VOLUME IV:

SANTA ANA REGION MONITORING PLAN

Updates and key revisions to this Monitoring Plan are presented in the format of blue underlined or strikeout text for clarity and review. Global "un-highlighted" revisions include standardization of terms, clarification of text, and other minor editorial corrections. Refer to the Monitoring Annual Report(s) for updates to the Special Studies Workplans, which are separate from this Monitoring Plan. The Permittees will proceed with the Monitoring Program in accordance with the guidance provided herein.

RIVERSIDE COUNTY
WATERSHED PROTECTION

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

CONSOLIDATED MONITORING PROGRAM
Volume IV

SANTA ANA REGION MONITORING PLAN

Riverside County Flood Control and
Water Conservation District
1995 Market Street
Riverside, CA 92501

Rev. 7 – November 2020
Rev. 6 – January 2020
Rev. 5 – October 2018
Rev. 4 – October 2017
Errata – November 2014
Rev. 3 – July 2014
Rev. 2 – November 2013
Rev. 1 – November 2012
May 2011

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ABBREVIATIONS AND ACRONYMS

BOD	Biological Oxygen Demand
BMP	Best Management Practice
CASQA	California Stormwater Quality Association
CCC	Criteria Continuous Concentration
cfs	cubic feet per second
CMC	Criteria Maximum Concentration
CMP	Consolidated Monitoring Program
COC	Chain of Custody
CRAM	California Rapid Assessment Method
CSBP	California State Bioassessment Protocol
CSCI	California Stream Condition Index
CTR	California Toxics Rule
DAMP	Drainage Area Management Plan
District	Riverside County Flood Control and Water Conservation District
DO	Dissolved Oxygen
DOC	Dissolved Organic Carbon
EDD	Electronic Data Deliverables
EPT Taxa	Ephemeroptera, Plecoptera, Trichoptera
FY	Fiscal Year
IBI	Index of Biological Integrity
IC/ID	Illicit Connection/Illegal Discharge
ID	Identification
IDDE	Illicit Discharge Detection and Elimination
LID	Low Impact Development
LIP	Local Implementation Plan
MBAS	Methylene Blue Active Substance
mg/L	milligram per liter
mL	milliliters
MDL	Method Detection Limit
MEP	Maximum Extent Practicable
ML	State Board Minimum Level
MMP	Model Monitoring Program prepared by SCWRRP for Municipal Separate Storm Sewer Systems in Southern California, Technical Report 419
MRP	Monitoring and Reporting Program
MS4	Municipal Separate Storm Sewer System
ng/L	nanograms per liter
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Unit
NWS	National Weather Service
Permittees	County of Riverside, the incorporated Cities of Riverside County and the Riverside County Flood Control and Water Conservation District within the SAR
QA/QC	Quality Assurance/Quality Control
QPS	Quantitative Precipitation Statement
Regional Board	Santa Ana Regional Water Quality Control Board
RL	Reporting Limit
RWMP	Regional Watershed Monitoring Program
Sample IDs	Sample identification numbers
SAR	Santa Ana Region

SAR Permit	Order No. R8-2010-0033, National Pollutant Discharge Elimination System (NPDES) Permit No. CAS618033
SAWPA	Santa Ana Watershed Project Agency
SCCWRP	Southern California Coastal Watershed Research Project
SMC	Southern California Monitoring Coalition
SOP	Standard Operating Procedure
SWAMP	Surface Water Ambient Monitoring Program
TDS	Total Dissolved Solids
TIE	Toxicity Identification Evaluation
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TRE	Toxicity Reduction Evaluation
TSS	Total Suspended Solids
Triad	Chemistry, Toxicity, and Bioassessment
USEPA	United States Environmental Protection Agency
WER	Water Effect Ratio
WQMP	Water Quality Management Plan
WQO	Water Quality Objective
µg/L	micrograms per liter

REVISIONS

Volume III Version	Date	Summary of Revisions
Original	May 2011	Development of a monitoring plan for compliance with the Monitoring and Reporting Program of Order R8-2010-0033.
Revision 1	November 2012	The 2011–2012 monitoring year was the first year of monitoring under the 2010 Order. The CMP (Volume IV) was revised to reflect programmatic adjustments, which included: • Global revisions to formatting and standardization of terms; and • Updates of key staff assignments.
Revision 2	November 2013	The 2012–2013 monitoring year was the second year of monitoring under the 2010 Order. As a result of lessons learned, the CMP (Volume IV) was revised to reflect programmatic adjustments. Updates included: • Global revisions and some consolidation to provide standardization and clarity; • Updates of key staff assignments; • Removal of special study workplans for inclusion of updates in the annual reports; • Analytical methods updates; • Clarification of wet weather monitoring mobilization within the wet season; and • Improvements to sampling and QA/QC procedures.
Revision 3	July 2014	The 2013–2014 monitoring year was the third year of monitoring under the 2010 Order. As a result of lessons learned, the CMP (Volume IV) was revised to reflect programmatic adjustments. Updates included: • Global revisions to provide standardization and clarity, including decapitalization of common terms; • Clarification of key staff assignments and roles as consistent with the QAPP; • Reference to updated SWAMP SOPs (QAPP Attachment E); • Additional clarification of wet weather monitoring mobilization criteria (Section 1.6) as consistent with the QAPP; • Further analytical methods updates; • Updates to Section 5 to reflect current program requirements; and • Streamlining to remove redundant records management procedures and to summarize in Section 6.
Errata	November 2014	Minor revisions to Table 2-1, SAR Numeric WQOs, to reflect updates to the Basin Plan (through July 2014), list the most current benchmarks in reference to the Multi-Sector Permit, and provide clarity regarding application of the WQOs, CTR, WQOs, and benchmarks for metals.
Revision 4	October 2017	The 2016-2017 monitoring year was the sixth year of monitoring under the 2010 Order. As a result of lessons learned, the CMP (Volume IV) was revised to reflect minor programmatic adjustments and reference relevant updates in other Volumes of the CMP, including changes of key staff assignments, analytical updates, minor improvements in protocols and procedures.
Revision 5	October 2018	Changes to key staff assignments, updates to TMDL QAPP references, and added description to the HMP reference.
Revision 6	January 2020	Changes to key staff assignments and updates to public education.
Revision 7	November 2020	Changes to reference approved temporary relocation of one of the receiving water monitoring stations, updates to discussion of the SMC regional monitoring, and other minor editorial changes.

1.0 INTRODUCTION

The Santa Ana Regional Water Quality Control Board (Regional Board) issued Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) draining the County of Riverside, the incorporated Cities of Riverside County and the Riverside County Flood Control and Water Conservation District within the Santa Ana Region (SAR), Order No. R8-2010-0033, National Pollutant Discharge Elimination System (NPDES) Permit No. CAS618033, hereafter referred to as the SAR Permit. The SAR Permit pertains to discharges of urban runoff from the MS4s draining the County of Riverside, the incorporated Cities of Riverside County and the Riverside County Flood Control and Water Conservation District (District) (collectively, Permittees), in the Santa Ana Region within the Santa Ana Watershed (Hydrologic Unit No. 801) and the San Jacinto Watershed (HUC No. 802). This is Volume IV of the Consolidated Monitoring Program (CMP), establishing procedures for compliance with the Monitoring and Reporting Program (MRP) Order No. R8-2010-0033 and will be implemented within six months of approval by the Executive Officer of the Santa Ana Regional Board, as required by SAR Permit Appendix 3, Section III.C. The May 2011 CMP was revised and approved by the Regional Board per the approval letter dated March 26, 2012. Pending approval of this revised CMP, the current monitoring efforts set forth by Order No. R8-2010-0033 will continue to be implemented.

1.1 BACKGROUND

The District is comprised of 2,700 square miles with three distinct watersheds: the Santa Margarita River, the Santa Ana River, and the Whitewater River. Each watershed is governed by a separate Regional Water Quality Control Board (San Diego, Santa Ana, and Colorado River Basin Regional Boards, respectively) and NPDES permits. The District extends from the northwest portion of Riverside County east to Desert Hot Springs and Palm Springs and south to San Diego County through the Temecula area, and has jurisdiction over 40% of the western portion of Riverside County. The Upper and Middle portions of the Santa Ana River Watershed within the Permittees' jurisdiction, hereafter referred to as the SAR, are located in the north to northwest portion of the District. The Lower Santa Ana River Watershed is located in Orange County and the Upper Santa Ana River Watershed is located in San Bernardino County. These areas are regulated under separate MS4 Permits and are not within the Permittees' jurisdiction. This Monitoring Plan is intended to comply with the MRP requirements for the portion of the Middle SAR Watershed located within Riverside County.

The SAR is considered to have a Mediterranean climate, characterized by warm, dry summers and cool, rainy winters. Precipitation depths range from less than 10 inches in the alluvial valleys where urban development is concentrated to over 36 inches in the San Bernardino, Santa Ana and San Jacinto Mountains. In general, rain shading from the coastal ranges forming the western boundary of the watershed (Santa Ana Mountains) leads to very little precipitation throughout valley areas of the inland watershed. Wet weather runoff in the receiving waters is primarily due to rainfall. Dry weather flows in receiving waters are mainly due to discharges from Publicly Owned Treatment Works, covered under the MRP. The second most prominent source of dry weather flows come from agricultural runoff, which is not covered under the MRP. Urban runoff is considered a minor component of dry weather flows. Almost all streams are ephemeral, only flowing during and immediately after rainfall events. A small number of mountainous streams are fed by groundwater and flow during parts of the summer. The Santa Ana River flows perennially from the City of San Bernardino through Prado Dam primarily due to permitted discharges from municipal wastewater treatment plants.

In complying with previous MS4 permits and participating in various regional monitoring efforts over the past ~~15~~ 20 years, the District has established water quality monitoring stations throughout the SAR. To comply with the current MRP, the existing stations will continue to be monitored. In addition, siting will

be conducted prior to implementation of this Monitoring Plan to identify new monitoring stations. The quantity and required characteristics of these new stations are described under the applicable program component in the sections below. Most stations will be used for more than one program component, and overlap is noted.

1.2 PROGRAM GOALS

The goal of the MS4 permit regulatory program, as expressed through the MRP, is to manage the quality of urban runoff to prevent impacts to receiving waters within the Permittees' collective jurisdictions. The SAR Monitoring Program is designed to comply with requirements set forth in the MRP. It is designed to evaluate and address current and/or potential water quality issues in the SAR that may be influenced by urban runoff discharges into the MS4s. The MRP is intended to meet the following objectives[1]:

A. "To identify those Receiving Waters, which, without additional action to control Pollution from urban stormwater runoff, cannot reasonably be expected to achieve or maintain applicable Water Quality Standards required to sustain the designated Beneficial Uses, the goals, and the objectives of the Basin Plan.
B. To develop and support an effective Urban Runoff Management Program.
C. To identify significant water quality problems, related to discharges of urban runoff within the SAR.
D. To determine water quality status, trends, and Pollutants of Concern associated with urban runoff and their impact on the Beneficial Uses of the Receiving Waters.
E. To analyze and interpret the collected data to determine the impact of urban runoff and/or validate relevant water quality models.
F. To characterize pollutants associated with urban runoff, and to assess the influence of urban land uses on Receiving Water quality and associated Beneficial Uses.
G. To identify other sources of pollutants in urban runoff to the maximum extent possible (e.g., including, but not limited to, atmospheric deposition, contaminated sediments, other non-point sources, etc.)
H. To identify and permit or prohibit Illicit Connections.
I. To identify, verify, and prohibit Illegal Discharges.
J. To verify and identify the sources of pollutants in urban runoff.
K. To evaluate the effectiveness of the Drainage Area Management Plan (DAMP) and Water Quality Management Plans (WQMPs), including an estimate of pollutant reductions achieved by the site design (Low Impact Development [LID]), Treatment Control and Source Control BMPs implemented by the Permittees.
L. To evaluate the effectiveness of proposed Urban Runoff Management Programs to protect Receiving Water quality."

1.3 PROGRAM DESCRIPTION

The SAR MRP includes monitoring of receiving waters, outfalls, Illicit Connection/Illegal Discharge (IC/ID) monitoring, in addition to various special studies. The program is designed to answer the following management questions, as discussed in the Southern California Coastal Water Research Project (SCWRRP) Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California, Technical Report 419 (MMP)[2]:

[1] Monitoring and Reporting Program No. R8-2010-0033, Section I – Objectives.
[2] *Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California*. 2004. Model Monitoring Technical Committee. Technical Report 419. Southern California Coastal Water Research Project. Westminster, CA.

1) Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
2) What is the extent and magnitude of the current or potential receiving water problems (i.e., impairments)?
3) What is the relative MS4 discharges contribution to the receiving water problems (i.e., impairments)?
4) What are the sources of MS4 discharges that contribute to receiving water problems (i.e., impairments)?
5) Are conditions in receiving waters getting better or worse?

The Program is designed to determine if urban runoff is contributing to exceedances of Water Quality Objectives (WQOs) by comparison of monitoring results to WQOs provided in the Water Quality Control Plan for the Santa Ana Basin (Basin Plan), the California Toxics Rule (CTR), the USEPA Multi-Sector Permit Parameter Benchmark Values, and other MS4 discharges monitoring data and/or other data, as appropriate.

1.4 GENERAL SCOPE OF MONITORING

The Mass Emissions Monitoring program described in the SAR MRP is designed to assess the condition of receiving waters, effectiveness of BMPs, and the management programs to prevent impairment of receiving waters from urban runoff. Monitoring will consist of grab (discrete) and/or time-weighted and flow-weighted composite samples collected by automated samplers, grab samples, field measurements and bioassessments. Monitoring procedures are based on Surface Water Ambient Monitoring Program (SWAMP) Standard Operating Procedures (SOP) recommendations, modified as necessary for automated equipment and the needs of the specific monitoring program requirements. When feasible, a regional watershed approach is implemented for elements of the monitoring program to enhance consistency of monitoring data within southern California. Monitoring of wet weather and dry weather flows are included in this program. Mobilization criteria are consistent with the MRP and 40 C.F.R. §122.21(g)(7), refer to Section 1.6. Sampling events will be coordinated by the District, the Permittees, and/or with consultants authorized to monitor on behalf of the District. Samples will be analyzed for the constituents listed in the sections of this Monitoring Plan specific to each of the monitoring programs.

All monitoring program's results and updates will be reported in the SAR Monitoring Annual Report. The CMP is reviewed annually, as necessary, and any updates to the Monitoring Plan are submitted to the Santa Ana Regional Board for review as part of the SAR Watershed Annual Report. The Mass Emissions Monitoring Plan includes the following components:

Receiving Water Monitoring Program

- Water Column Toxicity
- Bioassessments

MS4 Outfall and IC/ID Monitoring

- MS4 Outfall Monitoring (historically referred to as "Core" MS4 outfall stations)
- IC/ID Monitoring
- Source Identification Monitoring

Special Studies

- Middle Santa Ana River Bacterial Indicator TMDL Monitoring
- Lake Elsinore and Canyon Lake Nutrient Monitoring
- Hydromodification Study
- LID BMP Monitoring

Grab and/or composite samples will be collected for all monitoring programs in the SAR. All monitoring activities are intended to be compatible with protocols provided by SWAMP and the Center for Watershed Protection IDDE guidance. Table 1-1 provides a summary of monitoring program requirements.

