the project or job task, the final report will be compiled and includes a brief narrative discussion of the analyses, the analytical results, and the QC results. The final report is reviewed and approved by both the QA Director and the Laboratory Director.

A documentation control system assures that all documents for a given project are accountable and traceable. It includes chain-of-custody records, all logbooks, graphs, raw data, and other miscellaneous items.

15.6 Recordkeeping

Documentation in the laboratory is initiated by the Sample Control Technician who receives samples, assigns laboratory numbers and maintains laboratory custody logbooks which document sample movement in the laboratory.

Samples are processed together in a batch by the analysts. A batch consists of a number of samples carried through the entire analytical procedure, along with QC samples and blanks. All work performed on a sample batch is documented in laboratory logbooks which are described as follows:

Sample Receiving Logbook

This logbook lists samples as they are received into the laboratory and assigned unique sample identification numbers. This number corresponds to the LIMS generated numbering system.

Instrument Maintenance Logbook

A unique logbook is maintained for each system and used to record the maintenance and upkeep of analytical instruments.

Standards Logbook

Used for tracing all laboratory prepared or purchased standards back to certified standards or stock solutions. All standards are entered into the EMA LIMS from the vendor certified standard sheets. It indicates standard traceability. Documented in this logbook are all activities associated with the standard preparation process.

Data Notebook or Bench sheets

This is used to document all activities associated with the analytical process and recording raw data of every batch.

In some instances, analytical data recording and standards preparation may be included in a single notebook.

15.7 Rules Governing the Use of Logbooks

1. Bound notebooks with pre-numbered pages are preferred record-keeping forms. Loose sheets, if used, are ultimately secured in notebooks.
2. All writing must be legible and in ink. All numbers are clear. Corrections are made by drawing one line through the incorrect entry, entering the correct information, initialing, and dating the entry.
3. Complete information should be entered so that in an examination, it can be determined what was done, when and what the results were.
4. If any data are determined to be invalid, reasons are indicated.
5. All relevant information is included (i.e.: the manufacturer and lot number of a chemical, the specific procedure reference, etc.)
6. When work is continued in another notebook or logbook, the number of the first notebook is written in the first page of the new notebook and vice-versa for easy reference.

15.8 Document Control

Document control is accomplished through the use of a centralized location of document inventories. Records, including raw data, supporting documentation, and electronic media are retained for a minimum of 5 years. After on-site storage for one full year, records may be transferred to a secured off-site storage facility. The QA Director maintains control of laboratory generated documents.

The EMA document control system, under the control of the QA Director, ensures that methods and procedures are followed in a consistent manner.

The document control system provides for the following:

- Managerial review and approval of documents prior to issue;
- A unique document control number for each document including the QA Program
- Manual and SOPs;
- A central location for all documents;
- A systematic method for distribution of all documents;
- A tracking system for existing documents;
- Identification of document revisions;
- A mechanism for periodic review of documents;
- Cataloging and archival of outdated materials in secured storage;
- Retrieval of raw data by authorized personnel only;
- A focal point for information exchange;
- Establishment of standardized methods and procedures;
- Scheduled review and revision of documents, including QA program documents.
- Internal systems audits confirm use of current SOPs
- All quality assurance program documents are revised by the QA Director; and,
- Current revisions of documents replace older versions.

15.9 Standard Operating Procedures

The laboratory maintains SOPs for each methodology or procedure used. SOPs are updated frequently for any revisions made. Changes in documents reflect actual procedures being followed. Before any revision is made, documents are submitted to the Quality Assurance Director for approval of the proposed revision. Minor changes are those which do not affect the content or quality of the action being prescribed in the document.

An addendum, subject to review and approval by the Quality Assurance Director, may be attached to a document to reflect policy and procedural changes which become effective between revisions. These changes are then incorporated into the body of the document at the time of the next revision.

15.10 Verification of Software

All computer software used to acquire, process, or report data shall be verified upon initial use and re-verified after any modification. Manual calculations are performed to verify all computer calculations for at least one sample from every analytical batch.

Limited access policies for software and data maintain security and integrity of these systems.

EMA currently uses local and instrument software, and the Element Datasystem Laboratory Information Management Systems (LIMs). Data is backed up on a daily basis and the data storage tape removed off site daily. Additional software quality assurance requirements will be added as deemed necessary.

16.0 Quality Assurance Project Plans

Project specific Quality Assurance Project Plans (QAPjPs) may be developed to meet contract and agency requirements on a project specific basis. These plans discuss specific terms, policies, objectives and QA activities to achieve the data quality objectives of the project.

QA Project Plans are generally written in accordance with the US EPA Document Guidelines and Specifications for Preparing Quality Assurance Project Plans.

The QAPjPs follow the format listed below as applicable (additional information is added, if required):

Section	
	Title Page
1.0	Table of Contents
2.0	Approval Signatory Page
3.0	Introduction
3.1	Project Description
3.2	Background
3.3	Definition of Terms
3.4	Purpose

- 3.5 Scope
- 4.0 Project Organization and Responsibilities
- 5.0 QA Objectives for Measurement Data, in terms of precision, accuracy, completeness, comparability and representativeness
- 6.0 Sampling Requirements
- 7.0 Sample Custody
- 8.0 Calibration Procedures and References
- 9.0 Analytical Procedures
- 10.0 Data Analysis, Validation, and Reporting
- 11.0 Quality Control
 - 11.1 Internal QC Checks
 - 11.2 Performance and System Audits
 - 11.3 Preventative Maintenance Procedures and Schedules
- 12.0 Data Quality Assessment
- 13.0 Corrective Action
- 14.0 QA Reports to Management

17.0 Performance and System Audits

The laboratory is subject to both internal and external audits, in order to monitor the capability and performance of the total measurement systems.

Performance and systems audits are conducted semi-annually by the QA Director and encompass all activities of the laboratory, to assess compliance with established methods, policies and procedures. These audits are both scheduled and unscheduled.

An audit is defined as a systematic check to determine the quality of the laboratory operation and activities. The following are definitions of audit types:

Performance Audit - determines the accuracy of the total measurement system, or portions. Test samples are analyzed and results evaluated.

System Audit - an evaluation of all components of the lab's measurement systems to determine their proper selection and use, including QC procedures.

A copy of audit findings and any proficiency test results obtained are submitted to the EMA President and Laboratory Director in monthly quality assurance reports.

17.1 Performance Audit

A performance audit involves analysis of reference samples of concentrations unknown to laboratory personnel to evaluate analyst/method performance. Reference standards or matrix standards are purchased from reputable suppliers (Environmental Resource Associates and USEPA) or prepared using traceable standards and submitted to the laboratory by the QA Director. The true values or reference values are available only to the QA Director.

Internal performance audits are accomplished by the laboratory through the use of blind check samples (when available), replicate measurement evaluations, and individual proficiency test samples. Results are compared to "true" values and evaluated for accuracy and/or precision. Records are maintained by the QA Director.

EMA is a participant in the EPA Water Pollution (WP), Water Supply (WS) and Soil Proficiency programs. Performance evaluation check samples are analyzed on an annual basis and are submitted to the California Department of Health Service, Environmental Laboratory Accreditation Program and EPA Region 9 for compliance under the State Certification. Please refer to Appendix H for a copy of our external certification.

17.2 Systems Audit

The laboratory systems audit is designed to verify that all QA/QC practices are being followed and that all procedures and protocols are fully understood and upheld by laboratory personnel. It also is used to find problems which may have entered the system or for which the QA/QC program is insufficient. General audit checklists which apply to all lab areas and procedures have been developed, and are used for documenting audit and surveillance findings.

Audits ensure that laboratory quality control criteria are adhered to and proper corrective action is implemented, when required. All inquiries relative to data quality issues are reviewed and any corrective actions identified.

Additional audits performed by various regulatory agencies will be conducted periodically.

System audits are performed to provide an objective evaluation of compliance with established requirements, methods, and procedures. Audits also determine the adequacy of the QA program. Re-audits verify efficacy of corrective actions.

The audits include an evaluation of the work areas, activities, processes, review of documents and records, storage of standards and reagents, housekeeping, good laboratory practice, analytical procedures, and quality control.

The auditor uses a prepared audit checklist, documents the audit in writing, and signs the audit report. The audit report contains sufficient information to stand alone as a document.

Any deficiencies noted during the audit are discussed with the audited department within 5 days of the audit. All corrective actions are taken and a formal response submitted to the auditor following receipt of the audit report. The auditor re-audits the area to determine that the corrective action was implemented and the deficiency corrected.

System audits include an evaluation of the following:

1. Assessment of compliance with the QA Program
2. Verification of and adherence to written procedures

3. Data storage and record keeping
4. Analytical data review and validation procedures

17.3 External Audits

An on-site audit is performed every two years by the California Department of Health Service, Environmental Laboratory Accreditation Program to verify the laboratory has all equipment, documentation, personnel, and standard operation procedures needed for performance of EPA requirements. Other agencies with which EMA has contracts may perform site audits.

17.4 Subcontracted Services Audits

EMA occasionally sends selected analyses to a subcontract laboratory. The most common reason for utilization of a subcontractor facility is that the procedure is not routinely performed by EMA. Subcontracting of analyses is not conducted without client approval.

All subcontract laboratories utilized by EMA on a continuing basis are overseen by EMA Project Managers and require approval of the QA Director prior to use. The subcontractor and EMA agree on the specific quality control, analytical requirements, and acceptance limits to be performed prior to use.

Subcontract laboratories may receive an on-site systems audit by a representative of EMA' staff or be subjected to double-blind performance evaluations.

All data produced by another laboratory is identified.

18.0 Instrument Maintenance Procedures

Preventative maintenance is the program of defensive actions for averting failure of equipment and ensuring optimal performance of instrumentation. These actions may include specification checks, lubrication, cleaning, reconditioning, adjusting, etc.

A preventative maintenance program for the instrumentation ensures fewer interruptions of analyses, personnel efficiency, and lower repair costs. It eliminates premature replacement of parts, and reduces discrepancy among test results.

All EMA laboratory employees using the instrumentation are fully trained; having developed troubleshooting skills that enable them to recognize problems, their causes and appropriate corrective actions, quickly and accurately to reduce equipment failure. Service contracts are maintained for several pieces of equipment to guarantee expedient service and reduce analytical down-time.

Instrument maintenance is deemed necessary when an instrument is inoperable, is not performing acceptably or as expected, or a change in the performance characteristics of the instrument is noted.

EMA maintains maintenance logs and several service contracts for all major instrumentation. Major maintenance and repair of instrumentation is only performed by qualified analysts and manufacturer recommended service representatives.

Following major instrument maintenance and repair activities, a return to analytical control must be demonstrated and documented through performance according to typical QA/QC requirements.

Written equipment maintenance records are kept to document all maintenance and repair activities. Instrument performance criteria are established to determine the need to make adjustments to the instrument operating conditions.

The following are examples of general measures that are performed throughout the laboratory as a part of the preventative maintenance program.

GC/MS Systems

- Injection port liners and gold seals are replaced daily or as deemed necessary.
- Two to three inches of the front of the pre columns or capillary columns are removed as deemed necessary.
- Septa are inspected and replaced (if necessary) before each batch sequence.
- Ion source is cleaned as required.
- Mass Spectrometers are tuned every 12 hours of use.
- Compressed gas cylinders are checked daily.
- Autosampler wash bottles are changed at the beginning of each sequence.
- Gas filters on carrier lines are checked weekly.

GC Systems

- Septa are replaced before starting a new sequence run.
- Compressed gas cylinders are checked daily.
- Solvent blank is injected before starting a new sequence run to demonstrate the system is free of interfering artifacts.
- Flows are checked before starting sequence.
- Autosampler wash bottles are changed at the beginning of each new sequence run.
- Gas filters on carrier lines are checked weekly.

ICP and ICP-MS

- Nebulizer and spray chamber are cleaned as needed.
- Torch, sample cones, center tubes and other consumables are cleaned on a regular basis.
- Tubing is replaced daily or every other day depending on use.
- Filters for the ICP-OES are cleaned weekly.
- Waste containers are disposed of in the proper waste receptacle weekly.
- Lenses are cleaned as deemed necessary.

pH Meters

- Gel-type electrodes are inspected prior to use and cleaned with Alconox-type soap solution to remove oily residues.
- Meter is calibrated daily before use using a two point calibration and verifying with a third point for the slope check. If calibration or slope has deteriorated, the electrode is cleaned and treated with 1N HCL, then recalibrated.
- pH electrodes are stored in fresh pH 7.0 buffer solution when not in use.

Analytical Balances

- All balance surfaces are cleaned daily and covered when not in use.
- Analytical balances are calibrated and cleaned annually by manufacturer's representatives.
- Labels are attached to each balance indicating date of last calibration.
- The accuracy of each balance is checked against "S" Class weights prior to use.

Autoclave

- All interior and exterior surfaces are cleaned daily.
- Sterilization temperatures are monitored to be in control for every sterilization task.

Incubators and Water-baths

- All interior and exterior surfaces are cleaned daily.
- Incubator and water-bath temperatures are monitored two times per day at least four hours apart for temperature control.

19.0 Procedures for Assessing Precision, Accuracy and Completeness

Definitions according to *Standard Methods For The Examination of Water and Wasterwater 20th Ed.*:

Precision: Measure of the degree of agreement among replicate analyses of a sample, usually expressed as the standard deviation.

Accuracy: Combination of bias and precision of an analytical procedure, which reflects the closeness of a measured value to a true value.

Bias: Consistent deviation of measured values from the true value, caused by systematic errors in a procedure.

19.1 Precision

Reproducibility among duplicate samples provides a determination of precision in analytical testing. Precision is determined by splitting actual samples which cover a wide range of concentrations and a variety of commonly encountered interfering materials.

Duplicates and Duplicate Matrix Spiked Samples are run at a frequency of every 10 to every 20 samples analyzed as specified in the particular method or SOP. Acceptable RPD (relative percent difference) results are <20% or <30% depending upon the sample matrix type analyzed and specific analysis performed.

Duplicate

A duplicate is a regular sample which is split and carried through the entire sample preparation and analysis procedure with the sample set. Duplicate results provide information regarding the sample matrix effects, and the method efficiency. Duplicate samples are run at a frequency of one for every 20 samples analyzed, or at a minimum of one per analyzed batch and matrix, whichever is greater.

Matrix Spike

A matrix spike is a regular sample that is split into three sub-samples and two of the replicates are spiked with analyte solution at the same concentration. The two spiked replicates are defined as the matrix spike and the matrix spike duplicate. The matrix spike and the matrix spike duplicate samples are carried through the sample preparation and analysis procedure with the sample set. Matrix spikes are run at a frequency of every 10 to 20 samples analyzed, or at a minimum of once per analyzed batch and matrix, whichever is greater. The matrix spike and matrix spike duplicate results provide information regarding the precision of the matrix spike and matrix spike duplicate, the sample matrix effects, and the method efficiency.

The difference between the matrix spike and the matrix spike duplicate are reported as RPD as calculated below.

$$RPD = \frac{MS - MSD}{\frac{(MS + MSD)}{2}} \times 100$$

RPD = relative percent difference

MS = Matrix Spike Result

MSD = Matrix Spike Duplicate Result

19.2 Accuracy

Accuracy is the degree of difference between observed and actual (known) values. Accuracy is determined by analyzing reference samples. Acceptable percent recoveries for matrix spikes are based upon statistical control limits. Control limits are equal to or narrower than the EPA published control limit ranges for each method.

Percent recovery calculations are determined through the following equation:

$$\% \text{ Recovery} = \frac{(C_o - C_s) \times 100}{C}$$

C_o = Concentration observed in analysis

C = True value of standard

Cs = Concentration observed in unspiked sample

Spike data can be indicative of matrix bias or interference on analyte recovery as well as sample preparation procedure performance. A spiked sample is a regular sample to which a known concentration of analyte is introduced. The sample is then carried through the entire workup or extraction and analysis procedure with the other samples in the sample set. The spike is reported as percent recovery.

20.0 Corrective Actions

The purpose of a formal corrective action process is to identify areas that require improvement and to ensure that long term corrective action is put in place to resolve the problem in a permanent manner.

Corrective actions are required any time project or method requirements are not met or as a result of audit deficiency findings. The laboratory Director and QA Director are notified immediately and the approach and time frame of the corrective action is discussed. The out-of-control situation is documented and the client is notified.

Whenever possible, a long term resolution to the occurrence is desirable. In some instances involving unusual circumstances, a long term corrective action may not be appropriate. This process is designed to handle both types of occurrences and to document the action that was taken. A fundamental goal of the corrective action process is to foster continual improvement in laboratory operations. Corrective actions are monitored to make certain that similar problems do not recur.

Daily quality control procedures are designed to identify the need for corrective action. Most corrective actions are performed by the chemists doing the analysis, and are usually as simple as re-calibrating an instrument should the instrument check sample or CCV fall outside it's acceptable range, or resulting because of a power failure. Most corrective actions are described in methods, standard operating procedures, and instrument manuals.

Corrective actions may also be initiated as a result of various quality assurance activities, including:

- Performance audits
- System audits
- Performance evaluation or check sample studies
- Program audits, and
- Review of raw data

Standard operating procedures for corrective actions are to:

- Define the problem
- Determine the cause(s) of the problem
- Determine possible solutions to the problem
- Implement corrective action

- Verify that the corrective action is effective, and
- Document the corrective action and its effectiveness

All employees must immediately bring to their supervisor's attention any problem or practice which they feel may affect data quality. If control parameters are outside acceptability criteria analysis must cease immediately and all affected samples must be reanalyzed when the system is corrected.

The need for corrective action may result from:

- Instrument malfunction
- Failure of internal QA/QC checks
- Failure to follow-up on performance or system audit findings
- And non-compliance with QA requirements

Corrective actions taken depend on the type of analyses and the extent of the error and are discussed with the Laboratory Supervisor and/or Laboratory Director. If the problem is indeterminate and cannot be controlled, the laboratory evaluates its impact on the data.

The QA Director and Laboratory Director shall determine that corrective actions proposed and agreed upon are actually implemented and successful. When corrective actions are implemented, evidence of their success shall be documented. Corrective action documents are to be signed and dated by the Chemist, and the Laboratory Director.

All corrective action documents are reviewed and maintained by the QA Director in the QA program files.

20.1 Client Concerns

The corrective action procedure is used to handle routine client inquiries concerning data reports. In some cases, an investigation regarding the concern may indicate that no problem was found. In other situations, the investigation may reveal a problem and the corrective action to prevent that occurrence in the future will be required.

The corrective action process involves the following actions:

- Client concerns are addressed accurately and in a timely fashion.
- The concern is properly identified and documented.
- Responsibility for investigation is assigned.
- The cause of the problem is investigated and determined.
- The appropriate long-term corrective action is determined and implemented.
- The complete corrective action process is documented.

If a new data report needs to be issued as a result of the investigation, the Laboratory Director is responsible for issuance of the revised report. All revised data are marked as such.

20.2 Criteria Used for Determining an Out-of-Control Event

Factors that affect data quality require investigation and corrective actions. All out-of-control events are investigated to determine whether the condition indicates a procedure that is truly out-of-control, or a possible random error. Any corrective actions taken are to be documented, whether the analytical batch is repeated or the data was reviewed and released to the client (included in the documentation is the rationale behind this decision).

20.3 Procedures for Stopping Analysis

Whenever an analytical system is out-of-control, investigative-corrective action is initiated. Once corrective actions have been implemented, samples may be reanalyzed. If a sample batch reanalysis is out-of-control following corrective actions, all analytical work for the method will cease immediately. A detailed investigation shall be conducted to identify the source of the problem. Sample security, integrity of standards, glassware preparation, reagents, notebooks, instrument performance, and method adherence shall be included in this investigation.

All actions taken will be documented.

21.0 Timeliness of Data Reports

EMA recognizes the timeliness of data reports is assessed as an important part of the quality of our services from the client's perspective. High quality data when received several weeks late is not acceptable. In recognition of this, EMA tracks all projects from the time they are received to the report completion and mailing (or facsimile transmission) of results. EMA's tracking procedure is designed to monitor and maintain on-time report generation.

All staff queries for their respective analyses a daily basis. Project Managers track the status of all samples as they are processed from the moment they are received through the final delivery of the report. Weekly status meetings are held to assess the status of samples processed in the laboratory. When problems arise, clients are notified well in advance.

EMA monitors our success in the timely delivery of reports to clients on a monthly basis. The date clients are promised delivery is compared to the date actually mailed or faxed to the client. This monitoring serves to identify service trends, helps to maintain timeliness, and ensures that corrective action will be taken before problems occur.

22.0 Quality Assurance Reports to Management

The QA Director completes monthly reports issued to the President and Laboratory Director of EMA regarding quality activities of the laboratory.

- A typical report includes such information as:
- Proposed revisions in the QA program;
- Performance evaluation results;
- Systems audit results;

- Changes in certification status;
- Significant QA concerns and recommendations for resolution; and,
- Accomplishments since previous report.

Copies of quality assurance reports are maintained by the QA Director in the quality assurance program files.

23.0 Quality Assurance Program Revisions

Revisions to the EMA Quality Assurance Program Manual can be made upon written approval of the Laboratory Director and the QA Director. Program revisions are to be presented to the Laboratory staff for implementation immediately following approval. Client-requested QC procedures may be incorporated on a project basis provided the procedures are not in opposition to the objectives of quality assurance and the EMA Quality Assurance Program. Revisions must be documented and kept on file for review.

Appendix A

Sampling Guidelines

General Wet Chemistry Analyses

ANALYSIS/TEST	SPECIFIC METHOD	CONTAINER Water; Soil	PRESERVATIVE	TEMPERATURE	MINIMUM SAMPLE REQUIRED Water; Soil	HOLDING TIME
Alkalinity	SMEWW 2320 B	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	100 ml; 25 g	14 days
Ammonia	SMEWW 4500-NH3 B,C	250 ml poly; 4 oz. glass jar	H₂SO₄ to pH < 2	0 - 6°C	50 ml; 5 g	28 days
* BOD	SMEWW 5210 A-B	1 L poly	UNPRESERVED	0 - 6°C	1 L	48 hr
Bicarbonate	SMEWW 2320 B	250 ml poly	UNPRESERVED	0 - 6°C	100 ml	14 days
Carbonate	SMEWW 2320 B	250 ml poly; 8 oz. glass jar	UNPRESERVED	0 - 6°C	100 ml; 25 g	14 days
Chloride	SMEWW 4500 Cl- C,D	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	50 ml; 50 g	28 days
* Chlorine, Residual	SMEWW 4500 Cl- G	125 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	100 ml; 25 g	15 minutes
COD	EPA 410.4, HACH 8000	125 ml poly; 4 oz. glass jar	H₂SO₄ to pH < 2	0 - 6°C	25 ml; 5 g	28 days
* Coliform (Total+Fecal)	SMEWW 9221 B, E	100 ml poly-bacti	Sodium Thiosulfate	0 - 6°C	100 ml	6 hrs**/24hrs**
* Coliform (Total+E. Coli) by Colilert	SMEWW 9223, Colilert®	100 ml poly-bacti	Sodium Thiosulfate	0 - 6°C	100 ml	6 hrs**/24hrs**
Conductivity (E.C.)	EPA 120.1, SMEWW 2510 B	125 ml poly	UNPRESERVED	0 - 6°C	25 ml	28 days
Cyanide (liquid)	EPA 9014, SMEWW 4500 CN C	500 ml poly	NaOH to pH > 12	0 - 6°C	250 ml	14 days
Cyanide (solid)	EPA 9014	4 oz. glass jar	UNPRESERVED	0 - 6°C	25 g	14 days
Fecal Streptococcus & Enterococcus Groups	SMEWW 9230, Enterolert®	100 ml poly	Sodium Thiosulfate	0 - 6°C	100 ml	6 hrs**/24hrs**
Flashpoint	EPA 1010, 1030	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	100 ml; 100 g	none
Fluoride	EPA 9214, SMEWW 4500 F C	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	100 ml; 25 g	28 days
* Heterotrophic Plate Count	SMEWW 9215 B	100 ml poly	Sodium Thiosulfate	0 - 6°C	100 ml	6 hrs**/24hrs**
* Hexavalent Chrome (Cr+6)	EPA 3060, EPA 7196 A, SMEWW 3500 Cr D	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	50 ml; 10 g	24 hr
* MBAS (Surfactants)	SMEWW 5540 C	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	200 ml; 10 g	48 hr
* Nitrate	SMEWW 4500 NO3 E	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	100 ml; 100 g	48 hr
* Nitrite	SMEWW 4500 NO2 B	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	100 ml; 100 g	48 hr
Nitrogen; TKN	SMEWW 4500 N C	250 ml poly; 4 oz. glass jar	H₂SO₄ to pH < 2	0 - 6°C	50 ml; 10 g	28 days
pH	EPA 9045 C, SMEWW 4500 H+ B	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	25 ml; 10 g	15 minutes
Phenols, Total	EPA 420.1, 9065	250 ml Amber; 4 oz. glass jar	H₂SO₄ to pH < 2	0 - 6°C	250 ml; 50 g	28 days
* Phosphate, Ortho	SMEWW 4500 P E; HACH 8048	125 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	50 ml; 10 g	15 minutes
Phosphorus, Total	SMEWW 4500 P E; HACH8190	125 ml poly; 4 oz. glass jar	H₂SO₄ to pH < 2	0 - 6°C	50 ml; 5 g	28 days
* Solids, Settleable (SS)	SMEWW 2540 F	1 L poly	UNPRESERVED	0 - 6°C	1 liter	48 hr
Solids, Total Dissolved (TDS)	SMEWW 2540 C	250 ml poly	UNPRESERVED	0 - 6°C	100 ml	7 days
Solids, Total Suspended (TSS)	SMEWW 2540 D	250 ml poly	UNPRESERVED	0 - 6°C	100 ml	7 days
Solids, Total	SMEWW 2540 B	250 ml poly	UNPRESERVED	0 - 6°C	100 ml	7 days
Sulfate	SMEWW 4500 SO4 E	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	100 ml; 25 g	28 days
Sulfide, Total	EPA 9034, SMEWW 4500 S D	250 ml poly; 4 oz. glass jar	NaOH/Zn Acetate	0 - 6°C	50 ml; 5 g	7 days
Sulfide, Dissolved	SMEWW 4500 S D	250 ml poly; 4 oz. glass jar	UNPRESERVED	0 - 6°C	50 ml; 5 g	7 days
Total Organic Carbon (TOC)	EPA 9060, SMEWW 5310 B	125 ml Amber; 4 oz. glass jar	H₂SO₄ to pH < 2	0 - 6°C	50 ml; 10 g	28 days
* Turbidity	SMEWW 2130 B	250 ml poly	UNPRESERVED	0 - 6°C	50 ml	48 hr
Total Volatile Solids (TVS or VSS)	SMEWW 2540 E	250 ml poly	UNPRESERVED	0 - 6°C	100 ml	28 days

g-gram ml-milliliter

* These analyses have short holding times. Please coordinate delivery time for these analyses.

** Recommended holding times for coliforms are 6 hours. Between 6 - 24 hours holding results become questionable. After 24 hours holding, results are considered unacceptable.

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Organic Analyses

ANALYSIS/TEST	SPECIFIC METHOD(S)	CONTAINER Water; Soil	PRESERVATIVE	TEMPERATURE	MINIMUM SAMPLE REQUIRED Water; Soil	HOLDING TIME Water ¹ ; Soil
Oil & Grease	EPA 1664A	1 L amber 500 ml amber; 4 oz. glass jar	HCl to pH < 2	0 - 6°C	1 L	28 days
Oil & Grease	EPA 413.2	500 ml amber; 4 oz. glass jar	H ₂ SO ₄ to pH < 2 for liquids	0 - 6°C	500 ml; 50 g	28 days
TRPH	EPA 418.1	500 ml amber; 4 oz. glass jar	H ₂ SO ₄ to pH < 2 for liquids	0 - 6°C	500 ml; 5 g	28 days
Purgeable Halocarbons (Chlorinated Solvents)	EPA 601, EPA 8021 B	(2) 40 ml VOA Vial; 4 oz. glass jar	HCl to pH < 2 for liquids	0 - 6°C	40 ml; 40 g	14 days
Aromatic Volatile Organics	EPA 602, EPA 8021 B	(2) 40 ml VOA Vial; 4 oz. glass jar	HCl to pH < 2 for liquids	0 - 6°C	40 ml; 40 g	14 days
Organochlorine Pesticides and PCBs	EPA 608, EPA 8081, EPA 8082	1 Liter Amber; 8 oz. glass jar	UNPRESERVED	0 - 6°C	1 L; 30 g	7/40; 14 days
Organophosphorus Pesticides	EPA 8141	1 Liter Amber; 8 oz. glass jar	UNPRESERVED	0 - 6°C	1 L; 40 g	7/40; 14 days
Volatile Organic Compounds (VOCs)	EPA 624, EPA 8260 B	(2) 40 ml VOA Vials; 4 oz. glass jar	HCl to pH < 2 for liquids	0 - 6°C	40 ml; 40 g	14 days
Semi Volatile Organics (SVOCs)	EPA 625, EPA 8270 C	1 Liter Amber; 8 oz. glass jar	UNPRESERVED	0 - 6°C	1 L; 40 g	7/40; 14/40 days
Organotin Compounds - Tributyltins (TBT)	GCFPD	1 Liter Amber; 8 oz. glass jar	UNPRESERVED	0 - 6°C	1 L; 40 g	7/40; 14/40 days
Total Petroleum Hydrocarbons (TPH) - Gas	EPA 8015 B, DOHS LUFT Method (liquid), ASTM D2887 (solid)	(2) 40 ml VOA Vials; 4 oz. glass jar	HCl to pH < 2 for liquids	0 - 6°C	40 ml; 10 g	14 days
Total Petroleum Hydrocarbons (TPH) - Diesel	EPA 8015 B, DOHS LUFT Method (liquid), ASTM D2887 (solid)	125 ml Amber; 4 oz. glass jar	HCl to pH < 2 for liquids	0 - 6°C	40 ml; 10 g	14 days

Metals Analyses

ANALYSIS/TEST	SPECIFIC METHOD(S)	CONTAINER Water; Soil	PRESERVATIVE	TEMPERATURE	MINIMUM SAMPLE REQUIRED Water; Soil	HOLDING TIME
Hexavalent Chrome (Cr+6)	EPA 3060, EPA 7196 A, SMEWW 3500 Cr D	250 ml poly; 8 oz. glass jar	UNPRESERVED	0 - 6°C	50 ml; 10 g	28 days (with preservation)
Mercury	EPA 245.1, EPA 7471, EPA 7470	500 ml poly; 4 oz. glass jar	HNO ₃ to pH < 2	0 - 6°C	500 ml; 100 g	28 days
Metals*	EPA 6010, EPA 6020, EPA 3050, EPA 200.7, EPA 200.8	500 ml poly; 8 oz. glass jar	HNO ₃ to pH < 2	0 - 6°C	500 ml; 100 g	6 mos
STLC metals	Title 22-WET	500 ml poly; 8 oz. glass jar	UNPRESERVED	0 - 6°C	500 ml; 200 g	Method Dependant
SPLP metals	EPA 1312	500 ml poly; 8 oz. glass jar	UNPRESERVED	0 - 6°C	500 ml; 200 g	Method Dependant
TCLP metals	EPA 1311	500 ml poly; 8 oz. glass jar	UNPRESERVED	0 - 6°C	500 ml; 200 g	Method Dependant

* Including but not limited to: Al, Ag, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mn, Mg, Mo, Na, Ni, Pb, Sb, Se, Sn, Ti, Tl, V, Zn
 ^ 7/40, 14/40 refers to hold time before extract/hold time after extract

4340 Viewridge Ave., Suite A
 San Diego, CA 92123
 Phone/Fax: (858) 560-7717 / (858) 560-7763

Appendix B

Sample Report

EnviroMatrix



Analytical, Inc.

03 November 2003

EnviroMatrix Analytical, Inc
Attn: Dave Renfrew
4340 Viewridge Ave., Suite A
San Diego, CA 92123

EMA Log #: 0208147

Project Name: Soil 39

Enclosed are the results of analyses for samples received by the laboratory on 08/15/02 08:59. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that this data is in compliance both technically and for completeness.

A handwritten signature in black ink, appearing to read 'Dan Verdon', is written over a light gray grid background.

Dan Verdon
Laboratory Director

CA ELAP Certification #: 1931

4340 Viewridge Avenue, Suite A - San Diego, California 92123 - (858) 560-7717 - Fax (858) 560-7763
Analytical Chemistry Laboratory

Client Name: Enviromatrix Analytical, Inc
Project Name: Soil 39

EMA Log #: 0208147

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Soil-39 Anions	0208147-01	Soil	08/15/02 08:00	08/15/02 08:59
Known Anions	0208147-02	Soil	08/15/02 08:00	08/15/02 08:59
Known pH	0208147-06	Soil	08/15/02 08:00	08/15/02 08:59
Known Cr+6	0208147-08	Soil	08/15/02 08:00	08/15/02 08:59

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

EnviroMatrix Analytical, Inc.



Client Name: Enviromatrix Analytical, Inc
Project Name: Soil 39

EMA Log #: 0208147

Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Soil-39 Anions (0208147-01) Soil Sampled: 08/15/02 08:00 Received: 08/15/02 08:59									
Fluoride	67.0	3.00	mg/kg	2	2090409	09/03/02	09/03/02	EPA 9214	
Known Anions (0208147-02) Soil Sampled: 08/15/02 08:00 Received: 08/15/02 08:59									
Chloride	320	0.5	mg/kg	1	2091809	09/17/02	09/17/02	SM4500 Cl C	A-01a
Fluoride	87.5	7.50	"	5	2090409	09/03/02	09/03/02	EPA 9214	
Sulfate as SO4	2660	50.0	"	1	2092006	09/19/02	09/19/02	SM4500 SO4 E	
Known pH (0208147-06) Soil Sampled: 08/15/02 08:00 Received: 08/15/02 08:59									
pH	4.28	0.10	pH Units	1	2082706	08/26/02	08/26/02	EPA 9045B	A-01
Known Cr+6 (0208147-08) Soil Sampled: 08/15/02 08:00 Received: 08/15/02 08:59									
Hexavalent Chromium	90.2	4.00	mg/kg	5	2082908	08/26/02	08/27/02	EPA 7196A	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Enviromatrix Analytical, Inc.



Client Name: Enviromatrix Analytical, Inc
Project Name: Soil 39

EMA Log #: 0208147

Conventional Chemistry Parameters by Standard/EPA Methods - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Batch 2082706									
Reference (2082706-SRM1)				Prepared & Analyzed: 08/26/02					
pH	8.85	0.10	pH Units	9.10		97	96.7-103.3		
Batch 2082908									
Blank (2082908-BLK1)				Prepared: 08/26/02 Analyzed: 08/27/02					
Hexavalent Chromium	ND	0.800	mg/kg						
LCS (2082908-BS1)				Prepared: 08/26/02 Analyzed: 08/27/02					
Hexavalent Chromium	32.0	0.800	mg/kg	40.0		80	80-120		
LCS Dup (2082908-BSD1)				Prepared: 08/26/02 Analyzed: 08/27/02					
Hexavalent Chromium	32.4	0.800	mg/kg	40.0		81	80-120	1	20
Duplicate (2082908-DUP1)		Source: 0208147-08		Prepared: 08/26/02 Analyzed: 08/27/02					
Hexavalent Chromium	89.6	4.00	mg/kg		90.2			0.7	20
Batch 2090409									
Blank (2090409-BLK1)				Prepared & Analyzed: 09/03/02					
Fluoride	ND	1.50	mg/kg						
LCS (2090409-BS1)				Prepared & Analyzed: 09/03/02					
Fluoride	1.00	0.100	mg/kg	1.00		100	80-120		
LCS Dup (2090409-BSD1)				Prepared & Analyzed: 09/03/02					
Fluoride	1.00	0.100	mg/kg	1.00		100	80-120	0	20

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Enviromatrix Analytical, Inc.



Client Name: Enviromatrix Analytical, Inc
Project Name: Soil 39

EMA Log #: 0208147

Conventional Chemistry Parameters by Standard/EPA Methods - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes

Batch 2090409

Duplicate (2090409-DUP1)		Source: 0208147-01		Prepared & Analyzed: 09/03/02						
Fluoride	67.0	3.00	mg/kg		67.0			0	20	

Batch 2091809

Blank (2091809-BLK1)		Prepared & Analyzed: 09/17/02								
Chloride	ND	0.05	mg/kg							

LCS (2091809-BS1)		Prepared & Analyzed: 09/17/02								
Chloride	194	0.05	mg/kg	200		97	80-120			

LCS Dup (2091809-BSD1)		Prepared & Analyzed: 09/17/02								
Chloride	200	0.05	mg/kg	200		100	80-120	3	20	

Batch 2092006

Blank (2092006-BLK1)		Prepared & Analyzed: 09/19/02								
Sulfate as SO4	ND	50.0	mg/kg							

LCS (2092006-BS1)		Prepared & Analyzed: 09/19/02								
Sulfate as SO4	10.3	10.0	mg/kg	10.0		103	80-120			

LCS Dup (2092006-BSD1)		Prepared & Analyzed: 09/19/02								
Sulfate as SO4	10.5	10.0	mg/kg	10.0		105	80-120	2	20	

Duplicate (2092006-DUP1)		Source: 0208147-02		Prepared & Analyzed: 09/19/02						
Sulfate as SO4	2960	50.0	mg/kg		2660			11	20	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Enviromatrix Analytical, Inc.



Client Name: Enviromatrix Analytical, Inc
Project Name: Soil 39

EMA Log #: 0208147

Notes and Definitions

A-01 24 hour holding time does not apply to PT samples.
A-01a Sample for internal QC
ND Analyte NOT DETECTED at or above the reporting limit
NR Not Reported
dry Sample results reported on a dry weight basis
RPD Relative Percent Difference

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

EnviroMatrix



Analytical, Inc.

Appendix C

Chain-Of-Custody Form

CHAIN-OF-CUSTODY RECORD

EnviroMatrix



Analytical, Inc.

4340 Viewridge Ave., Ste. A - San Diego, CA 92123 - Phone (858) 560-7717 - Fax (858) 560-7763

EMA LOG #:										EMA DATE/TIME STAMP												
Client:										REQUESTED ANALYSIS												
Address:																						
Attn:																						
Sampled by:																						
Billing Address:																						
Project:																						
PO #:																						
EMA ID #	Client Sample ID	Sample Date	Sample Time	Sample Matrix	Container(s) #	Type**	Oil & Grease 413.1 413.2 1664	TPH (8015B) Gas Diesel	TPH-Extended 8015B ASTM D2887	602 / 8021 B BTXE MTBE	601 / 8021 B (Volatile Organics)	EPA 8021 B Aromatics Halogenated	608 / 8081 (Pesticides)	608 / 8082 (PCBs)	624 / 8260 (Volatile Organics)	625 / 8270 (Semi Volatile Organics)	TTLIC Metals (CAC Title 22)	STLC Metals (CAC Title 22)	TCLP (RCRA) Metals Organics	Cd Cr Cu Pb Ni Ag Zn	pH EC TSS	
1																						
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						
*Container Types: B=Brass Tube; V=VOA; G=Glass; P=Plastic; O=Other (list)							RELINQUISHED BY					DATE/TIME					RECEIVED BY					
Tamper-Proof Seals Intact: Yes No N/A		Correct Containers: Yes No		VOAs w/ZHS: Yes No N/A		Signature							Signature									
Sample(s): Cold Ambient Warm		Yes No N/A		Yes No N/A		Print							Print									
All Samples Properly Preserved: Yes No N/A							Company:										Company:					
Disposal: N/C (aqueous) *EMA (@\$5,00/sample) Return Hold							Signature										Signature					
Turnaround Time: 24 hr 48 hr 3 day 4 day 5 day Normal							Print										Print					
Comments:							Company:										Company:					
							Signature										Signature					
							Print										Print					
							Company:										Company:					

* EMA reserves the right to return samples that do not match our waste profile.

White - EMA Capay - Accounting

Pink - Client (w/Report)

Goldenrod - Client (Relinquish Samples)

Appendix D

Corrective Action Form

EnviroMatrix Analytical, Inc.

CORRECTIVE ACTION FORM

ISSUED TO:

RESPONSE REQUIRED BY:

CORRECTIVE ACTION REQUESTED BY:

DATE:

_____(ISSUER) WILL
PROVIDE A BRIEF DESCRIPTION OF HOW PROCEDURE WAS DETERMINED TO BE
OUT-OF-CONTROL:

OUT-OF-CONTROL PROCEDURE(s):

LIST SAMPLE I.D.(s) AFFECTED:

DESCRIBE IMMEDIATE ACTION TAKEN TO REMEDY SITUATION:

DESCRIBE FINAL PLANNED ACTION WHICH WILL CORRECT PROBLEM,
EXPECTED DATE OF FINAL PLANNED ACTION, AND HOW YOU INTEND TO
PREVENT RECURRENCE OF THE PROBLEM:

SIGNATURE: _____ DATE: _____

REVIEWED BY: _____ DATE: _____

Appendix E

List of Analytical Services and Methods

Analytical Services and Methods

ANALYSIS	40 CFR	SW-846	OTHER
Oil & Grease			EPA 413.2, 1664A
Total Recoverable Petroleum Hydrocarbons (TRPH)			EPA 418.1
Purgeable Halocarbons	EPA 601		
Purgeable Aromatics	EPA 602		
Organochlorine Pesticides	EPA 608	EPA 8081A	
Organophosphorus Pesticides (OPP)		EPA 8141A	
Oxygenates		EPA 8260B	
Volatile Organics	EPA 624	EPA 8260B (8021B)	
Semi-Volatile Organics	EPA 625	EPA 8270C	
Benzene, Toluene, Xylenes Ethylbenzene, (MTBE)	mod EPA 602	EPA 8260B (8021B)	
Total Petroleum Hydrocarbons (TPH)			EPA 8015B, ASTMD 2887, LUFT
PCBs	EPA 608	EPA 8082	
Extraction Methods		EPA 3510,3520,3540C 3550,3580	
Clean-up Methods		EPA 3610,3620,3630, 3640A,3660,3665	
Multiple Extraction Procedure		EPA 1320	
SPLP		EPA 1312	
STLC (WET)			CCR Chapter 11, Article 5, Appendix II
TCLP		EPA 1311	
Title 22			Title 22
Organotin Compounds (Tributyltin - TBT)			GC-FPD

Analytical Services and Methods (continued)

ANALYSIS	40 CFR	SW-846	OTHER
Aluminum	EPA 200.7, 200.8	EPA 6010B, 6020	
Antimony	EPA 200.7, 200.8	EPA 6010B, 6020	
Arsenic	EPA 200.8	EPA 6020	
Barium	EPA 200.7, 200.8	EPA 6010B, 6020	
Beryllium	EPA 200.7, 200.8	EPA 6010B, 6020	
Boron	EPA 200.7	EPA 6010B	
Cadmium	EPA 200.7, 200.8	EPA 6010B, 6020	
Calcium	EPA 200.7	EPA 6010B	
Chromium	EPA 200.7, 200.8	EPA 6010B, 6020	
Cobalt	EPA 200.7, 200.8	EPA 6010B, 6020	
Copper	EPA 200.7, 200.8	EPA 6010B, 6020	
Gold	EPA 200.7	EPA 6010B	
Hardness	EPA 200.7		SM2340 B
Iron	EPA 200.7, 200.8	EPA 6010B, 6020	
Lead	EPA 200.7, 200.8	EPA 6010B, 6020	
Magnesium	EPA 200.7	EPA 6010B	
Manganese	EPA 200.7, 200.8	EPA 6010B, 6020	
Mercury	EPA 245.1	EPA 7470A, 7471A	
Molybdenum	EPA 200.7, 200.8	EPA 6010B, 6020	
Nickel	EPA 200.7, 200.8	EPA 6010B, 6020	
Potassium	EPA 200.7	EPA 6010B	
Selenium	EPA 200.7, 200.8	EPA 6010B, 6020	
Silver	EPA 200.7, 200.8	EPA 6010B, 6020	
Sodium	EPA 200.7	EPA 6010B	
Thallium	EPA 200.7, 200.8	EPA 6010B, 6020	
Tin	EPA 200.7	EPA 6010B	
Titanium	EPA 200.7	EPA 6010B	
Vanadium	EPA 200.7, 200.8	EPA 6010B, 6020	
Zinc	EPA 200.7, 200.8	EPA 6010B, 6020	
Digestion Methods	EPA 200.7, 200.8, 245.1	EPA 3010A,3020A 3050B,7470,7471	

Analytical Services and Methods (continued)

ANALYSIS	40 CFR	SW-846	OTHER
Acidity		SM2310 B	
Alkalinity-(Bi)Carbonate		SM2320 B	
Ammonia		SM4500-NH ₃ B,C (18 th)	
AVS-SEM			EPA 821R-91-100
BOD		SM5210 B	
Carbon Dioxide		SM4500 CO ₂ C	
cBOD		SM5210 B	
COD			EPA 410.4, HACH 8000
Chloride		SM4500-Cl C,D	
Chlorine, Residual		SM4500-Cl G	
Chromium VI		SM3500 Cr D (18 th /19 th)	EPA 7196A
Coliforms (Total and Fecal)		SM9221 A,B,C,E	
Coliforms (Total) and E. Coli by Colilert		SM9223	Colilert®
Color (True & Apparent)		SM2120 B	
Color (Solid)			Munsel Chart
Conductivity		SM2510 B	EPA 120.1
Cyanide (Reactive)		SM4500-CN C,E,G,I (Section 7.3 SW-846)	EPA 9014
Dissolved Oxygen		SM4500-O G	
Enterococcus		SM9230 C	Enterolert ®
Fecal Streptococcus		SM9230 C	
Flash Point (Ignitability)			EPA 1010,1030
Fluoride		SM4500-F C	EPA 9214
Heterotrophic Plate Count		SM9215 B	
Hexavalent Cr		SM3500 Cr D (18 th /19 th)	EPA 7196A
Langliers Index (Calc)		SM2330 B	
MBAS		SM5540 C	
Nitrate		SM4500-NO ₃ E	
Nitrite		SM4500-NO ₂ B	

Analytical Services and Methods (continued)

ANALYSIS	40 CFR	SW-846	OTHER
Nitrogen, TKN/Total Organic Nitrogen		SM4500 N C	
Odor		SM2150 B	
Oxygen Consumption Rate		SM2710 B	
Paint Filter			EPA 9095 A
pH		SM4500-H+ B	EPA 9045 C
Phenols			EPA 420.1, 9065
Phosphate , Ortho		SM4500-P E	HACH 8048
Phosphorus, Total		SM4500-P E	HACH 8190
Salinity		SM2520 B	
Settleable Solids		SM2540 F	
% Solids/Dry Weight		SM2540 G	
Solids, Total/Dissolved		SM2540 C	
Solids, Total Suspended		SM2540 D	
Sulfate		SM4500-SO ₄ E	
Sulfide (Reactive)		SM4500-S D,F (Section 7.3 SW-846)	EPA 9034
Residue – Total/Filterable/Non- Filterable/Settleable		SM2540 B,C,D,F	
Temperature		SM2550 B	
Total Organic Carbon (TOC) – Dissolved Organic Carbon (DOC)		SM5310 B *Currently Sub- Contracted	EPA 9060 (TOC) *Currently Sub- Contracted
Turbidity		SM2130 B	
VSS, VDS		SM2540 E	

Appendix F

List of Instrumentation and Equipment

Instrumentation

To meet our needs for accurate analytical results, EMA uses sophisticated instruments. Our instruments are calibrated to comply with regulatory detection limits in the parts per billion (ppb) and parts per million (ppm) detection ranges. Listed below are the key instruments that we use for inorganic and organic analyses.

#	INORGANIC INSTRUMENTS	MAKE	MODEL
Inductively Coupled Argon Plasma-Mass Spectrometry (ICP-MS)			
1	ICP-MS Spectrophotometer	Agilent	7500-cx
Inductively Coupled Argon Plasma-Atomic Emission Spectrometry (ICP-AES)			
1	ICP-AES Spectrophotometer	Perkin-Elmer	5300-DV
1	Automated Mercury Analyzer (Cold Vapor/Atomic Absorption Spectrophotometer)	Teledyne Leeman Labs	Hydra II _{AA}
Miscellaneous			
2	48-Well Block Digestor	CPI International	ModBlock
2	10-Position Distillation Block	Enviromental Express	

#	ORGANIC INSTRUMENTS	MAKE	MODEL
Gas Chromatography/Mass Spectrometry			
1	GC/MS	Agilent	5973N
1	GC/MS	Agilent	5973
1	GC/MS	Hewlett Packard	5970S
6	GC	Hewlett Packard	5890A
2	GC	Hewlett Packard	6890
1	GC	Perkin Elmer	Claris 600

Gas Chromatograph Detectors

3	Mass Spectrometer Detectors
4	Flame Ionization Detectors
2	Electron Capture Detectors
1	Photo Ionization Detectors
1	Hall Detector (Electrolytic Conductivity)
1	Flame Photometric Detector
1	Nitrogen-Phosphorus Detector

Instrumentation (continued)

#	ORGANIC INSTRUMENTS	MAKE	MODEL
Sample Introduction			
3	Purge and Trap	OI	4460
1	Purge and Trap	OI	MPM-16
1	Purge and Trap	OI	Eclipse/4560
3	VOC Autosampler	OI	4552
Spectrophotometers			
1	Infrared Spectrophotometer	Buck Scientific	404
1	UV/Visible Spectrophotometer	HACH	DR3000
Miscellaneous			
1	Accelerated Solvent Extractor	Dionex	ASE 200
1	Accelerated Solvent Extractor	Dionex	ASE 300
1	GPC Cleanup System	Waters	717
1	Nitrogen Blowdown System	Zymark	TurboVap

In addition to the above listed organic chemistry and inorganic chemistry laboratory equipment, EMA maintains a full wet chemistry laboratory for performing spectrophotometric, titrimetric, and gravimetric analysis and a microbiology laboratory.

Appendix G

Professional Profiles of Key Personnel

Key Personnel

Leland Stanton Pitt, B.S., M.S.
President

Education: **Master's of Science in Chemistry, 1981**
Delta State University, Cleveland, Mississippi

Bachelor of Science Degree in Biology and Physics, minor in Mathematics, 1969
University of New Mexico, Albuquerque, New Mexico

Professional Experience:

Certified Industrial Hygienist: Southland Labs, Inc. #4303

Certified Marine Chemist: Pacific Chemical Labs, Inc. #654

Certified Asbestos Consultant: Southland Labs, Inc. #97-2209

President

EnviroMatrix Analytical, Inc., San Diego, CA

2002-Present

Responsible for overall business management, business development and strategic planning. As the President EnviroMatrix Analytical, Inc. he is responsible for directing the activities of the business. Responsible for the strategic direction of the laboratory and business development. He provides consultation and recommendation to various clients to determine the specifics of project requirements.

President and Manager

H.M. Pitt Labs, Inc., San Diego, CA

1986-Present

H.M. Pitt Labs, Inc. is an analytical lab specializing in environmental studies and industrial hygiene. Mr. Pitt is currently the consulting CIH for The Port of San Diego, Ninyo & Moore, an environmental and geotechnical science group, and Westair Technologies. As the consulting CIH, Mr. Pitt typically reviews and approves abatement plans (both asbestos and lead, as well as other programs), and is responsible for monitoring and inspections. H.M.Pitt Labs does the monitoring and abatement review for Pacific Ship Repair and Southwest Marine, which removes insulation and asbestos on Navy ships. As a Marine Chemist, he certifies Navy ships and land tanks in the San Diego area and elsewhere when requested. He was the primary Marine Chemist and CIH on the Exxon Valdez ship repair.

Leland Stanton Pitt, B.S., M.S.
President (Continued)

Chemist and Gas Free Engineer

Long Beach Naval Shipyard, Long Beach, CA
1983-1986

Program Manager responsible for certifying spaces and shipboard as safe for production work in shipbuilding and repair. Work required knowledge of general safety and health regulations of CFR 1910, 1915, and 1926, as well as the pertinent Federal, State and D.O.D. regulations. Responsible for technical supervision of 15-25 technicians. Required knowledge of instrumentation associated with analytical chemistry. Civilian equivalent of this position is a Marine Chemist. Required to sample, identify, and quantify typical work place stressors associated with the industrial hygiene-monitoring program. Worked in the chemistry department at the shipyard doing analytical viscosity determinations, flashpoint, fire point, pH, water concentration, particle count, etc. Performed environmental analysis of industrial hygiene samples, i.e., asbestos, lead, organic solvents, etc., utilizing gas chromatography (GC), atomic absorption spectrometry (AA), and infrared spectrophotometers (IR).

Chemist

Office of Safety and Health, Mare Island Naval Shipyard, Vallejo, CA
1981-1983

Responsibilities included monitoring ships and industrial areas for potentially hazardous environments, and enforcing federal safety regulations. Use of various detection equipment: gas chromatography, infrared spectrophotometer analysis (qualitative and quantitative), as well as other methods. Functioned as an assistant gas free engineer and was responsible for certifying confined spaces on ships, fuel tanks, cofferdams and other voids. Began work in industrial hygiene department assisting CIH, IH and IH technicians in survey work on various shipyard stressors: asbestos, lead, solvents, ventilation, noise, etc.

Research Biologist

Stauffer Chemical Company, Greenville, MS
1975-1981

Assigned to Stauffer's experimental research station. Responsible for insecticide, fungicide, plant growth regulators, antidote and insect growth regulators.

Leland Stanton Pitt, B.S., M.S.
President (Continued)

AREAS OF SPECIALTY:

Effects of insecticide, fungicide, plant growth regulators, etc. on soybeans, milo, corn, with some work on barley and wheat. Soybean work has been centered on Verman and other related thiocarbamate herbicides. Corn research responsibilities included varietal testing with Stauffer's proprietary herbicides Sutan, Eptam and Vernam. Also basic antidote work on experimental corn antidotes and herbicides were performed.

Small plot techniques for insecticide screening. These techniques for insecticide screening were developed in order to cope with small technical samples.

Cotton insecticide work with pesticide interaction in both the antidote and insecticide field program.

Research efforts with Imidan on cotton, vegetable crops and fruit trees.

Soybean fungicide work with Captan and other coded experimental biocides.

Paint biocide screening of coded materials for use in commercial paints. Interest in these tests is centered on fungal discoloration and chemical compatibility. Both weathered and new wood surfaces are used.

ADDITIONAL DUTIES:

Respirator coordinator, 1980-81. Solely responsible for Stauffer's respirator program at the Mississippi field station. This included selecting the appropriate DOT and NIOSH certified respirators in accordance with federal regulations and Stauffer's own respirator program.

In January 1981 I attended and graduated from the Occupational Health Services respirator course given by John Pritchard and was certified.

Safety coordinator at the Mississippi field station 1975-78. Responsibilities included respirator monitoring and insuring the compliance to Stauffer's safety program (chemical exposures and handling machinery safety; EPA and OSHA regulations, etc.).

Head of Stauffer's synergist program January 1973 to September 1975. Responsible for developing new and sophisticated bioassay techniques which opened new leads in search of broad spectrum (field crop) synergists beyond household use. Developed ovicide program in two diverse areas: insect growth regulators and formamidine insecticides.

Assigned to Stauffer's Western Research Center Mt. View, Ca. Helped improve screening techniques, which lead to new classes of selective slow acting insecticides. Developed statistical interpretation of joint action.

Leland Stanton Pitt, B.S., M.S.
President (Continued)

Screened experimental compounds for insecticidal/miticidal activity, October 1969 to January 1973. Following this initial testing, more extensive testing was initiated on those leads which seemed both novel and potentially profitable.

Worked as a technician from 1968-1969 in rearing insects and functioned as a lab technician in the biochemistry lab.

RELATED EXPERIENCE:

Master's Thesis work done in "Insecticidal Activity of several benzamides and nicotinamides on the Tobacco Budworm (*Heliothis virescens*).

Graduate work in Chemistry in synthesizing analogs of Dimilin to determine structure/activity relationships and possible new chemical properties of related ureides.

General laboratory experience including radioactive tracing techniques (TLC and liquid scintillation work).

UNITED STATES PATENTS:

#4,123,526

Patented October 31, 1978

THIONOPHOSPHATE INSECTICIDE ACTIVATORS

Assignors Stauffer Chemical Company

George B. Large and Leland S. Pitt

#4,096,251

Patented June 20, 1978

DIETHYL 2-PYRIDINE THIONOPHOSPHONATE AS AN INSECTICIDE ACTIVATOR

Assignors, Stauffer Chemical Company

Leland S. Pitt, George B. Large, Alan MacDonald

#4,083,970

Patented April 11, 1978

**ACTIVATED INSECTICIDE COMPOSITION EMPLOYING A CERTAIN
PHOSPHORODITHIOATE AND AN ACTIVATOR**

Assignors Stauffer Chemical Company

George B. Large And Leland S. Pitt

Leland Stanton Pitt, B.S., M.S.
President (Continued)

#4,072,745

Patented July 12, 1977

SUBSTITUTED VINYL THIOPHOSPHATE ACTIVATORS

Assignors Stauffer Chemical Company

Leland S. Pitt and George B. Large

#4,035,490

Patented July 12, 1977

INSECTICIDAL PHTHALIMIDOTHIOPHOSPHATES ACTIVATED WITH CERTAIN
PHOSPHOROTHIONATES

Assignors Stauffer Chemical Company

George B. Large and Leland S. Pitt

#3,830,887

Patented August 20, 1974

O,) -DILOWERALKYL-O-(1-METHYL-2-PHENYL VINYL) THIOPHOSPHATES

Assignors Stauffer Chemical Company

George B. Large and Leland S. Pitt

PROFESSIONAL ORGANIZATIONS:

Marine Chemists Association

Industrial Hygiene Association

American Chemical Society

Daniel Verdon, B.S.
Laboratory Director

Education: **Bachelor of Science in Chemistry, minor in Computer Science, 1990**
Westmont College, Santa Barbara, California

Professional Experience:

Laboratory Director

EnviroMatrix Analytical, Inc., San Diego, CA

2003 – Present

Responsible for overall management of analytical laboratory production. Selection, training, and directing activities of chemistry laboratory personnel including compensation and termination. Extensive experience with current state, local and federal regulations. Oversees laboratory operations to ensure quality data reduction and review, and ensures that project specifications are met. Holds weekly status meetings to discuss current project status, analyses schedule, and any potential problems or irregularities with laboratory operations.

Senior Chemist

EnviroMatrix Analytical, Inc., San Diego, CA

1993 - 2003

Responsible for all volatile organic compound analyses by Gas Chromatography (GC) and Gas Chromatography Mass Spectrometry (GC/MS), following methods EPA 601, EPA 8010, EPA 624, EPA 8240 and EPA 8260 . Performs all systems maintenance and method development. Responsible for data review and systems management. Ensures that all volatile GC and GC/MS work is performed in compliance with all local, state and federal regulations, and quality assurance program requirements. Additionally, responsible for method and procedure development, and training other analysts.

Environmental Specialist

IT Corporation, Irvine, CA

1992 - 1993

Responsible for operation of mobile chemistry laboratory. Perform field Gas Chromatography analysis. Management and tracking of all CLP data validation projects. Performed CLP data validation (Levels C and D) for HAZWRAP and Comprehensive Long-Term Environmental Action Navy (CLEAN) projects.

Field Analytical Specialist

IT Corporation, Irvine, CA

1990 - 1992

Responsible for sampling and monitoring of ground-water wells, soils, and air at potentially contaminated sites. Performed on-site physical and chemical analyses. Sampled and monitored ground-water wells, industrial discharge, and contaminated soils at various commercial and military facilities.

Daniel Verdon, B.S.
Laboratory Director (Continued)

Consultant

G.V. Industries, Santa Barbara, CA
1990

Development of hazardous waste conformance plan to meet local, state and federal regulations. Development and implementation of emergency response program for G.V. facilities that met local and state regulatory requirements.

Research Assistant

Chemistry Department at Westmont College, Santa Barbara, CA
1989

Development and testing of microprocessor controlled pulse train generator and photon counter for application in optically detected magnetic resonance spectroscopy.

Laboratory Technician

Whittaker Corporation Research Laboratory, Colton, CA
1987 - 1988

Development, testing and formulation of industrial coil coatings (paint) for new product lines.

Training and Certificates:

OSHA 40 Hour 29 CFR 1910.120, November 1990

OSHA 8 Hour 29 CFR 1910.120 Refresher, (Annually)

Chemical Hygiene & Laboratory Safety OSHA and 29 CFR 1910.145C, February 1993

Jennifer Beyer, M.S.
Q.A. Director

Education: **Master of Science in Physical Chemistry, 2007**
San Diego State University, San Diego, CA

Bachelor of Arts in Chemistry, 1997
University of Northern Iowa, Cedar Falls, IA

Professional Experience:

Q.A. Director

EnviroMatrix Analytical, Inc., San Diego, CA

2005 – Present

Responsible for establishing and maintaining the laboratories working budget and approving all purchases and expenditures. Acts as liaison for all regulatory agencies. Responsible for maintaining and implementing the Quality Assurance Manual, QA/QC policies, Standard Operating Procedures, and corrective action documents. Performs data validation and review for adherence to QA requirements. Conducts internal quality audits. Reviews all project and/or contract specific QA requirements for laboratory implementation.

Senior Metals Chemist-Department Supervisor

EnviroMatrix Analytical, Inc., San Diego, CA

2003 - 2005

Responsible for performing ICP and ICP-MS metals analyses following method EPA 6010/6020 and EPA 200.7/200.8 and atomic absorption spectrophotometric analysis using cold vapor generation on a variety of matrices using method EPA 245.1, EPA 7470, and EPA 7471 for mercury. Ensures that analytical data complies with Quality Assurance Program requirements. Performs all aspects of analysis including those relating to troubleshooting instrument problems, detecting analytical interferences due to complex sample matrices, performing system maintenance and method development. Supervises the metals digestion department and the metals extraction department.

Independent Contractor

SDSUF/SPAWAR Systems Center, San Diego, CA

2002 – 2003

Provided technical and analytical support in the field of materials science for the Film Implementation of a Neutron Detector (FIND) Project.

Teachers Assistant (Masters Candidate)

San Diego State University, San Diego, CA

2000-2002

Organized and taught laboratory classes for SDSU Chemistry Department.

Jennifer Beyer, M.S.
Q.A. Director (Continued)

Organic Laboratory Technician

TestAmerica (NET, Inc.), Cedar Falls, IA
1997-1999

Performed laboratory extractions and analyses of environmental contaminants in water and soil samples utilizing EPA test protocols. Performed daily quality control procedures.

Laboratory Technician

AG Processing, Inc., Manning, IA
1997

Performed extensive work on NIR. Wet lab analyses included crude fiber determination, residual oil testing, urease activity, pH, moisture and volatiles testing.

Mike Giangiordano
Wet Chemistry/ Microbiology Supervisor

Education: **Bachelor of Science in Exercise Nutritional Sciences, 2001**
San Diego State University, San Diego, CA

Professional Experience:

Wet Chemistry/ Microbiology Supervisor
Enviromatrix Analytical, Inc., San Diego, CA
2003 – Present

Responsible for overall management of WET Chemistry and Microbiology Departments. Involved in selection and training of personnel in both departments as well as overseeing and performing analytical work designated to such departments. Responsible of for reviewing all data to ensure results are in control and project specifications are met for the above departments. Involved in creating and editing departments S.O.P.'s. Project manager to specific microbiology clients. Responsible for method development and implementation.

Head Microbiologist
Enviromatrix Analytical, Inc., San Diego, CA
2002 – 2003

Responsible for scheduling and executing work load for entire microbiology department. Creating and editing department S.O.P.'s including total and fecal coliform for both drinking and waste waters, Colilert®, Enterolert®, fecal streptococcus, enterococcus, and heterotrophic plate count (HPC). Ensures that all quality controls and assurance procedures are followed and meet requirements dictated by government regulations. Additionally, responsible for method development and training other microbiological personnel. As well as, performing all aspects of analysis including those relating to troubleshooting equipment problems, detecting analytical interferences, and conducting department wide maintenance.

Microbiologist
Enviromatrix Analytical, Inc., San Diego, CA
2001 – 2002

Involved in daily analysis and scheduling of microbiological work including total and fecal coliform for both drinking and waste waters, enterococcus, and fecal streptococcus using multiple tube fermentation (MTF). Also, setting up and executing procedures for Colilert® and heterotrophic plate count (HPC). Carrying out numerous daily quality assurance procedures including the use of control organisms, sterility checks and controls, and surveillance and maintenance of equipment set temperatures and other necessary functions.

Dennis Hickey , B.A.
Senior Organics Chemist

Education: **Bachelor of Arts in Biology, Minor in Organic Chemistry and Sociology, 1985**
University of California, San Diego, CA

Professional Experience:

Senior Organics Chemist

EnviroMatrix Analytical, Inc., San Diego, CA

02/2003 – Present

Responsible for semi-volatile organic compound analyses by Gas Chromatography (GC) and Gas Chromatography Mass Spectrometry (GC/MS), following methods EPA 608, EPA 8015, EPA 625, EPA 8270, EPA 8141, and EPA 8081/8082. Performs systems maintenance and method development. Responsible for data review and systems management. Ensures that semi-volatile GC and GC/MS work is performed in compliance with all local, state and federal regulations, and quality assurance program requirements. Additionally, responsible for method and procedure development, and training other analysts.

Staff Research Associate II

UCSD, San Diego, CA

01/1999 – Present

Provides technical support for undergraduate teaching laboratories. Maintains and troubleshoots laboratory equipment. Supervises pre-runs of experiments and works with faculty to revise and update experiment protocols. Maintains computers in the teaching laboratories. Establishes financial needs of classes and keeps records of financial expenditures.

Staff Scientist & Project Manager

Ceimic Corporation / S-Cubed (A Division of Maxwell Laboratories), San Diego, CA

1986-1998

Operated and maintained automated gas chromatography instrumentation for high precision measurement of volatile and semi-volatile compounds operating in a contract laboratory setting. Was responsible for GC/MS training and troubleshooting. Performed EPA Methods 8270, 8260, 8080, 625, 525, PAH by SIMS, and Isotope Dilution by EPA Method 1625c. Assisted in the validation of method EPA 8141 for the EPA's Office of Research and Development, Las Vegas, Nevada. Assisted in the validation of a multianalyte methodology for human adipose tissue for the EPA's Office of Research and Development, Las Vegas, Nevada. Performed beta testing of the Hewlett-Packard Enviroquant Chemstation Software. Assisted the software developers with recommendations for improvements and quality related functions as it related to GC/MS analyses.

Dennis Hickey, B.A.
Senior Organics Chemist (continued)

Extraction Chemist

Analytical Technologies, Inc., San Diego, CA
1985-1986

Prepared samples in the extraction laboratory for determination of a variety of pollutants including pesticides, herbicides, dioxins, PCBs, and BNAs. Responsible for sample receiving and sample log-in.

Publications:

Hatcher, M.D.; Hickey, D.M.; Marsden, P.J.; and Betowski, L.D.; "Development of a GC/MS Module for RCRA Method 8141"; final report to the U.S. EPA Environmental Protection Agency on Contract 68-03-1958; S-Cubed, San Diego, CA, 1988.

Taylor, V.; Hickey, D.M.; Marsden, P.J. "Single Laboratory Validation of EPA Method 8140"; U.S. Environmental Protection Agency, Environmental Monitoring Systems Laboratory, Office of Research and Development, Las Vegas, NV, 1987; EPA-600/4-87-009.

Mona Hanna, PhD
Senior Organics Chemist

Education: **Doctor of Philosophy in Inorganic Chemistry, 1986**
Ain Shams University, Cairo, Egypt

Masters of Arts in Inorganic and Analytical Chemistry, 1982
Ain Shams University, Cairo, Egypt

Bachelor of Arts in General Chemistry, 1978
Ain Shams University, Cairo, Egypt

Professional Experience:

Senior Organic Chemist

EnviroMatrix Analytical, Inc., San Diego, CA
2003-Present

Perform ICP metals analysis following EPA 6010 methods. Also analysis of volatile organic compound following EPA 8260, 8021 methods by using GC and GC/MS. Perform all aspects of analysis including troubleshooting instrument problems, detecting analytical interferences, system maintenance, and method development.

Chemistry Lab Instructor

Mesa College, San Diego, CA
2002 – Present

Teaching fundamental principles, laws of chemical behavior, and the properties of matter. Topics included: techniques of data analysis, auto titrators, UV/Vis spectrophotometer, HPLC, atomic theory, molecular geometry, and gaseous behavior.

Assistant Professor of Inorganic Chemistry

Ain Shams University, Cairo, Egypt
1996-2001

Carried out new research on the complexation and thermal properties of uric acid with some divalent and trivalent metal ions of biological interest. Characterization by FTIR, UV/VIS, and HPLC. Taught analytical, electroanalytical, and inorganic chemistry.

Research Assistant II

SDSU Foundation, San Diego, CA
1994-1996

Responsible for coordinating and analyzing water, soil, and plant tissue samples. Used a Lachat auto-analyzer to measure nutrient content, and a Dorman Organic Carbon Analyzer to assess organic matter content of estuarine waters.

Mona Hanna, PhD
Senior Organics Chemist (Continued)

Organic Chemist/Group Leader

Analytical Technologies Inc., San Diego, CA
1991-1994

Performed environmental analysis on soil, water, and air samples using separator funnel extraction, continuous liquid-liquid extraction, soxhlet extraction, and sonication. Extractions were cleaned using gel permeation chromatography, and alumina, florisal columns.

