February 12, 2016

Via Email Only

Mr. Chris Helmer
Environmental Programs Manager
City of Imperial Beach
825 Imperial Beach Boulevard
Imperial Beach, California 91932

In reply refer to / attn:
CW-794855:WChiu

Subject: San Diego Water Board Notice of Acceptance
San Diego Bay Watershed Management Area Water Quality Improvement Plan

Mr. Helmer:

The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) received the revised final San Diego Bay Watershed Management Area (WMA) Water Quality Improvement Plan (Plan) on September 29, 2015. The revised final San Diego Bay WMA Plan was jointly submitted by the Cities of Chula Vista, Coronado, Imperial Beach, La Mesa, Lemon Grove, National City, and San Diego, the County of San Diego, the San Diego County Regional Airport Authority, and the San Diego Unified Port District (collectively San Diego Bay WMA Copermittees) after considering written comments submitted by the public and San Diego Water Board staff on the draft final San Diego Bay WMA Plan. Submittal of the San Diego Bay WMA Plan, as revised in response to comments, is required by Order No. R9-2013-0001, as amended by Order Nos. R9-2015-0001 and R9-2015-0100, NPDES No. CAS0109266, *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).

Provisions B and D of the Order describe the required elements that must be included in the Plan. The San Diego Water Board reviewed the revised final San Diego Bay WMA Plan and the comments received during the Plan revision process. On January 6, 2016, the San Diego Water Board informed the San Diego Bay WMA Copermittees that there were minor deficiencies remaining. On January 29, 2016, the San Diego Bay WMA Copermittees provided proposed corrections to the San Diego Bay WMA Plan (see Attachment 1). After reviewing the proposed corrections, the San Diego Water Board finds that the San Diego Bay WMA Plan, with the corrections proposed in Attachment 1, is in compliance with Provisions B and D of the Order. To comply with Signatory Requirement Provisions 1.k.(1)(d) and 2.n (requiring certification of the Plan) in Attachment B to the Order, a *certified* final San Diego Bay WMA Plan incorporating the corrections proposed in Attachment 1 must be submitted promptly to the San Diego Water Board. The San Diego Water Board looks forward to the San Diego Bay WMA Copermittees achieving full compliance with the Signatory Requirement Provisions of the Order upon submittal of the *certified* final San Diego Bay WMA Plan.

Based on these findings, the San Diego Water Board accepts the revised final San Diego Bay WMA Plan dated September 29, 2015 with the corrections proposed in Attachment 1. As such, the San Diego Bay WMA Copermittees should continue implementation of the strategies described therein according to the specified schedules. The San Diego Bay WMA Copermittees

are now authorized to allow exemptions to the Hydromodification Management BMP Requirements that have been identified pursuant to Provision E.3.c.(2)(d)(iii) of the Order, and implement the Alternative Compliance Program for Priority Development Projects provided under provision E.3.c.(3) of the Order within the San Diego Bay WMA.

The San Diego Bay WMA Plan, dated September 29, 2015, and the proposed corrections in Attachment 1 will be available for public review on the San Diego Water Board website until the certified final San Diego Bay WMA Plan is submitted and posted. Any person aggrieved by this San Diego Water Board action to accept the San Diego Bay WMA Plan may petition the State Water Resources Control Board to review the action in accordance with Water Code section 13320 and California Code of Regulations (CCR), title 23, section 2050, et seq. The State Water Resources Control Board must receive the petition by 5:00 p.m. within 30 days after the date of this action except if the thirtieth day falls on a Saturday, Sunday or holiday, the petition must be received no later than 5:00 p.m. on the first business day following. Copies of laws and regulations applicable to petitions are available at http://www.waterboards.ca.gov/public_notices/petitions/water_quality and are available upon request.

Please submit any written correspondence in response to this letter to SanDiego@waterboards.ca.gov. Electronic documents must be submitted as a single file, in Portable Document Format (PDF) format, and converted to text searchable format using Optical Character Recognition (OCR). All electronic documents must also include scanned copies of all signature pages; electronic signatures will not be accepted. Electronic documents submitted to the San Diego Water Board must include the following identification numbers in the header or subject line: **PIN: CW-794855:WChiu.**

Should you have any questions or comment s on this matter, please contact Wayne Chiu by phone at (619) 521-3354 or by e-mail at Wayne.Chiu@waterboards.ca.gov.

Respectfully,

David W. Gibson
Executive Officer
San Diego Regional Water Quality Control Board

Attachment 1: Proposed Corrections to the San Diego Bay WMA Plan, City of Imperial Beach Letter to San Diego Water Board dated January 29, 2016

DWG:dtb:law:wc

cc (via email): Richard Gilb, Airport Authority
Boushra Salem, City of Chula Vista
Kim Godby, City of Coronado
Joe Kuhn, City of La Mesa
Malik Tamimi, City of Lemon Grove
Kuna Muthusamy, City of National City
Clem Brown, City of San Diego
Jo Ann Weber, County of San Diego
Karen Holman, Port of San Diego

Tech Staff Info & Use	
Order No.	R9-2013-0001
NPDES No.	CAS0109266
PIN ID	794855
Regulatory Measure ID	387355

ATTACHMENT 1

Proposed Corrections to the
San Diego Bay Watershed Management Area
Water Quality Improvement Plan

City of Imperial Beach Letter
to San Diego Water Board
dated January 29, 2016

City of Imperial Beach, California
PUBLIC WORKS DEPARTMENT
825 Imperial Beach Blvd., Imperial Beach, CA 91932 Tel: (619) 423-8311 Fax: (619) 429-4861

January 29, 2016

Mr. Wayne Chiu
California Regional Water Quality Control Board, San Diego Region
2375 Northside Drive, Suite 100
San Diego, CA 92108-2700

Subject: **San Diego Bay WQIP Proposed Changes**
Recommended changes to the San Diego Bay Watershed Management Area Water Quality Improvement Plan (WQIP)

Dear Mr. Chiu:

This letter outlines the recommended changes to the San Diego Bay WQIP document that the responsible agencies in the San Diego Bay Watershed Management Area developed in collaboration with the San Diego Regional Water Quality Control Board. These proposed changes are the same as what you have already reviewed in previous draft submittals where you have suggested that the Copermittees have addressed the deficiencies in the WQIP.

Enclosed with this submittal are the redline edits from the sections in the San Diego Bay WQIP that are being updated. The updated sections include Appendix K for the Monitoring and Assessment Plan, Attachment A1 of the Monitoring and Assessment Plan that pertains to the Long-Term Receiving Water Monitoring, and updated Jurisdictional WQIP Strategies from Appendix I. Proposed changes are summarized below.

Summary of changes to the Monitoring and Assessment Program

- Added the Otay River TWAS station (OR-TWAS-1) as an additional long-term monitoring station to represent the Otay HU, in addition to the Sweetwater River station that was already proposed in the original WQIP. While monitoring has been completed at both these sites during the current Permit term already, text was added to clarify the commitment continued monitoring at these sites after the end of the current Permit term to continue collecting data.
- Added a statement that long term monitoring will occur at site SD8(1) in Chollas Creek using the Chollas Creek TMDL monitoring. In response to your comment, a description of this monitoring was added to Attachment A1, which describes receiving water monitoring procedures.

Summary of changes to jurisdictional strategies

- The cities of Chula Vista, Coronado, Imperial Beach, and La Mesa have all individually submitted revised strategies descriptions via email. My understanding is that the proposed revisions have all been considered to have successfully addressed your previous comments.

We appreciated your help in making these proposed changes. We now look forward towards working with the stakeholders in the watershed on implementing the San Diego Bay WQIP.

Sincerely,

Chris Helmer
Environmental Programs Manager, City of Imperial Beach

ATTACHMENT A1. LONG-TERM RECEIVING WATER MONITORING PROGRAM – MONITORING PLAN

San Diego Bay Watershed Management Area Water Quality Improvement Plan
Final Deliverable
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
HU	hydrologic unit
IBI	Index of Biological Integrity
ID	identification
~~LTMSm~~	~~Long Term Monitoring Stationsmeter~~
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

Acronyms and Abbreviations (continued)

Acronym or Abbreviation	Definition
NPDES	National Pollutant Discharge Elimination System
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 Watershed Management Area (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)[1]
- Rapid stream bioassessment 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 (TIE)/toxicity reduction evaluation (TRE), 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

[1] The receiving water station~~s~~ in the Pueblo HU will be monitored according to Chollas Creek TMDL Compliance. See Section ~~4.3 in San Diego Bay WMA WQIP~~ A.1.4 and Appendix C~~H~~ (Chollas ~~Goal Development~~Creek TMDL Compliance) for details.

- City of Imperial Beach
- City of La Mesa
- City of Lemon Grove
- City of National City
- Port of San Diego
- City of San Diego
- Caltrans[2]

A.1.2 Monitoring Locations

The San Diego Bay WMA RPs have completed receiving water monitoring at stations in the Sweetwater, Otay, and Pueblo hydrologic units (HU) during the current Permit term and prior to the current Permit term. ~~selected the Sweetwater River Mass Loading Station (MLS) (SR-MLS) as the long-term receiving water monitoring location.~~ To continue to the long-term data sets and to supply more information that can be used in future reevaluations of priority conditions, monitoring will continue in these three HUs during the next Permit term, as~~Location details are provided in~~ summarized in Table A1-1~~2~~. Monitoring procedures applicable to the sites in the Sweetwater and Otay HUs are described in Monitoring and Assessment Plan Attachment A, and procedures applicable to the sites in the Pueblo HU are described in The Chollas Creek TMDL Monitoring ~~and Assessment~~ Plan Attachment C. ~~-~~Further description of the Pueblo HU monitoring stations ~~are described~~is provided in Section A.1.4.

A map of the locations is presented in Figure A1-1.

Table A1-1
List of Receiving Water Monitoring Locations ~~for Nextthe MS4 Permit Term~~

Station Name	Waterbody	HU	Latitude	Longitude	Description of Applicable Monitoring Procedures
SR-MLS	Sweetwater River	Sweetwater (909)	32.650720	-117.063592	Attachment A1, Section A.1.3
OR-TWAS-1	Otay River	Otay (910)	32.588464	-117.071683	Attachment A1, Section A.1.3
SD8(1)	~~Chollas Metals and Bacteria~~	Pueblo (908)	32.70493	-117.12132	Attachment A1, Section A.1.4; Attachment C

[2] 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.