Table 1-1: Summary of Monitoring Program

Monitoring Component	Sampling Frequency Requirement	Analytical Requirements
Receiving Water	2 Dry Weather (June 1st – Sept. 30th), 2 Wet Weather (Oct. 1st – May 31st)	Chemistry, Bacterial Indicator, Field parameters, Flow
Water Column Toxicity	2 Dry Weather (conducted with the Receiving Water monitoring program), 2 Wet Weather (conducted with the Receiving Water monitoring program)	Toxicity
Bioassessment[1]	1 Dry Weather (conducted with the Regional Bioassessment program from May-June)	CRAM, Algae, Benthic Macroinvertebrates, pHab, Toxicity, Field parameters, Flow
Follow-up Toxicity Analyses (TIE/TRE Triad Approach)	As necessary	Toxicity for TIE/TREs, Chemistry and field parameters as needed for source identification
MS4 Outfall Monitoring	2 Dry Weather, 3 Wet Weather	Chemistry, Bacterial Indicator, Field parameters, Flow
IC/ID Monitoring	Scheduled Dry Weather inspection visits: sampled as necessary	Field parameters and Flow, if present

[1]Bioassessment was conducted with the SMC Regional Program for a 5-year Study ending in the 2012-2013 monitoring year. For the 2013-2014 monitoring year targeted bioassessment monitoring was conducted at the dry weather receiving water stations as an interim measure as the SMC 5-year study cycle was completed in summer of 2013. Additional sites were selected for monitoring in 2014, in coordination with the SMC. For FY 2015-2019 both trend and condition sites were selected, as determined by SCCWRP under the 5-year work plan for those years. The Permittees will continue to participate in the SMC regional bioassessment monitoring in the interim year (2020) until which time a new 5-year study design is developed. Sites will be selected for monitoring under coordination with the SMC ongoing regional effort in a similar manner as the previous 5-year study design.

1.5 PROJECT ORGANIZATION AND RESPONSIBILITIES

The District, as the Principal Permittee named in the SAR MS4 Permit, is the lead agency responsible for overseeing the SAR monitoring program and is ultimately responsible for MRP compliance. Rebekah Guill is the District's Monitoring Program Manager and has the responsibility for overseeing all of the project work items, providing coordination of participating entities, and providing data to the Santa Ana Regional Board for reporting and analysis purposes. Rebekah Guill is the District's Watershed Monitoring Section Manager, serving as the Monitoring Program Manager under this CMP, and is responsible for MRP compliance. Abigail Suter is responsible for QC review of data received from laboratory consultants, as specified in Appendix O of Volume II: Quality Assurance Project Plan (QAPP).

The District, in coordination with the Santa Ana Watershed Project Authority (SAWPA) and the Southern California Monitoring Coalition (SMC), will conduct and/or coordinate all SAR monitoring required under the SAR Permit. Laboratory consultants will conduct constituent analysis. Responsibilities and consultant organization is located in Appendix O of Volume II: Quality Assurance Project Plan (QAPP). The laboratory consultant is responsible for all internal Quality Assurance/Quality Control (QA/QC) of analysis data, including their subcontractor's data analysis.

In addition to the program described in Sections 3.0 – 6.0, four additional monitoring components are required by the MRP. Standalone work plans have been developed and approved for these components independently of this CMP. The four monitoring components are:

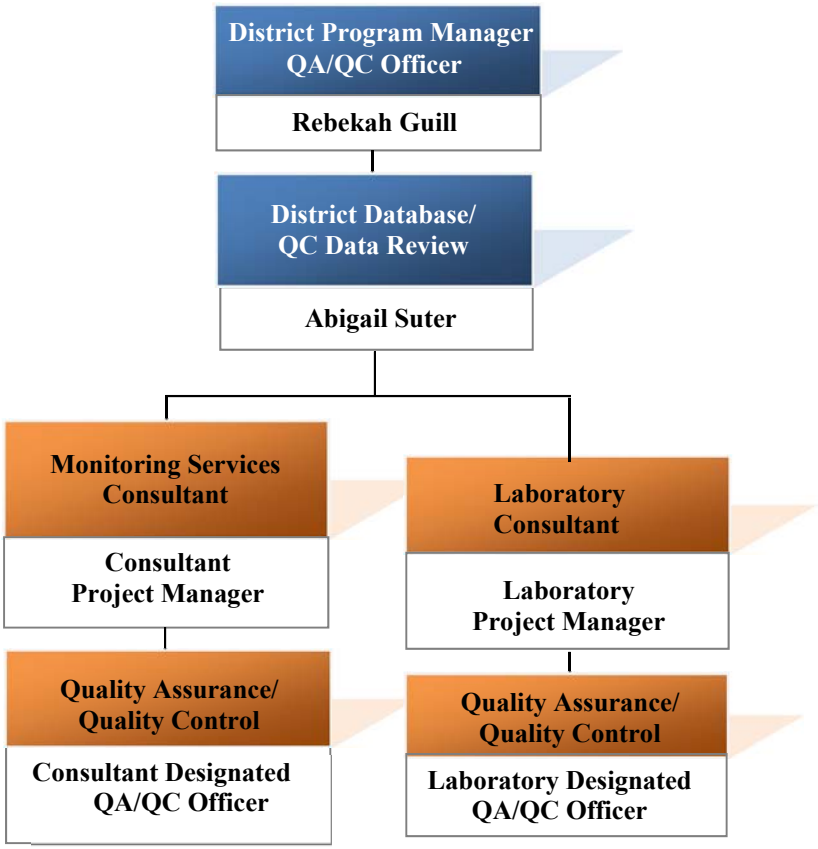
- Total Maximum Daily Load (TMDL)/303(d) Listed Waterbody Monitoring
- Regional Watershed Monitoring
- Hydromodification Monitoring
- Low Impact Development BMP Monitoring

The primary contacts for this Program are listed in Table 1-2. The Project Organization is summarized in Figure 1-1.

Table 1-2: Project Contacts

Affiliation	Name/Title	Contact Information
District	Rebekah Guill Watershed Monitoring Section Manager/ Monitoring Program Manager	Ph: 951.955.2901 E-mail: rguill@rivco.org
District	Abigail Suter Database Manager (Data QC)	Ph. 951.955.1734 E-mail: adsuter@rivco.org
Laboratory or Monitoring Consultant(s)	Project Manager (See Appendix O of Volume II)	See Appendix O of Volume II
Laboratory or Monitoring Consultant(s)	QA Officer (See Appendix O of Volume II)	See Appendix O of Volume II

Figure 1-1: Project Organizational Chart



Notes:
Government Agency
Consultant

1.6 MOBILIZATION CRITERIA

1.6.1 Wet Weather Monitoring Mobilization Criteria

The MRP defines the Wet Season as October 1st through May 31st. Monitoring stations will be sampled according to procedures described in the following Sections 3.1.2, and 4.3.3.

The representative storm event was derived using average rainfall depths and durations from the USEPA NPDES Storm Water Sampling Guidance Document, Exhibit 2-8, "Rain Zones of the United States".[3] The derivation is presented in Section 10.3 of Volume II.

- Pursuant to USEPA 833-B-92-001, a representative event for the Pacific Southwest is between:
  - 0.27" to 0.81" in depth and
  - within 6 to 18 hours in duration.
- Pursuant to District analysis of local rain gauge data conducted in accordance with USEPA 833-B-92-001, a representative event is between:
  - 0.38" to 1.14" in depth and
  - within 6 to 18 hours in duration.

Due to the ephemeral nature of the SAR, the first storm that falls under the USEPA-recommended criteria may not result in runoff from tributary areas. Based on the District's monitoring experience storm event forecasts of less than 0.5" in 24 hours do not typically result in measureable runoff and often results in false starts. If samples could not be collected during wet weather monitoring (i.e., station conditions were found not to be representative of precipitation-generated runoff, flow was insufficient for safe collection, unsafe weather conditions, human error, etc.) a wet weather monitoring event will be determined to be a false start (FS). If a monitoring station had one or more FS wet weather events, field personnel will be mobilized to a monitoring station for subsequent events meeting mobilization criteria or until the end of the wet season, in attempt to complete wet weather monitoring requirements.

Wet Season Storm Event monitoring, hereafter referred to as wet weather monitoring, will be conducted according to the mobilization criteria below (40 CFR §122.21(g)(7)(ii)):

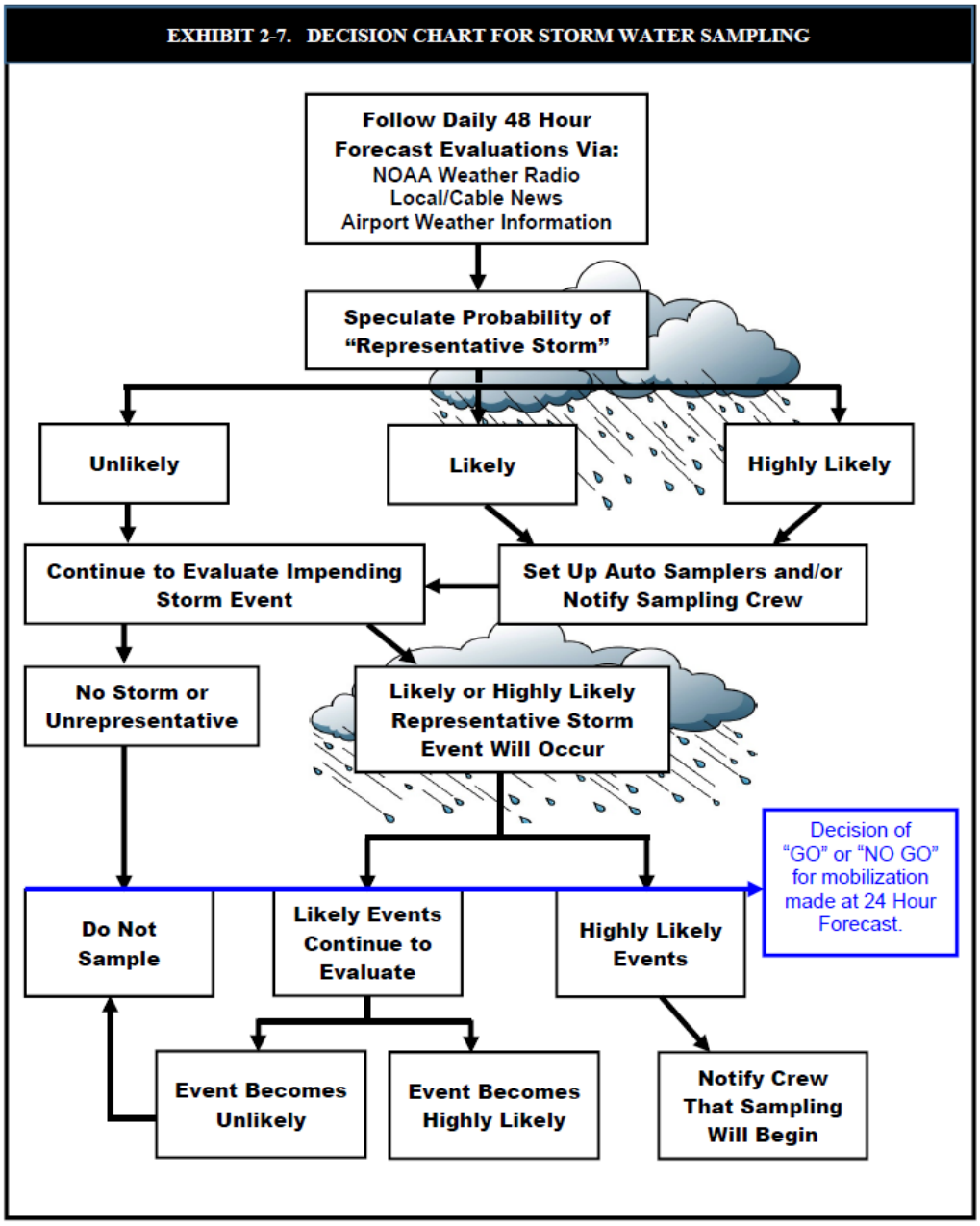
If a Storm Event is forecasted by the NWS QPS to be greater than 0.1" within the next 48 hours and there is at least 72 hours between the forecasted event and a previous measurable (>0.1") rainfall event:

- Then District will follow the procedure outlined in Exhibit 2-7 of USEPA NPDES Storm Water Guidance Document (USEPA 833-B-92-001), included below as Figure 1-2 and as discussed in Section 10.3 of Volume II. This Decision Chart references the speculation of representative storm size.
- Pursuant to NWS standard practice, the term "Likely" in Exhibit 2-7, represents a Probability of Precipitation (PoP) of at least 60%.
- Mobilization will occur when the NWS QPS forecast shows likely rainfall of 0.3" in 6 hours AND/OR 0.5" in 24 hours. This gives the District the greatest chance to sample a representative storm event.
- For mobilization to occur, criteria must be met 24 hours in advance of sampling for coordination with property owners, consultants, and sampling personnel.

Additional information regarding mobilization criteria is available in Section 10.3 of Volume II.

[3] Exhibit 2-8 "Rain Zones of the United States", Pacific Southwest Region. *NPDES Storm Water Sampling Guidance Document*. U.S. EPA Document No. 833-B-92-001.

Figure 1-2: USEPA Decision Chart for Storm Event Sampling



1.6.2 Dry Weather Monitoring Mobilization Criteria

Monitoring stations will be sampled according to procedures described in the following Sections 3.4.2, 3.5.3, and 4.4.2. Mobilization will be conducted according to the criteria below:

- Dry weather monitoring will occur between June 1st and September 30th.
- Dry weather monitoring must be preceded by at least 72 hours of dry conditions (<0.1 inch of precipitation).

During dry weather monitoring events, monitoring locations may be dry and, therefore, no samples will be collected. If this occurs, a field data sheet will be completed noting the site conditions and characteristics and that no samples were collected and categorized as Visited, Not Sampled. Photographs will also be taken to document the dry conditions.

2.0 WATER QUALITY OBJECTIVES

2.1 RECEIVING WATER QUALITY OBJECTIVES

The Regional Board has assessed the beneficial uses of receiving waters under their jurisdiction during the development of the Basin Plan. The SAR is included in the Basin Plan, as are waterbody and hydrologic sub-area (HSA) specific WQOs and beneficial uses.

Individual waterbodies within the SAR are assigned WQOs based on their existing and potential beneficial uses. These waterbodies are listed in Table 4-1 of the current Basin Plan with amendments from February 2008, June 2011 and February 2016. Beneficial use-based WQOs are designed to prevent harm to human health and/or aquatic life and may differ between receiving waters. Waterbodies designated in the Basin Plan as having the municipal (MUN) beneficial use have additional WQOs that are derived from drinking water standards and are available in Chapter 4 of the Basin Plan. Different reaches of a waterbody may cross HSAs and may have different beneficial uses. Analytical results are also compared to the USEPA Multi-Sector Permit Parameter Benchmark Values and may be compared to other dischargers' monitoring data for trend assessments.