Appendix H

External Certification



CALIFORNIA STATE

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM BRANCH

CERTIFICATE OF ENVIRONMENTAL ACCREDITATION

Is hereby granted to

EnviroMatrix Analytical, Inc.

4340 Viewridge Avenue., Suite A

San Diego, CA 92123

Scope of the certificate is limited to the
"Fields of Testing"
which accompany this Certificate.

Continued accredited status depends on successful completion of on-site,
proficiency testing studies, and payment of applicable fees.

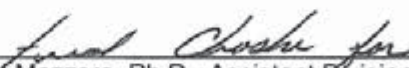
This Certificate is granted in accordance with provisions of
Section 100825, et seq. of the Health and Safety Code.

Certificate No.: **2564**

Expiration Date: **09/30/2014**

Effective Date: **10/01/2012**

Richmond, California
subject to forfeiture or revocation


David Mazzeza, Ph.D., Assistant Division Chief
Division of Drinking Water and Environmental Management

NOTICE

The “List of Approved Fields of Testing and Analytes”, as stated on this certificate will be sent to your laboratory upon completion of the entire certification process, which includes an on-site inspection and participation in the appropriate PT studies.



CALIFORNIA DEPARTMENT OF PUBLIC HEALTH
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
Accredited Fields of Testing



EnviroMatrix Analytical, Inc.
4340 Viewridge Avenue., Suite A
San Diego, CA 92123
Phone: (858) 560-7717

Certificate No.: 2564
Renew Date: 9/30/2012

Field of Testing: 101 - Microbiology of Drinking Water

101.010	001	Heterotrophic Bacteria	SM9215B
101.020	001	Total Coliform	SM9221A,B
101.021	001	Fecal Coliform	SM9221E (MTF/EC)
101.060	002	Total Coliform	SM9223
101.060	003	E. coli	SM9223
101.120	001	Total Coliform (Enumeration)	SM9221A,B,C
101.130	001	Fecal Coliform (Enumeration)	SM9221E (MTF/EC)
101.160	001	Total Coliform (Enumeration)	SM9223

Field of Testing: 102 - Inorganic Chemistry of Drinking Water

102.100	001	Alkalinity	SM2320B
102.120	001	Hardness	SM2340B
102.130	001	Conductivity	SM2510B
102.140	001	Total Dissolved Solids	SM2540C
102.163	001	Chlorine, Free and Total	SM4500-Cl G
102.171	001	Chloride	SM4500-Cl- D
102.190	001	Cyanide, Total	SM4500-CN E
102.192	001	Cyanide, amenable	SM4500-CN G
102.200	001	Fluoride	SM4500-F C
102.220	001	Nitrite	SM4500-NO2 B
102.231	001	Nitrate calc.	SM4500-NO3 E
102.240	001	Phosphate, Ortho	SM4500-P E
102.251	001	Sulfate	SM4500-SO4 E
102.260	001	Total Organic Carbon	SM5310B
102.261	001	DOC	SM5310B
102.270	001	Surfactants	SM5540C
102.520	001	Calcium	EPA 200.7
102.520	002	Magnesium	EPA 200.7
102.520	003	Potassium	EPA 200.7
102.520	005	Sodium	EPA 200.7
102.520	006	Hardness (calc.)	EPA 200.7

Field of Testing: 103 - Toxic Chemical Elements of Drinking Water

103.130	001	Aluminum	EPA 200.7
103.130	003	Barium	EPA 200.7
103.130	004	Beryllium	EPA 200.7
103.130	005	Cadmium	EPA 200.7

103.130	007	Chromium	EPA 200.7
103.130	008	Copper	EPA 200.7
103.130	009	Iron	EPA 200.7
103.130	011	Manganese	EPA 200.7
103.130	012	Nickel	EPA 200.7
103.130	015	Silver	EPA 200.7
103.130	017	Zinc	EPA 200.7
103.130	018	Boron	EPA 200.7
103.140	001	Aluminum	EPA 200.8
103.140	002	Antimony	EPA 200.8
103.140	003	Arsenic	EPA 200.8
103.140	004	Barium	EPA 200.8
103.140	005	Beryllium	EPA 200.8
103.140	006	Cadmium	EPA 200.8
103.140	007	Chromium	EPA 200.8
103.140	008	Copper	EPA 200.8
103.140	009	Lead	EPA 200.8
103.140	010	Manganese	EPA 200.8
103.140	012	Nickel	EPA 200.8
103.140	013	Selenium	EPA 200.8
103.140	014	Silver	EPA 200.8
103.140	015	Thallium	EPA 200.8
103.140	016	Zinc	EPA 200.8
103.140	017	Boron	EPA 200.8
103.140	018	Vanadium	EPA 200.8
103.160	001	Mercury	EPA 245.1

Field of Testing: 107 - Microbiology of Wastewater

107.010	001	Heterotrophic Bacteria	SM9215B
107.020	001	Total Coliform	SM9221B
107.040	001	Fecal Coliform	SM9221C,E (MTF/EC)
107.041	001	Fecal Coliform	SM9221C,E (A-1)
107.100	001	Fecal Streptococci	SM9230B
107.100	002	Enterococci	SM9230B
107.245	001	E. coli	SM9223

Field of Testing: 108 - Inorganic Chemistry of Wastewater

108.112	001	Boron	EPA 200.7
108.112	002	Calcium	EPA 200.7
108.112	003	Hardness (calc.)	EPA 200.7
108.112	004	Magnesium	EPA 200.7
108.112	005	Potassium	EPA 200.7
108.112	007	Sodium	EPA 200.7
108.323	001	Chemical Oxygen Demand	EPA 410.4
108.350	001	Total Recoverable Petroleum Hydrocarbons	EPA 418.1

108.360	001	Phenols, Total	EPA 420.1
108.381	001	Oil and Grease	EPA 1664A
108.390	001	Turbidity	SM2130B
108.400	001	Acidity	SM2310B
108.410	001	Alkalinity	SM2320B
108.430	001	Conductivity	SM2510B
108.440	001	Residue, Total	SM2540B
108.441	001	Residue, Filterable	SM2540C
108.442	001	Residue, Non-filterable	SM2540D
108.443	001	Residue, Settleable	SM2540F
108.451	001	Chloride	SM4500-Cl- C
108.465	001	Chlorine	SM4500-Cl G
108.470	001	Cyanide, Manual Distillation	SM4500-CN C
108.472	001	Cyanide, Total	SM4500-CN E
108.480	001	Fluoride	SM4500-F C
108.490	001	pH	SM4500-H+ B
108.491	001	Ammonia	SM4500-NH3 C (18th)
108.510	001	Nitrite	SM4500-NO2 B
108.520	001	Nitrate-nitrite, Total	SM4500-NO3 E
108.531	001	Dissolved Oxygen	SM4500-O G
108.540	001	Phosphate, Ortho	SM4500-P E
108.541	001	Phosphorus, Total	SM4500-P E
108.590	001	Biochemical Oxygen Demand	SM5210B
108.591	001	Carbonaceous BOD	SM5210B
108.610	001	Total Organic Carbon	SM5310B
108.640	001	Surfactants	SM5540C
108.660	001	Chemical Oxygen Demand	HACH8000
108.672	001	Phosphate, Ortho	HACH8048
108.675	001	Phosphorus, Total	HACH8190

Field of Testing: 109 - Toxic Chemical Elements of Wastewater

109.010	001	Aluminum	EPA 200.7
109.010	002	Antimony	EPA 200.7
109.010	003	Arsenic	EPA 200.7
109.010	004	Barium	EPA 200.7
109.010	005	Beryllium	EPA 200.7
109.010	007	Cadmium	EPA 200.7
109.010	009	Chromium	EPA 200.7
109.010	010	Cobalt	EPA 200.7
109.010	011	Copper	EPA 200.7
109.010	012	Iron	EPA 200.7
109.010	013	Lead	EPA 200.7
109.010	015	Manganese	EPA 200.7
109.010	016	Molybdenum	EPA 200.7

109.010	017	Nickel	EPA 200.7
109.010	019	Selenium	EPA 200.7
109.010	021	Silver	EPA 200.7
109.010	023	Thallium	EPA 200.7
109.010	024	Tin	EPA 200.7
109.010	025	Titanium	EPA 200.7
109.010	026	Vanadium	EPA 200.7
109.010	027	Zinc	EPA 200.7
109.020	001	Aluminum	EPA 200.8
109.020	002	Antimony	EPA 200.8
109.020	003	Arsenic	EPA 200.8
109.020	004	Barium	EPA 200.8
109.020	005	Beryllium	EPA 200.8
109.020	006	Cadmium	EPA 200.8
109.020	007	Chromium	EPA 200.8
109.020	008	Cobalt	EPA 200.8
109.020	009	Copper	EPA 200.8
109.020	010	Lead	EPA 200.8
109.020	011	Manganese	EPA 200.8
109.020	012	Molybdenum	EPA 200.8
109.020	013	Nickel	EPA 200.8
109.020	014	Selenium	EPA 200.8
109.020	015	Silver	EPA 200.8
109.020	016	Thallium	EPA 200.8
109.020	017	Vanadium	EPA 200.8
109.020	018	Zinc	EPA 200.8
109.190	001	Mercury	EPA 245.1
109.811	001	Chromium (VI)	SM3500-Cr D (18th/19th)

Field of Testing: 110 - Volatile Organic Chemistry of Wastewater

110.040	040	Halogenated Hydrocarbons	EPA 624
110.040	041	Aromatic Compounds	EPA 624
110.040	042	Oxygenates	EPA 624

Field of Testing: 111 - Semi-volatile Organic Chemistry of Wastewater

111.101	032	Polynuclear Aromatic Hydrocarbons	EPA 625
111.101	034	Phthalates	EPA 625
111.101	036	Other Extractables	EPA 625
111.170	030	Organochlorine Pesticides	EPA 608
111.170	031	PCBs	EPA 608

Field of Testing: 114 - Inorganic Chemistry of Hazardous Waste

114.010	001	Antimony	EPA 6010B
114.010	002	Arsenic	EPA 6010B
114.010	003	Barium	EPA 6010B
114.010	004	Beryllium	EPA 6010B

114.010	005	Cadmium	EPA 6010B
114.010	006	Chromium	EPA 6010B
114.010	007	Cobalt	EPA 6010B
114.010	008	Copper	EPA 6010B
114.010	009	Lead	EPA 6010B
114.010	010	Molybdenum	EPA 6010B
114.010	011	Nickel	EPA 6010B
114.010	012	Selenium	EPA 6010B
114.010	013	Silver	EPA 6010B
114.010	014	Thallium	EPA 6010B
114.010	015	Vanadium	EPA 6010B
114.010	016	Zinc	EPA 6010B
114.020	001	Antimony	EPA 6020
114.020	002	Arsenic	EPA 6020
114.020	003	Barium	EPA 6020
114.020	004	Beryllium	EPA 6020
114.020	005	Cadmium	EPA 6020
114.020	006	Chromium	EPA 6020
114.020	007	Cobalt	EPA 6020
114.020	008	Copper	EPA 6020
114.020	009	Lead	EPA 6020
114.020	010	Molybdenum	EPA 6020
114.020	011	Nickel	EPA 6020
114.020	012	Selenium	EPA 6020
114.020	013	Silver	EPA 6020
114.020	014	Thallium	EPA 6020
114.020	015	Vanadium	EPA 6020
114.020	016	Zinc	EPA 6020
114.103	001	Chromium (VI)	EPA 7196A
114.140	001	Mercury	EPA 7470A
114.141	001	Mercury	EPA 7471A
114.222	001	Cyanide	EPA 9014
114.230	001	Sulfides, Total	EPA 9034
114.241	001	Corrosivity - pH Determination	EPA 9045C
114.270	001	Fluoride	EPA 9214

Field of Testing: 115 - Extraction Test of Hazardous Waste

115.020	001	Toxicity Characteristic Leaching Procedure (TCLP)	EPA 1311
115.030	001	Waste Extraction Test (WET)	CCR Chapter 11, Article 5, Appendix II
115.040	001	Synthetic Precipitation Leaching Procedure (SPLP)	EPA 1312

Field of Testing: 116 - Volatile Organic Chemistry of Hazardous Waste

116.030	001	Gasoline-range Organics	EPA 8015B
116.040	062	BTEX	EPA 8021B
116.080	000	Volatile Organic Compounds	EPA 8260B

116.080 120 Oxygenates EPA 8260B

116.110 001 Total Petroleum Hydrocarbons - Gasoline LUFT

Field of Testing: 117 - Semi-volatile Organic Chemistry of Hazardous Waste

117.010 001 Diesel-range Total Petroleum Hydrocarbons EPA 8015B

117.016 001 Diesel-range Total Petroleum Hydrocarbons LUFT

117.017 001 TRPH Screening EPA 418.1

117.110 000 Extractable Organics EPA 8270C

117.210 000 Organochlorine Pesticides EPA 8081A

117.220 000 PCBs EPA 8082

117.240 000 Organophosphorus Pesticides EPA 8141A

Field of Testing: 120 - Physical Properties of Hazardous Waste

120.010 001 Ignitability EPA 1010

120.022 001 Ignitability EPA 1030

120.040 001 Reactive Cyanide Section 7.3 SW-846

120.050 001 Reactive Sulfide Section 7.3 SW-846

120.080 001 Corrosivity - pH Determination EPA 9045C

Field of Testing: 126 - Microbiology of Recreational Water

126.010 001 Total Coliform (Enumeration) SM9221A,B,C

126.030 001 Fecal Coliform (Enumeration) SM9221E

126.061 001 Enterococci SM9230B

126.080 001 Enterococci IDEXX

City of National City
Selenium Monitoring Field Datasheet

Site ID				Latitude	
Location				Longitude	
				Observer	
Date		Time			

ATMOSPHERIC / FLOW CONDITIONS

Weather Clear Partly Cloudy Overcast Fog **Amount of Rainfall** > 0.1" < 0.1"
Tide Low High **Tide Height:** _____ ft.
Last Rain > 72 hours < 72 hours **Water Flow** Dry Ponded Flowing **Flow rate:** _____ gpm

Field Screening Samples Collected? Yes No **Analytical Lab Samples Collected?** Yes No

Water Temp (°C)		Salinity (ppm CaCO ₃) (optional)	
Specific Conductance (mS/cm)			

COMMENTS: _____

Site ID				Latitude	
Location				Longitude	
				Observer	
Date		Time			

ATMOSPHERIC / FLOW CONDITIONS

Weather Clear Partly Cloudy Overcast Fog **Amount of Rainfall** > 0.1" < 0.1"
Tide Low High **Tide Height:** _____ ft.
Last Rain > 72 hours < 72 hours **Water Flow** Dry Ponded Flowing **Flow rate:** _____ gpm

Field Screening Samples Collected? Yes No **Analytical Lab Samples Collected?** Yes No

Water Temp (°C)		Salinity (ppm CaCO ₃) (optional)	
Specific Conductance (mS/cm)			

COMMENTS: _____

D-MAX Engineering, Inc.
Quality Assurance/Quality Control

Daily Field Meter Calibration Log

[illegible]

Notes: _____

**APPENDIX A.4-C: PUEBLO SAN DIEGO HYDROLOGIC UNIT: CREEK
REFUSE ASSESSMENT PROGRAM SPECIAL STUDY STANDARD
OPERATING PROCEDURE**

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SOP # 101.1

TRASH ASSESSMENT MONITORING

I. Purpose

To conduct uniform Trash Assessment Monitoring at designated locations.

II. Summary of Procedures

Designated locations will be subject to a trash assessment. Locations will be photographed, rated and categorized. Included are examples, images and tables for guidance.

III. Materials

- A.** Toughbook with SWDMS data base program and/or
- B.** City of San Diego Trash Assessment Program Worksheet
- C.** Pen/Pencil as needed
- D.** Clipboard as needed
- E.** Camera
- F.** GPS Unit as needed
- G.** Site Directions, Photos, and Maps as needed
- H.** Cell phone

IV. Assessment Procedures for SWDMS Database (Image 1)

A. Getting started

1. Take a photograph of the trash/area that is evaluated.
2. Open SWDMS. Create or open an existing sample document.
3. Click on the Trash tab.
4. Check the Rapid Trash Assessment Data Collected box.
5. Determine whether or not trash in the conveyance is readily visible to the public. Check Yes if it is, or No if it is not.
6. Check the Photo Taken box when a photo is taken (note a photo should be taken at every site evaluated for trash)

B. Area Assessed

1. Estimate and enter the survey area length(ft), width(ft) and depth(ft) using the following guidelines:
 - Manholes/Catchbasins: estimated visible bottom area.

- Channels: estimated length of visible and accessible affected/drainage area across the estimated width of the channel. For flat bottomed channels, the estimated width is determined by the high water mark and for more incised channels the width is estimated between the vertical banks.
- Storm Drain Outfalls: estimated length of downstream affected area, across the estimated width of the drainage area.

C. Estimate and enter what percentage of the area assessed (the “box”) would be filled with trash.

D. The “Estimated Volume” (ft³) and “Trash Volume” (ft³) will automatically calculate.

***NOTE:** Total area surveyed can be expected to vary year-to-year based on a number of factors, including changes in drainage patterns due to different flows in the conveyance system, changes in the presence of vegetation, accessibility, and variability in drainage area definition from one observer to the next.*

***NOTE:** Total volume in cubic feet depends on length, width and depth measurement. In order to establish the area assessed you must estimate the length, width, and depth of the conveyance area you are surveying by visualizing the conveyance as a box. The maximum recordable length of any area surveyed shall be 100ft. The minimum recordable depth of any surveyed area shall be .083ft. (1 inch). The minimum recordable coverage shall be 0%, **including when there is no trash present.** In this instance, a note shall be made in the comments section: “No Trash.”*

E. Trash Assessment

1. Highlight a parameter and choose a condition from the drop down list. Each condition is described to the right of the condition selection. Read through each condition for each parameter as needed to select the proper option. (Table 1)
2. Repeat for each Parameter, there are seven and each must be addressed.

***NOTE:** Use the Condition Description to help you select the proper condition for each parameter. The number of items you have addressed will be indicated on the left of the condition description.*

F. Overall Condition

1. The Score and Condition will automatically update based on the condition selections made for each parameter.
2. Check the appropriate boxes under Actions to be Taken. NOTE: Each condition will reveal different actions that can be taken. (Table 2)

G. Trash Source

1. Select a Source Category from the dropdown list. (Table 3)
2. Select the most likely Source, Disposal Type, and Entry Route. (Table 4-6)

NOTE: If there is more than one likely Source, Disposal Type, or Entry Route for any source category use additional lines for that Source Category. See a narrative example below.

3. Enter what percentage of the estimated total volume of trash this Source Category represents. Round to the nearest 5%.
4. Repeat steps 1-3 for each Source Category observed at the assessment site.

NOTE: When all sources are entered the percentage column must equal 100%

Example: Food packaging may be observed at a monitoring location. Some of the food packaging appears to be litter originating from the general public that was transported via the storm drain. The observer would note that on the worksheet along with an estimate of how much of the total trash present this food packaging represents. Then the observer may record on another line that additional food packaging is present, appearing to originate as litter from a nearby homeless encampment, from a route other than storm drain transport. Again, an estimate of how much of the total trash present this food packaging represents is recorded.

Hints for determining the Potential Trash Source, Potential Method of Disposal, and Conveyance:

- Pay attention to the surrounding land uses- is the area mostly residential? Are there schools nearby? What sorts of businesses are close? Does the site drain freeways or major roads? Can a connection be made between land use and trash category?
- Evidence of homeless activity in the area includes tents, mattresses, Arundo huts, feces and toilet paper, clothing, cooking utensils and food containers, etc.
- At outfalls, look for a “trash plume” or evidence of flow patterns to help distinguish between trash that has entered the conveyance via the outfall and trash entering via other means.
- An intact trash bag in the conveyance is reliable evidence of dumping, as are larger objects thrown over bridges or onto hillsides and banks. Trash dumped

upstream may enter the storm drain system from bags that have broken open or from large piles of loose trash. Some of this trash may appear to be litter when observed at the outfall. An observer may occasionally be able to see that dumped trash, not litter, is entering the conveyance system. More often though, the observer will only see a very limited portion of the upstream system, and will not be able to tell if trash from the outfall is the result of littering or dumping; this decision is left to best professional judgment.

- Comparisons of trash upstream of outlets to what is seen at the storm drain may be helpful in determining the potential method of disposal, when feasible. In tidally influenced areas trash from all disposal methods and conveyances may be redistributed in the creek making those determinations difficult.

NOTE: When unable to complete the Trash Assessment according to this work instruction, use best professional judgment to complete the assessment and make note of the differences in the comment section of the data sheet.

V. Assessment Procedures For Paper Worksheet (Image 2a&b)

A. Getting Started

1. Take a photograph of the trash/area that is evaluated.
2. Record Site ID, Date of Visit, and Observer initials on both pages of the worksheet.
3. Determine and record whether or not trash in the conveyance is readily visible to the public by circling yes or no.
4. Record whether or not a photo was taken by circling yes or no. (note a photo should be taken at every site evaluated for trash)

B. Area Assessed

1. Estimate and record the survey area length(ft), width(ft) and depth(ft) using the following guidelines:
 - Manholes/Catchbasins: estimated visible bottom area.
 - Channels: estimated length of visible and accessible affected/drainage area across the estimated width of the channel. For flat bottomed channels, the estimated width is determined by the high water mark and for more incised channels the width is estimated between the vertical banks.
 - Storm Drain Outfalls: estimated length of downstream affected area, across the estimated width of the drainage area.
2. Estimate and record what percentage of the area assessed (the “box”) would be filled with trash.

3. Calculate and record the Total Assessed Volume (ft³) and the Total Trash Volume (ft³). See equations below. (May be completed at the office)

- $TAV = \text{Total Assessed Volume (ft}^3\text{)} = \text{Length (ft)} \times \text{Width (ft)} \times \text{Depth (ft)}$
- $TTV = \text{Total Trash Volume (ft}^3\text{)} = TAV \text{ (ft}^3\text{)} \times \% \text{ Trash cover} \div 100$

NOTE: Total area surveyed can be expected to vary year-to-year based on a number of factors, including changes in drainage patterns due to different flows in the conveyance system, changes in the presence of vegetation, accessibility, and variability in drainage area definition from one observer to the next.

NOTE: Total volume in cubic feet depends on length, width and depth measurement. In order to establish the area assessed you must estimate the length, width, and depth of the conveyance area you are surveying by visualizing the conveyance as a box. The maximum recordable length of any area surveyed shall be 100ft. The minimum recordable depth of any surveyed area shall be .083ft. (1 inch). The minimum recordable coverage shall be 0%, **including when there is no trash present**. In this instance, a note shall be made in the comments section: “No Trash.”

C. Trash Assessment

1. For each of the seven Trash Assessment Parameters, circle a condition score. Each condition is described on the worksheet above the score. Read through each condition for each parameter as needed to select the proper score. (Table 1)
2. Add the scores for each column and record the totals at the bottom of the chart columns.

D. Overall Condition

1. Add the chart column totals to record the overall score. Circle the Condition that applies to the overall score.
2. Check the appropriate boxes under Actions to be Taken. NOTE: Each condition has different actions that can be taken. (Table 2)

E. Trash Source

1. Choose and record an applicable Trash Category from the list at the bottom of the chart. (Table 3)

2. For the selected category, record the most likely trash Source, Disposal Type, and Entry Route for the category.

NOTE: If there is more than one likely Source, Disposal Type, or Entry Route for any source category, use additional lines for that Source Category. See the box below for option explanations. See a narrative example below.

- F. **Record what percentage of the estimated total volume of trash this Source Category represents. Round to the nearest 5%.**
- G. **Repeat steps 1-3 for each Source Category observed at the assessment site.**

NOTE: when all sources are entered the percentage column must equal 100%

Example: Food packaging may be observed at a monitoring location. Some of the food packaging appears to be litter originating from the general public that was transported via the storm drain. The observer would note that on the worksheet along with an estimate of how much of the total trash present this food packaging represents. Then the observer may record on another line that additional food packaging is present, appearing to originate as litter from a nearby homeless encampment, from a route other than storm drain transport. Again, an estimate of how much of the total trash present this food packaging represents is recorded.

Hints for determining the Potential Trash Source, Potential Method of Disposal, and Conveyance:

- Pay attention to the surrounding land uses- is the area mostly residential? Are there schools nearby? What sorts of businesses are close? Does the site drain freeways or major roads? Can a connection be made between land use and trash category?
- Evidence of homeless activity in the area includes tents, mattresses, Arundo huts, feces and toilet paper, clothing, cooking utensils and food containers, etc.
- At outfalls, look for a “trash plume” or evidence of flow patterns to help distinguish between trash that has entered the conveyance via the outfall and trash entering via other means.
- An intact trash bag in the conveyance is reliable evidence of dumping, as are larger objects thrown over bridges or onto hillsides and banks. Trash dumped upstream may enter the storm drain system from bags that have broken open or from large piles of loose trash. Some of this trash may appear to be litter when observed at the outfall. An observer may occasionally be able to see that dumped trash, not litter, is entering the conveyance system. More often though, the observer will only see a very limited portion of the upstream system, and will not be able to tell if trash from the outfall is the result of littering or dumping; this decision is left to best professional judgment.

- Comparisons of trash upstream of outlets to what is seen at the storm drain may be helpful in determining the potential method of disposal, when feasible. In tidally influenced areas trash from all disposal methods and conveyances may be redistributed in the creek making those determinations difficult.

NOTE: When unable to complete the Trash Assessment according to this work instruction, use best professional judgment to complete the assessment and make note of the differences in the comment section of the data sheet.

VI. References

- A. Steven M. Moore, et. all. April 2007. A Rapid Trash Assessment Method Applied to Waters of the San Francisco Bay Region: Trash Measurement in Streams. SWAMP.
<<http://www.waterboards.ca.gov/sanfranciscobay/docs/swampthrashreport.pdf>>**

Table 1 – Condition Category Options Explanation Table

Overall level of Trash	
Optimal Score: 1	On first glance, no trash visible. Little or no trash (<10 pieces) evident when streambed and stream banks are closely examined for litter and debris, for instance by looking under leaves.
Sub optimal Score: 2	On first glance, little or no trash visible. After close inspection small levels of trash (10-50 pieces) evident in stream bank and streambed.
Marginal Score: 3	Trash is evident in low to medium levels at first glance. Close inspection of survey area reveals significant quantity of trash (51-100 pieces). Evidence of site being used by people (scattered cans, bottles, food wrappers, blankets, clothing, etc.)
Poor Score: 4	Trash distracts the eye on first glance. Close inspection of survey area reveals substantial quantities of trash (101-400 pieces). Site used frequently by people.
Very Poor Score: 5	Site is significantly impacted by trash. Evidence of trash accumulation behind a constriction point or evidence of excessive dumping. Evaluated area contains substantial levels of litter and debris (>400 pieces).
Threat to Aquatic Life	
Optimal Score: 1	Trash, if any, is mostly paper or wood products or other biodegradable materials. Note: A large amount of rapidly biodegradable material like food waste creates high oxygen demand, and should not be scored as optimal.
Sub optimal Score: 2	Little or no (<10 pieces) persistent, buoyant litter such as: hard or soft plastics, Styrofoam, balloons, cigarette butts. Presence of settleable, degradable, and nontoxic debris such as glass or metal.
Marginal Score: 3	Medium prevalence (10-50 pieces) of persistent, buoyant litter such as: hard or soft plastics, Styrofoam, balloons, cigarette butts. Larger deposits (< 50 pieces) of settleable debris such as glass or metal. Any evidence of clumps of deposited yard waste or leaf litter.
Poor Score: 4	Large amount (51-100 pieces) of persistent, buoyant litter such as: hard or soft plastics, balloons, Styrofoam, cigarette butts; toxic items such as batteries, lighters, or spray cans; large clumps of yard waste or dumped leaf litter; or large amount (51-100 pieces) of settleable glass or metal.
Very Poor Score: 5	>100 pieces of persistent, buoyant litter such as: hard or soft plastics, balloons, Styrofoam, cigarette butts; toxic items such as batteries, lighters, or spray cans; large clumps of yard waste or dumped leaf litter; or large amount (>100 pieces) of settleable glass or metal.

Table 1 Cont. – Condition Category Options Explanation Table

Threat to Human Health	
Optimal Score: 1	No evidence of bacteria or virus hazards such as medical waste, diapers, pet or human waste. No toxic substances such as chemical containers or batteries. No ponded water for mosquito production. No evidence of puncture and laceration hazards such as broken glass or metal debris.
Sub optimal Score: 2	No bacteria or virus hazards or sources of toxic substances, but small presence (<10 pieces) of puncture and laceration hazards such as broken glass and metal debris. Presence of ponded water in trash items such as tires or containers for mosquito production, but no presence of mosquitoes.
Marginal Score: 3	Presence of any one of the following: hypodermic needles or other medical waste; used diaper, pet waste, or human feces; any toxic substance such as chemical containers, batteries, or fluorescent light bulbs (mercury). Medium prevalence (10-50 pieces) of puncture hazards.
Poor Score: 4	Presence of two of the items described in the marginal condition category. High prevalence of (51-100 pieces) of puncture or laceration hazards.
Very Poor Score: 5	Presence of more than two of the items described in the marginal condition category. Extremely high prevalence (>100 pieces) of puncture or laceration hazards.
Dumping	
Optimal Score: 1	No evidence of illegal dumping. No bags of trash, no yard waste, no household items placed at site to avoid proper disposal, no shopping carts.
Sub optimal Score: 2	Some evidence of illegal dumping. Limited vehicular access limits the amount of potential dumping, or material dumped is diffuse paper-based debris.
Marginal Score: 3	Presence of one of the following: furniture, appliances, shopping carts, bags of garbage or yard waste, coupled with vehicular access that facilitates in-and-out dumping of materials to avoid landfill costs.
Poor Score: 4	Evidence of chronic dumping, with more than one of the following items: furniture, appliances, shopping carts, bags of garbage, or yard waste. Easy vehicular access for in- and-out dumping of materials to avoid landfill costs.
Very Poor Score: 5	Evidence of excessive chronic dumping, with several of the following items: furniture, appliances, shopping carts, bags of garbage, or yard waste. Easy vehicular access for in- and-out dumping of materials to avoid landfill costs.

Table 1 Cont. – Condition Category Options Explanation Table

Littering	
Optimal Score: 1	Any trash is incidental litter (< 5 pieces) or carried downstream from another location.
Sub optimal Score: 2	Evidence of some tossed/dropped litter (<10 pieces).
Marginal Score: 3	Tossed/dropped litter is prevalent (10-50 pieces).
Poor Score: 4	Large amount of tossed/dropped litter (51-100 pieces).
Very Poor Score: 5	Excessive amount of tossed/dropped litter (>100 pieces).
Accumulation from Storm Drain	
Optimal Score: 1	Little or no trash in the survey area which comes from the storm drain (< 5 pieces)
Sub optimal Score: 2	Some trash in the survey area which comes from the storm drain (5-10 pieces)
Marginal Score: 3	Significant amount of trash in the survey area comes from the storm drain (10-50 pieces)
Poor Score: 4	Large amount of trash in the survey area comes from the storm drain (51-100 pieces)
Very Poor Score: 5	Excessive amount of trash in the survey area comes from the storm drain (> 100 pieces)
Accumulation from Outside Transport	
Optimal Score: 1	Trash, if any, appears to have been directly deposited at the survey area either via the storm drain or other direct deposition (Litter, dumping)
Sub optimal Score: 2	Some trash (<10 pieces) deposited at survey area by outside transport (means, other than storm drain, littering, or dumping)
Marginal Score: 3	Significant amount of trash (10 to 50 pieces) deposited at survey area by outside transport (means other than storm drain, littering, or dumping)
Poor Score: 4	Large amount of trash (51-100 pieces) deposited at survey area by outside transport (means other than storm drain, littering, or dumping)
Very Poor Score: 5	Excessive amount of trash (> 100 pieces) deposited at survey area by outside transport (means other than storm drain, littering, or dumping)

Table 2 – Actions to be Taken Options Table

Actions to be taken	
Optimal & Sub-Optimal Score = 1 & 2-14	Continue Public Outreach and Education
	Continue Scheduled Monitoring
	None
	Other
Marginal, Poor & Very Poor Score = 15-21, 22-28 & 29-35	Enforcement Action
	Increased Public Outreach and Education
	Install BMPS's/increase use of existing BMPS's
	Municipal Crew to collect trash
	None
	Other (for this option fill in the blank box that appears)

Table 3 – Source Category Options Explanation Table

Source Category	
Food Packaging	Beverage bottles and cans, juice boxes, snack food wrappers, fast food wrappers/containers
Other Household	Styrofoam, writing paper, newspaper, misc household-use items/containers, garbage bags, toys, empty Rx bottles
Cigarette Butts	Cigarette butts, cigar butts
Fabric/clothing	Clothing, towels/rags, blankets/sheets, sleeping bags, carpets/rugs
Large Objects	Large appliances, shopping carts, furniture
Construction	Concrete debris, rebar, tools, gravel, dirt, lumber, roofing, etc
Landscape	Grass clippings, leaf debris, tree limbs, palm fronds, mulch
Toxic Waste	Paints, solvents, fuels, oils, batteries, full Rx bottles, smaller electronics
Automotive	Tires, seats, frames, misc parts
Biohazard	Needles, feces
Plastic Grocery Bags	Double-handled plastic grocery bags
Other (Specify)	Items not able to be placed in above categories. Specify this item in the “comments” box near the time and sampler boxes

Table 4 – Source Options Explanation Table

Source	
Business Related	TBD
General Public	TBD
Homeless Camp	TBD
School	TBD

Table 5 – Disposal Type Options Explanation Table

Disposal Type	
Dumping	TBD
Littering	TBD

Table 6 – Entry Route Options Explanation Table

Entry Route	
Dumping	TBD
Other	TBD
Storm Drain	TBD
Upstream	TBD

Image 1 – SWDMS Trash Assessment Example Snapshot

Home
Search
Sites
Samples
Reports
Sync
Admin

General Site Description
Investigation: Dry Weather Monitoring
Save Record
Cancel
Delete Record

Sample ID: DW851-120910
Date: 9/10/2012
Time: 09:45
Comments: Specify any Other items or routes here in addition to any other notes/comments you have about the site.
Latitude: 32.576
Longitude: -117.08849
Violation #:
Inspection Status: ☒ Open ☐ Closed

Observer: Jocelyn, Katie
Sampler: JE
Project: Dry Weather Monitoring
Program:
Presumptive Notification: ☐
Lab Sample Collected: ☒

Visual Observations
Field Measurements
Trash
Lab Results

☒ **Rapid Trash Assessment Data Collected**

Trash Readily Visible to the Public: ☐ Yes ☒ No

Area Assessed
Length (ft): 10
Width (ft): 5
Depth (ft): 0.08
Est. Volume (ft³): 4
% Trash Cover: 10
Trash Volume (ft³): 0.4

Trash Assessment

Parameter	Condition	Condition Description
Overall Level of Trash		
Threat to Aquatic Life		
Threat to Human Health		
Dumping		
Littering		
Accumulation from Storm Drain		
Accumulation from Outside Transport		

Addressed 7 of 7

Overall Condition
Score: 18
Condition: Marginal

Actions to be taken
☐ Enforcement Action
☒ Increased Public Outreach and Education E
☒ Install BMPs's/increase use of existing BMF
☐ Municipal Crew to collect trash
☐ None

Trash Source (100%)

Source Category	Source	Disposal Type	Entry Route
50	%		
50% Food Packaging - Homeless Camp Other Littering (Rank: 1)			
50% Food Packaging - General Public Storm Drain Littering (Rank: 2)			

Add
Cancel
Delete

Photos
☒ Photo Taken
Photo #:
Comments:

Image 2a – Paper Copy Trash Assessment Worksheet Page 1/2




City of San Diego Trash Assessment Worksheet

Record all measurements in feet.

1 inch = .083ft	7 inch = .581ft
2 inch = .166ft	8 inch = .664ft
3 inch = .249ft	9 inch = .747ft
4 inch = .332ft	10 inch = .83ft
5 inch = .415ft	11 inch = .913ft
6 inch = .498ft	12 inch = 1 foot

Site ID: _____
Date: _____
Observer(s): _____

Is trash readily visible to the public? (Circle one) **Yes** **No**
Photo Taken? (Circle one) **Yes** **No**

Area Assessed _____

Length (ft): _____

Width (ft): _____

Depth (ft): _____

% Trash Cover: _____

Total Assessed Volume (ft³): LxWxD _____

Total Trash Volume (ft³): TAV x %TC ÷ 100 _____

Trash Assessment Parameter	TRASH ASSESSMENT CONDITIONS				
	Optimal	Sub optimal	Marginal	Poor	Very Poor
1. Overall Level of Trash	At first glance, no trash visible. Close inspection of survey area reveals little or no trash (<10 pieces).	At first glance, little or no trash visible. Close inspection of survey area reveals small quantity of trash (10-50 pieces).	Trash is evident in low to medium levels at first glance. Close inspection of survey area reveals significant quantity of trash (51-100 pieces).	Trash distracts the eye at first glance. Close inspection of survey area reveals substantial quantity of trash (101-400 pieces).	Trash is immediately obvious and visually dominant at first glance. Close inspection of survey area reveals excessive quantity of trash (>400 pieces).
SCORE	1	2	3	4	5
2. Threat to Aquatic Life	Trash, if any, is mostly paper or wood products or other biodegradable materials. Note: deposited biodegradable material like yard waste, food waste or leaf litter creates high oxygen demand, and should not be scored as optimal.	Little or no (<10 pieces) persistent, buoyant litter such as: hard or soft plastics, Styrofoam, balloons, cigarette butts. Presence of settleable, degradable, and nontoxic debris such as glass or metal.	Medium prevalence (10-50 pieces) of persistent, buoyant litter such as: hard or soft plastics, Styrofoam, balloons, cigarette butts. Any evidence of clumps of deposited yard waste, food waste or leaf litter. Medium prevalence (10-50 pieces) of settleable debris such as glass or metal.	Large amount (51-100 pieces) of persistent, buoyant litter such as: hard or soft plastics, balloons, Styrofoam, cigarette butts; toxic items such as batteries, lighters, or spray cans; large clumps of deposited yard waste, food waste or leaf litter; or large amount (51-100 pieces) of settleable debris such as glass or metal.	Excessive amount (>100 pieces) of persistent, buoyant litter such as: hard or soft plastics, balloons, Styrofoam, cigarette butts; toxic items such as batteries, lighters, or spray cans; large clumps of deposited yard waste, food waste or leaf litter; or excessive amount (>100 pieces) of settleable debris such as glass or metal.
SCORE	1	2	3	4	5
3. Threat to Human Health	No evidence of bacteria or virus hazards such as medical waste, diapers, animal or human waste. No toxic substances such as chemical containers or batteries. No ponded water for mosquito production. No evidence of puncture and laceration hazards such as broken glass or metal debris.	No bacteria or virus hazards or sources of toxic substances, but small presence (<10 pieces) of puncture and laceration hazards such as broken glass and metal debris. Presence of ponded water in trash items such as tires or containers for mosquito production, but no presence of mosquitoes.	Presence of any one of the following: mosquitoes, hypodermic needles or other medical waste; used diaper, animal waste, or human feces; any toxic substance such as chemical containers, batteries, or fluorescent light bulbs. Medium prevalence (10-50 pieces) of puncture or laceration hazards.	Presence of two of the items described in the marginal condition category. High prevalence (51-100 pieces) of puncture or laceration hazards.	Presence of more than two of the items described in the marginal condition category. Extremely high prevalence (>100 pieces) of puncture or laceration hazards.
SCORE	1	2	3	4	5
4. Dumping	No evidence of dumping. No bags of trash, no yard waste, no household items placed at site to avoid proper disposal, no shopping carts.	Some evidence of dumping. Limited vehicular access limits the amount of potential dumping, or material dumped is diffuse paper-based debris.	Presence of one of the following: furniture, appliances, shopping carts, bags of garbage or yard waste, coupled with vehicular access that facilitates in-and-out dumping of materials to avoid landfill costs.	Evidence of chronic dumping, with more than one of the following items: furniture, appliances, shopping carts, bags of garbage, or yard waste. Easy vehicular access for in-and-out dumping of materials to avoid landfill costs.	Evidence of excessive chronic dumping, with several of the following items: furniture, appliances, shopping carts, bags of garbage, or yard waste. Easy vehicular access for in-and-out dumping of materials to avoid landfill costs.
SCORE	1	2	3	4	5
5. Littering	Tossed/dropped litter is incidental (< 5 pieces).	Evidence of some tossed/dropped litter (5-10 pieces).	Tossed/dropped litter is prevalent (10-50 pieces).	Large amount of tossed/dropped litter (51-100 pieces).	Excessive amount of tossed/dropped litter (>100 pieces).
SCORE	1	2	3	4	5

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Image 2b – Paper Copy Trash Assessment Worksheet Page 2/2




City of San Diego Trash Assessment Worksheet

Record all measurements in feet.

1 inch = .083ft	7 inch = .581ft
2 inch = .166ft	8 inch = .664ft
3 inch = .249ft	9 inch = .747ft
4 inch = .332ft	10 inch = .83ft
5 inch = .415ft	11 inch = .913ft
6 inch = .498ft	12 inch = 1 foot

Site ID: _____
Date: _____
Observer(s): _____

6. Trash Accumulation from Storm Drain	Little or no trash in the survey area which comes from the storm drain (< 5 pieces).	Some trash in the survey area which comes from the storm drain (5-10 pieces).	Significant amount of trash in the survey area comes from the storm drain (10-50 pieces).	Large amount of trash in the survey area comes from the storm drain (51-100 pieces).	Excessive amount of trash in the survey area comes from the storm drain (>100 pieces).
SCORE	1	2	3	4	5
7. Trash Accumulation From Outside Transport	Trash, if any, appears to have been directly deposited at the survey area either via the storm drain or other direct deposition (Litter, dumping).	Some trash (<10 pieces) deposited at survey area by outside transport (means other than storm drain, littering, or dumping).	Significant amount of trash (10 to 50 pieces) deposited at survey area by outside transport (means other than storm drain, littering, or dumping).	Large amount of trash (51-100 pieces) deposited at survey area by outside transport (means other than storm drain, littering, or dumping).	Excessive amount of trash (>100 pieces) deposited at survey area by outside transport (means other than storm drain, littering, or dumping).
SCORE	1	2	3	4	5
COLUMN TOTALS					

OVERALL CONDITION

TOTAL OF ALL COLUMNS = OVERALL SCORE: _____

OVERALL SCORE	OVERALL CONDITION	ACTION TO BE TAKEN
7	Optimal	☐ Continue Scheduled Monitoring ☐ Continue Public Outreach and Education ☐ Other
8-14	Sub-optimal	☐ Continue Scheduled Monitoring ☐ Continue Public Outreach and Education ☐ Other
15-21	Marginal	☐ Increased Public Outreach and Education Efforts ☐ Enforcement Action ☐ Install BMPs' s/increase use of existing BMP's ☐ Municipal Crew to collect trash ☐ Other
22-28	Poor	☐ Increased Public Outreach and Education Efforts ☐ Enforcement Action ☐ Install BMPs' s/increase use of existing BMP's ☐ Municipal Crew to collect trash ☐ Other
29-35	Very Poor	☐ Increased Public Outreach and Education Efforts ☐ Enforcement Action ☐ Install BMPs' s/increase use of existing BMP's ☐ Municipal Crew to collect trash ☐ Other

TRASH SOURCE

Trash Category	% of Total Trash Volume	Source				Method of Disposal		Entry Route			
Choose from List Below	<i>*Round to the nearest 5% *Column Sum must = 100%</i>	General Public	Business Related (specify)	School	Homeless/ Transient	Littering	Dumping	Storm Drain	Dumping	Upstream	Other (specify)
		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Automotive Landscape	Biohazard Large Objects	Cigarette Butts	Toxic Waste	Construction	Other Household	Fabrics/Clothing	Plastic Grocery Bags	Food Packaging	Other (specify)		
Comments: _____ _____ _____											

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ATTACHMENT A5. ANALYTE LIST

Intentionally Left Blank

Analyte	Volume Required	Analytical Method	Target Reporting Limit ¹	Units	Max Holding Time
Conventional Parameters					
Dissolved Oxygen	In field	Meter	0.01	mg/L	NA
Dissolved Organic Carbon	250 mL	SM 5310 C	0.6	mg/L	28D
Color	500 mL	SM 2120B	3	Color Units	48H
pH	In field	Meter	0.01	pH	NA
Specific Conductivity	In field	Meter	2.5	µS/cm	NA
MBAS	100 mL	SM5540C	0.05	mg/L	7D
Sulfates	250 mL	USEPA 300.0	1.0	mg/L	28D
TDS	500 mL	SM 2540C	10	mg/L	7D
Temperature	In field	Meter	0.1	°C	NA
Total Hardness	Calculation from Calcium and Manganese	SM 2340B	1	mg/L	6M
Total Organic Carbon	250 mL	SM 5310 C	0.6	mg/L	28D
Trash	In field	Visual Observation	NA	Count	NA
TSS	1000 mL	SM 2540D	0.5	mg/L	7D
Turbidity	In field or lab: 250 mL	Meter	0.5	NTU	NA or 48H

This table describes detailed monitoring and analytical methods that are illustrative and may be revised based on site-specific environmental conditions and equivalent alternate analytical methods.

NA = Not applicable; mL = milliliter; L = liter; D = day; H = hour; M = month

Sediment Toxicity and Benthic Community Effects are listed as a cause for impairment of receiving waters in the San Diego Bay WMA on the 303(d) list, however are not applicable to MS4 Outfalls.

1. SWAMP Target Reporting Limits are recommended and not required. At a minimum, monitoring programs will meet requirements set forth in the State Implementation Plan (SIP).
2. Nitrite and nitrate may be combined and reported as nitrite+nitrate.

Analyte	Volume Required	Analytical Method	Target Reporting Limit ¹	Units	Max Holding Time
Indicator Bacteria					
Enterococcus	100 mL	SM 9230C	1	Colonies/100mL	8H
Fecal Coliform	100 mL	SM 9221E	2	MPN/100mL	8H
Total Coliform	100 mL	SM 9221B	2	MPN/100mL	8H
Inorganic Analytes					
Aluminum (Dissolved)	250 mL	USEPA 200.8	0.3	µg/L	6M
Aluminum (Total)	250 mL	USEPA 200.8	0.3	µg/L	6M
Arsenic (Dissolved)	250 mL	USEPA 200.8	0.3	µg/L	6M
Arsenic (Total)	250 mL	USEPA 200.8	0.3	µg/L	6M
Cadmium (Dissolved)	250 mL	USEPA 200.8	0.01	µg/L	6M
Cadmium (Total)	250 mL	USEPA 200.8	0.01	µg/L	6M
Chromium (Dissolved)	250 mL	USEPA 200.8	0.1	µg/L	6M
Chromium (Total)	250 mL	USEPA 200.8	0.1	µg/L	6M
Chromium III	NA	Calculated from Chromium and Chromium VI	NA	NA	NA

This table describes detailed monitoring and analytical methods that are illustrative and may be revised based on site-specific environmental conditions and equivalent alternate analytical methods.

NA = Not applicable; mL = milliliter; L = liter; D = day; H = hour; M = month

Sediment Toxicity and Benthic Community Effects are listed as a cause for impairment of receiving waters in the San Diego Bay WMA on the 303(d) list, however are not applicable to MS4 Outfalls.

1. SWAMP Target Reporting Limits are recommended and not required. At a minimum, monitoring programs will meet requirements set forth in the State Implementation Plan (SIP).
2. Nitrite and nitrate may be combined and reported as nitrite+nitrate.

Analyte	Volume Required	Analytical Method	Target Reporting Limit ¹	Units	Max Holding Time
Chromium VI	250 mL	USEPA 218.6	0.1	µg/L	28D
Copper (Dissolved)	250 mL	USEPA 200.8	0.01	µg/L	6M
Copper (Total)	250 mL	USEPA 200.8	0.01	µg/L	6M
Iron (Dissolved)	250 mL	USEPA 200.7	0.02	mg/L	6M
Iron (Total)	250 mL	USEPA 200.7	0.02	mg/L	6M
Lead (Dissolved)	250 mL	USEPA 200.8	0.01	µg/L	6M
Lead (Total)	250 mL	USEPA 200.8	0.0002	µg/L	6M
Mercury (Dissolved)	250 mL	USEPA 200.8	0.0002	µg/L	6M
Mercury (Total)	250 mL	USEPA 200.8	0.0002	µg/L	6M
Manganese (Dissolved)	250 mL	USEPA 200.8	0.01	µg/L	6M
Manganese (Total)	250 mL	USEPA 200.8	0.01	µg/L	6M
Nickel (Dissolved)	250 mL	USEPA 200.8	0.02	µg/L	6M
Nickel (Total)	250 mL	USEPA 200.8	0.02	µg/L	6M
Selenium (Dissolved)	250 mL	USEPA 200.8	0.3	µg/L	6M
Selenium (Total)	250 mL	USEPA 200.8	0.3	µg/L	6M
Silver (Dissolved)	250 mL	USEPA 200.8	0.02	µg/L	6M

This table describes detailed monitoring and analytical methods that are illustrative and may be revised based on site-specific environmental conditions and equivalent alternate analytical methods.

NA = Not applicable; mL = milliliter; L = liter; D = day; H = hour; M = month

Sediment Toxicity and Benthic Community Effects are listed as a cause for impairment of receiving waters in the San Diego Bay WMA on the 303(d) list, however are not applicable to MS4 Outfalls.

1. SWAMP Target Reporting Limits are recommended and not required. At a minimum, monitoring programs will meet requirements set forth in the State Implementation Plan (SIP).
2. Nitrite and nitrate may be combined and reported as nitrite+nitrate.

Analyte	Volume Required	Analytical Method	Target Reporting Limit ¹	Units	Max Holding Time
Silver (Total)	250 mL	USEPA 200.8	0.02	µg/L	6M
Thallium (Dissolved)	250 mL	USEPA 200.8	1	µg/L	6M
Thallium (Total)	250 mL	USEPA 200.8	1	µg/L	6M
Zinc (Dissolved)	250 mL	USEPA 200.8	0.1	µg/L	6M
Zinc (Total)	250 mL	USEPA 200.8	0.1	µg/L	6M
Nutrients					
Ammonia	250 mL	USEPA 350.1	0.1	mg/L	28D
Nitrate ²	250 mL	USEPA 353.2	0.01	mg/L	48H
Nitrite ²	250 mL	USEPA 353.2	0.01	mg/L	48H
Orthophosphate	250 mL	USEPA 365.1	0.01	mg/L	48H
Total Kjeldahl Nitrogen (TKN)	250 mL	USEPA 351.2	0.5	mg/L	28D
Total Nitrogen	Calculation	Calculated from TKN, Nitrate, and Nitrite	NA	NA	NA
Phosphorus (Dissolved)	250 mL	USEPA 365.1	0.01	mg/L	28D
Phosphorus (Total)	250 mL	USEPA 365.1	0.01	mg/L	28D
Organics					

This table describes detailed monitoring and analytical methods that are illustrative and may be revised based on site-specific environmental conditions and equivalent alternate analytical methods.

NA = Not applicable; mL = milliliter; L = liter; D = day; H = hour; M = month

Sediment Toxicity and Benthic Community Effects are listed as a cause for impairment of receiving waters in the San Diego Bay WMA on the 303(d) list, however are not applicable to MS4 Outfalls.

1. SWAMP Target Reporting Limits are recommended and not required. At a minimum, monitoring programs will meet requirements set forth in the State Implementation Plan (SIP).
2. Nitrite and nitrate may be combined and reported as nitrite+nitrate.

Analyte	Volume Required	Analytical Method	Target Reporting Limit ¹	Units	Max Holding Time
Chlordane	1000ml	EPA 608	0.002	µg/L	7D
Diazinon	1000 mL	EPA 625	0.05	µg/L	7D
PAHs	1000 mL	EPA 8270C	10	µg/L	7D
PCBs	1000 mL	GC/MS SIM/ EPA 608	0.002	µg/L	7D/7D
Synthetic Organic Compounds					
Organophosphate Pesticides	2 L	USEPA 625M	0.05	µg/L	7/40D
Synthetic Pyrethroid Pesticides	2 L	GC/MS NCI-SIM	2-10	ng/L	7/40D
Toxicity					
Growth with <i>Hyaella azteca</i>	15 L	EPA-821-R-02-013	NA	Pass/Fail	36H
Larval Survival and Growth with <i>Pimephales promelas</i>	15 L	EPA-821-R-02-013	NA	Pass/Fail	36H
Survival and Reproduction with <i>Ceriodaphnia dubia</i>	4 L	EPA-821-R-02-013	NA	Pass/Fail	36H
Growth with <i>Selenastrum capricornutum</i>	4 L	EPA-821-R-02-013	NA	Pass/Fail	36H

This table describes detailed monitoring and analytical methods that are illustrative and may be revised based on site-specific environmental conditions and equivalent alternate analytical methods.

NA = Not applicable; mL = milliliter; L = liter; D = day; H = hour; M = month

Sediment Toxicity and Benthic Community Effects are listed as a cause for impairment of receiving waters in the San Diego Bay WMA on the 303(d) list, however are not applicable to MS4 Outfalls.

1. SWAMP Target Reporting Limits are recommended and not required. At a minimum, monitoring programs will meet requirements set forth in the State Implementation Plan (SIP).
2. Nitrite and nitrate may be combined and reported as nitrite+nitrate.

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ATTACHMENT B. SEDIMENT MONITORING PLAN

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San Diego County Municipal Copermittees Sediment Monitoring Plan-Draft

Prepared For:

County of San Diego Municipal Copermittees

September 2, 2014



San Diego County Municipal Copermittees Sediment Monitoring Plan-Draft

Prepared For:

County of San Diego Municipal Copermittees

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September 2, 2014

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ACRONYMS AND ABBREVIATIONS

ASTM	American Society for Testing and Materials
AVS:SEM	acid-volatile sulfides and simultaneously extracted metals
Bight	Southern California Bight Regional Monitoring Program
BRI	Benthic Response Index
CA EPA	California Environmental Protection Agency
CA LRM	California Logistic Regression Model
CEDEN	California Environmental Data Exchange Network
COC	chain-of-custody
Copermittees	San Diego Regional Copermittees
CSI	Chemical Score Index
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DGPS	Differential Global Positioning System
DO	dissolved oxygen
DTCS	Department of Toxic Substances Control
EC ₅₀	median effective concentration
IBI	Index of Biotic Integrity
ID	inner diameter
LC ₅₀	median lethal concentration
LOE	line of evidence
MgSO ₄	magnesium sulfate
MLOE	multiple lines of evidence
MS4	Municipal Separate Storm Sewer System
MW	molecular weight
NPDES	National Pollutant Discharge Elimination System
OEHHA	Office of Environmental Health Hazard Assessment
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
pH	hydrogen ion concentration
P _{MAX}	maximum probability model
QA	quality assurance
QA/QC	quality assurance/quality control
QAMP	Quality Assurance Management Plan
QAPP	Quality Assurance Project Plan
QC	quality control
RBI	Relative Benthic Index
RIVPACS	River Invertebrate Prediction and Classification System
RL	Reporting Limit
RWQCB	Regional Water Quality Control Board
SCAMIT	Southern California Association of Marine Invertebrate Taxonomists
SDRWQCB	San Diego Regional Water Quality Control Board
SOPs	Standard Operating Procedures
SPME	solid phase microextraction
SQOs	Sediment Quality Objectives
SWAMP	Surface Water Ambient Monitoring Program

SWRCB	State Water Resources Control Board
TIE	toxicity identification evaluation
TMDL	Total Maximum Daily Load
TOC	total organic carbon
USEPA	United States Environmental Protection Agency
WQIP	Water Quality Improvement Plan

UNITS OF MEASURE

cm	centimeter
°C	degrees Celsius
ft	feet or foot
L	liter
m ²	square meters
µg/kg	microgram per kilogram
mg	milligram
mg/kg	milligram per kilogram
mg/L	milligram per liter
mL	milliliter
mm	millimeter
ppt	parts per thousand
%	percent

1.0 INTRODUCTION

The San Diego County Regional Copermittees (Copermittees) are required to conduct sediment quality monitoring in accordance with the requirements of the San Diego Regional Water Quality Control Board (RWQCB) Order No. R9-2013-0001 (Permit), effective June 27, 2013. The Copermittees are required, either individually, in association with multiple Copermittees, or through participation in a water body monitoring coalition to perform sediment quality monitoring to assess compliance with the sediment quality receiving water limits applicable to MS4 discharges to enclosed bays and estuaries. Provision D.1.e.(2) of the Permit requires the Copermittees to develop a Sediment Monitoring Plan for incorporation into the Water Quality Improvement Plan (WQIP) which satisfies the requirements of the *Water Quality Control Plan for Enclosed Bays and Estuaries of California – Part I Sediment Quality* (Sediment Control Plan; State Water Quality Control Board [SWRCB] and California Environmental Protection Agency [CA EPA], 2009; see Appendix A).

Provision D.1.e.(1)(b) of the Permit also requires the Copermittees to participate in the Southern California Bight Regional Monitoring Program (Bight). The Bight Program can be used to simultaneously fulfill all or part of the sediment quality monitoring requirement (Provision D.1.e.(2)) as long as the Bight Program utilizes the Sediment Control Plan to assess the health of San Diego County lagoons. Depending on the outcome of the sediment quality objectives (SQOs) assessments at Bight stations located in San Diego County lagoons, follow-up monitoring may be necessary to meet all of the Permit requirements.

The following Sediment Monitoring Plan describes the sediment quality sample collection and analysis activities that will be implemented by the Copermittees during the Permit term. As required by the Permit, this Sediment Monitoring Plan includes the elements listed in Sections VII.D and VII.E of the Sediment Control Plan (Receiving Water Limits Monitoring Frequency and Sediment Monitoring, respectively), a Sediment Monitoring Quality Assurance Project Plan (QAPP) (Appendix B), and a schedule for completion of monitoring and submission of the Sediment Monitoring Report. Once the sediment quality monitoring is complete, the Copermittees will incorporate a Sediment Monitoring Report into the WQIP Annual Report.

1.1 Background

In 2003, the SWRCB initiated a program to develop SQOs for enclosed bays and estuaries. The primary objective is to protect benthic communities and aquatic life from exposure to contaminants in sediment that have been directly discharged into the water body or indirectly discharged into waters draining into the water body. The SQOs, which are outlined in the Sediment Control Plan, are based on a multiple lines of evidence (MLOE) approach in which the lines of evidence (LOE) are sediment toxicity, sediment chemistry, and benthic community condition, as described in the Sediment Control Plan (see Appendix A) and in Section 3.2. The MLOE approach evaluates the severity of biological effects and the potential for chemically mediated effects to provide a final station level assessment. The Sediment Control Plan was approved by the SWRCB and the Office of Administrative Law on September 16, 2008, and on January 5, 2009, respectively, and was subsequently approved by the United States Environmental Protection Agency (USEPA) on August 25, 2009.

1.2 Monitoring Objective

The primary objective of the sediment monitoring program is to assess compliance with the sediment quality receiving water limits applicable to MS4 discharges to enclosed bays and estuaries of San Diego County. Sediment toxicity, chemistry, and benthic community condition will be assessed using SQOs as described in the Sediment Control Plan (Appendix A). The goals of the SQOs are to determine whether pollutants in sediments are present in quantities that are toxic to benthic organisms and/or will bioaccumulate in marine organisms to levels that may be harmful.

The goal of the Sediment Monitoring Plan is to provide the key elements that are required to successfully conduct field sediment sampling, processing, testing, and analysis of the results. Analyses of chemistry, toxicity, and benthic community condition require that samples be collected, preserved, processed, and analyzed using proper field and laboratory equipment, methods, and techniques. Additionally, representative station locations ensure the proper characterization of benthic conditions. The Sediment Monitoring Plan and Sediment Monitoring QAPP (Appendix B) describe the collection and analysis of surface sediment samples necessary to provide representative assessments of in situ conditions for the enclosed bays and estuaries of San Diego County.

2.0 MATERIALS AND METHODS

The materials and methods described in this section are designed to meet the requirements of the Sediment Control Plan, Sections VII.D and VII.E, as required by Permit Provision D.1.e.(2)(a). The methodology is outlined in Section V of the Sediment Control Plan. If sediment quality monitoring is conducted as part of the Bight Program, the work plans and associated QA/QC documents pertaining to the Bight Program should be followed.

Quality assurance methods and procedures needed to maintain consistency in sample collection, processing, and analysis to produce scientifically defensible data are provided in the Sediment Monitoring Quality Assurance Project Plan (QAPP) (Appendix B). The QAPP provides acceptability criteria for the collection and analysis of duplicate field samples, field or equipment rinse blanks, laboratory methods, and laboratory spikes. The QAPP should be used as a reference to ensure proper methods are used consistently throughout the monitoring program.

2.1 Field Collection Program

2.1.1 Station Selection

The Sediment Control Plan applies to subtidal surficial sediments located seaward of the intertidal zone in enclosed bays and estuaries. It does not apply to ocean waters, inland surface waters, sediments consisting of less than 5 percent (%) fines or substrates composed of gravel, cobble, or consolidated rock, or to sediment classified as a pollutant due to physical processes such as burial or sedimentation. SQOs have been fully developed for only two of California's six enclosed bay habitats: euhaline (salinity = 25 to 32 parts per thousand [ppt]) bays and coastal lagoons south of Point Conception and polyhaline (18 to 25 ppt) central San Francisco Bay. In addition, the benthic species assemblage used to calculate the benthic LOE for southern California marine bays is Habitat C (Bay et al., 2014), and one of the criteria for Habitat C is a salinity greater than 27 ppt. In order to select a sampling station applicable to the SQO assessment using Habitat C for the benthic LOE, it is recommended to verify that a proposed sampling station is both subtidal and has salinity greater than 27 ppt. Salinity measurements should be taken at a spring high and low tide to get an estimate of the salinity range for a proposed station. If feasible, it is recommended that salinity should be monitored throughout an entire spring tidal cycle to ensure it meets the salinity criteria prior to sampling. This monitoring can be accomplished by deploying a continuous monitoring device such as an YSI water quality data sonde. Water depth should also be measured when visiting the station at a spring low tide or deploying a continuous monitoring device over a spring tidal cycle to ensure the station is subtidal.

The Sediment Control Plan does not give guidance as to how many stations should be sampled in each lagoon. The number of sampling stations will vary within each San Diego County lagoon based on the spatial extent of the area likely to be impacted. If the Bight Program is utilized to fulfill the Sediment Quality Monitoring requirement of the Permit, then the number of stations within each San Diego County lagoon will be dictated by the Bight Program. For example, in the 2008 Bight Program, five stations were analyzed per lagoon; however, in the 2013 Bight Program the number of stations per lagoon varied from one to three stations. If a stressor identification study becomes necessary following the original SQO assessment of a lagoon (see Section 4.0), then the number of stations will be based on what suspected pollutants are driving

the impacted scores (e.g. algae, physical factors, or chemical factors) and to have enough samples to statistically support meaningful findings.

2.1.2 Permitting

Scientific collecting permits from the California Department of Fish and Wildlife will need to be obtained in order to collect benthic infaunal samples containing invertebrate specimens. At a minimum, it can take up to three weeks to obtain the permit; however, at times it can take several months to receive a scientific collecting permit so applications should be submitted well in advance of the desired sampling dates. A minimum of 24 hours (business day only) prior to collecting benthic infaunal samples in the field, a copy of the Notification of Intent to Collect for Scientific Purposes form should be faxed or emailed to the Marine Region (Monterey, CA) office of the CDFW. Additionally, written authorization may be required from state agencies or private landowners in order to gain access to water bodies that are surrounded by private land, have locked fences or gates, contain threatened or endangered species, or require the use of a private boat launch. Nesting seasons of threatened and endangered bird species may prevent sampling from being conducted or may restrict access around nesting areas during certain times of year, typically mid to late summer months.

2.1.3 Monitoring Season and Frequency

Section VII.E.6 of the Sediment Control Plan requires that samples for SQO programs be collected between June and September. Physical environments and benthic community composition and abundance within enclosed bays and estuaries are generally stable and most similar from year to year during this time (Bay et al., 2014).

According to Section VII.D of the Sediment Control Plan, sediment monitoring associated with Phase I stormwater discharges and major discharges will be conducted at least twice during the Permit cycle except at stations that have consistently been classified as unimpacted or likely unimpacted using the MLOE approach described in Section 3.2. At the unimpacted or likely unimpacted stations, monitoring may be reduced to a frequency of once during the Permit cycle.

2.1.4 Sampling Vessels

Vessels used to collect sediment samples will be both stable and maneuverable and will have a sufficiently shallow draft to navigate into shallow waters (e.g. large inflatable boat). The vessels will be equipped with a side or rear davit from which to deploy and retrieve surface sampling equipment, and will be able to accommodate a minimum of two persons in addition to all appropriate sampling and safety equipment.

2.1.5 Navigation

All station locations will be pre-plotted prior to sampling activities. Stations will be identified using a Differential Global Positioning System (DGPS). The system uses U.S. Coast Guard differential correction data, and is accurate within 10 feet (ft). All final station locations will be recorded in the field using positions from the DGPS.

2.1.6 Sediment Sampling and Handling

Benthic sediments will be collected as surface grabs using an appropriate sampler, such as a stainless steel Van Veen grab sampler. The size of the grab sampler to be used for sediment programs in Southern California should be 0.1 square meter (m²) across the top of the sampler. An appropriate sampler for the collection of benthic sediments will have the following characteristics:

- Constructed of a material that does not introduce contaminants.
- Causes minimal surface sediment disturbance.
- Does not leak or mix during sample retrieval.
- Has a design that enables safe/easy sample verification that samples meet all applicable sampling criteria (e.g., collects sediments to at least 5 centimeters (cm) below the sediment surface, has access doors allowing visual inspection and removal of undisturbed surface sediment).

A sample will be determined to be acceptable if the surface of the grab is even, there is minimal surface disturbance, and there is a penetration depth of at least 5 cm. Rejected grabs will be discarded, and the station will be re-sampled. Upon retrieval, if the grab is acceptable, the overlying water will be carefully drained, and the sediment will be processed depending on analysis and use. Sediment grabs will be collected for the following analyses: benthic infauna, chemistry, grain size, and toxicity. Station location and grab event data should be written on preformatted field data sheets (hard copies or via computer). At a minimum, field data should include station identification, station location, date, time of sample collection, depth of water, depth of penetration of grab in sediment (e.g. 5 cm), sediment composition, sediment odor and color, and sample type (e.g. sediment chemistry).

In the event that a pre-plotted sample station is found to be unsuitable for collecting sediment, because of factors such as inaccessibility, the salinity does not meet the SQO criteria, disturbance to wildlife, or safety considerations, the station may be abandoned and an alternate station may be selected. Reasons for abandonment should be recorded on field data sheets.

The entire contents of a grab sample will be collected for benthic community analyses. Samples collected for benthic infaunal analysis will be rinsed through a 1.0-millimeter (mm) mesh screen. The material retained on the screen will be transferred to a labeled glass or plastic sample container. A 7% magnesium sulfate (MgSO₄) seawater solution will be added to the sample container to 85-90% of its volume to relax the collected specimens. The sample container will be inverted several times to distribute the relaxant solution. After 30 minutes, add enough sodium borate buffered formaldehyde to top off the sample container and gently invert the container several times to ensure the sample is mixed. This will make a 10% formalin solution.

Sediment samples for toxicity testing and chemistry will be collected from the top 5 cm of a grab sample using a pre-cleaned stainless steel scoop. Sediment within 1 cm of the sides of the grab will be avoided to prevent interaction of any contaminants and the steel sampling device. According to the Sediment Control Plan, the preferred method of collection for sediment-water interface toxicity tests (see Section 2.2.2.2) is to collect intact cores directly from the sediment sampler by pressing polycarbonate core tubes (7.3-cm inner diameter [ID] and 16 cm in length)

into the top 5 cm of sediment. However, homogenizing sediment for sediment-water interface testing is also acceptable according to the Sediment Control Plan. This method is more practical to implement in the field and is consistent with previous sediment quality objective methodology (e.g., Bight protocols and previous lagoon monitoring implemented by the Copermittees). Minimum sample volumes and types of sample containers to be used in the sediment collection is provided in the Sediment Monitoring QAPP (see Appendix B)

All sampling equipment will be cleaned prior to sampling. Between sampling stations, the grab sampler will be rinsed with station water. Stainless steel scoops will be rinsed with seawater and rinsed with de-ionized water between stations. All sediment samples will be logged on a chain-of-custody (COC) form (see Section 2.1.7). Sediment chemistry and toxicity samples will be placed in a cooler on ice until delivered or shipped to the appropriate laboratories. Prior to shipping, sample containers will be placed in sealable plastic bags and securely packed inside the cooler with ice. The original signed COC forms will remain with the samples during shipment. Sediment samples will be shipped or delivered to the analytical laboratory within appropriate holding times (refer to Sediment Monitoring QAPP in Appendix B).

2.1.7 Documentation of Chain-of-Custody

This section describes the program requirements for sample handling and COC procedures. Samples are considered to be in custody if they are: (1) in the custodian's possession or view, (2) retained in a secured place (under lock) with restricted access, or (3) placed in a secured container. The principal documents used to identify samples and to document possession are COC records, field log books, and field tracking forms. COC procedures will be used for all samples throughout the collection, transport, and analytical process, and for all data and data documentation, whether in hard copy or electronic format.