	~~TMDL~~Chollas Creek				

Figure A1-1
Receiving Water Long-Term Monitoring ~~Location~~ Stations

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A.1.3 Monitoring Methods: Sweetwater HU (909) and Otay (910) HU

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~~for the Sweetwater and Otay HU sites as ~~-~~indicated in Table A1-1 within the San Diego Bay WMA, in accordance with the MS4 Permit (Provisions D.1.b, c, and d). Further information and details of the long-term monitoring in Pueblo HU, as indicated in Table A1-1, is provided in Section A.1.4. Seasonal mobilization and demobilization activities will include the following:

- Equipment will be installed and maintained ~~at SR MLS~~ to perform flow monitoring and sampling.
- 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).
- 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 SWAMP ~~-~~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 station 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 o~~i~~n days with less than 0.1 inches of rainfall in any 24 hour period 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~~ Each 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 monitored rainfall event, and during one rainfall event on or 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 within a 24 hour period. 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.

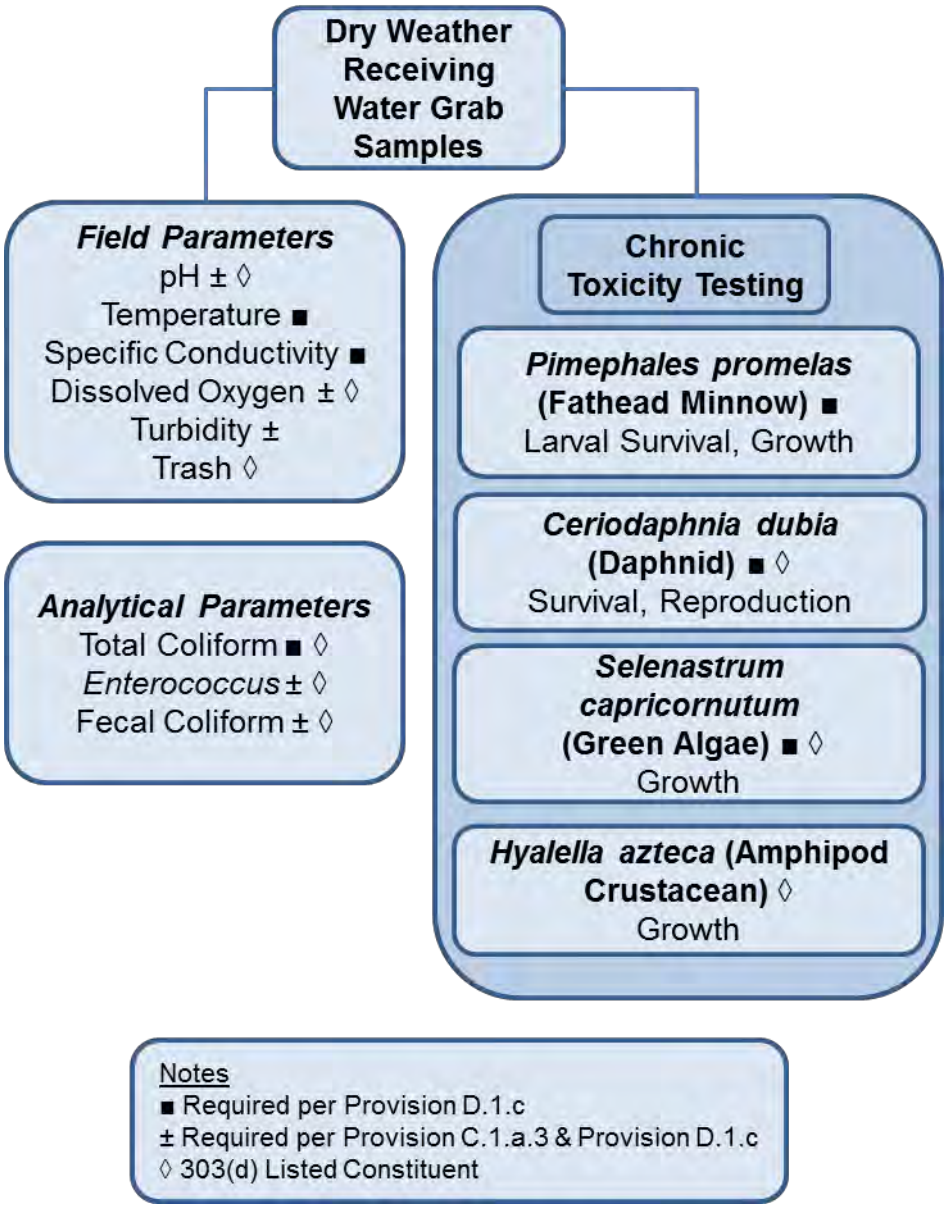
Equipment installed and used for monitoring during dry weather will remain in place during the course of the monitoring year. The monitoring year is October 1 through September 30. Continual flow data will be downloaded remotely from each station once every two weeks to verify equipment functionality and to reduce data gaps, increase 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 verify~~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:

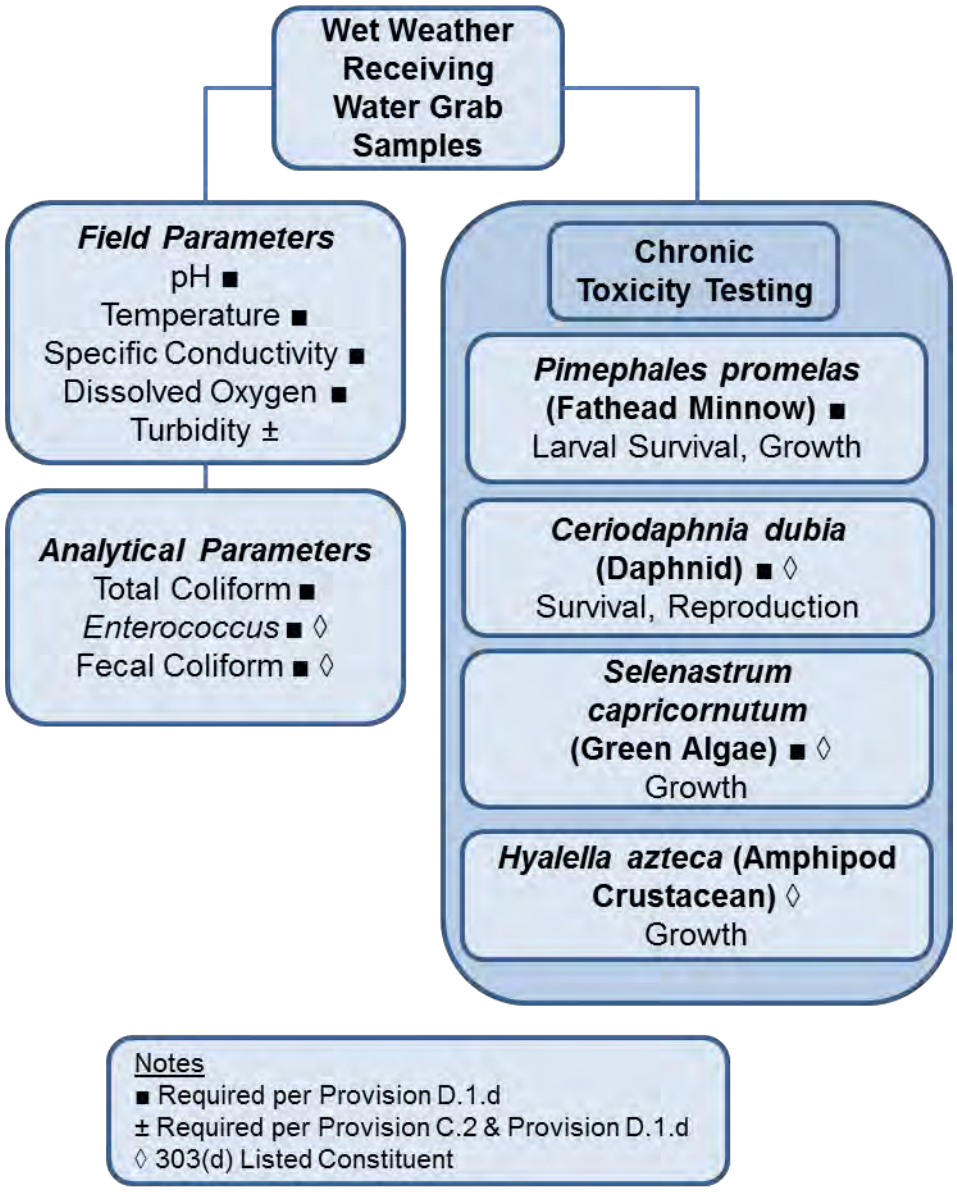
- Temperature
- Hydrogen ion concentration (pH)
- Specific conductance
- Dissolved oxygen
- Turbidity
- Total coliform
- Fecal coliform

- *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.

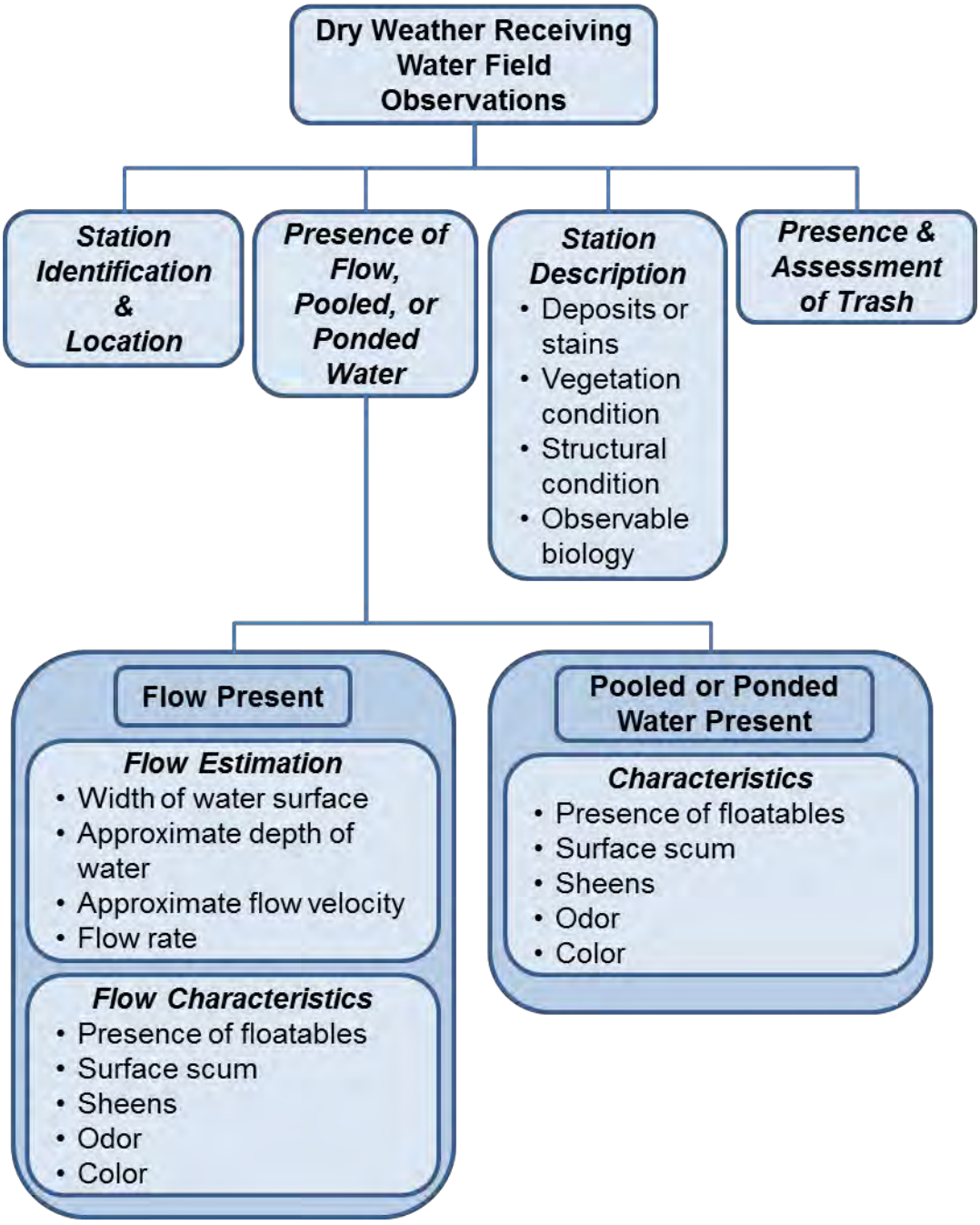
Figure A1-3
Wet Weather Receiving Water Monitoring Grab Samples

Samples will be collected from the horizontal and vertical center of the channel, if possible, per SWAMP requirements, 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).