In addition to WQOs listed in the Basin Plan, the California Toxics Rule (CTR) contains WQOs that are applicable to waterbodies within California, including the SAR. The CTR has up to two criteria for each constituent: Criteria Maximum Concentrations (CMCs, Acute) and Criteria Continuous Concentrations (CCCs, Chronic). CMCs are an acute concentration of the constituent and CCCs are a chronic concentration (based on a four day average). CMCs are an acute concentration of the constituent and will be used to assess wet weather events. CCCs are a chronic concentration (based on a four day average) and will be used to assess dry weather monitoring events. Table 2-1 below presents all the constituents analyzed within this MRP and numeric WQOs. Many constituents have objectives specific to reaches of waterbodies; the Basin Plan should be consulted for those constituents and any applicable beneficial use specific requirements.[4]

[4] In example, the Basin Plan contains Site Specific Objectives for nutrients and metals for certain waterbodies within the SAR.

Table 2-1: SAR Numeric WQOs

Constituent	Units	CTR WQOs		USEPA Multi-Sector Permit Benchmark Parameters[1]	Basin Plan WQOs[7]
		CMC	CCC		
Conventionals, Nutrients, and Hydrocarbons					
Ammonia	mg/L	NA	NA	2.14	See p. 4-7 of the Basin Plan
BOD (5 day)	mg/L	NA	NA	30	NA
COD	mg/L	NA	NA	120	See Table 4-1 of the Basin Plan
Color	Units	NA	NA	NA	15 (MUN)
Dissolved Phosphorus	mg/L	NA	NA	NA	NA
DO	mg/L	NA	NA	NA	5 (WARM); 6 (COLD)
DOC	mg/L	NA	NA	NA	NA
Fluorescence	TBD	NA	NA	NA	NA
Fluoride	mg/L	NA	NA	75	See p. 4-11 of the Basin Plan
MBAS	mg/L	NA	NA	NA	0.05 (MUN)
Nitrate	mg/L	NA	NA	0.68[2]	10 (MUN)[3]
Nitrite	mg/L	NA	NA	0.68[2]	NA
Nitrogen, Total (calculation)	mg/L	NA	NA	NA	See Table 4-1 of Basin Plan
Nitrogen, Total Inorganic	mg/L	NA	NA	NA	See Table 4-1 of the Basin Plan
Nitrogen, Total Organic	mg/L	NA	NA	NA	NA
Oil and Grease	mg/L	NA	NA	15	NA
pH	pH units	NA	NA	6.0-9.0	6.5-8.5
Specific Conductance	µmhos/cm	NA	NA	NA	NA
Sulfate	mg/L	NA	NA	NA	See Table 4-1 of the Basin Plan
TDS	mg/L	NA	NA	NA	See Table 4-1 of the Basin Plan
Temperature	°Celsius	NA	NA	NA	<5°F Increase (COLD); <90°F June to October or <78°F the rest of the year (WARM)
TKN	mg/L	NA	NA	NA	NA
TOC	mg/L	NA	NA	NA	NA
Total Hardness	mg/L	NA	NA	NA	See Table 4-1of the Basin Plan
Total Phosphorus	mg/L	NA	NA	2	NA
Total Potassium	mg/L	NA	NA	NA	NA
Total Residual Chlorine	mg/L	NA	NA	NA	0.1
TPH	mg/L	NA	NA	NA	NA

Table 2-1: SAR Numeric WQOs (continued)

Constituent	Units	CTR WQOs		USEPA Multi-Sector Permit Benchmark Parameters[1]	Basin Plan WQOs
		CMC	CCC		
TSS	mg/L	NA	NA	100	NA
Turbidity	NTU	NA	NA	50	See p. 4-20 of the Basin Plan
Metals (Total and Dissolved)					
Antimony	µg/L	NA	NA	640[4]	NA
Arsenic	µg/L	340[5]	150[5]	150[4]	NA
Barium	µg/L	NA	NA	NA	NA
Beryllium	µg/L	NA	NA	130[4]	NA
Boron	µg/L	NA	NA	NA	750[4]
Cadmium	µg/L	hardness-based[5]	hardness-based[5]	hardness-based[4]	See p. 4-12 of the Basin Plan[5]
Chromium, Hexavalent	µg/L	16[5]	11[5]	NA	NA
Chromium, Total	µg/L	NA	NA	NA	NA
Chromium, Trivalent	µg/L	hardness-based[5]	hardness-based[5]	NA	NA
Copper	µg/L	hardness-based[5]	hardness-based[5]	hardness-based[4]	See p. 4-12 of the Basin Plan[5]
Iron	µg/L	NA	NA	1000[4]	NA
Lead	µg/L	hardness-based[5]	hardness-based[5]	hardness-based[4]	See p. 4-12 of the Basin Plan[5]
Manganese	µg/L	NA	NA	NA	NA
Mercury	µg/L	NA	NA	1.4[4]	NA
Nickel	µg/L	hardness-based[5]	hardness-based[5]	hardness-based[4]	NA
Selenium	µg/L	NA	5[4]	5[4]	NA
Silver	µg/L	hardness-based[5]	NA	hardness-based[4]	NA
Thallium	µg/L	NA	NA	NA	NA
Zinc	µg/L	hardness-based[5]	hardness-based[5]	hardness-based[4]	NA
Bacteriological					
E. coli	MPN/100mL	NA	NA	NA	<126 See Table 4-pio of the Basin Plan[6]
Enterococcus	MPN/100mL	NA	NA	NA	NA
Fecal Coliform	MPN/100mL	NA	NA	NA	NA
Fecal Streptococci	MPN/100mL	NA	NA	NA	NA

Table 2-1: SAR Numeric WQOs (continued)

Constituent	Units	CTR WQOs		USEPA Multi-Sector Permit Benchmark Parameters[1]	Basin Plan WQOs
		CMC	CCC		
Total Coliform	MPN/100mL	NA	NA	NA	NA
Toxicity					
Ceriodaphnia dubia (acute)	% survival	NA	NA	NA	<1
Pimephales promelas (acute)	% survival	NA	NA	NA	<1
Selenastrum capricornium (chronic)	% survival	NA	NA	NA	<1
Pesticides					
4,4'-DDD	µg/L	NA	NA	NA	NA
4,4'-DDE	µg/L	NA	NA	NA	NA
4,4'-DDT	µg/L	1.1	0.001	NA	NA
Aldrin	µg/L	3	NA	NA	NA
alpha-BHC	µg/L	NA	NA	NA	NA
alpha-Endosulfan	µg/L	0.22	0.056	NA	NA
Aspon	µg/L	NA	NA	NA	NA
Atrazine	µg/L	NA	NA	NA	NA
Azinphos-ethyl	µg/L	NA	NA	NA	NA
Azinphos-methyl	µg/L	NA	NA	NA	NA
beta-BHC	µg/L	NA	NA	NA	NA
beta-Endosulfan	µg/L	0.22	0.056	NA	NA
Carbophenothion	µg/L	NA	NA	NA	NA
Chlordane	µg/L	2.4	0.043	NA	NA
Chlorfenvinphos	µg/L	NA	NA	NA	NA
Chlorpyrifos	µg/L	NA	NA	NA	NA
Chlorpyrifos methyl	µg/L	NA	NA	NA	NA
Ciodrin (Crotoxyphos)	µg/L	NA	NA	NA	NA
Coumaphos	µg/L	NA	NA	NA	NA
delta-BHC	µg/L	NA	NA	NA	NA
Demeton-O	µg/L	NA	NA	NA	NA

Table 2-1: SAR Numeric WQOs (continued)

Constituent	Units	CTR WQOs		USEPA Multi-Sector Permit Benchmark Parameters[1]	Basin Plan WQOs
		CMC	CCC		
Demeton-S	µg/L	NA	NA	NA	NA
Diazinon	µg/L	NA	NA	NA	NA
Dibrom (Naled)	µg/L	NA	NA	NA	NA
Dichlofenthion	µg/L	NA	NA	NA	NA
Dichlorvos	µg/L	NA	NA	NA	NA
Dicrotophos	µg/L	NA	NA	NA	NA
Dieldrin	µg/L	0.24	0.056	NA	NA
Dimethoate	µg/L	NA	NA	NA	NA
Dioxathion	µg/L	NA	NA	NA	NA
Disulfoton	µg/L	NA	NA	NA	NA
Endosulfan Sulfate	µg/L	NA	NA	NA	NA
Endrin	µg/L	0.086	0.036	NA	NA
Endrin Aldehyde	µg/L	NA	NA	NA	NA
EPN	µg/L	NA	NA	NA	NA
Ethion	µg/L	NA	NA	NA	NA
Ethyl Parathion	µg/L	NA	NA	NA	NA
Famphur	µg/L	NA	NA	NA	NA
Fenchlorophos (Ronnel)	µg/L	NA	NA	NA	NA
Fenitrothion	µg/L	NA	NA	NA	NA
Fensulfothion	µg/L	NA	NA	NA	NA
Fenthion (Mercaptophos)	µg/L	NA	NA	NA	NA
Fonophos (Dyfonate)	µg/L	NA	NA	NA	NA
gamma-BHC (lindane)	µg/L	0.95	NA	NA	NA
Guthion (Azinphos methyl)	µg/L	NA	NA	NA	NA
Heptachlor	µg/L	0.52	0.0038	NA	NA
Heptachlor Epoxide	µg/L	0.52	0.0038	NA	NA
Leptophos	µg/L	NA	NA	NA	NA
Malathion	µg/L	NA	NA	NA	NA
Merphos	µg/L	NA	NA	NA	NA
Methyl Parathion	µg/L	NA	NA	NA	NA

Table 2-1: SAR Numeric WQOs) (continued)

Constituent	Units	CTR WQOs		EPA Multi-Sector Permit Benchmark Parameters[1]	Basin Plan WQOs
		Acute	Chronic		
Mevinphos	µg/L	NA	NA	NA	NA
Monocroptophos	µg/L	NA	NA	NA	NA
Phorate	µg/L	NA	NA	NA	NA
Phosmet	µg/L	NA	NA	NA	NA
Phosphamidon	µg/L	NA	NA	NA	NA
Prophos (Ethoprop)	µg/L	NA	NA	NA	NA
Simanzine	µg/L	NA	NA	NA	NA
Sulfotepp	µg/L	NA	NA	NA	NA
Sulprofos (Bolstar)	µg/L	NA	NA	NA	NA
TEPP	µg/L	NA	NA	NA	NA
Terbufos	µg/L	NA	NA	NA	NA
Tetrachlorvinphos (Stirifos)	µg/L	NA	NA	NA	NA
Thionzin (Thionazin)	µg/L	NA	NA	NA	NA
Tokuthion	µg/L	NA	NA	NA	NA
Toxaphene	µg/L	0.73	0.0002	NA	NA
Trichlorfon	µg/L	NA	NA	NA	NA
Trichloronate	µg/L	NA	NA	NA	NA
Volatiles					
Acrolein	µg/L	NA	NA	NA	NA
Acrylonitrile	µg/L	NA	NA	NA	NA
Benzene	µg/L	NA	NA	NA	NA
Bromoform	µg/L	NA	NA	NA	NA
Carbon Tetrachloride	µg/L	NA	NA	NA	NA
Chlorobenzene	µg/L	NA	NA	NA	NA
Chlorodibromomethane	µg/L	NA	NA	NA	NA
Chloroethane	µg/L	NA	NA	NA	NA
2-Chloroethylvinyl Ether	µg/L	NA	NA	NA	NA
Chloroform	µg/L	NA	NA	NA	NA
Dichlorobromomethane	µg/L	NA	NA	NA	NA
1,1-Dichloroethane	µg/L	NA	NA	NA	NA

Table 2-1: SAR Numeric WQOs (continued)

Constituent	Units	CTR WQOs		USEPA Multi-Sector Permit Benchmark Parameters[1]	Basin Plan WQOs
		CMC	CCC		
1,2-Dichloroethane	µg/L	NA	NA	NA	NA
1,1-Dichloroethylene	µg/L	NA	NA	NA	NA
1,2-Dichloropropane	µg/L	NA	NA	NA	NA
1,3-Dichloropropylene	µg/L	NA	NA	NA	NA
Ethylbenzene	µg/L	NA	NA	NA	NA
Methyl Bromide	µg/L	NA	NA	NA	NA
Methyl Chloride	µg/L	NA	NA	NA	NA
Methylene Chloride	µg/L	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	µg/L	NA	NA	NA	NA
Tetrachloroethylene	µg/L	NA	NA	NA	NA
Toluene	µg/L	NA	NA	NA	NA
1,2-Trans-Dichloroethylene	µg/L	NA	NA	NA	NA
1,1,1-Trichloroethane	µg/L	NA	NA	NA	NA
1,1,2-Trichloroethane	µg/L	NA	NA	NA	NA
Trichloroethylene	µg/L	NA	NA	NA	NA
Vinyl Chloride	µg/L	NA	NA	NA	NA
Acid & Base/Neutral Compounds					
2-Chlorophenol	µg/L	NA	NA	NA	NA
2,4-Dichlorophenol	µg/L	NA	NA	NA	NA
2,4-Dimethylphenol	µg/L	NA	NA	NA	NA
2-Methyl-4,6-Dinitrophenol	µg/L	NA	NA	NA	NA
2,4-Dinitrophenol	µg/L	NA	NA	NA	NA
2-Nitrophenol	µg/L	NA	NA	NA	NA
4-Nitrophenol	µg/L	NA	NA	NA	NA
3-Methyl-4-Chlorophenol	µg/L	NA	NA	NA	NA
Pentachlorophenol	µg/L	19	15	NA	NA
Phenol	µg/L	NA	NA	NA	NA
2,4,6-Trichlorophenol	µg/L	NA	NA	NA	NA
Benzidine	µg/L	NA	NA	NA	NA
Bis(2-Chloroethoxy)Methane	µg/L	NA	NA	NA	NA
Bis(2-Chloroethyl)Ether	µg/L	NA	NA	NA	NA
Bis(2-Chloroisopropyl)Ether	µg/L	NA	NA	NA	NA
Bis(2-Ethylhexyl)Phthalate	µg/L	NA	NA	NA	NA
Butylbenzyl Phthalate	µg/L	NA	NA	NA	NA

Table 2-1: SAR Numeric WQOs (continued)