COC procedures will be initiated during sample collection. A COC record will be provided with each sample or sample group. Each person who has custody of the samples will sign the form and ensure that the samples are not left unattended unless properly secured. Minimum documentation of sample handling and custody will include the following:

- Sample identification.
- Sample collection date and time.
- Any special notations on sample characteristics.
- Initials of the person collecting the sample.
- Date the sample was sent to the laboratory.
- Shipping company and waybill information.

The completed COC form will be placed in a sealable plastic envelope that will travel inside the ice chest containing the listed samples. The COC form will be signed by the person transferring custody of the samples. The condition of the samples will be recorded by the receiver. COC records will be included in the final analytical report prepared by the laboratory and will be considered an integral part of the report.

2.2 Laboratory Testing

All samples will be tested in accordance with USEPA or American Society for Testing and Materials (ASTM) protocols. If appropriate protocols do not exist, the Copermittees should use other methods approved by the SWRCB or San Diego RWQCB. Analytical laboratories will be certified by the California Department of Health Services in accordance with Water Code 13176. Additional information pertaining to laboratory testing is presented in the Sediment Monitoring QAPP (see Appendix B).

2.2.1 Physical and Chemical Analysis

Physical and chemical measurements of sediment were selected to comply with the Sediment Control Plan and to provide data on chemicals of potential concern in bays and estuaries located in San Diego County. The physical and chemical analyses of sediments will include, at a minimum, the constituents outlined in Table 2-1. Reporting limits (RLs) must be equal to or less than those listed in Table 2-1 in order to generate the chemistry LOE outlined in Section 2.3.3.1. Concentrations associated with the RLs in Table 2-1 are expressed in dry-weight. Physical analyses of sediment will include grain size and percent solids. Grain size will be analyzed to determine the general size classes that make up the sediment (e.g., gravel, sand, silt, and clay), whereas percent solids will be measured to convert chemical concentrations from a wet-weight to a dry-weight basis. Chemical analyses of sediment will include total organic carbon (TOC), and the select trace metals, chlorinated pesticides, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs) shown in Table 2-1.

Table 2-1. Chemical and Physical Parameters for Sediment Samples

Parameter	Reporting Limit
Physical/Conventional Tests	
Grain Size	1.00 %
Percent Solids	0.10 %
Total Organic Carbon (TOC)	0.01 %
Metals	
Cadmium (Cd)	0.09 mg/kg
Copper (Cu)	52.8 mg/kg
Lead (Pb)	25.0 mg/kg
Mercury (Hg)	0.09 mg/kg
Zinc (Zn)	60.0 mg/kg
Organochlorine Pesticides	
2,4'-DDD	0.50 µg/kg
2,4'-DDE	0.50 µg/kg
2,4'-DDT	0.50 µg/kg
4,4'-DDD	0.50 µg/kg
4,4'-DDE	0.50 µg/kg
4,4'-DDT	0.50 µg/kg
Chlordane-alpha	0.50 µg/kg
Chlordane-gamma	0.54 µg/kg
Dieldrin	2.5 µg/kg

Table 2-1. Chemical and Physical Parameters for Sediment Samples (continued)

Parameter	Reporting Limit
trans-Nonachlor	4.6 µg/kg
PCB Congeners	
2,4'-Dichlorobiphenyl	3.0 µg/kg
2,2',5-Trichlorobiphenyl	3.0 µg/kg
2,4,4'-Trichlorobiphenyl	3.0 µg/kg
2,2',3,5'-Tetrachlorobiphenyl	3.0 µg/kg
2,2',5,5'-Tetrachlorobiphenyl	3.0 µg/kg
2,3',4,4'-Tetrachlorobiphenyl	3.0 µg/kg
2,2',4,5,5'-Pentachlorobiphenyl	3.0 µg/kg
2,3,3',4,4'-Pentachlorobiphenyl	3.0 µg/kg
2,3',4,4',5-Pentachlorobiphenyl	3.0 µg/kg
2,2',3,3',4,4'-Hexachlorobiphenyl	3.0 µg/kg
2,2',3,4,4',5'-Hexachlorobiphenyl	3.0 µg/kg
2,2',4,4',5,5'-Hexachlorobiphenyl	3.0 µg/kg
2,2',3,3',4,4',5-Heptachlorobiphenyl	3.0 µg/kg
2,2',3,4,4',5,5'-Heptachlorobiphenyl	3.0 µg/kg
2,2',3,4',5,5',6-Heptachlorobiphenyl	3.0 µg/kg
2,2',3,3',4,4',5,6-Octachlorobiphenyl	3.0 µg/kg
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	3.0 µg/kg
Decachlorobiphenyl	3.0 µg/kg
PAHs (low molecular weight)	
Acenaphthene	20.0 µg/kg
Anthracene	20.0 µg/kg
Phenanthrene	20.0 µg/kg
Biphenyl	20.0 µg/kg
Naphthalene	20.0 µg/kg
2,6-Dimethylnaphthalene	20.0 µg/kg
Fluorene	20.0 µg/kg
1-Methylnaphthalene	20.0 µg/kg
2-Methylnaphthalene	20.0 µg/kg
1-Methylphenanthrene	20.0 µg/kg
PAHs (high molecular weight)	
Benzo(a)anthracene	80.0 µg/kg
Benzo(a)pyrene	80.0 µg/kg
Benzo(e)pyrene	80.0 µg/kg
Chrysene	80.0 µg/kg
Dibenzo(a,h)anthracene	80.0 µg/kg
Fluoranthene	80.0 µg/kg
Perylene	80.0 µg/kg
Pyrene	80.0 µg/kg

DDD Dichlorodiphenyldichloroethane
DDE dichlorodiphenyldichloroethylene
DDT dichlorodiphenyltrichloroethane
mg/kg milligrams per kilogram
µg/kg micrograms per kilogram

2.2.2 Toxicity Testing

To evaluate the benthic condition of San Diego County's bays and lagoons, sediment toxicity testing will be conducted in accordance with ASTM and USEPA methods. Toxicity testing involves a short-term survival test, a sublethal endpoint test, and an assessment of sediment toxicity. For each test type, more than one specific test is acceptable. The appropriate species tested for a sample will depend on the characteristics of the sample such as grain size, salinity, and suspected toxic constituents, if any. When historical data are available for a sample location, it is recommended that the same species be used in order to make comparisons and to conduct trend analysis. In addition, when testing is conducted as part of a regional monitoring program such as the Bight program, the species selection will be dictated by the program.

If significant toxicity is observed in the solid phase or sediment-water interface test, a toxicity identification evaluation (TIE) may be conducted as part of stressor identification studies described in Section 4.0.

2.2.2.1 Short-Term Survival Testing

SQO analysis requires that at least one short-term survival test be conducted. There are three acceptable short-term survival tests, each of which is a 10-day test exposing amphipods to whole sediment. The three acceptable test organisms are *Eohaustorius estuarius*, *Leptocheirus plumulosus*, and *Rhepoxynius abronius*. The *E. estuarius* short-term survival test has been the 10-day test method used in previous San Diego County lagoon monitoring programs where the SQO analytical tool was used to assess lagoon health. These amphipod bioassays will be conducted in accordance with procedures outlined in *Methods for Assessing Toxicity of Sediment-Associated Contaminants with Estuarine and Marine Amphipods* (USEPA, 1994) and ASTM method E1367-03 (ASTM, 2006). Test conditions are summarized in Table 2-2.

A water-only reference toxicity test should be conducted concurrently with the whole sediment amphipod test to assess the relative sensitivity of test organisms used in the evaluation of project sediments. Amphipod reference toxicant tests are typically conducted using cadmium. However, using ammonia as the reference toxicant is preferable because the sensitivity of the test organisms to ammonia (often a confounding factor in sediment testing) can be evaluated along with the relative sensitivity of the batch of organisms used in testing.

Table 2-2. Summary of Conditions for 10-Day Whole Sediment Amphipod Bioassay

Test Conditions 10-Day Whole Sediment Bioassay				
Test Species		<i>E. estuarius</i>	<i>L. plumulosus</i>	<i>R. abronius</i>
Test Procedures		USEPA (1994); ASTM E1367-03 (2006)		
Test Type/Duration		Static - Acute Whole Sediment/10 days		
Sample Storage Conditions		4 °C, dark, minimal head space		
Age/Size Class		3-5 mm	2-4 mm; immature	3-5 mm
Grain Size Tolerance		0.6-100% sand	0-100% sand	10-100% sand
Recommended Water Quality Parameters	Temperature	15 ± 1 °C	25 ± 1 °C	15 ± 1 °C
	Salinity	20 ± 2 ppt	20 ± 2 ppt	28 ± 2 ppt
	Dissolved Oxygen	Maintaining 90% saturation		
	Total Ammonia	< 60 mg/L	< 60 mg/L	< 30 mg/L
Test Chamber		1 L glass		
Exposure Volume		2 cm sediment, 800 mL seawater		
Replicates/Sample		5		
No. of Organisms/Replicate		20		
Photoperiod		Continuous light		
Feeding		None		
Water Renewal		None		
Aeration		Constant gentle aeration		
Acceptability Criteria		Mean control survival ≥ 90%; ≥80% survival in each replicate		

mg/L milligram per liter

2.2.2.2 Sublethal Testing

The second type of testing required for SQO analysis is a sublethal test. Either a 48-hour development test exposing embryos of the bivalve *Mytilus galloprovincialis* to the sediment-water interface may be conducted or a 28-day survival and growth test exposing the polychaete worm *Neanthes arenaceodentata* to whole sediment. Test condition summaries for the bivalve and polychaete tests are presented in Table 2-3 and Table 2-4, respectively. The *M. galloprovincialis* sediment-water interface test has been the sublethal test method used in previous San Diego County lagoon monitoring programs where the SQO analytical tool was used to assess lagoon health.

Mytilus galloprovincialis Sediment-Water Interface Development Sublethal Test

Sediment-water interface bioassays are performed to estimate the potential toxicity of contaminants fluxing from test sediments into the overlying water. The sediments will be tested in a 48-hour sediment-water interface test using the bivalve *M. galloprovincialis* in accordance with procedures outlined in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (USEPA, 1995) and *Assessment of Sediment Toxicity at the Sediment-Water Interface* (Anderson et al., 1996). Sediment-water interface bioassays will be tested on intact cores collected in the field or on homogenized sediment samples as described in Section 2.1.6.

A water-only reference toxicity test should be conducted concurrently with the sediment-water interface bivalve test to assess the relative sensitivity of test organisms used in the evaluation of the project sediments. Bivalve reference toxicant tests are typically conducted using copper. However, using ammonia as the reference toxicant is preferable because the sensitivity of the test organisms to ammonia (often a confounding factor in sediment testing) can be evaluated along with the relative sensitivity of the batch of organisms used in testing.

Table 2-3. Test Conditions for the 48-Hour *M. galloprovincialis* Sediment-Water Interface Bioassay

Test Conditions 10-Day Whole Sediment Bioassay	
Test Species	<i>M. galloprovincialis</i>
Test Procedures	USEPA (1995), Anderson et al. (1996)
Test Type/Duration	Static - Acute sediment-water interface/48 hours
Sample Storage Conditions	4 °C, dark, minimal head space
Age/Size Class	< 4 hour old larvae
Recommended Water Quality Parameters	Temperature
	Salinity
	Dissolved Oxygen
	Total Ammonia
Test Chamber	Polycarbonate core tube 7.3-cm inner diameter, 16 cm high
Exposure Volume	5 cm sediment, 300 mL water
Replicates/Sample	4
No. of Organisms/Replicate	Approximately 250 larvae
Photoperiod	16 hours light: 8 hours dark
Feeding	None
Water Renewal	None
Aeration	Constant gentle aeration
Acceptability Criteria	Mean control normal-alive $\geq$ 80%

Neanthes arenaceodentata Whole Sediment Survival and Growth Sublethal Test

The *N. arenaceodentata* test will be conducted in accordance with ASTM method E1562 (ASTM, 2002) with modifications described in Farrar and Bridges (2011) that have been found to contribute manageability and precision to the ASTM procedure. A water-only reference toxicity test should be conducted concurrently with the whole sediment polychaete test to assess the relative sensitivity of test organisms used in the evaluation of the project sediments. Polychaete reference toxicant tests are typically conducted using cadmium. However, using ammonia as the reference toxicant is preferable because the sensitivity of the test organisms to ammonia (often a confounding factor in sediment testing) can be evaluated along with the relative sensitivity of the batch of organisms used in testing.

Table 2-4. Test Conditions for the 28-Day Whole Sediment *N. arenaceodentata* Bioassay

Test Conditions 10-Day Whole Sediment Bioassay		
Test Species		<i>N. arenaceodentata</i>
Test Procedures		ASTM E1562 (2002), Farrar and Bridges (2011)
Test Type/Duration		Static - Acute Whole Sediment/28 days
Sample Storage Conditions		4 °C, dark, minimal head space
Age/Size Class		≤ 7 days post-emergence
Grain Size Tolerance		5-100% sand
Recommended Water Quality Parameters	Temperature	20 ± 1 °C
	Salinity	30 ± 2 ppt
	Dissolved Oxygen	Maintaining 90% saturation
	Total Ammonia	< 20 mg/L
Test Chamber		300 mL glass
Exposure Volume		2 cm sediment, 125 mL seawater
Replicates/Sample		10
No. of Organisms/Replicate		1
Photoperiod		12 hours light: 12 hours dark
Feeding		Twice per week
Water Renewal		Weekly
Aeration		Constant gentle aeration
Acceptability Criteria		Mean control survival ≥ 80%; positive growth in controls

2.2.3 Benthic Infauna Analysis

The benthic infaunal samples will be transported from the field to the laboratory and stored in a formalin solution for a minimum of 48 hours and no longer than 5 days. The samples will then be transferred from formalin to 70% ethanol for laboratory processing. The organisms will initially be sorted using a dissecting microscope into five major phyletic groups: polychaetes, crustaceans, molluscs, echinoderms, and miscellaneous minor phyla. While sorting, technicians will keep a count for quality control purposes, as described in the following paragraph. After initial sorting, samples will be distributed to qualified taxonomists who will identify each organism to species or to the lowest possible taxon. Taxonomists will use the most recent version of the Southern California Association of Marine Invertebrate Taxonomists (SCAMIT) taxonomic listing for nomenclature and orthography.

A QA/QC procedure will be performed on each of the sorted samples to ensure a 95% sorting efficiency. A 10% aliquot of a sample will be re-sorted by a senior technician trained in the QA/QC procedure. The number of organisms found in the aliquot will be divided by 10% and added to the total number found in the sample. The original total will be divided by the new total to calculate the percent sorting efficiency. When the sorting efficiency of the sample is below 95%, the remainder of the sample (90%) will be re-sorted.

2.2.3.1 Quality Assurance/Quality Control

All quality assurance/quality control (QA/QC) samples must be conducted in accordance with the Quality Assurance Management Plan (QAMP) for the State of California's Surface Water Ambient Monitoring Program (SWAMP). The data quality objectives for all analyses conducted by the participating analytical laboratories will be detailed in the Sediment Monitoring QAPP (see Appendix B). The results of the laboratory quality control (QC) analyses will be reported with the final data. Any QC samples that fail to meet the specified QC criteria in the methodology or the Sediment Monitoring QAPP will be identified, and the corresponding data will be appropriately qualified in the final report. All QA/QC records for the various testing programs will be kept on file for review by regulatory agency personnel.

DRAFT

3.0 DATA REVIEW, MANAGEMENT, AND ANALYSIS

3.1 Data Review and Management

All quality assurance/quality control (QA/QC) data must be conducted in accordance with the Quality Assurance Management Plan (QAMP) for the State of California's SWAMP and the data quality objectives as outlined in the Sediment Monitoring QAPP (see Appendix B). Data will be reviewed to determine that appropriate corrective actions have been taken, when necessary. The laboratories will supply analytical results in both hard copy and electronic formats. Laboratories will have the responsibility of ensuring that both formats are accurate. Monitoring data and analytical results will be uploaded into California Environmental Data Exchange Network (CEDEN).

3.2 Data Analysis

Sediment toxicity, chemistry, and benthic community condition will be assessed using California's SQOs as described in the Sediment Control Plan (Appendix A). The goals of the SQOs are to determine whether pollutants in sediments are present in quantities that are toxic to benthic organisms and/or will bioaccumulate in marine organisms to levels that may be harmful to humans. SQOs have been fully developed for only one of Southern California's enclosed bay habitats: euhaline (salinity = 25 to 32 ppt) bays and coastal lagoons south of Point Conception. In addition, the benthic species assemblage used to calculate the benthic LOE for southern California marine bays is Habitat C (Bay et al., 2014), and one of the criteria for Habitat C is a salinity greater than 27 ppt. The data analysis methods described below should be limited to those subtidal areas of the coastal lagoons/estuaries where the for the SQO salinity criteria can be met.

The SQOs are based on a MLOE approach in which sediment toxicity, sediment chemistry, and benthic community condition are the LOE. The MLOE approach evaluates the severity of biological effects and the potential for chemically mediated effects to provide a final station level assessment. Brief descriptions of the specific methods associated with each LOE are described below. Detailed calculations and descriptions of each LOE are provided in the Sediment Control Plan (SWRCB and CA EPA, 2009) (see Appendix A).

3.2.1 Sediment Toxicity

Sediment toxicity will be assessed using two tests: a short-term survival test using one of three species of marine amphipods (*E. estuarius*, *L. plumulosus*, or *R. abronius*) and a sublethal test using either *N. arenaceodentata* (a species of polychaete worm) or *M. galloprovincialis* (a species of marine bivalve). Sediment toxicity test results from each station will be statistically compared to control test results; normalized to the control survival; and categorized as nontoxic, low, moderate, or high toxicity according to Table 3-1. The average of the two test response categories (nontoxic, low toxicity, moderate toxicity, and high toxicity) will be calculated to determine the final toxicity LOE category. If the average falls midway between the two categories, it will be rounded up to the higher of the two. For example, if the test response category for the short-term survival test is low toxicity, and the test response category for the sublethal test is moderate toxicity, the final category for sediment toxicity would be moderate toxicity.

Table 3-5. Sediment Toxicity Categorization Values

Test Type	Endpoint	Statistical Significance	Nontoxic ¹	Low Toxicity ²	Moderate Toxicity ²	High Toxicity ²
Short-Term Survival Tests	<i>E. estuarius</i> Survival	Significant	90 to 100	82 to 89	59 to 81	<59
		Not significant	82 to 100	59 to 81	-	<59
	<i>L. plumulosus</i> Survival	Significant	90 to 100	78 to 89	56 to 77	<56
		Not significant	78 to 100	56 to 77	-	<56
	<i>R. abronius</i> Survival	Significant	90 to 100	83 to 89	70 to 82	<70
		Not significant	83 to 100	70 to 82	-	<70
Sublethal Tests	<i>N. arenaceodentata</i> Growth	Significant	90 to 100 ²	68 to 90	46 to 67	<46
		Not significant	68 to 100	46 to 67	-	<46
	<i>M. galloprovincialis</i> Normal-Alive	Significant	80 to 100	77 to 79	42 to 76	<42
		Not significant	77 to 79	72 to 76	-	<42

¹ Expressed as percent.

² Expressed as percent of control.

3.2.2 Sediment Chemistry

Sediment chemistry will be assessed using the analyte list presented in Table 2-1. Concentrations of chemicals detected in sediments will be compared to the California Logistic Regression Model (CA LRM) and the Chemical Score Index (CSI). The CA LRM is a maximum probability model (P_{max}) that uses logistic regression to predict the probability of sediment toxicity. The CSI is calculated independently of the CA LRM and is a predictive index that relates sediment chemical concentration to benthic community disturbance. Sediment chemistry results according to CA LRM and CSI are categorized as having minimal, low, moderate, and high exposure to pollutants (Table 3-2). The final sediment LOE category is the average of the two chemistry exposure categories. If the average falls midway between the two categories, it is rounded up to the higher of the two. For example, if the CA LRM is low exposure and the CSI is moderate exposure, then the final sediment LOE category is moderate exposure.

Table 3-6. Sediment Chemistry Guideline Categorization

Sediment Chemistry Guideline		Sediment LOE Category
CA LRM	CSI	
<0.33	<1.69	Minimal Exposure
0.33 - 0.49	1.69 - 2.33	Low Exposure
0.50 - 0.66	2.34 - 2.99	Moderate Exposure
>0.66	>2.99	High Exposure

3.2.3 Benthic Community Condition

Benthic community condition will be assessed using a combination of four benthic indices: the Benthic Response Index (BRI; abundance-weighted average pollution tolerance of sample organisms), the Relative Benthic Index (RBI; the weighted sum of community parameters and abundance of indicator species), the Index of Biotic Integrity (IBI; a measure that identifies benthic community characteristics outside of reference ranges), and a predictive model based on the River Invertebrate Prediction and Classification System (RIVPACS; a comparison of assemblages in a sample to expected species composition). The four indices will be calculated

following the January 21, 2008, guidance provided by Southern California Coastal Water Research Project (SCCWRP) entitled *Determining Benthic Invertebrate Community Condition in Embayments* for Southern California marine bays. Each benthic index result is categorized according to four levels of disturbance, including reference, low, moderate, and high disturbance.

- Reference: Equivalent to a least affected or unaffected station.
- Low Disturbance: Some indication of stress is present, but is within measurement error of unaffected condition.
- Moderate Disturbance: Clear evidence of physical, chemical, natural, or anthropogenic stress.
- High Disturbance: High magnitude of stress.

Specific categorization values, which are tailored to southern California marine bays, are assigned for each index (Table 3-3), and are based on the specific taxa found within a given sample. To determine the benthic community condition, the four indices will be integrated into a single category. The median of the four benthic index response categories are computed to determine the benthic condition. If the median falls between two categories, the value is rounded to the next higher category to provide the most conservative estimate of benthic community condition.

Table 3-7. Benthic Index Categorization Values for Southern California Marine Bays

Benthic Community Guideline				Index
BRI	IBI	RBI	RIVPACS	
<39.96	0	>0.27	>0.90 to <1.10	Reference
39.96 - 49.14	1	0.17 - 0.27	0.75 - 0.90 or 1.10 - 1.25	Low Disturbance
49.15 - 73.26	2	0.09 - 0.16	0.33 - 0.74 or >1.25	Moderate Disturbance
>73.26	3 or 4	<0.09	<0.33	High Disturbance

3.2.4 Integration of Multiple Lines of Evidence

The station level assessment that indicates whether the aquatic life SQO at a station has been met will be determined by the combination of the three LOE categories to assess the severity of biological effects and the potential for chemically mediated effects. The severity of biological effects will be determined by combining the toxicity and benthic community condition LOEs (Table 3-4). The potential for chemically mediated effects will be determined by combining the toxicity and chemistry LOEs (Table 3-5).

Table 3-8. Determination of Severity of Biological Effects

Combination of Toxicity LOE and Benthic Condition LOE		Toxicity LOE			
		Non-toxic	Low Toxicity	Moderate Toxicity	High Toxicity
Benthic Community Condition LOE	Reference	Unaffected	Unaffected	Unaffected	Low Effect
	Low Disturbance	Unaffected	Low Effect	Low Effect	Low Effect
	Moderate Disturbance	Moderate Effect	Moderate Effect	Moderate Effect	Moderate Effect
	High Disturbance	Moderate Effect	High Effect	High Effect	High Effect

Table 3-9. Determination of Potential for Chemically Mediated Effects

Combination of Toxicity LOE and Sediment Chemistry LOE		Toxicity LOE			
		Non-toxic	Low Toxicity	Moderate Toxicity	High Toxicity
Sediment Chemistry LOE	Minimal Exposure	Minimum Potential	Minimum Potential	Low Potential	Moderate Potential
	Low Exposure	Minimum Potential	Low Potential	Moderate Potential	Moderate Potential
	Moderate Exposure	Low Potential	Moderate Potential	Moderate Potential	Moderate Potential
	High Exposure	Moderate Potential	Moderate Potential	High Potential	High Potential

Based on the determinations of the severity of biological effects and the potential for chemically mediated effects, a station level assessment (Table 3-6) will be made that categorizes the station as one of the following:

- Unimpacted: Confident that sediment contamination is not causing significant adverse impacts to aquatic life living in station sediments.
- Likely unimpacted: Sediment contamination at the station is not expected to cause adverse impacts to aquatic life, but some disagreement among the LOE reduces the certainty that the station is unimpacted.
- Possibly impacted: Sediment contamination at the station may be causing adverse impacts to aquatic life, but the impacts are either small or uncertain due to disagreement among the LOE.
- Likely impacted: Evidence for a contaminant-related impact to aquatic life at the station is persuasive, even if there is some disagreement among the LOE.
- Clearly impacted: Sediment contamination at the station is causing clear and severe adverse impacts to aquatic life.
- Inconclusive: Disagreement among the LOE suggests that either the data are suspect or additional information is needed before a determination can be made.

Table 3-10. Determination of Final Station Assessment

Combination of Severity of Biological Effects and Potential for Chemically-Mediated Effects		Severity of Biological Effects			
		Unaffected	Low Effect	Moderate Effect	High Effect
Potential for Chemically-Mediated Effects	Minimal Potential	Unimpacted	Likely Unimpacted	Likely Unimpacted	Inconclusive
	Low Potential	Unimpacted	Likely Unimpacted	Possibly Impacted	Possibly Impacted
	Moderate Potential	Likely Unimpacted	Possibly Impacted or Inconclusive ¹	Likely Impacted	Likely Impacted
	High Potential	Inconclusive	Likely Impacted	Clearly Impacted	Clearly Impacted

¹ When chemistry classification is minimal exposure, benthic response is reference, and toxicity is high.

All 64 possible combinations are presented in Attachment B of the Sediment Control Plan.

If a station is consistently classified as Unimpacted or Likely Unimpacted according to the SQO assessments, then the protective condition has been achieved. In cases where segments contain stations categorized as Possibly Impacted but not Clearly Impacted or Likely Impacted, confirmation monitoring will be conducted prior to requiring stressor identification studies. If a follow-up assessment result is Unimpacted or Likely Unimpacted, the protective condition has been achieved at that location. If the final station assessment result is Possibly Impacted, Likely Impacted or Clearly Impacted, the station is considered degraded and the Copermittees may need to conduct a stressor identification study. Stations categorized as Inconclusive should not be used to evaluate whether the protective condition at a station has been met. Additional information should be gathered at stations classified as Inconclusive in order to understand why the LOE results show a level of disagreement.

If stations are categorized as Possibly Impacted within a monitored segment, reach, or water body that also contain stations that are not categorized as Clearly or Likely Impacted, then confirmation monitoring should be conducted in order to confirm the level of impact at these stations prior to initiating a stressor identification study. As stated in the *Sediment Quality Assessment Technical Support Manual* (Bay et al., 2014), “the *Possibly Impacted* station assessment is the least certain of all categorizations, and therefore requires the most caution during interpretation. Stations may be classified as *Possibly Impacted* due to low levels of effect for each LOE, indicating a low magnitude of impacts. Alternatively, a *Possibly Impacted* classification may be the result of a large disagreement between LOEs, potentially due to confounding factors or noncontaminant stressors.” Following the confirmation monitoring, if the station assessment is categorized as Possibly Impacted, Likely Impacted, or Clearly Impacted then the Copermittees may need to conduct a stressor identification study. If additional monitoring or specialized studies at Possibly Impacted stations indicate that factors other than toxic pollutants in sediments are causing observed negative responses then it may be possible to designate the station as meeting the protective condition.

4.0 STRESSOR IDENTIFICATION

The highest priority for stressor identification will be assigned to those water body segments with the highest percentage of Clearly Impacted or Likely Impacted stations. In cases where segments contain sediments categorized as Possibly Impacted but not Clearly Impacted or Likely Impacted, confirmation monitoring will be conducted prior to requiring stressor identification studies. By reviewing the available data sets, deductive reasoning can be used to narrow the focus of future actions. Based on the outcome of the additional data analysis, steps forward for stressor identification should be coordinated with the San Diego RWQCB. If a stressor identification study is required, the Copermittees should develop a clearly defined work plan prior to beginning work. No formal guidance is given in the Sediment Control Plan on how to conduct a stressor identification study; however, the Sediment Control Plan does give some general guidance on types of stressor identification studies that can be implemented. These studies include confirmation and characterization of pollutant-related impacts, pollutant identification, and source identification and management actions. These types of studies are summarized in the following sections.

4.1.1 Pollutant Confirmation and Characterization

When the analyses described in Section 3.2 indicate that pollutants are a likely cause of an SQO exceedance at a station, a variety of tools can be used to determine whether the reason for the narrative objective not being met is due to generic stressors other than toxic pollutants, such as physical alterations or other pollutant-related stressors. Physical disturbances, such as decreased salinity, dredging impacts, and grain size, are confounding factors that may produce conditions mimicking the effects of pollutants. In these cases, the benthic community LOE will indicate degradation, but the toxicity and chemistry LOEs may not. Pollutant-related stressors, such as ammonia, TOC, nutrients, and pathogens, may also be confounding factors. In these cases, the benthic community LOE will indicate degradation, toxicity may be indicated, and chemical concentrations will be low. To determine whether a station is impacted from toxic pollutants, one or more of the following tools may be included in the stressor identification analysis as part of the confirmation:

- Evaluate the spatial extent of the area of concern in relation to anthropogenic sources.
- Evaluate the body burden of the pollutants accumulated in the animals used for exposure testing.
- Evaluate the chemical constituent results in relation to the mechanistic benchmarks.
- Compare chemistry and biology LOE to determine whether correlations exist.
- Alternative biological assessment, such as bioaccumulation experiments, pore water toxicity, or pore water chemistry analyses, may be conducted.
- Phase I TIEs, which are often useful in determining the causative agent or class of compounds causing toxicity may be conducted.

According to the SQO guidelines, “If there is compelling evidence that the SQO exceedances contributing to a receiving water limit exceedance are not due to toxic pollutants, then the assessment area shall be designated as having achieved the receiving water limit.”

4.1.2 Pollutant Identification

Pollutant identification investigations may be conducted using one or more of the following types of data: statistical, biological, or chemical investigation data. These investigations should be station-specific and should be based on:

- Correlations between individual chemicals and biological endpoints.
- Gradient analysis of chemical concentrations and the biological responses in comparison to distance from a chemical hotspot.
- Additional TIE procedures.
- Sediment pore water investigations into the bioavailability of pollutants (e.g., acid-volatile sulfides and simultaneously extracted metals [AVS:SEM] analysis, solid phase microextraction [SPME], and/or laboratory desorption studies.
- Verification studies such as spiking or in situ toxicity and bioaccumulation studies.

In cases where stressor identification studies conducted on stations categorized as Possibly Impacted are inconclusive, the Copermittees may implement a one-time augmentation to the study or suspend stressor identification studies in favor of additional routine SQO monitoring.

4.1.3 Pollutant Source Identification and Management

Stressor identification studies should include determinations of whether sources are ongoing or legacy and determinations of the number and nature of ongoing sources. If a single or multiple dischargers are responsible for stressor pollutant discharges, the discharger(s) may need to address the SQO exceedance and to reduce the pollutant loading.

According to Section VII.H of the Sediment Control Plan, the San Diego RWQCB may develop station-specific sediment management guidelines to estimate the level of the stressor pollutant in order to meet the SQOs. Guideline development should be initiated only following identification of the stressor, and should have an overall goal of establishing a relationship between the organism's exposure and the biological effect. Upon establishing this relationship, a pollutant-specific guideline may be designated that corresponds with minimum biological effects. Approaches that can be used to establish relationships between exposure and biological effect include the following: correspondence with sediment chemistry, correspondence with bioavailable pollutant concentration, correspondence with tissue residue, and literature review. Additionally, the Sediment Control Plan states that the chemistry LOE, "including the threshold values (e.g. CSI and CALRM) shall not be used for setting cleanup levels or numeric values for technical TMDLs."

5.0 REPORTING

Provision D.1.e.(2)(c) of the Permit requires incorporation of Sediment Monitoring Report into the WQIP Annual Report. The Sediment Monitoring Report will contain an evaluation, interpretation, and tabulation of monitoring data, including an assessment of whether receiving water limits outlined in the Permit were attained; a sample location map; and a statement of certification that monitoring data and results have been uploaded into CEDEN.

Based on the conclusions of the Sediment Monitoring Report, a human health risk assessment may be necessary based on the Sediment Monitoring Report conclusions in order to determine whether human health objectives have been obtained at each sample location. Provision A.2.a.(3)(b)(ii) states that “pollutants shall not be present in sediments at levels that will bioaccumulate in aquatic life to levels that are harmful to human health.” The potential risk assessments must consider any relevant information, such as guidelines set forth in the CA EPA’s Office of Environmental Health Hazard Assessment (OEHHA) fish consumption policies, CA EPA’s Department of Toxic Substances Control (DTSC) risk assessment, and the USEPA human health risk assessment policies.

Since the WQIPs are still in development and there will be not WQIP Annual Reports in 2015, the Copermittees will include the Sediment Monitoring Report with the Transitional Monitoring and Assessment Report due to the San Diego RWQCB on January 31, 2015. The Sediment Monitoring Report will include the results from the 2013 Bight Program and any follow-up monitoring collected in 2014 to satisfy Provisions D.1.e.(1)(b) and D.1.e.(2) of the Permit. Additional sediment quality monitoring or stressor identification studies conducted after 2014 will be included in the WQIP Annual Reports.

6.0 SCHEDULE

The schedule for completing the sediment quality monitoring requirements of the Permit and for submitting the Sediment Monitoring Report is shown in Table 6-1:

Table 6-11. Sediment Monitoring Plan Schedule

Activity/Deliverable	Dates(s)
San Diego RWQCB Order No. R9-2013-0001	Adopted May 8, 2013 and effective June 27, 2013
Southern California Bight Regional Monitoring Program	August-September 2013
Draft Sediment Monitoring Plan	September 2014
Draft Sediment Monitoring QAPP	September 2014
Final Sediment Monitoring Plan	November 2014
Final Sediment Monitoring QAPP	November 2014
Follow-up confirmation monitoring	TBD
Final Sediment Monitoring Plan incorporated into WQIPs	December 2014
Draft Sediment Monitoring Report	Summer 2015
Final Sediment Monitoring Report incorporated into appropriate WQIP Annual Report	December 2015
Potential Stressor ID Studies	TBD
Potential Human health risk assessment	TBD

7.0 REFERENCES

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- USEPA (United States Environmental Protection Agency). 1994. *Methods for Assessing Toxicity of Sediment-Associated Contaminants With Estuarine and Marine Amphipods*. EPA/600/R-94/025. EPA Office of Research and Development, Narragansett, Rhode Island. June 1994.
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ATTACHMENT C. CHOLLAS CREEK TMDL MONITORING PLAN

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**DRAFT
CHOLLAS CREEK
DIAZINON AND DISSOLVED METALS TMDL
AND BACTERIA TMDL
2014-2015 MONITORING PLAN**

**Submitted to:
City of San Diego**



**Submitted by:
AMEC Environment & Infrastructure, Inc.
San Diego, California**

May 2014

AMEC Project No. 5025141073

IMPORTANT NOTICE

This report was prepared exclusively for the City of San Diego by AMEC, Inc. The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in AMEC's services and based on: i) information available at the time of preparation, ii) data supplied by outside sources and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended to be used by only, subject to the terms and conditions of its contract with AMEC. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
303(d) List	Clean Water Act (CWA) Section 303(d) List of Water Quality Limited Segments
AMEC	AMEC Environment and Infrastructure, Inc.
ASAP	as soon as possible
AVB	area velocity bubbler
Bacteria TMDL	<i>A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate Revised Total Maximum Daily Loads for Indicator Bacteria Project I-Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)</i>
Basin Plan	Water Quality Control Plan for the San Diego Basin
BMP	best management practice
BPA	Basin Plan Amendment
Caltrans	California Department of Transportation
CD	compact disk
CFU	Colony-forming Units
Chambers	Chambers Group, Inc.
City	City of San Diego
CLRP	Comprehensive Load Reduction Plan
cm	centimeters
COC	chain of custody
CTL(1)	Chollas Creek Tidal Compliance Monitoring Location
CTR	California Toxics Rule
CWA	Clean Water Act
Diazinon TMDL	Investigation Order No. R9-2004-00277, California Department of Transportation and San Diego Municipal Separate Storm Sewer system Copermittees Responsible for the Discharge of Diazinon into the Chollas Creek HSA, San Diego, California
Dissolved Metals TMDL	Resolution No. R9-2007-0043, A Resolution Adopting an Amendment to the Water Quality Control Plan for the San Diego Basin (9) to Incorporate Total Maximum Daily Loads for Dissolved Copper, Lead and Zinc in Chollas Creek, Tributary to San Diego Bay (approved under State Water Resources Control Board Resolution No. 2008-0054)
DPR3	South Chollas Creek Mass Loading Station
DQO	data quality objective
e	exponential
EDD	Electronic data deliverable
e.g.	<i>exempli gratia</i> (for example)
EPA	United States Environmental Protection Agency
FIB	Fecal Indicator Bacteria
ft	feet
GCMS	gas chromatography mass spectrometer
GIS	Geographic Information Systems
HCl	hydrochloric acid
HNO ₃	nitric acid
H ₂ SO ₄	sulfuric acid
HVF	head versus flow

Acronyms and Abbreviations (Cont.)

ID	identification
JHA	job hazards analysis
L	liter
LA	Load Allocation
LCS	laboratory control sample
LWA	Larry Walker and Associates
ln	natural logarithm
mA	milliampere
MDL	method detection limit
mg	milligrams
mL	milliliters
MLS	mass loading station
MOU	Memorandum of Understanding
MPN	Most Probable Number
mS	milli Siemens
MS	matrix spike
MS4	Municipal Separate Storm Sewer System
MSD	matrix spike duplicate
NA	not applicable
Nautilus	Nautilus Environmental
ng	nanograms
No.	number
NTU	Nephelometric Turbidity Units
NWS	National Weather Service
O&M	operations and maintenance
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
*.pdf	Portable Document Format
pH	potential Hydrogen
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
REC-1	Water contact recreation
RL	reporting limit
RPD	relative percent difference
SCCWRP	Southern California Coastal Water Research Project
SD8(1)	North Chollas Creek Mass Loading Station
SDRWQCB	San Diego Regional Water Quality Control Board
SIM	selective ion monitoring
SM	Standard Method
SOP	Standard Operating Procedure
SRM	Standard Reference Material

Acronyms and Abbreviations (Cont.)

State Board	State Water Resources Control Board
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
TBD	To Be Determined
Tetra Tech	Tetra Tech, Inc.
TIE	toxicity identification evaluation
TMDL	total maximum daily load
TU	toxicity units
μS	micro Siemens
μS/cm	micro Siemens per centimeter
μg	micrograms
USEPA	United States Environmental Protection Agency
VDC	volts direct current
Weck	Weck Laboratories, Inc.
WLA	Waste Load Allocation
WQO	water quality objective
WURMP	HSA Urban Runoff Management Plan

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1.0 PROJECT DESCRIPTION

1.1 Purpose

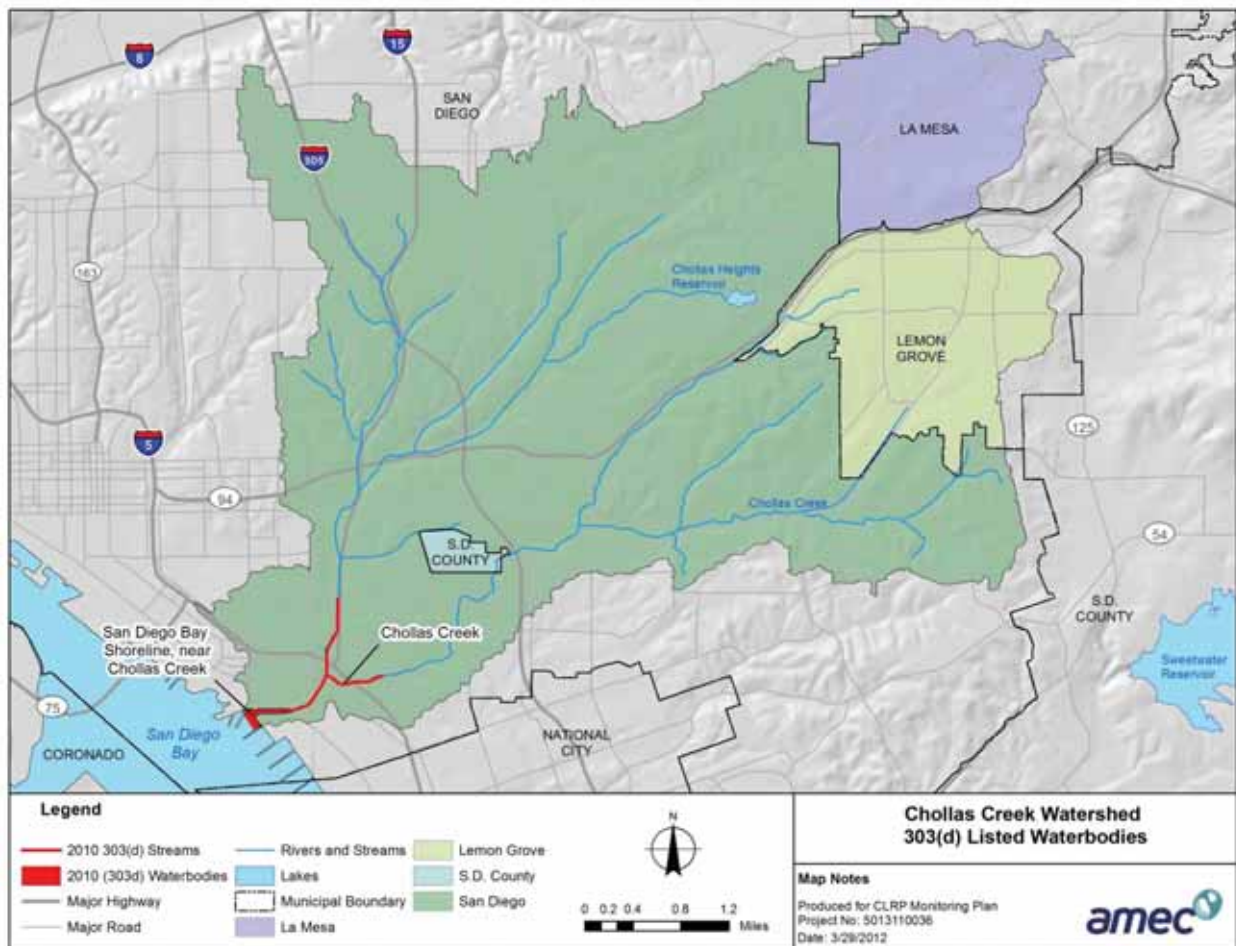
The purpose of this monitoring plan is to perform total maximum daily load (TMDL) water quality monitoring during the 2014-2015 wet weather season in Chollas Creek. This monitoring plan has included provisions to aid in attaining the TMDL monitoring requirements of the recently adopted *National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the watersheds within the San Diego Region*, Order No. R9-2013-0001, herein referred to as the MS4 Permit (SDRWQCB, 2013). Monitoring will generate data to support the Chollas Creek Contaminate Load Reduction Plan (CLRP).

1.2 Chollas Creek Hydrologic Subarea

The Chollas Creek hydrologic subarea (HSA) encompasses approximately 18,000 acres of mainly urbanized land located southeast of downtown San Diego, in the San Diego Mesa Hydrologic Area, and within the larger Pueblo San Diego Hydrologic Unit. Land use in the Chollas Creek HSA is predominantly composed of residential (48 percent) road (20 percent), and open space (9 percent) land uses. The remaining HSA land uses consist of office/institutional (6 percent), freeway (5 percent), commercial (4 percent), industrial (3 percent), and other miscellaneous land uses.

The creek includes two main tributaries, the north fork and the south fork. The drainage area of the northern fork (i.e., 8,794 acres) of the HSA is larger than that of the southern fork (i.e., 7,575 acres). The headwaters of the north fork originate approximately 1.5 miles west of the jurisdictional boundary of the City of La Mesa. From this point, the north fork flows in a southwesterly direction for approximately 3 miles before it is joined by several smaller tributaries, which feed into the main stem of the creek. The creek then flows in a southerly direction for approximately 1.5 miles before discharging into San Diego Bay. The south fork of Chollas Creek flows in a west-southwesterly direction from its headwaters in the City of Lemon Grove and is the product of two smaller creek branches. The north and south fork of Chollas Creek merge approximately 0.8 miles east of the creek's mouth at San Diego Bay, in a tidally influenced section of the creek. Figure 1-1 presents the Chollas Creek HSA.

Figure 1-1. Chollas Creek Hydrologic Subarea



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1.3 TMDL Background

The San Diego Regional Water Quality Control Board (SDRWQCB) has issued the following resolutions and investigative orders in the Chollas Creek Hydrologic Subarea (HSA):

- Investigation Order No. R9-2004-00277, California Department of Transportation (Caltrans) and San Diego Municipal Separate Storm Sewer System (MS4) Copermittees Responsible for the Discharge of Diazinon into the Chollas Creek Watershed, San Diego, California, herein referred to as the Diazinon Total Maximum Daily Load (TMDL).
- Resolution No. R9-2007-0043, A Resolution Adopting an Amendment to the Water Quality Control Plan for the San Diego Basin (9) to Incorporate TMDLs for Dissolved Copper, Lead, and Zinc in Chollas Creek, Tributary to San Diego Bay (approved under State Water Resources Control Board Resolution No. 2008-0054), herein referred as the Dissolved Metals TMDL.
- Resolution No. R9-2010-0001, *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate Revised TMDLs for Indicator Bacteria Project I-Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)*, herein referred to as the Bacteria TMDL.

Sediments in San Diego Bay near the mouth of Chollas Creek are on the 303(d) list for benthic community effects and sediment toxicity (SWRCB, 2010). These issues are being addressed through the development of TMDLs for polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and chlordane, and are not addressed in this monitoring plan. Table 1-1 presents the water bodies in the Chollas Creek HSA that have been placed on the 2010 State Board's Section 303(d) List. Beneficial uses within the Chollas Creek HSA, as designated by the State Water Resources Control Board's (State Board) San Diego Region Basin Plan (Basin Plan) for surface waters, are provided in Table 1-2.

Table 1-1. TMDL Pollutants and Other 303(d) Listed Constituents

Water body	TMDL Pollutants ^(a) (b) (c)	Other 303(d) Listed Constituents ^(d)
Chollas Creek	Indicator bacteria, dissolved copper, dissolved lead, dissolved zinc, diazinon	Total nitrogen and trash
San Diego Bay Shoreline, near Chollas Creek (Mouth of Chollas Creek)	-	Benthic community effects and sediment toxicity ^(c)

Note:

(a) Source: California RWQCB, San Diego Region. Resolution No. R9-2010-0001.

(b) Source: California RWQCB, San Diego Region. Resolution No. R9-2007-0043.

(c) Source: California RWQCB, San Diego Region. Resolution No. R9-2004-00277.

(d) Source: USEPA, 2010; Integrated Report (CWA, 303(d) List / 305(b) Report).

Table 1-2. Beneficial Uses Listed in Basin Plan

Inland Surface Water	Hydrologic Unit Basin Number	Municipal and Domestic Supply (MUN)	Contact Recreation (REC1)	Non-Contact Recreation (REC2)	Warm Freshwater Habitat (WARM)	Wildlife Habitat (WILD)
Chollas Creek	908.22	+	○	●	●	●

Notes:

Source: Basin Plan = Water Quality Control Plan for the San Diego Basin (9) (San Diego RWQCB, 2007).

● Beneficial use

○ Potential beneficial use

+ Indicates that the water body has been exempted by the Regional Board from the municipal use designation under the terms and conditions of State Board Resolution No. 88-63, *Sources of Drinking Water Policy*.

Chollas Creek was placed on the Clean Water Act Section 303(d) list in 1996 for toxicity, cadmium, copper, lead, and zinc due to exceedances of the Water Quality Control Plan for the San Diego Region (Basin Plan) water quality objectives (WQOs) and California Toxics Rule (CTR) water quality criteria (SDRWQCB, 2007b; USEPA, 2000). Results from toxicity identification evaluations (TIEs) indicated that the insecticide diazinon in part caused toxicity in Chollas Creek during storm events. As a result, a TMDL for diazinon was developed and was adopted in 2002 for toxicity in urban storm water flows under Resolution No. R9-2002-0123 (SDRWQCB, 2002). Based on further review of storm water data cadmium was delisted in 2006. The copper, lead, and zinc 303(d) listings were addressed through The Chollas Creek Dissolved Metals TMDL which was adopted in 2007 under Resolution No. R9-2007-0043 (SDRWQCB, 2007a). The monitoring requirements and management program for diazinon and dissolved metals in Chollas Creek are outlined in Investigation Order No. R9-2004-0277 (SDRWQCB, 2004). The water quality criteria which will be used to determine compliance with the diazinon and dissolved metals TMDLs in Chollas Creek are provided in Table 1-3.

Table 1-3. Water Quality Criteria for Dissolved Metals in Chollas Creek

Metal	Numeric Target for Acute Conditions: Criteria Maximum Concentration	Numeric Target for Chronic Conditions: Criteria Continuous Concentration
Diazinon	0.072 µg/L	0.045 µg/L
Copper	$(1) * (0.96) * \{e^{[0.9422 * \ln(\text{hardness}) - 1.700]}\}$	$(1) * (0.96) * \{e^{[0.8545 * \ln(\text{hardness}) - 1.702]}\}$
Lead	$(1) * \{1.46203 - [0.145712 * \ln(\text{hardness})]\} * \{e^{[1.273 * \ln(\text{hardness}) - 1.460]}\}$	$(1) * \{1.46203 - [0.145712 * \ln(\text{hardness})]\} * \{e^{[1.273 * \ln(\text{hardness}) - 4.705]}\}$
Zinc	$(1) * (0.978) * \{e^{[0.8473 * \ln(\text{hardness}) + 0.884]}\}$	$(1) * (0.986) * \{e^{[0.8473 * \ln(\text{hardness}) + 0.884]}\}$

Notes:

Hardness expressed in mg/L.

Calculated concentrations should have two significant figures.

The Bacteria TMDL is based on the 2002 303(d) List which indicated that the greatest cause of water body impairments in the San Diego Region was due to elevated bacteria levels. Per the Bacteria TMDL, impaired waters were given a priority number of 1, 2, or 3 with 1 being the highest priority. The prioritized list identifies segments or areas where bacterial water quality improvements are most likely to occur first (Priority 1), and segments or areas where bacterial water quality improvements are most likely to require more time to accomplish (Priority 3). Priority 1 waters also include water bodies likely to be removed from the CWA Section 303(d) List. Chollas Creek is listed as Priority 3. The ultimate goal of the Bacteria TMDL analysis is to achieve the necessary pollutant load reductions to restore and protect designated beneficial uses, particularly water contact recreation (REC-1).

The Bacteria TMDL defines the numeric targets and WLAs for the RAs. Data collected will be utilized to evaluate progress and attainment of TMDL targets and WLAs. Tables 1-4 and 1-5 provide the numeric targets, WLAs, and LAs for the Chollas Creek HSA per the Bacteria TMDL.

Table 1-4. Numeric Targets for Bacteria TMDL

Parameter	Dry Weather ^(a)		Wet Weather ^(b)	
	WQO (MPN/100mL) ^(c)	Allowable Exceedance ^(c)	WQO (MPN/100mL) ^(d)	Allowable Exceedance ^(e)
<i>Enterococcus</i>	33	0%	61	22%
Fecal Coliform	200	0%	400	22%

Notes:

mL = milliliters

MPN = Most Probable Number

- Source (including footnotes): California RWQCB, San Diego Region. Resolution No. R9-2010-0001.
- Dry weather days defined as days with less than 0.2 inch of rainfall observed on each of the previous 3 days.
- Wet weather days defined as days with rainfall events of 0.2 inches or greater and the following 72 hours.
- Dry weather numeric objectives based on the 30-day geometric mean (or equivalent) water quality objectives in Water Quality Control Plan for the San Diego Basin (1994). Compliance with the dry weather TMDLs in the receiving water is based on the frequency that the dry weather days in any given year exceed the dry weather numeric objective.
- Wet weather numeric objectives based on the single sample maximum (or equivalent) water quality objectives in the Water Quality Control Plan for the San Diego Basin (1994). Compliance with the wet weather TMDLs in the receiving water is based on the frequency that the wet weather days in any given year exceed the wet weather numeric objective, but 30-day geometric mean must also be met.
- The wet weather allowable exceedance frequency is set at 22%. In the calculation of the wet weather TMDLs, the San Diego Regional Board chose to apply the 22 percent allowable exceedance frequency as determined for Leo Carillo Beach in Los Angeles County. At the time the wet weather HSA model was developed, the 22 percent exceedance frequency from Los Angeles County was the only reference beach exceedance frequency available. The 22 percent allowable exceedance frequency used to calculate the wet weather TMDLs is justified because the San Diego Region HSAs' exceedance frequencies will likely be close to the value calculated for Leo Carillo Beach, and is consistent with the exceedance frequency that was applied by the Los Angeles Regional Board.

Table 1-5. Indicator Bacteria TMDL for Chollas Creek

Pollutant	TMDLs, WLAs & LAs for Controllable Sources (Billion MPN/Year)				
	Total HSA TMDL ^(a)	MS4 WLA ^(b)	Caltrans WLA ^(c)	Agriculture LA ^(d)	Open LA ^(e)
Dry Weather					
<i>Enterococcus</i>	66	66	0	0	0
Fecal Coliform	398	398	0	0	0
Total Coliform	1,991	1,991	0	0	0
Wet Weather					
<i>Enterococcus</i>	1,152,645	802,918	2,062	0	347,665
Fecal Coliform	520,440	252,479	892	0	267,070
Total Coliform	13,247,626	9,880,784	46,652	0	3,321,191

Notes:

Source: California RWQCB, San Diego Region. Resolution No. R9-2010-0001.

- TMDLs, WLAs, and LAs calculated based on numeric targets and percent allowable exceedance frequency. Meeting the numeric targets in the discharge and/or RW indicate the TMDLs, WLAs, and/or LAs have been met.
- MS4 WLA = Point source WLA for discharges from Municipal MS4 land uses.
- Caltrans WLA = Point source WLA for discharges from Caltrans land uses, assumed to be equal to the Caltrans Existing Load.
- Agriculture LA = Non-point source LA for discharges from Agriculture land uses, assumed to be equal to the Agriculture Existing Load.
- Open Space LA = Point source WLA for discharges from Open Space land uses, assumed to be equal to the Open Space Existing Load.

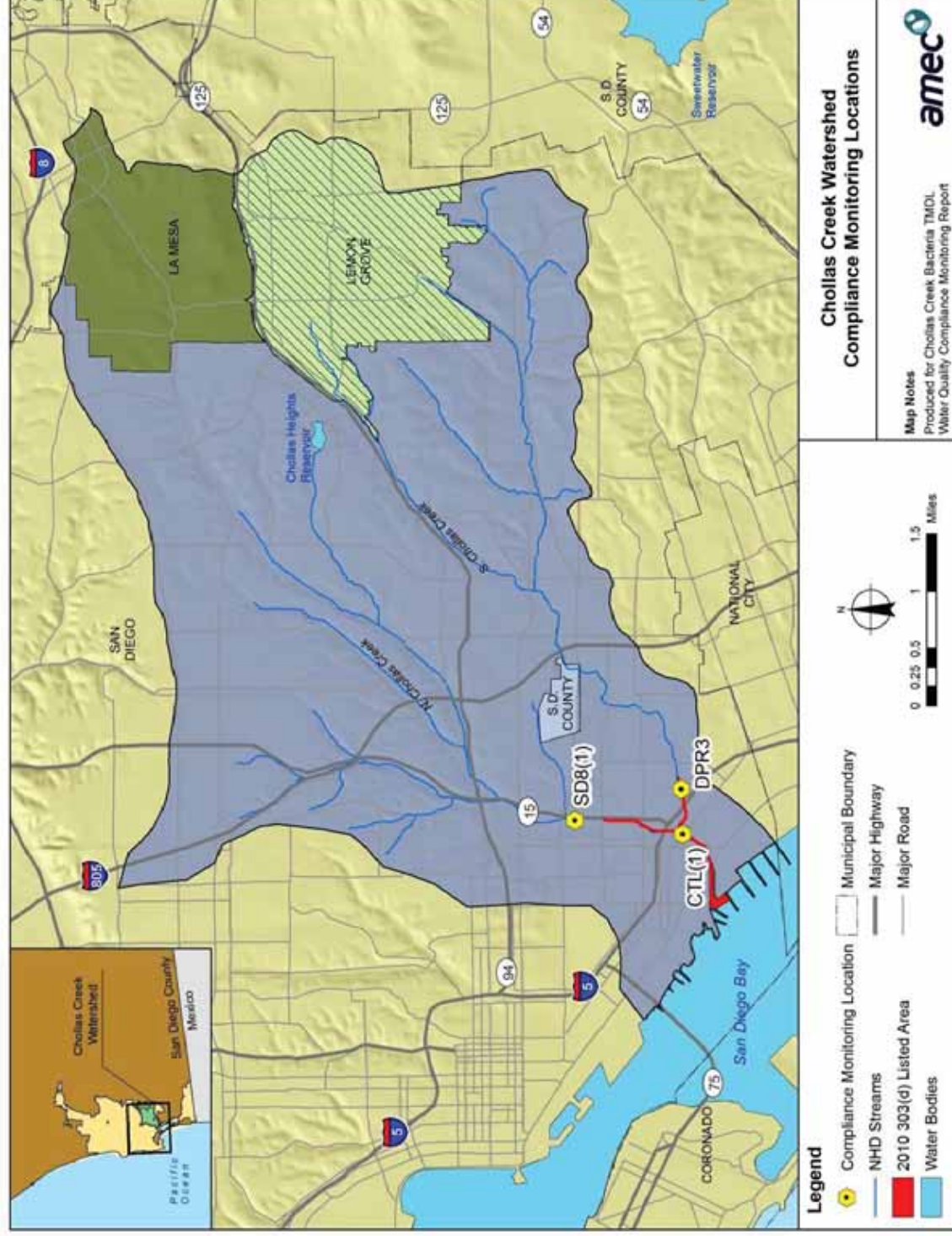
Attainment of the TMDLs in the receiving water is based on the frequency that the dry or wet weather days in any given year exceed the respective numeric objective. For dry weather, the TMDL numeric target is based on the geometric mean water quality objective and a 0 percent allowable exceedance frequency as presented in Table 1-4. The “existing” dry weather exceedance frequencies for impaired water bodies will be calculated using the available historical data from the years 1996 to 2002 per the Bacteria TMDL. For wet weather, the TMDL numeric target is based on the single-sample maximum and an allowable exceedance frequency of 22 percent as well as the geometric mean as presented in Table 1-4. The Bacteria TMDL provides a modeled estimate of the “existing” wet weather exceedance frequency for Chollas Creek HSA. RAs will compare the “existing” exceedance frequencies for dry and wet weather to the mandated frequency reductions in order to evaluate progress toward attaining the TMDL.

1.4 Monitoring Programs

This monitoring plan includes two primary scopes of work as detailed below. The monitoring locations are provided in Figure 1-2.

- Diazinon and Dissolved Metals Compliance Monitoring is presented in Section 2. Monitoring will be conducted at DPR3 and SD8(1)
- Bacteria Compliance Monitoring is presented in Section 3. Monitoring will be conducted at DPR3, SD8(1), and CTL (1).

Figure 1-2. Chollas Creek Monitoring Locations



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1.5 Project Organization

The approved Chollas Creek TMDLs identify Responsible Agencies (RAs). The RAs are collaborating on the implementation of the monitoring programs. The RAs, excluding owners and operators of small MS4s, are:

- City of San Diego (Lead Agency)
- City of La Mesa
- City of Lemon Grove
- San Diego County
- San Diego Unified Port District
- Caltrans
- United States Navy (Diazinon and Dissolved Metals TMDL only)

The City of San Diego (City) is the municipal government agency overseeing this project.

- Ruth Kolb is the Program Manager with the City of San Diego Storm Water Division.
- Andre Sonksen is the City of San Diego Project Manager. The Chollas Creek TMDL organization structure is provided in Figure 1-3.

AMEC Environment & Infrastructure, Inc. (AMEC) is the consultant hired by the City of San Diego to perform work for the Chollas Creek Monitoring Program.

- Tommy Wells is the Project Manager for AMEC and will be responsible for project coordination, scheduling, budget management, and oversight of project plans and deliverable development.
- Roshan Christoph is the AMEC Assistant Project Manager and will provide technical oversight and leadership of the Bacteria TMDL sampling and reporting.
- Claire Johnson is the AMEC Sampling Manager and Laboratory Coordinator. She will be responsible for implementing the monitoring activities.
- John Brandt is the AMEC Quality Assurance Officer and will be responsible for the project quality assurance and quality control procedures implemented during sampling, laboratory analysis, data management, and data analysis.
- Jesse Davis is the AMEC Health and Safety Officer and will be responsible for implementation of the project Health and Safety Plan and practices.
- William Szafranski will be responsible for developing and maintaining a database of project data.
- Darcy Ebentier is the AMEC Reporting Manager.

Weck Laboratories, Inc. (Weck) will be responsible for the analysis of the water quality samples with the exception of toxicology analyses.

- Hai Van Nguyen is the Weck Laboratory Project Manager and will be responsible for the proper analysis of samples in accordance with the methods and quality assurance requirements outlined in this monitoring plan.

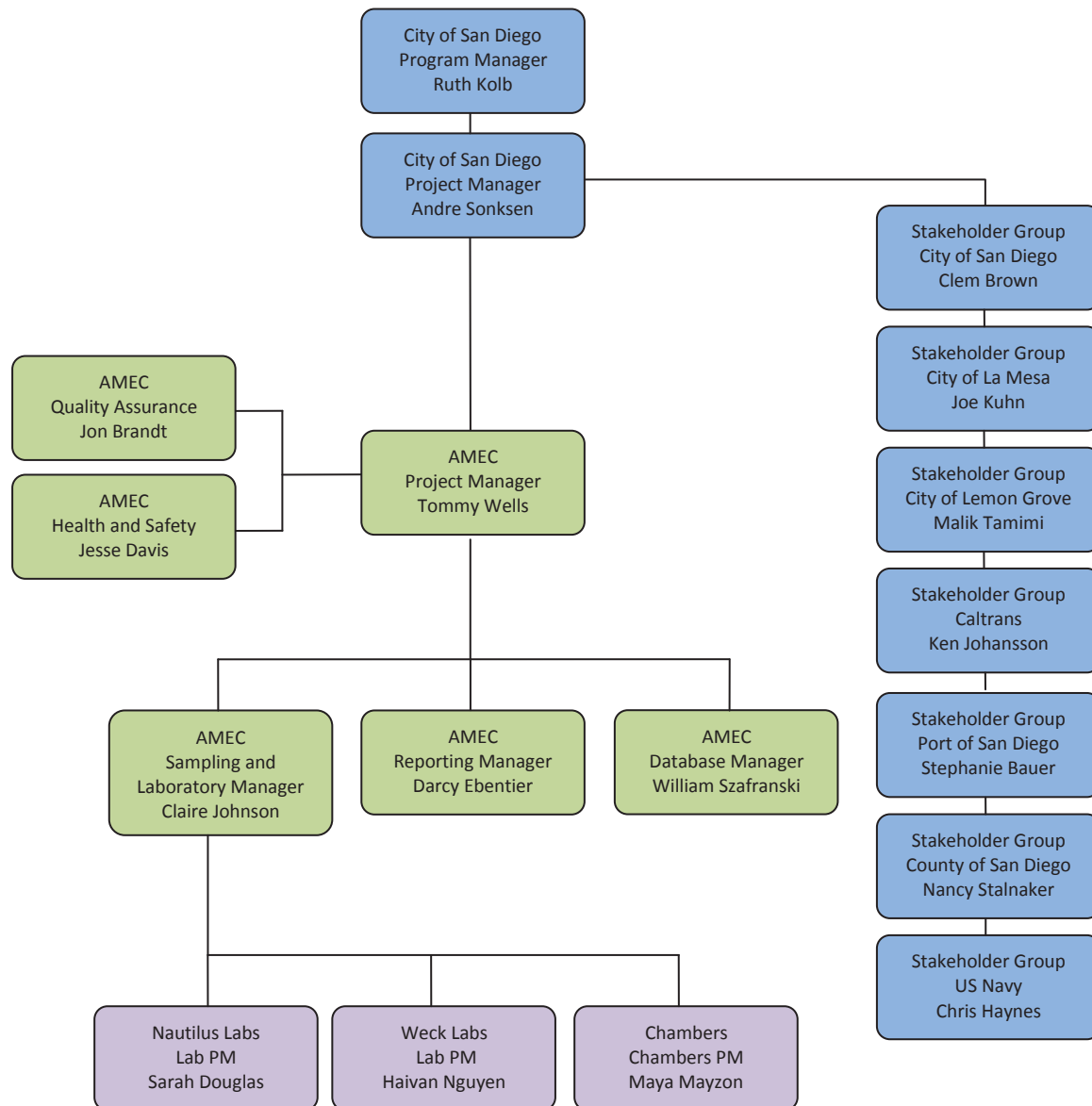
Nautilus Environmental (Nautilus) is responsible for toxicology analyses of program water samples.

- Sarah Douglas is the Nautilus Environmental Project Manager and will be responsible for the proper analysis of samples in accordance with the methods and quality assurance requirements outlined in this monitoring plan.

Chambers Group, Inc. (Chambers) will be responsible for providing field support during equipment installation and removal, maintenance, and storm event monitoring.

- Maya Mazon is the Chambers Project Manager and will be responsible for coordination of field support staff.

Figure 1-3. Organizational Chart



2.0 DIAZINON AND DISSOLVED METALS TMDL COMPLIANCE MONITORING

2.1 Analytes

Water quality samples collected at the Chollas TMDL MLSs monitoring sites will be analyzed for general chemistry, metals, synthetic organics, and toxicity during wet weather events. Additionally, *in-situ* field measurements will be collected during wet weather events. *In-situ* field measurements are presented in Table 2-1. Analytical constituents, methods, method detection limits (MDLs), and target reporting limits (RLs) are provided in Table 2-2. A comprehensive list of MDLs and RLs for organics is presented in Appendix A.

Wet weather water quality samples will be collected as flow-weighted composites, *in-situ* field measurements will be recorded once during the monitored storm events.

Table 2-1. Field Measurements

Constituent	Method	Range	Units
Conductivity	Field Meter	0 to 200,000	microSiemens per centimeter (µS/cm)
pH	Field Meter	0 to 14	pH units
Temperature	Field Meter	-5 to +75 °C	Degrees Celsius (°C)

Table 2-2. List of Constituents

Analyte	Method	MDL	RL	Units
General Chemistry				
Chloride	EPA 300.0	0.10	0.50	milligrams per liter (mg/L)
Sulfate	EPA 300.0	0.10	0.50	mg/L
Total Calcium	EPA 200.7	0.016	0.10	mg/L
Total Magnesium	EPA 200.7	0.012	0.10	mg/L
Dissolved Organic Carbon	SM 5310C	0.013	0.30	mg/L
Total Organic Carbon	SM 5310C	0.0090	0.30	mg/L
Total and Dissolved Metals				
Copper, Dissolved	EPA 200.8	0.022	0.50	micrograms per liter (µg/L)
Copper, Total	EPA 200.8	0.022	0.50	µg/L
Lead, Dissolved	EPA 200.8	0.017	0.20	µg/L
Lead, Total	EPA 200.8	0.017	0.20	µg/L
Zinc, Dissolved	EPA 200.8	0.30	5.0	µg/L
Zinc, Total	EPA 200.8	0.30	5.0	µg/L
Organics				
Organophosphorus Pesticides	EPA 625 modified low level	varies ^(a)	varies ^(a)	µg/L
Organochlorine Pesticides/PCBs	EPA 608 low-level	varies ^(a)	varies ^(a)	nanograms per liter (ng/L)
Polynuclear Aromatic Hydrocarbons (PAHs)	EPA 8270C-SIM	varies ^(a)	varies ^(a)	µg/L
PCB Congener	GCMS SIM	5.0 ng/L	10 ng/L	ng/L
Toxicity				
<i>Ceriodaphnia dubia</i> 96-hour acute static-renewal test	EPA/821/R-02/012, Oct-02	NA	NA	TU _a
<i>Ceriodaphnia dubia</i> 7-day chronic static-renewal test	EPA/821/R-02/012, Oct-02	NA	NA	TU _c

Notes:

- (a) See Appendix A for MDL and RL.
MDL Method Detection Limit
RL Reporting Limit
SM Standard Method
EPA United States Environmental Protection Agency
NA Not Applicable
TU Toxicity Units, a = acute, c = chronic
GCMS Gas Chromatography Mass Spectrometer
SIM Selective Ion Monitoring

2.1.1 Holding Times, Sample Times, and Preservation Requirements

Sample containers and preservation methods have been confirmed with the laboratories and are presented in Table 2-3.

Chains-of-Custody (COCs) will be pre-printed along with the bottle labels. The COCs will contain at a minimum the same data as the sample labels. The COCs will be completed in the field with dates, times, and sample team names, and will be cross-checked with the bottle labels. For composite samples, the start of the holding time will be considered to be the time that the last sample aliquot was collected.

Transport of the samples will be coordinated with the laboratories by the Sampling Manager. The COCs will be reviewed by personnel at the receiving laboratory to verify that stated samples are accounted for, preservation requirements have been met, analysis requirements are clearly detailed, and the holding times are remaining.