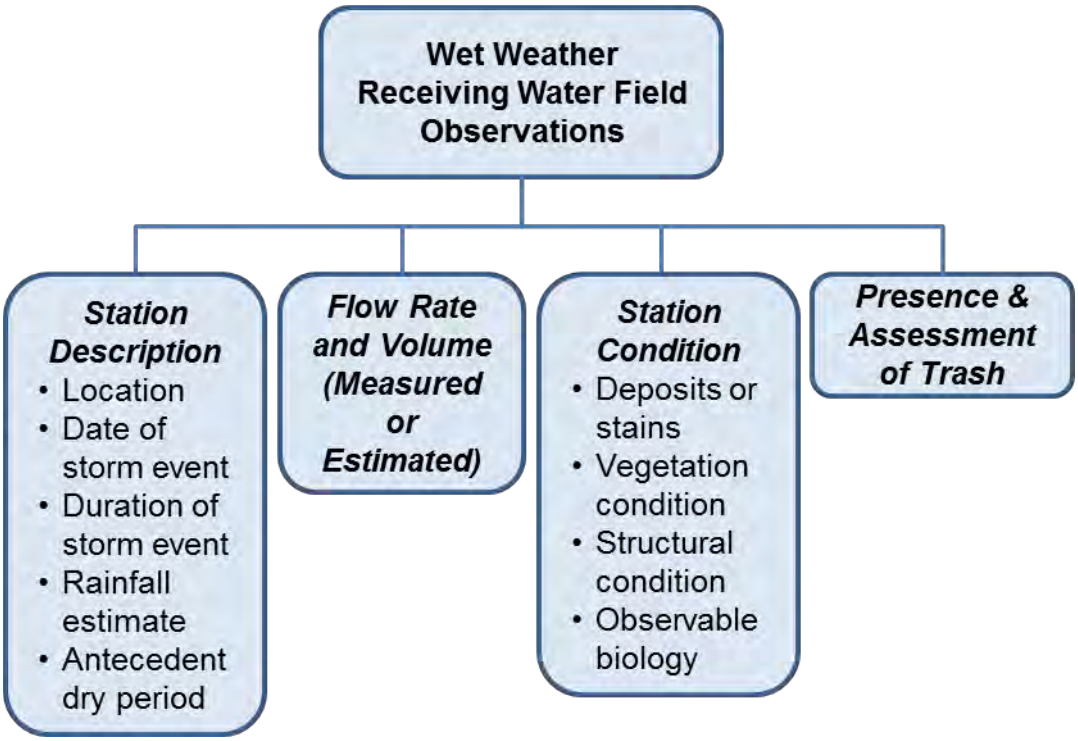
Field measurements will be performed for pH, specific conductance, temperature, dissolved oxygen, and turbidity using an YSI ~~6600~~ 6920 series water quality probe or similar device. Calibration of the instruments will be conducted prior to each sampling event in accordance with the manufacturer's specifications and checked 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.

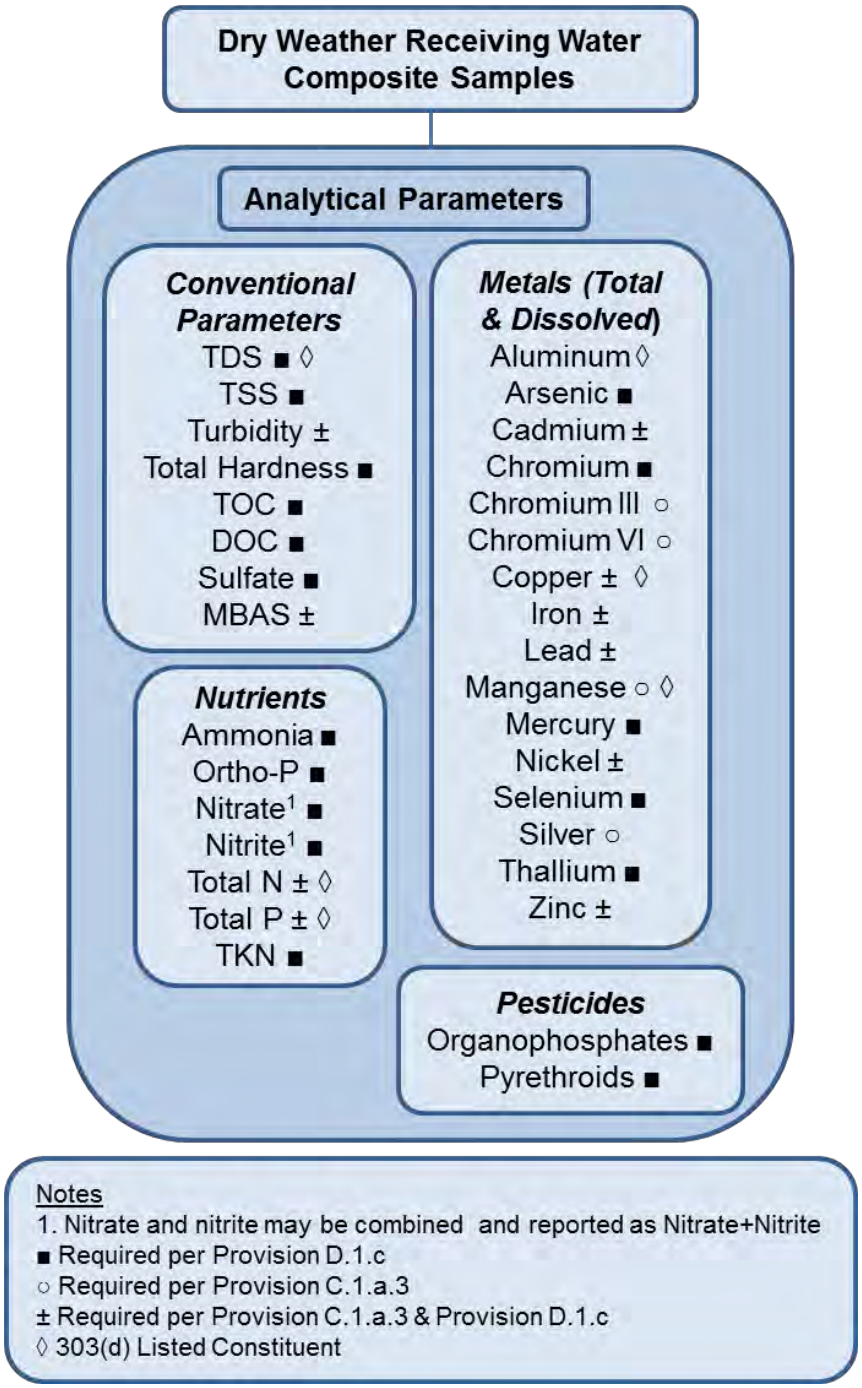
Figure A1-5
Wet Weather Receiving Water Field Observations

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. 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 when the selected pacing triggers the sampler, 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.

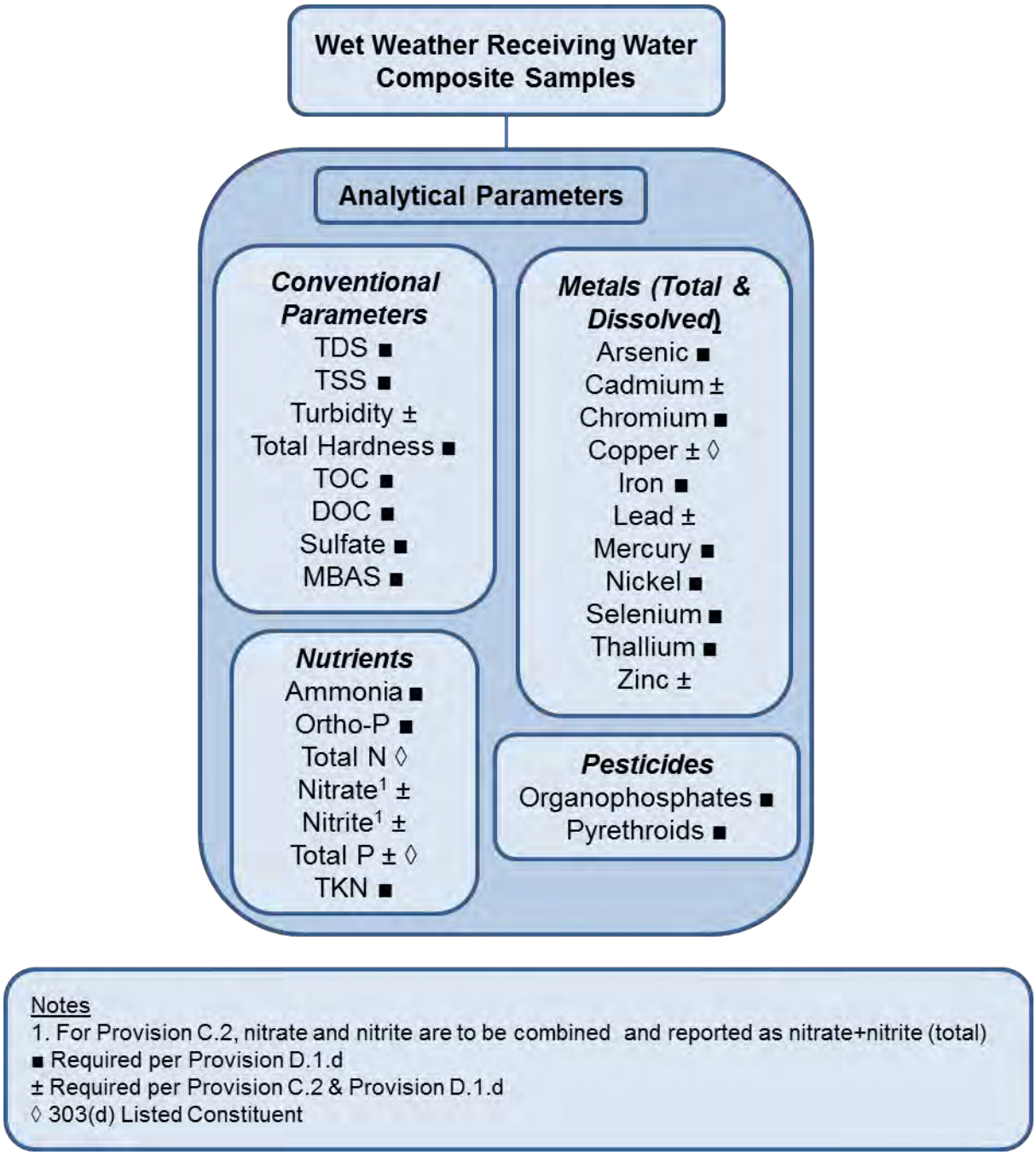
Flow-weighted water samples will be collected in pre-cleaned 20-liter (L) borosilicate graduated glass bottles. Sample bottles will be properly labeled with sample identification (ID), date, and time; sealed with a pre-cleaned rubber stopper; and preserved on ice for transport to the laboratory or consultant 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 mixed prior to pouring out liquid. A 100-L compositing container will be used to composite samples with multiple bottles. The graduated 19-L sample bottle 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~~ mixed continuously using a pre-cleaned glass stir bar as they are poured into the large pre-cleaned containers. After ~~all of the samples~~the determined amount from each bottle has been added to the compositing container 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~~appropriate sample bottles.