Constituent	Units	CTR WQOs		USEPA Multi-Sector Permit Benchmark Parameters[1]	Basin Plan WQOs
		CMC	CCC		
4-Bromophenyl Phenyl Ether	µg/L	NA	NA	NA	NA
2-Chloronaphthalene	µg/L	NA	NA	NA	NA
4-Chlorophenyl Phenyl Ether	µg/L	NA	NA	NA	NA
1,2-Dichlorobenzene	µg/L	NA	NA	NA	NA
1,3-Dichlorobenzene	µg/L	NA	NA	NA	NA
1,4-Dichlorobenzene	µg/L	NA	NA	NA	NA
3,3'-Dichlorobenzidine	µg/L	NA	NA	NA	NA
Diethyl Phthalate	µg/L	NA	NA	NA	NA
Dimethyl Phthalate	µg/L	NA	NA	NA	NA
Di-n-Butyl Phthalate	µg/L	NA	NA	NA	NA
2,4-Dinitrotoluene	µg/L	NA	NA	NA	NA
2,6-Dinitrotoluene	µg/L	NA	NA	NA	NA
Di-n-Octyl Phthalate	µg/L	NA	NA	NA	NA
1,2-Diphenylhydrazine	µg/L	NA	NA	NA	NA
Hexachlorobenzene	µg/L	NA	NA	NA	NA
Hexachlorobutadiene	µg/L	NA	NA	NA	NA
Hexachlorocyclopentadiene	µg/L	NA	NA	NA	NA
Hexachloroethane	µg/L	NA	NA	NA	NA
Isophorone	µg/L	NA	NA	NA	NA
Nitrobenzene	µg/L	NA	NA	NA	NA
N-Nitrosodimethylamine	µg/L	NA	NA	NA	NA
N-Nitrosodi-n-Propylamine	µg/L	NA	NA	NA	NA
N-Nitrosodiphenylamine	µg/L	NA	NA	NA	NA
1,2,4 Triochlorobenzene	µg/L	NA	NA	NA	NA
Acenaphthene	µg/L	NA	NA	NA	NA
Acenaphthylene	µg/L	NA	NA	NA	NA
Anthracene	µg/L	NA	NA	NA	NA
Benzo(a)Anthracene	µg/L	NA	NA	NA	NA
Benzo(a)Pyrene	µg/L	NA	NA	NA	NA
Benzo(b)Fluoranthene	µg/L	NA	NA	NA	NA
Benzo(ghi)Perylene	µg/L	NA	NA	NA	NA
Benzo(k)Fluoranthene	µg/L	NA	NA	NA	NA
Chrysene	µg/L	NA	NA	NA	NA
Dibenzo(a,h)Anthracene	µg/L	NA	NA	NA	NA

Table 2-1: SAR Numeric WQOs (continued)

Constituent	Units	CTR WQOs		EPA Multi-Sector Permit Benchmark Parameters[1]	Basin Plan WQOs
		Acute	Chronic		
Fluoranthene	µg/L	NA	NA	NA	NA
Fluorene	µg/L	NA	NA	NA	NA
Indeno(1,2,3-cd)Pyrene	µg/L	NA	NA	NA	NA
Naphthalene	µg/L	NA	NA	NA	NA
Phenanthrene	µg/L	NA	NA	NA	NA
Pyrene	µg/L	NA	NA	NA	NA
Polychlorinated Biphenyls (PCBs)					
Aroclor -1016	µg/L	NA	0.014	NA	NA
Aroclor -1221	µg/L	NA	0.014	NA	NA
Aroclor -1232	µg/L	NA	0.014	NA	NA
Aroclor -1242	µg/L	NA	0.014	NA	NA
Aroclor -1248	µg/L	NA	0.014	NA	NA
Aroclor -1254	µg/L	NA	0.014	NA	NA
Aroclor -1260	µg/L	NA	0.014	NA	NA
Other Toxic Pollutants					
Cyanide, total	µg/L	22	5.2	~~NA~~	NA
Phenols, total	µg/L	NA	NA	NA	NA

[1] Values updated to reflect the 2008 MSGP benchmarks.
[2] 2008 MSGP specifies a benchmark for "nitrate plus nitrite nitrogen". The benchmark has been applied to both nitrate and nitrite.
[3] The MUN WQO is 10 mg/L for nitrate as nitrogen, the form of nitrate monitored in the SAR. The MUN WQO is 45 mg/L for nitrate as NO_3.
[4] Numeric criteria applies to total phase metal only.
[5] Numeric criteria applies to dissolved phase metal only.
[6] Applies to REC1-only or REC1 and REC2.
[7] The Bain Plan Numeric WQO's as stated in the June, 2019 Basin Plan.

The CTR also contains sample-specific WQOs for dissolved metals in which a calculation is required to determine Acute/CMC and Chronic/CCC criteria. Additional information is available at 40 C.F.R. §131.38. The calculation requires hardness to be analyzed. Since no site-specific water effect ratio (WER) is present for any waterbody within the SAR, it is assumed to be 1 for the purposes of the calculation. Results should be rounded to two significant figures. The calculations are as follows:

$$CMC = WER \times (\text{Acute Conversion Factor}) \times (\exp\{m_A[\ln(\text{hardness})\}+b_A\})$$

$$CCC = WER \times (\text{Chronic Conversion Factor}) \times (\exp\{m_C[\ln(\text{hardness})\}+b_C\})$$

Specific dissolved metal conversion requirements under the CTR are presented in Table 2-2:

Table 2-2: CTR Conversion Requirements

Constituent[1]	m_A	b_A	m_C	b_C	Conversion Factor for CMC	Conversion Factor for CCC
Antimony	-	-	-	-	NA[2]	NA[2]
Arsenic	-	-	-	-	1.000	1.000
Beryllium	-	-	-	-	NA[2]	NA[2]
Cadmium	1.128	-3.6867	0.7852	-2.715	= 1.136672-[(ln {hardness}) (0.041838)]	= 1.101672-[(ln {hardness})(0.041838)]
Chromium (III)	0.8190	3.688	0.8190	1.561	0.316	0.860
Chromium (VI)	-	-	-	-	0.982	0.962
Copper	0.9422	-1.700	0.8545	-1.702	0.960	0.960
Lead	1.273	-1.460	1.273	-4.705	= 1.46203-[(ln {hardness})(0.145712)]	= 1.46203-[(ln {hardness})(0.145712)]
Mercury	-	-	-	-	NA	NA
Nickel	0.8460	2.255	0.8460	0.0584	0.998	0.997
Selenium	-	-			NA	NA
Silver	1.72	-6.52	NA	NA	0.85	NA[2]
Thallium	-	-	-	-	NA[2]	NA[2]
Zinc	0.8473	0.884	0.8473	0.884	0.978	0.986

[1] Metal Criterion based on conversion from the total recoverable fraction to criterion applicable to the dissolved fraction.
[2] Aquatic life criterion has not yet been published by the USEPA.

2.2 SOURCES OF DATA

The District will coordinate with the California Association of Stormwater Quality Agencies (CASQA), Southern California Coastal Watershed Research Project (SCCWRP), the SMC, SAWPA, and other municipalities within southern California "for the collection, analysis, and interpretation of existing data from local, regional or national monitoring programs. These data sources may be utilized to:

- Characterize different sources of pollutants discharged to the MS4;
- Determine pollutant generation, transport and fate;
- Develop a relationship between land use, development size, storm size and the event mean concentration of pollutants;
- Determine spatial and temporal variances in Urban Runoff quality and seasonal and other bias in the collected data; and
- Identify any unique features of the SAR."

Per the MRP, the District may obtain data from other monitoring efforts for comparison purposes and to augment their data set with data from other organizations and municipalities from similar studies, if available.

3.0 RECEIVING WATER MONITORING PROGRAM

The Receiving Waters Monitoring Program is part of a regional effort by the Permittees to implement a watershed-based monitoring program. The program has been designed to comply with the MRP, with emphasis on meeting MRP goals, providing meaningful data, and providing informative answers to management questions posed in the MRP. The Receiving Waters Monitoring Program is comprised of monitoring the chemistry, toxicity, and bioassessment metrics of the two major receiving waters in the SAR – the San Jacinto River and the Santa Ana River. The program will be performed in conjunction with the Regional Watershed Monitoring Program, overseen by SWAMP and the SMC and coordinated by SCCWRP.

3.1 RECEIVING WATER MONITORING PROGRAM OVERVIEW

The MRP requires receiving water monitoring at a minimum of two locations: one located near a major outfall into the San Jacinto River and one located near a major outfall into the Middle Santa Ana River. Monitoring will be conducted during two wet weather and two dry weather monitoring events. Composite and grab sampling regimes will be used for sample collection during wet weather and dry weather monitoring events. Field measurements will also be taken. The Bioassessment requirement of the receiving water monitoring program was previously fulfilled through the Regional Watershed Monitoring Program, specifically the SMC's Regional Bioassessment 5-year study (2009-2013) which was completed in 2013. The Final Report of this study is anticipated to be published in 2015. To continue to satisfy the bioassessment requirement of the Permit, during the 2013-2014 monitoring year the Permittees participated in bioassessment monitoring independent of the SMC and in coordination with the SMC's interim study design for 2014. Moving forward the Bioassessment monitoring requirement of the receiving water monitoring program will continue to be coordinated with the SMC's Regional Watershed Monitoring Program. Refer to Section 3.5 for details.

Samples will be collected in accordance with the SOPs in Appendix D (Clean Hands/Dirty Hands) and Appendix E (Collection of Water and Bed Sediment Samples with Associated Field Measurements and Physical Habitat in California) of CMP Volume II. Monitoring is intended to be SWAMP compatible. Composite and grab sample times, *in-situ* field measurements, and sampling activities and observations will be recorded on a field data sheet in accordance with the procedures detailed in Section 11 of Volume II.

The Receiving Waters Monitoring Program incorporates the following monitoring components:

- Receiving water quality and flow monitoring (Sections 3.3 and 3.4)
- Water column toxicity monitoring (Sections 3.3 and 3.4)
- Bioassessment monitoring (Section 3.5)
- Regional monitoring programs (Section 3.5)

3.1.1 Receiving Water Monitoring Program Management Questions

To meet the goals of the MS4 Permit, the Receiving Waters Monitoring Program will address the following MMP core management questions:

1) "Are conditions in Receiving Waters protective, or likely to be protective, of Beneficial Uses?"
2) "What is the extent and magnitude of the current or potential Receiving Water problems? (i.e., impairments)"
3) " What is the relative Urban Runoff contribution to the Receiving Water problem(s) (i.e., impairments)?"
4) "Are conditions in Receiving Waters getting better or worse?"

Management questions will be addressed in the SAR Monitoring Annual Report.

3.1.2 Receiving Waters Monitoring Program Compliance

Table 3-1 below summarizes compliance requirements for the Receiving Waters Monitoring Program:

Table 3-1: Receiving Water Monitoring Program Compliance Matrix

Station Name	Station ID	Watershed	# Wet Events	# Dry Events	Monitoring Type	Sample Type	Analyses	Permit Reference
Temescal Channel at Main	801TMS746	Santa Ana River	2	-	Receiving Water	Composite	General Chemistry; Flow	Appendix 3, §III.E.2
						Grab	Bacterial Indicators, VOCs, TPH, O&G	
						Field Meter	*In-situ* measurements	
					Water Column Toxicity	Grab	Acute and Chronic Toxicity	
Santa Ana River at Highgrove*	801AHG857		-	2	Receiving Water	Grab	General Chemistry; Flow, Bacterial Indicators, VOCs, TPH, O&G	Appendix 3, §III.E.2
						Field Meter	*In-situ* measurements	
					Water Column Toxicity	Grab	Acute and Chronic Toxicity	
Perris Valley Channel at Nuevo[1]	802NVO325	San Jacinto River	2	2	Receiving Water	Composite (wet weather), Grab (dry weather)	General Chemistry; Flow	Appendix 3, §III.E.2
						Grab	Bacterial Indicators, VOCs, TPH, O&G	
						Field Meter	*In-situ* measurements	
					Water Column Toxicity	Grab	Acute and Chronic Toxicity	
TBD**	-**	Santa Ana River/ San Jacinto River	-	1	Bioassessment**	Grab	CRAM, Algae, Benthic Macroinvertebrates, pHab, Toxicity, Field parameters, Flow	Appendix 3, §III.E.5

[1] During the 2020-2021 monitoring year this station may be temporarily moved 0.25 miles upstream due to road construction on Nuevo Rd. This temporary relocation was approved by the Regional Board per the approval letter dated September 1, 2020.

* Monitors the quality of water ***received*** from San Bernardino County via the Santa Ana River.

** The MRP requires bioassessment monitoring to be conducted in coordination with the SMC's Regional Watershed Monitoring Program. Refer to Section 3.5 for the bioassessment monitoring criteria and monitoring locations, which typically are determined by the study design in an on-going basis.

3.2 RECEIVING WATER MONITORING LOCATIONS

Receiving water stations will be monitored under one or more components of the program. Three stations will be monitored under the Mass Emissions and Water Column Toxicity Monitoring Program (as outlined in Table 3-2 and Figure 3-1).

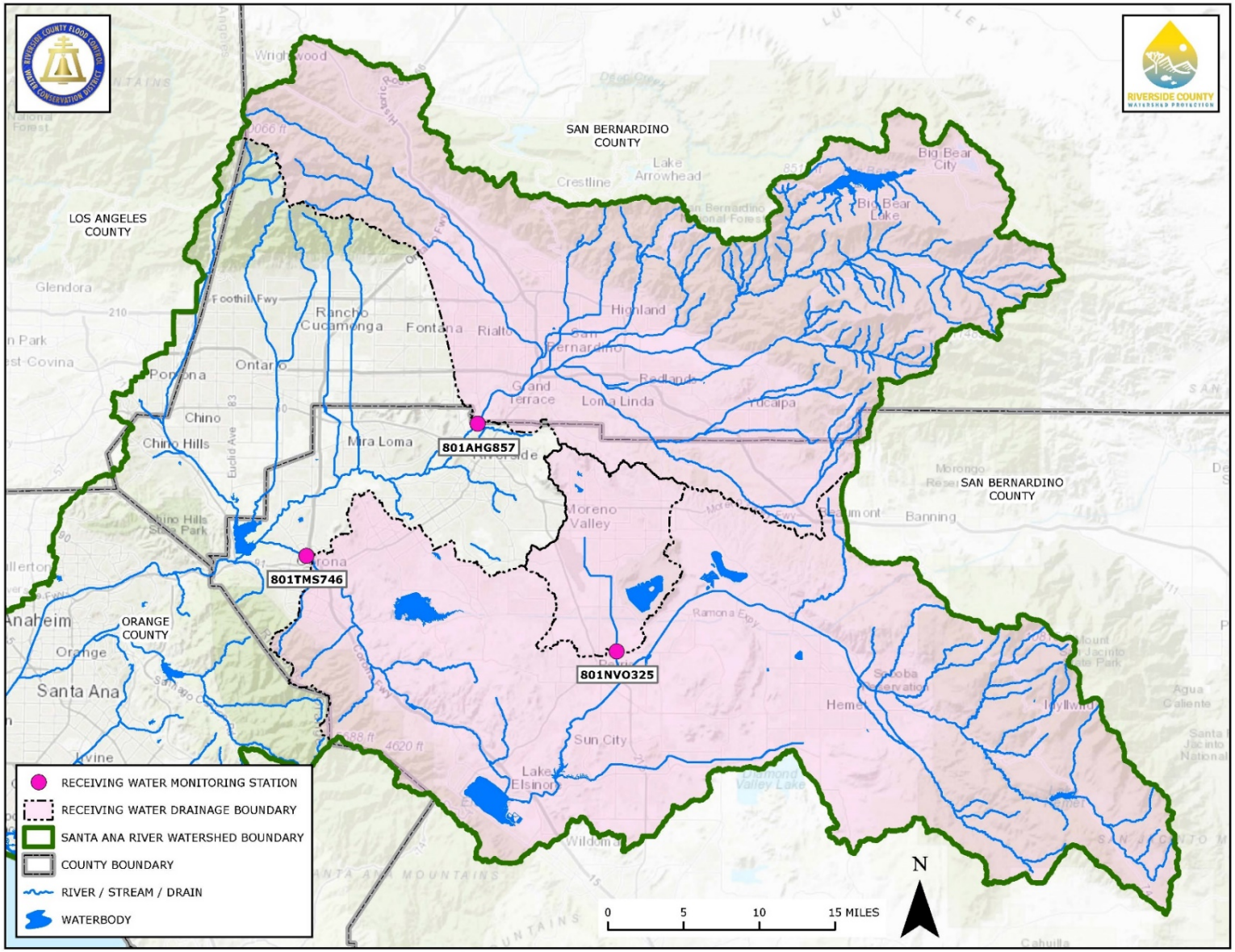
Changes to the bioassessment monitoring components are anticipated, given that the field effort for the SMC's Regional Bioassessment 5-year study, led by the SMC's Bioassessment Working Group, was completed in 2013. The final report for the 5-year study is anticipated in 2015. To address the approach for future monitoring, recommendations have been provided in the 2012-2013 Monitoring Annual Report for the Regional Boards consideration. Refer to Section 3.5 for more detail on the Bioassessment monitoring requirements.