Table 2-3. Sample Volumes, Containers, Preservations, and Holding Times

Analyte	Container	Sample Volume	Preservation	Holding Time
General Chemistry				
Chloride	19-Liter (L) glass bottle	300 milliliters (mL)	<4°C; store in the dark	28 days
Sulfate		300 mL	<4°C; store in the dark	28 days
Total Hardness as Calcium and Magnesium		300 mL	<4°C; store in the dark; Acidify with HNO ₃ to pH<2	6 months
Total Organic Carbon		40 mL	<4°C; store in the dark; pH < 2 with HCl or H ₂ SO ₄	28 days
Dissolved Organic Carbon		40 mL	<4°C; store in the dark	28 days
Total and Dissolved Metals				
Copper	19-L glass bottle	360 mL	<4°C; store in the dark; Acidify to pH<2 with pre-tested HNO ₃ ASAP	48 hours to filter and preserve/ 6 months to analyze
Lead				
Zinc				
Synthetic Organics				
Organochlorine Pesticides/PCBs	19-L glass bottle	1 L ^(a)	Cool to ≤4°C in the dark; pH 5-9.	7 Days Extraction/ 40 Days Analysis
Organophosphorus Pesticides		1 L ^(a)	Cool to ≤4°C in the dark; pH 5-9.	7 Days Extraction/ 40 Days Analysis
Polynuclear Aromatic Hydrocarbons		1 L ^(a)	Cool to 4°C in the dark.	7 Days Extraction/ 40 Days Analysis
PCB Congeners		1 L ^(a)	Cool to 4°C in the dark.	7 Days Extraction/ 40 Days Analysis
Toxicity				
Ceriodaphnia dubia 96-hour acute static-renewal test	19-L glass bottle	2.5 L	<4°C in the dark	48 hours
Ceriodaphnia dubia 7-day chronic static-renewal test		2.5 L	<4°C in the dark	48 hours

Notes:

^a Additional sample volume may be required for QC samples.

2.1.2 Sample Labeling

Water quality sample bottles will be pre-labeled, to the extent possible, before each monitoring event. Pre-labeling bottles simplifies field activities and leaves only date, time, sample ID, and sampling personnel names to be filled out in the field. Each sample collected will be labeled with the following information:

- Project Name
- Monitoring Program
- Event Number
- Date and Time
- Site ID Number
- Bottle ___ of ___ (for multi-bottle samples)
- Collected by ___
- Analysis

Field samples will be labeled as described below. These samples will be labeled, recorded on the COC form, and then transported to the analytical laboratory.

Each water sample collected will receive a unique alphanumeric code (Sample ID Number) for tracking. This code will be standardized for water quality samples and will contain information as it relates to the site, event, and type of sample. The required sample identification numbers, applicable to water quality samples, are listed below. Example identification numbers are shown in Table 2-4:

- Monitoring Year
 - 2014 = 2014-2015 Wet weather season
- Event Number
 - W1 = Wet Weather Event 1
 - W2 = Wet Weather Event 2
 - W3 = Wet Weather Event 3
- Site ID
 - Alphanumeric unique ID
- Sample Code
 - C = Composite sample
- Sample Type
 - 01 = Primary sample

Table 2-4. Example Sample Identification Numbers

Sample ID	Description			
	Sample Type	Site ID	Event	Sample Type
2014-W1-SD8(1)-C-01	Composite Sample	SD8(1)	2014-2015 Season Wet Weather Event 1	Primary Sample

2.1.3 Laboratory Data Package Deliverables

Laboratories will aim to provide a three-week turnaround on the deliverable package per event. The deliverable package will include a hard copy and electronic data files. The hard copy will include standard narratives identifying analytical inconsistencies, Quality Assurance / Quality Control (QA/QC) exceedances, and corrective actions. The electronic data files will be submitted in a Surface Water Ambient Monitoring Program (SWAMP) compatible format (SWRCB, 2008) and will contain the same information found in the hard copy reports submitted by the laboratory. Individual data sets may be submitted to the consultant as either Microsoft Excel workbook files or as Microsoft Access database files.

2.1.4 Laboratory Selection

Weck Laboratories, Inc., located in the City of Industry, California, will be providing laboratory services for this project, including analytical testing for water quality constituents except toxicology samples.

Weck Laboratories Inc.
 14859 East Clark Avenue
 City of Industry, California 91745
 Office: (626) 336-2139
 Fax: (626) 336-2634

Nautilus Environmental, located in San Diego, California, will be providing toxicology laboratory services for this project.

Nautilus Environmental
 4340 Vandever Avenue
 San Diego, California 92120
 Office: (858) 587-7333
 Fax: (858) 587-6769

2.2 Monitoring

Chollas TMDL Compliance MLSSs will be monitored for water quality and flow during three storm events. Monitoring will be conducted at the north fork of Chollas Creek (SD8(1)) and at the south fork of Chollas Creek (DPR3). Additionally, flow will be monitored during the wet weather season at the Compliance MLSSs. Flow monitoring will be conducted at both locations from October 1, 2013, through April 30, 2014.

The sites will be monitored for the parameters listed in Table 2-1 and Table 2-2. The first two qualifying storm events after October 1, 2013 and the first qualifying storm event after February 1, 2014, will be mobilized for.

Qualifying storm events for the purposes of this project are defined as storms forecast to produce at least 0.10 inches of rainfall within a 24 hour period with at least a 72 hour antecedent dry weather period (<0.10" of rainfall in a 24 hour period). The weather forecast, forecast discussion, and quantitative precipitation forecast produced by the National Weather Service (NWS) and publically available at: <http://www.wrh.noaa.gov/sqx/> will be used to determine if a storm event should be mobilized for. Antecedent rainfall conditions will be determined by review of data available from publically available NWS rain gauge data and on site rain gauge data.

2.2.1 Monitoring Locations

The Chollas TMDL MLSSs are located upstream of the tidally influenced sections of Chollas Creek. The North Chollas Creek site is located in a trapezoidal concrete channel east of the intersection of 33rd Street and Durant Street. The South Chollas Creek site is located north of the intersection of Beta Street and Birch Street, in a natural bottom channel with concrete lined walls and a small concrete-lined bottom section. The monitoring site coordinates are provided in Table 2-5

Table 2-5. Chollas TMDL Mass Loading Stations

Site Name	Site ID	Latitude	Longitude
North Chollas Creek	SD8(1)	32.70493	-117.12132
South Chollas Creek	DPR3	32.69130	-117.11682

2.2.1.1 SD8(1) Mass Loading Station

The SD8(1) mass loading station is located in a trapezoidal concrete channel on North Chollas Creek. Flow will be measured at the station using an American Sigma 950 Area Velocity Bubbler (AVB) flow meter. A low profile velocity sensor and stainless steel bubbler pressure transducer will be used to measure stage and velocity in the channel.

Flow will be calculated in the flow meter using a head versus flow (HVF) table. The HVF table was developed based on a survey of channel dimensions and slope and the calculations produced using the Manning's Equation for open channel flow. The HVF table will be adjusted

to produce more accurate flow estimations based on recorded channel velocities and physical gauging of the stream during low flow and high flow conditions, as available. This monitoring location is depicted in Figure 3-1.

Figure 2-1. SD8(1) Mass Loading Station



2.2.1.2 DPR3 Mass Loading Station

The DPR3¹ mass loading station is located in a relatively short section of trapezoidal concrete channel. Approximately 10 feet (ft) upstream and 10 ft downstream of the monitoring site the channel bottom is natural with concrete sides. Several large wooden posts are present embedded in the concrete near the monitoring location and reach approximately the height of the channel. These posts are remnants of a footbridge that was removed during the 2012-2013 wet weather season.

Flow will be measured at the station using an American Sigma 950 AVB flow meter. A low profile velocity sensor and stainless steel bubbler pressure transducer will be used to measure stage and velocity in the channel.

Flow will be calculated in the flow meter using a HVF² table. The HVF table was developed based on a survey of channel dimensions and slope and the calculations produced using the Manning's Equation for open channel flow. The HVF table will be adjusted to produce more

¹ The South Chollas Creek MLS was relocated prior to the 2011-2012 wet season downstream of the historical monitoring location. At the previous monitoring site, DPR2, located at 38th Street and Alpha Street (32.69204, -117.11233), heavy vegetation and sediment had accumulated over several years consequently reducing the accuracy of flow data obtained at this location. The current monitoring site, DPR3, has been used for numerous studies, including a 1999 Caltrans District 11 Water Quality Study (Caltrans 1999), the 2005-2007 SCCWRP Chollas Creek TMDL program (SCCWRP 2007), and the 2009-2010 City of San Diego Storm Drain Characterization Study (Tetra Tech 2010). The change of the site location was approved by the San Diego Regional Water Quality Control Board (SDRWQCB) in a letter sent to the City of San Diego on September 19, 2011.

² A HVF table developed by Caltrans in 1999 was used to calculate flows prior to the 2013-2014 wet weather season. However, review of aerial imagery indicated that channel conditions have likely changed significantly since this table was initially developed. Thus, an updated HVF table was created.

accurate flow estimations based on recorded channel velocities and physical gauging of the stream during low flow and high flow conditions, as available.

Figure 2-2. DPR3 Mass Loading Station



2.2.2 Water Quality Monitoring

AMEC will perform water quality monitoring at the Chollas MLSs for three storm events during the 2014-2015 wet weather monitoring period, in accordance with SDRWQCB Order No. R9-2004-0277.

Storm water monitoring will include the collection of flow-weighted composite samples to be analyzed for chemistry and toxicity parameters, as listed in Table 2-2. *In-situ* field measurements will be taken once during each storm event for pH, temperature, and conductivity. Flow monitoring will be conducted at each monitoring site to capture the event hydrograph. Rain gauges will be installed at MLS SD8(1) and MLS DPR3. In accordance with SDRWQCB Order No. R9-2004-0277, monitoring and analyses must follow the SWAMP Quality Assurance (QA) guidelines, which are presented in Section 2.5.

Water quality samples will be collected using a Hach SD900 automated peristaltic pump that is paced by the American Sigma 950 flow meter to collect samples proportional to the flow of the creek. Additional information regarding automated flow-weighted sampling equipment is presented in Section 5.

To be compatible with SWAMP, equipment blanks will be performed on 19L bottles, Teflon tubing, peristaltic tubing, and sample intake strainers. Composite sampling is not amenable to field duplicate or field blank samples. Duplicate measurement of *in-situ* parameters will be performed. As the laboratories perform sample compositing, a laboratory split duplicate sample analysis will be performed at a frequency of five percent of the total sample count. Quality control methods are describes in more detail in Section 2.5.

2.2.3 Extended Flow Monitoring

In addition to storm event monitoring, flow will be measured continuously at the two MLSs. Flow data will be logged at one-minute intervals during monitored storm events and at 15-minute intervals during non-storm events. Data will be manually downloaded and reviewed on an approximately bi-weekly basis. Additional information regarding flow monitoring equipment is presented in Section 2.3.

2.3 Field Equipment Installation, Operation, and Maintenance

2.3.1 Extended Flow Monitoring and Water Quality Monitoring Equipment

This section will describe the type of equipment that is proposed to be used to complete the Chollas Creek Monitoring Program, as well as the installation and maintenance procedures. Flow and storm water monitoring are dynamic processes which may require modification based on current site and channel conditions. Thus, the methodologies presented are subject to modification or change in order to meet the objectives of this monitoring program.

2.3.1.1 Automated Composite Sampling and Flow Monitoring Equipment

The storm water sampling equipment is designed to measure flow and collect composite samples of storm water runoff in a flow-proportioned manner. The selected equipment has been found to be appropriate to meet the project objectives and has been successfully utilized in other regional water quality monitoring studies. The equipment is automated and can be accessed remotely via telemetry if properly equipped. The use of telemetry is not proposed during the 2014-2015 wet weather season due to manufacturer upgrades currently being conducted to the telemetry system which have not been determined to be presently reliable by AMEC. However, if AMEC identifies a telemetry system that appears reliable, telemetry may be implemented during the 2014-2015 wet weather season. These features allow reductions in operating effort and increase the reliability and quality of the storm water monitoring data.

The following equipment components will be installed at the two Chollas TMDL MLSs. Equipment components will be installed prior to the beginning of the 2014-2015 wet weather season (October 1, 2014). Installed equipment will include the following:

- American Sigma 950 AVB data-logging flow meter(s).
- Hach SD900 automated composite sampler(s).
- American Sigma tipping bucket rain gauge.
- 12-VDC rechargeable gel cell power supply.
- Security Enclosure

The specific configuration at each site will be dependent on site location and access. An overview of the main flow monitoring components and other monitoring equipment is presented below.

2.3.1.2 Data-Logging Flow Meter

American Sigma 950 AVB flow meters log and calculate flow based on measured parameters. Water stage and velocity are measured with a stainless steel bubbler pressure transducer and low profile velocity sensor installed in the conveyance. A pressure transducer translates the proportional relationship of the hydrostatic pressure on a pressure plate compare to an atmospheric vent to estimate water level. Water velocity is measured using Doppler technology, which rates the velocity of particles in the water. The water must have sufficient suspended solids in order for a velocity reading to be obtained. The flow meter allows for several methods of flow estimations. This project will utilize HVF tables at the TMDL compliance sites and the area-velocity method at the Special Study sites. The flow meter allows for programming of either the HVF table or the geometry of the conveyance and, based on input from the bubbler and velocity sensors, the flow meter calculates instantaneous flow estimates. The flow meters also have inputs for a rain gauge and sampler communication.

2.3.1.3 Flow Meter Logging and Sampler Control

The data logging feature of the American Sigma 950 AVB flow meter is a required component of any flow-weighted sampling station. The American Sigma 950 AVB flow meter can be connected to an automated sampler through a 4-20 milliampere (mA) range output. In this configuration, the flow meter provides a method to control or pace the sampler, and store sampling data and other auxiliary data.

The flow meter will measure and log flow levels, rainfall and sample history. One-minute average flow and rainfall data will be recorded in the flow meters during monitored storm events. During dry weather flow and non-monitored storm events, flow will be recorded every 15 minutes. The flow meters convert instantaneous flow into total runoff volume. Data containing storm and hydrological information is electronically stored in the flow meter, with each monitoring event stored separately. The recorded information includes:

- Flow rates.
- Time of peak flow rate.
- Cumulative rainfall.
- Rainfall intensity.
- Discharge volume totals.
- Time of each sample.
- Success or failure of each sample.

2.3.1.4 Automated Sampler and Associated Sampling Equipment

The Hach SD900 automated sampling system consists of an intake strainer, Teflon-lined intake tubing, flexible silicon pump tubing, a peristaltic pump, sample bottle(s), a distributor arm, and a controller. The samplers will be programmed to collect flow-weighted composite samples throughout a monitoring event.

The intake tubing and intake strainers will be securely fastened at the desired sampling point in the runoff flow stream. The intake tubing will be housed in protective conduit and then attached to the flexible silicon pump tubing at the sampler. The flexible silicon pump tubing will run through the sampler's peristaltic pump into the composite sample bottle(s).

A sample aliquot will be collected after a programmed volume of flow, referred to as the "pacing," has passed the flow monitoring point for flow-weighted sampling sites. The pacing is selected, based on forecast rainfall totals and estimated runoff volumes, so that an appropriate number of aliquots will be collected to provide sufficient sample volume. The automated sampler will be programmed to collect 500-milliliter (mL) sample aliquots in a 19-L borosilicate glass bottle. The composite sample will be analyzed for the constituents listed in Table 2-2.

2.3.1.5 Rain Gauges

An American Sigma tipping bucket rain gauge will be used to measure rainfall at each of the four monitoring sites. The rain gauge measures 0.01 inches of rain each time the tipping bucket fills and closes a switch. The data logger/controller counts each switch closure to calculate rainfall totals.

2.3.1.6 Power

The Hach SD900 automated samplers and American Sigma 950 AVB flow meters will be powered by a 12-VDC rechargeable gel cell power source.

2.3.1.7 Equipment Security Housing

Monitoring equipment will be mounted within fiberglass or metal enclosures that will be bolted to concrete or wooden monitoring foundations and locked to secure the monitoring equipment.

2.3.2 Installation of Monitoring Equipment

Field teams will mount equipment securely using best professional judgment. Sampler tubing and wiring will be routed through conduits that will be placed between the monitoring locations and the sampling equipment or enclosures. Above-ground instruments will be protected within a site equipment enclosure. Exposed conduit, intakes, and sensors will be securely fastened using stainless steel brackets, screws, and anchors. Once the study is completed, monitoring equipment will be removed except for the enclosures.

2.3.3 Maintenance and Calibration of Monitoring Equipment

Maintenance and calibration of monitoring equipment will be performed during installation and prior to wet weather monitoring events. A calibration log will be maintained for calibrations performed in the field. Prior to monitoring events, field teams will verify that the batteries are sufficiently charged.

2.4 Preparation and Logistics

2.4.1 Weather Tracking

Weather will be tracked for the duration of the 2014-2015 wet weather season from October 1, 2014, to April 30, 2015. The weather forecast, forecast discussion, and quantitative precipitation forecast produced by the National Weather Service (NWS) and publically available at: <http://www.wrh.noaa.gov/sqx/> will be used to determine if a storm event should be mobilized for. Antecedent rainfall conditions will be determined by review of data available from publically available NWS rain gauge data and on site rain gauge data.

2.4.2 Storm Selection Criteria

The Chollas MLSs will be monitored for the first two storm events that meet the sampling criteria and produce sufficient flow at the monitoring locations after October 1, 2014. The third event will be the first storm event after February 1, 2015, that meets the sampling criteria and produce sufficient flow at the monitoring locations.

The sampling criteria are:

- Rainfall of a least one-tenth (0.1) of an inch in the drainage area within a 24 hour period.
- An antecedent dry period of at least 72 hours prior to the sampled event (<0.10" in 24 hours).
- A storm event within plus or minus 50 percent of the average or median storm volume and duration for the region.

Communication with the City's project manager will be made within 48 hours of the intent to monitor a storm via either phone or email. Storm event monitoring will be conducted from the onset of rainfall until stream flow returns to within approximately 10 percent of base flow or a maximum of 24 hours from the first sample aliquot time.

2.4.3 Mobilization and Staffing

Monitoring for both the flow and water quality of storm water runoff requires considerable planning prior to actual rainfall occurring. Obtaining representative samples and complete storm data is only possible using well-trained and alert field teams. The uncertainty of weather forecasts coupled with abrupt changes in the weather can greatly alter the expected workload. It is critical to plan and prepare for numerous aspects of the field effort well in advance of a storm

event. Each pre- and post-storm mobilization team will be made up of two field individuals. A Staffing Plan, which designates personnel and equipment required for each facet of storm monitoring, will be completed for each potential monitoring event.

The Staffing Plan will include the following:

- Personnel assigned for monitoring.
- Shift (e.g., start-up and relief).
- Equipment mobilization.
- Communication channels.

Field teams will not be mobilized during or near certain holidays if either the mobilization or the laboratory analysis is projected to continue through that holiday. This includes the following holidays and dates:

- Thanksgiving: November 27 and 28, 2014.
- Christmas: December 24 and 25, 2014.
- New Year's: December 31, 2014, and January 1, 2015.

2.4.3.1 Personnel

Storm water monitoring tasks require a variety of skills and positions. The required personnel include:

- Project Manager.
- Sampling Manager.
- Field Technicians.
- **Project Manager** – During storm events, the Project Manager will monitor the status of the monitoring stations via communication with field crews. The Project Manager must be able to obtain and interpret the most recent weather forecasts to determine the appropriate "Volume to Sample" values (volume of runoff to flow past the station prior to each sample aliquot being taken) for composite sampling, as well as to make informed decisions regarding the storm status. It is also the responsibility of the Project Manager to notify personnel of shift start- and end-time changes.

The Project Manager must have excellent decision-making and dispatch skills as well as a thorough understanding of the project requirements. If an assistant fills this position, the consultant's Project Manager should be available to answer questions.

- **Sampling Manager** – The Sampling Manager is a technically-skilled, experienced field supervisor and is the most experienced member of the field team. This position requires a thorough understanding of project requirements, sampling procedures, and equipment

operations. The Sampling Manager will communicate frequently with the Project Manager to determine task priorities. The Sampling Manager will also monitor the ability of field teams to complete their shifts safely and effectively, and will notify the Project Manager of the need for relief teams. The Sampling Manager must be able to troubleshoot the common problems that could be experienced by any of the field teams, and will be responsible for directing the procedures at each site visit and for making sure that data are recorded properly. The Sampling Manager will also provide on-site weather observations for the Project Manager.

- **Field Technicians** – The Sampling Manager will usually have one to three field technicians assisting. This will be dependent on the number of sites being monitored for a given storm event. Field technicians are field personnel trained in storm water sample collection and Health and Safety issues. Field technicians may also be used as couriers.

2.4.3.2 Equipment Mobilization

Equipment needed for storm water sampling includes: sampling equipment and containers, safety equipment, personal rain gear, storm kits, and vehicles equipped with mobile communication and safety equipment (See Table 2-6). The necessary equipment should be loaded into the appropriate vehicles early in the storm preparation sequence. During the wet weather season, field crews will utilize the safety equipment, personal rain gear, and other site maintenance equipment listed below.

Table 2-6. Storm Kit Equipment and Mobilization List

Storm Kit Equipment List	Mobilization List
Flashlights (2)	Field notebook (including job hazards analysis (JHA) and Tailgate Safety Meeting Forms)
Maps	Paper towels
High-quality alkaline D-cell batteries	Spare chains of custody
Spare sample labels	Sample control paperwork
Pencils and indelible markers	Extra-fine indelible markers
Desiccant (packages and jar)	19-L borosilicate glass bottles
Diagonal clipper	Grab sample bottles
Electrical tape	Reagent-grade, analyte-free deionized water (3-gallon jug) from the laboratory
Cable ties (assorted sizes)	Cellular phone
Utility knife	Personal rain gear
Ziploc bags (assorted sizes)	Digital or disposable camera
Nitrile gloves	Necessary safety gear (see Appendix B - <i>Health and Safety Plan</i>)
Keys	
Sampling pole for grab samples	
Manhole lifter	

2.4.3.3 Communication Channels

Communication channels must be established for personnel to contact each other before and during the event. Cellular telephone communication links to field teams are essential for efficient storm water monitoring because the Project Manager and the Sampling Manager will need to track the location and workload of each field team and direct them to priority tasks. The project field notebook will include phone lists with home, work, and cellular numbers of the AMEC field

team, and work numbers for primary laboratory contacts and City of San Diego personnel to aid in communication.

2.4.4 Station Preparation

Prior to a storm event, stations must be made ready for monitoring. These preparations include verifying that the automated samplers and flow monitoring equipment are calibrated and active, and that the system pumps are functioning as designed. The flow sensors should be cleared of debris. Additional preparation for storm events includes pre-icing the composite sample bottles. Performing general equipment inspections to confirm that the sites are operational will also be included in station preparation.

2.4.4.1 Determination of Sampler Pacing Value

Water quality monitoring requires that the proper "Volume to Sample" or "Pacing" value be entered into the flow meter when collecting a flow-weighted composite sample. This is the flow volume corresponding to the automated sampler trigger for each composite sample aliquot. The amount of expected rainfall, how the station performed during previous storms, and how much runoff is anticipated at the station for each storm event are to be taken into consideration in determining the "Volume to Sample" for each event.

Once the proper "Pacing" is determined for the flow-weighted composites, it must be entered into the monitoring station flow meter at the onset of rainfall. It is important that this value is accurate. If the value is too high, the system will not collect enough volume of water to be analyzed; if the value is too low, the sample bottle capacity will be exceeded, and if the bottles are not changed in time the percent storm capture will drop. This project requires a minimum volume of six liters of sample to meet analytical chemistry needs, and three liters of sample to meet toxicity needs designated for the composite samples.

2.4.4.2 Prepare Sampler

A complete maintenance program will be performed for monitoring equipment before each wet weather event. Maintenance will include checking the performance of the equipment, checking power supplies and replacing batteries as required, inspecting and clearing intake structures, checking the status of instrumentation desiccant, and performing any necessary equipment repairs to keep the monitoring equipment operational.

Field teams must verify that the automated sampler has been reset and that it has been programmed to collect samples based on flow pulses from the flow meter. The sampler should be programmed to "run continuously."

2.4.4.3 Iced Sample Bottle

The composite sample bottles will be iced after the decision has been made to monitor the storm. From the time that the first sample aliquot is delivered to the composite sample bottle, sufficient ice must be maintained around the bottle(s) to maintain a sample temperature of four degrees Celsius or less.

2.4.4.4 General Site Inspection

The general functionality of the surrounding site will be inspected. It should be verified that no debris is located in the water sampling areas, and the areas should be inspected for trash to prevent clogging of equipment.

The equipment will be physically inspected to make certain that there are no obvious problems, such as damaged cables or a kinked hose. Intake strainers and flow sensors are to be visually inspected when access allows and cleared of debris if necessary.

2.4.4.5 Documentation

During each monitored storm event records of the event should be recorded accurately in the field data sheet. A blank field data sheet is provided in Appendix C.

The following general information should be entered during each monitored storm event:

- Alphanumeric Site ID
- Date
- Time
- Monitoring program
- Field team
- Field measurements
- Weather conditions
- Runoff characteristics
- Equipment condition
- Sample aliquots in each bottle
- Grab sample collection times
- Miscellaneous comments

Additional data will be recorded on the field data sheet at the end of a storm event. The following data will be collected at stations:

- **Total Flow Volume (liters)** – Total volume of water that passed the station during the storm at sites where flow meters are installed
- **Composite Sample Aliquot Count** – Total aliquots attempted, the number of aliquots missed, and the total number of successful aliquots
- **Total Rain (inches)** – Total accumulated rainfall in inches since the start of the storm, measured each time the rain bucket tips
- **Sample Volume (liters)** – Total volume of sample collected during the storm

This data will be logged by the flow meter; however, if downloaded data is lost, the data recorded on the field log will act as a back-up.

2.4.4.6 Training

Field personnel will be properly trained in the use of the monitoring equipment and clean sample handling techniques (Appendix D) along with appropriate health and safety protocols (Appendix B). Specifically, the following elements will be included in the training of field personnel:

- Review of Health and Safety Plan
- Field equipment training

Each field team member will review the Health and Safety Plan and consult with the Sampling Manager if they have any questions before mobilization. The Sampling Manager will train field personnel in sampling protocols and procedures in accordance with the Monitoring Plan. Field training also will be provided before the beginning of the wet season to make field personnel aware of the project-specific goals and objectives.

2.5 Quality Assurance / Quality Control

2.5.1 Field Quality Assurance/Quality Control

This section addresses Quality Assurance/Quality Control (QA/QC) activities associated with field sampling. The field QA/QC samples are used to evaluate potential contamination and sampling errors applicable to automated composite sampling and grab sampling introduced prior to submittal of the samples to the analytical laboratory.

The main types of field QA/QC samples that will be utilized are as follows. Sample types, measurement objectives, and frequencies are summarized in Table 2-7.

- **Equipment Blanks** – Equipment blanks provide verification that the sampling containers, sampling equipment, and tubing are clean³ prior to sampling. A representative number of bottles or sections of tubing from each lot will be submitted to the laboratory. The laboratory will use reagent-grade, analyte-free deionized water to fill the bottles or rinse through the tubing and then analyze the water. Blank analysis results will be evaluated by checking against the reporting limit for that analyte. Results obtained should be less than the reporting limit for each analyte. If results are above the reporting limits then the entire lot must be cleaned and re-analyzed.
- **Field Duplicates** – A field duplicate may be produced during grab sampling or post storm composite sampling. However, no grab samples are being collected for this project and post storm compositing of samples is being performed by the laboratories. Thus, no field duplicates will be collected for this project. Field duplicate measurements of in-situ measurements will be conducted at a rate of greater than or equal to five percent.

³ Present at concentrations below the laboratory MDL for analytes selected for analysis.

- **Laboratory Duplicates** – Laboratory duplicates evaluate sampling error introduced by sub sampling. The laboratory is responsible for compositing samples and sub sampling. The laboratory will select one sample during the wet season at the direction of AMEC to create a laboratory duplicate for analysis. A laboratory duplicate will not be performed for toxicity analysis.

Table 2-7. Quality Control Samples

Constituent Category	Measurement Quality Objective		Frequency of Analysis ^(b)
	Laboratory Duplicate	Equipment Blank	
Conventionals	RPD<25% ^(a)	<RL for target analyte	5% of total project sample count
Metals	RPD<25% ^(a)	<RL for target analyte	5% of total project sample count
Organics	RPD<25% ^(a)	<RL for target analyte	5% of total project sample count
Toxicity	NA	NA	NA

Notes:

NA: Not applicable.

a. NA if native concentration of either sample<RL.

b. For equipment blanks, the frequency is 5% per batch or lot. A batch is defined as the group of bottles that have been cleaned at the same time, in the same manner, or, if decontaminated bottles are sent directly from the manufacturer, the batch would be the lot designated by the manufacturer in their testing of the bottles.

2.5.2 Laboratory Quality Assurance/Quality Control

This section addresses QA/QC activities associated with laboratory analyses. Laboratory QA/QC samples provide information to assess potential laboratory contamination, analytical precision, and accuracy. Analytical quality assurance for this program includes the following:

- Employing analytical chemists trained in the procedures to be followed.
- Adherence to documented procedures, United States Environmental Protection Agency (USEPA) approved methods, and written Standard Operating Procedures (SOPs).
- Calibration of analytical instruments.
- Use of quality control samples, internal standards, surrogates, and Standard Reference Materials (SRMs).
- Complete documentation of sample tracking and analysis.

Internal laboratory quality control checks will include the use of laboratory replicates, method blanks, matrix spikes/matrix spike duplicates (MS/MSDs), and laboratory control samples (LCSs) as follows. The quality control checks performed on each constituent are presented in Table 2-8. The frequency of the laboratory QA/QC samples is presented in Table 2-9, and the laboratory quality control objectives are presented in Table 2-10.

- **Laboratory Replicate/Split** – A sample is split by the laboratory into two portions and each portion is analyzed. Once analyzed, the results are evaluated by calculating the relative percent difference (RPD) between the two sets of results. This serves as a measure of the reproducibility, or precision, of the sample analysis. Typically, replicate results should fall within an accepted RPD range, depending upon the analysis.
- **Method Blanks** – A method blank is an analysis of a known clean sample matrix that has been subjected to the same complete analytical procedure as the field sample to determine if potential contamination has been introduced during processing. Blank analysis results are evaluated by checking against reporting limits for that analyte. Results obtained should be less than the reporting limit for each analyte.
- **Matrix Spike and Matrix Spike Duplicates (MS/MSDs)** – Matrix spikes and matrix spike duplicates involve adding a known amount of the analyte(s) of interest to one of the actual samples being analyzed. One sample is split into three separate portions. One portion is analyzed to determine the concentration of the analyte in question in an unspiked state. The other two portions are spiked with a known concentration of the analytes of interest. The recovery of the spike, after accounting for the concentration of the analyte in the original sample, is a measure of the accuracy of the analysis. An additional precision measure is made by calculating the RPD of the duplicate spike recoveries. Both the RPD values and spike recoveries are compared against accepted and known method dependent acceptance limits. Results outside these limits are subject to corrective action.
- **Laboratory Control Sample (LCS)** – The laboratory control sample procedure involves spiking known amounts of the analyte of interest into a known, clean, sample matrix to assess the possible matrix effects on spike recoveries. High or low recoveries of the analytes in the matrix spikes may be caused by interferences in the sample. Laboratory control samples assess these possible matrix effects since the LCS is known to be free from interferences.

Table 2-8. Laboratory Quality Control Samples by Constituent

Analyte	Laboratory Replicate	Method Blank	MS/MSD	LCS
General Chemistry				
Chloride	—	✓	✓	✓
Sulfate	—	✓	✓	✓
Total Calcium	—	✓	✓	✓
Total Magnesium	—	✓	✓	✓
Dissolved Organic Carbon	—	✓	✓	✓
Total Organic Carbon	—	✓	✓	✓
Total and Dissolved Metals				
Copper, Total	—	✓	✓	✓
Copper, Dissolved	—	✓	✓	✓
Lead, Dissolved	—	✓	✓	✓
Lead, Total	—	✓	✓	✓
Zinc, Dissolved	—	✓	✓	✓
Zinc, Total	—	✓	✓	✓
Organics				
Organophosphorus Pesticides	—	✓	✓	✓
Organochlorine Pesticides/PCBs	—	✓	✓	✓
Polynuclear Aromatic Hydrocarbons (PAHs)	—	✓	✓	✓
PCB Congeners	—	✓	✓	✓
Toxicity				
<i>Ceriodaphnia dubia</i> 96-hour acute static-renewal test	✓	✓	—	—
<i>Ceriodaphnia dubia</i> 7-day chronic static-renewal test	✓	✓	—	—

Table 2-9. Laboratory Quality Control Sample Frequency

QA/QC Sample Type	Minimum Sampling Frequency
	General Chemistry
Laboratory Replicate/Split	One per batch or per 20 samples (5% collected throughout the duration of the project)
Method Blank	One per batch or per 20 samples (5% collected throughout the duration of the project)
Matrix Spike/ Matrix Spike Duplicate (MS/MSD)	One per batch or per 20 samples (5% collected throughout the duration of the project)
Laboratory Control Sample (LCS)	One per batch or per 20 samples (5% collected throughout the duration of the project)

Table 2-10. Laboratory Quality Control Sample Objectives

QC Sample Type	General Chemistry	Metals	Synthetic Organics
Laboratory Blank	<RL for target analyte	<RL for target analyte	<RL for target analytes
Laboratory Duplicate	NA	NA	NA
Reference Material	80-120% recovery	75-125% recovery	70-130% recovery if certified; otherwise, 50-150% recovery
Matrix Spike/ Matrix Spike Duplicate (MS/MSD)	80-120% recovery; RPD<25%	75-125% recovery; RPD<25%	50-150% recovery, or based on 3x the standard deviation of laboratory's actual method recoveries; RPD<25%

Notes:

NA: Not applicable.

^a. NA if native concentration of either sample <RL.

2.5.3 Data Quality Objectives

Data quality objectives (DQOs) are quantitative and qualitative statements that define project objectives and specify the acceptable ranges of field sampling and laboratory performance. Numeric DQOs for *in-situ* measurements and water samples are listed in Tables 2-11 and 2-12, respectively. DQOs for this project will include the following:

- Accuracy.
- Precision.
- Completeness.

Accuracy describes how close the measurement is to its true value. Accuracy is the measurement of a sample of known concentration and comparing the known value against the measured value. The accuracy of chemical measurements will be checked by performing tests on a standard prior to and/or during sample analysis. A standard is a known concentration of a certain solution. Standards can be purchased from chemical or scientific supply companies. Standards might also be prepared by a professional partner, e.g., a commercial or research laboratory. The standard used to determine accuracy by Weck is called a Standard Reference Material (SRM), which is a sample with a matrix similar to the sample being tested that contains analytes of interest at known or certified concentrations. The concentrations of the standards will be unknown to the analyst until after measurements are determined. The concentrations of the standards should also be within the mid-range of the equipment. Recovery measurements are determined by spiking a replicate sample in the laboratory with a known concentration of the analyte. Laboratory Control Samples (LCSs) can be used when SRMs are not available. Accuracy of the project data will be determined by comparing results from MS/MSDs, SRMs, field blanks, method blanks, and equipment blanks to the accuracy objectives specified in Table 2-7 for field control samples and Table 2-10 for laboratory control samples.

Table 2-11. *In-Situ* Field Measurement Data Quality Objectives

Parameter	Accuracy	Resolution	Completeness
Conductivity	±1% Full Scale + 1 digit	0.01 µS/cm	90%
pH	±0.01 units	0.01 unit	90%
Temperature	±0.51°C	0.1 °C	90%

Table 2-12. Laboratory Quality Control Data Quality Objectives

Constituent Category	Accuracy	Precision	Representativeness		Completeness
			Lab	Field	
General Chemistry	80-120%	RPD<25% ^(a)	Laboratory sample replicates per 20 samples or analytical batch (whichever is more frequent).	NA	90%
Metals	75-125% recovery	RPD<25% ^(a)	Laboratory sample replicates per 20 samples or analytical batch (whichever is more frequent).	NA	90%
Synthetic Organic Compounds	Laboratory control standards: 70-130% recovery if certified, otherwise 50-150% recovery; Matrix spikes: 50-150% recovery, or based on 3x the standard deviation of laboratory's actual method recoveries.	RPD<25% ^(a)	Laboratory duplicate per method.	NA	90%
Toxicity Testing	Laboratory Control Water and Sediment Control must meet test acceptability criteria	Per method requirements	NA	NA	90%

Notes:

NA: Not applicable.

^a. NA if native concentration of either sample is less than the RL.

Precision describes how well repeated measurements agree. The evaluation of precision described here relates to repeated measurements/samples collected in the field (field duplicates) or the laboratory (laboratory replicates and MS/MSDs). Precision measurements will be determined by comparing results from field duplicates, laboratory replicates, and matrix spike duplicates to the precision objectives specified in Table 2-7 for field control samples and Table 2-10 for laboratory control samples. Relative Percent Differences (RPDs) will be calculated to determine the precision between duplicate samples. This calculation is shown below:

$$RPD = \frac{abs[x_1 - x_2]}{0.5 * (x_1 + x_2)} * 100$$

Completeness is the fraction of planned data that must be collected to fulfill the statistical criteria of the project. There are no statistical criteria that require a certain percentage of data. However, it is expected that 90 percent of measurements will be taken when anticipated. This accounts for adverse weather conditions, safety concerns, and equipment problems. The project team will determine completeness by comparing the number of measurements planned to be collected with the number of measurements actually collected that were also deemed valid. An invalid measurement would be one that does not meet the sampling method requirements and the DQOs. Completeness will be measured as a percentage of the number of samples collected that meet the respective DQOs compared to the anticipated total number of samples. This calculation is shown below:

$$Completeness = \frac{Actual\ number\ of\ samples\ collected}{Project\ required\ total\ samples\ to\ be\ collected} * 100$$

2.5.3.1 Accuracy, Precision, and Completeness

The *in-situ* field measurement DQOs are presented in Table 2-11. Analytical method numerical DQOs for constituent reporting limits, accuracy, precision, and completeness are summarized in Table 2-12.

2.5.3.2 Composite Sample Representativeness

A flow-weighted composite sample consists of a mixture of constant volume aliquots collected at variable time intervals during a storm event. For example, at higher flow rates (i.e., larger cumulative volume), the aliquot times are more closely spaced. The resulting composite is representative of the average concentration throughout the storm hydrograph.

The representativeness of any composite sample is dependent upon many factors, but is most heavily dependent upon: 1) the spacing of samples collected relative to the hydrograph, and 2) the number of samples collected during the storm event. This is true whether the samples are analyzed individually or composited. To collect a representative flow-weighted composite sample an automated sampler is utilized in conjunction with a flow meter. Immediately following sample collection composite sample representativeness will be evaluated by comparing the first sample aliquot times to the flow start times and confirming that sample aliquots are collected

throughout the storm event. Composite samples with excessive missed aliquots generally are not analyzed. The decision to analyze samples with questionable representativeness will be made in consultation with the City of San Diego.

2.5.3.3 Instrument/Equipment Calibration and Frequency

Laboratory equipment is calibrated based on manufacturer recommendations and accepted laboratory protocols. Laboratories maintain calibration practices as part of their method SOPs maintained by their Laboratory Directors and QA officers, and can be provided upon request.

Calibration for flow meters and automated samplers will be conducted prior to installation and, thereafter, per the calibration frequencies discussed in Table 2-13.

- The American Sigma 950 AVB flow meter will be calibrated using the procedures described in the American Sigma 950 AVB O&M Manual (Hach Catalog No. 3314). For flow meter calibration, the recorded water level will be checked by operation of the flow meter while the pressure transducer is submersed in water of a known level. Level adjustments will be made to the flow meter. Results that deviate significantly from the known level and do not maintain an adjusted offset will be documented and will require the equipment to be replaced or repaired. Velocity is calibrated at the factory only; therefore, if a velocity sensor is reporting erroneous velocity measurements it will be replaced.
- The Hach SD900 automated sampler will be calibrated using the procedures described in the SD900 O&M Manual (Hach Catalog No. DOC026.53.00742). For automated sampler calibration, the aliquot volume will be calibrated using a graduated flask or beaker.
- Rain gauges are not adjustable and cannot be calibrated. If a rain gauge fails to record simulated rainfall, the instrument will be repaired or replaced.

Calibration of the Oakton Con10 series pH/conductivity/temperature handheld meter will be performed during storm event mobilization or as needed according to manufactures recommendations.

Calibration measurements will be recorded and a calibration log will be maintained.

Table 2-13. Calibration of Field Sampling Equipment and Monitoring Instruments

Equipment	Calibration Description	Responsible Person	Frequency	SOP Reference
American Sigma 950 AVB Flow Meter (level only)	Water level check against known levels	AMEC Technical Staff	Semi-annually	American Sigma 950 AVB O&M Manual 3314
Hach SD900 Automated Sampler	Aliquot calibration	AMEC Technical Staff	Semi-annually	Hach SD900 Sampler O&M Manual DOC026.53.00742
American Sigma Rain Gauge	NA	AMEC Technical Staff	Semi-annually	NA
Oakton Con10 Series Water Quality Meter	Calibration using standard solutions	AMEC Technical Staff	Prior to each event	Manufacturer O&M Manual

2.5.3.4 Inspection/Acceptance of Supplies and Consumables

Glassware, sample bottles, and collection equipment will be inspected prior to use. Some sampling containers and caps will be obtained from Weck and Nautilus. The Sampling Manager will be in charge of ordering sampling containers. Ordered supplies will be examined for damage as they are received per Table 2-14.

The Sampling Manager will order field supplies prior to the start of the wet weather season and as needed through the year. Field supplies will be stored at AMEC and laboratory supplies will be stored at the laboratories conducting the work. Inspection and testing requirements for laboratory supplies are covered in the laboratory's QA/QC procedures.

Table 2-14. Consumable Supplies Requirements

Project-Related Supplies/ Consumables	Inspection/ Testing Specifications/ Source	Acceptance Criteria	Frequency	Responsible Individual
Pre-Cleaned Sample Bottles	Closed bottle	Lids screwed on bottles	100%	AMEC
Composite Sample Bottles	Laboratory cleaned and blanked	Pass blanking analysis	Clean blanked bottles each monitoring event	Weck/AMEC
Silicone Tubing	Laboratory cleaned and blanked	Pass blanking analysis	New blanked tubing each season	Weck/AMEC
Teflon Tubing	Laboratory cleaned and blanked	Pass blanking analysis	New blanked tubing each season	Weck/AMEC
Gloves	New box	New box	As needed	AMEC

2.5.3.5 Corrective Action

Corrective action will be taken when an analysis is deemed suspect for some reason. The reasons include exceedances of the RPD ranges, spike recoveries, and blanks. The corrective action varies somewhat from analysis to analysis, but typically involves the following:

- Check of procedures.
- Review of documents and calculations to identify any possible errors.
- Error correction.
- Re-analysis of the sample extract, if available, to see if results can be improved.
- Complete reprocessing and re-analysis of additional sample material, if it is available.

Any failures (e.g., instrument failures) that occur during data collection and laboratory analyses will be the responsibility of the field crew or laboratory conducting the work, respectively. In the case of field instruments, problems will be addressed through instrument cleaning, repair, or replacement of parts or the entire instrument, as warranted. Field crews will carry basic spare parts and consumables with them, and will have access to spare parts to be stored at the AMEC office. Records of repairs or replacements of field instruments will be maintained at AMEC. The laboratories have procedures in place to follow when failures occur, and will identify individuals responsible for corrective action and develop appropriate documentation.

2.6 Data Management and Reporting Procedures

2.6.1 Data Management

The responsibility for hydrologic data management and laboratory data management will be led by the Project Manager. The laboratory will be requested to provide data in both hard copy and electronic formats.

The Reporting and Laboratory Coordinator will be responsible for tracking the analytical process to make sure that laboratories are meeting the required turnaround times and are providing a complete deliverable package. The Reporting and Laboratory Coordinator will receive the original hard copy from the laboratory, verify completeness, and log the date of receipt. The hard copy originals then will be transferred to the Project Manager and filed with other original project documentation in order to maintain complete project records.

The electronic submittals will conform to reporting protocols that are compatible with the Surface Water Ambient Monitoring Program (SWRCB, 2008). A relational database will be developed by the Database Coordinator and used for data. Laboratory data will be maintained and managed with Microsoft Excel and/or Microsoft Access by the Database Coordinator. Data from the monitoring site flow meters/data loggers will also be stored in the same database system and linked to the laboratory database. The data logger files will include rainfall, sampling history, and discharge (velocity, stage, and instantaneous flow) data.

2.6.2 Compliance Monitoring Report

AMEC will provide the City of San Diego with an end of year Compliance Monitoring Report, which will be included in the WURMP Annual Report as an appendix. An executive summary, formatted as a “drop in” to the WURMP Annual Report text will also be prepared.

The data collected under the Chollas Creek TMDL Compliance Monitoring Program will be compiled and analyzed, with the findings presented in a Draft Compliance Monitoring Report. This report will comply with the January 31, 2016, deliverable requirements specified in Order No. R9-2004-0277. The draft report will be completed as soon as possible after the last storm event to provide sufficient time for the workgroups to review and provide comments and to produce the final report before the fiscal year end.

The report will summarize the sample collection methods and events, present the findings of the analytical results, and provide spatial loading information from both forks of Chollas Creek. It will assess TMDL compliance, discuss chemistry and toxicity bioassay results, identify constituent concentrations above water quality criteria, and present trend information of TMDL analytes. Any deviations from protocols listed in the Monitoring Plan and the implications of those deviations on the interpretation of the data will be included in the report. Raw data will be provided as an appendix on CDs.

A Draft Compliance Monitoring Report will be provided (up to seven hardcopies with CDs). The files will also be provided electronically for review and comments. A comment template will be provided for the jurisdictions to complete.

Comments on the 2014-2015 Draft Compliance Monitoring Report will be compiled and tabulated in a response to comments letter for inclusion in the final report. The report will be finalized per the discharger group’s recommendations. The Final Compliance Monitoring Report will be produced to meet the June 30, 2015, fiscal year end. Seven hard copies with CDs of electronic files will be provided.

3.0 BACTERIA TMDL COMPLIANCE MONITORING

This section describes the purpose, scope, and type of sampling conducted for each monitoring program including Compliance Monitoring, Optional Monitoring, and Follow-Up Monitoring. Additional details of the sampling and analytical methodology and data quality objectives are described in the Bacteria TMDL QAPP, provided as Appendix E.

3.1 Bacteria Compliance Monitoring

Compliance monitoring is designed to meet the receiving water monitoring requirements of the Bacteria TMDL. Compliance monitoring, including wet and dry weather sampling, will be conducted each year at the compliance monitoring locations. The data generated will be used to address the following questions:

- Are TMDL numeric targets for bacteria indicators being met at the compliance monitoring locations?
- Are bacteria levels improving at the compliance monitoring locations?

Per the Bacteria TMDL, receiving water monitoring will be conducted with the existing Regional MS4 Mass Loading Station (MLS) Monitoring Program. Therefore, the scope of compliance monitoring accounts for the frequency and type of sampling activities of the existing programs in order to facilitate overlap of monitoring efforts and resources. Table 3-1 provides the general scope of Compliance Monitoring Program.

Table 3-1. Scope of Compliance Monitoring

Number of Monitoring Locations	Wet Weather Monitoring		Dry Weather Monitoring 10/01/13 to 03/31/14		Dry Weather Monitoring 06/24/13 to 9/30/13 and 04/1/14-9/30/14	
	Grab Samples Per Site Per Event	Event Frequency	Grab Samples Per Site Per Event	Event Frequency	Grab Samples Per Site Per Event	Event Frequency
3	1	3 storms	1	monthly	1	Weekly (minimum 5 events per month)

3.1.1 Compliance Monitoring Locations

The Bacteria TMDL identifies the lower 1.2 miles of Chollas Creek as the targeted segment in the TMDL. Three monitoring locations were selected based on the compliance requirements set forth in Resolution No. R9-2010-0001. The resolution requires receiving water compliance monitoring to occur at or near the mouth of the creek, such as the MLS or Mass Emission Station, and one or more locations upstream of the mouth, such as the Chollas Creek HSA Assessment Station. The two MLSs in the Chollas Creek HSA, SD8(1) and DPR3, were selected for compliance monitoring. A third compliance monitoring location approximately 100

yards south of the confluence of the north and south forks of Chollas Creek was also selected to fulfill the TMDL compliance monitoring requirements, since it is more reflective of the loading from the entire HSA. Table 2.2 provides the location name and coordinates for the compliance monitoring locations.

Table 3-2. Compliance Monitoring Location

Site ID	Site Name	Site Type	Latitude	Longitude
CTL(1)	Chollas Tidal	Creek	32.69120	-117.12354
SD8(1) ^(a)	North Chollas Creek MLS	Creek	32.70493	-117.12132
DPR3 ^(a)	South Chollas Creek MLS	Creek	32.69130	-117.11682

Notes:

CTL = Chollas Tidal Compliance Monitoring Location

SD8(1) = North Chollas Creek Mass Loading Station

DPR3 = South Chollas Creek Mass Loading Station

^(a) Monitoring location also selected to fulfill monitoring requirements of the Diazinon and Dissolved Metals TMDL.

3.1.2 Constituents

Fecal indicator bacteria (FIB) are the target constituents for Chollas Creek, as indicated by the TMDL. Grab samples will be representative of the environmental conditions of each location, therefore, the grab samples will be collected from the horizontal center of the stream to the maximum extent practicable. For intermittent streams, sampling will be suspended once the stream is too low to sample. Samples collected during wet and dry weather monitoring will be analyzed for FIB in accordance with Surface Water Ambient Monitoring Program (SWAMP) requirements provided in the QAPP (Appendix A). Table 3-3 presents the constituents, reporting limits, and analytical methods. In accordance with the new MS4 Permit, total coliform is not a required analyte for creeks and will not be analyzed.

Table 3-3. Compliance Analyses for Bacteria TMDL

Parameter	Project Reporting Limit ^(a) (per 100mL)	Analytical Method
<i>Enterococcus</i>	10 CFU	TBD
Fecal Coliform	20 MPN	TBD

Notes:

CFU = Colony Forming Units

TBD = To be determined by the RAs.

^(a) The reporting limits are consistent with the existing AB411 program to facilitate overlap with that program. However, reporting limits may be lower depending on the laboratory used to conduct the analysis.

3.1.3 Dry Weather Monitoring

Dry weather monitoring will be conducted monthly during the wet season and weekly during the dry season at the compliance monitoring locations listed in Table 3-2. Dry weather sampling will occur on dry weather days when there is measureable flow at the location. Samples are to be collected after an antecedent dry period of 72 hours with less than 0.1 inches of rainfall. During each dry weather monitoring event, field observations will be recorded and a grab water sample will be collected at the compliance monitoring location(s). Methodology for field observations and sample collection is described in the QAPP (Appendix E).

3.1.4 Wet Weather Monitoring

Wet weather monitoring will be conducted at the compliance monitoring location(s) during three storm events each wet season (October 1 to April 30). Per the MS4 Permit Appendix E.6, a minimum of one storm is required to be monitored. Storms resulting in greater than 0.2 inches of precipitation will be targeted for analysis. One grab sample will be collected per storm within 24 hours of the end of precipitation. The storm events will be spread throughout the wet season to the maximum extent practicable as follows:

- Storm Event 1 (October to November)
- Storm Event 2 (December to January)
- Storm Event 3 (February to April)

During each wet-weather monitoring event, field observations will be recorded and a grab water sample will be collected at the compliance monitoring locations. Grab samples will be collected using the same sample technique as during a dry weather monitoring event, taking additional safety precautions as needed. Methodology for field observations and sample collection is described in the QAPP (Appendix E).

3.1.5 Future Considerations

The Bacteria TMDL monitoring will be coordinated with the Diazinon and Dissolved Metals TMDLs monitoring to the maximum extent possible, however there are two differences in storm monitoring requirements that support the need for autonomous or semi-autonomous monitoring programs: (1) The definition of a wet weather event, and (2) the distribution of events throughout the wet weather season.

1. The Diazinon and Dissolved Metals TMDLs state that storm events are captured per the USEPA's mobilization criteria defined as 0.10 inch storm event. This differs from the Bacteria TMDL which requires a storm event greater than 0.20 of an inch. The difference in mobilization criteria between the TMDLs may require separate monitoring programs, as storm events less than 0.2 inches are common in the Chollas Creek HSA.

2. The Diazinon and Dissolved Metals TMDLs require monitoring of the first two storm events after October 1 and the first storm event after February 1, whereas the Bacteria TMDL compliance monitoring will target three storm events throughout the entire wet season (early, mid, and late season). This difference makes it unlikely that sampling will be coordinated for all three events.

3.2 Optional Monitoring

Optional monitoring is not mandatory to meet TMDL monitoring requirements and may be suspended if directed. Optional monitoring is presented in this Monitoring Plan so that the procedures are available should the RAs decide to conduct the monitoring. The Chollas Creek HSA RAs will determine when any optional monitoring elements will be implemented. The Chollas Creek HSA RAs will determine each year whether the optional monitoring will be initiated, modified, or eliminated (although optional monitoring may be revised more frequently if approved by the RAs). Modifications to optional monitoring elements will be documented in the Annual CLRP Monitoring Summary. The decision to initiate, modify, or eliminate optional monitoring will be communicated to the SDRWQCB Project Manager to clearly inform the SDRWQCB whether the monitoring is to occur.

The field measurements in Table 3-4 are considered optional for Chollas Creek. Flow may be monitored during sampling events or throughout the year at the compliance monitoring locations. Flow monitoring is considered optional since it is not clearly specified by the TMDL, however, flow information is required to calculate the WLA.

Table 3-4. Optional Field Parameters

Field Parameter	Recommended SWAMP Reporting Limit	Method
Dissolved Oxygen	NA	Field Meter
Flow	NA	TBD
pH	NA	Field Meter
Specific Conductivity	2 μ S/cm	Field Meter
Temperature	NA	Field Meter
Turbidity	5 NTU	Field Meter

Notes:

pH = potential Hydrogen
 μ S/cm = micro Siemens per centimeter
 NTU = Nephelometric Turbidity Units

3.3 Follow-Up Monitoring

Per the TMDL, if exceedances of the numeric targets are observed in the monitoring data, additional monitoring locations and/or other source identification methods must be implemented to identify the sources causing the exceedances. Additionally, the locations and/or other source identification methods must also be used to demonstrate that the bacteria loads have been addressed. The RAs have designed the Follow-up Monitoring Program to be implemented prior

to the end of the compliance period in order to facilitate compliance with the interim reduction milestones. The Follow-up Monitoring Program should address both expected exceedances and sources limiting the attainment of the milestone. Implementation of follow-up monitoring, if necessary, is scheduled to begin after the first milestone requiring 50 percent reduction of dry or wet weather exceedances.

The Follow-up Monitoring Program will utilize an adaptive monitoring approach to determine the sources contributing to exceedances in the receiving water. Each year, the program will evaluate compliance data to determine if follow-up monitoring is needed and the monitoring approach would be modified to address the pattern of exceedances. The data generated will be used to address the following questions:

- What are the potential sources/areas causing exceedances in the receiving water?
- Are MS4 discharges contributing to WQO exceedances in the receiving water?
- What is the magnitude and duration of the exceedance condition?

3.3.1 Initiation of Follow-up Monitoring

Follow-up monitoring will be implemented based on exceedances of receiving water numeric targets and allowable frequencies recorded each year at the compliance monitoring locations. Follow-up monitoring is designed to address persistent exceedances and to assess the frequency of exceedances over relatively long-term periods. Compliance dates will be consistent with dates presented in the CLRP. Under the Compliance Monitoring Program, FIB results will be compared to TMDL numeric targets and mandated frequency reductions, as described in Section 1.

Follow-up monitoring will occur when:

- Allowable exceedance frequency of dry weather data has not been reduced by at least 50 percent by year seven (2018).
- Allowable exceedance frequency of wet weather data has not been reduced by at least 50 percent by year ten (2021).
- After the 100 percent reduction milestones for both wet and dry weather (i.e., the respective final compliance dates), the initiation criteria will be updated to reflect the most applicable 'trigger' based on the available data and possible revisions to the TMDL.

3.3.2 Follow-up Monitoring Approach

The approach implemented for the Follow-up Monitoring Program will be adaptive based on the type of exceedance (wet or dry weather), the frequency of exceedances, and HSA specific data following the first interim milestone. Four types of follow-up monitoring options were identified in the Copermittee Compliance Framework (Larry Walker and Associates [LWA], 2011) and are summarized below. These options are designed to assist with source identification and TMDL compliance and more than one type of monitoring may be implemented per monitoring year.

- Upstream Monitoring: Upstream monitoring may be implemented in HSAs with clear jurisdictional boundaries, hydrologic breaks, or to isolate non-point source inputs along the receiving water. This option will characterize sources throughout the extent of the receiving water and will require additional monitoring to further isolate and identify sources. This option may provide useful data for HSAs where pollutant sources are largely unknown. Follow-up monitoring locations would be located in the receiving water, upstream of the compliance monitoring location.
- Representative Land Use Monitoring: Representative land use monitoring may be implemented in HSAs where homogenous land uses are present and discharge to the MS4. It may provide useful data for distinguishing between non-MS4 land uses and MS4 land uses that may be contributing to receiving water objective exceedances. This data may also be used to further calibrate and validate the HSA model and facilitate selection of management measures and/or BMPs. Follow-up monitoring locations would be selected to be representative of the major land use types present in the HSA.
- Localized Outfall Monitoring: Localized outfall monitoring may be implemented at monitoring stations adjacent to the receiving water in which objective exceedances were detected. It may provide useful data for identification of MS4 discharges to the receiving water in the direct vicinity of the objective exceedance. Monitoring may be employed in HSAs or HSAs that have a limited number of outfalls and may assist in determining whether the MS4 is causing or contributing to particular receiving water exceedances. If WQO exceedances are recorded at the follow-up monitoring locations then additional actions must be taken to bring the location into compliance. This may lead to additional monitoring in the immediate area or an evaluation of management measures and/or BMPs.
- Source Identification Monitoring: Microbial source testing may be added to any of the monitoring options described in the previous sections including both compliance monitoring and follow-up monitoring locations. This will assist in identification of pollutant sources that contribute to exceedances that may or may not be the result of MS4 discharges. Specifically, if no human sources are identified then it is possible to report that controllable sources are not causing the exceedances of WQOs at the monitoring location. This may lead to a potential special study to further identify sources of human fecal bacteria or natural sources.

Follow-up monitoring locations will be identified after compliance year six and will be updated each year after that, to reflect the most recent compliance data set. Therefore, monitoring locations are not provided in this Monitoring Plan. Aerial imagery, Geographic Information Systems (GIS), and field surveys may be utilized to assist with determination of appropriate sampling locations.

Follow-up monitoring will be unique to each location and monitoring condition, therefore the monitoring approach for each specific case will be determined at that time.

A summary of follow-up monitoring will be provided in the Annual CLRP Monitoring Program Summary. The summary will include the monitoring approach, monitoring locations, sampling protocols, summary of results, and planned actions.

3.4 Data Management and Reporting Procedures

This section describes the management of field and analytical data and reporting procedures for the Chollas Creek CLRP Monitoring Program.

3.4.1 Data Management

Field Data Records and Analytical Data Reports will be sent to and kept by the designated Lead Agency Project Manager. Data will be submitted in a standardized SWAMP-compatible format. The Lead Agency will compile the monitoring data and provide an annual CLRP Monitoring Summary to RWQCB.

The Sampling Agency will review all Field Data Log Sheets for completeness, maintain the original hardcopies, and scan electronic copies (personal data form [*.pdf]) for storage in the project file. Copies of Field Data Log Sheets and photographs for each event will be submitted to the Lead Agency on a quarterly basis. The field crew will retain the original Field Data Log Sheets.

The laboratories will provide data in electronic format: both *.pdf copies of lab reports and a SWAMP-compatible Electronic Data Deliverable (EDD). Analytical results will be submitted to the Sampling or Lead Agency in *.pdf format and as a SWAMP compatible EDD within three weeks of submittal of samples. A SWAMP-compatible template will generate data files that can be uploaded to the SWAMP regional database. The Sampling or Lead Agency will review all lab reports and EDDs for accuracy, completeness, and compatibility with SWAMP. The contract laboratory shall retain original Chain-of-Custody forms. The contract laboratory will retain copies of the preliminary and final data reports.

3.4.2 Reporting Procedures

The Sampling Agency will provide quarterly sampling summaries to the Lead Agency as a status of monitoring activities. The update will include a brief summary of activities completed in the previous quarter and the field observations recorded. The Lead Agency will provide quarterly updates to the other participating RAs during regularly scheduled HSA Workgroup meetings.

The Lead Agency will generate an Annual CLRP Monitoring Summary, which will be included in the WURMP Annual Report as an appendix. The Annual CLRP Monitoring Summary will describe the sample collection methods, sampling events, and present key findings of the analytical results. As part of the first year's assessment, the "existing" dry weather exceedance frequency will be calculated based on the 1996 to 2002 data set which will be used to evaluate progress toward attaining the TMDL. Any deviations from protocols listed in the Monitoring Plan

and/or QAPP and the implications of those deviations on the interpretation of the data will be included in the report.

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City of San Diego
Draft Chollas Creek Diazinon, Dissolved Metals, and Bacteria TMDLs
2014-2015 Monitoring Plan
AMEC Project No. 5025141073
May 2014

APPENDIX A

DIAZINON AND DISSOLVED METALS ANALYTICAL SUITE

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Table A-1: Full Analytical Suite

Analyte	Method	MDL	RL	Units
<i>Conventionals</i>				
Chloride	EPA 300.0	0.10	0.50	mg/L
Sulfate	EPA 300.0	0.10	0.50	mg/L
Calcium	EPA 200.7	0.016	0.10	mg/L
Magnesium	EAP 200.7	0.012	0.10	mg/L
TOC	SM 5310C	0.009	0.3	mg/L
DOC	SM 5310C	0.013	0.3	mg/L
<i>Metals</i>				
Copper, Dissolved	EPA 200.8	0.022	0.50	µg/L
Copper, Total	EPA 200.8	0.022	0.50	µg/L
Lead, Dissolved	EPA 200.8	0.017	0.20	µg/L
Lead, Total	EPA 200.8	0.017	0.20	µg/L
Zinc, Dissolved	EPA 200.8	0.30	5.0	µg/L
Zinc, Total	EPA 200.8	0.30	5.0	µg/L
<i>Organochlorine Pesticides/PCBs</i>				
2,4'-DDD	EPA 608 low level	5.0	5.0	ng/L
2,4'-DDE	EPA 608 low level	5.0	5.0	ng/L
2,4'-DDT	EPA 608 low level	5.0	5.0	ng/L
4,4'-DDD	EPA 608 low level	3.0	5.0	ng/L
4,4'-DDE	EPA 608 low level	2.5	5.0	ng/L
4,4'-DDT	EPA 608 low level	3.1	5.0	ng/L
Aldrin	EPA 608 low level	1.5	5.0	ng/L
alpha-BHC	EPA 608 low level	1.8	5.0	ng/L
alpha-chlordane	EPA 608 low level	5.0	5.0	ng/L
Aroclor 1016	EPA 608 low level	50	100	ng/L
Aroclor 1221	EPA 608 low level	60	100	ng/L
Aroclor 1232	EPA 608 low level	100	100	ng/L
Aroclor 1242	EPA 608 low level	70	100	ng/L
Aroclor 1248	EPA 608 low level	60	100	ng/L

Analyte	Method	MDL	RL	Units
Aroclor 1254	EPA 608 low level	40	100	ng/L
Aroclor 1260	EPA 608 low level	40	100	ng/L
beta-BHC	EPA 608 low level	3.1	5.0	ng/L
Chlordane (tech)	EPA 608 low level	50	100	ng/L
cis-Nonachlor	EPA 608 low level	5.0	5.0	ng/L
delta-BHC	EPA 608 low level	2.5	5.0	ng/L
Dieldrin	EPA 608 low level	2.1	5.0	ng/L
Endosulfan I	EPA 608 low level	1.7	5.0	ng/L
Endosulfan II	EPA 608 low level	1.9	5.0	ng/L
Endosulfan sulfate	EPA 608 low level	5.0	5.0	ng/L
Endrin	EPA 608 low level	2.8	5.0	ng/L
Endrin aldehyde	EPA 608 low level	3.0	5.0	ng/L
gamma-BHC (Lindane)	EPA 608 low level	2.1	5.0	ng/L
gamma-Chlordane	EPA 608 low level	5.0	5.0	ng/L
Heptachlor	EPA 608 low level	1.7	5.0	ng/L
Heptachlor epoxide	EPA 608 low level	1.9	5.0	ng/L
Methoxychlor	EPA 608 low level	5.0	5.0	ng/L
Mirex	EPA 608 low level	5.0	5.0	ng/L
Oxychlordane	EPA 608 low level	5.0	5.0	ng/L
Toxaphene	EPA 608 low level	120.0	500.0	ng/L
trans-nonachlor	EPA 608 low level	5.0	5.0	ng/L
Decachlorobiphenyl (Surrogate)	EPA 608 low level			% Recovery
Tetrachloro-meta-xylene (Surrogate)	EPA 608 low level			% Recovery
Organophosphorus Pesticides				

Analyte	Method	MDL	RL	Units
Azinphos methyl (Guthion)	EPA 625 low level	0.0055	0.010	µg/L
Bolstar	EPA 625 low level	0.0046	0.010	µg/L
Chlorpyrifos	EPA 625 low level	0.0069	0.010	µg/L
Coumaphos	EPA 625 low level	0.0051	0.010	µg/L
Demeton-o	EPA 625 low level	0.010	0.010	µg/L
Demeton-s	EPA 625 low level	0.010	0.010	µg/L
Diazinon	EPA 625 low level	0.0052	0.010	µg/L
Dichlorvos	EPA 625 low level	0.0029	0.010	µg/L
Dimethoate	EPA 625 low level	0.0062	0.010	µg/L
Disulfoton	EPA 625 low level	0.010	0.010	µg/L
Ethoprop	EPA 625 low level	0.0067	0.010	µg/L
Ethyl parathion	EPA 625 low level	0.0054	0.010	µg/L
Fensulfothion	EPA 625 low level	0.0029	0.010	µg/L
Fenthion	EPA 625 low level	0.0038	0.010	µg/L
Malathion	EPA 625 low level	0.0076	0.010	µg/L
Merphos	EPA 625 low level	0.0058	0.010	µg/L
Methyl parathion	EPA 625 low level	0.0063	0.010	µg/L
Mevinphos	EPA 625 low level	0.0042	0.010	µg/L
Naled	EPA 625 low level	0.0076	0.010	µg/L
Phorate	EPA 625 low level	0.0030	0.010	µg/L
Ronnel	EPA 625 low level	0.0041	0.010	µg/L
Stirophos	EPA 625 low level	0.0031	0.010	µg/L
Tokuthion (Prothiofos)	EPA 625 low level	0.0078	0.010	µg/L
Trichloronate	EPA 625 low	0.0067	0.010	µg/L

Analyte	Method	MDL	RL	Units
	level			
1,3-Dimethyl-2-nitrobenzene (Surrogate)	EPA 625 low level	NA	NA	% Recovery
Triphenyl phosphate (Surrogate)	EPA 625 low level	NA	NA	% Recovery
Polynuclear Aromatic Hydrocarbons				
1-Methylnaphthalene	EPA 8270C-SIM	0.020	0.10	µg/L
1-Methylphenanthrene *	EPA 8270C-SIM	0.020	0.10	µg/L
2,6-Dimethylnaphthalene *	EPA 8270C-SIM	0.020	0.10	µg/L
2-Methylnaphthalene	EPA 8270C-SIM	0.020	0.10	µg/L
Acenaphthene	EPA 8270C-SIM	0.020	0.10	µg/L
Acenaphthylene	EPA 8270C-SIM	0.020	0.10	µg/L
Anthracene	EPA 8270C-SIM	0.020	0.10	µg/L
Benzo (a) anthracene	EPA 8270C-SIM	0.020	0.10	µg/L
Benzo (a) pyrene	EPA 8270C-SIM	0.020	0.10	µg/L
Benzo (b) fluoranthene	EPA 8270C-SIM	0.020	0.10	µg/L
Benzo (e) pyrene *	EPA 8270C-SIM	0.020	0.10	µg/L
Benzo (g,h,i) perylene	EPA 8270C-SIM	0.020	0.10	µg/L
Benzo (k) fluoranthene	EPA 8270C-SIM	0.020	0.10	µg/L
Biphenyl *	EPA 8270C-SIM	0.020	0.10	µg/L
Chrysene	EPA 8270C-SIM	0.020	0.10	µg/L
Dibenzo (a,h) anthracene	EPA 8270C-SIM	0.020	0.10	µg/L
Fluoranthene	EPA 8270C-SIM	0.020	0.10	µg/L
Fluorene	EPA 8270C-SIM	0.020	0.10	µg/L
Indeno (1,2,3-cd) pyrene	EPA 8270C-SIM	0.020	0.10	µg/L
Naphthalene	EPA 8270C-SIM	0.020	0.10	µg/L
Perylene *	EPA 8270C-SIM	0.020	0.10	µg/L
Phenanthrene	EPA 8270C-SIM	0.020	0.10	µg/L
Pyrene	EPA 8270C-SIM	0.020	0.10	µg/L
2-Fluorobiphenyl (Surrogate)	EPA 8270C-SIM	NA	NA	% Recovery
Nitrobenzene-d5 (Surrogate)	EPA 8270C-SIM	NA	NA	% Recovery
Terphenyl-dl4 (Surrogate)	EPA 8270C-SIM	NA	NA	% Recovery
PCB Congeners				
PCB 101	GCMS SIM	5.0	10	ng/L
PCB 105	GCMS SIM	5.0	10	ng/L
PCB 110	GCMS SIM	5.0	10	ng/L
PCB 114	GCMS SIM	5.0	10	ng/L
PCB 118	GCMS SIM	5.0	10	ng/L
PCB 119	GCMS SIM	5.0	10	ng/L
PCB 123	GCMS SIM	5.0	10	ng/L
PCB 126	GCMS SIM	5.0	10	ng/L

Analyte	Method	MDL	RL	Units
PCB 128	GCMS SIM	5.0	10	ng/L
PCB 132	GCMS SIM	5.0	10	ng/L
PCB 138	GCMS SIM	5.0	10	ng/L
PCB 141	GCMS SIM	5.0	10	ng/L
PCB 149	GCMS SIM	5.0	10	ng/L
PCB 151	GCMS SIM	5.0	10	ng/L
PCB 153	GCMS SIM	5.0	10	ng/L
PCB 156	GCMS SIM	5.0	10	ng/L
PCB 157	GCMS SIM	5.0	10	ng/L
PCB 158	GCMS SIM	5.0	10	ng/L
PCB 167	GCMS SIM	5.0	10	ng/L
PCB 168	GCMS SIM	5.0	10	ng/L
PCB 169	GCMS SIM	5.0	10	ng/L
PCB 170	GCMS SIM	5.0	10	ng/L
PCB 174	GCMS SIM	5.0	10	ng/L
PCB 177	GCMS SIM	5.0	10	ng/L
PCB 18	GCMS SIM	5.0	10	ng/L
PCB 180	GCMS SIM	5.0	10	ng/L
PCB 183	GCMS SIM	5.0	10	ng/L
PCB 187	GCMS SIM	5.0	10	ng/L
PCB 189	GCMS SIM	5.0	10	ng/L
PCB 194	GCMS SIM	5.0	10	ng/L
PCB 195	GCMS SIM	5.0	10	ng/L
PCB 200	GCMS SIM	5.0	10	ng/L
PCB 201	GCMS SIM	5.0	10	ng/L
PCB 203	GCMS SIM	5.0	10	ng/L
PCB 206	GCMS SIM	5.0	10	ng/L
PCB 209	GCMS SIM	5.0	10	ng/L
PCB 28	GCMS SIM	5.0	10	ng/L
PCB 3	GCMS SIM	5.0	10	ng/L
PCB 31	GCMS SIM	5.0	10	ng/L
PCB 33	GCMS SIM	5.0	10	ng/L
PCB 37	GCMS SIM	5.0	10	ng/L
PCB 44	GCMS SIM	5.0	10	ng/L
PCB 49	GCMS SIM	5.0	10	ng/L
PCB 52	GCMS SIM	5.0	10	ng/L
PCB 56	GCMS SIM	5.0	10	ng/L
PCB 60	GCMS SIM	5.0	10	ng/L
PCB 66	GCMS SIM	5.0	10	ng/L
PCB 70	GCMS SIM	5.0	10	ng/L
PCB 74	GCMS SIM	5.0	10	ng/L
PCB 77	GCMS SIM	5.0	10	ng/L

Analyte	Method	MDL	RL	Units
PCB 8	GCMS SIM	5.0	10	ng/L
PCB 81	GCMS SIM	5.0	10	ng/L
PCB 87	GCMS SIM	5.0	10	ng/L
PCB 95	GCMS SIM	5.0	10	ng/L
PCB 97	GCMS SIM	5.0	10	ng/L
PCB 99	GCMS SIM	5.0	10	ng/L
1,3-Dimethyl-2-nitrobenzene (Surrogate)	GCMS SIM	NA	NA	% Recovery
Toxicity				
<i>Ceriodaphnia dubia</i> 96-hour acute static-renewal test	EPA/821/R-02/012, Oct-02	NA	NA	TU _a
<i>Ceriodaphnia dubia</i> 7-day chronic static-renewal test	EPA/821/R-02/012, Oct-02	NA	NA	TU _c

NA: Not applicable

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City of San Diego
Draft Chollas Creek Diazinon, Dissolved Metals, and Bacteria TMDLs
2014-2015 Monitoring Plan
AMEC Project No. 5025141073
May 2014

APPENDIX B

HEALTH AND SAFETY PLAN (HASP)

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CHOLLAS CREEK
DIAZINON AND DISSOLVED METALS TMDL
PROJECT

HEALTH AND SAFETY PLAN (HASP)

MAY 2014

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9177 Sky Park Court
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ACRONYMS AND ABBREVIATIONS

AMEC	AMEC Environment & Infrastructure, Inc.
ANSI	American National Standard Institute
DPR3	Mass Loading Station Compliance Site at south fork of Chollas Creek
HASP	Health and Safety Plan
HSO	Health and Safety Officer
IDLH	Immediate Danger to Life and Health
ISEA	International Safety Equipment Association
LG-1	Lemon Grove Special Studies Monitoring Site
LM-1	La Mesa Special Studies Monitoring Site
MLS	Mass Loading Station
MSDS	Material Safety Data Sheet
PEL	Permissible Exposure Limit
PPE	personal protective equipment
PPM	parts per million
SD8(1)	Mass Loading Station Compliance Site at north fork of Chollas Creek
STEL	Short Term Exposure Limit
TMDL	Total Maximum Daily Load
TWA	Time Weighted Average

1.0 INTRODUCTION

This Health and Safety Plan (HASP) is intended to address the health and safety concerns that relate to the field work associated with the Chollas Creek Dissolved Metals TMDL Project. Field team members and the subcontractor's field teams must be familiar with the contents of this document and site-specific safety concerns.