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.
Aluminum will be analyzed for Sweetwater HU only.

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.

Total N will be analyzed for Sweetwater HU only.

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 6920~~600~~ 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. Samples will be collected in laboratory-supplied, laboratory-certified, contaminant-free sample bottles. Field staff will wear powder-free nitrile or similar gloves 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 (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. The QA/QC

records for the various testing programs will be kept on file for review by regulatory agency personnel for five years.

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 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 6920~~600~~ series water quality probe or similar probe in accordance with the manufacturer's specifications. The YSI 6920~~600~~ 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 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.

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, sublatable, 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

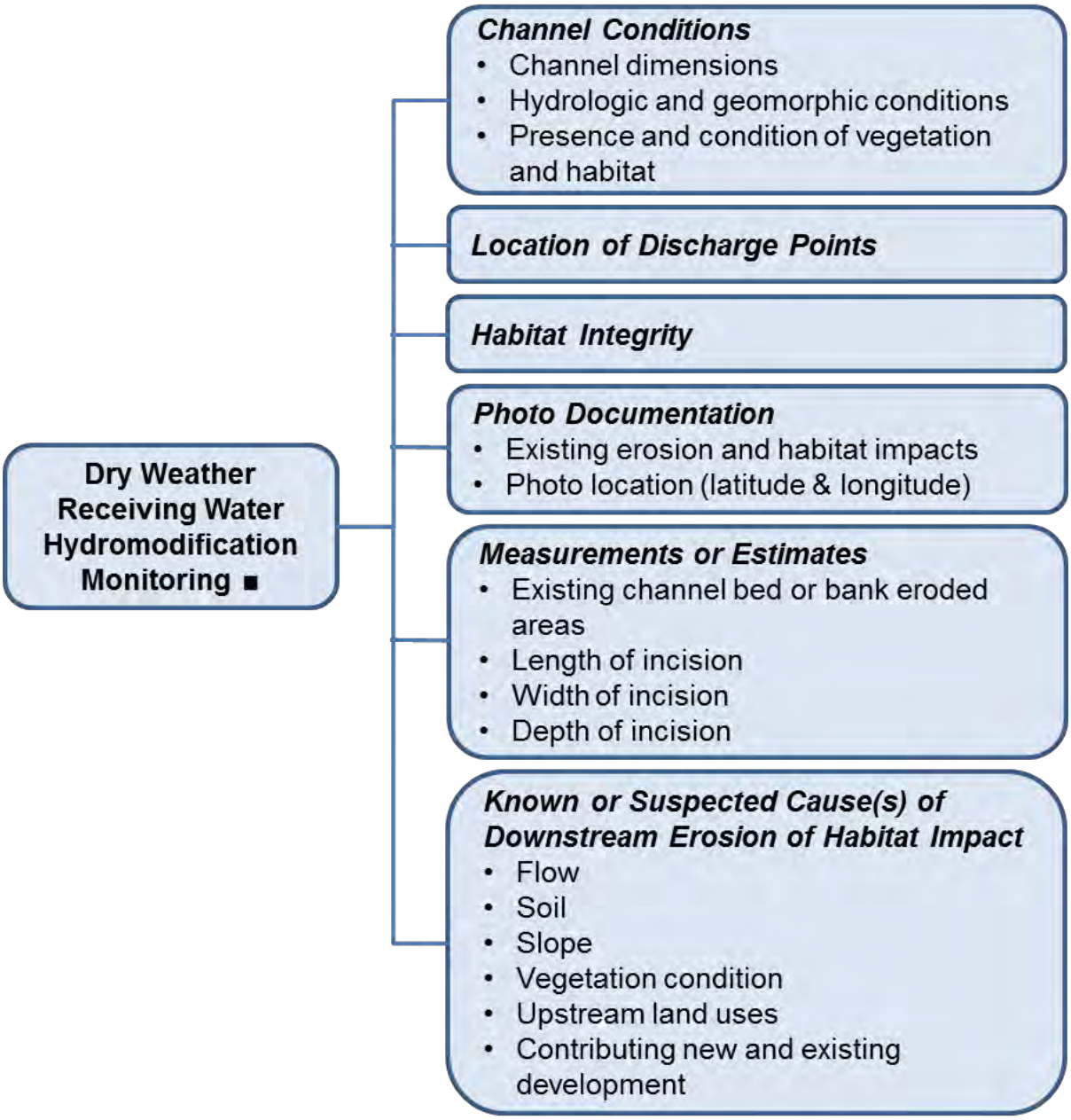
This section describes the sampling and data collection methods for the dry weather receiving water hydromodification monitoring requirements as outlined in Provision D.1.c.(6) of the MS4 Permit.

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 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 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 standard line of site survey. Channel depth, height and slope will be calculated by visual

estimations. 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. ~~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. Channel surveys will be conducted using a standard line of site survey. Channel depth, height and slope will be calculated by visual estimations. hannel 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). 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

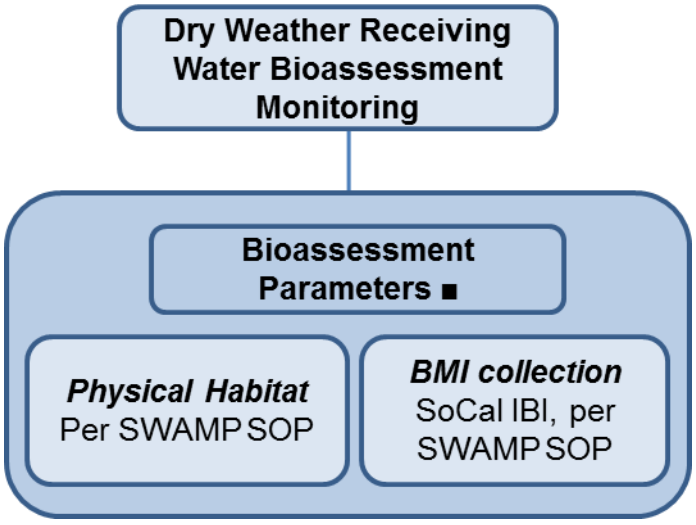
Known or suspected cause(s) of existing downstream erosion or habitat impact, including flow, soil, slope, and vegetation conditions, as well as upstream land uses and contributing new and existing development, will be assessed during a GIS desktop exercise and the SCCWRP channel assessment tool.

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 (cm^2) 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~~ 6920 (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 cm^2 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 Monitoring Methods: Pueblo HU

This section describes monitoring methods and procedures used to perform total maximum daily load (TMDL) water quality monitoring at the long-term receiving water location~~s~~ during the wet and dry weather season in Chollas Creek. Long-term receiving water monitoring will be conducted ~~at~~ for the Pueblo HU at the site~~s~~ as indicated in Table A1-~~1~~ 3 within 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 to perform flow monitoring and sampling, as well as extended flow monitoring.
- Flow monitoring data will be collected throughout the monitoring season to estimate the annual watershed loads.
- Monitoring equipment will be removed upon completion of the required monitoring.
- Because safety and quality are integral parts of data collection, team safety meetings and quality reviews will be conducted to increase safe and reliable business practices are used during the implementation of this program.

A.1.4.1 Monitoring Location

The Chollas Creek receiving water station is located upstream of the tidally influenced reach of Chollas Creek. The SD8(1) mass loading station is located in a trapezoidal concrete channel on North Chollas Creek. Historically, SD8(1) mass loading station has been monitored as a receiving water station through the Copermittees' Regional Monitoring Program. Sampling has also been conducted at SD8(1) to support the Diazinon TMDL, the Dissolved Metals TMDL, and the Bacteria TMDL, as described in the sections below. Water quality sampling during the wet and dry weather seasons has occurred at the Chollas MLS station during the current permit term and will continue during the next permit cycle. The monitoring site coordinates are provided in Table A1-3.

Table A1-3
Pueblo HU Receiving Water Monitoring Location

Site ID	Site Name	Latitude	Longitude
SD8(1)	North Chollas Creek MLS	32.70493	-117.12132

~~A.1.4.1~~A.1.4.2 Water Quality Sampling

Water quality sampling and analyses conducted for the receiving water monitoring location~~s~~ will be in accordance with applicable SWAMP regulations and guidance. Table A1-4 and A1-5, as well as Attachment C, provide a complete list of constituents, methods, sample volumes, holding times, and target reporting limits for the TMDL compliance monitoring.~~:~~

A.1.4.2.1 Wet Weather

The Chollas Creek receiving water station will be monitored at SD8(1) for water quality and flow during three storm events: the first two qualifying storm events after October 1 and the first qualifying storm event after February 1.

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) are publically available at: http://www.wrh.noaa.gov/sgx/ 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.