Table 3-2: Receiving Water Station Locations

Station Name	Station Number	Station Type	Latitude	Longitude	Sampling Frequency
Temescal Channel at Main	801TMS746	Santa Ana Receiving Water	33.889583° N	117.563889° W	2 Wet Events (Oct. 1st – May 31st)
Santa Ana River at Highgrove	801AHG857	Santa Ana Receiving Water	34.018056° N	117.368750° W	2 Dry Events (June 1st- Sept 30th)
Perris Valley Channel at Nuevo[1]	802NVO325	San Jacinto Receiving Water	33.801111° N	117.206111° W	2 Wet Events (Oct. 1st – May 31st) 2 Dry (June1st- Sept 30th)

[1] During the 2020-2021 monitoring year this station may be temporarily moved 0.25 miles upstream due to road construction on Nuevo Rd. This temporary relocation was approved by the Regional Board per the approval letter dated September 1, 2020.

Figure 3-1: Receiving Waters Monitoring Locations



3.3 RECEIVING WATER WET WEATHER MONITORING

Wet weather monitoring (i.e., occurring during the wet season) will consist of flow-weighted composite samples collected during the first three hours of storm-induced flow using automated samplers or grab samples later composited by the laboratory based on flow measurements. Grab samples will be collected for toxicity, VOC's, TPH, oil and grease, and bacterial indicators during Wet weather event sampling. Composite and grab samples will be analyzed for the constituents listed in Table 3-8. The constituent list will be reviewed annually and updates will be proposed, as necessary, in the SAR Monitoring Annual Report as based on detections in receiving waters and any exceedances at the MS4 outfall monitoring stations. Water quality monitoring at the two wet weather receiving water stations includes recording flow and precipitation for the sampling event. Refer to Section 1.6.1 for wet weather mobilization criteria.

3.3.1 Receiving Water Wet Weather Event Locations

The following stations will be monitored during wet weather events:

- Temescal Channel at Main (801TMS746) – Santa Ana Watershed
- Perris Valley Channel at Nuevo (802NVO325) – San Jacinto Watershed

3.3.2 Receiving Water Wet Weather Event Sampling Teams, Equipment, and Bottles

Sampling Teams

One team comprised of two District field personnel will monitor both stations during storm events. The team will coordinate with field teams conducting MS4 outfall monitoring (described in Section 4.0) to assist as needed, probably by transporting short holding-time samples to the laboratory. A staffing breakdown of programs covered under this Monitoring is provided in Table 3-3 below:

Table 3-3: Receiving Water Wet Weather Monitoring Team Roles

Discussed in this Section	Event	Team	Monitoring Responsibility	Agency
✓	Wet 1	1	Receiving Water and Runners for MS4 samples	District
		2	MS4	District
		3	MS4	District
✓	Wet 2	1	Receiving Water and Runners for MS4 samples	District
		2	MS4	District
		3	MS4	District
	Wet 3	1	MS4	District
		2	MS4	District
	Dry 1	1	Receiving Water	District
		2	MS4 and IC/ID	District
	Dry 2	1	Receiving Water	District
		2	MS4 and IC/ID	District
		3	Bioassessment	SCCWRP/District

All samples will be delivered to the laboratory by field crews immediately following sample collection. Runners will be used as necessary to ensure samples are delivered to the laboratory within USEPA recommended holding times.

Equipment

Each receiving water monitoring station may be equipped with the following for Storm Event sampling:

- Data-logging flow meter
- Automated composite sampler with sample tubing
- Tipping bucket rain gauge
- 12-V DC power supply
- Data telemetry unit (as necessary and/or available)
- Portable field water quality meter(s)

A detailed description of the monitoring equipment and its operation can be found in Section 15 of Volume II: QAPP.

Installation and Maintenance

Receiving water station equipment may be installed as described in Section 15 of Volume II: QAPP as permanent stations for use during wet weather event monitoring. Prior to the start of each Wet Season (October 1st) the electronic equipment and clean tubing will be installed at each station in preparation for the first storm of the season. After the last wet weather event monitoring of each season the equipment will be removed from the enclosure and stored at the District office to reduce weather and vandalism-related deterioration. Maintenance and calibration will be performed per Section 15 of Volume II: QAPP.

Bottles

Flow-weighted composite samples may be collected directly into a 19-liter bottle or into individual bottles that will be composited at the laboratory. Grab samples may be collected by manually operating the automated equipment to fill the appropriate bottles or by following grab sampling protocols described in Volume II: QAPP. Section 11 of Volume II: QAPP contains additional information regarding sample bottles. Table 3-4 below provides a summary of bottles required for receiving water wet weather monitoring.

Table 3-4: Receiving Water Wet Weather Event Bottle List

Constituent	Container Type Per Site[1]	Preservative	USEPA Recommended Holding Time (maximum)
E coli, Total Coliform, Fecal Coliform, *Enterococcus*, Fecal Streptococci [2]	2 x 125-mL plastic (each)	$Na_2S_2O_3$	8 hours
Toxicity	3 x 1-Gallon amber glass (4 if TIE required), or 3 x 1-Gallon cubitainer	≤6°C	48 hours
All other constituents (Chemistry)	1 x 19-Liter glass (& 1 spare 19-L glass), or 10 x 1-L glass, or As directed by the laboratory	≤6°C	Varies, see specific method (48 hours minimum)

[1] Container Type may change based on ELAP certified laboratory recommendations.

[2] Total Coliform, Fecal Coliform, *Enterococcus*, and Fecal Streptococci may be removed from the bottle list after the first year of sampling, if analytical results indicate three consecutive non-detects and no exceedances have been noted at MS4 outfall monitoring stations.

3.3.3 Receiving Water Wet Weather Data Collection

Wet weather receiving water monitoring events will occur two times a year at the two receiving water stations, including the first "sampleable" storm after October 1st of each year. Wet weather monitoring events will consist of flow-weighted composite samples collected during the first three hours of storm-induced flow via automated samplers or grab samples to be composited at the laboratory. Grab samples will be collected for toxicity, TPH, VOC's and *E. coli* during wet weather sampling.

The following samples and measurements will be collected at each receiving water station:

- Composite samples
  - Chemistry flow-weighted composite samples
- Grab samples
  - Toxicity grab samples
  - TPH grab samples
  - VOC's grab samples
  - Bacteriological grab samples
- *In-situ* field measurements
  - Temperature
  - pH
  - Specific conductance
  - Dissolved oxygen
  - Turbidity
- Flow measurements (may be taken from USGS gauging stations)

Constituents for analysis and detailed sampling methods are available in Section 3.6 of this Monitoring Plan and Section 11 of Volume II: QAPP, respectively.

3.4 RECEIVING WATER DRY WEATHER MONITORING

Dry weather monitoring will consist of manual discrete (grab) samples. Samples will be analyzed for the constituents listed in Table 3-8 during the first year, and revised SAR monitoring constituent lists, as updated annually, for the remainder of the MS4 Permit term. Water quality monitoring at the two receiving water stations includes recording flow during each dry weather event. Refer to Section 1.6.2 for dry weather mobilization criteria.

3.4.1 Receiving Water Dry Weather Locations

Receiving water monitoring stations will be sampled during two dry weather events which are consistent with this Monitoring Plan and compatible with SWAMP. The monitoring stations are listed below:

- Santa Ana River at Highgrove (801AHG857) – Santa Ana Watershed
- Perris Valley Channel at Nuevo (802NVO325[5]) – San Jacinto Watershed

The Santa Ana River at Highgrove sampling station, located within Reach 4 of the Santa Ana River was chosen to determine the quality of water entering into Riverside County and to avoid duplication by San

[5] During the 2020-2021 monitoring year this station may be temporarily moved 0.25 miles upstream due to road construction on Nuevo Rd. This temporary relocation was approved by the Regional Board per the approval letter dated September 1, 2020.

Bernardino County's monitoring program. The San Bernardino County monitoring program monitors a receiving water sampling station located within Reach 3 of the Santa Ana River.

3.4.2 Receiving Water Dry Weather Sampling Teams, Equipment, and Bottles

Sampling Teams
One team comprised of two District field personnel will monitor the dry weather receiving water stations. A staffing breakdown of programs covered under this Monitoring Plan is provided in Table 3-5 below:

Table 3-5: Receiving Water Dry Weather Monitoring Team Roles

Discussed in this Section	Event	Team	Monitoring Responsibility	Agency
	Wet 1	1	Receiving Water and Runners for MS4 samples	District
		2	MS4	District
		3	MS4	District
	Wet 2	1	Receiving Water and Runners for MS4 samples	District
		2	MS4	District
		3	MS4	District
	Wet 3	1	MS4	District
		2	MS4	District
✓	Dry 1	1	Receiving Water	District
		2	MS4 and IC/ID	District
✓	Dry 2	1	Receiving Water	District
		2	MS4 and IC/ID	District
		3	Bioassessment	SCCWRP/District

All samples will be delivered to the laboratory by field crews immediately following sample collection. Runners will be used as necessary to ensure samples are delivered to the laboratory within USEPA recommended holding times.

Equipment
Each sampling team will be equipped with portable field water quality meter(s) for dry weather sampling. A detailed description of the monitoring equipment and its operation can be found in Section 15 of Volume II: QAPP.

Installation and Maintenance
No installation of equipment will be conducted under this portion of the Receiving Waters Monitoring Program.

Bottles
Grab samples will be collected directly into the appropriate bottles manually. Table 3-6 below provides a summary of bottles required for dry weather receiving water monitoring.

Table 3-6: Receiving Water Dry Weather Bottle List[1]

Constituent	Container Type Per Site	Preservative	USEPA Recommended Holding Time
E. coli, Total Coliform, Fecal Coliform, *Enterococcus*, Fecal Streptococci [2]	2 x 125-mL plastic (each)	$Na_2S_2O_3$	8 hours
Toxicity	3 x 1-Gallon amber glass (4 if TIE required) or 3 x 1-Gallon cubitainers	≤6°C	48 hours
Oil and Grease	1 x 1-Liter amber glass	HCl or H_2SO_4 to pH<2, ≤6°C	6 months
Total Petroleum Hydrocarbons (TPH)	1 x 1-Liter amber glass	≤6°C	Extract 7 days
All other constituents	As directed by the laboratory	≤6°C	48 hours (minimum)

[1] Container Type and size may vary based on equivalent recommended by ELAP certified laboratory.
[2] Total Coliform, Fecal Coliform, *Enterococcus*, and Fecal Streptococci may be removed from the constituent list for a given station after the first year of sampling, if analytical results indicate three consecutive samples from the station have non-detects (Permit Appendix 3, §III.E.1.b.iv).

3.4.3 Receiving Water Dry Weather Data Collection

Dry weather receiving water monitoring will occur twice a year at the two receiving water locations. The following types of samples and measurements will be collected at each receiving water station:

- Grab samples
  - Chemistry grab samples
  - Toxicity grab samples
  - Bacteriological grab samples
  - Oil and grease grab samples
  - TPH grab samples
- *In-situ* field measurements
  - Temperature
  - pH
  - Specific conductance
  - Dissolved oxygen
  - Turbidity
- Flow measurements

Constituents for analysis and detailed sampling methods are available in Section 3.6 of this Monitoring Plan and Section 11 of Volume II, respectively.

3.5 BIOASSESSMENT MONITORING

The purpose of a bioassessment is to assess the cumulative impacts of discharges to benthic invertebrates and algae in the receiving waters as indicators of the biological condition of a stream. The MRP requires in-stream bioassessment monitoring to be conducted and specifies that monitoring will be conducted simultaneously under the Regional Watershed Monitoring Program, titled Bioassessment Survey of the Stormwater Monitoring Coalition, Technical Report 849 (SCCWRP, 2015). As outlined in the MRP and in Technical Report 849, four stations are sampled within the Middle Santa Ana and San Jacinto Watersheds by Riverside County. Each year, two 'trend' sites will be revisited to monitor any changes and two 'conditional' sites will be selected based on a probabilistic study design to be visited once each during the study period. Bioassessment monitoring is designed to be SWAMP compatible.

Bioassessments are conducted in coordination with the SMC's Regional Watershed Monitoring Program. The field effort for the regional bioassessment study design, as referenced in the 2010 MS4 Permit, was completed in 2013. Changes to the bioassessment monitoring components were anticipated, given that the field effort for the SMC's first 5-year Regional Watershed Monitoring Study (2009-2013), as based on a probabilistic bioassessment approach, was completed in June 2013. The final report for this 5-year study was published in February 2015.

For the 2013-2014 monitoring year, sampling conducted independently of and in coordination with the SMC was selected as an interim monitoring effort to fulfill the bioassessment requirement of the Permit until the SMC can develop a workplan for future regional monitoring. The Permittee's independent effort consisted of a targeted bioassessment monitoring approach at two locations including one of the existing receiving water stations (801AHG857) and a previously monitored SMC station at Temescal Creek near Temescal Canyon Road (SMC Station ID 801S40887). Refer to the 2013-2014 Monitoring Annual Report for a description of the interim bioassessment monitoring locations, site selection criteria, and results.

The SMC's interim monitoring study design for 2014 consisted of a subset of revisited sites from the pool of stations used in the 5-year study and newly added non-perennial sites. Refer to the Monitoring Annual Report for the most current updates and status of the special studies workplans, including the "SMC Regional Watershed Monitoring Program – Proposal for 2014 Sampling" (12/09/13). The results of the interim effort will be additive to the next 5-year study for 2015-2019. Moving forward the bioassessment component of the Receiving Water Monitoring Program will continue to be fulfilled in coordination with the SMC's Regional Watershed Monitoring Program. The SMC's workplan for Years 2015 through 2019, Technical Report 849 (SCCWRP, 2015) is also available on the SMC website (http://socalsmc.org/wp-content/uploads/2017/01/Workplan_Bioassessment.pdf). The final report for the most current 5-year study is tentatively anticipated in 2020-2021.