The project Health and Safety Officer (HSO) will be responsible for assuring that all members of the field team are familiar with the requirements of the HASP and have received appropriate training for their specific roles. The Field Monitoring Officer will be responsible for enforcing site-specific health and safety protocols. Site-specific health and safety protocols include emergency response/contingency plans. The project manager and individual employees have authority to suspend work, if necessary, due to health and safety concerns.

1.1 Field Activities

Field activities associated with the Chollas Creek Dissolved Metals TMDL Project will be performed by AMEC Environment & Infrastructure, Inc. (AMEC) employees. Such Activities will include siting, equipment installation and maintenance, travel, and removal and replacement of sample bottles.

1.1.1 Siting of Monitoring Locations

The siting and review of monitoring locations for this project will include physical exertion (walking) in extreme weather conditions (heat) for short periods of time. There will also be physical obstacles encountered such as stream banks, channels, bridges, and low-clearance areas.

1.1.2 Equipment Installation and Maintenance

Installation and maintenance may include working with power tools in wet or damp environments and the operation of heavy equipment. Confined space entry will not be necessary for the Chollas Creek Dissolved Metals TMDL Project.

1.1.3 Travel

Travel to and from the selected monitoring sites will occur for siting, installation and maintenance activities, and storm event monitoring. Although travel during the storm events will be minimized by use of automated equipment, some access is typically necessary during storm events and often at night to document observations, replace composite sample containers, and repair any malfunctioning equipment. Efforts will be made to locate equipment in safe work zones, far from high-traffic and high-use areas.

1.1.4 Removal and Replacement of Sample Containers

Composite sample containers will need to be removed and replaced immediately after each storm event and, perhaps, during storm events.

1.2 Traffic Safety

Working near roadways presents inherent risks, dominated by the possibility of errant vehicles. The motoring public is largely made up of conscientious drivers operating well-maintained equipment. However, some percentage of vehicles on the road at any given time may be marginally under control due to driving factors like distractions, fatigue, confusion, or inadequate training, as well as mechanical factors like vehicle age and condition. Any or all of these factors may contribute to a vehicle leaving the traveled lanes and entering the work site.

Traffic load, posted speed limits, and proximity to travel lanes all have a direct relation to the probability of worker exposure to errant vehicles. Work site selection can reduce the exposure potential relating to these factors. In all cases, the Field Team Leader will make the final evaluation of the appropriateness of performing work with the conditions present at a site.

Field Teams will use signs, cones, and flashing amber lights when necessary to inform motorists of activities that may impact roadway travel conditions. To avoid shoulder closures, attempts will be made to pull vehicles off the road and perform work as far away from the edge of pavement as possible.

Field members will work in teams and utilize high visibility reflectorized (Class 2 ANSI/ISEA minimum) vests or clothing. Steel-toed boots and hard hats will be recommended if overhead hazards and/or if heavy equipment is used when working along roadsides.

Exiting and entering the highway or roadway to/from the shoulder when approaching and leaving sampling sites will be performed in a manner consistent with the roadway conditions present. The use of flashing amber lights as well as turn signals will be required. Drivers will evaluate run-off/run-on distances with respect to traffic load and traffic speed before attempting to exit to the shoulder. The Field Team Leader will consider the possibility of significant changes in road conditions taking place within the duration of planned work at the sampling site.

When working on or near the shoulder, physical barriers should be employed whenever possible to protect workers from errant vehicles. Physical barriers include barrier vehicles, guardrails, fences, and other man-made or natural objects capable of slowing, stopping, or diverting an errant vehicle. Barrier vehicles are to be unoccupied, positioned

upstream of the work zone, and parked so as not to roll into the work area or active travel lanes if struck by an errant vehicle. Workers not protected by a physical barrier should employ the use of a lookout whose sole responsibility is to watch traffic for signs of potential trouble and notify endangered workers to make use of a pre-planned escape route. The lookout must have an effective means of communicating with workers given the noise and visual condition present. Workers will conduct their work facing the traffic whenever feasible.

1.3 General Safety

In addition to traffic hazards, field teams may face a variety of potential dangers while maintaining the facilities, installing equipment, and performing environmental monitoring. Some these dangers include:

- Slippery conditions
- Lightning
- Fast moving water
- Unstable earth
- Poor visibility, especially at night
- Lifting heavy objects
- Transients
- Muggers and other criminals
- Power tools and heavy equipment
- Elevated places
- Sharp edges and broken glass
- Overhead dangers
- Dogs and other biological hazards
- Electrical hazards posed by equipment malfunctions

Always be aware of these dangers and all other hazards. Here are some tips that will help increase your safety and the safety of others while working in the field:

- Stay away from the edges of a fast moving body of water. These edges are usually slippery and unstable during rainy conditions.
- If sampling is required at the edge of a fast moving body of water, use a lifeline and a personal flotation device. Have on hand a grabbing device when possible.
- Never work alone at night, and avoid working alone during the day. Two people are required during each site visit.

- Avoid leaving materials, tools, and equipment lying around where someone can trip over them.
- Maximize lighting at all times, especially at night.
- Always keep a charged cellular phone or other means of communication nearby.
- Do not use your back to lift heavy objects. Get help.
- Never use drugs or alcohol while working.
- Always wear an orange reflective vest, appropriate shoes and a hard hat when overhead dangers exist.
- Do not use power tools and heavy equipment unless trained in the proper use and care of the specific power tools.
- Always wear eye protection when working with tools or chemicals.
- Wear rain gear.
- Never leave open holes unattended or not barricaded.
- Do not sample during lightning storm.
- Clean up the work area before leaving.
- Always carry drinking water with you.
- Be aware of the nearest toilet and hand washing facilities.

Workers will complete the following personal hygiene procedures:

- Toilet and hand washing facilities will be located on site or an alternate sanitary facility and their specific location identified prior to beginning work activities.
- Where employees are engaging in the application of paints, coatings, or in other operations involving substances which may be harmful to the employees, cleansing facilities shall be provided in proximity of the worksite and shall be so equipped as to enable employees to remove such substances. Depending upon the problem, these facilities may be in the form of ordinary soap and water or in the form of special compounds designed specifically for removal of the harmful material from skin surfaces.
- Personal protective equipment shall be kept clean and in good repair. Safety devices, including protective clothing worn by the employee, shall not be interchanged among the employees until properly cleaned.
- All equipment leaving the site will be free of gross hazardous and non hazardous waste (i.e. mud and/or soil).

1.4 Confined Space Entry

There are no known instances where a permitted confined space entry will be necessary during the course of site selection or monitoring of the Chollas Creek Dissolved Metals TMDL Project. Additionally, there are no known instances where a non-permitted confined space entry will be necessary. However, if an instance does arise that requires a non-permitted confined space entry the Project Manager, the Site Health and Safety Officer, and the Health and Safety Director must be notified and this HASP amended.

OSHA requires that all employees required to enter a permitted/non-permitted confined space be instructed in the nature of the hazards involved, the necessary precautions to be taken, and the use of protective and emergency equipment required for the job.

AMEC considers all confined spaces as permit-required confined spaces until otherwise re-classified as a non-permit required confined space by a competent person. Prior to entering a confined space, each employee is required to be trained to AMEC's Permit Required Confined Space Entry Procedure ESH 2.9.8 (Rev 1) and the attached re-classification certificate must be completed.

2.0 SITE SPECIFIC SAFETY CONCERNS

This section provides information on unique hazards and necessary precautions for the types of sites that will be monitored during this study. Appropriate emergency response numbers and routes to the nearest medical emergency facilities can be found at the end of this appendix. Field personnel will be responsible for adhering to the requirements of this plan for installation, maintenance, and storm monitoring. If additional measures are necessary due to unforeseen or temporary changes to the work environment, the on-site team leader will make the final judgment for any safety procedure changes.

2.1 Errant Vehicles

There is a moderate exposure hazard from errant vehicles while accessing most sites. While personnel are stopped on the shoulder of the highway or roadway, they should keep well back from the highway or roadway lanes and face the approaching traffic. A lookout person is required if two or more workers are engaged in exposed activity within 30 feet of the travel lane. Exposed activities will occur before, during, and after storm events

2.2 Chemical Hazards

Chemical hazards may collect within pipes and/or collection channels. Chemicals can be corrosive and will burn exposed flesh, and/or they can cause severe illness if they are absorbed through the skin or ingested. Exercise caution when encountering a suspected liquid hazard. Use a pH meter or pH test paper to test for corrosives, but always assume that a hazardous chemical is present and wear personal protective clothing. Chemical hazards other than those discussed above could be hazardous chemicals that have precipitated or accumulated on the sides of the pipes and channels. Table 2.1 lists potential chemicals that may be on site along with each chemical's Permissible Exposure Limit (PEL), Immediately Dangerous to Life and Health (IDLH), odor thresholds, and routes of entry. Personnel will use proper personal protective equipment (PPE) to guard against chemical hazards.

Table 2-1: Toxic Gases

Name	Source/Use	IDLH ^(a) Ceiling PPM	STEL ^(b) PPM/ Exposure Time	TWA ^(c) 8 Hr PEL ^(d) PPM	Odor Threshold
Acetone	Solvent	2,500	1,000/15	750	100
Carbon Dioxide	Comb./Sludge	40,000	30,000/15	5,000	-
Carbon Monoxide	Comb. Exhaust	1,200	-	25	-
Chlorine		10	1/15	0.5	
Gasoline	Fuel	-	500/15	300	0.005-10
Hydrogen Sulfide	Sewer/Sludge Coal Gas/Petrol.	100	15/15	10	Impairs smell
Nitrogen Oxides		20	1/15	-	-
Ozone	Electric Arcing	5	0.3/15	0.1	0.015

Notes:

- (a) IDLH (Immediately Dangerous to Life and Health)
- (b) STEL (Short Term Exposure Limit)
- (c) TWA (Time Weighted Average)
- (d) PEL (Permissible Exposure Limit)

2.3 Physical Hazards

Always be alert and use adequate protection to safeguard against the physical hazards associated with working at these sites. The most common hazard encountered is falling or tripping. The following are some other common hazards:

- Falling objects
- Sharp objects
- "Flash" flooding
- High water
- Electrical shock
- Grinding
- Chipping
- Moving vehicles and heavy equipment operation
- Mechanical energy

2.3.1 Biological Hazards

Beware of poison ivy, poison oak, and other plants that cause allergic reactions. Use protection against bacteria and other microbiota that could be present in the water and sediment. Be aware that mosquitoes are a common vector for human diseases. In addition, field crews should be aware of poisonous snakes and spiders (i.e. rattlesnakes and Black Widow spiders), which may be present near monitoring activities and/or fields and channel bottoms in the vicinity.

2.3.2 Heat Stress

Heat stress is a major hazard, especially for workers wearing protective clothing. The same protective materials that shield the body from chemical exposure also limit the dissipation of body heat and moisture. In its early stages, heat stress can cause rashes, cramps, discomfort, and drowsiness, resulting in impaired functional ability that threatens the safety of both the individual and coworkers. Continued heat stress can lead to heat stroke and death. Avoiding overprotection, careful training and frequent monitoring of personnel who wear protective clothing, judicious scheduling of work and rest periods, and frequent replacement of fluids can protect against this hazard.

Heat stress is a possibility on this project. Breaks in a shaded area will be taken if any worker exhibits or believes necessary to mitigate the symptoms of heat stress such as excessive sweating, muscle spasms, thirst, dizziness, rapid/weak pulse, flushed skin, loss of consciousness, or convulsions. The breaks will last until symptoms are relieved and/or the pulse of the worker is less than 110 beats per minute. As a preventive measure, workers will be instructed to drink fluids to keep hydrated. For severe heat stress, workers will be examined by a health-care professional as soon as possible.

Additionally, during periods of hot weather or other potential heat stress conditions the following safe work practices must apply:

- Be on the alert to signs and symptoms of heat illness during periods of abnormally high heat.
- Know the symptoms of heat illness to watch for which includes excessive sweating, headache, poor concentration, muscle pain, headache, cramping, dizziness, irritability, loss of coordination, vomiting, blurry vision, confusion, and lack of sweating, fainting, or seizures.
- Drink plenty of water throughout the day. Employees working in the heat need to drink four 8-ounce glasses of water per hour, including at the start of the shift to replace the water lost to sweat.
- Dress for conditions. Wear lightweight, light-colored loose clothing. Wear a wide brimmed hat if possible.
- Wear sunscreen and sunglasses.
- Use cool compresses to stay cool.
- Take scheduled rest periods and spend them in the shade.
- Tell your supervisor immediately if you feel you may be getting sick from the heat.
- Know the locations of your closest drinking water supplies.

- Keep track of your coworkers. You all need to look out for each other.
- Know how to contact emergency services in the event of heat illness and how to effectively report the work location to 911.

2.3.3 Cold Exposure

Storms can bring unusual cold weather to the area. Cold injury (frostbite and hypothermia) and impaired ability to work are dangers at low temperatures and wet conditions. To guard against this hazard, wear appropriate clothing, have warm shelter readily available, carefully schedule work and rest periods, and monitor workers' physical conditions.

2.3.4 Worker Safety

Only personnel trained in the use of the proper safety equipment will be allowed to complete the required tasks.

2.4 Personal Protective Equipment

Personal protective equipment recommended includes hard hats, safety vests, work boots, gloves, and sturdy clothing. This equipment will not only help protect against numerous potential hazards but will also allow others to identify you as belonging to the work site. Additionally, Nitrile, latex, or other plastic-based personal protective equipment will be used by any personnel who is likely to come in contact with storm water runoff as the contents of the water are unknown and potentially dangerous.

The safety officer will select the PPE ensemble based on the potential hazards. The appropriate PPE are listed in Table 2-2. Each worker will be responsible for maintaining his or her own PPE.

2.4.1 Special Circumstances

Extreme caution will be used when maintaining pole-mounted equipment. Qualified individuals will perform this task with proper equipment due to the danger of potential falls.

Table 2-2: Standard PPE for Non-Hazardous Work Zones

Activity	Head/Face/Ear	Foot	Hands	Respirator	Clothing
General Site labor	Hard hat (Class B or E) Safety glasses Hearing protection	Steel toed boots w/ puncture resistant insoles.	Leather/Nitrile gloves as needed	None ^(a)	Shirt w/sleeves. Long pants. High vis-reflectorized vest
Supervision of work	Hard hat (Class B or E) Safety glasses Hearing protection	Steel toed boots w/ puncture resistant insoles.	Leather/Nitrile gloves as needed	None ^(a)	Shirt w/sleeves. Long pants. High vis-reflectorized vest
Site Visitors	Hard hat (Class B or E) Safety glasses Hearing protection ^(b)	Steel toed boots w/ puncture resistant insoles.	None	None ^(a)	Shirt w/sleeves. Long pants. High vis-reflectorized vest

Notes:

^(a) Voluntary use of respirators is authorized for nuisance dusts and exposures known to be below PEL levels. For nuisance dust use disposable N, R or P95 or better (dispose of N or r types daily and P type weekly). For odors use half mask with OV or OV/P95 or better (change at start of week).

^(b) Hearing protection with adequate noise reduction rating (if consistently exposed to greater than 85 decibels steady-state or 140 decibels impulse). Workers should use clean hands to insert earplugs. Ample supplies of disposable earplugs will be available onsite.

2.5 Traffic Safety

A rotating amber light is required when accessing many of the monitoring locations. A shoulder or lane closure will be considered for all work near the shoulder or in a traffic lane that is expected to last more than 30 minutes. Traffic control requirements described in the encroachment permit for selected shoulder/lane closures shall be followed.

2.6 Installation Safety

The following precautions will be taken while installing the Chollas Creek Dissolved Metals TMDL Project:

- Use plenty of light during the evening hours and use reflective ANSI/ISEA class II or III vests (23 CFR Part 634) if working near the highway or roadway. Night time work also requires on site personnel to wear white coveralls or appropriate ANSI/ISEA approved retroreflective pants.
- Always wear protective gloves, a reflective vest, as described above, and a hard hat when overhead dangers exist.
- Wear boots and foul weather gear during rainy weather.

- Do not eat or smoke while on the job site.
- Use proper lifting techniques and get assistance when moving coolers and large sample composite containers or other equipment.

2.7 Emergency Procedures

2.7.1 Medical Emergencies

Even with full safety awareness and compliance by field teams, medical emergencies can and do occur. To handle minor injuries, field teams will have a basic first aid kit on-site at all times. Table 2-3 is a list of site-specific emergency contacts. Driving directions to the hospital nearest each site are presented in Tables 2-4 through 2-7, along with corresponding maps showing driving routes Figures 2-1 through 2-4.

Table 2-3: Emergency Contacts

Site	Name	Phone	Comments
All	San Diego Police Dept	911	From Cell Phone

Document all information related to the accident or incident that resulted in injury or damage and report it to the Consultant Safety Manager.

Table 2-4: Driving Directions to Hospital from DPR3

Site	Directions/Hospital	Name/Address	Hospital Route Map Figure No.
DPR3	Head Southwest on Birch St. Turn Right on S. 40 th St. Turn Left onto Division St. Turn Right at S. Euclid Ave. Turn Left at E. 7 th Ave	Paradise Valley Hospital 2400 E 4th St National City, CA 91950 (619) 470-4321	Figure 2-1

Figure 2-1: Hospital Map from DPR3

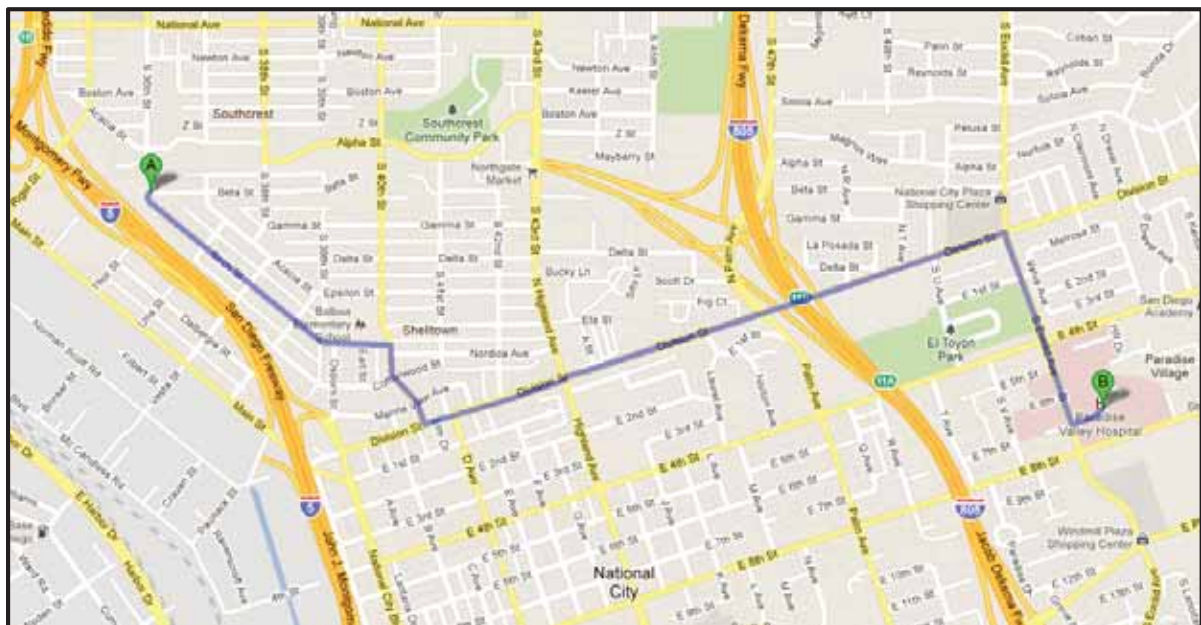


Table 2-5: Driving Directions to Hospital from SD8(1)

Site	Directions/Hospital	Name/Address	Hospital Route Map Figure No.
SD8(1)	Head West on Durant St. Left on S. 33 rd St. Left onto Ocean View Blvd. Turn Right at S. 47 th St. Left onto Logan Ave. Right on S. Euclid Ave.	Paradise Valley Hospital 2400 E 4th St National City, CA 91950 (619) 470-4321	Figure 2-2

Figure 2-2: Hospital Map from SD8(1)

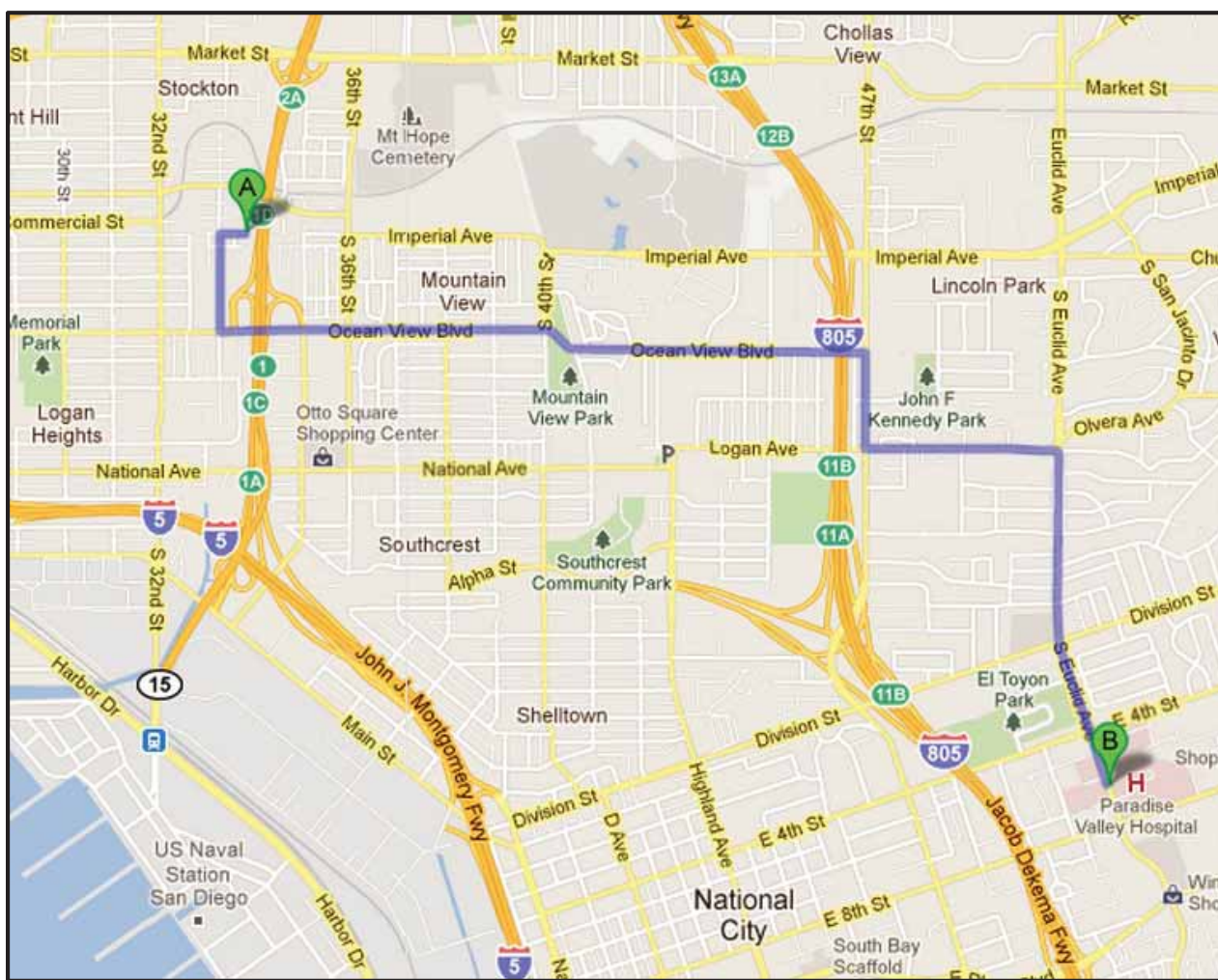


Table 2-6: Driving Directions to Hospital from LM-1

Site	Directions/Hospital	Name/Address	Hospital Route Map Figure No.
LM-1	Head East on Boulevard Dr. Left on Lois St. Continue onto 70 th St. Left onto El Cajon Blvd. Right onto Montezuma Rd. Right onto Reservoir Dr.	Alvarado Hospital 6655 Alvarado Rd. San Diego, CA 92120 (619) 287-3270	Figure 2-3

Figure 2-3: Hospital Map from LM-1

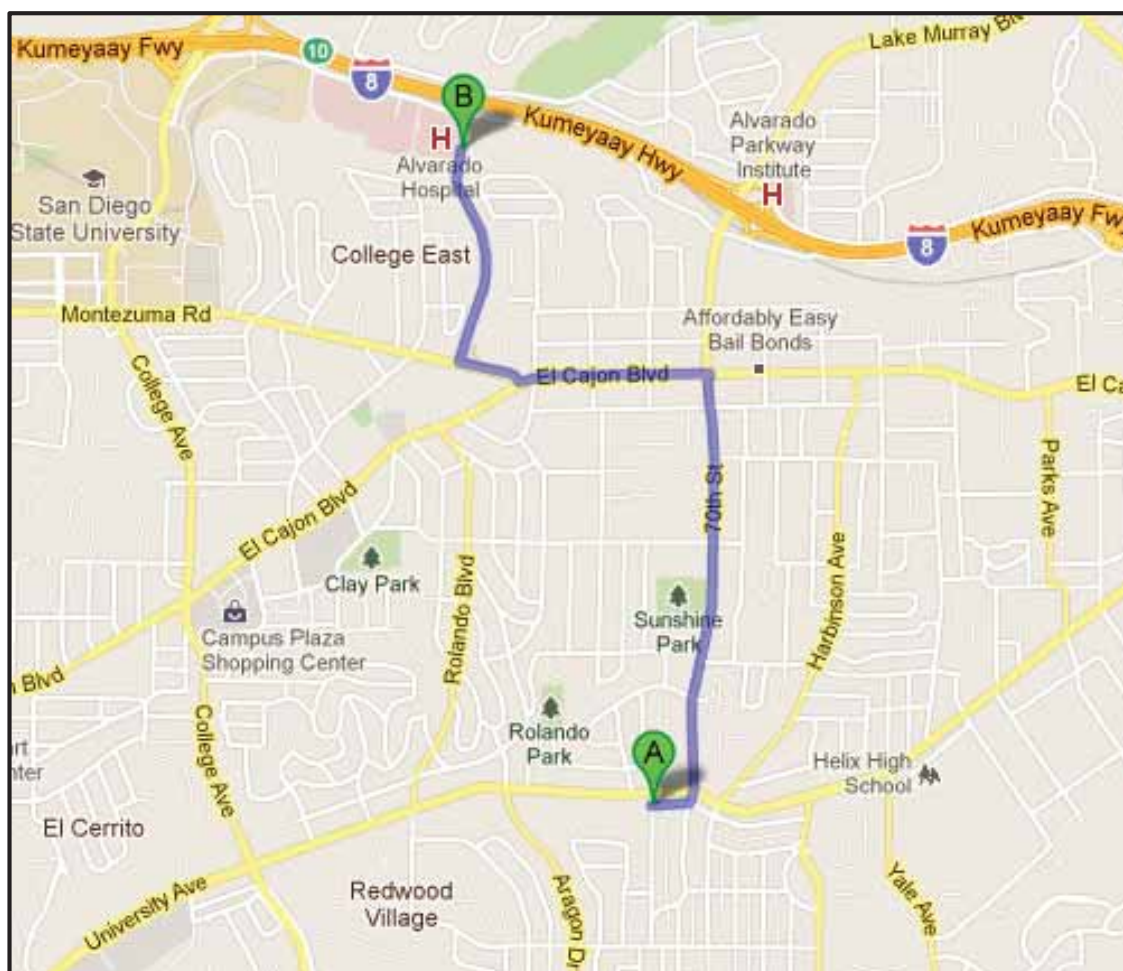
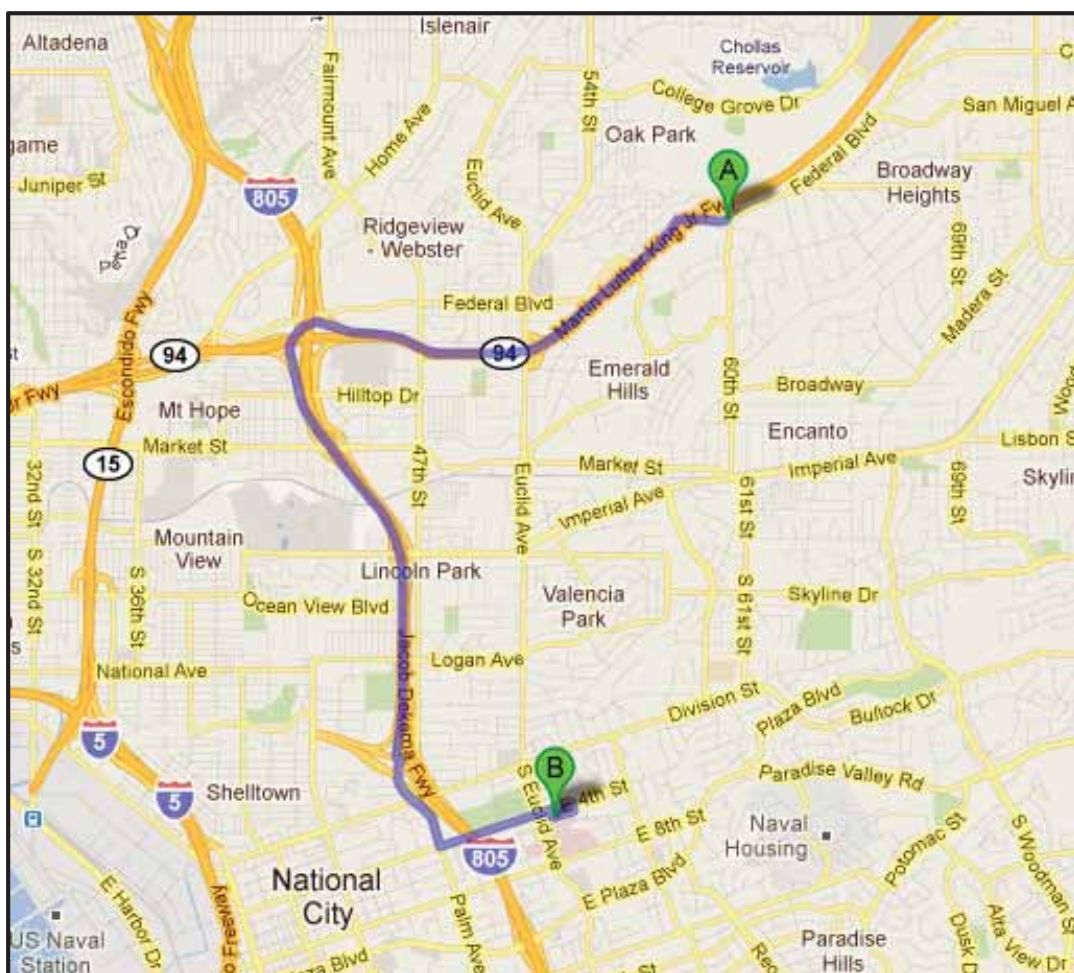


Table 2-7: Driving Directions to Hospital from LG-1

Site	Directions/Hospital	Name/Address	Hospital Route Map Figure No.
LG-1	Head West on Federal Blvd. Merge onto the 94W Freeway Merge onto 805 South Take Exit 11A for Palm Ave. Right onto S. 47 th St./N. Palm Ave. Left onto E. 4 th St.	Paradise Valley Hospital 2400 E 4th St National City, CA 91950 (619) 470-4321	Figure 2-4

Figure 2-4: Hospital Map from LG-1



2.8 Hazardous Spills

Hazardous substances may be used for various purposes at and around the site. When working with hazardous substances, leaks and spills are always a concern. With the close proximity of the site to the roadway, the probability also exists of potential hazardous spills originating from traveling vehicles.

A spill may present a number of hazards. The specific hazards depend on the substance(s) involved. Among the possibilities are:

- Fire
- Explosion
- Contamination of individuals who come in contact with the spilled substance
- Hazardous substances entering the water supply

Spill response procedures are designed to minimize the risk of any of these things occurring as a result of a spill or, at the very least, reducing the degree of hazard. The primary concern of spill contamination is to stop or retard the spill before it becomes serious.

Field teams working with potentially hazardous materials will be trained in the use of proper personal protective equipment, the safe usage or handling of the substances, and contingency plans for spills and leaks. In the event of a hazardous material spill, follow the procedures listed in Section 1.3 of this HASP. The hazards posed by a spill of a particular substance are detailed on the Material Safety Data Sheet (MSDS) for that substance. In the event of a hazardous material spill originating from an external source such as an accident on the roadway, follow the procedures listed in Section 1.3 of this HASP.

2.9 Tailgate Safety Training

The HSO or another designated Safety Officer will conduct tailgate safety training sessions regularly. These meetings will be held on-site prior to work operations. New personnel working on site will be required to attend a tailgate meeting prior to work operations. The purpose of the safety-training meeting is to ensure that field team members understand and will abide by all safety and potential emergency response measures that may be necessary for the well being of the field team.

The following items will be discussed at each safety meeting:

- Traffic safety
- Safe entering and exiting of the highway or roadway
- Use of personal protective clothing and equipment
- Potential chemical and physical hazards and how to deal with them
- Nearest hospital information
- Emergency response procedures
- Any other site-specific safety issues

Field team members must sign the tailgate safety training meeting form in acknowledgment of understanding all issues discussed. An example of a tailgate meeting form is included as Figure 2-5.

Figure 2-5: Tailgate Safety Meeting Form

Project No.: _____ Client: _____

Site: _____ Location: _____

Safety Topics Discussed
1. Protective clothing and equipment: - PPE – Use the PPE that has been provided to prevent injury, exposure to the cold and wet weather conditions, and exposure to storm water runoff containing diluted levels of chemical contaminants. Typical PPE may consist of a hard hat, rain gear, rubber rain boots, nitrile gloves, pants, long sleeved shirts, and layered clothing. Use and wear a PFD if working over water, on piers or quay walls. - Equipment and tool use - Use proper equipment for the task in the prescribed manner to prevent injury.
2. Chemical hazards: - Dermal/eye contact with water contaminants - Do not overfill containers. Fill bottles only to the neck or as otherwise instructed by the site manager. - Food, drinks, or cigarettes will not be consumed while observing or sampling. Prior to handling food, drinks, or cigarettes, personnel will wash hands and face.
3. Physical hazards: - Lifting - Use proper equipment and lifting and motion technique. Do not twist back, stay balanced and use your legs. - Vehicle Hazards - Be aware of vehicle operations in your area. Make eye contact with vehicle operators on approaching equipment. - Driving - Drive vehicle in accordance with company policy. Drive in right lane, use 3-second rule or extended distance from vehicle in front of you. Drive speed limit or slower depending on road conditions and visibility. - Working over water - Exercise care and alertness when working around water. Use the buddy system and wear a PFD if working over water, on piers or quay walls.
4. Vehicle Hazards: - Wear seat belt while vehicle is in motion. - Do not exceed the posted speed limit. - Reduce speed in adverse weather conditions. - Always drive with headlights on. - Drive vehicle in accordance with AMEC policy. Drive in the right lane and maintain an extended distance (3-second rule) from the vehicle in front of you. - Drive defensively and follow traffic regulations. - Do not make sudden lane changes, weave through traffic, or cut off other drivers. - Do not use handheld or hands-free cell phones while driving. - Stop at intersections and give the right-of-way to other vehicles and pedestrians. - Check tires for proper inflation.

5. Traffic Hazards:

- Be aware of vehicles in your area. Make eye contact with approaching vehicle operators.
- In dry weather, a reflective vest should be worn for maximum visibility in high-traffic areas.
- Use traffic cones around the work zone in high-traffic areas.
- At least two persons must be present to perform any work in high-traffic areas. One of these persons must monitor approaching traffic for any potential hazards.
- Watch out for moving vehicles and equipment and equipment.

6. Environmental and biohazards:

- Dangerous animals and insect bites and stings – Be aware of your surroundings and watch for dangerous animals and insects such as spiders and snakes. Wear appropriate clothing such as pants, long sleeved shirts, and steel toe boots.
- Watch for Poison Oak.

7. Equipment hazards:

- Pinch Points – Use proper equipment in the prescribed manner in conjunction with proper lifting techniques to avoid pinch points.
- Wear leather or canvas gloves - to protect the hands when performing manual labor, such as moving manhole covers

8. Decontamination procedures:

- If an exposure or eye contact occurs, respond with appropriate first aid and immediately notify the supervisor.

9. Other:

- The supervisor will review any other significant safety matters specific to sampling and observation activities at this base.

10. Review of emergency procedures:

In case of emergency, **immediately dial 911.**

City of San Diego
 Chollas Creek Diazinon and Dissolved Metals TMDL Project
 Health and Safety Plan
 AMEC Project No. 5025141073
 May 2014

Project Safety Log			Attendees	
Date	Site Activity	Topic Discussed	Printed Name	Signature

Meeting Conducted by:

Name

Title

Signature

Date

City of San Diego
Chollas Creek Diazinon and Dissolved Metals TMDL Project
Health and Safety Plan
AMEC Project No. 5025141073
May 2014

[illegible]

Meeting Conducted by:

Name _____

Title

Signature _____

Date _____

City of San Diego
Draft Chollas Creek Diazinon, Dissolved Metals, and Bacteria TMDLs
2014-2015 Monitoring Plan
AMEC Project No. 5025141073
May 2014

APPENDIX C

FIELD FORM AND CHAIN OF CUSTODY

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Field Data Log Sheet

Site ID		Field Crew		Date	
Site-Specific Event	Wet Weather 1 Wet Weather 2 Wet Weather 3 Data Download	Time			

ATMOSPHERIC CONDITIONS

Weather	Sunny	Partly Cloudy	Overcast	Fog	Raining
Last Rain	> 72 Hours	< 72 Hours	Rainfall	None	< 0.1" > 0.1"

RUNOFF CHARACTERISTICS

Odor	None	Musty	Rotten Eggs	Chemical	Sewage	Other _____
Color	None	Yellow	Brown	White	Gray	Other _____
Clarity	Clear	Slightly Cloudy	Opaque	Other _____		
Floatables	None	Trash	Bubbles/Foam	Sheen	Other _____	
Deposits	None	Sediment/Gravel	Fine Particles	Stains	Oily Deposits	Other _____
Vegetation	None	Limited	Normal	Excessive	Other _____	
Water Flow	Flowing	Ponded	Moist	Dry		

CURRENT CONDITIONS

Upon Arrival: Flowmeter Running? Y N Sampler Running? Y N Tubing Connected? Y N

Level (in)		Velocity (fps)		Flow (cfs)	

Total Flow (cf)		Total Rainfall (in)		# of Missed Samples	

Flow Meter Battery Voltage		# of Successful Samples	

Sampler Battery Voltage		Approx. Sample Volume (L)	

Upon Departure: Flowmeter Running? Y N Sampler Running? Y N Tubing Connected? Y N

FIELD MEASUREMENTS

Temp (°C)		pH		Sp Conductivity @ 25°C (µS/cm)	

SAMPLE COLLECTION

Sample Type	Date	Time	Bottle ID	Sample ID
Chemistry				
Toxicity				

POST STORM DATA

Total Flow Volume (cf)	Total Rainfall (in)	Sample Aliquot Count	Total Sample Volume

BOTTLE CHANGE

LAST SAMPLE

Chemistry	Toxicity	Chemistry	Toxicity
Date	Date	Date	Date
Time	Time	Time	Time
Aliquot	Aliquot	Aliquot	Aliquot
Volume	Volume	Volume	Volume
Bottle ID	Bottle ID	Bottle ID	Bottle ID

NOTES/COMMENTS

Analysis Request and Chain of Custody

City of San Diego

Chollas TMDL Compliance Monitoring 2013-2014

Project Number: 5025-13-1035

PO Number: C013101246

From:

AMEC Environment & Infrastructure

Attn: Tommy Wells

9177 Sky Park Court

San Diego, CA 92123

Phone: (858) 278-3600 Fax: (858) 278-5300

To:

Weck Laboratories, Inc.

14859 East Clark Avenue

City of Industry, CA 91745

Phone: (626) 336-2139

Fax: (626) 336-2634

SampleID	Date	Time	Analyses	Bottle Size	Preservative	Bottle Count
2013-W____-DPR3-C-01	_____	_____	Chloride, Sulfate, Total Hardness as CaCO ₃ , Mg, Ca, Total and Dissolved Copper, Total and Dissolved Lead, Total and Dissolved Zinc, Organophosphorus Pesticides, Organochlorine Pesticides/PCBs, PAHs, PCB Congeners, TOC, DOC	19L	6 °C	_____ Etched Bottle ID _____
2013-W____-SD8(1)-C-01	_____	_____	Chloride, Sulfate, Total Hardness as CaCO ₃ , Mg, Ca, Total and Dissolved Copper, Total and Dissolved Lead, Total and Dissolved Zinc, Organophosphorus Pesticides, Organochlorine Pesticides/PCBs, PAHs, PCB Congeners, TOC, DOC	19L	6 °C	_____ Etched Bottle ID _____

<u>Relinquished By:</u> Print: _____ Sign: _____	<u>Received By:</u> Date: _____ Time: _____ Sign: _____	<u>Notes/Comments:</u>
<u>Relinquished By:</u> Print: _____ Sign: _____	<u>Received By:</u> Date: _____ Time: _____ Sign: _____	
Sampler's Initials: _____		Page: ____ of ____

Analysis Request and Chain of Custody

City of San Diego

Chollas TMDL Compliance Monitoring 2013-2014

Project Number: 5025-13-1035

PO Number: C013101247

From:

AMEC Environment & Infrastructure

Attn: Tommy Wells

9177 Sky Park Court

San Diego, CA 92123

Phone: (858) 278-3600 Fax: (858) 278-5300

To:

Nautilus Environmental

4340 Vandever Ave

San Diego, CA 92120

Phone: (858) 587-7333

Fax: (858) 587-6769

SampleID	Date	Time	Analyses	Bottle Size	Preservative	Bottle Count
2013-W____-SD8(1)-C-01	_____	_____	Ceriodaphnia dubia 96-hour acute static-renewal test, Ceriodaphnia dubia 7-day chronic static-renewal test	19L	6 °C	_____
Etched Bottle ID _____						
2013-W____-DPR3-C-01	_____	_____	Ceriodaphnia dubia 96-hour acute static-renewal test, Ceriodaphnia dubia 7-day chronic static-renewal test	19L	6 °C	_____
Etched Bottle ID _____						

<u>Relinquished By:</u> Print: _____ Sign: _____	<u>Received By:</u> Date: _____ Print: _____ Sign: _____	<u>Notes/Comments:</u>
<u>Relinquished By:</u> Print: _____ Sign: _____	<u>Received By:</u> Date: _____ Print: _____ Sign: _____	Sampler's Initials: _____ Page: ____ of ____

City of San Diego
Draft Chollas Creek Diazinon, Dissolved Metals, and Bacteria TMDLs
2014-2015 Monitoring Plan
AMEC Project No. 5025141073
May 2014

APPENDIX D

CLEAN SAMPLING PROTOCOLS

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FLOW MONITORING AND SAMPLING STANDARD OPERATING PROCEDURE

FIELD FLOW MONITORING AND SAMPLING TECHNIQUES

The following text describes clean sampling techniques that should be used when low-level analytical detection limits are to be employed for sampling.

The following topics are discussed below:

- Clean Sample and Equipment Handling
- Composite Bottle Changing
- Bottle and Equipment Cleaning

CLEAN SAMPLE AND EQUIPMENT HANDLING

During all sampling operations, extreme care must be taken to minimize exposure of the sample and sample collection equipment to human, atmospheric, and other sources of contamination. This section provides clean sample and equipment handling procedures to be used when samples are collected for-level analysis.

Clean sampling techniques typically require a two person sampling team. Upon arrival at the sampling site, one member of the sampling team is designated as “dirty hands”; the second member is designated as “clean hands”. All operations involving contact with the sample bottle, sample bottle lid, sample suction tubing, and the transfer of the sample from the sample collection device (if the sample is not directly collected in the bottle) to the sample bottle are handled by “clean hands” wearing clean powder-free nitrile gloves. “Dirty hands” (also wearing clean powder-free nitrile gloves) is responsible for preparation of the sampler (except the sample container itself), operation of any machinery, and for all other activities that do not involve handling items that have direct contact with the sample. “Clean hands” will change into clean gloves as frequently as required to ensure that the gloved hands contacting the sample container, container lid, and laboratory cleaned sampling equipment have not contacted any source of potential contamination.

Although the duties of “clean hands” and “dirty hands” would appear to be a logical separation of responsibilities, in fact, the completion of the entire protocol may require a good deal of coordination and practice. For example, “dirty hands” must open the box or ice chest containing the sample bottle and unzip the outer bag; “clean hands” must reach into the outer bag, open

the inner bag, remove the bottle, collect the sample, replace the bottle lid, put the bottle back into the inner bag, and zip the inner bag. “Dirty hands” must close the outer bag and place the double-bagged sample in an ice-filled ice chest.

COMPOSITE BOTTLE CHANGING

If an automated monitoring station is used for the collection of composite stormwater samples and a composite bottle change is required, composite bottle changing is conducted using the following steps:

1. The automated sampling equipment is placed in pause mode prior to the initiation of a composite bottle change. This action is accomplished in the field or by remote monitoring personnel if the monitoring station is equipped with telemetry.
2. Composite bottle changing requires two field crew members- “clean hands” and “dirty hands”. Both team members wear clean, powder-free nitrile gloves. “Clean hands” only touches suction tubing and Teflon composite bottle lids. Keep extra gloves within easy reach.
3. Prior to putting on clean gloves, the clean empty sample bottle is placed near the automated sampling unit, and the sampler is opened.
4. Wearing clean powder-free nitrile gloves, “dirty hands” removes the lid clamps from both the full sample bottle and the clean sample bottle.
5. “Clean hands” removes the end of the pump tubing from the composite bottle and “dirty hands” places a clean ziplock bag over the end of the tubing securing it with a rubber band. The inside of the bag should never be touched by sampling personnel.
6. “Clean hands” switches the bottle lids, putting the solid lid on the full bottle and the perforated lid on the clean empty bottle.
7. “Dirty hands” installs the lid clamps on both bottles, removes the full bottle from the sampler, replacing it with the clean empty bottle.
8. “Clean hands” holds the tubing while “dirty hands” removes the ziplock bag from the end of the pump tubing, being careful not to touch the tubing.
9. “Clean hands” inserts the tubing through the lid of the clean bottle.
10. The sampler is closed and sampling equipment is placed in sample mode. Remote operation personnel are notified as soon as the bottle change is complete.
11. The sampling team fills out the appropriate information on the label of the full sample bottle.
12. The full bottle is surrounded with fresh ice or frozen refreezable ice packets, and secured inside the vehicle for transport.

BOTTLE AND EQUIPMENT CLEANING

When use of the preceding clean techniques is called for, additional effort should also be made in the area of bottle and equipment cleaning. Consult also EPA Method 1669, *Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels*, and relevant individual 1600 series methods for further information.

Automated Sampling Equipment

Key components required for successful automated sample collection include an automated sampler, tubing with strainer, and sample bottle(s).

Automated Sampler

Automated samplers are comprised of a peristaltic pump, pump control electronics, a sample distribution system, a power supply, and a housing that contains the composite bottle(s). A peristaltic pump creates suction by compressing a flexible tube with a rotating roller, drawing a sample that is then pushed out of the pump. The pump operates best when placed close to the source; this reduces the suction head or lift (experience has shown that the reliability of peristaltic pumps drawing a consistent sample volume is greatly reduced as the static suction head increases). According to manufacturer's specifications, vertical lift must be no greater than 26 feet. When sampling with an automated sampler, static head height refers to the vertical distance from the surface of the flow stream to the automated sampler pump inlet. Automated samplers may be configured for single or multiple bottle composite collection. Samplers configured to fill multiple sample bottles have a sample distribution mechanism. Tubing from the discharge port of the intake pump is connected to a rotating distributor arm that dispenses the samples into several sample bottles. If flow-weighted sampling is planned, the automated sampler must be capable of accepting a signal from a flow meter that is used to trigger collection of a sample aliquot. Cables can be purchased that connect each type of flow meter to an automated sampler. Automated samplers are equipped with internal memory circuits, and typically a small LCD data screen. The memory holds the user-programmed values for the sample aliquot volume, sample bottle configuration, and number of samples per bottle. The memory also retains information describing the status of the sampling program and the time at which each triggering signal was received from the flow meter. Messages can be displayed on the data screen for the user regarding any sample collection failures.

Samplers are powered by 12-volt (V) DC batteries, AC power, or solar-powered batteries. Two types of 12-V DC batteries are available: nickel-cadmium and lead-acid. Most automated sampler manufacturers offer AC power packs for use where line power is available. Use of AC power decreases routine maintenance requirements, as battery changes are not necessary. The preferred configuration includes AC power with an in-line battery backup. However, back-up batteries typically will not provide adequate power for refrigerated units.

Sampler Intake Strainer, Intake Tubing and Flexible Pump Tubing

The intake strainer is attached to the intake tubing and mounted to the bottom of a pipe or channel. Intake strainers prevent rocks and debris from clogging or damaging the intake tubing or pump. Sizes vary, but smaller intake strainers are generally better for use under low flow conditions. Sample intake strainers are typically made of stainless steel, or a combination of stainless steel and Teflon. For trace metals analyses, all intake strainer parts must be Teflon, or coated with Teflon or Teflon-like material. Specific intake and pump tubing requirements are listed below:

- Intake tubing: Teflon
 - Maximum vertical lift = 26 feet
 - Maximum length = 99 feet
- Pump tubing: Silicon or other medical grade flexible tubing

Limit to length needed to feed through peristaltic pump, connect to Teflon intake tubing and sample bottle Teflon tubing is used for the sample intake tubing because of its inert properties. This tubing is connected from the intake strainer to the pump tubing, and may range from 3 to 99 feet in length. EPA protocols permit the use of the minimum amount of flexible pump tubing needed to carry the sample water through a peristaltic pump. Silicone tubing is normally used for this purpose.

Sample Bottle(s)

Automated samplers may be configured to have a variety of sample bottles, from one to a dozen or more sample bottles. If a sampler holds a single bottle, all of the sample aliquots are pumped into this bottle, resulting in one large composite sample. Use of a single composite bottle has the advantage of providing for the estimation of the event mean concentrations (EMCs) directly from analysis of the constituents in the one bottle. However, it does not allow for isolation of specific samples or groups of samples from specific periods of the runoff hydrograph, and provides less visual indication of sampler malfunction (if this should occur). A multiple bottle configuration, however, provides these latter capabilities.

It is important to keep extra bottles (for either the single or multiple bottle configurations) available in case bottles are contaminated or damaged, or in the event that bottles need to be changed to accommodate a larger-than-expected storm. If a storm delivers more precipitation than expected, sample bottles will fill prior to the end of the storm, prompting sample bottle replacement.

AUTOMATED SAMPLER INSTALLATION

The automated sample collection equipment should be installed and maintained according to manufacturer specifications. See Section 5 regarding selection of automated equipment.

Installation The automated sampler should be installed inside the protective enclosure in such a way that all controls, display windows and cable connections are easily accessed. All wiring should be secured, in a well organized fashion to the inside of the enclosure to prevent accidental disconnection or damage. The sampler must be oriented in a way that will allow the sample intake tubing to enter the sampler without sharp bends or kinking, and to allow easy access for tubing replacement. At the sampler peristaltic pump, where the sample intake tubing is connected to the pump tubing, no metallic fittings or clamps should be used. Using “clean techniques”, the Teflon intake tubing should be inserted (at least a half inch) into the flexible pump tubing and fastened using a non-metallic clamp or cable tie. At no time during this procedure should the ends of the tubing be allowed to touch any object that is not known to be clean. The flexible pump tubing should then be fed through the peristaltic pump and into the area of the sampler where the sample bottle(s) are housed. Adequate space must be available in the equipment enclosure to easily remove and replace sample bottles from the automated sampler. Proper placement of the sampler intake assures the collection of representative samples. The intake strainer should be placed in the main flow. The vertical position of the intake strainer in the flow is important. Placement at the bottom may result in excess heavy solids and no floating material, while placement at the top may result in excess floating material and no heavy solids. The constituents of interest must be considered when positioning the intake strainer. Placement of the intake strainer is usually at the channel invert, but may be mounted slightly above the invert on one side of the channel wall if high solids loadings are expected. This will reduce the amount of solids that may enter the intake strainer, and help prevent blockages. However, with the intake strainer offset above the channel invert, low flows may not adequately submerge the strainer, thus preventing sample collection. Maintenance using laboratory provided blank water, the automated sampler should be calibrated according to manufacturer specifications to collect the desired sample aliquot. At a minimum, the calibration should be checked prior to each stormwater monitoring season.

After each stormwater monitoring event, the sample bottle(s) should be checked to verify that the programmed sample volume was delivered to the sample bottle(s). If the programmed sample volume was not delivered accurately to the sample bottle(s), the automated sampler should be recalibrated prior to the next monitoring event.

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ATTACHMENT D. SHELTER ISLAND YACHT BASIN TMDL MONITORING PLAN

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**FINAL
SHELTER ISLAND DISSOLVED COPPER
TMDL 2014-2015 MONITORING PLAN**

**Submitted to:
City of San Diego**



**Submitted by:
AMEC Environment and Infrastructure, Inc.
San Diego, California**

November 2014

AMEC Project No. 5025-14-1083

IMPORTANT NOTICE

This monitoring plan was prepared exclusively for the City of San Diego by AMEC, Inc. The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in AMEC's services and based on: i) information available at the time of preparation, ii) data supplied by outside sources and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended to be used by only, subject to the terms and conditions of its contract with AMEC. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
ac	acres
AMEC	AMEC Environment and Infrastructure, Inc.
ASAP	as soon as possible
ASBS	Area of Special Biological Significance
AVB	area velocity bubbler
Basin Plan	Water Quality Control Plan for the San Diego Basin
CD	compact disk
cfs	cubic feet per second
Chambers	Chambers Group, Inc.
City	City of San Diego
cm	centimetres
COC	chain of custody
DQO	data quality objective
e.g.	example given
GIS	geographic information system
HEC-HMS	Hydrologic Engineering Center - Hydrologic Modeling System
HVF	head versus flow
kg	kilograms
L	litre
LCS	laboratory control sample
Ln	Lane
No.	number
MDL	method detection limit
mg	milligrams
MOS	margin of safety
MS	matrix spike
mS	milli Siemens
MSD	matrix spike duplicate
MS4	municipal separate storm sewer system
NA	not applicable
ND	non detect
NWS	National Weather Service
O&M	operations and maintenance
POSD	Unified Port District of San Diego
QA	quality assurance
QC	quality control
RL	reporting limit
RPD	relative percent difference
SDRWQCB	San Diego Regional Water Quality Control Board
SIYB	Shelter Island Yacht Basin
SOP	Standard Operating Procedure
St.	Street
SWAMP	Surface Water Ambient Monitoring Program
SWRCB	State Water Resources Control Board
TMDL	total maximum daily load

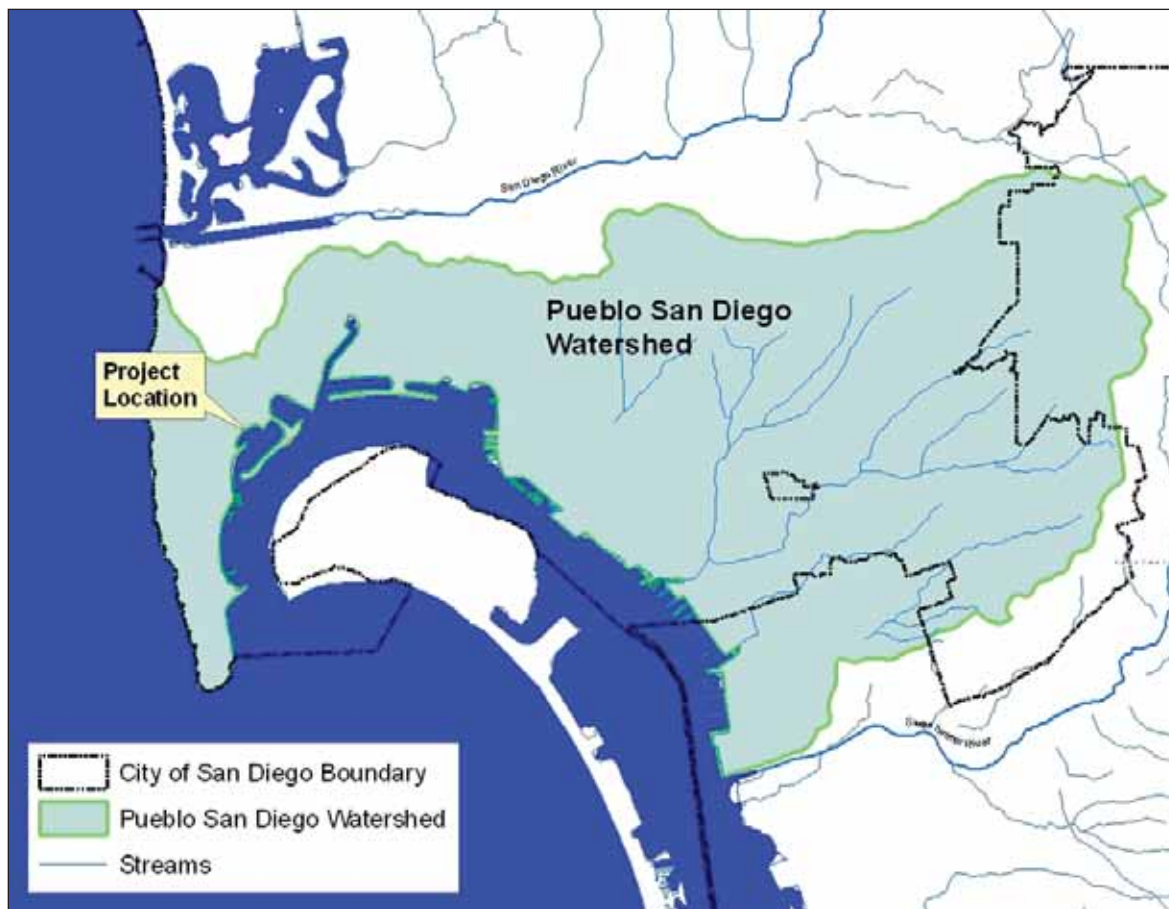
μS	micro Siemens
μg	micrograms
USEPA	United States Environmental Protection Agency
VDC	volts direct current
Weck	Weck Laboratories, Inc.
Weston	Weston Solutions, Inc.
WLA	waste load allocation
yr	year

1.0 INTRODUCTION

Shelter Island Yacht Basin (SIYB) is a semi-enclosed recreational yacht basin located in the north-western end of San Diego Bay in San Diego, California. The SIYB drainage area is contained within the Point Loma Hydrologic Area (908.10), which is within the Pueblo San Diego Hydrologic Unit (Figure 1-1). The Pueblo San Diego Hydrologic Unit is one of three sub-watersheds within the San Diego Bay Watershed. The SIYB drainage area is approximately 673 acres and consists of three sub-drainage areas that discharge via municipal separate storm sewer system (MS4) outfalls into the SIYB.

A total maximum daily load (TMDL) for dissolved copper was established for the SIYB and was added as an amendment to the San Diego Regional Water Quality Control Board (SDRWQCB) Water Quality Control Plan for the San Diego Basin (Basin Plan) on February 9, 2005 (SDRWQCB, 2005b).

Figure 1-1. Project Location



1.1 Background and Objectives

The SIYB is part of San Diego Bay. Thus, the same beneficial uses detailed in the Basin Plan that apply to San Diego Bay are applicable to the SIYB. Table 1-1 details the beneficial uses for San Diego Bay stated in the Basin Plan.

Table 1-1. San Diego Bay Beneficial Uses

Designation¹	Description¹
Industrial Service Supply (IND)	<i>Includes uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.</i>
Navigation (NAV)	<i>Includes uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.</i>
Contact Water Recreation (REC1)	<i>Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural hot springs.</i>
Non-Contact Water Recreation (REC2)	<i>Includes the uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.</i>
Commercial and Sport Fishing (COMM)	<i>Includes the uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.</i>
Preservation of Biological Habitats of Special Significance (BIOL)	<i>Includes uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection.</i>
Estuarine Habitat (EST)	<i>Includes uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).</i>
Wildlife Habitat (WILD)	<i>Includes uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.</i>
Rare, Threatened, or Endangered Species (RARE)	<i>Includes uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.</i>
Marine Habitat (MAR)	<i>Includes uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).</i>
Migration of Aquatic Organisms (MIGR)	<i>Includes uses of water that support habitats necessary for migration, acclimatization between fresh and salt water, or other temporary activities by aquatic organisms, such as anadromous fish.</i>
Spawning, Reproduction, and/or Early Development (SPWN)	<i>Includes uses of water that support high quality habitats suitable for reproduction, early development and sustenance of marine fish and/or cold freshwater fish.</i>
Shellfish Harvesting (SHELL)	<i>Includes uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters and mussels) for human consumption, commercial, or sport purposes.</i>

The most sensitive beneficial uses are those designated for protection of marine aquatic life and aquatic dependent wildlife. These beneficial uses are considered threatened or impaired due to elevated levels of dissolved copper in the water column (SDRWQCB, 2005b).

In 1996, the SIYB was placed on the Clean Water Act, Section 303(d) list of impaired waters due to the elevated levels of dissolved copper in the water column. To address this impairment the SDRWQCB issued a resolution on February 9, 2005 adopting an amendment to the Basin Plan to incorporate a TMDL for dissolved copper specific to the SIYB (SDRWQCB Resolution No. R9-2005-0019). The TMDL states that the loading capacity for dissolved copper discharges into the SIYB is 1.6 kilograms per day or 567 kilograms per year (kg/yr).

¹ California Regional Water Quality Control Board, 2011. Water Quality Control Plan for the San Diego Basin. September 8, 1994, revised April 4, 2011.

This allowable load is composed of a Waste Load Allocation (WLA) that has been distributed among the known potential sources of dissolved copper into the SIYB. Approximately 98 percent (%) of the total copper loading to SIYB was determined to originate from copper-based antifouling paints applied to the hulls of recreational vessels moored in the SIYB marinas. Of this total, 93% was determined to be attributable to copper entering the water column through passive leaching of copper from antifouling paints. The remaining 5% was attributed to antifouling paints sourced from underwater hull cleaning operations in the SIYB. Four additional sources of copper were identified: urban runoff, direct atmospheric deposition, marine sediment, and background levels (SDRWQCB, 2005b). The SIYB is under the jurisdiction of the Unified Port of San Diego (POSD) and is stated in the TMDL as the primary source of dissolved copper loading to the SIYB.

The City of San Diego (City) is also named as a discharger under the TMDL and is responsible for the urban runoff contribution to the SIYB from its MS4; however, the contribution from the City's MS4, as reported in previous monitoring years, has historically been relatively minor. The TMDL provides a source analysis, which assigned a WLA for urban runoff from the MS4 of 30 kg/yr, which represents 1% of the current estimated dissolved copper load to SIYB of 2,163 kg/yr (Table 1-2). Based on the historical monitoring results, urban runoff from the City's MS4 is below the City's WLA and was not assigned a load reduction in the TMDL.

Table 1-2 presents a detailed breakdown of the TMDL and WLA.