A.1.4.2.1.1 Sample Analysis

Water quality samples collected at the Chollas Creek receiving water monitoring site will be analyzed for general chemistry, metals, synthetic organics, and toxicity during wet

weather events. *In-situ* field measurements and flow will be collected during wet weather events. Flow will also be monitored throughout the wet weather season (October 1-April 30). All analytes to be monitored during the wet weather season are presented in Table A1-4. A comprehensive list of analytical methods and target RLs for is presented in Attachment A5.

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). 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 6920 series water quality probe or similar type device.

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 composite samples proportional to the flow of the creek. Additional information regarding methodology and QAQC for sample collection and field observations is further described in Attachment C.

Table A1-4
List of Constituents

Analyte	Method	MDL	RL	Units
General Chemistry				
Chloride	EPA 300.0	0.10	0.50	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	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)]	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				
Ceriodaphnia dubia 96-hour acute static-renewal test	EPA/821/R-02/012, Oct-02	NA	NA	TU_a
Ceriodaphnia dubia 7-day chronic static-renewal test	EPA/821/R-02/012, Oct-02	NA	NA	TU_c
Field Parameters				
Dissolved Oxygen	Field Meter	NA	NA[(d)]	mg/L

Table A1-4
List of Constituents (continued)

Analyte	Method	MDL	RL	Units
Flow	TBD	NA	NA[(b)]	cfs
pH	Field Meter	NA	NA[(b)]	pH units
Specific Conductivity	Field Meter	NA	2 µS/cm[(b)]	µS/cm
Temperature	Field Meter	NA	NA[(b)]	°C
Turbidity	Field Meter	NA	5 NTU[(b)]	NTU

Notes:
(a) See Attachment C, Appendix A for MDL and RL.
(b) Recommended SWAMP reporting limit

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
µg/L	micrograms/liter
µS/cm	Micro Semens/centimeter
mg/L	milligrams/liter
cfs	cubic feet per second
°C	Celsius degrees
NTU	Nephelometric Turbidity Units

~~*A.1.4.1.1.1*~~*A.1.4.2.1.2 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 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. 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

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 C.

A.1.4.2.2 Dry Weather Bacteria TMDL Sampling

Dry weather monitoring will be conducted monthly during the wet season and weekly during the dry season at the compliance monitoring location SD8(1). 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 (Attachment C, Appendix E). Table A1-5 provides the general scope of the Compliance Monitoring Program for dry weather Bacteria TMDL sampling.

Table A1-5
Scope of Bacteria TMDL Compliance Monitoring

Number of Monitoring Locations	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
1	1	monthly	1	Weekly (minimum 5 events per month)

A.1.4.2.2.1 Sample Analysis

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 dry weather monitoring will be analyzed for Fecal Indicator Bacteria (FIB) in accordance with SWAMP requirements. Table A1-6 presents the constituents, reporting limits, and analytical methods.

Table A1-6
Compliance Analyses for Bacteria TMDL

Parameter	Project Reporting Limit[(a)] (per 100mL)	Analytical Method
Enterococcus	10 CFU	TBD
Fecal Coliform	20 MPN	TBD
Total 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.

A.1.4.2.2.2 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.

The flow meter will measure and log flow levels, rainfall and sample history. 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 hydrological information is electronically stored in the flow meter. 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.

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 C.

A.1.5 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.1.5.1 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.1.5.2 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

San Diego Bay Watershed Management Area Water Quality Improvement Plan
Final Deliverable
Attachment A1 – Long-Term Receiving Water Monitoring Program – Monitoring Plan

Attachment A
Stream Rating and Channel Survey Details

San Diego Bay Watershed Management Area Water Quality Improvement Plan
Final Deliverable
Attachment A1 – Long-Term Receiving Water Monitoring Program – Monitoring Plan

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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 estimate~~accurately measure~~ flow in streams, the following elements are needed to develop the rating curves:

- An up to date~~accurate~~ survey of the stream channel cross-section and longitudinal slope
- ~~Accurate l~~Level measurements based on a fixed point
- Measurements of velocity ~~and flows~~ at several ~~points~~ stages 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.~~ **CHANNEL SURVEYS**

~~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, first, an appropriate reach of stream must be located which is hydraulically connected to the flow sensor location. Straight sections of stream with consistent gradients that are away from channel bends or structures which have laminar flow are considered ideal.

~~a~~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~~generally 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. 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.

~~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.~~

Channel slope is determined by channel thalweg surveys which are conducted for the reach upstream and downstream of the cross-section. The average channel slope is calculated from the survey data.

INSTANTANEOUS FLOW MEASUREMENT

~~Using Manning's Equation, D~~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.~~

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.

A Stream Pro 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.

During each instantaneous flow measurement, it is critical that the stage at the monitoring station is recorded at the same time so that a relationship between stage and discharge can be developed.

RATING CURVE DEVELOPMENT

A rating curve is then developed using the Chézy–Manning Equation which is calibrated with the data from the field measurements. Each rating curve is adjusted by the roughness coefficient. 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:

$$Q = (1.486/n)AR^{2/3}\,S^{1/2}$$

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~~ station will be conducted to compute the channel characteristics for each station.

As Southern California has predominantly sandy bottom braided stream channels that shift continually, routine updated channel surveys, instantaneous flow measurements, and rating curve calibrations are critical to flow estimation.

~~***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

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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).

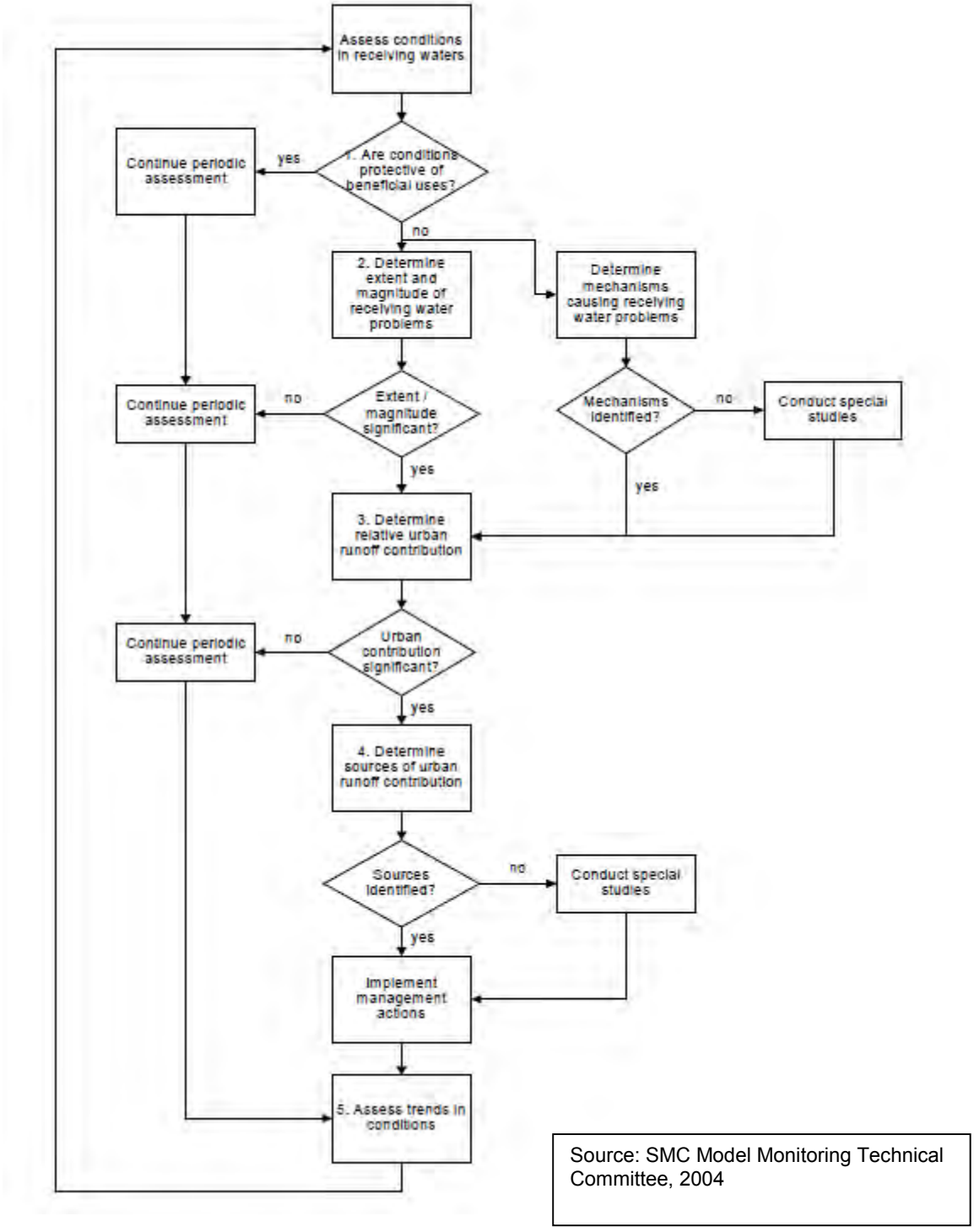

Figure A-1. Example Receiving Water Monitoring and TIE/TRE Decision Framework

2.0 RECEIVING WATER TOXICITY TESTING

Receiving water monitoring is conducted by the San Diego Regional Copemittees (Copermittees) 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**~~**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			
Ceriodaphnia dubia	Chronic survival and reproduction	Pass/Fail	EPA-821-R-02-013
Selenastrum capricornutum	Chronic growth		
Pimephales promelas	Chronic survival and growth		
Monitoring in accordance with Order No. R9-2013-0001, Salinity ≥ 1 ppt			
Strongylocentrotus purpuratus	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 1993bPriority 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 approaych 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**~~.

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, sublatable, 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**~~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**~~.