The Permittees continued to participate in the SMC Regional Monitoring for 2020, implementing the monitoring pursuant to the 2015-2019 study design in the interim as the next 5-year study design was not yet complete. The 2021-2025 study design is under development and is expected to begin in Spring 2021.

Refer to the Monitoring Annual Report(s) for recommendations for future monitoring.

3.5.1 Bioassessment Monitoring Criteria

The Bioassessment Monitoring Program is designed to use a multiple lines of evidence approach to assess the condition of biological communities in freshwater receiving waters through the collection of biological, chemical, and physical data. The monitoring will typically be performed once a year, during May, June, or July, at multiple locations and in coordination with the receiving waters dry weather monitoring. Refer to Section 1.6.2 for dry weather mobilization criteria.

The following criteria will also be used to determine if mobilization will occur for a bioassessment monitoring event:

- Monitoring should occur between May 15th and July 15th.
- Monitoring must occur between 4 to 12 weeks after the last significant rainfall.
- Dry weather events must be preceded by at least 72 hours of dry conditions (<0.10 inch of precipitation).

The bioassessment monitoring will consist of measurements based on the Southern California Index of Biological Integrity (IBI) scores or the California Stream Condition Index (CSCI) and a physical habitat characterization using the California Rapid Assessment Method (CRAM).

3.5.2 Bioassessment Monitoring Locations

Bioassessment Monitoring Program will be performed by the Permittees and/or in collaboration with the SMC's Bioassessment Working Group. During the first five years (i.e., 2009-2013) of the Regional Monitoring Program monitoring stations selected for bioassessment were determined annually according to SCCWRP Report No. 539 and distributed to participating agencies by SCCWRP personnel. Stations were randomly selected by SCCWRP according to the protocols in "A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams" by Ode, *et al*. 2005. Per the Permit, and as referenced in SCCWRP's 2007 Technical Report, five sites shall be sampled per year within the Riverside County's Santa Ana and San Jacinto Watersheds in accordance with the original SMC study design. Under the SMC study design for 2015-2019, four sites were monitored within this region each year. With the completion of the prior 5-year study design, the District, in coordination with SCCWRP, will ensure that a sufficient number of monitoring stations are selected for bioassessment monitoring. The next 5-year study design is currently under development.

3.5.3 Bioassessment Sampling Teams, Equipment, and Bottles

Sampling Teams

Bioassessment teams must be led by a person specifically train in bioassessment techniques, as described in the Bioassessment Methods section of Volume II, located in Appendix F of Volume II. Two monitoring stations per day, will be monitored by a field team in accordance with the Regional Watershed Monitoring Program and SWAMP SOPs. Qualified biological sampling personnel will conduct the bioassessment and other associated sampling as necessary, consistent with the most current study plan and with possible modifications as approved by the SMC member agencies. A staffing breakdown of programs covered under this Monitoring Plan is provided in Table 3-7 below:

Table 3-7: Bioassessment Monitoring Team Roles

Discussed in this Section	Event	Team	Monitoring Responsibility	Agency
	Wet 1	1	Receiving Water and Runners for MS4 samples	District
		2	MS4	District
		3	MS4	District
	Wet 2	1	Receiving Water and Runners for MS4 samples	District
		2	MS4	District

Discussed in this Section	Event	Team	Monitoring Responsibility	Agency
		3	MS4	District
	Wet 3	1	MS4	District
		2	MS4	District
	Dry 1	1	Receiving Water	District
		2	MS4 and IC/ID	District
✓	Dry 2	1	Receiving Water	District
		2	MS4 and IC/ID	District
✓		3	Bioassessment	SCCWRP/Consultant

All samples will be delivered to the laboratory by field crew or an additional sample runner to ensure samples with short holding times are delivered to the laboratory within USEPA recommended holding times.

Equipment
Field equipment may include of a hand-held flow meter and a field meter (such as a Horiba U-22). A detailed description of the equipment needed for in-stream bioassessment monitoring and their functions can be found in Appendix F of Volume II.

Installation and Maintenance
No installation of equipment will be conducted under this portion of the Receiving Waters Monitoring Program.

Bottles
Bioassessments require a complicated set of bottles and sampling equipment to prepare samples for the laboratory. Trained personnel must organize the bottles and equipment prior to bioassessment mobilization. Bottle lists are available in Appendix F of Volume II and SCCWRP Technical Report No. 849.

3.5.4 Bioassessment Data Collection

Bioassessment monitoring will occur once a year in accordance with Section 3.5, and will be conducted typically between May and July. The following types of samples and measurements will be collected at each Bioassessment station:

- Bioassessment: IBI or CSCI Measurements
  - Benthic Macroinvertebrate Sample
- Bioassessment: Physical Habitat Assessment
  - *In-situ* field measurements
  - *Temperature*
  - *pH*
  - *Specific conductance*
  - *DO*
  - *Turbidity*
  - Flow measurements

3.6 RECEIVING WATER MONITORING PROGRAM ANALYSES TYPES

Grab and composite samples collected during wet weather and dry weather monitoring events will be analyzed for the constituents listed in Table 3-8. For the constituent's corresponding units, methods and reporting limits, refer to the Master List of Analytical Constituents, Table 6.2, provided in the QAPP Volume II. During the first year of monitoring (July 1, 2011 to June 30, 2012), samples were analyzed for the entire constituent list. Annually, beginning upon completion of the 2011/2012 monitoring year, constituents that have not been detected in samples from three consecutive monitoring events (wet weather or dry weather monitoring events) at a given monitoring station and are not specifically named in MRP Section III.E.1.b.iv may be removed from the analysis list (see Section 4.0). As a result, reduced constituent lists will be analyzed during years 2-5 of the program, or as necessary. The constituent list will be updated annually and included in the Monitoring Annual Report[6]. Additional constituents may be analyzed under the SCCWRP Technical Report 849 (Table 5) as trend site constituents.

RLs found in Table 6.2 of the QAPP, represent the State Board Minimum Level (ML) RLs, which are required under the MRP for constituents listed as Priority Pollutants in the CTR, and SWAMP recommended RLs. The analytical laboratory will attempt to improve upon these RLs, and will provide a written explanation for any failure to meet them. Standard Method RLs will be used when no required RL is available.

[6] During the 2013-2014 Annual Report development, the District performed an extensive analysis to conservatively identify parameters that could be removed from monitoring based on Permit criteria (MRP Section III.E.1(b)(iv)) with additional discussions and guidance received from the Regional Board the following year. Constituents with analytical detection limits that were above corresponding CTR/Basin Plan WQOs or MSGP benchmarks (current 2008 MSGP) were not removed. The updated monitoring lists were submitted to the Regional Board within the 2014-2015 Monitoring Annual Report and implemented in the 2015-2016 monitoring year. A review of non-detections was completed in 2018-2019 and a proposed constituent list was submitted with the 2018-2019 Monitoring Annual Report. 2019-2020 data was reviewed for consistency and the revised lists were implemented in the 2020-2021 monitoring year. The revised list included 108 ~~170~~ constituents for the receiving water stations and between 105 to 90 ~~132 to 167~~ constituents for the MS4 outfall stations (varying between events and event types).

Table 3-8: First Year Receiving Water and First "Sampleable Wet Weather Event" SAR Monitoring Constituents

Analytes[1]			
Metals (Total)			
Antimony	Boron	Iron, total	Selenium
Arsenic	Cadmium	Lead	Silver
Barium	Chromium, Total and all valences	Mercury	Thallium
Beryllium	Copper	Nickel	Zinc
Bacterial Indicators			
E.coli	*Enterococcus*	Total Coliform	
Fecal Streptococci	Fecal Coliform		
Nutrients and Others			
Turbidity	TDS	Nitrogen, Total Inorganic	
Specific Conductance	TSS	Nitrogen, Total Organic	
Temperature	TOC	Orthophosphorus (as P)	
DO	TKN	Total Hardness	
pH	TPH	Total Phosphorus	
Color	Nitrate	Total Potassium	
MBAS	Nitrite	Oil and Grease	
Ammonia (as N)			
Other Toxic Pollutants			
Phenols, total	Cyanide, total		
Organophosphate Pesticides			
Volatiles			
Semi-Volatiles			
Organics, PAHs			
Organochloride Pesticides			
Polychlorinated Biphenyls (PCB)			
Toxicity			
Ceriodaphnia dubia (acute)	*Pimephales promelas (acute)*	*Pseudokirchneriella subcapitata (chronic) (formerly Selenastrum capricornium)*	

[1] Refer to Attachment D: SAR Monitoring Parameter Lists-Planned Parameter Lists included in the most recent Annual Report for the full list of current constituents.

Composite Samples
Composite samples will be collected for chemistry analyses; wet weather event samples will be composited based on three-hour flow-weighted aliquots. Sample aliquots may be collected according to a sample pacing which will be determined based on the size of the storm event or by time pacing to be composited later by the laboratory based on flow measurements. Further detail regarding standard flow-weighted and time-weighted composite sampling is provided in Section 11 of Volume II: QAPP.

Grab Samples
Grab samples will be collected for constituents that have short holding times or special bottle or preservative requirements, as described in Sections 3.3 through 3.5. Receiving water grab samples will be collected using protocols outlined in Section 11 of Volume II: QAPP. Grab samples should be collected and delivered to the laboratory in accordance with Sections 3.3 through 3.5.

***In-situ* Field Measurements**
In-situ water quality field measurements will be collected at each receiving water station once during each monitoring event. *In-situ* field measurements will be collected concurrently with grab sample collection. *In-situ* field measurements will be collected for the following parameters:

- Temperature
- pH
- Specific conductance
- DO
- Turbidity

Standard procedures for collecting *in-situ* water quality parameters are described in Section 11 of Volume II: QAPP. Duplicate field meters will be carried when possible. If meter failure occurs, the field team will attempt to use a back-up meter, another team's meter or non-meter option for some parameters (e.g., thermometer or pH strip-paper). As a last resort, the laboratory will be instructed to analyze for any missing parameters according to the methods provided in Table 3-8. For long term deployment of field meters refer to the considerations outlined in the USGS guidance document, Techniques and Methods 1-D3, 2006.

Flow and Precipitation Monitoring
At wet weather and dry weather monitoring stations where automated equipment is used, flow meters will be programmed to record stage (to be converted to flow values based on channel dimensions) and precipitation data throughout the monitoring event. Flow and precipitation monitoring will commence during the pre-event preparation and will terminate upon completion of sampling.

During Bioassessments, wet weather, and dry weather monitoring stations, where automated equipment is not used, flow will be estimated by collecting the following measurements:

- Width of the water surface,
- Approximate depth of the water, and
- Approximate flow velocity.

Handheld velocity probes will be used to measure velocity, when available. Alternatively, visual estimates may be made per the procedures detailed in the QAPP. Ponded water will be indicated by a flow value of 0.0 cubic feet per second (cfs).

Bioassessment
Stream bioassessment analyses are used to assess the cumulative impacts of discharges to water-supported native stream species including benthic invertebrates, algae, fish, and plants. A bioassessment is the direct

measurement of the biological and physical condition of a watershed. Ideally, bioassessment monitoring will reveal the impacts of cumulative, sub-lethal doses of pollutants that may not be detectable in a water chemistry analysis, but that may still have biological effects. However, there are some limitations to this method. According to the USEPA's Rapid Bioassessment Protocol guidance, an accurate assessment stream biological data is difficult because natural variability cannot be controlled. Unlike analytical assessments conducted in the laboratory, in which accuracy can be verified in a number of ways, the accuracy of field assessments cannot be objectively or independently verified. Even under pristine conditions, bioassessment metrics naturally vary from stream to stream.

Bioassessments evaluate the benthic macroinvertebrates, physical habitat, and algae in a stream or river. SWAMP SOPs for macroinvertebrate bioassessments are provided in Appendix F of Volume II. Bioassessments may be conducted under the SMC Regional Bioassessment monitoring program. Bioassessments will be conducted according to the most current SWAMP SOPs, which includes assessment techniques for physical habitat and benthic macroinvertebrates (Ode, et al. 2007). Southern California Index of Biotic Integrity (SoCal IBI) and/or CSCI scores will be calculated from benthic macroinvertebrate data. Algae assessment will be conducted using SWAMP's SOP for Collecting Stream Algae Samples (Fetscher et al. 2009) as provided in Appendix G of Volume II.

Benthic Macroinvertebrate Sampling IBI Metrics and CSCI Metrics

Benthic macroinvertebrates, which include crustaceans such as crayfish, mollusks such as clams and snails, aquatic worms and the immature forms of aquatic insects such as stonefly and mayfly nymphs, are collected from the streambed using nets. A monitoring reach is delineated then 21 transects are identified. Prior to any other disturbance of the stream, field crews begin at the downstream point of the reach and work upstream from one transect to the next, sifting and emptying the nets, as necessary, collecting a composite sample into a large plastic bucket. The contents of the bucket are sieved into sample jars that are labeled and preserved prior to delivery to the laboratory for sample analyses. Detailed protocols may be found in Appendix F of Volume II. At the laboratory, the organisms are identified and sorted, and the count of organisms in each taxa is recorded. The counts are used to calculate the IBI and/or CSCI score.

The IBI integrates seven key measures of organism abundance and diversity at a given site into a single score that varies predictably in response to anthropogenic stresses. The seven key metrics incorporated into the SoCal IBI include the number of Coleopteran taxa, number of Ephemeroptera, Plecoptera and Trichoptera taxa (collectively referred to as "EPT taxa"), number of predator taxa, percent collector individuals, percent intolerant individuals, percent non-insect taxa, and percent tolerant taxa. The individual metric scores from each of these seven measures is ranked 0 to 10, and then summed and multiplied by 1.43 to convert the cumulative score into a 0 to 100 point scale. This number is then grouped into one of five categories that relate to biological integrity. These categories include: very poor (0 - 19), poor (20 - 39), fair (40 - 59), good (60 - 79) and very good (80 - 100).

The CSCI is a biological index used to score the condition of BMI communities in perennial wadeable rivers and streams. Unlike previous MMI or O/E indices that were applicable only on a regional basis or under-represented large portions of the state, the CSCI was built with a statewide dataset that represents the broad range of environmental conditions across California. Developed in 2013 the CSCI combines two unique types of index that have traditionally been used separately: an observed-to-expected (O/E) index and a multimetric index (MMI). The CSCI provides consistency and accuracy in the interpretation of biological data collected by both statewide and regional monitoring programs. The CSCI was calibrated during its development so that the mean score of reference sites is 1. Scores that approach 0 indicate great departure from reference condition and degradation of biological condition. Scores > 1 can be interpreted to indicate greater taxonomic richness and more complex ecological function than predicted for a site given its natural environmental setting. For the purposes of making statewide assessments, three thresholds were established based on the 30th; 10th; and 1st percentiles of CSCI scores at reference sites. These three

thresholds divide the CSCI scoring range into 4 categories of biological condition as follows: ≥0.92 = likely intact condition; 0.91 to 0.80 = possibly altered condition; 0.79 to 0.63 = likely altered condition; ≤0.62 = very likely altered condition.