Table 1-2. TMDL and WLA Summary

Source	Current Load (kg/yr of Copper)	Percent Contribution (% Copper)	WLA (kg/yr of Copper)	Percent Reduction From Current Source Load (%)	Percent Reduction from Total Loading to SIYB (%)
Passive Leaching	2,000	93	375	81	75
Hull Cleaning	100	5	72	28	1
Urban Runoff (City of San Diego)	30	1	30	0	0
Background	30	1	30	0	0
Direct Atmospheric Deposition	3	<1	3	0	0
Sediment	0	0	0	0	0
Current Mass Load	2,163	100	NA	NA	0
MOS	NA	NA	57	NA	0
TMDL	NA	NA	567	NA	0
Total Load Reduction					76

Notes:

kg/yr = kilograms per year
MOS = Margin of Safety
NA = Not Applicable

TMDL = Total Maximum Daily Load
SIYB = Shelter Island Yacht Basin
WLA = Waste Load Allocation

Source: SDRWQCB, Total Maximum Daily Load for Dissolved Copper In Shelter Island Yacht Basin, San Diego Bay Technical Report (SDRWQCB, 2005c).

The primary objectives of this study are to address two main questions:

1. What is the estimated annual dissolved copper load from the City's MS4 into the SIYB and how does it compare to the TMDL urban runoff WLA of 30 kg/yr?
2. Is there evidence of a trend in the historical dataset?

These two questions can be further broken down as follows:

- What are the dry weather and wet weather estimated pollutant loadings of dissolved copper from the City's MS4 into the SIYB?
- Does the estimated annual dissolved copper load from the City's MS4 exceed the TMDL WLA for urban runoff?
- How does the 2014-2015 monitoring season estimated annual dissolved copper load from the City's MS4 compare to historical results?

1.2 Previous Studies

The monitored drainage area that discharges into the SIYB under the City's jurisdiction consists of three sub-drainage areas, each of which have separate outfalls (Outfall 1, Outfall 2, and Outfall 3). Monitoring and sampling of the City's MS4 that connects to these three outfalls began in February 2008.

During a preliminary site investigation conducted in 2007, it was determined that flow monitoring and sampling was only feasible at Outfall 2. Outfall 2 represents the largest of the three drainage areas (Weston Solutions, Inc. [Weston], 2009). Monitoring of Outfall 1 and Outfall 3 was determined to be infeasible due to tidal influences. Flows for Outfall 1 and Outfall 3 were estimated through modeling and the results are documented in the 2011 Monitoring Report (Weston, 2011c).

A total of 10 wet weather monitoring events and seven dry weather monitoring events were conducted by Weston from 2008 to 2011 to assess dissolved copper loading from the City's MS4 to the SIYB (Weston, 2011c). Beginning in July 2011, AMEC Environment & Infrastructure, Inc. (AMEC) was contracted by the City to continue monitoring and sampling of the City's MS4 that discharges into the SIYB. In an effort to gather additional information to further characterize and estimate the dissolved copper load from the City's MS4 into SIYB, AMEC also began wet weather monitoring at a location upstream from Outfall 3² during the 2011-2012 monitoring season. Table 1-3 presents a summary of monitoring events conducted to date.

Table 1-3. Summary of Monitoring Events Conducted to Date

Event Type	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
Wet Weather	1	3	3	3	3	3
Dry Weather	0	1	3	3	3	3

This Monitoring Plan presents information, protocols, and procedures relative to the monitoring and sampling of the selected sites by AMEC for the 2014-2015 season.

1.3 Project Organization

The City is the municipal government agency overseeing this project. Ruth Kolb is the Program Manager with the City storm water department. Andre Sonksen is the City Project Manager. The Shelter Island TMDL organization structure is provided in Figure 1-2.

AMEC is the consultant hired by the City to perform work for the Shelter Island Monitoring Program. Tommy Wells is the Project Manager for AMEC and will be responsible for project coordination, scheduling, budget management, and oversight of project plans and deliverable development. Claire Johnson is the AMEC Sampling Manager and Laboratory Coordinator. She will be responsible for developing the monitoring approach and for preparing and implementing the monitoring activities. John Brandt is the AMEC Quality Assurance Officer and will be responsible for the project quality assurance and quality control procedures implemented during sampling, laboratory analysis, data management, and data analysis. Jesse Davis is the AMEC Health and Safety Officer and will be responsible for implementation of the project Health and Safety Plan and practices. William Szafranski will be responsible for developing and maintaining a database of project data and Darcy Ebentier is the AMEC Reporting Manager.

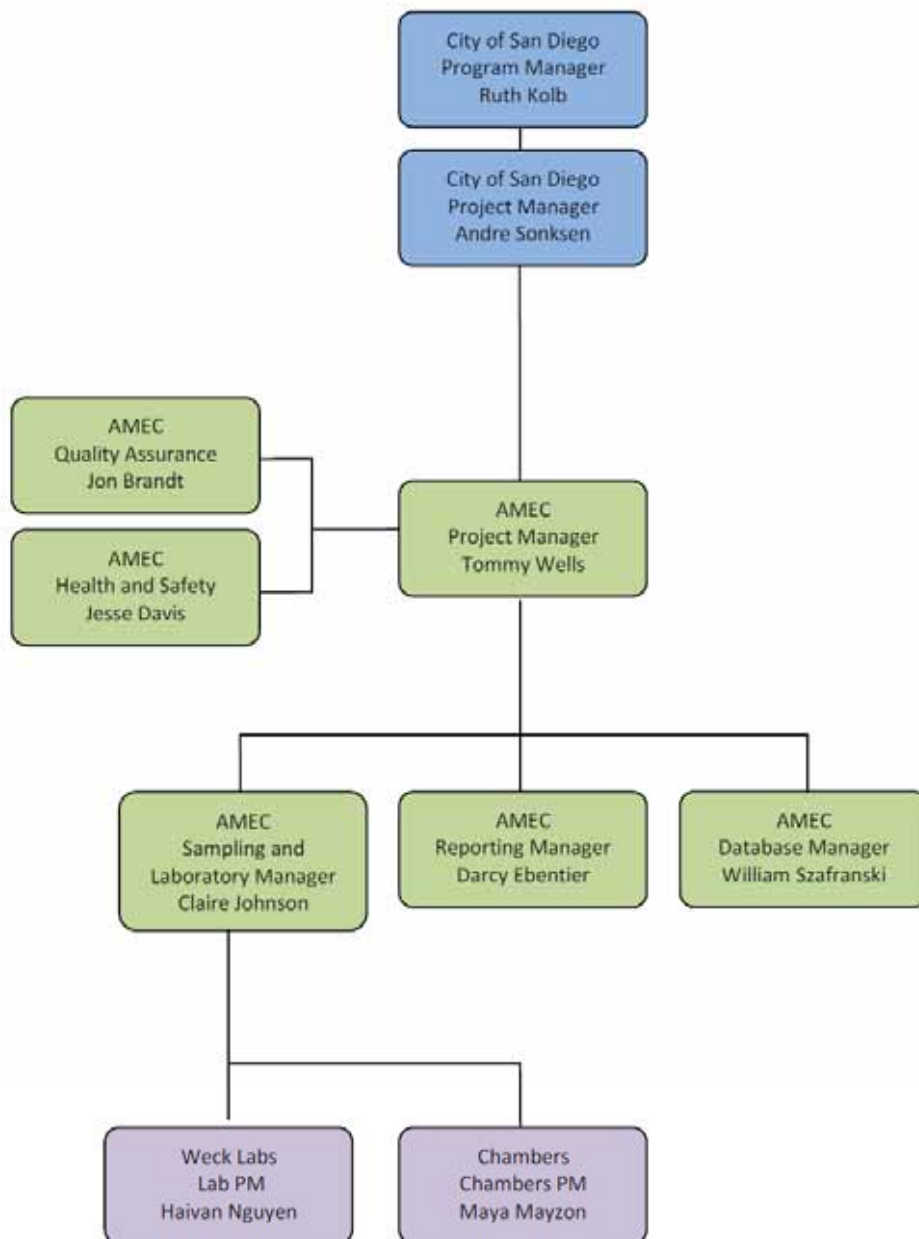
Weck Laboratories, Inc. (Weck) will be responsible for the analysis of the water quality samples. Haivan Nguyen is the Weck Laboratory Project Manager and will be responsible for the proper

² Flow monitoring was conducted during the 2011-2012 monitoring season. However, tidal influence limited its effectiveness and it was discontinued. During the 2012-2013 monitoring season samples were collected at Outfall 3 based on the flows and rainfall observed at the Outfall 2 monitoring location. Modeling was utilized to estimate the flows for Outfall 3.

analysis of samples in accordance with the methods and quality assurance requirements outlined in this monitoring plan.

Chambers Group, Inc. (Chambers) will be responsible for providing field support during equipment installation and removal, maintenance, and storm event monitoring. Maya Mazon is the Chambers Project Manager and will be responsible for coordination of field support staff.

Figure 1-2. Organizational Chart



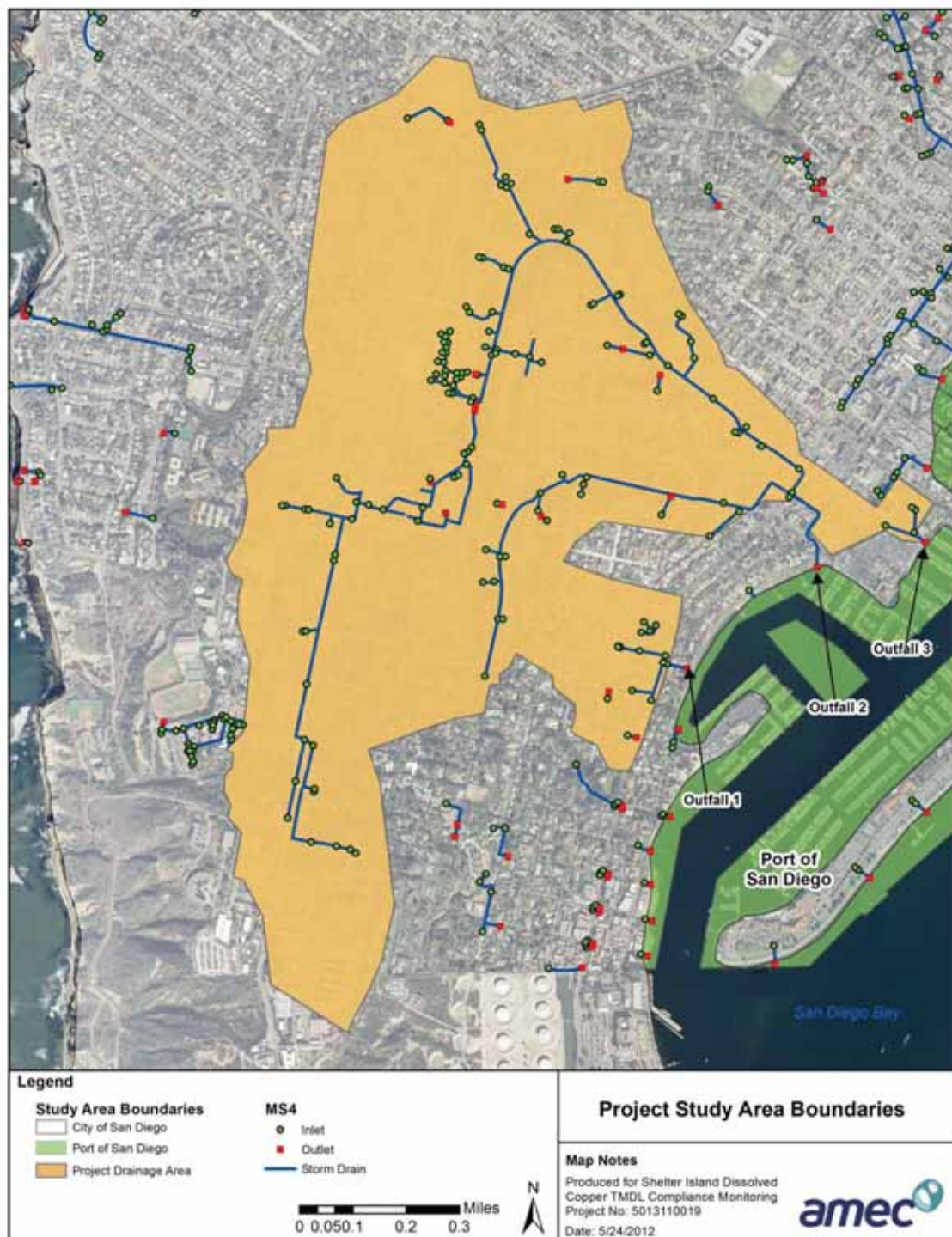
2.0 MONITORING APPROACH

The questions outlined in Section 1.1 will be addressed by estimating wet weather and dry weather flows (monitoring and modeling) and analyzing copper concentrations in runoff samples. The estimated annual dissolved copper load will be calculated based on study results and will be compared to the TMDL load allocation.

2.1 Study Area

The study area for this project consists of the drainage area that discharges into SIYB through the MS4 within the City's boundary and does not encompass the tidelands, which are under the jurisdiction of POSD. The boundaries of the City of San Diego and POSD in the vicinity of the project study area are presented in Figure 2-1. The drainage area that discharges into the SIYB from the City's jurisdiction is approximately 673 acres. It consists of three sub-drainage areas, each with a separate primary outfall (Outfall 1, Outfall 2, and Outfall 3).

Figure 2-1. Project Study Area Boundaries



2.2 Monitoring Site Locations

Prior to the beginning of the 2011-2012 monitoring season, Outfall 2 had been annually monitored and sampled as part of this monitoring program. For Outfall 1 and Outfall 3, dissolved copper load was calculated using modeled flow estimations and dissolved copper concentration data from Outfall 2 (Weston, 2011c).

In August 2011, AMEC conducted a site reconnaissance to re-evaluate the previous monitoring locations. Based on the re-evaluation:

- Outfall 1 – monitoring and sampling activities would likely require encroachment onto POSD land and/or California Department of Transportation (Caltrans) right-of-way; therefore, monitoring was not considered feasible.
- Outfall 2 – the monitoring location remained the same (i.e., Upshur Street at Rosecrans Street).
- Outfall 3 – the outfall is located on private property; however, an inlet upstream at the intersection of Anchorage Lane and Canon Street was observed not to be tidally influenced during low tide (i.e., below three to four feet (ft) tide level) (AMEC, 2011a). However, during the 2011-2012 monitoring season, it was determined that this location was frequently tidally influenced and was not considered a reliably feasible monitoring location.

The locations of these outfalls and monitoring sites are shown in Figure 2-2 and summarized in Table 2-1.

Figure 2-2: Outfalls and Monitoring Locations



Table 2-1: Summary of Outfalls and Monitoring Locations

Site ID/Name	Location	Description	Drainage Area (ac.)	Photo
Outfall 1	32°42'57.71"N 117°14'7.80"W	A 24-inch concrete pipe with a concrete head wall discharging to SIYB.	44.7 ^(a)	
Outfall 2	32°43'8.08"N 117°13'53.11"W	A 66-inch concrete pipe discharging to SIYB.	613 ^(a)	
Outfall 2 Flow Monitoring and Sampling Location	32°43'14.89"N 117°13'55.80"W (Intersection of Rosecrans St. and Upshur St.)	An underground vault with three inlet pipes and one 66-inch outlet pipe.	613 ^(a)	
Outfall 3	32°43'9.88"N 117°13'40.64"W	A 24-inch concrete pipe discharging to SIYB.	15.0 ^(a)	Not Available (on private property)
Outfall 3 Sampling Location	32°43'11.69"N 117°13'45.22"W (Intersection of Anchorage Ln. and Canon St.)	A rectangular vault with a 24-inch inlet pipe and outlet pipe.	10.2 ^(b)	

(a) Estimated based on previous Weston reports and available GIS information.

(b) Estimated based on GIS data.

2.3 Monitoring Equipment

This section describes the type of equipment that is proposed to be used to complete the Shelter Island Monitoring Program, as well as the installation and maintenance procedures. Flow and water quality water monitoring are dynamic processes that may require modification based on current site and channel conditions. Thus, the methodologies presented are subject to modification or change in order to meet the objectives of this monitoring program.

2.3.1 Selected Equipment

The water quality sampling equipment selected is designed to measure flow and collect water quality samples of runoff. The selected equipment has been found to be appropriate to meet the project objectives and has been successfully utilized in other regional water quality monitoring studies. The equipment is automated and can be accessed remotely via telemetry if properly equipped³. These features allow reductions in operating effort and increase the reliability and quality of the storm water monitoring data. Table 2-2 summarizes monitoring equipment selected for deployment during the 2014-2015 monitoring season.

Table 2-2. Monitoring Equipment

Equipment	Description
American Sigma 950 AVB Flow Meter	American Sigma 950 AVB flow meters log and calculate flow based on measured parameters. Water stage and velocity are measured with a stainless steel bubbler pressure transducer and low profile velocity sensor installed in the conveyance. A pressure transducer translates the proportional relationship of the hydrostatic pressure on a pressure plate compare to an atmospheric vent to estimate water level. Water velocity is measured using Doppler technology, which rates the velocity of particles in the water. The water must have sufficient suspended solids in order for a velocity reading to be obtained.
Hach SD900 Automated Sampler	The Hach SD900 automated sampling system consists of an intake strainer, Teflon-lined intake tubing, flexible silicon pump tubing, a peristaltic pump, sample bottle(s), a distributor arm, and a controller.
American Sigma Tipping Bucket Rain Gauge	The rain gauge measures 0.01 inches of rain each time the tipping bucket fills and closes a switch. The data logger/controller counts each switch closure to calculate rainfall totals.
12-VDC Rechargeable Gel Cell Power Supply	The Hach SD900 automated samplers and American Sigma 950 AVB flow meters will be powered by a 12-VDC rechargeable gel cell power source.

2.3.2 Installation, Calibration, and Maintenance of Monitoring Equipment

Field teams will mount equipment securely using best professional judgment. Sampler tubing and wiring will be routed through conduits that will be placed between the monitoring locations and the sampling equipment location. Exposed conduit, intakes, and sensors will be securely

³ The use of telemetry is not proposed during the 2013-2014 monitoring season due to manufacturer upgrades currently being conducted to the telemetry system which have been determined to not currently be reliable by AMEC.

fastened using stainless steel brackets, screws, and anchors. Once the study is completed, monitoring equipment will be removed. Maintenance and calibration of monitoring equipment will be performed during installation and prior to monitoring events if necessary. A calibration log will be maintained for calibrations performed in the field. Prior to monitoring events, field teams will verify that the batteries are sufficiently charged.

2.3.3 Site Specific Equipment

Outfall 1

No flow or water quality sampling will be undertaken for Outfall 1. Thus, no equipment will be utilized.

Outfall 2

The monitoring location for Outfall 2 is approximately two blocks upstream of the outfall in an underground vault with an access manhole on Upshur Street. There are three pipes entering (inlet) the vault and one 66 inch pipe exiting (outlet) the vault. Rainfall (during the three monitored wet weather events only) and flow (continuously for the season) will be measured using a Sigma 950 area-velocity bubbler (AVB) flow meter with a low profile velocity sensor and bubbler pressure transducer installed downstream in the outlet pipe. A Sigma SD900 automatic sampler will be used to manually collect water quality grab samples with the intake strainer collocated with the flow sensors in the outlet pipe.

Based on historical observations, AVB flow meter/sensor combinations are less accurate in low-level/low-flow conditions (i.e., when water level is less than one inch), where a primary device such as a weir or flume is typically more accurate. However, due to limitations at the site, long-term installation of a weir or flume is not considered feasible.

In order to collect more accurate flow data in low-flow conditions using the flow meter/sensor combination a flow calibration monitoring was conducted during September and October of 2011. During the calibration period, two separate sets of flow monitoring equipment were installed to measure dry weather flow in the effluent pipe: one was a Sigma 950 AVB flow meter with an AVB sensor; the other was a Sigma 950 AVB flow meter with the bubbler line in combination with a 90° V-notch weir installed in the pipe upstream from the AVB sensor. The two flow meters were deployed simultaneously to record water level and flow during the calibration period. The recorded flow data from the flow meter and weir combination was used to develop a head-versus-flow (HVF) table, which will be applied to low-flow data (when the level is ≤ 1.2 inches) measured by the AVB flow meter/sensor combination. Table 2-3 presents the developed HVF table.

Table 2-3. Head versus Flow Table for Outfall 2

Level (inches)	Estimated Flow (cfs)
0.73 ^(a)	0.030
0.80	0.036
0.90	0.047
1.00	0.083
1.10	0.103
1.20 ^(b)	0.122

(a): Level less than 0.73 inches were not recorded during the calibration period.

(b): Flow for levels greater than 1.2 inches are calculated via area and velocity.

cfs = cubic feet per second.

Outfall 3

The monitoring location for Outfall 3 is an inlet at the intersection of Anchorage Lane and Canon Street. It is approximately 400 feet upstream from Outfall 3. The inlet is approximately three feet deep with no upstream inlet pipes and a single 24 inch downstream outlet pipe. Due to the tidally influenced conditions (especially during storm surge conditions) encountered during the 2011-2012 monitoring season no equipment will be installed within the downstream pipe during the 2014-2015 monitoring season. Water quality samples will be collected directly from the road surface immediately prior to storm water runoff entering the catch basin.

3.0 MONITORING AND MODELING METHODOLOGY

3.1 Monitoring Preparation

3.1.1 Training

Field personnel will be trained in the use of the monitoring equipment and clean sampling techniques (Appendix D) along with appropriate health and safety protocols (Appendix B).

Each field team member will review the Health and Safety Plan and consult with the Sampling Manager if they have any questions before mobilization. The Sampling Manager will train field personnel in sampling protocols and procedures in accordance with this Monitoring Plan. Field training also will be provided before the beginning of the wet season to make field personnel aware of the project-specific goals and objectives.

3.1.2 Personnel

Water quality monitoring tasks require a variety of skills and positions. The required personnel include:

- Project Manager.
- Sampling Manager.
- Field Technicians.
- **Project Manager** – During monitoring events, the Project Manager will monitor the status of the monitoring stations via communication with field crews. The Project Manager must be able to obtain and interpret the most recent weather forecasts to provide guidance to field technicians on when samples should be collected. It is also the responsibility of the Project Manager to notify personnel of shift start- and end-time changes.

The Project Manager must have excellent decision-making and dispatch skills as well as a thorough understanding of the project requirements. If an assistant fills this position, the consultant's Project Manager should be available to answer questions.

- **Sampling Manager** – The Sampling Manager is a technically-skilled, experienced field supervisor and is the most experienced member of the field team. This position requires a thorough understanding of project requirements, sampling procedures, and equipment operations. The Sampling Manager will communicate frequently with the Project Manager to determine task priorities. The Sampling Manager will also monitor the ability of field teams to complete their shifts safely and effectively, and will notify the Project Manager of the need for relief teams. The Sampling Manager must be able to troubleshoot the common problems that could be experienced by any of the field teams, and will be responsible for directing the procedures at each site visit and for making sure that data are recorded properly. The Sampling Manager will also provide on-site weather observations for the Project Manager.

- **Field Technicians** – The Sampling Manager will usually have one to three field technicians assisting. This will be dependent on the number of sites being monitored for a given storm event. Field technicians are field personnel trained in water quality sample collection and Health and Safety issues. Field technicians may also be used as couriers.

3.1.3 Monitoring Event Preparation Activities

Monitoring for flow and water quality of runoff requires considerable planning prior to an actual monitoring event occurring. Obtaining representative samples and complete flow data is only possible using well-trained and alert field teams. The uncertainty of weather forecasts coupled with abrupt changes in the weather can greatly alter the expected workload. It is critical to plan and prepare for numerous aspects of the field effort well in advance of a storm event. Each pre- and post-event mobilization team should be made up of two field individuals. A Staffing Plan, which designates personnel and equipment required for each facet of monitoring, will be completed for each potential monitoring event.

The Staffing Plan should include the following:

- Personnel assigned for monitoring.
- Shift (e.g., start-up and relief).
- Equipment mobilization.
- Communication channels.

Field teams will not be mobilized during or near certain holidays if either the mobilization or the laboratory analysis is projected to continue through that holiday. This includes the following holidays and dates:

- Thanksgiving: November 27 and 28, 2014.
- Christmas: December 24 and 25, 2014.
- New Year's: December 31, 2014, and January 1, 2015.

3.1.4 Station Preparation

Prior to a monitoring event, stations must be made ready for monitoring. These preparations include verifying that the automated samplers and flow monitoring equipment are calibrated and active, and that the system pumps are functioning as designed. The flow sensors should be cleared of debris. Additional preparation for monitoring events includes performing general equipment inspections to confirm that the sites are operational.

A complete maintenance program will be performed for monitoring equipment before each wet weather event. Maintenance will include checking the performance of the equipment, checking power supplies and replacing batteries as required, inspecting and clearing intake structures, checking the status of instrumentation desiccant, and performing any necessary equipment repairs to keep the monitoring equipment operational.

Field teams must verify that the automated sampler has been reset and that it has been programmed to allow collection of samples manually.

The general functionality of the surrounding site will be inspected. It should be verified that no debris is located in the water sampling areas, and the areas should be inspected for trash to prevent clogging of equipment.

The equipment will be physically inspected to make certain that there are no obvious problems, such as damaged cables or a kinked hose. Intake strainers and flow sensors are to be visually inspected when access allows and cleared of debris if necessary.

3.1.5 Equipment Mobilization

Equipment needed for water quality sampling includes: sampling equipment and containers, safety equipment, personal rain gear, storm kits, mobile phones, and vehicles equipped with safety equipment (See Table 6-1). The necessary equipment should be loaded into the appropriate vehicles early in the preparation sequence. During the monitoring season, field crews will utilize the safety equipment, personal rain gear, and other site maintenance equipment listed below.

**Table 3-1.
 Storm Kit Equipment and Mobilization List**

Storm Kit Equipment List	Mobilization List
Flashlights (2) Maps High-quality alkaline D-cell batteries Spare sample labels Pencils and indelible markers Desiccant (packages and jar) Diagonal clipper Electrical tape Cable ties (assorted sizes) Utility knife Ziploc bags (assorted sizes) Nitrile gloves Keys Sampling pole for grab samples Manhole lifter	Field notebook (including JHA and Tailgate Safety Meeting Forms) Paper towels Spare chains of custody Sample control paperwork Extra-fine indelible markers Sample bottles Reagent-grade, analyte-free deionized water (3-gallon jug) from the laboratory Cellular phone Personal rain gear Digital or disposable camera Necessary safety gear (see Appendix B - <i>Health and Safety Plan</i>)

3.1.6 Communication Channels

Communication channels must be established for personnel to contact each other before and during the event. Cellular telephone communication links to field teams are essential for efficient water quality monitoring because the Project Manager and the Sampling Manager will need to track the location and workload of each field team and direct them to priority tasks. The project field notebook will include phone lists with home, work, and cellular numbers of the AMEC field team, and work numbers for primary laboratory contacts and City personnel to aid in communication.

3.1.7 Documentation

During each monitored event, records of the event should be recorded accurately on a field data sheet. A blank project specific field data sheet is provided in Appendix C.

The following general information should be entered during each monitored storm event:

- Alphanumeric Site ID
- Date
- Time
- Monitoring Program
- Field Team
- Field Measurements
- Weather Conditions
- Runoff Characteristics
- Equipment Condition
- Grab Sample Collection Times
- Miscellaneous Comments

3.1.8 Iced Coolers

Once a sample is collected it should be sealed and placed directly into a cooler with wet ice sufficient to maintain a sample temperature of four degrees Celsius or less.

3.1.9 Post Storm Activities

After each successful water quality monitoring event, flow and rainfall data will be downloaded from the flow meter. Water quality samples will be transported on ice under chain-of-custody (COC) to Weck in the City of Industry, California for analysis.

3.2 Wet Weather Monitoring

Weather will be tracked during the 2014-2015 wet weather season from October 1, 2014, to April 30, 2015. The weather forecast, forecast discussion, and quantitative precipitation forecast produced by the National Weather Service (NWS) and publicly available at: <http://www.wrh.noaa.gov/sqx/> will be used to determine if a storm event should be mobilized for. Antecedent rainfall conditions will be determined by review of NWS publicly available rain gauge data.

The sampling criteria are:

- Rainfall of a least one-tenth (0.1) of an inch in the drainage area within a 24 hour period.
- An antecedent dry period of at least 72 hours prior to the sampled event.
- A storm event within plus or minus 50% of the average or median storm volume and duration for the region.

Communication with the City's project manager will be made within 48 hours of the intent to monitor a storm via either phone or email. Storm event monitoring will be conducted from the onset of rainfall until stream flow returns to within approximately 10% of base flow or a maximum of 24 hours from the first sample collection time.

3.2.1 Monitoring Locations

Wet weather monitoring will be conducted at Outfall 2 and Outfall 3 monitoring locations for three storm events during the 2014-2015 monitoring season. Outfall 1 will not be monitored due to the jurisdictional boundaries described previously.

3.2.2 Determination of Pollutograph Sample Collection

Pollutograph sampling requires interpretation of rainfall forecasts prior to a storm event to determine when samples should be collected. Ideally, at least eight samples will be collected from Outfall 2 and Outfall 3 during storm event monitoring. Further interpretation by the Project Manager of satellite, radar, and rain gauge data during storm events is generally required to guide field teams on when samples should be collected. Peak flows are typically targeted for sampling. This is a dynamic process that will occur as the storm event is unfolding.

3.2.3 Water Quality Sampling

Due to the Outfall 2 sampling point being located in a confined space, a Sigma SD900 automated sampler will be used to manually collect water quality grab samples during monitored storm events. Samples should be collected to target peak flows and also to provide a representative sample of water quality for a range of flow conditions. A field crew will visit the site during the course of monitored storm events to oversee the sampling equipment.

As previously discussed, the Outfall 3 monitoring location is tidally influenced during high tides; therefore, pollutograph sampling will be conducted by manually collecting samples directly from the road surface immediately prior to storm water runoff entering the catch basin. Samples will be collected based on rainfall intensity, flow data from Outfall 2, and observed road surface runoff volume.

3.3 Dry Weather Monitoring

Three dry weather sampling events will be conducted at the Outfall 2 monitoring location during the 2014-2015 monitoring season.

- Pollutograph sampling will not be conducted during dry weather monitoring event. Historical flow data has shown little variation in dry weather flows and concentrations over a 24-hour period. Thus, automated time-weighted composite sampling will be used to collect dry weather samples over a 24-hour period during each dry weather monitoring event.
- The composite sample at Outfall 2 will be collected using an automated sampler, which will be connected to the sampler intake tubing pre-installed in the 66 inch pipe.
- A composite sample aliquot will be collected once every two hours during a dry weather monitoring event.

Dry weather sampling will not be conducted for Outfall 1 or Outfall 3 due to historic and current lack of observed dry weather flows, as well as the previously described jurisdictional boundaries at Outfall 1.

3.4 Long Term Flow Monitoring

Continuous flow monitoring at 15-minute intervals will be conducted from October 1, 2014 to April 30, 2015 at the Outfall 2 monitoring location. A Sigma 950 AVB flow meter, bubbler, and low profile velocity sensor will be used to determine and record velocity and water level, which will be subsequently used to calculate flow.

Prior to each monitored storm event at the Outfall 2 monitoring location, the flow meter will be programmed to record water level, velocity, flow, and rainfall data at one minute intervals. Following completion of storm monitoring events, the flow meter will be programmed to collect data at 15-minute intervals.

Flow monitoring will not be conducted at Outfall 1 or Outfall 3 due to jurisdictional boundaries and tidal influence, respectively.

3.5 Flow Modeling

HEC-HMS modeling will be used to estimate wet weather runoff for Outfall 1 and Outfall 3 since monitoring of flows for these outfalls is considered infeasible.

A HEC-HMS model was developed for each of the three outfalls by Weston in 2010. The models were modified by AMEC in 2012 based on the following:

- AMEC's review of historical data and reports.
- Updated geographic information system (GIS) information.
- Model calibration results using the recorded flow data during the three monitored storm events for Outfall 2 and Outfall 3⁴.

The modified model parameters were area and percent imperviousness for each respective sub-drainage according to available information. Figures 3-1 through 3-3 show the schematics of the modified model setups that will likely be used for the 2014-2015 monitoring season. The calibrated models will be used to estimate flows for the following scenarios from October 1, 2014 to April 30, 2015:

- Storm events for Outfall 1.
- Storm events for Outfall 3.
- Data gaps due to non-monitored periods or equipment malfunctions for Outfall 2.

⁴ Flow data obtained at Outfall 3 during the 2011-2012 monitoring season during non tidally influenced periods.

Figure 3-1. HEC-HMS Model Schematic for Outfall 1 Drainage

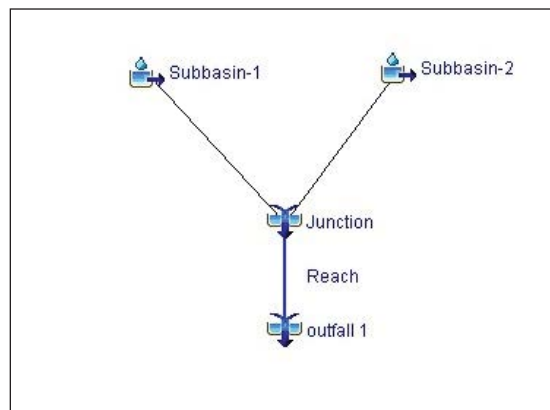


Figure 3-2. HEC-HMS Model Schematic for Outfall 2 Drainage

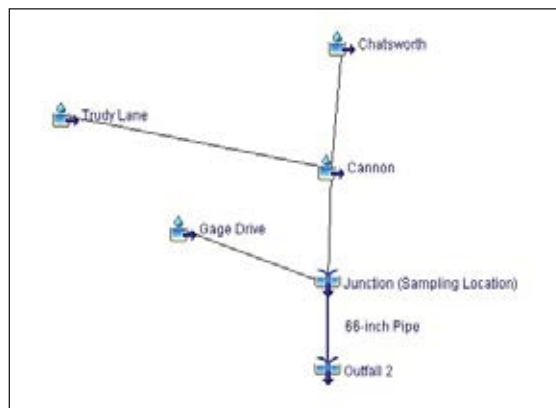
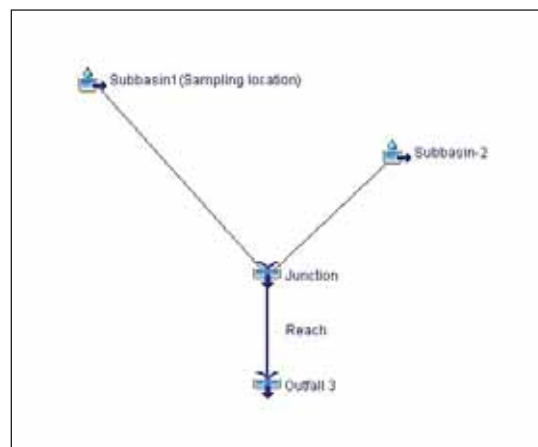


Figure 3-3. HEC-HMS Model Schematic for Outfall 3 Drainage



4.0 SAMPLE ANALYSIS

Water quality samples collected at the Shelter Island monitoring sites will be analyzed for total and dissolved copper and total hardness. Additionally, *in-situ* field measurements will be collected for pH, conductivity, and temperature.

4.1 Holding Times, Sample Times, and Preservation Requirements

Sample containers and preservation methods have been confirmed with the laboratories and are presented in Table 4-1.

Table 4-1.
Holding Times, Sample Volumes, Containers, and Preservations Recommendations

Analyte	Container	Sample Volume	Preservation	Holding Time
General Chemistry				
Total Hardness	1-L poly bottle	1 L	<4°C	6 months
Total and Dissolved Metals				
Copper	1-L poly bottle	1 L	<4°C; store in the dark; Acidify to pH<2 with pre-tested HNO ₃ ASAP	48 hours to filter and preserve/ 6 months to analyze

Notes:

^a Additional sample volume may be required for QC samples.

COCs will be pre-printed along with the bottle labels. The COCs will contain at a minimum the same data as the sample labels. The COCs will be completed in the field with dates, times, and sample team names, and will be cross-checked with the bottle labels. For composite samples, the start of the holding time will be considered to be the time that the last sample aliquot was collected.

Transport of the samples will be coordinated with the laboratories by the Sampling Manager. The COCs will be reviewed by personnel at the receiving laboratory to verify that stated samples are accounted for, preservation requirements have been met, analysis requirements are clearly detailed, and the holding time remaining.

Analytical constituents, methods, method detection limits (MDLs), and target reporting limits (RLs) are provided in Table 4-2. If samples are non-detect for total copper and dissolved copper by United States Environmental Protection Agency (USEPA) 200.8, then the more sensitive method USEPA 1640⁵ will be used. *In-situ* field measurements are presented in Table 4-3.

⁵ USEPA 1640 typically requires use of clean hands sampling protocol which is not proposed as the sample collection technique for this project. This sampling protocol requires the use of specially prepared double bagged bottles and two people to perform the sampling. Auto samplers, which are utilized for this project, are typically not considered viable for the clean hands sampling technique. Thus, if results are ND using USEPA 200.8, results obtained by analyzing with USEPA 1640 will be qualified.

Table 4-2: Analytical Constituents and Methods for Dry Weather Water Sampling

Analyte	Method	Minimum Detection Limit	Reporting Limit	Units
Total hardness	USEPA 200.7	0.016	0.10	mg/L
Total and dissolved copper (Cu)	USEPA 200.8	0.022	0.50	µg/L
Total and dissolved copper (Cu)	USEPA 1640	0.0038	0.010	µg/L

Table 4-3. Field Measurements

Constituent	Method	Range	Units
Conductivity	Field Meter	0 to 200 miliSiemens per centimeter (mS/cm)	microSiemens per centimeter (µS/cm)
pH	Field Meter	0 to 14	pH units
Temperature	Field Meter	-5 to +75 °C	Degrees Celsius (°C)

4.2 Sample Labelling

Water quality sample bottles will be pre-labeled, to the extent possible, before each monitoring event. Pre-labelling bottles simplifies field activities and leaves only date, time, sample ID, and sampling personnel names to be filled out in the field. Each sample collected will be labelled with the following information:

- Project Name
- Monitoring Program
- Event Number
- Date and Time
- Site ID Number
- Bottle ___ of ___ (for multi-bottle samples)
- Collected by
- Analysis

Field samples will be labelled as described below. These samples will be labeled, recorded on the COC form, and then transported to the analytical laboratory.

Each water sample collected will receive a unique alphanumeric code (Sample ID Number) for tracking. This code will be standardized for water quality samples and will contain information as it relates to the site, event, and type of sample. The required sample identification numbers, applicable to water quality samples, are listed below.

An example Sample ID is shown in Table 4-4:

- Monitoring Year
 - 2014 = 2014-2015 Monitoring Season
- Event Number
 - W1 = Wet Weather Event 1
 - W2 = Wet Weather Event 2
 - W3 = Wet Weather Event 3
 - D1 = Dry Weather Event 1
 - D2 = Dry Weather Event 2
 - D3 = Dry Weather Event 3
- Site ID
 - OF001
 - OF002
 - OF003
- Sample Code
 - C = Composite sample
 - G = Grab sample (pollutograph)
- Sample Type
 - 01 = Primary sample
 - D = Duplicate Sample
 - FB = Field Blank

Table 4-4. Example Sample Identification Numbers

Sample ID	Description			
	Sample Type	Site ID	Event	Sample Type
2014-W1-OF002-G-01	Grab Sample	Outfall 2	2014-2015 Wet Weather Event 1	Primary Sample

4.3 Laboratory Data Package Deliverables

The laboratory will aim to provide a three-week turnaround on the deliverable package per event. The deliverable package will include a hard copy and electronic data files. The hard copy will include standard narratives identifying analytical inconsistencies, Quality Assurance / Quality Control (QA/QC) exceedances, and corrective actions. The electronic data files will be submitted in a Surface Water Ambient Monitoring Program (SWAMP) compatible format (SWRCB, 2008) and will contain the same information found in the hard copy reports submitted by the laboratory. Individual data sets may be submitted to the consultant as either Microsoft Excel workbook files or as Microsoft Access database files.

4.4 Laboratory Selection

Weck Laboratories, Inc., located in the City of Industry, California, will be providing laboratory services for this project.

Weck Laboratories Inc.
14859 East Clark Avenue
City of Industry, California 91745
Office: (626) 336-2139
Fax: (626) 336-2634

5.0 QUALITY CONTROL/DATA QUALITY OBJECTIVES

5.1 Field Quality Assurance/Quality Control

This section presents quality assurance/quality control (QA/QC) activities associated with field sampling. Field QA/QC samples will be used to evaluate potential contamination and sampling errors applicable to automated composite samples and grab samples that may be introduced prior to submittal of the samples to the analytical laboratory.

The field QA/QC samples that will be utilized are field blanks and field duplicates. Sample types, measurement objectives, and frequencies are summarized in Table 5-1.

Table 5-1.
Field Quality Control Samples

Analyte Category	Measurement Quality Objective		Frequency of Analysis ^(a)
	Field Duplicate	Field Blank	
Metals	RPD<30% ^(b)	<RL for target analyte	≥ 5%

Notes:

RL = reporting limit.

RPD = relative percent difference.

(a) No field duplicate or field blank will be collected for dry weather monitoring events as samples will be collected via time-weighted composite sampling.

(b) Relative percent difference (RPD) is not available if native concentration of either sample is less than reporting limit (RL).

5.2 Laboratory Quality Assurance/Quality Control

This section addresses QA/QC activities associated with laboratory analyses. Laboratory QA/QC samples provide information to assess potential laboratory contamination, analytical precision and accuracy. Analytical QA for this program consisted of the following:

- Employing analytical chemists trained in the procedures to be followed.
- Adherence to documented procedures, United States Environmental Protection Agency approved methods, and written Standard Operating Procedures (SOPs).
- Calibration of analytical instruments.
- Use of QC samples, internal standards and surrogates.
- Documentation of sample tracking and analysis.

Internal laboratory QC checks will consist of the use of laboratory replicates, method blanks, matrix spikes/matrix spike duplicates (MS/MSDs), and laboratory control samples (LCSs). The QC check performed on each constituent is presented in Table 5-2. The frequency of the laboratory QA/QC samples is presented in Table 5-3 and the laboratory QC objectives are presented in Table 5-4.

Table 5-2.
Laboratory Quality Control Samples by Constituent

Analyte	Laboratory Replicate	Method Blank	MS/MSD	LCS
General Chemistry				
Total Hardness	—	✓	✓	✓
Total and Dissolved Metals				
Copper, Total	—	✓	✓	✓
Copper, Dissolved	—	✓	✓	✓

Notes:

LCS = laboratory control sample.

MS = matrix spike.

MSD = matrix spike duplicate.

Table 5-3.
Laboratory Quality Control Sample Frequency

QA/QC Sample Type	Minimum Sampling Frequency
	General Chemistry
Method Blank	One per batch or per 20 samples
MS/MSD	One per batch or per 20 samples
LCS	One per batch or per 20 samples
Laboratory Duplicate	One per batch or per 20 samples

Notes:

LCS = laboratory control sample.

MS = matrix spike.

MSD = matrix spike duplicate.

QA/QC = quality assurance/quality control.

Table 5-4.
Laboratory Quality Control Sample Objectives

QC Sample Type	General Chemistry	Metals
Method Blank	<RL for target analyte	<RL for target analyte
Laboratory Duplicate	NA	NA
LCS	70-130% recovery	70-130% recovery
MS/MSD	70-130% recovery; RPD<30% ^(a)	70-130% recovery; RPD<30% ^(a)

Notes:

LCS = laboratory control sample.

MS = matrix spike.

MSD = matrix spike duplicate.

NA = not applicable.

(a) Relative percent difference (RPD) is not available if native concentration of either sample is less than RL

QC = quality control.

RL = reporting limit.

RPD = relative percent difference.

5.3 Data Quality Objectives

Data quality objectives (DQOs) are quantitative and qualitative statements that define project objectives and specify the acceptable ranges of field sampling and laboratory performance. DQOs for this project consisted of the following:

- Accuracy.
- Precision.

- Completeness.

Accuracy describes how close the measurement is to its true value. Accuracy is the measurement of a sample of known concentration and comparing the known value against the measured value. The accuracy of chemical measurements will be checked by performing tests on a standard prior to and/or during sample analysis. A standard is a known concentration of a certain solution. Standards can be purchased from chemical or scientific supply companies. Standards might also be prepared by a professional partner (e.g., a commercial or research laboratory). The concentrations of the standards should be within the mid-range of the equipment. Recovery measurements are determined by spiking a replicate sample in the laboratory with a known concentration of the analyte. Accuracy of the project data will be determined by comparing results from MS/MSDs, LCSs, field blanks, and equipment blanks to the accuracy objectives specified in Table 5-1 for field QC samples and Table 5-4 for laboratory QC samples.

Precision describes how well repeated measurements agree. The evaluation of precision described here applies to repeated measurements and samples collected in the field (field duplicates) or the laboratory (laboratory replicates and MS/MSDs). Precision measurements will be determined by comparing results from field duplicates, laboratory replicates and MSD to the precision objectives specified in Table 5-1 for field control samples and Table 5-4 for laboratory QC samples. Relative Percent Differences (RPDs) will be calculated to determine the precision between duplicate samples. This calculation is presented in Equation 1.

Equation 1.

$$RPD = \frac{abs[x_1 - x_2]}{0.5 * (x_1 + x_2)}$$

Where:

abs is the absolute value.
 x_1 is measurement 1.
 x_2 is measurement 2.

Completeness is the fraction of planned data that must be collected to fulfill the statistical criteria of the project. There are no statistical criteria that require a certain percentage of data. However, the anticipated target is 90%. This accounts for adverse weather conditions, safety concerns, and equipment problems. The project team determined completeness by comparing the number of measurements planned to be collected with the number of measurements actually collected that are deemed valid. An invalid measurement would be one that does not meet the sampling method requirements. Completeness will be measured as a percentage of the number of samples collected that meet the respective DQOs compared to the anticipated number of samples. This calculation is presented in Equation 2.

Equation 2.

$$Completeness = \frac{Actual\ number\ of\ samples\ collected}{Project\ required\ total\ samples\ to\ be\ collected} * 100$$

5.3.1 Accuracy, Precision, and Completeness

Analytical method DQOs for accuracy, precision and completeness are summarized in Table 5-5.

Table 5-5.
Laboratory Quality Control Data Quality Objectives

Constituent Category	Accuracy	Precision	Completeness
General Chemistry	70-130%	RPD<30% ^(a)	90%
Metals	70-130% recovery	RPD<30% ^(a)	90%

Notes:

RPD = relative percent difference.

(a) Relative percent difference (RPD) is not available if native concentration of either sample is less than the reporting limit (RL).

5.3.2 Composite Sample Representativeness

Time-weighted composite sampling will be utilized to collect dry weather samples. Historical monitoring data has shown little variation in dry weather flows and concentrations over a 24-hour period. During each of the three dry weather monitoring events at the Outfall 2 monitoring site conducted during the 2014-2015 monitoring season, composite sample aliquots will be collected once every two hours. This frequency will be utilized in an effort to adequately represent dissolved copper concentrations during the 24-hour period.

5.3.3 Instrument/Equipment Calibration and Frequency

Laboratory equipment will be calibrated based on manufacturer recommendations and in accordance with the method and laboratory SOP. The laboratory SOP is maintained by the respective Laboratory Directors and QA officers, and is available upon request.

The Sigma 950 AVB flow meters will be calibrated using the procedures described in the Sigma 950 operations and maintenance (O&M) manual (Hach Catalogue No. 3314). For flow meter calibration, the recorded water level will be checked by operation of the flow meter while the bubbler will be submersed in water of a known level. Level adjustments can be made directly on the flow meter. Results that deviate significantly from the known level and do not maintain an adjusted offset will be documented and the equipment will be replaced or repaired. Velocity cannot be calibrated; therefore, if a low profile velocity sensor reports erroneous velocity measurements it will be replaced.

The Sigma SD900 sampler will be calibrated using the procedures described in the Sigma SD900 O&M manual (Hach Catalogue No. DOC026.53.00742). For automated sampler calibration, the aliquot volume will be calibrated using a graduated flask or beaker.

Rain gauges are not adjustable and cannot be calibrated. If a rain gauge fails to record simulated rainfall, the instrument will be repaired or replaced.

Calibration of flow meters and automated samplers will be conducted prior to installation, and per the calibration frequencies discussed in Table 5-6.

**Table 5-6.
Calibration of Field Sampling Equipment and Monitoring Instruments**

Equipment	Calibration Description	Responsible Person	Frequency	SOP Reference
Sigma 950 AVB flow meter (level only)	Water level check against known levels	AMEC technical staff	Semi-annually	Sigma 950 O&M Manual 3314
Sigma SD900 automated sampler	Aliquot calibration	AMEC technical staff	Semi-annually	Sigma SD900 Sampler O&M Manual DOC026.53.00742
American Sigma rain gauge	NA	AMEC technical staff	Semi-annually	NA

Notes:

AVB = area-velocity bubbler.

NA = Not Applicable.

O&M = operations and maintenance.

SOP = standard operating procedure.

5.3.4 Inspection/Acceptance of Supplies and Consumables

Sample bottles (provided by Weck) and collection equipment will be inspected prior to their use. Procured supplies will be examined for damage prior to use per Table 5-7.

Field supplies will be stored at AMEC offices; laboratory supplies will be stored at Weck. Inspection and testing requirements for laboratory supplies are covered in the laboratory's QA/QC procedures.

**Table 5-7.
Inspection/Acceptance Testing Requirements for Consumables and Supplies**

Project-Related Supplies/ Consumables	Inspection/ Testing Specifications/ Source	Acceptance Criteria	Frequency	Responsible Party
Pre-cleaned sample bottles	Closed bottle	Lids screwed on bottles	100%	AMEC
Composite sample bottles	Laboratory cleaned	Pass blanking analysis	Clean bottles each monitoring event	Weck/AMEC
Silicone tubing	Laboratory cleaned	Pass blanking analysis	New tubing each season	Weck/AMEC
Teflon tubing	Laboratory cleaned	Pass blanking analysis	New tubing each season	Weck/AMEC
Gloves	New box (Grainger)	New box	As needed	AMEC

5.3.5 Corrective Action

Corrective action will be taken when an analysis is deemed suspect. Reasons a sample may be considered suspect consist of exceedances of the RPD ranges, spike recoveries, and blanks. The corrective action may vary from analysis to analysis, but typically will involve the following:

- Check of procedures.
- Review of documents and calculations to identify possible errors.
- Error correction.
- Re-analysis of the sample extract, if available, to see if results can be improved.
- Reprocessing and re-analysis of additional sample material, if it is available.

Malfunctions that occur during data collection and laboratory analyses will be the responsibility of the field crew or laboratory conducting the work, respectively. In the case of field instruments, problems will be addressed through instrument cleaning, repair, or replacement of parts or the instrument, as warranted. Field crews should carry basic spare parts and consumables with them, and have access to spare parts stored at AMEC. The laboratories have procedures in place to follow when failures occur, and have identified individuals responsible for corrective action and developed appropriate documentation as needed.

6.0 DATA MANAGEMENT AND DATA REPORTING PROCEDURES

6.1 Data Management

The responsibility for hydrologic data management and laboratory data management will be led by the Project Manager. The laboratory will be requested to provide data in both hard copy and electronic formats.

The Reporting and Laboratory Coordinator will be responsible for tracking the analytical process to make sure that laboratories are meeting the required turnaround times and are providing a complete deliverable package. The Reporting and Laboratory Coordinator will receive the original hard copy from the laboratory, verify completeness, and log the date of receipt. The hard copy originals then will be transferred to the Project Manager and filed with other original project documentation in order to maintain complete project records.

The electronic submittals will conform to reporting protocols that are compatible with the Surface Water Ambient Monitoring Program (SWRCB, 2009). A relational database will be developed by the Database Coordinator and used for data management and analysis. Laboratory data will be maintained and managed with Microsoft Excel and/or Microsoft Access by the Database Coordinator. Data from the monitoring site flow meters/data loggers will also be stored in the same database system and linked to the laboratory database. The data logger files will include rainfall and discharge (velocity, stage, and instantaneous flow) data.

6.2 Monitoring Report

The data collected under the Shelter Island Monitoring Program will be compiled and analyzed, with the findings presented in a draft Monitoring Report. The draft report will be completed once flows have been monitored through April 30, 2015 at Outfall 2 to provide annual estimated loading estimates within the draft monitoring report for review and to provide comments.

The report will summarize the sample collection methods and events, present the findings of the analytical results, and provide estimated loading information from the three outfalls. Any deviations from protocols listed in the Monitoring Plan and the implications of those deviations on the interpretation of the data will be included in the report. Raw data will be provided as an appendix on CDs.

Comments on the 2014-2015 Draft Monitoring Report will be compiled and tabulated in a response to comments letter for inclusion in the final report. The report will be finalized per the recommendations during the 2015-2016 monitoring season.

7.0 REFERENCES

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ATTACHMENT E. SHELTER ISLAND SHORELINE PARK BACTERIOLOGICAL MONITORING

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Shelter Island Shoreline Park Bacteriological Monitoring

Final Work Plan

The Port of San Diego
3165 Pacific Highway
San Diego, CA 92101

November 2012

Shelter Island Shoreline Park Bacteriological Monitoring

Final Work Plan

The Port of San Diego
3165 Pacific Highway
San Diego, CA 92101

November 6, 2012

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Appendix A – Laboratory Quality Assurance Program Manual

Appendix B – Field Log

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LIST OF ACRONYMS

AB411	Assembly Bill 411
Basin Plan	Water Quality Control Plan for the San Diego Basin (9)
DEH	San Diego County Department of Environmental Health
COC	chain of custody
CSDM	Coastal Storm Drain Monitoring
HA	Hydrologic Area
HSA	Hydrologic Sub-Area
HU	Hydrologic Unit
NWS	National Weather Service
PID	photoionization detector
Port	Port of San Diego
QA Manual	Quality Assurance Program Manual
QA/QC	quality assurance/quality control
QPF	quantitative precipitation forecast
RWQCB	Regional Water Quality Control Board
SISP	Shelter Island Shoreline Park
SWRCB	State Water Resources Control Board
TMDL	total maximum daily load
WQO	water quality objective

1.0 INTRODUCTION

In 1997, the California State Assembly passed a resolution to amend the state's Health and Safety Code Section 115880. The amendment, known as Assembly Bill 411 (AB411), required the testing of the ocean receiving waters adjacent to all public beaches for microbiological contamination, including total coliform, fecal coliform, and *Enterococcus* bacteria. AB411 criteria established a monitoring program whereby receiving waters at public beaches were required to be sampled weekly from April 1 through October 31 within a given calendar year. The law also required the California State Department of Health Services to adopt regulations establishing minimum standards for the sanitation of public beaches.

In order to meet the requirements of the AB411 regulations, the San Diego County Department of Environmental Health (DEH) has monitored water quality at several sites along the coastline of San Diego Bay since 1999. In addition, the San Diego Unified Port District (Port) has monitored ocean receiving waters at several sites in San Diego Bay as part of the Coastal Storm Drain Monitoring (CSDM) Program. One of these sites (Site EH-200) is located in Shelter Island Shoreline Park (SISP) – a mile-long park and promenade that spans the bayside length of Shelter Island in San Diego Bay (Figure 1). Compliance Monitoring Site EH-200 represents a 0.4 mile long section of the Park that has been identified since 2002 as a water quality limited segment due to exceedances of water quality objectives (WQOs) for three indicator bacteria: total coliform, fecal coliform, and *Enterococcus*. The site has been placed on the State Water Resources Control Board (SWRCB) Section 303(d) List of Water Quality Limited Segments in accordance with the Clean Water Act. A summary of the 303(d) listing for SISP is presented in Table 1. Shelter Island Shoreline Park and the EH-200 compliance monitoring site are shown on Figure 1.

Table 1. Summary of 303(d) Listings for Shelter Island Shoreline Park

Waterbody Name	HA ¹	HSA ²	HSA Number	Pollutant
Shelter Island Shoreline Park	Point Loma 908.1	Lindbergh	908.11	Total Coliform
				Fecal Coliform
				<i>Enterococcus</i>

¹ HA = Hydrologic Area

² HSA = Hydrologic Sub-Area

SISP is located in San Diego Bay within San Diego County. Historically, concentrations of indicator bacteria (total coliform, fecal coliform, and *Enterococcus*) have exceeded REC-1 WQOs as defined in the AB411 criteria and the San Diego Regional Water Quality Control Board's (RWQCB) Water Quality Control Plan for the San Diego Basin (9) (Basin Plan) (RWQCB, 1994). In the Basin Plan, the REC-1 Beneficial Use definition includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible (e.g., swimming, wading, water-skiing, surfing, fishing and SCUBA diving).



Figure 1. Map of Shelter Island Shoreline Park and EH-200 Monitoring Site in San Diego Bay

In 2000, DEH reported that beach closure and/or health risk advisory signs were posted at SISP for 24 days. Based on this information, SISP was placed on the 2002 Section 303(d) List by the SWRCB as impaired for the REC-1 beneficial use for all three indicator bacteria. In June, 2008, a Total Maximum Daily Load (TMDL) for indicator bacteria was produced for SISP and approved by the United States Environmental Protection Agency (RWQCB, 2008).

The TMDL was based on analytical data made available from the Port and DEH from samples collected at SISP between March, 1999 and February, 2004. Since that time, the Port and the City of San Diego have made significant improvements to SISP to reduce indicator bacteria levels at Site EH-200. Monitoring data collected at Site EH-200 have shown a significant reduction in bacterial levels since 2004 and the site is currently being considered for removal from the 303(d) List (de-listing) for all three indicator bacteria.

According to the Implementation Plan of the TMDL, submittal of a request for de-listing of Site EH-200 for indicator bacteria is the final step in the Compliance Schedule, which is to be completed in 2012. The stated goal of the Implementation Plan is:

“to ensure that WQOs for indicator bacteria for the shoreline segments of SISP are attained and maintained throughout the waterbody and in all seasons of the year. WQOs are considered “attained” when the waterbody can be removed from the Clean Water Action Section 303(d) List of Water Quality Limited Segments. WQOs are considered “maintained” when, upon subsequent listing cycles, the waterbody has not returned to an impaired condition and been put back on the List.”

The purpose of this Work Plan is to describe the procedures and protocols for verifying that WQOs for indicator bacteria are maintained at SISP (as defined above), through a consistent, on-going monitoring program.

1.1 Project Objectives

This Work Plan has been designed to answer the following Key Questions:

- 1. What are the concentrations of indicator bacteria in the ocean receiving waters at SISP Site EH-200 during dry and wet weather conditions over time?**
- 2. Are the WQOs for indicator bacteria being maintained over time at SISP Site EH-200, in accordance with the TMDL?**

To answer these questions, water quality will be monitored at Site EH-200 during both dry and wet weather conditions as part of a routine monitoring program for SISP.

1.2 Monitoring Site Location

The SISP monitoring location is in the Point Loma Hydrologic Area (HA) (908.1), which is within the Pueblo San Diego Hydrologic Unit (HU). The Pueblo San Diego HU is approximately 70 square miles, covering 44,368 acres, and does not have a major stream system (RWQCB, 1994). Site coordinates and location description are provided in Table 2. Photographs of the EH-200 monitoring site are presented in Figure 2 and a map of the site showing area storm drains and approximate sub-basin boundaries is provided in Figure 3.

Table 2. Shelter Island Shoreline Park Site EH-200 Coordinates and Site Description

Site ID	Coordinates		Site Description
	Latitude	Longitude	
EH-200	32.714668	-117.224461	Site EH-200 is located on Shelter Island in San Diego Bay within Shelter Island Shoreline Park (SISP), a mile-long park and promenade that spans the bayside length of Shelter Island. Compliance Monitoring Site EH-200 is located on the sandy beach adjacent to the boat ramp at SISP and represents a 0.4 mile long section of the Park.

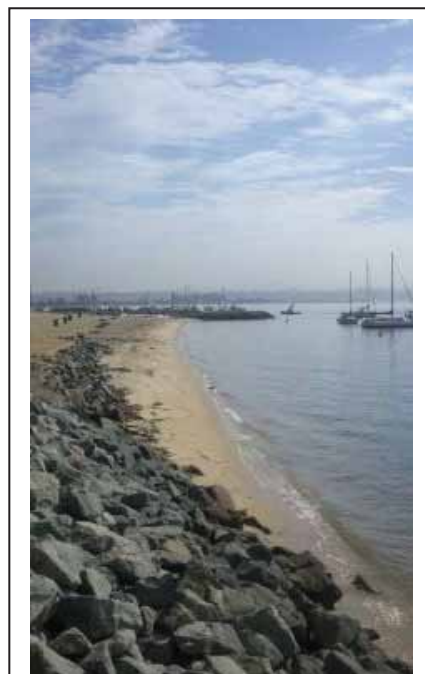
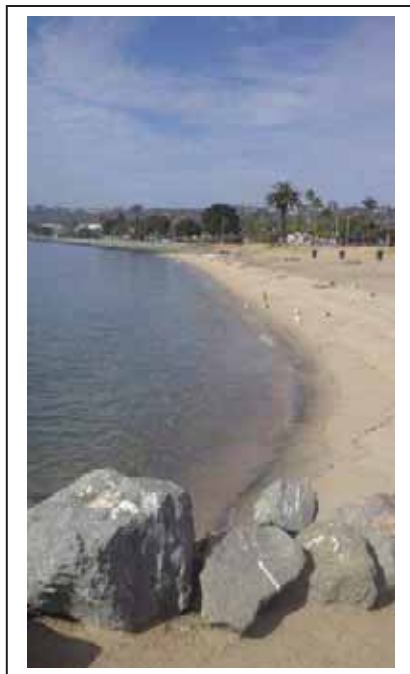


Figure 2. Photographs of Shelter Island Shoreline Park Monitoring Location

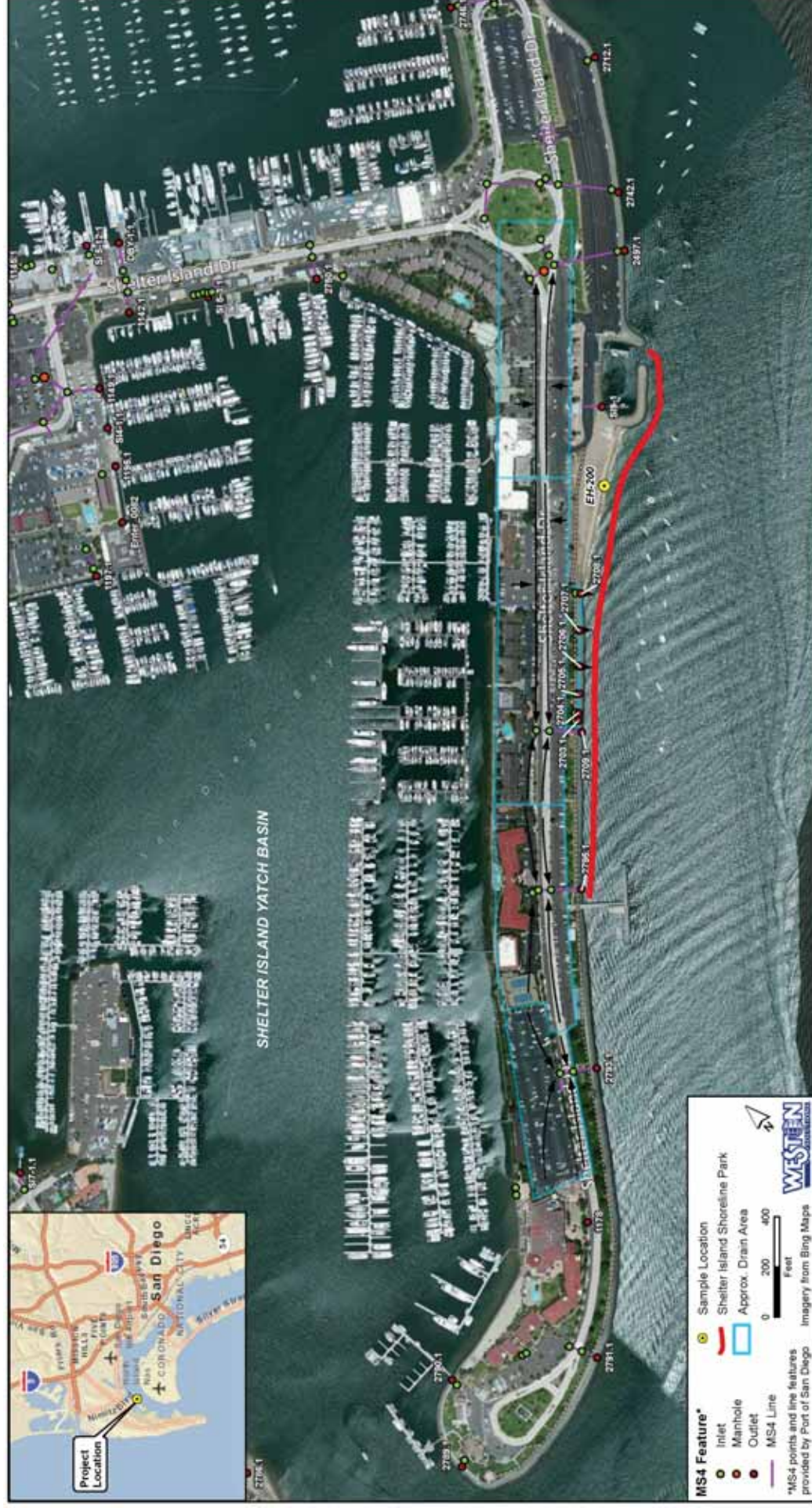


Figure 3. Shelter Island Shoreline Park in San Diego Bay Showing the EH-200 Compliance Monitoring Site and Approximate Sub-drainage Boundaries

2.0 SAMPLING AND ANALYSIS PROCEDURES

2.1 Dry Weather Monitoring

2.1.1 Sample Collection

Field scientists wearing clean, disposable gloves will collect bacterial grab samples in sterile, plastic, 100-mL containers. Sampling containers will be kept in clear Ziploc™ bags until use. The bag will be opened, and the sampling container will be opened with the lid held face-down to prevent any airborne contamination. Samples will be collected directly from the ocean in ankle to knee-deep water at Site EH-200 during an incoming wave. The bottle will be submerged open-end down approximately 6 inches below the water's surface. The bottle will then be turned face-up and allowed to fill. As sampling containers contain trace amounts of sodium thiosulfate (a chlorine neutralizer), the bottle should be filled once and drained to the desired volume. The bottle will then be closed and placed back in the Ziploc™ bag, and the bag will be sealed. Samples will be stored on ice in a covered cooler in the field and during pick-up and delivery to the laboratory. All samples will be labeled and transported according to the Sample Handling and Tracking procedures discussed in Section 3.0. Laboratory analysis will begin as quickly as possible and always within the maximum holding time of six hours.

Samples will be transported on ice under chain of custody (COC) from collection in the field and will be delivered to the appropriate certified analytical laboratory for further processing. The Quality Assurance Program Manual (QA Manual) for chemistry analyses (Appendix A) outlines the practices used by the laboratory to ensure reliable, high-quality results for the bacteriological analyses.

A field data log (Appendix B) will be filled out by the field team over the course of each dry weather sampling event. The field data log includes empirical observations regarding the site and its current conditions (*e.g.*, meteorological conditions, odor, color, turbidity, floating materials, and trash).

2.1.2 Sample Frequency

Dry weather monitoring will be conducted at Site EH-200 during two distinct Dry Weather Monitoring Seasons: Summer Dry Weather and Winter Dry Weather. The Summer Dry Weather monitoring will be conducted between April 1 and October 31 of a given calendar year as part of the AB411 Monitoring Program. During this period, a single sample will be collected by DEH staff one time per week during the daylight hours between 7:00 a.m. and 4:00 p.m.

Winter Dry Weather monitoring may be conducted by the Port between November 1 and March 31 of a given calendar year. During this timeframe, samples may be collected from Site EH-200 approximately once every month, depending on storm frequency during the winter months. If needed, Winter Dry Weather samples will be collected at least 72 hours after a storm event using the sample collection techniques discussed above.

2.2 Wet Weather Monitoring

The Port will conduct three wet weather monitoring events per storm season to verify that WQOs for indicator bacteria are being maintained at SISP. Criteria for wet weather events include a minimum of 72 hours of antecedent dry weather and a minimum of 0.10 inch of rain forecasted within the runoff area. Staff will monitor the National Weather Service (NWS) website (<http://www.wrh.noaa.gov/sgx/>) for forecasted storms. The posted forecasts, discussions, and quantitative precipitation forecast (QPF) are used to determine if a storm meets the criteria for a potential wet weather event. If the QPF predicts measurable rain greater than 0.10 inch at the coast the day prior to a rain event or within 48 hours of a weekend event, storm event staffing will be notified to be on call and ready to perform monitoring. Staff will also use infrared satellite imagery, live streaming NEXRAD radar, and pressure gradient maps to verify the QPF.

2.2.1 Sample Collection

Wet weather samples will be collected for bacterial analyses in the same manner as that described for dry weather (see Section 2.1.1). A single grab will be collected near the peak of the storm in the ocean receiving waters for a total of three storms per storm season. (Note: Due to the small size of the watershed, runoff response time is short at SISP.)

All samples will be labeled and transported according to the Sample Handling and Tracking procedures discussion in Section 3.0. Laboratory analysis will begin as quickly as possible and always within the maximum holding time of six hours. As with Dry Weather Monitoring, a field data log (Appendix B) will be filled out by the field team over the course of each wet weather sampling event. The field data log includes empirical observations regarding the site and its current conditions (*e.g.*, meteorological conditions, odor, color, turbidity, floating materials, and trash).