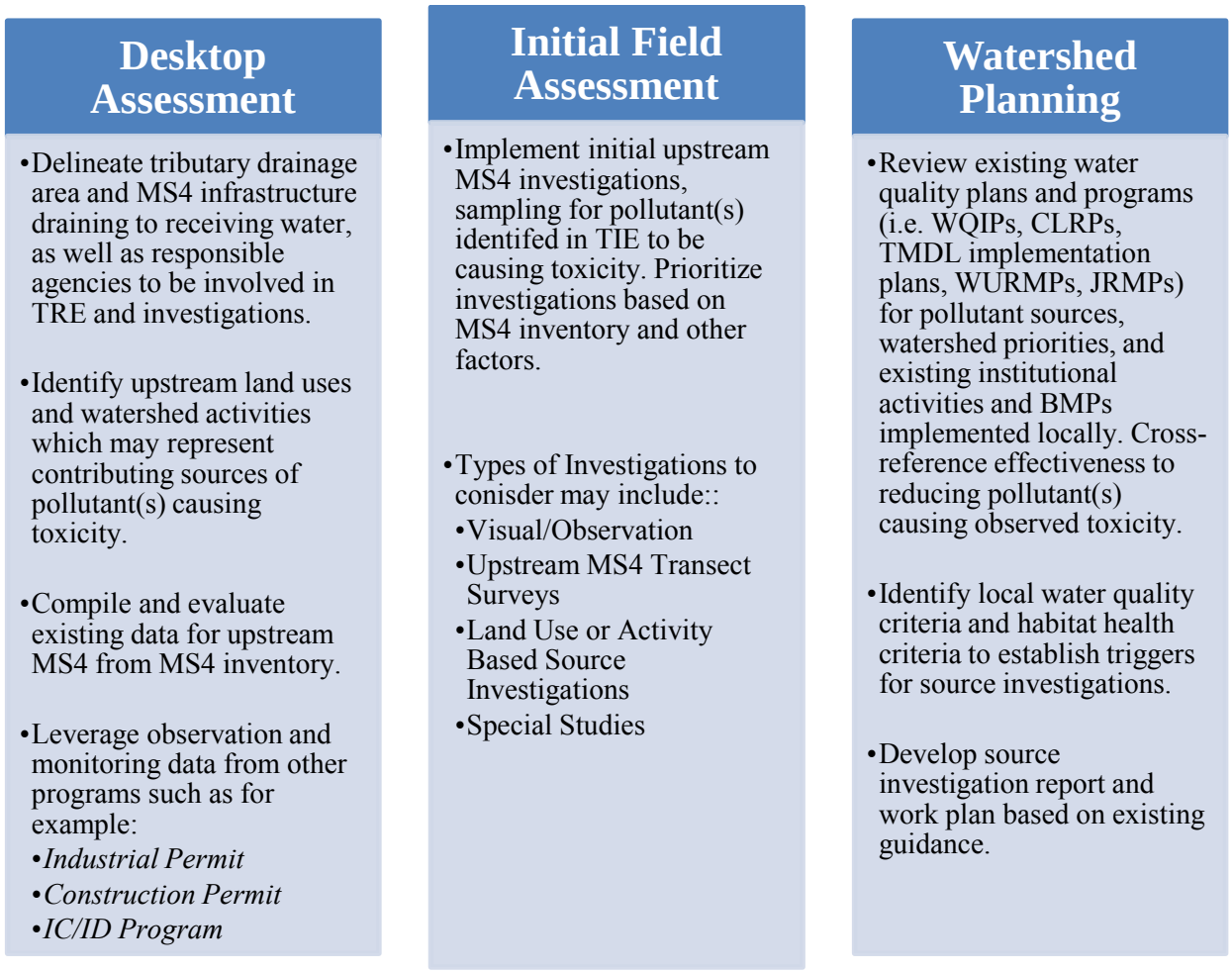

Figure A-2. The Toxicity Source Evaluation Approach

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**~~.

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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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 Bacteria/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	Long-Term Receiving Water	Dry	Chemistry, FIB, toxicity (chronic), visual observations, field measurements	Time-weighted water composite, water grab, visual observations, *in-situ* measurements	✓[7]	–	–	–	–	•	–	–	–	–
				Trash Assessment	Visual observations, *in-situ* measurements	–	–	–	✓	–	•	–	–	–	–
				Hydromodification (channel conditions, discharge points, habitat integrity, evidence and estimate of erosion and habitat impacts)	Visual observations, *in-situ* measurements	–	–	–	–	–	•	–	–	–	–
				Bioassessment (BMI taxonomy, algae taxonomy, physical habitat characteristics)	Per SWAMP protocols	–	–	✓	–	–	•	–	–	–	–
			Wet	General: chemistry, FIB, toxicity (chronic), field measurements	Flow-weighted water composite	✓[7]	–	–	–	–	•	–	–	–	–
				Trash Assessment	Visual observations, *in-situ* measurements	–	–	–	✓	–	•	–	–	–	–
	Regional Monitoring	Southern California Bight Monitoring (Bight '13)	Dry	Chemistry, toxicity, bioassessment	Sediment grab, per SWAMP protocols	✓	–	✓	✓	✓	•	–	–	–	–
		Stormwater Monitoring Coalition (SMC)	Dry	TBD (year 1 was under SMC bioassessment)	Per SMC Protocols	–	–	✓	✓	–	•	TBD[1]	TBD[1]	TBD[1]	TBD[1]

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; PWQC = 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

1. ~~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.~~ SMC participation will be determined each year.
2. The California Assembly Bill 411 (AB411) program monitoring has been conducted for a number of year 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.
3. Conducted under the Ambient Bay and Lagoon Monitoring (ABLM) Program, as part of Bight '13.
4. If <125 outfalls, 80% must be monitored twice annually.
5. 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.
6. Monitoring is paired. Receiving Water and MS4 Outfall will be monitored the same day.
7. Provided via Chollas Creek TMDL monitoring.

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
Receiving Water Monitoring (cont.)	Regional Monitoring (cont)	Hydromodification Monitoring Program (HMP)	Wet	Rain gauge analysis; stream gauge analysis; channel assessments; flow monitoring; and sediment transport monitoring	Visual observations, *in-situ* measurements	–	–	✓	–	–	•	•	•	TBD	TBD
	Sediment Quality Monitoring	Sediment Quality Monitoring	Dry	Chemistry, toxicity, bioassessment	Sediment grab, visual observations, *in-situ* measurements	–	–	✓	–	–	•[3]	•	•	•	•
		Regional Harbor Monitoring Program (RHMP)	Dry	Field parameters, chemistry, toxicity, bioassessment, trash assessment	Water grab, sediment grab, visual observations, *in-situ* measurements	✓	–	–	✓	✓	•	–	–	–	–
MS4 Monitoring	MS4 Outfall	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	Dry	Chemistry, FIB, toxicity (chronic), visual observations, field measurements	Water grab, visual observations, *in-situ* measurements	✓	✓	✓	✓	✓	•	•	•	•	•
		MS4 Outfall	Wet	Chemistry, FIB, toxicity (chronic), visual observations, field measurements	Time-weighted or flow-weighted water composite, water grab, visual observations, *in-situ* 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; PWQC = 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

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- – Monitoring will not be conducted

1. ~~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.~~ SMC participation will be determined each year.
2. The California Assembly Bill 411 (AB411) program monitoring has been conducted for a number of year 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.
3. Conducted under the Ambient Bay and Lagoon Monitoring (ABLM) Program, as part of Bight '13.
4. If <125 outfalls, 80% must be monitored twice annually.
5. 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.
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7. Provided via Chollas Creek TMDL monitoring.

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	Wet	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, *in-situ* measurements	✓	–	–	–	–	●	●	●	●	●
			Wet	FIB, visual observations, field measurements (optional)	Water grab, visual observations, *in-situ* measurements	✓	–	–	–	–	●	●	●	●	●
	Focused Priority	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	Plant communities	% Survival of Plantings % Native Cover % Non-Native Weed Cover % Bare Ground			✓			Will begin after completion of creek restoration. Initial monitoring will likely begin in 2017-2018, depending on date restoration is completed.				
			Dry	Bioassessment (CRAM)	Physical Habitat (pHab)	–	–	✓	–	–	–	●	–	–	●
		Physical Aesthetics Monitoring – Sweetwater and Otay[6]	Dry	Trash Assessment	Visual observations, *in-situ* measurements	–	–	–	✓	–	–	–	●	●	●
			Wet (Post-storm)	Trash Assessment	Visual observations, *in-situ* measurements	–	–	–	✓	–	–	–	●	●	●
		Swimmable Waters Monitoring – Beaches (Otay River)[6]	Dry[2]	FIB	Water grab	–	–	–	–	✓	●	●	●	●	●
			Wet	FIB	Water grab	–	–	–	–	✓	–	–	●	●	●

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Water Quality Improvement Plan Monitoring Overview

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					Chollas Creek Bacteria/Metals	Airport Metals	Riparian	Physical Aesthetics	Swimmable Waters	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Additional Monitoring Programs														
Additional TMDL Monitoring	Shelter Island Yacht Basin Dissolved Copper TMDL – Receiving Water Monitoring	See Regional Board Investigative Order No. No. R9-2011-0036.												
	Shelter Island Yacht Basin Dissolved Copper TMDL – MS4 Outfall Monitoring	Dry	Dissolved Copper	Water grab, visual observations, *in-situ* measurements	✓	✓				•	•	•	•	•
		Wet	Dissolved Copper	Time-weighted or flow-weighted water composite, water grab, visual observations, *in-situ* measurements	✓	✓				•	•	•	•	•
	Shelter Island Shoreline Park Bacteria TMDL	Dry	FIB	Water grab	–	–	–	–	✓	•	•	•	•	•
		Wet	FIB	Water grab	–	–	–	–	✓					

Notes:

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						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	San Diego Regional Reference Streams and Beaches	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	San Diego Bay Debris Study	Dry	Trash Assessment, pHab	Grab, visual observation	✓	–	✓	✓	✓	TBD	TBD	TBD	TBD	TBD
	Focused Priority Special Study	Pueblo-San Diego Hydrologic Unit: Creek Refuse Assessment Program	Dry	Trash Assessment	Grab, visual Observation	✓	–	✓	✓	✓	•	•	•	•	•
	Highest Priority Special Study	Chollas Jurisdictional Boundary Study	Wet	Metals, Pesticides, FIB	Flow-weighted water composites, water grabs	✓	–	–	–	–	•	•	TBD	TBD	TBD
	Beach Water Quality (AB411)[2]	Beach Water Quality (AB411)[2]	Dry	FIB	Water grab	–	–	–	–	✓	•	•	•	•	•
	Focused Priority Special Study	Riparian Area Special Study	Dry	Metals (selenium)	Water grab	–	–	✓	–	–	•	•	TBD	TBD	TBD
			Wet												

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7. Provided via Chollas Creek TMDL monitoring.