Bioassessment: Physical Habitat Characterization

USEPA's physical habitat scoring criteria is a nationally standardized method that has been adopted as part of the California State Bioassessment Protocol. This method was developed as a tool to measure the physical integrity of the in-channel and immediate riparian area of a stream to provide an evaluation of its suitability to support a healthy macroinvertebrate community. This scoring system ranks each of 10 key stream habitat indicators on a scale of 0 (poor) to 20 (optimal). The individual indicator scores from each of these 10 measures are then summed for a total possible score of 200. This score is then grouped into one of four categories that relate to physical habitat quality. These include: poor (0 - 49), marginal (50 - 99), sub-optimal (100 - 149), and optimal (150 - 200).

Bioassessment: Algae Sampling

Algal indicators can be monitored as part of a bioassessment including percent algal cover, algal taxonomic composition, and algal biomass. The percent algal cover can be recorded during the standard physical habitat assessment with sample collection. The SWAMP SOP describes how to collect a composite algae sample that can be used to quantify chlorophyll *a*, AFDM, diatom assemblage, and/or soft-bodied algal assemblages depending on the purpose of the study. Algae samples are collected after BMI samples have been collected, in the same manner, field crews work upstream from transect to transect collecting a sample from a location that is undisturbed. Samples are collected from the upper most substrate of the stream and are kept out of the sun to reduce degradation of chlorophyll *a,* limit cell division post-collection, and protect algae from desiccation. The SWAMP SOP for Collecting Stream Algae Samples describes methodology to collect and preserve a quantitative algal sample from various types of substrates and when different forms of algae are present and are described in detail in Appendix G of Volume II. Future algae assessment will incorporate algal IBI scores or other predictive numeric as they are developed, ensuring consistency with SMC members and the next SMC 5-year Study Plan.

3.7 FOLLOW-UP ANALYSIS AND ACTIONS

As soon as sample results have been received from the laboratory and undergone a thorough quality review, they will be compared to the WQOs described in Section 2.0. Follow-up actions will be performed for every exceedance as described in Table 3-10. These actions include, but are not limited to, additional data collection, Toxicity Identification Evaluations (TIEs) and upstream source identification studies.

3.7.1 Triad Approach

Under the Triad approach, as discussed in the Model Monitoring Program (MMP) and the Permit, chemistry results from receiving water monitoring stations are compared to compliance and WQOs as described in Section 2.0. The Triad approach, the chemistry, toxicity, and bioassessment lines of evidence are weighed as described Table 5-4 of the MMP, which is summarized below as Table 3-9. As defined in the MMP, persistent exceedance is an "exceedance of relevant Basin Plan or CTR objectives by 20% for three sampling periods". Evidence of toxicity is determined by a high toxicity score in relation to other stations, on a metric combining magnitude and persistence of observed toxicity over an entire monitoring year. Evidence of benthic alteration is present when an IBI or CSCI score indicates a substantially degraded community (Model Monitoring Program, SMC 2004).

Table 3-9: Triad Approach to Determining Toxicity Follow-Up Actions[1]

Chemistry[2]	Evidence of Toxicity?	Indication of Benthic Alteration?	Actions
Persistent WQO Exceedance	Yes	Yes	Conduct TIE to identify contaminants of concern, based on TIE metric, initiate TRE
		No	If chemical and toxicity tests indicate persistent degradation, conduct TIE to identify contaminants of concern, based on TIE metric, initiate TRE
	No	Yes	Initiate upstream source identification
		No	Assess possible upstream sources that may be causing exceedances
No persistent WQO exceedance[2]	Yes	Yes	Conduct TIE to identify contaminants of concern, based on TIE metric, initiate TRE
		No	Conduct TIE to identify contaminants of concern, based on TIE metric, initiate TRE
	No	Yes	No action necessary due to toxic chemicals, initiate TRE for physical sources of benthic alteration
		No	No action necessary

[1]*Model Monitoring Program for Municipal Separate Storm Sewer Systems in Southern California.* Stormwater Monitoring Coalition August 2004.
[2]WQO exceedances for chemistry are determined by the SAR Basin Plan, the CTR, and the USEPA Multi-Sector Permit Parameter Benchmark values.

3.7.2 Toxicity Identification Evaluations

When a monitoring site has been determined to exhibit evidence of toxicity, a TIE will be initiated on the following toxic sample. A TIE is a process of complex biochemistry techniques used to isolate the compound or group of compounds responsible for the toxic effects. The compound that the TIE identifies will be added to the analyte list for that site. Phase I TIEs will be conducted in accordance with USEPA Method 600-3-88-034 (USEPA, 1988). If the Phase I TIE is inconclusive, a Phase II TIE may be performed.

Table 3-10 below summarizes TIE methods and costs.

Table 3-10: TIE Methods

Parameter	USEPA Method	Estimated Analysis Cost (per sample)	Water Required
Ceriodaphnia Dubia larval survival (acute and chronic, freshwater)	821-R-02-012	$850 acute/ $1370 chronic	1 gal
Hyalella azteca (acute and chronic, freshwater)	821-R-02-012	$850 acute/ $1370 chronic	1 gal
Pseudokirchneriella subcapitata growth (acute and chronic, freshwater)	821-R-02-012	$1485 chronic	1 gal
Pimephales promelas larval survival (acute and chronic, freshwater)	821-R-02-013	$850 acute/ $1370 chronic	1 gal
Toxicity Identification Evaluation (Phase I)	600-3-88-034	$4,500 - $6,000	5 gal
Toxicity Identification Evaluation (Phase II)	600-3-88-035	$20,000 - $170,000	Dependent on tests run

3.7.3 Toxicity Reduction Evaluations (TREs)

Where there is evidence of toxicity and a TIE has identified the stressor causing the toxicity, a TRE may be initiated. TRE study work plans will be developed on a case by case basis. Typically, field crews will begin at the receiving water and move upstream, observing both the receiving water and outfalls for potential pollutant sources, including but not limited to in-stream vegetation, gross pollutants and dry weather flows. Discharges to the receiving waters will be investigated, and results from the MS4 monitoring described in Sections 4.0 and 5.0 will be evaluated. If the source of the problem has not been identified, land use surveys, literature reviews, and additional data collection may be performed.

The results will be used to evaluate the cause and extent of the toxicity. BMPs and other mitigation methods will be investigated for their potential to reduce or eliminate pollutant discharges. A plan to implement the findings will be prepared and executed.

4.0 MS4 OUTFALL AND MASS EMISSIONS MONITORING

The MS4 outfall and mass emissions discharge monitoring program (historically known as the "Core stations" monitoring program) is part of a regional effort by the Permittees to implement a watershed-based monitoring program. The program has been designed to comply with the MRP, with emphasis on meeting MRP goals, providing meaningful data, and providing informative answers to management goals posed in the MRP. Wet weather MS4 discharge monitoring is comprised of MS4 outfall monitoring and source identification monitoring.

4.1 MS4 OUTFALL MONITORING PROGRAM OVERVIEW

The MRP requires outfall monitoring at seven "Core stations", hereafter simply referred to MS4 outfall stations, as part of the MRP Mass Emissions Monitoring Program (Sections 4.3 and 4.4). Monitoring will be conducted during three wet weather events and two dry weather monitoring events at all MS4 outfall stations. Composite and grab samples will be collected for constituents during wet weather and dry weather monitoring events. Field measurements will also be taken.

Samples will be collected in accordance with the Clean Hands/Dirty Hands SOP provided in Appendix D of Volume II: QAPP. Monitoring is intended to be SWAMP compatible. Discrete (grab) sample times, *in-situ* field measurements, and sampling activities and observations will be recorded on a field data sheet in accordance with the procedures for documenting dry locations detailed in Section 11 of Volume II: QAPP.

4.1.1 MS4 Outfall Monitoring Program Management Questions

The MS4 outfall monitoring program is designed to monitor pollutants in stormwater effluent from the MS4 and to conduct special studies to address areas of concern as they may appear. The MS4 outfall monitoring program will address the following management questions:

"3) What is the relative MS4 discharge contribution to the Receiving Water problem(s)?"

"4) What are the sources of MS4 discharge that contribute to Receiving Water problems(s)?"

4.1.2 MS4 Outfall Monitoring Program Compliance

Table 4-1 below summarizes compliance for the MS4 Outfall Monitoring Program.

Table 4-1: MS4 Outfall Monitoring Program Compliance Matrix

Station Name	Station ID	Watershed	# Wet Events	# Dry Events	Monitoring Type	Sample Type	Analyses	Permit Reference
Corona Storm Drain	801CRN040	Santa Ana	3	2	MS4 Outfall	Grab	General Chemistry, Flow	Appendix 3, §III.E.1.b.iv and Appendix 3, §III.E.1.a
			3	2			Bacteria, TPH & Oil & Grease (dry weather only)	Appendix 3, §III.E.1.b.iv
			3	2		Field Meter	*In-situ* measurements	Appendix 3, §III.E.1.b.iv
Sunnymead Channel	802SNY316	San Jacinto	3	2	MS4 Outfall	Grab	General Chemistry, Flow	Appendix 3, §III.E.1.b.iv and Appendix 3, §III.E.1.a
			3	2			Bacteria, TPH & Oil & Grease (dry weather only)	Appendix 3, §III.E.1.b.iv
			3	2		Field Meter	*In-situ* measurements	Appendix 3, §III.E.1.b.iv
Hemet Channel	802HMT318	San Jacinto	3	2	MS4 Outfall	Grab	General Chemistry, Flow	Appendix 3, §III.E.1.b.iv and Appendix 3, §III.E.1.a
			3	2			Bacteria, TPH & Oil & Grease (dry weather only)	Appendix 3, §III.E.1.b.iv
			3	2		Field Meter	*In-situ* measurements	Appendix 3, §III.E.1.b.iv
Magnolia Center Storm Drain	801MAG364	Santa Ana	3	2	MS4 Outfall	Grab	General Chemistry, Flow	Appendix 3, §III.E.1.b.iv and Appendix 3, §III.E.1.a
			3	2			Bacteria, TPH & Oil & Grease (dry weather only)	Appendix 3, §III.E.1.b.iv
			3	2		Field Meter	*In-situ* measurements	Appendix 3, §III.E.1.b.iv
University Wash	801UNV702	Santa Ana	3	2	MS4 Outfall	Grab	General Chemistry, Flow	Appendix 3, §III.E.1.b.iv and Appendix 3, §III.E.1.a
			3	2			Bacteria, TPH & Oil & Grease (dry weather only)	Appendix 3, §III.E.1.b.iv
			3	2		Field Meter	*In-situ* measurements	Appendix 3, §III.E.1.b.iv
North Norco Channel	801NNR707	Santa Ana	3	2	MS4 Outfall	Grab	General Chemistry, Flow	Appendix 3, §III.E.1.b.iv and Appendix 3, §III.E.1.a
			3	2			Bacteria, TPH & Oil & Grease (dry weather only)	Appendix 3, §III.E.1.b.iv
			3	2		Field Meter	*In-situ* measurements	Appendix 3, §III.E.1.b.iv

Table 4-1: MS4 Outfall Monitoring Program Compliance Matrix (continued)

Station Name	Station ID	Watershed	# Wet Events	# Dry Events	Monitoring Type	Sample Type	Analyses	Permit Reference
Perris Line J	802PLJ752	San Jacinto	3	2	MS4 Outfall	Grab	General Chemistry, Flow	Appendix 3, §III.E.1.b.iv and Appendix 3, §III.E.1.a
			3	2			Bacteria, TPH & Oil & Grease (dry weather only)	Appendix 3, §III.E.1.b.iv
			3	2		Field Meter	*In-situ* measurements	Appendix 3, §III.E.1.b.iv

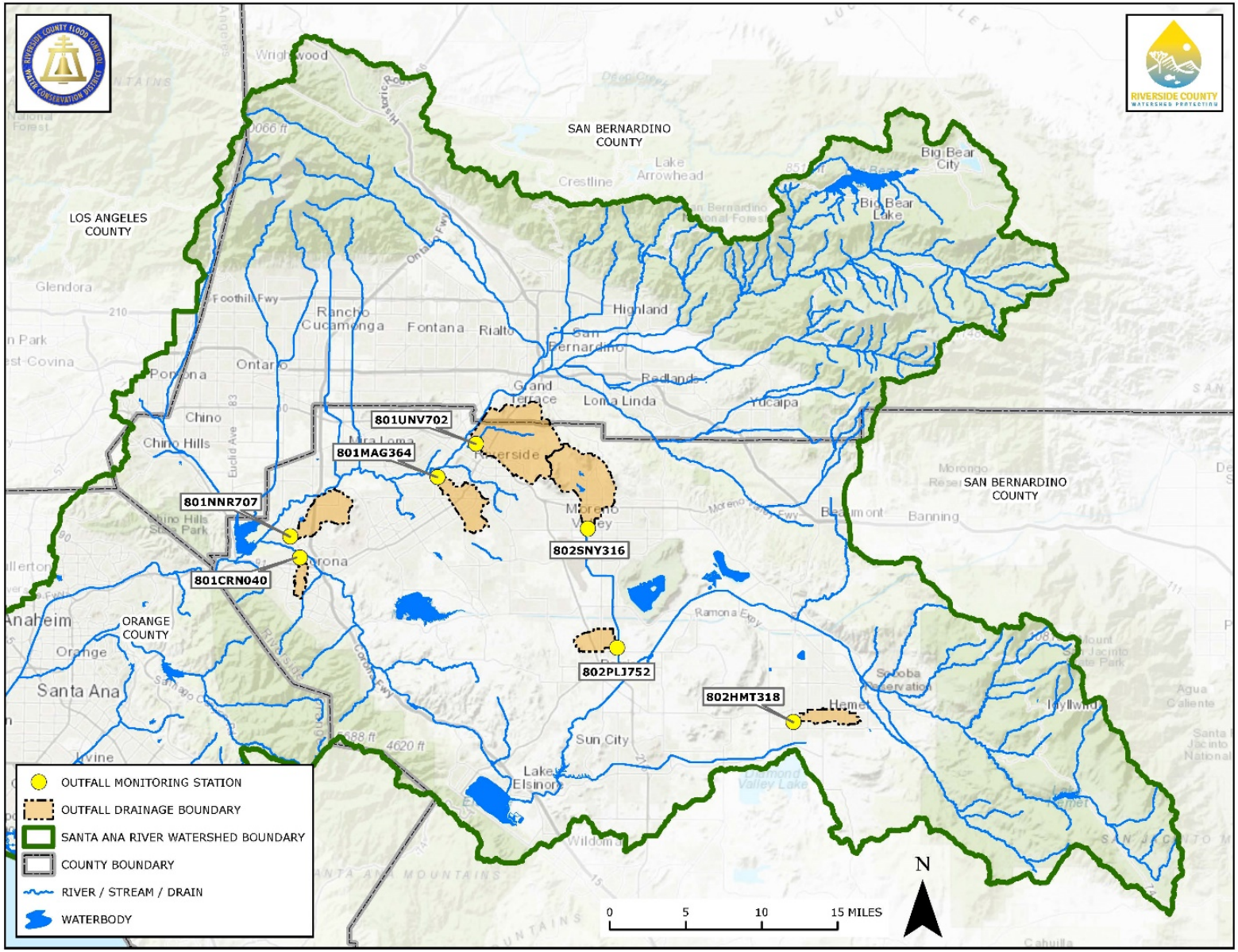
4.2 MS4 OUTFALL MONITORING LOCATIONS

Three wet weather events and two dry weather events will be monitored annually at each of the seven MS4 outfall stations. MS4 outfall monitoring stations for the mass emissions and outfall monitoring were reviewed and determined to be representative of urban runoff within the SAR. Full descriptions and photographs of each MS4 outfall monitoring station are included in the Monitoring Annual Reports. MS4 outfall monitoring stations are summarized and mapped in Table 4-2 and Figure 4-1, respectively. For simplicity, Figure 4-1 uses the former 3-digit station codes.