Samples will be transported on ice under COC from collection in the field and will be delivered to the appropriate certified analytical laboratory for further processing. The QA Manual for chemistry analyses (Appendix A) outlines the practices used by the laboratory to ensure reliable, high-quality results for the bacteriological analyses.

2.2.2 Sample Frequency

The Port will conduct three wet weather monitoring events per storm season, between October 1 and April 30 for a given storm season.

For official rainfall statistics, staff will use NWS information from the San Diego Lindbergh Field. In the event of an equipment malfunction, other rain gauges in close proximity to the SISP site which may be used for official rainfall statistics are presented in Table 3. Data may be obtained from the Weather Underground website: <<http://www.wunderground.com>>.

Table 3. Rain Gauges in Close Proximity to the Shelter Island Shoreline Park Site EH-200

Weather Underground Site ID	Coordinates		Site Description
	Latitude	Longitude	
KNZY	32.70	-117.21	NORTH ISLAND GAUGE (ELEVATION: 23-ft) North of SISP, at the San Diego Naval Supply Center.
MAS414	32.67	-117.17	CORONADO GAUGE (ELEVATION: 13-ft) East of SISP, on North Island at State Highway 75.
KCASANDI129	32.69	-117.17	C AVENUE GAUGE (ELEVATION: 39-ft) East of SISP, at Tidelands Park.

2.2.3 Quality Control

Quality assurance and quality control for sampling processes begin with proper collection of the samples in order to minimize the possibility of contamination. All water samples are first collected in laboratory-certified, contaminant-free bottles. For bacterial sampling, sterile bacteria-free containers, containing sodium thiosulfate (which neutralizes chlorine) will be used.

Field blanks will be collected at a rate of one sample per sampling event. Field blanks are check samples that monitor contamination originating from the collection, transport or storage of environmental samples. A field blank is analyte-free water that is poured into the sample collection device and sub-sampled for analyses to verify that field cleansing procedures are adequate and sample handling and transportation does not introduce any analytes of interest. Field blanks will be collected and analyzed for total coliforms, fecal coliforms, and enterococci.

2.3 Sample Analysis

All dry and wet weather samples will be analyzed for total coliforms, fecal coliforms, and enterococci. Table 4 outlines the methods, minimum detection limits, and reporting limits of each analysis.

Table 4. Analytical Methods for Quantifying Indicator Bacteria Concentrations

Analyte	Method	Minimum Detection Limit	Reporting Limit	Units
Total coliform	SM9221B	<2	<20	MPN/100 mL
Fecal coliform	SM 9221E	<2	<20	MPN/100 mL
<i>Enterococcus</i>	SM 9230B or Enterolert	<2 or <1	<20 or <10	MPN/100 mL

3.0 SAMPLE HANDLING AND TRACKING

3.1 Sample Identification

Each sample will receive a unique alphanumeric code (sample I.D. number) for tracking. This code will be standard for all samples and contain information as to the station, sample interval number, and sequential monitoring event number. Samples will be kept properly chilled and transferred to the analytical laboratory within holding times to achieve the highest quality data possible. To ensure proper tracking and handling of the samples, documentation will accompany the samples from the initial pickup to the final extractions and analysis. This documentation will be in the form of Chain of Custody Forms (Appendix C). These forms, or equivalent, will be used to track and handle samples. All samples collected will be labeled with the following information:

3.2 Chain of Custody Procedures

Samples will be considered in custody if they are (1) in the custodian's possession or view, (2) retained in a secured place (under lock) with restricted access, or (3) placed in a container and secured with an official seal such that the sample can not be reached without breaking the seal. A COC record (Appendix C) and field logs (Appendix B) are the principal documents used to track samples and to document possession. COC procedures will be used for all samples throughout the collection, transport, and analytical process.

COC procedures will be initiated during sample collection. A COC record will accompany each sample or group of samples. Each person who has custody of the samples will sign the form and ensure that samples are not left unattended unless properly secured. Documentation of sample handling and custody includes the following:

- Sample identifier.
- Sample collection date and time.
- Any special notations on sample characteristics or analysis.
- Initials of the person collecting the sample.
- Date the sample was sent to and received by the analytical laboratory.
- Shipping company and waybill information (if used).
- Constituents to be tested, preservatives, and temperature requirements.

Completed COC forms will be placed in a waterproof envelope and kept with the samples. Once delivered to the analytical laboratory, the COC form will be signed by the sample recipient. The condition of the samples (*i.e.*, confirming all samples are accounted for and properly labeled, the temperature of the samples, and integrity of the sample bottles) will be noted and recorded by the receiver. COC records will be included in the final analytical reports prepared by the laboratories and are considered an integral part of the analytical report.

4.0 DATA ANALYSIS AND REPORTING

All field and laboratory data collected will be subjected to quality assurance/quality control (QA/QC) protocols to assure the data's accuracy and validity. Once the data have been verified, wet and dry weather bacterial concentrations will be compared to the appropriate WQO (Table 5) to determine the extent to which the objective for each indicator bacteria is being maintained at SISP.

Table 5. Water Quality Objectives for Indicator Bacteria

	30-Day Limit¹	Single Sample Limit
Total Coliform	1,000 MPN ² / 100 mL	1,000 MPN/ 100 mL if Fecal > 10% of Total, or 10,000 MPN/100 mL ³
Fecal Coliform	200 MPN/ 100 mL	400 MPN/ 100 mL
<i>Enterococcus</i>	35 MPN/ 100 mL	104 MPN/ 100 mL

1 = 30 day limit is based on the geometric mean of at least five weekly samples

2 = MPN is Most Probable Number

3 = Total coliform single sample limit of 10,000 MPN decreases to 1,000 when the fecal coliform value is greater than 10% of total coliform value

The results will be summarized based on dry and wet weather exceedance frequencies and presented to the RWQCB for review. A summary report will be submitted to the RWQCB every two years, in accordance with the Compliance Schedule in the TMDL Implementation Plan (RWQCB, 2008), as a periodic demonstration that wasteload allocations and WQOs are being met at SISP.

5.0 HEALTH AND SAFETY

Wet weather sampling events can pose some potentially dangerous situations that field personnel need to be aware of and take precautions against. A health and safety tailgate meeting is required prior to any on-site activity. During this meeting, site-specific hazards should be taken into account, discussed, and addressed appropriately. There are various health and safety issues of particular interest to this sampling location.

5.1.1 Inclement Weather

Extremes of heat, cold, and humidity as well as rain, snow, and ice can adversely affect monitoring instrumentation response and reliability, respiratory protection performance, and chemical protective clothing materials. Rain and wet weather conditions also increase slipping and tripping hazards, braking distances of vehicles, and the potential for slippage or handling difficulties of field equipment. Rain fills holes and obscures trip and fall hazards. Tools and personnel can slip on wet surfaces. Rain and wet weather conditions may decrease visibility,

increasing potential for driving accidents, and may limit the effectiveness of certain direct-reading instruments (e.g., photoionization detectors (PIDs)).

Winter storms will bring in colder than normal temperatures to the area. Field crews will be working long hours in wet and cold conditions. Field personnel should wear extra layers of clothing under rain gear since to prepare for a variety of temperature changes.

5.1.2 Traffic Hazards and Traffic Control

There is potential for field crews to be driving in the rain and/or at night, so extra precaution should be taken while driving. All traffic rules and regulations and all traffic control signs and devices should be obeyed. Field personnel should allow for extra time when planning travel routes. Vehicle traffic is a major concern in storm water monitoring. Traffic presents hazards in the following two ways: 1) when field personnel are close to roadways, the potential exists to be hit by oncoming traffic and 2) driving to, from, and on the site poses a potential accident hazard.

There is a public parking lot at the SISP site and direct access to the site. Whenever possible, field personnel should park close to the site, in well-lit a designated parking space. Field personnel should abide by the following guidelines while working in traffic:

- Traffic awareness of other drivers and pedestrians.
- Turn on the vehicle's flashing yellow warning light and hazard lights.
- Put out safety cones to mark off the work area, and wear a reflective safety vest.
- Avoid steep slopes and stream banks.
- Always use a flashlight in the dark.
- Always wear bright rain gear during storms to be more visible.

5.1.3 Fatigue

Field staff may work long hours during the course of the monitoring event. If field personnel are too tired to safely continue working, a replacement will be provided.

These are just some basic, common hazards encountered during storm water sampling and are not intended to be a complete list for any and all sites or conditions. A complete Health and Safety Plan may need to be developed specifically for this project and will be reviewed and implemented by all field staff prior to project implementation.

6.0 REFERENCES

RWQCB, 1994. California Regional Water Quality Control Board San Diego Region. Water Quality Control Plan for the San Diego Basin (9). September 8, 1994 (with amendments effective on or before April 4, 2011).

RWQCB, 2008. California Regional Water Quality Control Board San Diego Region. Total Maximum Daily Loads for Indicator Bacteria – Baby Beach in Dana Point Harbor and Shelter island Shoreline park in San Diego Bay. Technical Report, June 11, 2008.

SWRCB, 2004. State of California State Water Resources Control Board, Water Quality Control Policy for Developing California’s Clean Water Act Section 303(d) List. September 2004.

SWRCB. 2010. State of California State Water Resources Control Board. Water Quality Control Plan, Ocean Waters of California (California Ocean Plan). Effective March 10, 2010.

Appendix A

Analytical Laboratory's Quality Assurance Program Manual

Appendix B

Field Log

Appendix C

Chain-of-Custody Form

ATTACHMENT F. SAN DIEGO DEBRIS SPECIAL STUDY WORK PLAN

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**San Diego Bay Debris Special Study
Work Plan**

**Prepared by:
San Diego Bay Debris Study Workgroup**

**Prepared for:
Surface Water Ambient Monitoring Program of the State Water Resources Control Board
and
Southern California Bight 2013 Regional Marine Monitoring Survey
Bight '13 Debris Planning Committee**

October 2014



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ACRONYMS AND ABBREVIATIONS

AMRI	Algalita Marine Research Institute
Bay Debris Study	San Diego Bay Debris Study
Bight Program	Southern California Bight Regional Monitoring Program
C-CAP	Coastal Change Analysis Program
CEDEN	California Environmental Data Exchange Network
CIA	Bight Contaminant Impacts Assessment Group
cm	centimeter
COC	Chain of Custody
GPS	Global Positioning System
m	meter
mm	millimeter
MS4	Municipal Separate Storm Sewer System
NAVFAC	United States Naval Facilities Engineering Command
NHD Plus	National Hydrography Dataset
NOAA	National Oceanic and Atmospheric Administration
RHMP	Regional Harbor Monitoring Program
RTA	rapid trash assessment
RWQCB	Regional Water Quality Control Boards
SCCWRP	Southern California Coastal Water Research Project
SDTP	Standard Data Transfer Protocol
SMC	Stormwater Monitoring Coalition
SOP	Standard Operating Procedure
SWAMP	Surface Water Ambient Monitoring Program
SWHB	San Diego Bay Shallow Water Habitat Bioaccumulation Study
QA/QC	Quality Assurance/Quality Control

1.0 INTRODUCTION

1.1 San Diego Bay Debris Special Study

In Southern California, and particularly the San Diego County coastline, the coastal wetlands and bays are an important intermediary waterbody between the upland watersheds and the downstream marine environment. As a primary linkage between rivers and the marine environment, coastal embayments may be a key sink of land-based debris and the types of land-based debris that are the most influential on conditions in the bay and eventually the marine environment are not well understood. Because of the extended residence time and exposure to the environment, coastal wetlands and bays can have the potential to increase the retention of debris and facilitate the breakdown of materials into smaller and potentially more detrimental pieces of plastic that can have diverse impacts on wildlife including bird and fish communities (Andrady, 2011). At the focus of this study, San Diego Bay, shown in Figure 1-1, is a large coastal embayment that rests between the upland watersheds in the greater San Diego area and the coastal waters off of southern California.

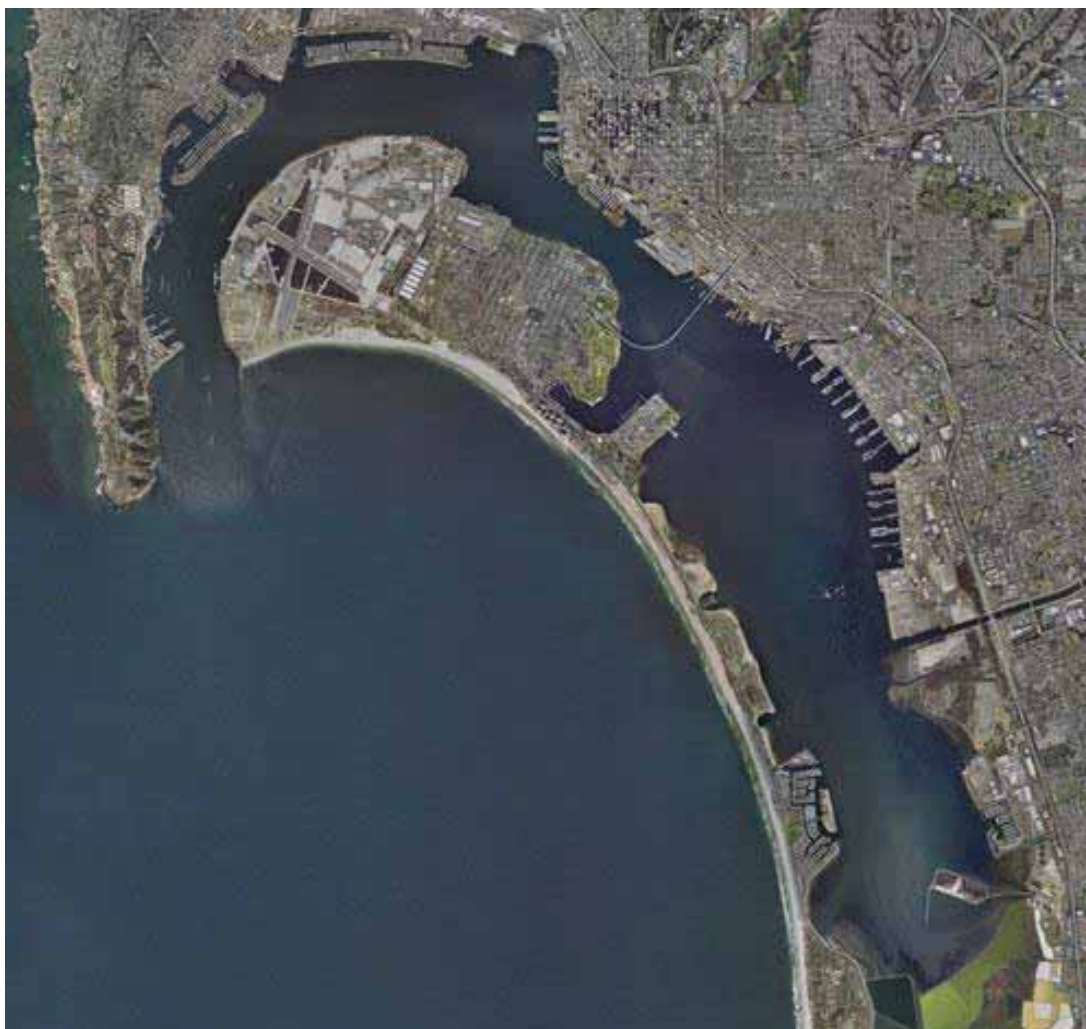


Figure 1-1. San Diego Bay

To better understand the distribution of debris amongst various bay habitats, the San Diego Bay Debris Study (Bay Debris Study) is being developed as a special study to understand the types and quantities of debris in a coastal embayment. Because plastics generally represent the largest proportion of land-based debris, the Bay Debris Study focuses only on plastic based items. The terms debris, plastic debris, and plastics may be used interchangeably in this Work Plan and intended to be synonymous to the Bay Debris Study's focus on plastics.

1.2 Geographic Setting

The San Diego Bay Watershed, shown in Figure 1-2, encompasses a 415 square mile area that extends more than 50 miles to the east - all the way to the Laguna Mountains. The watershed land area lies north of the border with Mexico and south of Mission Bay just to the north of San Diego Bay. The watershed is comprised of three smaller watersheds: Pueblo San Diego, Sweetwater, and Otay. The major water courses feeding San Diego Bay include the Sweetwater River, Otay River, Chollas Creek, Paleta Creek, Paradise Creek, and Switzer Creek.

The San Diego Bay watershed transects all or portions of seven cities including San Diego, National City, Chula Vista, Imperial Beach, Coronado, Lemon Grove, and La Mesa along with unincorporated areas of the County of San Diego, the San Diego County Regional Airport Authority, and the Port of San Diego. Nearly half of the population of San Diego County lives and works in the San Diego Bay Watershed. Most of these people live and work in close proximity to San Diego Bay itself.

San Diego Bay, which is 12 miles (19 km) long and 1 to 3 miles (1.6 to 4.8 km) wide, is the third largest of three large, protected natural bays on California's entire 840 miles (1,350 km) long coastline after San Francisco Bay and Humboldt Bay.

San Diego Bay hosts a wide range of uses including a commercial shipping port, naval base docks and shipyards, a large number of marinas for privately held boats, and numerous docks for the sport and commercial fishing fleets. The southern area of San Diego Bay is held in reserve for the San Diego Bay National Wildlife Refuge and the South Bay Naval Biological Study area. Portions of the south bay are also home to an active salt work.

The bay itself consists of a variety of different ecological habitat types including mudflats, salt marshes, sandy beaches, salt flats, freshwater and river mouth habitats, and open water areas. Portions of the bay are also protected by a series of man-made protective barriers built out of large granitic type of rocks, commonly referred to as rip-rap.

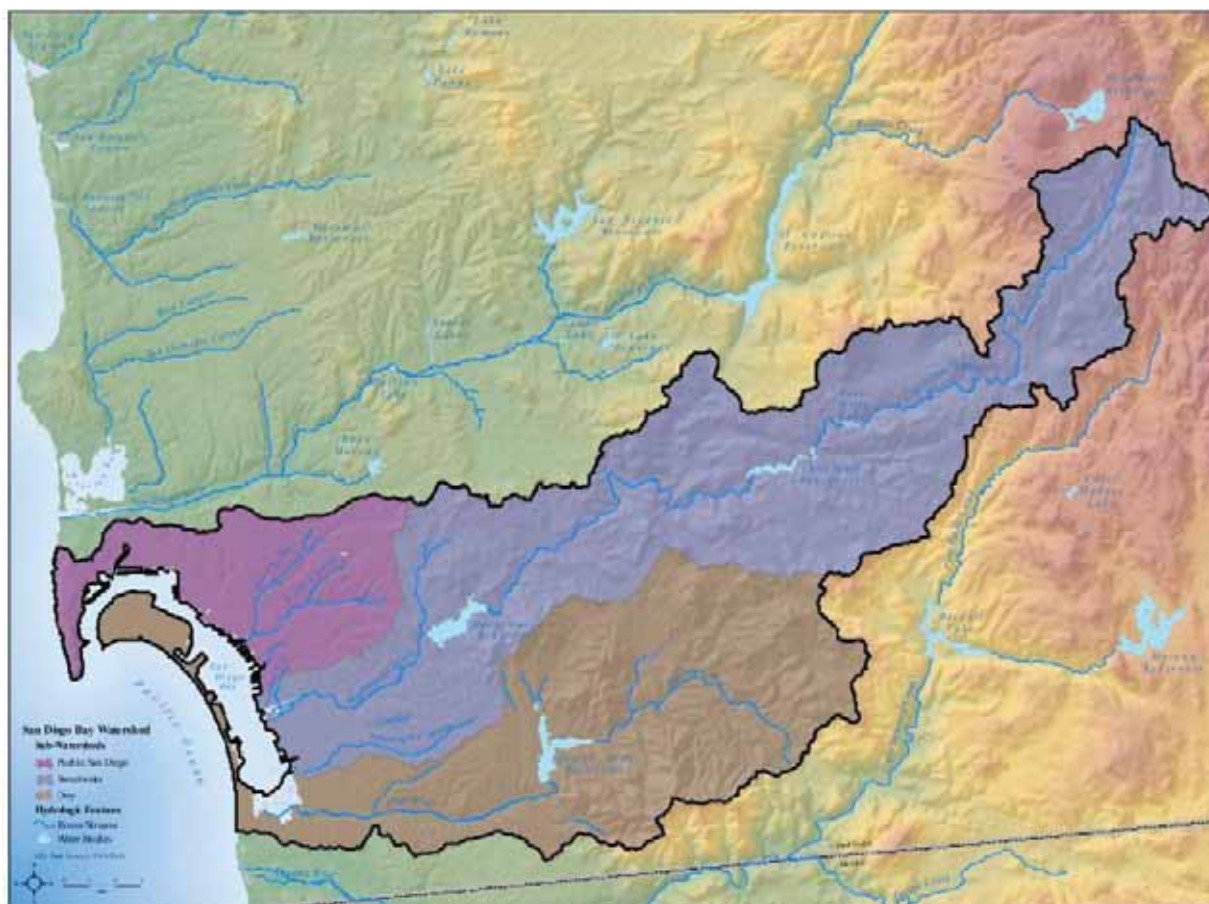


Figure reproduced with permission from the Unified Port District of San Diego.

Figure 1-2. San Diego Bay and the contributing watersheds

1.3 Overall Goals of the San Diego Bay Debris Study

The goal of the Bay Debris Study is to develop a baseline debris assessment of the bay habitats that includes identifying the most abundant type of plastic items, evaluating where the plastic accumulates in greatest quantities, evaluating plastic items that are preferentially transported to the bay during wet weather conditions, and whether the plastics that reach the open waters of the bay affect fish communities. The general approach adopted for the Bay Debris Study follows the question-driven approach of the San Diego Region Framework for Monitoring and Assessment (Busse and Posthumus, 2012).

This study provides one of the first opportunities to generate results that can be used for management decisions to target efforts towards controlling trash, specifically plastic based items. As one of the first comprehensive debris assessments of San Diego Bay and the contributing watershed, shown in Figure 1-2, the Bay Debris Study is intended to help managers understand the types of plastics that may be the most prevalent in the various habitats. Similarly, measuring the types of debris that are present during dry weather and preferentially transported to the bay during wet weather, or plastics found most often ingested by fish provides the opportunity to better target management decisions at the most important types of plastics.

The San Diego Bay Debris Study also provides an example of a coastal embayment debris study that might help managers to deal with debris in coastal estuaries in general.

2.0 BACKGROUND

2.1 Marine Debris

Marine debris has become one of the most recognized pollution problems in the world's oceans and watersheds today (Lippiatt et al. 2013). About 80 percent of debris found in marine environments is generated from land-based sources (Sheavly, 2010) suggesting that the reduction of watershed based debris sources is an important management action for reducing marine debris. Of the debris found in watersheds, studies generally show that about 60 percent of the debris is composed of plastic based items which are the primary and generally most abundant type of material found in marine debris (Thompson et al., 2009). Debris in the environment also represents a substantial financial burden to cities and public agencies responsible for managing debris. It is estimated that the West Coast cities of the United States spend on average \$500 million per year to remove trash from streets and neighborhoods in an effort to prevent it from reaching coastal water bodies (Stickel et al., 2012). The perpetual clean up that is required to prevent debris from entering the environment and the ongoing costs to the public suggests that debris represents an environmental issue of high priority for land and public agency managers.

Debris can cause adverse impacts on aquatic and terrestrial wildlife, can affect human health and reduce the aesthetics of freshwater and coastal environments. Debris that enters the environment has the potential to become ingested by animals such as fish and birds or create entanglement problems for sea life (Boergner et al., 2010; Ryan, 1989; Azzarello et al., 1987). Persistent plastic pieces which form the predominate type of marine debris found in the ocean and type of material ingested by animals, can also function as a transport mechanism for persistent organic pollutants such as flame retardants, chlorinated organic compounds such as DDT, and chemicals created as by-products of petroleum combustion and industrial processes (Rios, 2007; Rios, 2010; Teuten et al., 2009; Engler 2012).

2.2 Bight '13 Debris Study

The Southern California Bight Regional Monitoring Program (Bight Program) is a large scale multi-stakeholder monitoring program consisting of more than 60 organizations focused on assessing emerging or priority environmental concerns across the coastal area of the Southern California Bight. The Bight Program surveys which are conducted once every five years between Point Conception and the US-Mexico Border focus on assessing issues of common concern amongst the stakeholders.

The Bight surveys provide a mechanism to develop standardized methods, quality assurance protocols, and data transfer standards agreeable to all participants. This process ensures that all data collected during the survey can be integrated and provides the foundation for enhanced coordination among southern California's monitoring programs. The surveys have also provided a forum for multi-party agreement about ways to analyze and interpret monitoring data.

A key advantage of the Bight Program is the opportunity to leverage ongoing programs and studies to expand the sampling efforts for the Bight surveys. The San Diego Bay Regional Harbor Monitoring Program (RHMP) and Shallow Water Habitat Bioaccumulation Study (SWHB) are examples of two studies focused on specific water quality issues, but through the cooperative interaction with the Bight Program, integrated a Bight survey approach into their own program and as a result have contributed information towards an understanding a debris issues in San Diego Bay.

“Core” components of Bight surveys include offshore water quality, coastal ecology, focusing on sediment quality, and shoreline microbiology. Previous Bight Program studies (1994, 1998, 2003, and 2008) have evaluated debris in the marine environment, but never highlighted marine debris a primary focus of the Bight Regional Monitoring Program. In 2013, the Bight Program started the first ever comprehensive marine debris survey. The objective for the (Bight '13) Debris Study was to characterize the extent and magnitude of debris in the Southern California Bight and its coastal watersheds. The main monitoring questions for the Bight '13 Debris Study were:

1. What are the quantities and types of debris in marine and estuarine sediments and epibenthos?
2. What is the prevalence of debris in the nearshore demersal and pelagic fish?
3. What are the quantities and types of debris in riverine channels?

The Bight '13 Debris Study focused on evaluating the types and quantities in benthic, epibenthic, and riverine habitats including an analysis of plastic ingestion in near shore demersal and pelagic fish. The coastal wetlands and bays, however, were not studied extensively for the Bight '13 debris study.

The marine environment and the coastal watersheds which were the focus of the Bight '13 debris study represents an important starting point for evaluating the linkages between watershed sources and marine debris. The bay includes several different intertidal habitats that are expected to respond to seasonal changes in debris conditions from storm event flows and these habitats represent a data gap in the Bight '13 Debris Study.

The San Diego Bay Debris Study presented in this Work Plan follows some of the approaches developed in the Bight Debris Study and expands the habitats surveyed for Bight by including a coastal embayment.

3.0 PROJECT MANAGEMENT RESPONSIBILITIES

3.1 Overview of San Diego Bay Debris Study Workgroup

The San Diego Bay Debris Study Workgroup is a multi-agency coalition of stakeholders with an interest in developing a better understanding of debris conditions in San Diego Bay. The members of the workgroup include staff from local and state government agencies, regional and joint power authorities, non-profit organizations, and the University of California. Members of the workgroup are providing support to the study through voluntary contributions of in-kind services, directed funding of various study elements, or sharing of resources from existing programs or projects of similar scope and interest.

3.2 Key Project Personnel

The Bay Debris Study workgroup consists of members from the Surface Water Ambient Monitoring Program (SWAMP) of the California State Water Resources Control Board, San Diego Region Water Quality Control Board, Unified Port District of San Diego, City of Chula Vista, City of Imperial Beach, United States Naval Facilities Engineering Command (NAVFAC), San Diego Coastkeeper, Ocean Discovery Institute, California Sea Grant, Wildcoast, Surfrider Foundation San Diego Chapter, members of the San Diego Bay Port Tenants Association, Southern California Coastal Waters Research Project, and AMEC Environment & Infrastructure.

Additional agencies are contributing to the Bay Debris Study through sharing of resources from current and ongoing projects. The City of San Diego's contribution to the Regional Harbor Monitoring Program and Shallow Water Habitat Bioaccumulation Study are providing important data to the study that will help to provide a better understanding of debris issues in San Diego Bay.

The Work Group also includes third party subject experts for reviewing project documentation, data analyses performed, and the associated reporting. The third party reviewers have key role in assessing the overall conclusions based on the data collected.

A list of the key project personnel included project titles and contributions to the Bay Debris Study are provided in Table 3-1.

Table 3-1. Key Project Personnel

Organization	Name	Bay Debris Study Title	Contribution
SWAMP	Lilian Busse	Lead Agency Program Manager	Principle-In-Charge
Port of San Diego	Philip Gibbons	Agency Project Manager	RHMP, Rip-Rap Habitat Surveys, SD Bay Port Tenants Association Liaison
RWQCB	Chad Loflen	Agency Project Manager	Water Column Trawls, SWHB Liaison
NAVFAC	Christiana Boerger	Agency Project Manager	Project Scientist, Plastic Ingestion Study
City of Chula Vista	Marisa Soriano	Agency Project Manager	Data Management, Sweetwater and Otay River Surveys
City of Imperial Beach	Wbaldo Arellano	Agency Project Manager	Otay River Surveys
SCCWRP	Shelly Moore	Agency Project Manager	Bight '13 Debris Study Lead Scientist
San Diego Coastkeeper	Travis Pritchard	Agency Project Manager	Intertidal Habitat Surveys
San Diego Coastkeeper	Kristin Kuhn	Volunteer Coordinator	Intertidal Habitat Surveys
Ocean Discovery Institute	Lindsey Goodwin	Chollas Creek Outreach Coordinator	Chollas Creek Surveys Program Coordinator
California Sea Grant	Theresa Talley	Chollas Creek Outreach Coordinator	Project Scientist, Wet Weather Tracking Study
WildCoast	John Holder	Volunteer Coordinator	Otay River Surveys
Surfrider Foundation	Haley Haggerstone	Volunteer Coordinator	Field and Lab Team Support
AMEC Environment & Infrastructure	Theodore Von Bitner	Project Manager	Project Coordination
AMEC Environment & Infrastructure	Terra Miller-Cassman	Project Support Staff	Quality Assurance Administrator
AMEC Environment & Infrastructure	Monica Netherly	Project Support Staff	Volunteer Training and Auditor
AMEC Environment & Infrastructure	Michelle Bowman	Project Support Staff	Marinas Property Owner Coordinator
NOAA, Marine Debris Program	Dr. Sherry Lippiatt	Third Party Reviewer	Technical Review
Independent Consultant	Dr. Brock Bernstein	Third Party Reviewer	Project Documentation Review

4.0 SURVEY DESIGN

4.1 Study Goal

The overall goal of this study is to characterize the extent and magnitude of debris in San Diego Bay amongst the various habitats and evaluate the potential ecological impact of plastic on fish communities in the bay. Within this study, three core questions have been developed to answer the study goals:

- 1) *How do the quantities and types of debris in different habitats vary during dry and wet season?*
 - a) *What are the quantities and types of debris found in San Diego Bay habitats?*
 - b) *What are the quantities and types of debris found in watersheds flowing to San Diego Bay?*
 - c) *How do the quantities and types of trash in different San Diego Bay habitats vary by summer and winter dry season?*
 - d) *What are the quantities and types of trash in San Diego Bay following the first storms of the wet weather season?*
- 2) *What types of riverine debris do wet weather flows transport to the bay?*¹
- 3) *What species caught in the bay has ingested plastic pieces?*¹

The first question seeks to evaluate the differences in the abundance and types of debris found in bay bottom sediments (benthic and epibenthic habitats), water column (open water habitats), estuarine (salt marsh habitats), beaches and mudflats (intertidal habitats), and upland areas (riverine habitats). The approach to answering this question leverages efforts conducted through RHMP study of benthic ecology, Bight Debris Study Riverine Habitat Surveys, and the San Diego Bay Shallow Water Habitat Bioaccumulation Study². In addition to the existing collected data, additional sites in bay habitats will be surveyed in dry weather to establish a baseline comparison of the types and quantities across each of the habitat types. The habitats surveyed for the first question also include a focus on key areas expected to accumulate larger amounts of debris including the wrack line throughout the salt marsh and along the rip-rap shoreline protective barrier. A subset of the bay habitats will also be evaluated after the first major storm events of the 2014-2015 storm season in order to evaluate seasonal changes in debris types and quantities.

¹ Data needed to answer question 2 and 3 will be leveraged from existing efforts to extent possible. The data that may be needed is dependent on the availability of funding or in-kind services contributed by project partners and completion of the Bay Debris Study is not contingent upon the completion of Questions 2 and 3.

² The RHMP and Bight '13 programs sampled for analysis of bioaccumulative compounds in sediments, invertebrates, fish, plankton, and bird eggs, which represent a primary on-going contaminant source of concern, and a wide range of trophic levels in the food chain. However, all of the sampling in San Diego Bay was focused on areas deeper than 3 meters in compliance with the Bight '13 protocols and station draw. An assessment of bioaccumulative compounds in the more heavily wildlife-utilized and productive shallow water habitats is an important recognized data gap. The initial concept for studying the trophic transfer of bioaccumulative compounds was developed for the Bight '13 program by a collaborative group comprising the City of San Diego, Port of San Diego, Southern California Coastal Water Research Project (SCCWRP), San Diego State University (SDSU), United States Fish and Wildlife (USFW), and the San Diego Regional Water Quality Control Board (SDRWQCB).

The second question focuses on evaluating the types and quantities of debris in riverine habitats that are transported to the bay during storm events. The differences or similarities in the composition of plastics in upland riverine habitats and those that occur in the bay are not fully understood. The second question focuses on better understanding which types of debris are more likely to be transported to the bay during storm events. Based on results of the riverine habitat debris surveys, a subset of the most prevalent types of plastics found will be tagged in place and tracked to the bay following a storm event by using multiple tracking methodologies. These results are intended to help better understand the types of plastics from land based sources that can be transported to the bay in comparison to the plastics that are less mobile and may be entangled on vegetation or structures in the riverine habitats.

The third question seeks to assess demersal and pelagic fish communities in the bay by quantifying the abundance and types of debris ingested. Demersal and pelagic fish collected from the RHMP and SWHB trawls and pelagic fish collected during bay trawls as part of this study will be analyzed.

4.2 Quantities and Types of Plastic Debris in San Diego Bay

4.2.1 Study Approach

To complete this baseline assessment, the Bay Debris Study has been designed with the intention of integrating existing datasets with new monitoring information from additional habitats to develop a more complete understanding of the types, quantities, and locations of debris within San Diego Bay. The data generated for the Bay Debris Study will be leveraged through coordination of ongoing projects, in-kind services, or project-directed contributions from stakeholders. In order to take full advantage of available resources, data collected for the Bight '13 Debris Study within San Diego Bay and its associated watersheds, including sediment, epibenthos, riverine samples, and fish gut data will be leveraged with this study dataset to the extent feasible.

This Work Plan provides details on the habitats that will be surveyed, the field and laboratory methods used to generate debris data, and the laboratory methods needed for analyzing ingested plastics in fish guts. Supporting documents to the Work Plan include field and laboratory forms, proposed sampling location lists, and Standard Operating Procedures. In addition, the detailed descriptions of the field methods, laboratory methods, and quality assurance plans that accompany the data generated for the RHMP survey of San Diego Bay (Port of San Diego, 2013) and the Bight '13 Debris Study are available on-line at the Southern California Coastal Water Research Project (sccwrp.org) website.

4.2.2 Target Population, Sample Frame Development, and Site Selections

The target population for the Bay Debris Study includes all bay or bay-influenced habitats, including high tide zones as well as upland riverine areas. The sample frame will include three habitats studied in previous RHMP, SMC, and Bight surveys and six new habitats, for a total of nine habitats assessed during this study. Within these nine habitats, the goal is to collect a target sample size of thirty sites from each habitat in order to develop statistically based

estimates of the debris quantities. The targeted habitats for the Bay Debris Study are listed in Table 3-1.

Table 4-1. Targeted Habitats for Bay Debris Study

Category	Targeted Habitat	Data Source
Bay	Benthic	RHMP and SWHB
	Water Column	RHMP and SWHB
Structures-Facilities	Marinas	This Study
Intertidal	Mudflats	This Study
	Sandy Beaches	This Study
	Salt Marsh	This Study
	Salt Marsh, Wrackline	This Study
	Protective Barriers (Rip-Rap)	This Study
Upland	Riverine	SMC and Bight '13

This study component is being leveraged over resources in place through the RHMP 2013 survey, SMC 2013 Regional Monitoring Program, Bight '13 Debris Study, and San Diego Bay Shallow Water Habitat Study to take advantage of the target population, sample frame, and sites selected by the previous studies. Sites within habitats will be randomly selected to provide an unbiased among sampled sites and allow for inference into bay-wide conditions. For habitats not previously sampled, a systematic component will be used in the site selection to target habitats of interest following approaches adopted for the Bight Regional Monitoring Program. Briefly, a grid system will be placed over a map of the targeted habitat and a subsample of the grid will be randomly chosen from this population, and a debris survey will be conducted at the selected site within the grid cell. The grid structure allows for a systematic approach to sample targeted habitats while the random sites selection of sites within the grid ensures an unbiased estimate of ecological condition.

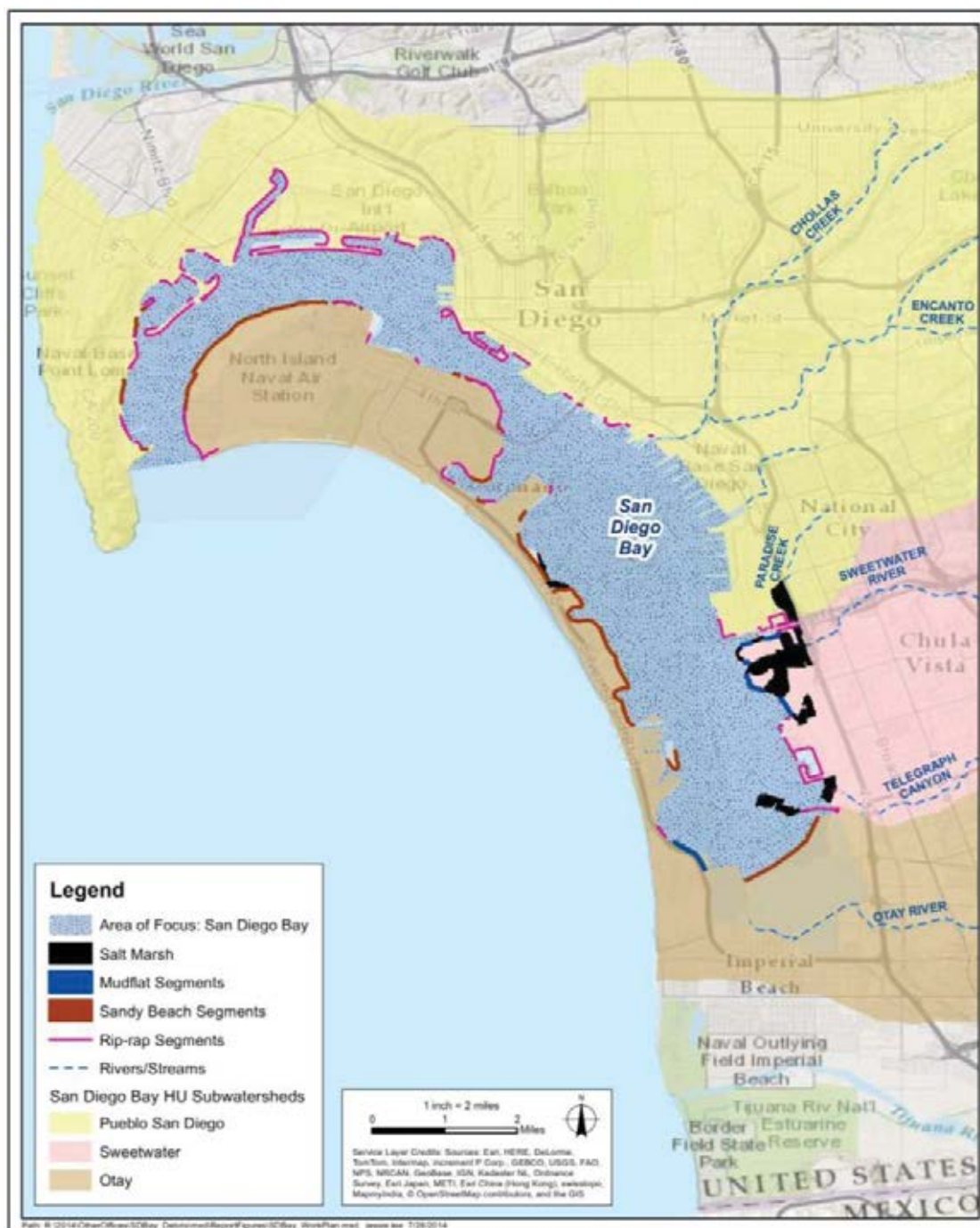


Figure 4-1. San Diego Bay Habitats for Debris Surveys

4.3 Study Schedule

The Bay Debris Study is anticipated to be a multi-year project beginning in the winter of 2014 and continuing until the spring of 2016. The timeline for completing the major elements of the study during the approximately two-year time period are shown below in Table 4-2.

Table 4-2 Bay Debris Study Proposed Schedule

Activity	Schedule	Study Element
Develop Study Design	February 2014 – June 2014	Work Plan
Prepare Work Plan and SOPs	June 2014 – August 2014	Work Plan and Data Quality Assurance
Field training and intercalibration	August 2014 – September 2014	Training and Data Quality Assurance
1 st dry weather surveys, all habitats	August 2014 – October 2014	Early Season Dry Weather Condition
Wet weather tracking study	October 2014 – December 2014	Wet Weather Conditions
Post-storm trawls ¹	October 2014 – December 2014	Wet Weather Conditions
2 nd dry weather trawl ²	January 2015 – March 2015	Late Season Dry Weather Conditions
2 nd dry weather surveys ^{2,3}	January 2015 – March 2015	Late Season Dry Weather Conditions
Marina passive samplers	September 2014 – March 2015	Early to Late Season Dry Weather Conditions
Fish gut dissections	December 2014 – May 2015	Plastic ingestion
Draft Report	December 2015	Data Analysis and Reporting
Final Report	March 2016	Reporting

Notes:

- 1) Post-storm surveys will be dependent on the weather and timing between early season storm events.
- 2) Surveys will target non-storm event dry weather conditions following an antecedent period of 14-28 days
- 3) Surveys will not be started until the Post-Storm Surveys are complete, does not include water column trawls.

4.4 Summary of Plastics Data from Recent Debris Surveys

The Bay Debris Study will include plastics data from surveys conducted in San Diego Bay and the contributing watershed during 2013 and 2014. The additional data is needed to develop a more complete understanding of the types and quantities of plastic throughout the bay and the information from the recent surveys helps to fill the data gaps. A summary of the monitoring programs that collected the plastics data, the habitats or studies in which the debris surveys were conducted, the plastics size ranges collected, and whether the habitats will be re-sampled for the Bay Debris Study are listed in Table 4-3.

Table 4-3. Recent Debris Surveys for Plastics Data Included in the Bay Debris Study

Program	Monitoring Year	Habitat or Study	Debris Size(s)	Number Samples	Resample Station Location for Bay Debris Study?	Bay Debris Study Question
RHMP Benthic Ecology	2013	Benthic	Micro-, Meso-, Macro-	50	NO	1
RHMP Benthic Ecology	2013	Epibenthic	Meso-, Macro-	10	NO	1
San Diego Bay Shallow Water Habitat Bioaccumulation Study	2014	Benthic	Micro-, Meso-, Macro-	30	NO	1
San Diego Bay Shallow Water Habitat Bioaccumulation Study	2014	Epibenthic	Micro-, Meso-, Macro-	9	NO	1
Bight '13 Debris Study Riverine Habitat Surveys*	2013	Riverine	Meso-, Macro-	2	YES	1
Stormwater Monitoring Coalition (SMC) Regional Stream Trash Assessment *	2013	Riverine	Meso-, Macro-	7	YES	1
RHMP Water Column Surveys	2013	Demersal and Pelagic Fish Gut Content	Micro-	TBD	NO	3
San Diego Bay Shallow Water Habitat Bioaccumulation Study	2014	Demersal and Pelagic Fish Gut Content	Micro-	TBD	NO	3

Note: (TBD) Samples collected are currently being analyzed and the final counts of samples passing acceptability criteria have not been finalized at the time this work plan was prepared.

5.0 SAMPLING AND ANALYSIS METHODS

This section describes the field and laboratory methods associated with the data collection. The field and laboratory methodologies performed in concert with the Bight '13 Debris Study have been included in this section to provide details on the sampling and analysis approach used to collect the data that will be included in this study. Samples collected for the RHMP and San Diego Bay Shallow Water Habitat Bioaccumulation Study followed Bight '13 site selection and field methods. For additional details on the Bight '13 methods detailed information is available in the Bight '13 Field Methods Manual and Bight '13 Benthic Manual (Bight '13 Benthic Committee, 2013; Bight '13 Field Sampling & Logistics Committee, 2013).

The summary of sampling and analysis methods detailed in Section 5.0 for the habitats that will be surveyed for plastic are as follows:

- 5.1 Quantities and Types of Plastic Debris in the Bay Habitats**
 - 5.1.1 Benthic (Grabs)
 - 5.1.2 Epibenthic (Trawls)
 - 5.1.3 Water Column (Trawls)
 - 5.1.4 Continuous Debris Collection by Trash Skimmers in Marinas
- 5.2 Quantities and Types of Plastic Debris in Intertidal Habitats**
 - 5.2.1 Mudflats, Salt Marsh (emergent vegetation), Sandy Beaches
 - 5.2.2 Wrackline, Rip-Rap
- 5.3 Quantities and Types of Plastic Debris in Upland Habitats**
 - 5.3.1 Riverine
- 5.4 Wet Weather Debris Tracking from Riverine to Bay Habitats**
- 5.5 Prevalence of Plastic Debris in Demersal and Pelagic Fish Gut Analysis**

Sites selected for the targeted habitats in sections 5.1 to 5.3 are listed in Appendix A.

Plastic items collected for the Bay Debris Study will be sorted and quantified according to size categories referenced in the NOAA Marine Debris Shoreline Survey protocols. The classification and size ranges that will be analyzed for this study are provided in Table 5-1. Section 7.0 provides details on the quality assurance and quality control procedures that will be incorporated into the data collection process for all habitats surveyed as part of the Bay Debris Study.

Table 5-1. Debris classification and size ranges to be analyzed

Category	Size (mm)
Macrodebris	> 25 cm
Mesodebris	5 mm - 25 cm
Microdebris	4.75 mm
	2.00 mm
	1.00 mm
	0.710 mm
	0.500 mm
	0.355 mm

The sampling and analysis methods described in detail in Section 5.0 are summarized in Table 5-2.

Table 5-2. Summary of sampling and analysis methods in the study habitats according to size of plastic items collected.

Habitat or Study Focus*	Method	Plastic Sizes		
Water Column	Bight '13 Trawl, Boerger 2010	Macrodebris	Mesodebris	Microdebris
Rip-Rap	NOAA Shoreline Survey	Macrodebris	Mesodebris	---
Wrackline	NOAA Shoreline Survey	Macrodebris	Mesodebris	---
Mudflat	NOAA Shoreline Survey	Macrodebris	Mesodebris	---
Salt Marsh	NOAA Shoreline Survey	Macrodebris	Mesodebris	---
Sandy Beach	NOAA Shoreline Survey	Macrodebris	Mesodebris	Microdebris
Riverine	Bight '13 Debris	Macrodebris	Mesodebris	---
Marina Skimmers	This Study	Macrodebris	Mesodebris	Microdebris
Wet Weather Tracking	This Study	Macrodebris	---	---
Fish Gut	Bight '13 Trawl, Boerger 2010	---	---	Microdebris

Note: In conjunction with the US Fish & Wildlife Service, microdebris will not be collected from the salt marsh or mudflat habitats to avoid impacts to important habitats. Similarly, collection of microdebris in these habitats requires the removal of the top 3 cm of high silt content soil and vegetation that would be prohibitive to process on a time and materials basis. Microdebris in rip-rap and riverine habitats will not be collected due to the challenges of working around large rocks and in areas of high gravel content that would be logistically infeasible to sieve.

5.1 Quantities and Types of Plastic Debris in the Bay and Marinas Habitats

Sections 4.1.1 and 4.1.2 provide details on the methods that used to previously collect debris data that will be included in this study. Sections 5.1.3 and 5.1.4 provide details on the method that will be adopted to collect new data for this study. Benthic (Grabs)

The main purpose of benthic sampling is to obtain data on the amounts and types of plastic found in the sediment. Benthic sample collections were conducted in collaboration with the RHMP 2013 survey and San Diego Bay Shallow Water Habitat Bioaccumulation Study following sample collection methods described in the Bight '13 Field Operations Manual.

Field Sampling Methods

A 0.1 m² modified Van Veen grab was used to collect sediment samples for physical, chemical, and infaunal analyses (Stubbs et al. 1987). The grab used for infaunal analysis was also used for macroplastic analysis. Grab acceptance criteria were the same as that for infaunal grabs, and were based on two characteristics of the sample: sample condition and depth of penetration. Sample condition was judged using criteria for surface disturbance, leakage, canting and washing (Bight '13 Field Sampling & Logistics Committee, 2013). Sediment penetration depth must have been at least 5 cm; however, penetration depths of 7-10 cm should have been obtained in silt.

Once the sample was found acceptable, any larger plastic items (or items of questionable material) found on top or within (caught in jaws or found inside the grab) the sample were retained and placed in a bag labeled with the sampling date, station and collecting agency (Bight '13 Field Sampling & Logistics Committee, 2013). The sample itself was processed in the field by washing the sediment from the grab and sending it and the wash through a 1.0-mm screen. Once the sample was washed through the screen, the material left was transferred to a labeled sample container. Samples were then returned to the lab for further analysis. Chain of Custody (COC) forms were used to track all samples from the field to the sorting lab for final debris analysis.

Laboratory Analysis Methods

Upon receiving samples at the lab, the samples was washed and transferred to a clean container. Samples were then sorted into broad debris categories for subsequent analysis. All plastic or questionable plastic items were placed in labeled vials with water, ethanol, or left dry (whatever is easiest for the sorting lab). If more than one vial was filled, then the vials were labeled as such, e.g. vial 1 of 2 or 2 of 2. All debris that has been sorted was sent to SCCWRP for delivery to Algalita Marine Research Institute (AMRI) or delivered directly to AMRI for final analysis.

The sorting labs also performed Quality Assurance/Quality Control (QA/QC) for plastic debris. Samples that underwent QA/QC were resorted and debris items that were missed from the original samples during the initial sort were placed in a vial and sent to AMRI for analysis. Error rates were computed and included in the final data analysis.

Final analysis of the debris samples included counting, typing (e.g. fragment, line, film, foam or pellet), categorizing by size (e.g. 1.00 mm - 4.99 mm, >5.00mm), volume, and if resources available, determined the polymer type using the Andrad method³ (see Appendix D).

5.1.1 Epibenthic (Trawls)

Epibenthic or trawl marine debris sample collections were done in collaboration with the RHMP group and San Diego Bay Shallow Water Habitat Study. Sample collection methods in the field followed the Bight '13 Field Operations Manual, and sample collections occurred during the spring-summer of 2013 and 2014. The main purpose of the trawl survey was to obtain data on localized community structure of fish and invertebrate assemblages; however, the collection of these samples served a dual role in providing a more thorough characterization of the amounts and types of debris found on the bottom of the bay.

Field Sampling Methods

The field sampling methods for trawls (Appendix B) were conducted using a semi-balloon otter trawl with a 7.6-m head rope (25 ft), 8.8-m footrope (29 ft), 3.8-cm (1.5 in) body mesh, and a 1.3-cm cod-end mesh (0.5 in). Trawls were towed along isobaths at a speed-over-ground of 1.0 m/sec (or 1.5 to 2.0 knot) for 10 minutes. At the end of the prescribed trawl time, the net was retrieved and brought onboard the vessel. Any debris caught on the cable was noted, but not included in the tally. The cod-end was then opened and the catch deposited into a tub or holding tank. The criteria used to evaluate the success of any trawl included making sure that proper depth, scope, speed, and distance (or duration) were maintained, whether the net was fouled (net tangled), and whether the catch shows evidence that it was on the bottom (e.g., rocks, benthic invertebrates, benthic fish). The trawl catch were sorted on deck into containers.

Trawl debris were sorted into containers for processing. Debris collected during any trawl was quantified by recording the specific types of material and their quantities on the Bight '13 Trawl Debris Form (Appendix C). This form was developed based on the same form used by the Stormwater Monitoring Coalition (SMC) for collecting debris information for land-based sources. Items within the debris categories are specific and included those commonly found by the RHMP and San Diego Bay Shallow Water Habitat 2013 trawls. Types of items within each of these categories were counted and recorded. If an item was not on the list it was placed in the appropriate "Other" category and a comment made to describe the item. In the case of items that could fit into multiple categories, the item was included in the category that the item consisted most of, and included documenting any of the other categories it would fit in the comments field. Additional descriptive information regarding the debris such as brand names was included in the comments section for that type. For debris of marine or terrestrial origin, counts of each were made; however, estimates were acceptable as well. For estimated counts a qualifier was included in the estimate box based on the following categories: L for low abundance (2-10 items); M for Moderate abundance (11-100 items); and H for High abundance (>100 items). In cases where counts were not easily made, a comment explaining the difficulty was suggested. The volume of debris items were recorded to the extent feasible but comments

³ Application of the Andrad method on a subset of the overall samples from each habitat may be performed but is pending potential funding.

that better described the debris such as estimated size (e.g. the size of a basketball), condition (e.g. decayed kelp frond in pieces), or type/species (e.g. hard plastic, foam, wrapper, etc) are encouraged. After all of the debris has been categorized and counted, all plastic debris will be retained for further analysis. All or a piece (about the size of a quarter) of each plastic item will be placed in a gallon Ziploc bag and returned to be sent to the lab.

5.1.2 Water Column (Trawls)

Surface waters in San Diego Bay will be sampled for plastic debris sizes and sample collections will be performed using manta trawl field methods based on past southern California plastics trawls (Moore et al., 2001; Moore et al., 2002; Boerger et al., 2010; Lattin et al., 2004), with modifications for consistency with other sampling conducted by Bight '13. Sample collection methods in the field will follow the Bight '13 Field Operations Manual to the extent feasible, and sample collections will occur from summer of 2014 through spring 2015. The main purpose of the trawl survey is to obtain data on amounts and types of debris located floating on or near the water surface in various portions off the bay. Subsequent mid-depth water column trawls may be conducted if resources are available.

The bay will be split into 4 regions (mouth, north, central, south), to account for differences in tidal flows and circulation, habitat types, watershed inputs, and vessel traffic (Largier, 1995; Largier et al., 1997; Komoroske et al., 2012), with trawls conducted at randomly selected fixed transects in each region. Trawls conducted at the mouth of the bay may also be conducted during both flood and ebb tides on the first event to evaluate the effect of tidal exchange process on debris quantities. Additionally, tide direction stratified sampling may be conducted during subsequent events if the results from the first event indicate significant differences in debris quantities as a result of tidal exchange processes. The project target is a total of 10 trawls per time period within each region and 10 trawls at the mouth of the bay over each tide condition

Trawls will occur within 3 time periods: 1) Summer Dry, 2) Winter Wet, and 3) Winter Dry. Summer Dry trawls will occur in the late summer to early fall (September-October) time period when there is limited to no rainfall and storm event flows to the bay from the adjacent watersheds will not complicate the data interpretation. Winter Wet trawls will occur during the rainy season (October – December) immediately following an early season storm event of at least 0.5 inches over a 24 hour duration, or following the first event of the rainy season depending on the storm totals. Winter Dry will occur during the late rainy season (January - March), but will follow a period of at least 14 to 28 days of preceding dry weather.

Field Sampling Methods

Trawl field methods will be performed to be consistent with monitoring approaches adopted for the Bight '13 surveys to the extent feasible given that surface trawls samples were not collected during the Bight Program (Appendix B). Trawls will be conducted using an aluminum framed manta trawl with 0.335 mm net mesh and cod-end. The manta trawl net opening is 16 cm in height and 60 cm in width with a 4 meter net. Trawls will be towed along fixed bay transects at roughly 1-3 knots over a distance of 1,000 meters. A flow-meter will be attached to the manta trawl in order to calculate volumetric trawl data. At the end of the prescribed trawl time, the net

is retrieved and brought onboard the vessel. Any debris caught on the cable will be noted, but not included in the final item tally. The net is then rinsed from the outside using site water to move sample into the cod-end. Large items may be manually removed from the net when necessary. The cod-end is then opened and turned inside out and the catch deposited into a tub, holding tank, or pre-cleaned 1 liter glass jar, depending upon sample size. The criteria used to evaluate the success of any trawl includes making sure that proper depth, scope, speed, and distance (or duration) were maintained, whether the net was fouled (net tangled), and whether the catch shows evidence that the opening was fouled in any way (e.g., kelp, large plastic bags, etc).

The catch will be placed directly into pre-cleaned 1 liter glass jars, if possible. If not, large trawl debris will be sorted into appropriate containers for later processing. Debris collected during any trawl should be field quantified by recording the specific types of material observed, including counts where feasible for large items, and other pertinent quantitative and qualitative information on the Trawl Debris Field Form (Appendix C). This form was developed based on the same form used by the SMC for collecting debris information for land-based sources. The major categories are consistent with Bight '13, though some items have been removed (e.g. glass, metal), and others added to reflect a more detailed analysis of plastics in the upper water column and surface. Items within these categories are specific and include those commonly found by the Bight '13 Trawl Group in previous surveys (Appendix C). Full plastics typing, counts, and measurements will be done in the San Diego Water Board laboratory. Samples will be placed on ice in the field and immediately frozen upon return to the San Diego Water Board laboratory.

Laboratory Analysis Methods

All samples analyzed in the lab will follow methods utilized for plastic in Southern California (Moore et al., 2001; Moore et al., 2002; Lattin et al., 2004), with minor deviations for archival purposes. Samples will be thawed and sorted by category (plastics, paper, feathers, etc.) prior to filtering and analysis. Large items will be rinsed with DI water in the lab to remove smaller debris that is adhered to the surface. A dissecting scope will then be used to remove and sort remaining debris in categories. Filtering will then be conducted for each category type using six pre-cleaned *Newark* type sieves, sized 4.75, 2.0, 1.0, 0.710, 0.500, and 0.355 mm. Debris for each category will then be counted for each size class prior to further material identification. Volume will also be measured and recorded for each size class.

Types of items within each of the size class categories will be sorted according to color (i.e. white, red, black, etc.) based on previous studies indicating a feeding preference by fish based on the color of plastic microdebris (Boerger, 2010). If an item is not on the list it will be placed in the appropriate "Other" category and a comment made to describe the item. In the case of items that could fit into multiple categories, the item will be included in the category that the item consists most of, and records will document any of the other categories it would fit in the comments field. Notes will include additional descriptive information regarding the debris such as brand names and item color(s) in the comments section for that item. In cases where counts cannot be easily made, estimates will be generated and a qualifier included in the estimate box

based on the following categories: L for low abundance (2-10 items); M for Moderate abundance (11-100 items); and H for High abundance (>100 items).

After all of the debris has been categorized and counted, all plastic debris will be retained and archived at the San Diego Water Board laboratory for future analysis. All or a piece (about the size of a quarter) of each item will be placed in archive.

5.1.3 Continuous Debris Collection by Passive Samplers

Debris movement throughout the bay is governed by tides and wind directions that vary on daily and seasonal time periods. Tracking the movement of debris in the bay on a daily basis for the Bay Debris Study would be challenging in terms of timing with tides, local wind currents, and seasonal inputs. At the same time, collecting samples of debris on a continuous basis over the study period would also be logistically challenging and resource intensive. In order to capture variations in bay debris types and quantities over the time period of this study, this survey design includes the use of passive samplers anchored in four different marinas throughout the bay. The passive samplers, commonly referred to as trash skimmers, are situated in four locations throughout the bay and provide an opportunity to collect continuous debris data in concert with habitat survey and trawl events. The trash skimmers are situated in areas of the bay that have been previously documented to accumulate trash from tidal processes and daily surface winds (Port of San Diego, 2011).

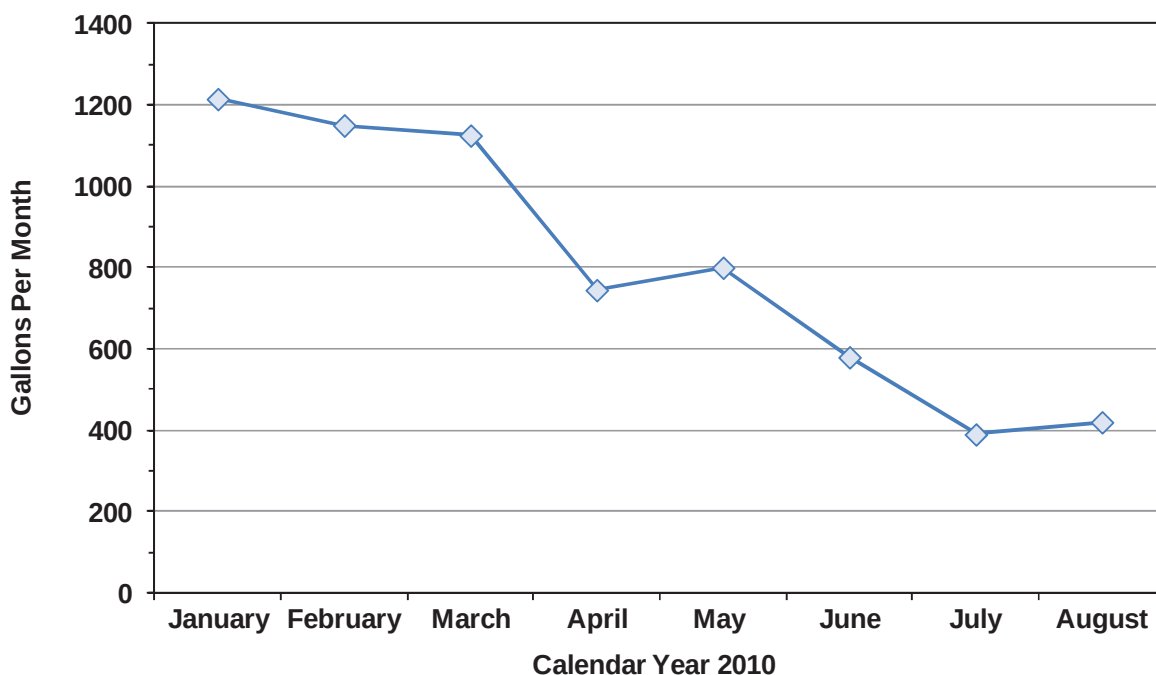
Site Selection

The marinas with trash skimmers currently are:

- Pt. Loma Marina: Owned by America's Cup Harbor located along the east end of the main dock. This skimmer location is an area of debris collection located below a high traffic area and is also routinely exposed to prevailing winds transporting debris directly into the area.
- Half Moon Marina: Owned by Humphrey's in Shelter Island located on the east end of the Shelter Island Basin. Humphrey's By the Bay concert venue overlooks the site and is a prime location for debris collection.
- Harbor Island West Marina: Located in Harbor Island located along a channel leading to a low flush area of the Harbor Island Basin. Debris must pass through this region during high tide and again as the tide retreats.
- Pier 32 Marina: Located in Chula Vista along the Sweetwater River outlet to the bay. The skimmer has been placed in a section of the marina that has been previously documented to have low tidal exchange characteristics.

The inclusion of the passive samplers for this project is based on a published report which suggested that the presence of trash skimmers in the marinas can have a notice positive impact on improving water quality through the continuous removal of large and floating debris. Plastics data collected from a trash skimmers located in Half Moon Bay Marina is shown in Figure 5-1 to

provide an example of the type of information that can be obtained using passive samplers in this study.



Note: Data reproduced with permission from the Unified Port District of San Diego.

Figure 5-1. Debris Volumes from San Diego Bay Marina Trash Skimmer Study (Port of San Diego, 2011)

Field Sampling Methods

The debris collection and quantification methods for this study will follow methods described in the marina trash skimmer study (Port of San Diego, 2011). The sample collection period will occur September 2014 to March 2015 in order to have the continuous data overlap with the dry weather event, post-storm trawl, and winter dry weather trawl events. The four marinas with trash skimmers will keep detailed logs of debris collected by the skimmer on a weekly to monthly basis. Each marina will record volumes of debris and types of debris following the item descriptions in the Intertidal and Riverine Field Forms (Appendix E and F).

Laboratory Analysis Methods

Macro and mesodebris will be sorted by type and counted. Volumes will be recorded for debris in each size class collected during each assessment. Additional information such as brand names will also be noted on data sheets if available. If available, microdebris collected from skimmers will be sieved for size classes of 4.75, 2.0, 1.0, .710, 0.500, and 0.355 mm. After further sorting the microdebris by these size classes, items will be counted to determine the abundance and the volume will be measured for each size class. Item colors will also be counted for microdebris according to the colors of ingested plastic found previously in fish gut trawl samples (Boerger et al., 2010).

5.2 Quantities and Types of Plastic Debris in Intertidal Habitats

Debris deposited in intertidal habitats accumulates from land-based and bay-based sources, and varies according to geographic location, oceanographic and meteorological conditions, and climatic changes (Lippiatt et al., 2013). The goal of this assessment is to obtain information on the types of amounts of debris which accumulate onshore on the mudflats, salt marsh, sandy beaches, rip-rap structures, and along the high tide line (wrackline) throughout the bay. Section 5.2 provides details on the methods used to collect new data that will be included in this study.

Site Selection

Intertidal assessment sites will be randomly chosen from a set of grids placed over the intertidal habitats. As a general guide for the site selection process for the mudflat, salt marsh – emergent vegetation, and sandy beaches, the following criteria suggested by the NOAA Marine Debris Monitoring Program will be used:

- Clear, direct, year-round access⁴
- At least 100 meter (m) length of shoreline
- No regular cleanup activities such as beach grooming

Survey sites within each stratum will be randomly selected to ensure that sites are selected in each stratum and that the quantities of plastic are based on unbiased estimates.

Field Sampling Methods

Debris collection methods will be adapted from the NOAA Marine Debris Monitoring methodology (Lippiatt et. al 2013; Viehman, 2011; Viehman, 2009). The NOAA shoreline technique is designed to be useable by trained community volunteer organizations while simultaneously providing data that can be used to address key management questions. Sampling efforts will focus on collecting detailed information about macrodebris (greater than 25 cm) and mesodebris (5 mm up to 25 cm) in each assessment site. Microdebris (sizes less than 5 mm) will also be collected, but on a limited extent in order to avoid impacts to sensitive estuarine habitats.

Sampling will be conducted during dry weather conditions and conducted within three hours of low tide if possible in order to take advantage of the maximum width of the shoreline section. A subset consisting of no more than 10 percent of the wrackline and rip-rap sites will re-evaluated after 30 days from the date of survey following the next spring tide event in order to assess whether debris re-accumulation occurred as a result of tidal displacement of the remaining plastic along the high tide zone.

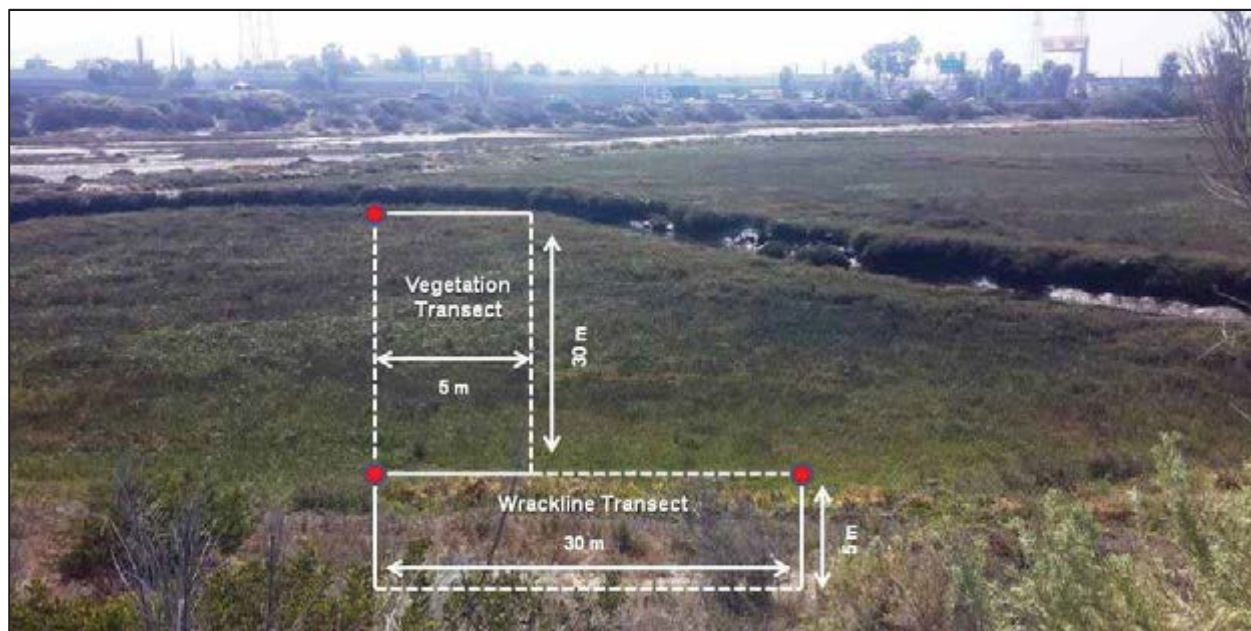
Site specific information recorded at each assessment site includes the substrate type, tidal range, and transect width from the low tide water line to the wrackline. Photo documentation

⁴ Seasonal restrictions apply from February 15 to September 15 for intertidal areas within the San Diego Bay National Wildlife Refuge. Debris surveys during the winter dry weather season will be performed in coordination with project partner from US Fish and Wildlife Service during time periods that are expected to not interfere with the nesting season for specific bird species.

will record the physical characteristics of the assessment site prior to the survey being conducted to document the aesthetic condition of the site.