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 long-term 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

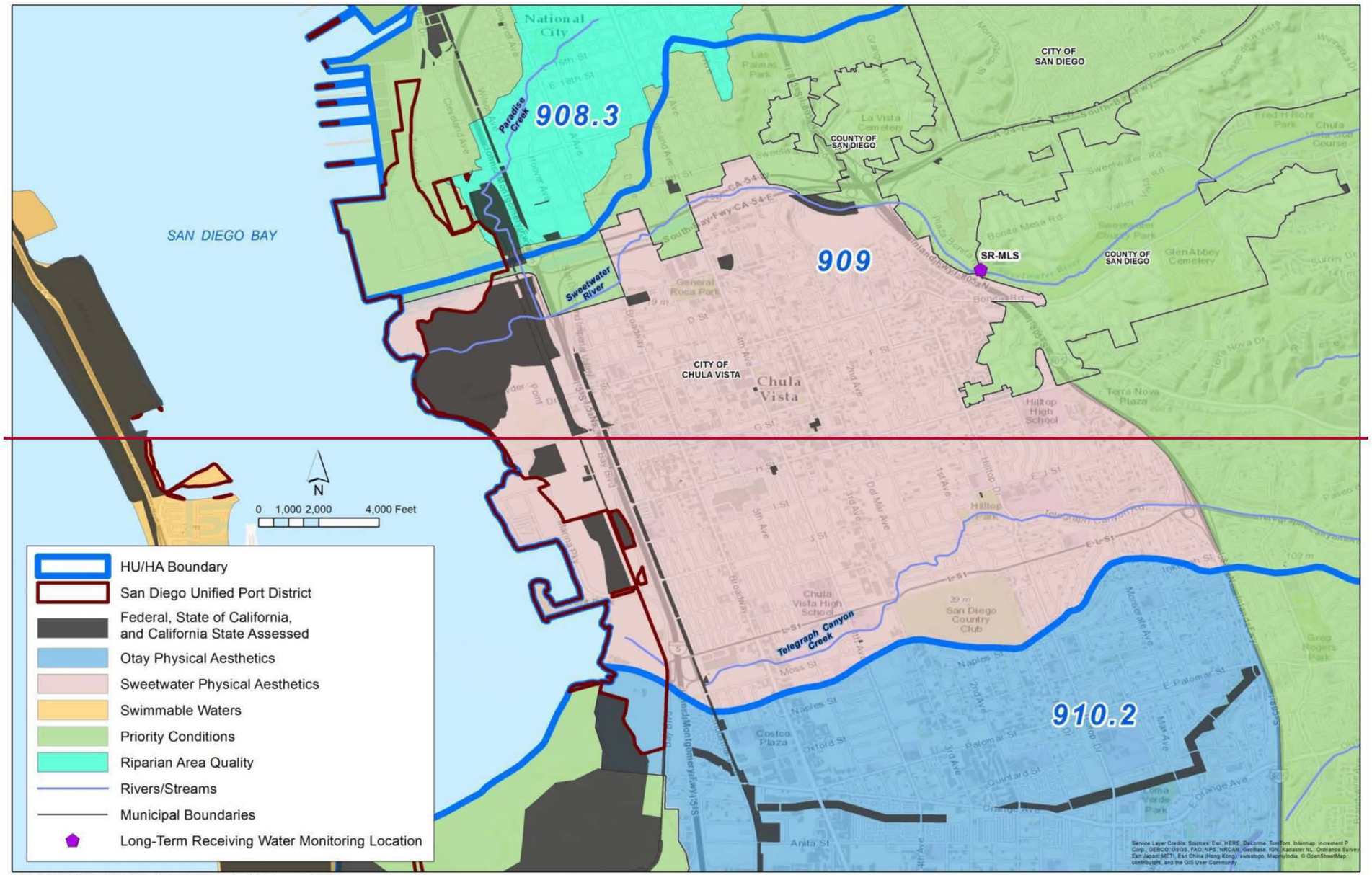
~~Dry and wet weather monitoring was performed at the Sweetwater River Mass Loading Station (SR-MLS) under the transitional monitoring program to fulfill the permit requirements for long-term receiving water monitoring in the San Diego Bay WMA. RPs have monitored SR-MLS since 2001. The SR-MLS was selected 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?

Dry and wet weather receiving water monitoring has been completed during the current Permit term and prior to the current Permit term in the Sweetwater, Otay, and Pueblo hydrologic units (HU). To continue to the long-term data sets and to supply more information that can be used in future reevaluations of priority conditions, monitoring will continue in these three HUs during the next Permit term, as follows:

- Sweetwater HU: at site SR-MLS, per procedures described in Sections K.3.1.1.1 and K.3.1.1.2 and Section A.1.3 of Attachment A1.
- Otay HU: at site OR-TWAS-1, per procedures described in Sections K.3.1.1.1 and K.3.1.1.2 and Section A.1.3 of Attachment A1.
- Pueblo HU: at site-SD8(1) per procedures described in Section K.4.1, Section A1.4 of Attachment A1, and Attachment C.

~~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 locations of ~~the SR-MLS~~these monitoring stations.


SAN DIEGO BAY
National City
908.3
Paradise Creek
909
Sweetwater River
CITY OF SAN DIEGO
COUNTY OF SAN DIEGO
SR-MLS
CITY OF CHULA VISTA
Chula Vista
910.2
Telegraph Canyon Creek
N
0 1,000 2,000 4,000 Feet
HU/HA Boundary
San Diego Unified Port District
Federal, State of California, and California State Assessed
Otay Physical Aesthetics
Sweetwater Physical Aesthetics
Swimmable Waters
Priority Conditions
Riparian Area Quality
Rivers/Streams
Municipal Boundaries
Long-Term Receiving Water Monitoring Location

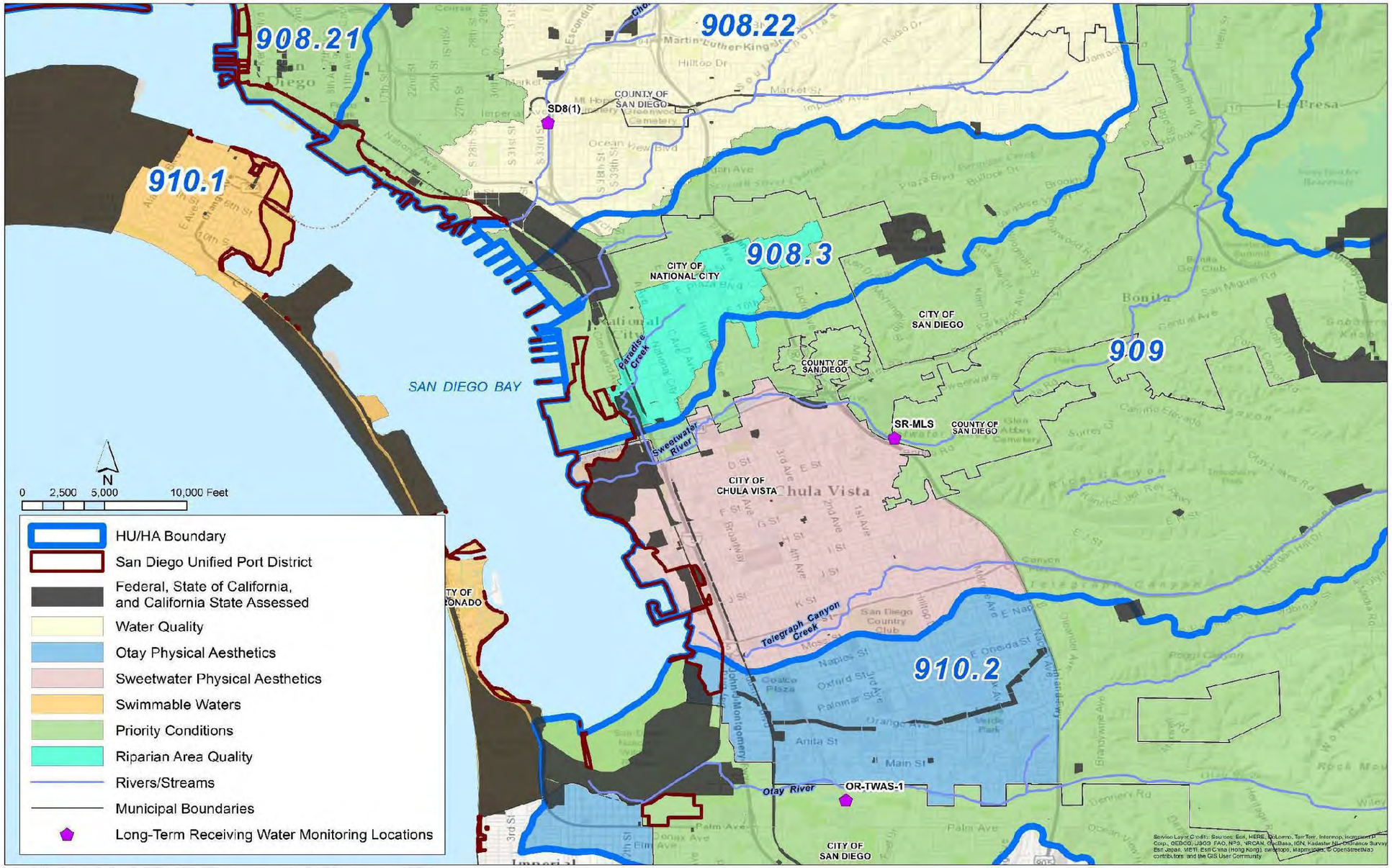


Figure K3-1
~~Sweetwater MLS~~ Long-Term Receiving Water Monitoring Stations

K.3.1.1.1 Dry Weather Receiving Water Monitoring (Municipal Permit Provision D.1.c)

Dry weather monitoring ~~at the SR-MLS comprises~~ per Municipal Permit Provision D.1.c consists of 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~~designated monitoring stations 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~~per Municipal Permit Provision D.1.d consists of monitoring ~~during~~ three storm events during ~~one~~ the 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.

CITY OF CHULA VISTA – Strategy Revisions

Based on comments from the Regional Board, the City of Chula Vista has updated its strategy table in the WQIP to include the following updated strategies.

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Schedule (B.3.b.(3)(a)(iv))	Pollutant or Condition Addressed							Source (B.3.b(1)(a)(i))	Responsible City Department and Other Collaborating Departments or Agencies (B.3.b.(1)(c))
					Bacteria	Nutrients	Metals	Trash	Sediment	Flow	Habitat/Wildlife		
Retrofit and Rehabilitation in Areas of Existing Development (Provision E.5.e.)													
CV-19	Identify candidate areas of existing development for stream, channel, or habitat rehabilitation projects and facilitate implementation of such projects.	The City's JRMP Appendix F describes the methods used for identifying and assessing potential stream, channel, or habitat rehabilitation projects in existing development areas and facilitating such projects. Rehabilitation project selection will be based upon a variety of factors including addressing the FPWQC of trash, existing stream or habitat degradation, multiple benefits of the project, and feasibility of implementation. Projects can arise as part of the Offsite Alternative Compliance Program. 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. Grant funding can be utilized as available.	FY17	Continuous – Ongoing	X	X	X	X	X	X	X	Various	Development Services, Engineering, NPDES, applicable City Departments
Non-JRMP Strategies (Optional Strategies, Provision B.3.b.(1)(b))													
CV-30	Implement stream, channel, and habitat rehabilitation projects as needed.	This strategy may be triggered if 1) Interim goals are not met, 2) Stream or habitat rehabilitation is determined to be a more effective pathway, relative to additional structural or non-structural BMPs to meeting trash goals, 3) Funding and staffing has been secured, 4) Partners, MOUs, and permits required by regulatory agencies are secured, and 5) Recommendations from the community are identified and consensus and community support has been achieved. Will occur in areas identified during feasibility studies. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations, 2) Secure funds in the form of general funds, bonds, or grants, 3) Obtain City Council approval of Capital Improvement Projects budget, 4) Initiate preliminary engineering to narrow project scope, 5) Hire design consultant to develop detailed construction plans and construction cost estimates, 6) Complete construction contractor bid and award process for construction phase, 7) Construct project, 8) Operation and maintenance into perpetuity.	Trigger	Continuous – Ongoing	X	X	X	X	X	X	X	Various	Development Services, Engineering, NPDES, applicable City Departments

CITY OF CORONADO – Strategy Revisions

Based on comments from the Regional Board, the City of Coronado has updated its strategy table in the WQIP to include the following strategies.

ID	Strategy and BMPs (B.3.b(1)(a)(ii))	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Jurisdictional or Optional	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Schedule (B.3.b.(3)(a)(iv))	H/FPWQC or Pollutants Addressed							Source and Ranking (from Table 3-14) (B.3.b(1)(a)(i))	Responsible City Department and Other Collaborating Departments or Agencies (B.3.b.(1)(c))
						Trash	Bacteria	Nutrients	Metals	Sediment	Flow	Habitat		
	Retrofit and Rehabilitation in Areas of Existing Development													
CO-46	Evaluate street infrastructure replacement or repairs for retrofit opportunities	Projects may include green streets and similar retrofit opportunities (e.g., porous pavement), as capital improvement plans are updated and implemented. Funding: General Fund, Grants and Others	Jurisdictional	FY-16-17	On-going	X	X	X		X	X		Medium sources: over-irrigation or runoff potential.	Public Services and Engineering
CO-47	Implement a strategy to include incentives or programs to retrofit existing development, and identify candidate areas or projects	Offsite Alternative Compliance Program, when available, will include incentives and projects to encourage or implement projects to retrofit existing development sites in the City. Incentives may include public and/or private projects or sites. Existing development retrofit project selection will be based upon a variety of factors including project size, project location, pollutant reduction potential (compared to existing conditions), cost, funding, cost-benefit analysis, public perception and acceptance (especially for public sites/projects) 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. Refer to JRMP Storm Water Standards Manual, Section 4.D Funding: Storm Drain Enterprise and General Fund	Jurisdictional	Project List FY16-17 Policy and Procedures FYs 16-17 and 17-18 (upon availability of regional guidance)	Ongoing	X	X	X		X	X		High source: pet waste Medium sources: residential, over-irrigation/ runoff	Public Services and Engineering, and Community Development
CO-48	Proactively repair, replace, and retrofit MS4 components to maintain proper operation and function for reduction of infiltration.	As needed and available. Funding: Storm Drain Enterprise and General Fund	Jurisdictional	Triggered by infrastructure assessment or other determination	Following CIP revision or sooner if possible	X	X	X		X	X		Medium sources: over-irrigation or runoff potential.	Community Development, Public Services and Engineering
CO-49	Promote with water purveyor, as available, residential retrofit to reduce irrigation and over-irrigation runoff (smart controllers), rainwater harvesting, and turf conversion that may include a rebate programs in target areas.	As needed and available. Funding: Storm Drain Enterprise and General Fund	Jurisdictional	FY15-16	Ongoing		X	X			X		Medium sources: residential, over-irrigation/ runoff	Public Services and Engineering

ID	Strategy and BMPs (B.3.b(1)(a)(ii))	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Jurisdictional or Optional	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Schedule (B.3.b.(3)(a)(iv))	H/FPWQC or Pollutants Addressed							Source and Ranking (from Table 3-14) (B.3.b(1)(a)(i))	Responsible City Department and Other Collaborating Departments or Agencies (B.3.b.(1)(c))
						Trash	Bacteria	Nutrients	Metals	Sediment	Flow	Habitat		
CO-50	Implement program that will require sources to retrofit trash enclosures when identified to be persistent and problematic sources through annual or complaint inspections (when public education, employee training, etc. are insufficient solutions)	As needed, through annual, routine inspections Funding: Storm Drain Enterprise.	Jurisdictional	FY15-16	Ongoing	X	X	X					High sources: Eating and drinking establishments Animal facilities	Public Services and Engineering, Community Development
CO-51	Commercial redevelopment projects. Require additional source control BMPs as applicable for persistent problem or areas. May include retrofit of trash enclosures, outdoor areas/facilities/uses to address pollutants of concern (including bacteria).	As projects are submitted for permitting. Funding: Storm Drain Enterprise (fees).	Jurisdictional	FY15-16	Ongoing	X	X	X			X		High sources: eating and drinking establishments animal facilities, pet waste	Community Development, Public Services and Engineering
CO-52	Residential and medium risk sources: Review projects for potential sources of bacteria and require retrofit of areas, if appropriate, Retrofits may include landscaping modifications, impervious area retrofit, trash storage areas design/location or retrofit.	As projects are submitted for permitting or identified through inspection as persistent and problematic. Funding: Storm Drain Enterprise (fees). Optional strategy trigger: interim or final goal not being met or at risk of not being met as determined by assessment plan.	Optional	Triggered by Goal Assessment	FY following trigger or sooner if possible	X	X	X		X	X		Medium sources: over-irrigation or runoff potential, groundwater, residential projects.	Community Development, Public Services and Engineering

ID	Strategy and BMPs (B.3.b(1)(a)(ii))	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v))	Jurisdictional or Optional	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Schedule (B.3.b.(3)(a)(iv))	H/FPWQC or Pollutants Addressed							Source and Ranking (from Table 3-14) (B.3.b(1)(a)(i))	Responsible City Department and Other Collaborating Departments or Agencies (B.3.b.(1)(c))
						Trash	Bacteria	Nutrients	Metals	Sediment	Flow	Habitat		
	Non-JRMP Strategies (Optional Strategies, Provision B.3.b.(1)(b))													
CO-53	Implement stream, channel, and habitat rehabilitation projects as needed.	This strategy may be triggered if: 1) Interim goals are not met, 2) Stream or habitat rehabilitation is determined to be a more effective pathway, relative to additional structural or non-structural BMPs to meeting bacterial indicator goals, 3) Funding and staffing has been secured, 4) Partners, MOUs, and permits required by regulatory agencies are secured, and 5) Recommendations from the community are identified and consensus and community support has been achieved. Will occur in areas identified during feasibility studies. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations and feasibility of property or land acquisition, 2) Secure funds in the form of general funds, bonds, or grants, 3) Obtain City Council approval of Capital Improvement Project budget, 4) Initiate preliminary engineering to narrow project scope and demonstrate effectiveness and feasibility, 5) Hire design consultant to develop detailed construction plans and construction cost estimates, including land acquisition, if applicable, 6) Complete construction contractor bid and award process for construction phase, 7) Construct project, 8) Operation and maintenance into perpetuity.	Optional	Triggered as noted in Implementation Approach	On-going.		X						NA	Public Services and Engineering

CITY OF IMPERIAL BEACH – Strategy Revisions

Based on comments from the Regional Board, the City of Imperial Beach has updated its strategy table in the WQIP to include the following updated strategy.

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Jurisdictional (B.3.b.(1)(a)) or Optional (B.3.b.(1)(b))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Schedule (B.3.b.(3)(a)(iv)	Pollutants Addressed							Source (B.3.b(1)(a)(i)) Med to High WQIP priority sources	Responsible City Department and Other Collaborating Departments or Agencies (B.3.b.(1)(c))
						Bacteria	Nutrients	Metals	Trash	Sediment	Flow	Habitat/ Wildlife		
	Stream, Channel and Habitat Rehabilitation Projects (B.3.b.(1)(b)(iii))													
IB-69	Implementation of stream channel and habitat rehabilitation projects	This is an ongoing and budgeted activity for the following strategies: IB-12, IB-34b, IB-38, IB-54, and IB-58. The City actively seeks projects to retrofit the MS4 system to provide natural treatment of storm water and provide rehabilitation of native habitat. Additional stream channel and habitat restoration projects are contingent upon existing partnerships in the watershed moving specific projects forward based on priorities in the region including triggers for not meeting WQIP priority conditions. The City also partners with local, state, and federal agencies on wetland restoration projects for south San Diego Bay.	Optional	Prior to FY16	Continuous-Ongoing	X	X	X	X	X	X	X	Variable	Public Works, FWS, RWQCB, NGOs, Port of San Diego, Airport Authority, South Bay Union School District

CITY OF LA MESA – Strategy Revisions

Based on comments from the Regional Board, the City of La Mesa has updated its strategy table in the WQIP to include the following updated strategies.

ID	Strategy	Implementation Approach (Frequency of Inspections, B.3.b.(1)(a)(iv)) (Funds/Resources, B.3.b.(1)(b)(iv), B.3.b.(3)(a)(iii)) (Triggers, B.3.b.(1)(b)(v)) (Inventory BMPs, B.3.b.(1)(a)(ii))	Implementation or Construction Year (B.3.b.(3)(a)(i); B.3.b.(3)(a)(ii))	Implementation Schedule (B.3.b.(3)(a)(iv))	Pollutant or Condition Addressed							Source (B.3.b(1)(a)(i))	Responsible City Department and Other Collaborating Departments or Agencies (B.3.b.(1)(c))
					Bacteria	Nutrients	Metals	Trash	Sediment	Flow	Habitat/Wildlife		
Retrofit and Rehabilitation in Areas of Existing Development (Provision E.5.e.)													
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.	Potential stream, channel, or habitat rehabilitation projects will be selected based upon a variety of factors including the reasonable access of a project (right of way, hydrologic factors), areas existing stream or habitat degradation, multiple benefits of the project, and feasibility of implementation. Projects can arise as part of the Offsite Alternative Compliance Program. 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. Grant funding can be utilized as available.	FY17	Continuous – Ongoing	X	X	X	X	X	X	X	Various	Public Works
Non-JRMP Strategies (Optional Strategies, Provision B.3.b.(1)(b)													
LM-28	Implement stream, channel, and habitat rehabilitation projects as needed.	This strategy may be triggered if 1) Interim goals are not met, 2) Stream or habitat rehabilitation is determined to be a more effective pathway, relative to additional structural or non-structural BMPs to meeting goals, 3) Funding and staffing has been secured, 4) Partners, MOUs, and permits required by regulatory agencies are secured, and 5) Recommendations from the community are identified and consensus and community support has been achieved. Will occur in areas identified during feasibility studies. The following resources, funds, and steps are needed to implement this strategy if the above triggers are met or at the City's discretion: 1) Identify project locations, 2) Secure funds in the form of general funds, bonds, or grants, 3) Obtain City Council approval of Capital Improvement Projects budget, 4) Initiate preliminary engineering to narrow project scope, 5) Hire design consultant to develop detailed construction plans and construction cost estimates, 6) Complete construction contractor bid and award process for construction phase, 7) Construct project, 8) Operation and maintenance into perpetuity.	Trigger	Continuous – Ongoing	X	X	X	X	X	X	X	Various	Public Works