5.2.1 Emergent Vegetation, Mudflat, and Sandy Beach Assessments

Transects for the intertidal assessments will be distributed between the wrackline and the low tide line or water's edge. For the purposes of this study, wrackline assessments will be conducted separately in order to obtain a more detailed assessment of the intertidal habitats as shown in Figure 5-2. Intertidal habitat surveys sites in the emergent vegetation, mudflats, and sandy beach will consist of evenly sized 150 m² grid cells follows method previously adopted for intertidal debris surveys (Lippiatt et. al 2013, Viehman 2009).



Note: Red dots indicate locations of GPS coordinates. Image not to scale.

Figure 5-2. Example of Survey Transects in Emergent Vegetation and Wrackline Habitats

Within each transect, surveys will be conducted over the entire transect area for macrodebris (sizes greater than 25 cm). Mesodebris (sizes from 25 cm – 5m) and microdebris (sizes less than 5 mm) will be collected using a quadrat approach (Lippiatt et. al 2013).

Quadrat locations for mesodebris in all intertidal habitats and microdebris surveys on sandy beaches will be randomly distributed over each transect following methods previously published (Moore, et. al, 2001). Quadrats will be distributed at 20 percent margins of the transect length, and alternate between left edge, middle, and right edge in order to capture the distribution of debris over the entire transect area. Within quadrats, debris will be counted and recorded within categories and then collected. Items that do not fall under a specific subcategory will be entered into the “Miscellaneous” category on the field sheets (Appendix E). Field crew will provide a written description and photo documentation of these items.

5.2.2 Wrackline and Rip-Rap Assessments

In order to capture the quantity of debris potentially associated with the wrackline or the high tide elevation in the shoreline protective rip-rap barrier as shown in Figure 4, detailed surveys will be conducted using a modified NOAA shoreline assessment approach. Detailed assessments will be conducted along a 30 m transect length of the wrackline or rip rap, running parallel to the water's edge. Transects will be 5 m wide, and will be measured from the highest edge of the wrackline or rip rap towards the water. The debris collection and quantification approach will be consistent with the intertidal habitat survey method provided in Section 5.2.1.



Note: Red dots indicate locations of GPS coordinates. This image is not to scale.

Figure 3-4. Example of Survey Transects on Intertidal Rip-Rap Habitats.

Laboratory Analysis Methods

Macro- and mesodebris will be sorted by type and counted. Volumes will be recorded for debris in each size class collected during each assessment. Additional information such as brand names will also be noted on data sheets if available. Microdebris collected from sandy beaches will be sieved for size classes of 4.75, 2.0, 1.0, .710, 0.500, and 0.355 mm (Appendix G). After further sorting the microdebris by these size classes, items will be counted to determine the abundance and the volume will be measured for each size class. Item colors will also be counted for each size class of items collected from sandy beaches according to the colors of ingested plastic found previously in fish gut trawl samples (Boerger et al., 2010).

5.3 Quantities and Types of Debris in Riverine Habitats

The goal of this assessment will be to determine the quantities and types debris in the channels of upland wadeable streams in the watersheds draining to San Diego Bay. Debris deposited in

riverine habits occurs through land use-based sources, incidental or wind-blown litter from adjacent areas, and direct deposit of debris through littering and illegal dumping. Understanding the quantity and types of debris in riverine habits is a first step in making the connections between land based sources and debris that is ultimately transported to the bay. Section 5.3 provides details on the methods used to collect riverine habitat data that will be included in this study.

Site Selection

This study component follows on the Bight '13 Debris Riverine Habitat Study adopted from the SMC Regional Watershed Monitoring Program, and as such the target population, sample frame, and site selection has been pre-determined by that workgroup. The target population for the SMC surveys is perennial, wadeable, and Strahler second order or higher classification streams across the Southern California watersheds. The sample frame will include the major strata used in previous SMC surveys, which are as follows:

1. Strahler Order
2. Land Use
 - a. Urban
 - b. Agriculture
 - c. Open
3. Watershed Jurisdiction (Hydrologic Unit Boundaries)
4. County Jurisdictional Boundaries
5. Regional Water Quality Control Board Jurisdiction Boundaries

Briefly, SMC sample sites were selected using a probabilistic approach weighting by watershed, land use, and stream order. The sampling frame includes watershed units located from Ventura to San Diego and east to San Bernardino and Riverside Counties. These watersheds equate to combinations of management units utilized by the Regional Water Quality Control Boards (RWQCB) or SMC member agencies. Altogether, these 15 watershed units are comprised of roughly 28,051 km². The streamlines used to define the sampling frame were derived from the National Hydrography Dataset. Altogether, there are 9,492 stream miles of Strahler order 2 and greater in the sampling frame. Land use was defined as either urban, agriculture, or open based on the Coastal Change Analysis Program (C-CAP) remote imaging algorithms (National Oceanic and Atmospheric Administration 1995). C-CAP defines 35 different land use classes that have been aggregated into the three categories for this study (i.e., open, agriculture, urban, and water). The dominant land use within a 500-m buffer was assigned to each stream reach.

The Bay Debris Study will focus on the urban stratum riverine sites in the Chollas Creek, Sweetwater River, and Otay River watersheds. The riverine habitat portion of the Bay Debris Study focusing on revisiting sites surveyed during prior regional monitoring programs. Sites sampled for the SMC Regional Monitoring Program and the Bight '13 Debris Study Riverine Assessment will be selected as the first set of potential sites, up to a maximum of 30 sites over the three watersheds. In the event an insufficient number of sites cannot be developed from the existing pool of previously visited sites, additional new sites will be selected.

Field Sampling Methods

The Bight '13 riverine assessment protocol will serve as the survey approach for the riverine habitats in the Bay Debris Study. The riverine habitat survey approach is based on combination of field methods incorporating a multimetric rapid trash assessment index and an associated item tally. Sites are numerically evaluated using a modified version of the Surface Water Ambient Monitoring Program Rapid Trash Assessment approach developed by the Bight '13 Debris Study planning committee. In addition to the RTA score, individual debris items will be recorded according to specific item categories on the Stream Trash Item Tally Sheet.

Debris collected during any survey should be record the quantity of plastic material in specific categories on the Riverine Habitat Debris Assessment Tally Worksheet (Appendix F). Types of items within each of these categories will counted and recorded during field surveys. Field information collected during site assessments will include a description of site characteristics that will further aid in the data analysis. The additional site characterization data will include an evaluation of storm drain inputs, presence of homeless encampments, adjacent land features, and summaries of the stream geomorphologies.

Laboratory Analysis Methods

A subset of the macro and mesodebris collected will be re-counted for quality assurance purposes by size and type of item. Volumes will be recorded for each plastic debris category and size class. Additional information such as brand names will also be noted on data sheets if available.

5.4 Wet Weather Debris Tracking from Riverine to Bay Habitats

The goal of this component of the Bay Debris Study is to evaluate pathways and distances traveled of common debris (trash) items during storm events. Much of Southern California's watersheds are composed of networks of canyons that reticulate most urban neighborhoods and act as downhill pathways to the coast. Many of the higher elevation, lower order creeks are seasonal, where debris accumulates throughout the dry season and washes downstream to the coast during the wet season. Tracking common debris items can reveal the patterns and potential influences on accumulations and flows of these items as they move throughout the watershed. Understanding the patterns and influences on pathways of debris throughout coastal waterways can strength our understanding of how land based debris enters coastal oceans and bays. Section 5.4 provides details on the methods used to track riverine habitat plastic debris that will be included in this study.

Site Selection

Four canyons within the Chollas Creek subwatershed in the City Heights neighborhood of San Diego have been chosen for these tracking studies: Manzanita, Swan, Juniper and Chollas Canyons. The canyons in the Chollas Creek watershed are representative of urban seasonal waterways with surrounding areas being densely populated and heavily urbanized, with land uses including industrial, residential, commercial, and open space. Study sites will be distributed across each of these four canyons to capture a representative assessment of the

landscape features (e.g., surrounding land use, vegetation cover and type) present in urban seasonal waterways.

Field Sampling Methods

Assessments will be conducted with the help volunteers from the Ocean Discovery Institute. Before the start of the rainy season in October, at least five sampling locations will be established in each canyon- two each on the right and left sides and one at the canyon head. Based on the availability of volunteers, the number of sites may be increased to as many as 13 sites per canyon if adequate staffing is available (6 sites on each side, one at head). Three (3) types of common, single-use plastic debris items (shopping bags, plastic bottles, Styrofoam or waxed fast food containers) will be labeled for tracking at each site. In order to avoid adding debris back into the environment, plastic items will be collected from the canyon and labeled for tracking purposes. Labels will contain sample information (site, date, item number) and study information (contact, brief explanation of project so item isn't removed). Labeling approaches planned include but may not be limited to painting items with brightly colored paint, wildlife radio frequency identification tags, and electronic trackers (e.g., radio or satellite based systems) to be able to track items placed along the subwatershed (upstream mid reach, near mouth) and to minimize loss in determining distances traveled. At each of the sites five individual items of each type of debris (e.g., 5 bags, 5 bottles, and 5 containers) will be staged for tracking. GPS locations of release sites will be recorded. Cover of land features in the immediate surrounding area will be assessed using a 10 x 10 m quadrat. Within each quadrat, cover of each feature will be assessed using the point intercept method where presence of a feature is recorded at every intersection along a grid containing 1m² cells. Bags will be located and mapped every 2 weeks or immediately following a rain event. Land feature quadrats will be taken around each item (where the item is centered in the quadrat) if the items are 10 m or more apart, or taken around the center item in a cluster if items are less than 10m apart. Surveys will be conducted throughout the rainy season (through March) during post-storm event conditions and, if items are still trackable, throughout the dry season on a monthly basis. If degradation or loss of items occurs, a new item will be placed in the last known location and noted.

If funds and volunteer help are available, debris tracking releases can be conducted farther downstream in the intertidal portion of Chollas Creek. In this area of the riverine habitat tracking methods can be evaluated using the painted and labeled items as described above and using adhesive radio tags placed on items as well as receivers placed along the stream to track unidirectional locations (flow downstream).

5.5 Prevalence of Plastic Debris in Demersal and Pelagic Fish

The goal of this part of the Bay Debris Study is to determine the quantities and types debris ingested by pelagic and demersal fish. As noted previously, accumulation of plastics in the gut can have two potential harmful effects on fish communities. Plastic items can provide a false sensation of feeding satiation leading to starvation. Plastics in the marine environment can also act as an intermediary for transmitting persistent organic pollutants that can bioaccumulate in the fish tissue (Rochman, 2013). Section 5.5 provides details on the methods used to previously collect debris data that will be included in this study.

The approach for this component of the Bay Debris Study is to leverage samples collected from RHMP 2013, San Diego Bay Shallow Water Habitat Bioaccumulation 2014 Study, and fish captured during the water column trawls in this study (see Section 5.1) in order to acquire specimens of fish. Fish gut contents will be processed to quantify the size, shape, color and abundance of debris ingested by fish. Comparisons between the types and amounts of different types of plastic among pelagic and demersal fish can provide useful information for determining the extent of area effected as well as suggests pathways for ingestion of debris to determine where and what types of debris to focus on for management actions.

Site Selection

As with the RHMP and SWHB study components, the sample frame and site selection were pre-determined (see Section 5.1).

Field Sampling Methods

Fish species collected during the previous trawls will serve as the initial list of targeted species for the Bay Debris Study. The four categories of fish consisting of species from the Pelagobenthivore Guild, Benthivore Guild, which were previously found to have consumed plastics and Pelagic Species, will represent the initial targeted fish species for this study. Although some species may not be found in San Diego Bay, the initial targeted list of fish species is not intended to be exclusive of other fish potentially collected during trawls of the bay. The species identity of non-target list fish caught during trawls will be recorded and those samples will be included into the overall sample set to be analyzed for ingestion of plastic debris. The final species list of fish that will be analyzed will take into consideration additional factors including number of fish caught, size and effort needed to extract ingested plastic, and feasibility of plastic being ingested based on existing precedence from previous studies. Any fish caught but not analyzed will be determined by consensus of the technical workgroup.

Table 4-3. Targeted fish species to determine ingestion of plastic

Pelagobenthivore Guild:	Benthivores Guild:	Fish previously found with ingested plastic:	Pelagic species:
Pacific sanddab	English sole	white croaker	Deepbody Anchovy
longfin sanddab	blackbelly eelpout	queenfish	Northern Anchovy
Longspine combfish	hornyhead turbot	shiner perch	Sardine
speckled sanddab	curlfin sole	spotted cusk eel	Herring
Bay goby	bearded eelpout	lizardfish	Jack Mackerel
			Pacific Mackerel
			Smelt

Trawls were performed using Bight '13 standardized procedures as found in the Bight '13 Field Methods Manual. Fish collected, counted, and weighed as part of the RHMP and SWHB species of interest will be analyzed. Fish previously caught were frozen and transferred under COC documentation in order to retain location and specie identity information.

Laboratory Analysis Methods

In the laboratory, each fish will be measured for length, weighed, and sexed. The gut (stomach and intestinal tract) will be removed and washed into a 1 mm sieve. The contents in the sieve will be examined under a 10X magnifying lens or dissecting scope for ingested plastic. Each plastic item will be removed, sized, sorted by shape, color, type (fragment, pellet, line, film, and foam), and archived.

6.0 DATA ANALYSIS

Analysis of the overall plastic debris quantities are an important component for establishing a benchmark of the most abundant type of plastic and being able to measure changes in the plastics quantities over time. The plastics data that will be collected for the Bay Debris Study includes a substantially expanded list of items beyond the data collected during previous SMC and Bight regional monitoring programs to capture a greater level of detail about the most prevalent types of plastic items. The plastics data that will be collected for the Bay Debris Study were categorized according to major plastics categories and examples of items within each category are as follows:

- Bags and Packaging Materials
 - o Single use bags, food wrapper, Styrofoam pellets, etc.
- Food Service
 - o Sport drink bottles, Styrofoam cups, bottle caps, etc.
- Household
 - o Sports balls, synthetic fabric clothing, CDs/DVDs, etc.
- Toxics
 - o Lighters, cigarette butts, pens or markers, etc.
- Miscellaneous
 - o Balloons, foam balls, PVC pipe, etc.

Additional details on the specific plastic item descriptions and size categories are provided in Appendices C, E, F, and G. The primary data analyses that will be performed to answer the study questions include the following:

Data Analyses for Study Question 1.

1. What are the abundance and volume of plastics by category, item description, and size categories for each habitat type?
2. Are the average and total abundance and volume of plastics different in each habitat between survey events?
3. How do the abundance, category, item description, and volume of plastics in trash skimmers change over the study period?

Data Analyses for Study Question 2.

1. What percent of labeled plastic items were found following a storm event?
2. How does the percent of items found vary between types of plastic items?

3. What is the average distances traveled by a plastic item following storm events?

Data Analyses for Study Question 3.

1. What proportion of fish caught have debris ingested using a presence/absence approach?
2. What is the average number of plastic pieces ingested within fish according to species and body size?
3. What are the total numbers of plastic pieces ingested according to color?

Proposed statistical methodologies include cumulative distribution frequency curves, comparison of averages including rank-sum and analysis of variance, linear and logistical regression, and correlative analyses including Spearman-Rank or Kendall Tau. All data collected will be summarized in tables included as an appendix to the study report.

7.0 DATA QUALITY ASSURANCE AND QUALITY CONTROL

Data quality assurance and quality control guidelines have been developed for the Bay Debris Study to ensure that data generated is representative and reliable for supporting management decisions. The QA/QC guidelines for debris monitoring include:

- **Development of standard operating procedures (SOPs):** The QA/QC procedures for all habitat data collection and laboratory analyses will include the use of Standard Operating Procedures to establish consistent guidance for all the project partners that perform data collection activities. The SOP prepared for this study provides detailed step-by-step instructions for field data collection, laboratory analyses and performance audits. SOPs will provide a reference for field personnel during field activities, and should be reviewed prior to field events in order to maintain consistent methodology.

Table 7-1. Summary of standard operating procedures for data collection activities.

Habitat or Study Focus	Data Collection Method	SOP Guidance Document
Water Column	Bight '13 Trawl, Boerger 2010	Bight '13 CIA Field Operations Manual
Rip-Rap	NOAA Shoreline Survey	Intertidal Habitat Rip Rap Survey SOP, August 2014
Mudflat	NOAA Shoreline Survey	Intertidal Habitat Rip Rap Survey SOP, August 2014
Salt Marsh	NOAA Shoreline Survey	Intertidal Habitat Rip Rap Survey SOP, August 2014
Sandy Beach	NOAA Shoreline Survey	Intertidal Habitat Sandy Beach Survey SOP, August 2014
Riverine	Bight '13 Debris	Riverine Habitat Survey SOP, August 2014
Marina Skimmers	This Study	Port of San Diego Marina Trash Skimmer Study
Wet Weather Tracking	This Study	Talley 2014
Fish Gut	Bight '13 Trawl, Boerger 2010	Boerger 2010
Quality Assurance	This Study	Performance Evaluation Guidance for Data Collection Activities

- **Completion of pre-project field based training events:** Training will focus on establishing consistency in data collection activities among all field personnel. Training will include instruction in proper field sampling methods, item identification, sampling and preservation procedures, and health and safety precautions. Field teams will perform intercalibration exercises prior to collecting samples to evaluate whether the requirements outlined in the field SOPs are understood by all field personnel.

Site captains will be appointed for each field team performing intertidal and riverine habitat assessments. These site captains will go through in depth training of all field

assessment requirements, item identification, data quality requirements, and site orientation. Field teams will be equipped with field notebooks and supplies, and site captains are required to prepare these items before each field event. Field equipment will be checked for proper performance prior to use.

- **Vessel positioning field forms.** Trawl sample tracks will be performed as to pass within approximately 10 m of the intended target collection location using a digital GPS unit with sites coordinates pre-programmed. The boat captain or field team leader on the boat will be responsible for accurate occupation of the sampling sites and will maintain a record of all station occupation and sampling event data. The data required to be recorded for every trawl is described in Appendix A. The Water Column Habitat Trawl project leader will submit station occupation and sampling event data in electronic format to the Quality Assurance Administrator.
- **Distribution of data collection guides and site maps for field teams:** A field guide will be distributed to all field teams which includes a cross reference chart with photos to identify debris. Volunteers will study this chart so that all debris items are identified consistently during field assessments. It will also be available for volunteers to crosscheck items for which they might be uncertain about the correct category.
- **Field team performance audits:** Routine QC checks of the field team data collection methodology and performance will be conducted using a tiered approach. The performance audit process consists of an initial evaluation by the designated regional team leader when field teams begin the data collection activities followed by periodic audits conducted by the site captains. The goal of the performance audits is to identify potential problems at the onset of data collection activities and maintain a consistent level of oversight during the sampling period as data sets are generated. Following the pre-season training event, the regional team leader conducts a performance audit of the field teams during the first day of data collection activities. Thereafter, the responsibility of maintaining data quality is managed by the site captains who's goal is to completed an auditor of field crews for at least 1 site per sample batch or 10 percent of the field team's sites, whichever is more, to note and provide instruction on areas of inconsistency with SOP methods.
- **Site verification requirements (site and survey area accuracy):** Field teams will be given GPS coordinates for each site prior to field events. In order to maintain accuracy in site identification, field teams are required to record GPS coordinates for each site on the field sheet. This will be cross checked against the original GPS coordinates in order to verify that the correct site was assessed. To ensure accuracy in the transect area, field teams are also required to measure the length and width of each transect and include this information on the field sheets.
- **Site audits to evaluate data collection thoroughness (data accuracy):** A minimum of 10 percent of sites will be randomly selected for a site audit. Team leaders will return to the site to verify that all debris items have been collected and the GPS location for the site is accurate.

- **Duplicate counts of collected items (data precision):** Macrodebris and mesodebris collected during intertidal field assessments and trawl water column assessments will be reanalyzed at the lab. Debris will be sorted by type and recounted for each size category. The results should be compared to the field data sheets for each site for quality assurance purposes, however, it is recognized that quantities could be skewed by the breakup of debris during the transportation process.

In light of the fact that data quality objectives have not been developed for debris surveys, variations of more than 30 percent in any portion of the QA/QC analyses would be sufficient to flag that portion of the data. If flagged data is identified during QA/QC reviews, data quality issues will be discussed and agreed upon by the workgroup, and based on the severity of the QA/QC issues may include re-collecting data.

- **Data analysis and reporting:** Following initial field data collection, a QA/QC review of all raw data and field sheets will be conducted by the project partners. Data collected during field surveys and laboratory analyses will be reviewed by the site captains and regional team leaders. Field forms will be reviewed by the site captains following each site survey and regional team leaders will perform random checks of the field forms for completeness. Once field forms have been reviewed and the information is considered complete, the raw data will be entered into a computer database for further review and data validation, preferably in the SWAMP database if appropriate fields for data exist. A 100 percent check of this data against the field sheets will be performed preceding any data analysis. Any data analyses and associated conclusions included in a final report will also go through a 100 percent QA check.

8.0 INFORMATION MANAGEMENT PLAN

The San Diego Bay Debris Study is funded, in part, by SWAMP and is a collaboration between many different stakeholders of San Diego Bay watershed in coordination with the Bight '13 debris regional monitoring program. The study provides a unique challenge for collecting and organizing the data among the different stakeholders in a comparable way; therefore a data/information management plan is crucial for this study. The San Diego Bay Debris Study will follow the information management plan for Bight '13 (Bight '13 Information Management Committee) and the SWAMP database management plan (SWAMP data management plan).

The Bight '13 Information Management Technical Committee is responsible for creating Standardized Data Transfer Protocols (SDTPs) to ensure data comparability and ease of data analyses for the Bight program. The Bight '13 information management plan includes SDTPs for the Bight '13 Debris Study but does not fully address the information management needs for the San Diego Bay Debris Study.

According to the information management plan for Bight '13, the information management needs to occur on several levels: (1) a process must be developed to ensure the quality, compatibility, and timeliness of the data each organization collects, (2) the data must be readily available for review, analysis, and interpretation, and (3) the data must be made available to other interested organizations and the general public. The following major functions are described in the Information Management Plan (Bight '13 Information Management Committee) which will be followed by the San Diego Bay Debris Study:

1. The Standardized Data Transfer Protocols each participating agency will use to transfer data from their internal Information Management System to the Bight'13 Information Management System.
2. The data submission process for submitting data to the Bight'13 Information Management Officer.
3. The technical guidelines of how the data will be organized in the centralized Bight'13 database.
4. The milestones and mechanisms by which the data will be made accessible to project participants, other organizations, and the general public.

Because the San Diego Debris Study is supported by SWAMP funds awarded to the San Diego Water Board, data management also has to follow SWAMP's data management requirements. Data generated from this study will be stored in the SWAMP database. Field crews will be responsible for entering all field generated data into the database. In cases where laboratory results will be created, results from the laboratory analyses will be uploaded into the SWAMP database by the lab analysts with the help of the SWAMP database management team. It is expected that the data will also be uploaded to the California Environmental Data Exchange Network (CEDEN). The SWAMP Database Manager and support staff will follow their SOPs for data management, including record keeping and tracking, document control, and data handling. They will perform all QA/QC on data before entering into the SWAMP Permanent database.

Standard Data Transfer Protocols (SDTPs):

Field sampling data sheets will be prepared for debris assessments for the riverine habitats, the water columns habitats, and the intertidal habitats. The SWAMP database management team will build the SDTPs for the San Diego Bay Debris Study based on the field sampling data sheets. The SDTPs will be compatible with the Bight '13 information management plan. Meta data, field data, and lab data (when available) will be stored in the SWAMP database which is organized through a relational structure.

Submission Process

Field crew leaders and lab crew leaders are responsible for compiling the data into the STDP tables. They are also responsible for the QA/QC checks on the data prior to its submission to the SWAMP database.

Database

The data from the San Diego Bay Debris Study will be stored in the SWAMP database. These data will then be uploaded into CEDEN and will not be stored in the Bight '13 centralized database. However, the program managers for the San Diego Bay Debris Study will coordinate with the Information Management Officer for Bight '13.

Accessibility to Data

The data from the San Diego Bay Debris Study will be submitted to CEDEN by the SWAMP data management team and will be available on the CEDEN website to the public.

The program managers for the San Diego Bay Debris Study will oversee the implementation of the information/data management plan.

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APPENDIX A
Proposed Locations for San Diego Bay Debris Sample Collection

APPENDICIES

Habitat	Segment ID	Latitude	Longitude	Waterbody Name	Sample Type	Sample Status
Mudflat	9	32.64759	-117.11119	San Diego Bay	NOAA Method	New Sample
Mudflat	26	32.64782	-117.11033	San Diego Bay	NOAA Method	New Sample
Mudflat	48	32.64813	-117.10922	San Diego Bay	NOAA Method	New Sample
Mudflat	66	32.64879	-117.10874	San Diego Bay	NOAA Method	New Sample
Mudflat	73	32.64908	-117.1086	San Diego Bay	NOAA Method	New Sample
Mudflat	95	32.64664	-117.11515	San Diego Bay	NOAA Method	New Sample
Mudflat	100	32.64671	-117.1149	San Diego Bay	NOAA Method	New Sample
Mudflat	115	32.64322	-117.1155	San Diego Bay	NOAA Method	New Sample
Mudflat	136	32.64042	-117.11508	San Diego Bay	NOAA Method	New Sample
Mudflat	187	32.63842	-117.11422	San Diego Bay	NOAA Method	New Sample
Mudflat	195	32.63818	-117.11399	San Diego Bay	NOAA Method	New Sample
Mudflat	207	32.63795	-117.11344	San Diego Bay	NOAA Method	New Sample
Mudflat	212	32.63783	-117.11322	San Diego Bay	NOAA Method	New Sample
Mudflat	243	32.63744	-117.11166	San Diego Bay	NOAA Method	New Sample
Mudflat	249	32.63565	-117.10816	San Diego Bay	NOAA Method	New Sample
Mudflat	266	32.63504	-117.10761	San Diego Bay	NOAA Method	New Sample
Mudflat	286	32.63426	-117.1071	San Diego Bay	NOAA Method	New Sample
Mudflat	296	32.63385	-117.10689	San Diego Bay	NOAA Method	New Sample
Mudflat	302	32.6336	-117.10676	San Diego Bay	NOAA Method	New Sample
Mudflat	327	32.60726	-117.12955	San Diego Bay	NOAA Method	New Sample
Mudflat	341	32.60689	-117.12895	San Diego Bay	NOAA Method	New Sample
Mudflat	353	32.60657	-117.12844	San Diego Bay	NOAA Method	New Sample
Mudflat	383	32.6058	-117.12713	San Diego Bay	NOAA Method	New Sample
Mudflat	393	32.60556	-117.12668	San Diego Bay	NOAA Method	New Sample
Mudflat	401	32.60538	-117.12631	San Diego Bay	NOAA Method	New Sample
Mudflat	423	32.60485	-117.12532	San Diego Bay	NOAA Method	New Sample
Mudflat	440	32.60424	-117.1248	San Diego Bay	NOAA Method	New Sample
Mudflat	468	32.60313	-117.1241	San Diego Bay	NOAA Method	New Sample
Mudflat	480	32.60264	-117.12384	San Diego Bay	NOAA Method	New Sample
Mudflat	491	32.60219	-117.12359	San Diego Bay	NOAA Method	New Sample

APPENDICIES

Habitat	Segment ID	Latitude	Longitude	Waterbody Name	Sample Type	Sample Status
Riprap	55	32.70558	-117.23657	San Diego Bay	NOAA Method	New Sample
Riprap	58	32.70636	-117.23682	San Diego Bay	NOAA Method	New Sample
Riprap	63	32.71514	-117.23323	San Diego Bay	NOAA Method	New Sample
Riprap	72	32.71474	-117.23337	San Diego Bay	NOAA Method	New Sample
Riprap	114	32.71089	-117.22943	San Diego Bay	NOAA Method	New Sample
Riprap	141	32.71606	-117.22237	San Diego Bay	NOAA Method	New Sample
Riprap	150	32.71816	-117.22036	San Diego Bay	NOAA Method	New Sample
Riprap	151	32.71842	-117.22033	San Diego Bay	NOAA Method	New Sample
Riprap	191	32.72865	-117.20668	San Diego Bay	NOAA Method	New Sample
Riprap	242	32.72468	-117.20852	San Diego Bay	NOAA Method	New Sample
Riprap	244	32.72474	-117.20789	San Diego Bay	NOAA Method	New Sample
Riprap	245	32.72477	-117.20757	San Diego Bay	NOAA Method	New Sample
Riprap	260	32.72508	-117.20278	San Diego Bay	NOAA Method	New Sample
Riprap	276	32.72505	-117.19766	San Diego Bay	NOAA Method	New Sample
Riprap	280	32.72499	-117.19638	San Diego Bay	NOAA Method	New Sample
Riprap	286	32.72485	-117.19447	San Diego Bay	NOAA Method	New Sample
Riprap	388	32.73515	-117.21118	San Diego Bay	NOAA Method	New Sample
Riprap	465	32.72525	-117.2115	San Diego Bay	NOAA Method	New Sample
Riprap	473	32.72558	-117.20897	San Diego Bay	NOAA Method	New Sample
Riprap	498	32.68519	-117.16378	San Diego Bay	NOAA Method	New Sample
Riprap	544	32.69083	-117.16439	San Diego Bay	NOAA Method	New Sample
Riprap	651	32.7031	-117.18087	San Diego Bay	NOAA Method	New Sample
Riprap	700	32.7045	-117.16617	San Diego Bay	NOAA Method	New Sample
Riprap	718	32.70423	-117.16119	San Diego Bay	NOAA Method	New Sample
Riprap	739	32.70711	-117.16857	San Diego Bay	NOAA Method	New Sample
Riprap	771	32.70662	-117.23687	San Diego Bay	NOAA Method	New Sample
Riprap	826	32.72087	-117.22708	San Diego Bay	NOAA Method	New Sample
Riprap	828	32.72111	-117.22747	San Diego Bay	NOAA Method	New Sample
Riprap	907	32.72693	-117.17567	San Diego Bay	NOAA Method	New Sample
Riprap	931	32.68047	-117.17076	San Diego Bay	NOAA Method	New Sample
Riprap	942	32.69853	-117.1682	San Diego Bay	NOAA Method	New Sample
Riprap	968	32.70326	-117.18093	San Diego Bay	NOAA Method	New Sample
Riprap	1028	32.65119	-117.12039	San Diego Bay	NOAA Method	New Sample
Riprap	1033	32.64986	-117.1201	San Diego Bay	NOAA Method	New Sample
Riprap	1042	32.64785	-117.11922	San Diego Bay	NOAA Method	New Sample
Riprap	1055	32.65005	-117.10988	San Diego Bay	NOAA Method	New Sample
Riprap	1108	32.62451	-117.10553	San Diego Bay	NOAA Method	New Sample
Riprap	1126	32.62533	-117.10177	San Diego Bay	NOAA Method	New Sample
Riprap	1131	32.62405	-117.10125	San Diego Bay	NOAA Method	New Sample
Riprap	1135	32.62302	-117.10084	San Diego Bay	NOAA Method	New Sample
Riprap	1137	32.62251	-117.10063	San Diego Bay	NOAA Method	New Sample
Riprap	1138	32.62225	-117.10053	San Diego Bay	NOAA Method	New Sample
Riprap	1185	32.61957	-117.10061	San Diego Bay	NOAA Method	New Sample
Riprap	1211	32.6137	-117.10161	San Diego Bay	NOAA Method	New Sample
Riprap	1601	32.60043	-117.11363	San Diego Bay	NOAA Method	New Sample
Riprap	1636	32.60126	-117.11205	San Diego Bay	NOAA Method	New Sample

APPENDICIES

Habitat	Segment ID	Latitude	Longitude	Waterbody Name	Sample Type	Sample Status
Salt Marsh	719	32.65728	-117.1085	San Diego Bay	NOAA Method	New Sample
Salt Marsh	893	32.65647	-117.10839	San Diego Bay	NOAA Method	New Sample
Salt Marsh	1569	32.65323	-117.10708	San Diego Bay	NOAA Method	New Sample
Salt Marsh	1902	32.60955	-117.10221	San Diego Bay	NOAA Method	New Sample
Salt Marsh	1917	32.61017	-117.1019	San Diego Bay	NOAA Method	New Sample
Salt Marsh	1939	32.61109	-117.10145	San Diego Bay	NOAA Method	New Sample
Salt Marsh	1973	32.64876	-117.10767	San Diego Bay	NOAA Method	New Sample
Salt Marsh	2677	32.64613	-117.11628	San Diego Bay	NOAA Method	New Sample
Salt Marsh	2827	32.64579	-117.10711	San Diego Bay	NOAA Method	New Sample
Salt Marsh	3146	32.64491	-117.11691	San Diego Bay	NOAA Method	New Sample
Salt Marsh	3628	32.64419	-117.10326	San Diego Bay	NOAA Method	New Sample
Salt Marsh	3703	32.64405	-117.10443	San Diego Bay	NOAA Method	New Sample
Salt Marsh	4358	32.64307	-117.10922	San Diego Bay	NOAA Method	New Sample
Salt Marsh	4618	32.64283	-117.10495	San Diego Bay	NOAA Method	New Sample
Salt Marsh	4777	32.64251	-117.1123	San Diego Bay	NOAA Method	New Sample
Salt Marsh	4951	32.64242	-117.10601	San Diego Bay	NOAA Method	New Sample
Salt Marsh	5162	32.64215	-117.10559	San Diego Bay	NOAA Method	New Sample
Salt Marsh	5218	32.64198	-117.11102	San Diego Bay	NOAA Method	New Sample
Salt Marsh	5874	32.64023	-117.10887	San Diego Bay	NOAA Method	New Sample
Salt Marsh	5932	32.63997	-117.10823	San Diego Bay	NOAA Method	New Sample
Salt Marsh	6455	32.63808	-117.10736	San Diego Bay	NOAA Method	New Sample
Salt Marsh	6579	32.63766	-117.10906	San Diego Bay	NOAA Method	New Sample
Salt Marsh	6672	32.63739	-117.10916	San Diego Bay	NOAA Method	New Sample
Salt Marsh	7413	32.63256	-117.10411	San Diego Bay	NOAA Method	New Sample
Salt Marsh	7426	32.63257	-117.10272	San Diego Bay	NOAA Method	New Sample
Salt Marsh	7481	32.63244	-117.10133	San Diego Bay	NOAA Method	New Sample
Salt Marsh	8354	32.61627	-117.11215	San Diego Bay	NOAA Method	New Sample
Salt Marsh	8489	32.61609	-117.09862	San Diego Bay	NOAA Method	New Sample
Salt Marsh	8535	32.61589	-117.10853	San Diego Bay	NOAA Method	New Sample
Salt Marsh	9094	32.61425	-117.11064	San Diego Bay	NOAA Method	New Sample

APPENDICIES

Habitat	Segment ID	Latitude	Longitude	Waterbody Name	Sample Type	Sample Status
Sandy Beach	140	32.71026	-117.23675	San Diego Bay	NOAA Method	New Sample
Sandy Beach	165	32.70916	-117.23695	San Diego Bay	NOAA Method	New Sample
Sandy Beach	232	32.72852	-117.20904	San Diego Bay	NOAA Method	New Sample
Sandy Beach	253	32.68542	-117.23525	San Diego Bay	NOAA Method	New Sample
Sandy Beach	266	32.7005	-117.17340	San Diego Bay	NOAA Method	New Sample
Sandy Beach	318	32.69005	-117.16459	San Diego Bay	NOAA Method	New Sample
Sandy Beach	322	32.68987	-117.16453	San Diego Bay	NOAA Method	New Sample
Sandy Beach	830	32.71401	-117.20605	San Diego Bay	NOAA Method	New Sample
Sandy Beach	946	32.71468	-117.20003	San Diego Bay	NOAA Method	New Sample
Sandy Beach	959	32.71467	-117.1991	San Diego Bay	NOAA Method	New Sample
Sandy Beach	1257	32.70439	-117.22305	San Diego Bay	NOAA Method	New Sample
Sandy Beach	1330	32.7069	-117.22055	San Diego Bay	NOAA Method	New Sample
Sandy Beach	1520	32.71205	-117.21275	San Diego Bay	NOAA Method	New Sample
Sandy Beach	1538	32.7124	-117.21189	San Diego Bay	NOAA Method	New Sample
Sandy Beach	1748	32.60426	-117.10727	San Diego Bay	NOAA Method	New Sample
Sandy Beach	1793	32.60558	-117.10545	San Diego Bay	NOAA Method	New Sample
Sandy Beach	2062	32.6235	-117.129	San Diego Bay	NOAA Method	New Sample
Sandy Beach	2475	32.65045	-117.14499	San Diego Bay	NOAA Method	New Sample
Sandy Beach	2491	32.64988	-117.14447	San Diego Bay	NOAA Method	New Sample
Sandy Beach	2529	32.6483	-117.14374	San Diego Bay	NOAA Method	New Sample
Sandy Beach	2551	32.64736	-117.14337	San Diego Bay	NOAA Method	New Sample
Sandy Beach	2553	32.64727	-117.14334	San Diego Bay	NOAA Method	New Sample
Sandy Beach	2606	32.64509	-117.14221	San Diego Bay	NOAA Method	New Sample
Sandy Beach	2703	32.64119	-117.14017	San Diego Bay	NOAA Method	New Sample
Sandy Beach	2750	32.63927	-117.13909	San Diego Bay	NOAA Method	New Sample
Sandy Beach	2774	32.63826	-117.13865	San Diego Bay	NOAA Method	New Sample
Sandy Beach	2795	32.63792	-117.13955	San Diego Bay	NOAA Method	New Sample
Sandy Beach	2808	32.63779	-117.1402	San Diego Bay	NOAA Method	New Sample
Sandy Beach	2881	32.63557	-117.1403	San Diego Bay	NOAA Method	New Sample
Sandy Beach	3010	32.63052	-117.13759	San Diego Bay	NOAA Method	New Sample

APPENDICIES

Habitat	Segment ID	Latitude	Longitude	Waterbody Name	Sample Type	Sample Status
Water Column	WC1	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC2	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC3	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC4	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC5	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC6	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC7	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC8	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC9	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC10	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC11	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC12	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC13	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC14	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC15	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC16	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC17	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC18	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC19	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC20	TBD	TBD	San Diego Bay	Trawl	Resample
Water Column	WC21	TBD	TBD	San Diego Bay	Trawl	Resample

Habitat	Segment ID	Latitude	Longitude	Waterbody Name	Sample Type	Sample Status
Marinas	MTS1	32.723459	-117.224659	Pt. Loma Marina	Marina Trash Skimmers	New Sample
Marinas	MTS10	32.726707	-117.208384	Harbor Island West Marina	Marina Trash Skimmers	New Sample
Marinas	MTS18	32.715079	-117.230096	Half Moon Marina	Marina Trash Skimmers	New Sample
Marinas	MTS24	32.6505	-117.108768	Pier 32 Marina	Marina Trash Skimmers	New Sample

APPENDICIES

Habitat	Segment ID	Latitude	Longitude	Waterbody Name	Sample Type	Sample Status
Riverine	SMC01258	32.64950	-117.05887	Sweetwater River	Bight '13	Resample
Riverine	SMC17918	32.66304	-117.03173	Sweetwater River	Bight '13	Resample
Riverine	WCAP99-1014	32.83213	-116.72650	Sweetwater River	Bight '13	Resample
Riverine	SMC01962	32.66067	-117.03919	Sweetwater River	Bight '13	Resample
Riverine	SMC06458	32.66902	-117.01724	Sweetwater River	Bight '13	Resample
Riverine	SMC06714	32.67579	-117.00604	Sweetwater River	Bight '13	Resample
Riverine	SMC08426	32.65071	-117.05482	Sweetwater River	Bight '13	Resample
Riverine	SMC09162	32.84088	-116.70988	Sweetwater River	Bight '13	Resample
Riverine	SMC16266	32.81856	-116.75313	Sweetwater River	Bight '13	Resample
Riverine	SMC14218	32.82998	-116.73604	Sweetwater River	Bight '13	Resample
Riverine	SMC23495	32.83382	-116.72302	Sweetwater River	Bight '13	Resample
Riverine	SMC05146	32.84458	-116.61367	Sweetwater River	Bight '13	Resample
Riverine	CC-SD8(1)	32.70490	-117.12115	Chollas Creek	Bight '13	Resample
Riverine	CC-NF54	32.74136	-117.08349	Chollas Creek	Bight '13	Resample
Riverine	RCC3	TBD	TBD	Chollas Creek	Bight '13	Resample
Riverine	RCC4	TBD	TBD	Chollas Creek	Bight '13	Resample
Riverine	RCC5	TBD	TBD	Chollas Creek	Bight '13	Resample
Riverine	RCC6	TBD	TBD	Chollas Creek	Bight '13	Resample
Riverine	RCC7	TBD	TBD	Chollas Creek	Bight '13	Resample
Riverine	RCC8	TBD	TBD	Chollas Creek	Bight '13	Resample
Riverine	RCC9	TBD	TBD	Chollas Creek	Bight '13	Resample
Riverine	RCC10	TBD	TBD	Chollas Creek	Bight '13	Resample
Riverine	SMC04330	32.61428	-117.03332	Otay River	Bight '13	Resample
Riverine	OR-TWAS-1	32.58846	-117.07168	Otay River	Bight '13	Resample
Riverine	ROR1	32.59021	-117.09018	Otay River	Bight '13	New sample
Riverine	ROR2	32.59021	-117.08283	Otay River	Bight '13	New sample
Riverine	ROR3	32.59000	-117.08375	Otay River	Bight '13	New sample
Riverine	ROR4a	32.59072	-117.06206	Otay River	Bight '13	New sample
Riverine	ROR4b	32.59067	-117.06247	Otay River	Bight '13	New sample
Riverine	ROR7	32.59126	-117.0345	Otay River	Bight '13	New sample
Riverine	ROR10	32.59236	-117.00540	Otay River	Bight '13	New sample
Riverine	ROR11	32.59095	-117.07958	Otay River	Bight '13	New sample
Riverine	ROR13	32.59428	-117.09272	Otay River	Bight '13	New sample
Riverine	ROR14	32.59068	-117.07299	Otay River	Bight '13	New sample
Riverine	ROR15	32.59155	-117.07528	Otay River	Bight '13	New sample

APPENDIX B
Trawling Field Data Forms

TRAWL EVENTS

[illegible]

APPENDIX C
Trawl Debris Data Forms

Water Columnn Trawl Debris Form

Agency: _____

Samplers Initials: _____

Page _____ of _____

Station: _____

Trawl #: _____ Check if trawl sample collected

Date: _____

Time: _____ Check if no macrodebris or mesodebris present in sample

Comments:

MACRODEBRIS WITH IDENTIFIABLE LABELS PROVIDE BRAND NAME OR MANUFACTURER

Bags and Packaging	Macrodebris Count	Mesodebris Count
Bags (single use plastic)		
Bags (takeout or other)		
Bags (large/retail)		
Food Wrapper		
Other Wrapper		
Pet Waste Bags		
Plastic straw wrapper		
Styrofoam pieces		
Styrofoam pellets		
Soft Plastic Pieces		
Hard Plastic Pieces		
Other (comment required)		
Food Service	Macrodebris Count	Mesodebris Count
Juice container		
Bottle Caps		
Milk Cartons		
Water Bottles		
Sports drink bottle		
Soda bottle		
Straws		
Lid		
Cups		
Utensils		
Styrofoam Container		
Styrofoam Cup		
6-pack rings		
Waxed Paper Cups		
Waxed Plates		
Other (comment required)		

Water Columnn Trawl Debris Form

Agency: _____

Samplers Initials: _____

Page _____ of _____

Miscellaneous	Macrodebris Count	Mesodebris Count
Packaging Ribbon		
Polypropylene Rope		
Fishing Line/Net		
Balloons (mylar)		
Balloons (latex)		
Roping/Ties		
Bandage/Bandaid		
Cigarette Box/Wrapper		
Rubber pieces		
Foam balls		
Other (comment required)		
Household	Macrodebris Count	Mesodebris Count
Storage Containers		
Shampoo Bottles		
Toothbrushes		
CDs / DVDs		
Mechanical Pencils		
Pipe (PVC)		
Tarp		
Furniture		
Sports balls		
Tape		
Toys		
Clothing (synthetic fabric)		
Other (comment required)		
Toxic	Macrodebris Count	Mesodebris Count
Syringes or Pipettes		
Medical Devices		
Lighters		
Computers		
Keyboard		
Phones		
E-waste		
Cigarette Butts		
Chemical Containers		
Pens or Markers		
Bleach Bottles		
Cleaning Bottles		
Other (comment required)		

Water Columnn Trawl Debris Form

STATION ID: _____

LAB TECH INITIALS: _____

DATE: _____

TIME: _____

If container used to measure not gallon please provide units. Values must be converted to Liters (L) on right

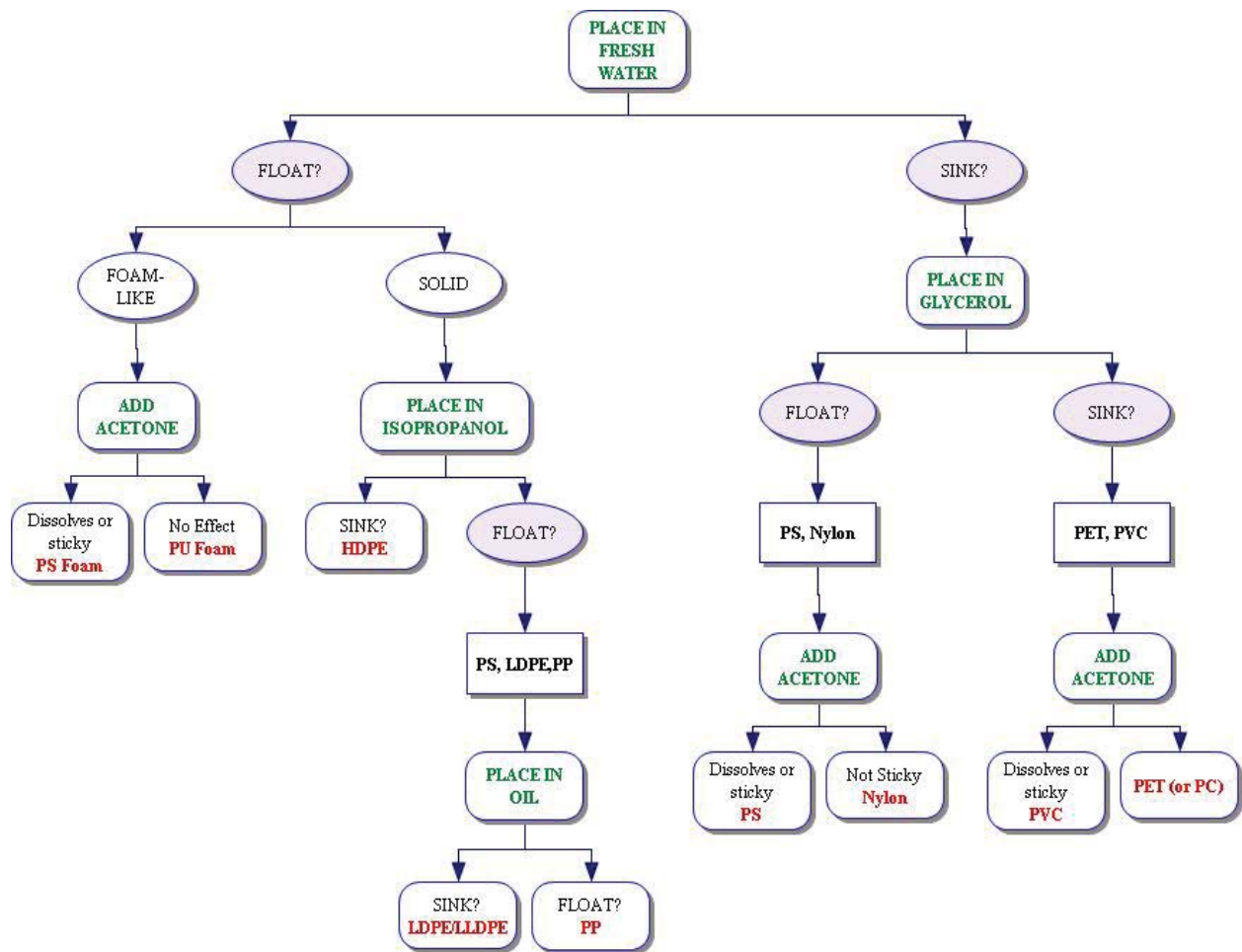
Macrodebris Category	VOLUME	UNITS	VOLUME (L)
Bags and Packaging			
Toxic			
Miscellaneous			
Food Service			
Household			
TOTAL VOLUME:		—	
Mesodebris Category	VOLUME	UNITS	VOLUME (L)
Bags and Packaging			
Toxic			
Miscellaneous			
Food Service			
Household			
TOTAL VOLUME:		—	
OVERALL VOLUME	VOLUME	UNITS	VOLUME (L)
Bags and Packaging			
Toxic			
Miscellaneous			
Food Service			
Household			
TOTAL VOLUME:		—	

If container used to measure not gallon please provide units. Values must be converted to Liters (L) on right

Size	VOLUME	UNITS	VOLUME (L)
>25 cm			
25 mm - 5 mm			
TOTAL VOLUME:		—	

Comments:

APPENDIX D
Andrady Method for Microdebris Plastic Type Determination

Andrady Method for Plastic Type Determination

APPENDIX E
Intertidal Habitat Debris Assessment Field Forms

Intertidal Debris Assessment Worksheet: *Trash Tally*

STATION ID: _____ DATE: _____

SITE CAPTAIN INITIALS: _____ TIME: _____

SAMPLER NAME: _____ GPS: Start _____

SAMPLER NAME: _____ GPS: End _____

SAMPLER NAME: _____

CONDITION CATEGORY				
Trash Assessment Parameter	Optimal	Sub optimal	Marginal	Poor
Aesthetic Condition	No to small visual impact	Small to moderate visual impact from trash present.	Moderate to substantial impact from trash present.	Substantial to severe visual impact from trash present.
Rate impact to aestheric condition of site based on visable trash (<i>rate higher or lower within each category according to condition. The higher number within each category reflects decreasing aesthetic condition</i>)	1 _____	6 _____	11 _____	16 _____
	2 _____	7 _____	12 _____	17 _____
	3 _____	8 _____	13 _____	18 _____
	4 _____	9 _____	14 _____	19 _____
	5 _____	10 _____	15 _____	20 _____
SITE CHARACTERIZATION				
Check if no data collected:	Number of photos taken:	Provide explanation for why no data collected:		
Site Dimensions:	Width _____ (meters)	Length _____ (meters)		
Habitat Type	MARSH	MUDFLAT	BEACH	
	WRACKLINE	RIP-RAP		
Substrate Characteristics	ROCKY	SAND	MUD	VEGETATED
	(Y / N)	(Y / N)	(Y / N)	(Y / N)
Access:	Parking Lot (Y / N)	Fence (Y / N)		
Select all features located near the site	Roadway (Y / N)	Heavy or thick vegetation (Y / N)		
	Picnic Area (Y / N)	Walkway (Y / N)		
	Restricted Access Maintenance Road (Y / N)	Bike Path (Y / N)		
Homeless Encampment:	Within Transect (Y / N)	Distance from Transect _____ (Meters)		
Outfall:	Within Transect (Y / N)	Distance from Transect _____ (Meters)		
Physical Characteristics	Wind Direction: _____ (degrees)	Wind Speed: _____ (meters per second)		
	Tide Height: _____ (meters)	Tide Direction: (flood / ebb)		
Comments:				

Intertidal Debris Assessment Worksheet: *Trash Tally*

STATION ID: _____ DATE: _____ BANK: _____	SITE CAPTAIN INITIALS _____ TIME: Start: _____ Finish: _____

	COUNTS	
Bags and Packaging	> 25 cm	25 cm - 5 mm
Bags (single use plastic)		
Bags (takeout or other)		
Bags (large/retail)		
Food Wrapper		
Other Wrapper		
Pet Waste Bags		
Plastic straw wrapper		
Styrofoam pieces		
Styrofoam pellets		
Soft Plastic Pieces		
Hard Plastic Pieces		
Other (comment required)		
Category Total		

	> 25 cm	25 cm - 5 mm
Food Service		
Juice container		
Bottle Caps		
Milk Cartons		
Water Bottles		
Sports drink bottle		
Soda bottle		
Straws		
Lid		
Cups		
Utensils		
Styrofoam Container		
Styrofoam Cup		
6-pack rings		
Waxed Paper Cups		
Waxed Plates		
Other (comment required)		
Category Total		

Check box if no debris present at site ☐

Comments:

Intertidal Debris Assessment Worksheet: *Trash Tally*

STATION ID: _____		SITE CAPTAIN INITIALS _____
Toxic	> 25 cm	25 cm - 5 mm
Syringes or Pipettes		
Medical Devices		
Lighters		
Computers		
Keyboard		
Phones		
E-waste		
Cigarette Butts		
Chemical Containers		
Pens or Markers		
Bleach Bottles		
Cleaning Bottles		
Other (comment required)		
Category Total		
Miscellaneous	> 25 cm	25 cm - 5 mm
Packaging Ribbon		
Polypropylene Rope		
Fishing Line/Net		
Balloons (mylar)		
Balloons (latex)		
Roping/Ties		
Bandage/Bandaïd		
Cigarette Box/Wrapper		
Rubber pieces		
Foam balls		
Other (comment required)		
Category Total		
	COUNTS	
Household	> 25 cm	25 cm - 5 mm
Storage Containers		
Shampoo Bottles		
Toothbrushes		
CDs / DVDs		
Mechanical Pencils		
Pipe (PVC)		
Tarp		
Furniture		
Sports balls		
Tape		
Toys		
Clothing (synthetic fabric)		
Other (comment required)		
Category Total		
GRAND TOTAL:		
Comments:		

Intertidal Debris Assessment Worksheet: *Trash Tally*

STATION ID: _____

SITE CAPTAIN INITIALS _____

DATE: _____

TIME: _____

If container used to measure not gallon please provide units. Values must be converted to Liters (L) on right

Macrodebris Category	VOLUME	UNITS	VOLUME (L)
Bags and Packaging			
Toxic			
Miscellaneous			
Food Service			
Household			
TOTAL VOLUME:		—	

Mesodebris Category	VOLUME	UNITS	VOLUME (L)
Bags and Packaging			
Toxic			
Miscellaneous			
Food Service			
Household			
TOTAL VOLUME:		—	

OVERALL VOLUME	VOLUME	UNITS	VOLUME (L)
Bags and Packaging			
Toxic			
Miscellaneous			
Food Service			
Household			
TOTAL VOLUME:		—	

If container used to measure not gallon please provide units. Values must be converted to Liters (L) on right

Size	VOLUME	UNITS	VOLUME (L)
>25 cm			
25 mm - 5 mm			
TOTAL VOLUME:		—	

Comments:

APPENDIX F
Riverine Habitat Debris Assessment Field Forms

Riverine Debris Assessment Worksheet: *Riverine Characterization*

WATERSHED: _____

DATE: _____

STREAM: _____

TIME: _____

STATION ID: _____

GPS: Start _____

SITE CAPTAIN INITIALS: _____

GPS: End _____

SAMPLER INITIALS: _____

Check box if no data collected at site ☐ (Provide explanation in comments section)		Number of photos taken: _____		
CONDITION CATEGORY				
Trash Assessment Parameter	Optimal	Sub optimal	Marginal	Poor
1. Aesthetic Condition	No to small visual impact	Small to moderate visual impact from trash present.	Moderate to substantial impact from trash present.	Substantial to severe visual impact from trash present.
Rate impact to aesthetic condition of site based on visible trash (rate higher or lower within each category according to condition. The higher number within each category reflects decreasing aesthetic condition)	1 _____	6 _____	11 _____	16 _____
	2 _____	7 _____	12 _____	17 _____
	3 _____	8 _____	13 _____	18 _____
	4 _____	9 _____	14 _____	19 _____
	5 _____	10 _____	15 _____	20 _____
Dimensions: Bank Full Width _____ (meters) Wetted Width _____ (meters) Transect Length _____ (meters)				
Stream Bed Characteristics	EARTHEN / CONCRETE (E / C)	EMERGENT VEGETATION (Y / N)	LARGE ROCKS/ COBBLE (Y / N)	SUBMERGED PLANTS (Y / N)
Stream Bank	VEGETATED / EARTHEN (V / E)	RIP-RAP (Y / N)	CONCRETE (Y / N)	SLOPED/VERTICAL (S / V)
Homeless Encampment: Within Transect (Y / N) Distance from Transect _____ (meters) (DS / US)				
Public Access:	Right Bank: _____ Easy _____ Difficult _____ Not at All Comments: _____ Left Bank: _____ Easy _____ Difficult _____ Not at All Comments: _____			
Adjacent Land Features	Near Bridge (Y / N) Fence on Bridge (Y / N) Fence height overhead (estimated) _____			
Access: Select all features located near the site	Left Bank		Right Bank	
	Fence	(Y / N)	(Y / N)	
	Heavy or thick vegetation	(Y / N)	(Y / N)	
	Roadway	(Y / N)	(Y / N)	
	Walkway	(Y / N)	(Y / N)	
	Bike Path	(Y / N)	(Y / N)	
	Parking Lot	(Y / N)	(Y / N)	
	Picnic Area	(Y / N)	(Y / N)	
	Restricted Access Maintenance Road	(Y / N)	(Y / N)	
Landuse	Residential	(Y / N)	(Y / N)	Comments:
	Commercial	(Y / N)	(Y / N)	
	Industrial	(Y / N)	(Y / N)	
	Park	(Y / N)	(Y / N)	
	Open Space	(Y / N)	(Y / N)	

Riverine Debris Assessment Worksheet: *Riverine Characterization*

STATION ID: _____

SITE CAPTAIN INITIALS _____

DATE: _____

Storm Drains Within Transect Area

Storm Drain Within Transects (Y / N) Sizes Categories (12" / 18" / 24" / 30" / 36" / 48" / 60" / > 96")

Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Storm Drains Outside of Transect Area

Storm Drain Upstream Transects (Y / N) Sizes Categories (12" / 18" / 24" / 30" / 36" / 48" / 60" / > 96")

Distance from Transect: _____ Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Distance from Transect: _____ Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Distance from Transect: _____ Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Distance from Transect: _____ Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Distance from Transect: _____ Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Distance from Transect: _____ Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Distance from Transect: _____ Size: _____ Bank: L or R Trash at Drain (None / < 10 / <50 / <100 / >100)

Comments:

Riverine Debris Assessment Worksheet: *Riverine Characterization*

STATION ID: _____		SITE CAPTAIN INITIALS _____	
DATE: _____		TIME: Start: _____	
BANK: _____		Finish: _____	
		COUNTS	
Bags and Packaging	> 25 cm	25 cm - 5 mm	
Bags (single use plastic)			
Bags (takeout or other)			
Bags (large/retail)			
Food Wrapper			
Other Wrapper			
Pet Waste Bags			
Plastic straw wrapper			
Styrofoam pieces			
Styrofoam pellets			
Soft Plastic Pieces			
Hard Plastic Pieces			
Other (comment required)			
Category Total			
Food Service	> 25 cm	25 cm - 5 mm	
Juice container			
Bottle Caps			
Milk Cartons			
Water Bottles			
Sports drink bottle			
Soda bottle			
Straws			
Lid			
Cups			
Utensils			
Styrofoam Container			
Styrofoam Cup/pieces			
6-pack rings			
Waxed Paper Cups			
Waxed Plates			
Other (comment required)			
Category Total			
Check box if no debris present at site ☐			
Comments:			

Riverine Debris Assessment Worksheet: *Riverine Characterization*

STATION ID: _____

SITE CAPTAIN INITIALS _____

Toxic	> 25 cm	25 cm - 5 mm
Syringes or Pipettes		
Medical Devices		
Lighters		
Computers		
Keyboard		
Phones		
E-waste		
Cigarette Butts		
Chemical Containers		
Pens or Markers		
Bleach Bottles		
Cleaning Bottles		
Other (comment required)		
Category Total		
Miscellaneous	> 25 cm	25 cm - 5 mm
Packaging Ribbon		
Polypropylene Rope		
Fishing Line/Net		
Balloons (mylar)		
Balloons (latex)		
Roping/Ties		
Bandage/Bandaids		
Cigarette Box/Wrapper		
Rubber pieces		
Foam balls		
Other (comment required)		
Category Total		
	COUNTS	
Household	> 25 cm	25 cm - 5 mm
Storage Containers		
Shampoo Bottles		
Toothbrushes		
CDs / DVDs		
Mechanical Pencils		
Pipe (PVC)		
Tarp		
Furniture		
Sports balls		
Tape		
Toys		
Clothing (synthetic fabric)		
Other (comment required)		
Category Total		
GRAND TOTAL:		

Riverine Debris Assessment Worksheet: *Riverine Characterization*

STATION ID: _____		SITE CAPTAIN INITIALS _____	
DATE: _____		TIME: Start: _____	
BANK: _____ Left / Right		Finish: _____	
		COUNTS	
Bags and Packaging	> 25 cm	25 cm - 5 mm	
Bags (single use plastic)			
Bags (takeout or other)			
Bags (large/retail)			
Food Wrapper			
Other Wrapper			
Pet Waste Bags			
Plastic straw wrapper			
Styrofoam pieces			
Styrofoam pellets			
Soft Plastic Pieces			
Hard Plastic Pieces			
Other (comment required)			
Category Total			
Food Service	> 25 cm	25 cm - 5 mm	
Juice container			
Bottle Caps			
Milk Cartons			
Water Bottles			
Sports drink bottle			
Soda bottle			
Straws			
Lid			
Cups			
Utensils			
Styrofoam Container			
Styrofoam Cup/pieces			
6-pack rings			
Waxed Paper Cups			
Waxed Plates			
Other (comment required)			
Category Total			
Check box if no debris present at site ☐			
Comments:			

Riverine Debris Assessment Worksheet: *Riverine Characterization*

STATION ID: _____

SITE CAPTAIN INITIALS _____

Toxic	> 25 cm	25 cm - 5 mm
Syringes or Pipettes		
Medical Devices		
Lighters		
Computers		
Keyboard		
Phones		
E-waste		
Cigarette Butts		
Chemical Containers		
Pens or Markers		
Bleach Bottles		
Cleaning Bottles		
Other (comment required)		
Category Total		
Miscellaneous	> 25 cm	25 cm - 5 mm
Packaging Ribbon		
Polypropylene Rope		
Fishing Line/Net		
Balloons (mylar)		
Balloons (latex)		
Roping/Ties		
Bandage/Bandaids		
Cigarette Box/Wrapper		
Rubber pieces		
Foam balls		
Other (comment required)		
Category Total		
	COUNTS	
Household	> 25 cm	25 cm - 5 mm
Storage Containers		
Shampoo Bottles		
Toothbrushes		
CDs / DVDs		
Mechanical Pencils		
Pipe (PVC)		
Tarp		
Furniture		
Sports balls		
Tape		
Toys		
Clothing (synthetic fabric)		
Other (comment required)		
Category Total		
GRAND TOTAL:		

Riverine Debris Assessment Worksheet: *Riverine Characterization*

STATION ID: _____

LAB TECH INITIALS: _____

DATE: _____

TIME: _____

If container used to measure not gallon please provide units. Values must be converted to Liters (L) on right

Macrodebris Category	VOLUME	UNITS	VOLUME (L)
Bags and Packaging			
Toxic			
Miscellaneous			
Food Service			
Household			
TOTAL VOLUME:		—	

Mesodebris Category	VOLUME	UNITS	VOLUME (L)
Bags and Packaging			
Toxic			
Miscellaneous			
Food Service			
Household			
TOTAL VOLUME:		—	

OVERALL VOLUME	VOLUME	UNITS	VOLUME (L)
Bags and Packaging			
Toxic			
Miscellaneous			
Food Service			
Household			
TOTAL VOLUME:		—	

If container used to measure not gallon please provide units. Values must be converted to Liters (L) on right

Size	VOLUME	UNITS	VOLUME (L)
>25 cm			
25 mm - 5 mm			
TOTAL VOLUME:		—	

Comments:

Riverine Debris Assessment Worksheet: *Riverine Characterization*

STATION ID: _____

SITE CAPTAIN INITIALS _____

DATE: _____

Large or Unmoveable Items					
ITEM 1	Right Bank	Left Bank	ITEM 2	Right Bank	Left Bank
Location:			Location:		
Description:			Description:		
ITEM 3	Right Bank	Left Bank	ITEM 4	Right Bank	Left Bank
Location:			Location:		
Description:			Description:		
ITEM 5	Right Bank	Left Bank	ITEM 6	Right Bank	Left Bank
Location:			Location:		
Description:			Description:		
ITEM 7	Right Bank	Left Bank	ITEM 8	Right Bank	Left Bank
Location:			Location:		
Description:			Description:		
ITEM 9	Right Bank	Left Bank	ITEM 10	Right Bank	Left Bank
Location:			Location:		
Description:			Description:		
Comments:					

APPENDIX G
Laboratory Forms

Debris Assessment Laboratory Worksheets

STATION ID: _____

LAB TECH INITIALS: _____

LAB ANALYSIS DATE: _____

LAB ANALYSIS TIME: _____

	COUNT		
Bags and Packaging	> 25 cm	25 cm - 5 mm	Labels/Brand Names:
Bags (single use plastic)			
Bags (takeout or other)			
Bags (large/retail)			
Food Wrapper			
Other Wrapper			
Pet Waste Bags			
Plastic straw wrapper			
Styrofoam pieces			
Styrofoam pellets			
Soft Plastic Pieces			
Hard Plastic Pieces			
Other (comment required)			
Category Total			
Food Service	> 25 cm	25 cm - 5 mm	Labels/Brand Names:
Juice container			
Bottle Caps			
Milk Cartons			
Water Bottles			
Sports drink bottle			
Soda bottle			
Straws			
Lid			
Cups			
Utensils			
Styrofoam Container			
Styrofoam Cup/pieces			
6-pack rings			
Waxed Paper Cups			
Waxed Plates			
Other (comment required)			
Category Total			

Comments:

Debris Assessment Laboratory Worksheets

STATION ID: _____

LAB TECH INITIALS: _____

Toxic	> 25 cm	25 cm - 5 mm	Labels/Brand Names:
Syringes or Pipettes			
Medical Devices			
Lighters			
Computers			
Keyboard			
Phones			
E-waste			
Cigarette Butts			
Chemical Containers			
Pens or Markers			
Bleach Bottles			
Cleaning Bottles			
Other (comment required)			
Category Total			
Miscellaneous	> 25 cm	25 cm - 5 mm	Labels/Brand Names:
Packaging Ribbon			
Polypropylene Rope			
Fishing Line/Net			
Balloons (mylar)			
Balloons (latex)			
Roping/Ties			
Bandage/Bandaïd			
Cigarette Box/Wrapper			
Rubber pieces			
Foam balls			
Other (comment required)			
Category Total			
Household	> 25 cm	25 cm - 5 mm	Labels/Brand Names:
Storage Containers			
Shampoo Bottles			
Toothbrushes			
CDs / DVDs			
Mechanical Pencils			
Pipe (PVC)			
Tarp			
Furniture			
Sports balls			
Tape			
Toys			
Clothing (synthetic fabric)			
Other (comment required)			
Category Total			
GRAND TOTAL:			

Debris Assessment Laboratory Worksheets

STATION ID: _____

LAB TECH INITIALS: _____

DATE: _____

TIME: _____

If container used to measure not gallon please provide units. Values must be converted to Liters (L) on right

Macrodebris Category	VOLUME	UNITS	VOLUME (L)
Bags and Packaging			
Toxic			
Miscellaneous			
Food Service			
Household			
TOTAL VOLUME:		_____	

Mesodebris Category	VOLUME	UNITS	VOLUME (L)
Bags and Packaging			
Toxic			
Miscellaneous			
Food Service			
Household			
TOTAL VOLUME:		_____	

OVERALL VOLUME	VOLUME	UNITS	VOLUME (L)
Bags and Packaging			
Toxic			
Miscellaneous			
Food Service			
Household			
TOTAL VOLUME:		_____	

If container used to measure not gallon please provide units. Values must be converted to Liters (L) on right

Size	VOLUME	UNITS	VOLUME (L)
>25 mm			
25 mm - 5 mm			
TOTAL VOLUME:		_____	

Comments:

Debris Assessment Laboratory Worksheets

STATION ID: _____ Initials: _____ Sample Date: _____ Sample Time: _____

If more than 1 sample, Sample No. _____ of _____ Lab Analysis Date: _____ Lab Analysis Time: _____

Size	Count	Total Count
> 4.75 mm		
4.75 mm		
2.0 mm		
1.0 mm		
0.500 mm		
0.355 mm		
Total		

If container used to measure not liters (L) please provide units. Values must be converted to Liters (L) on right

Size	Volume	Units	Volume (L)
> 4.75 mm			
4.75 mm			
2.0 mm			
1.0 mm			
0.500 mm			
0.355 mm			
Total Volume			

Colors	Count	Total Count
White		
Clear		
Blue		
Green		
Black		
Yellow		
Grey		
Pink		
Red		
Orange		
Tan		
Peach		
Total		

Comments