Table 4-2: MS4 Outfall Monitoring Station Locations

Station Name	Station Number	Station Type	Latitude (°N)	Longitude (°W)
Corona Storm Drain	801CRN040	Outfall	33° 53' 7.18"	-117° 34' 7.62"
Sunnymead Channel	802SNY316	Outfall	33° 55' 3.47"	-117° 14' 36.43"
Hemet Channel	802HMT318	Outfall	33° 44' 4.71"	-117° 0' 22.23"
Magnolia Center Storm Drain	801MAG364	Outfall	33° 57' 56.60"	-117° 24' 56.08"
University Wash	801UNV702	Outfall	33° 59' 49.94"	-117° 22' 22.07"
North Norco Channel	801NNR707	Outfall	33° 54' 26.93"	-117° 34' 59.80"
Perris Line J	802PLJ752	Outfall	33° 48' 16.45"	-117° 12' 31.54"

Figure 4-1: MS4 Outfall Monitoring Locations



4.3 MS4 OUTFALL WET WEATHER MONITORING

Wet weather monitoring events will consist of discrete (grab) samples. Every attempt will be made to collect samples during the rising limb of a storm's hydrograph. Samples will be analyzed for the constituents listed in Table 3-8 during the first sampleable wet weather event annually. Additional wet weather monitoring event will be analyzed for the constituents listed in Table 4-7. Constituent lists will be reviewed annually, or as necessary, and constituents may be removed from the analysis list upon three consecutive non-detects. Water quality monitoring at the seven MS4 outfall monitoring stations includes recording flow and precipitation during sampling. MS4 outfall monitoring stations will be sampled during three wet weather event, including the first "sampleable" storm after October 1st of each year. Refer to Section 1.6.1 for wet weather mobilization criteria.

4.3.1 MS4 Outfall Wet Weather Event Locations

The following stations will be monitored during wet weather events:

- Corona Storm Drain Line K at Harrison and Sheridan Street
- Sunnymead Channel Line B at Alessandro Blvd and Heacock Street
- Hemet Channel at Sanderson Avenue
- Magnolia Center Storm Drain at the Santa Ana River
- University Wash at Market and Bowling Green
- North Norco Channel at Country Club Lane
- Perris Line J at Sunset Avenue below Murrieta Road

4.3.3 MS4 Outfall Wet Weather Sampling Teams, Equipment, and Bottles

Sampling Teams

Two teams, each comprised of two District field personnel will monitor all seven stations during wet weather events. The teams will coordinate with field teams conducting receiving water monitoring (described in Section 3.0) for assistance, as needed, most likely by transporting short holding-time samples to the laboratory. A staffing breakdown of programs covered under this Monitoring Plan is provided in Table 4-3 below.

Table 4-3: MS4 Outfall Wet Weather Monitoring Team Roles

Discussed in this Section	Event	Team	Monitoring Responsibility	Agency
	Wet 1	1	Receiving Water and Runners for MS4 samples	District
✓		2	MS4	District
✓		3	MS4	District
	Wet 2	1	Receiving Water and Runners for MS4 samples	District
✓		2	MS4	District
✓		3	MS4	District
✓	Wet 3	1	MS4	District
✓		2	MS4	District

Discussed in this Section	Event	Team	Monitoring Responsibility	Agency
	Dry 1	1	Receiving Water	District
		2	MS4 and IC/ID	District
	Dry 2	1	Receiving Water	District
		2	MS4 and IC/ID	District
		3	Bioassessment	SCCWRP/District

All samples will be delivered to the laboratory by field crews immediately following sample collection. Runners will be used as necessary to ensure samples are delivered to the laboratory within USEPA recommended holding times.

Equipment

Each sampling team will be equipped with portable field water quality meter(s) for wet weather sampling. A detailed description of the monitoring equipment and their functions can be found in Section 15 of Volume II.

Installation and Maintenance

No installation of equipment will be conducted under this portion of the MS4 Outfall Monitoring Program.

Bottles

Grab samples will be collected directly into the appropriate bottles manually. Section 11 of Volume II contains additional information regarding sample bottles. Table 4-4 below provides a summary of bottles required for wet weather receiving water monitoring.

Table 4-4: MS4 Outfall Wet Weather Event Bottle List[1]

Constituent	Container Type Per Site	Preservative	USEPA Recommended Holding Time
E. coli, Total Coliform, Fecal Coliform, *Enterococcus*, Fecal Streptococci[2‡]	2 x 125-mL plastic (each)	$Na_2S_2O_3$	8 hours
All other constituents (Chemistry)	As directed by the laboratory	≤6°C	48 hour (maximum)

[1] Container Type and size may vary based on equivalent recommended by ELAP certified laboratory.

[2‡] Total Coliform, Fecal Coliform, *Enterococcus*, and Fecal Streptococci are sampled during the first "sampleable" storm only.

4.3.4 MS4 Outfall Wet Weather Data Collection

Wet weather MS4 outfall monitoring will occur three times a year at seven MS4 outfall monitoring stations, including the first "sampleable" storm after October 1st of each year. Wet weather monitoring will consist of discrete (grab) samples for chemical and bacteriological analyses.

The following types of samples and measurements will be collected at each receiving water station:

- Grab samples
  - Chemistry grab samples
  - Bacteriological grab samples
- *In-situ* field measurements
  - Temperature
  - pH
  - Specific conductance
  - Dissolved oxygen
  - Turbidity
- Flow measurements

Constituents for analysis and detailed sampling methods are available in Section 4.5 and Section 11 of Volume II, respectively.

4.4 MS4 OUTFALL DRY WEATHER MONITORING

Dry weather monitoring will consist of discrete (grab) samples and will be analyzed for the constituents listed in Table 4-7. Water quality monitoring at the seven MS4 outfall monitoring stations includes recording flow during two dry weather monitoring events. Refer to Section 1.6.2 for dry weather mobilization criteria. Refer to Section 5 for details of IC/ID monitoring.

4.4.1 MS4 Outfall Dry Weather Locations

The following MS4 outfall monitoring stations will be monitored during dry weather:

- Corona Storm Drain at Line K Harrison and Sheridan Street
- Sunnymead Channel Line B at Alessandro and Heacock
- Hemet Channel at Sanderson Avenue
- Magnolia Center Storm Drain at the Santa Ana River
- University Wash at Market and Bowling Green
- North Norco Channel at Country Club Lane
- Perris Line J at Sunset Avenue below Murrieta Road

4.4.2 MS4 Outfall Dry Weather Sampling Teams, Equipment and Bottles

Sampling Teams

Two teams, each comprised of two District field personnel will monitor all seven stations during dry weather. The teams will coordinate with field teams conducting receiving water monitoring (described in Section 3.0) for assistance, as needed, most likely by transporting short holding-time samples to the laboratory.

A staffing breakdown of programs covered under this Monitoring Program is provided in Table 4-5 below.

Table 4-5: MS4 Outfall Dry Weather Monitoring Team Roles

Discussed in this Section	Event	Team	Monitoring Responsibility	Agency
	Wet 1	1	Receiving Water and Runners for MS4 samples	District
		2	MS4	District
		3	MS4	District
	Wet 2	1	Receiving Water and Runners for MS4 samples	District
		2	MS4	District
		3	MS4	District
	Wet 3	1	MS4	District
		2	MS4	District
	Dry 1	1	Receiving Water	District
✓		2	MS4 and IC/ID	District
	Dry 2	1	Receiving Water	District
✓		2	MS4 and IC/ID	District
		3	Bioassessment	SCCWRP/District

All samples will be delivered to the laboratory by field crews immediately following sample collection. Runners will be used as necessary to ensure samples are delivered to the laboratory within USEPA recommended holding times.

Equipment

Each sampling team will be equipped with portable field water quality meter(s) for dry weather sampling. A detailed description of the monitoring equipment and its operation can be found in Section 15 of Volume II.

Installation and Maintenance

No installation of equipment will be conducted under this portion of the Receiving Waters Monitoring Program.

Bottles

Grab samples will be collected directly into the appropriate bottles. Table 4-6 below provides a summary of bottles required for dry weather receiving water monitoring.

Table 4-6: MS4 Outfall Dry Weather Monitoring Bottle List[1]

Constituent	Container Type Per Site	Preservative	USEPA Recommended Holding Time
E coli	2 x 125-mL plastic (each)	$Na_2S_2O_3$	8 hours
Oil and Grease	1 x 1-Liter amber glass	HCl or H_2SO_4 to pH<2, ≤6°C	6 months

Constituent	Container Type Per Site	Preservative	USEPA Recommended Holding Time
Total Petroleum Hydrocarbons (TPH)	1 x 1-Liter amber glass	≤6°C	Extract 7 days
All other constituents	As directed by the laboratory	≤6°C	48 hours (minimum)

[1] Container type and size may vary based on equivalent recommended by ELAP certified laboratory.

4.4.3 MS4 Outfall Dry Weather Data Collection

Dry weather MS4 outfall monitoring will occur twice a year at the seven MS4 outfall monitoring locations. Grab samples will be collected for chemistry, toxicity, *E. coli*, oil and grease, and TPH during dry weather sampling.

The following types of samples and measurements will be collected at each receiving water station:

- Grab samples
  - Chemistry grab samples
  - Toxicity grab samples
  - Bacteriological grab samples
  - Oil and grease grab samples
  - TPH grab samples
- *In-situ* field measurements
  - Temperature
  - pH
  - Specific conductance
  - DO
  - Turbidity
- Flow measurements

Constituents for analysis and detailed sampling methods are available in Section 3.6 of this Monitoring Plan and Section 11 of Volume II, respectively.

4.5 PROGRAM ANALYSES AND SAMPLE TYPES

The analyses for samples collected under the MS4 Outfall Monitoring Program during the first sampleable storm each year are provided in Table 3-8 in Section 3.6. Analyses for all other samples collected under the MS4 Outfall Monitoring Program are provided in Table 4-7 below. For constituents found in both of the above tables, please refer to the Master List of Analytical Constituents, Table 6.2, provided in the QAPP Volume II for the constituent's corresponding units, methods, and reporting limits. Grab and/or composite samples will be collected for all constituents. Constituents that have not been detected above the ML/RL for three consecutive analyses at all MS4 outfall monitoring stations will be removed from the constituent list, which will be updated annually and reported in the SAR Monitoring Annual Report.

RLs in this table represent the ML/RLs, which are required under the MRP for constituents listed as priority pollutants in the CTR, and SWAMP recommended RLs. The analytical laboratory will attempt to improve upon these RLs, and will provide a written explanation for any failure to meet them. Standard Method RLs will be used when no required RL is available.

Table 4-7: MS4 Outfall Monitoring Constituents (other than First "Sampleable" storm)

Analytes[1]			
Metals (Total)			
Antimony	Boron	Iron, total	Selenium
Arsenic	Cadmium	Lead	Silver
Barium	Chromium, Total and all valences	Mercury	Thallium
Beryllium	Copper	Nickel	Zinc
Bacterial Indicators			
E.coli	*Enterococcus*	Total Coliform	
Fecal Streptococci	Fecal Coliform		
Nutrients and Others			
Turbidity	TDS[2]	Nitrogen, Total Inorganic[2]	
Specific Conductance	TSS	Nitrogen, Total Organic	
Temperature	TOC	Orthophosphorus (as P)	
DO	TKN	Total Hardness	
pH	TPH	Total Phosphorus	
Color	Nitrate	Total Potassium	
MBAS	Nitrite	Oil and Grease	
Ammonia (as N)			
Organophosphate Pesticides			
Semi-Volatiles			
Organochloride Pesticides			
Polychlorinated Biphenyls (PCB)			

[1] Refer to Attachment D: SAR Monitoring Parameter Lists-Planned Parameter Lists of the most recent Annual Report for the full list of current constituents.

[2] TDS and Total Inorganic Nitrogen are used to establish dry weather baseline flow concentrations.

Grab Samples

Grab samples will be collected for wet weather events and dry weather monitoring events at the MS4 outfall monitoring stations as described in Sections 4.3 and 4.4. MS4 outfall grab samples will be collected using protocols outlined in Section 11 of Volume II. Grab samples should be collected and delivered to the laboratory in accordance with Sections 4.3 and 4.4.

***In-situ* Field Measurements**

In-situ water quality field measurements will be collected at each MS4 outfall station once during each monitoring event. *In-situ* field measurements will be collected concurrently with grab sample collection. *In-situ* field measurements will be collected for the following parameters:

- Temperature
- pH
- Specific conductance
- DO
- Turbidity

Standard procedures for collecting *in-situ* water quality parameters are described in Section 11 of Volume II. If meter failure occurs, the field team will attempt to use another team's meter. As a last resort, the laboratory will be instructed to analyze for any missing parameters according to the methods provided in Tables 3-8 and 4-7.

Flow and Precipitation Monitoring

At wet weather and dry weather monitoring stations where automated equipment is used, flow meters will be programmed to record stage (to be converted to flow values based on channel dimensions) and precipitation data throughout the monitoring event. Flow and precipitation monitoring will commence during the pre-event preparation and will terminate upon completion of sampling.

Where automated equipment is not used, flow will be estimated by collecting the following measurements:

- Width of the water surface,
- Approximate depth of the water, and
- Approximate flow velocity.

Handheld velocity probes will be used to measure velocity when available. Alternatively, visual estimates may be made per the procedures detailed in the QAPP. Ponded water will be indicated by a flow value of 0.0 cubic feet per second (cfs).

5.0 ILLICIT CONNECTION/ILLEGAL DISCHARGE MONITORING

Illicit Connection/Illegal Discharge (IC/ID) reconnaissance and monitoring is required for wet weather and dry weather monitoring events during routine Permittee outfall inspections and field reconnaissance, and as part of the MS4 Monitoring and Receiving Waters Monitoring programs. It is designed to be compatible with the "Illicit Discharge, Detection, and Elimination: Guidance Manual" (Center for Watershed Protection, 2004). The SAR Permit requires that the Permittees effectively prohibit the discharge of non-stormwater into their MS4 facilities and to Waters of the U.S.

When a potential IC/ID has been identified during MS4 Monitoring (see Section 3) or receiving water monitoring (see Section 4), the District will notify the Permittee having jurisdiction so that they implement the proper follow-up procedures in accordance with their LIP and in general conformance with the guidance provided in Sections 5.2, 5.3, and 5.5, as appropriate.

This section covers the actions to be conducted by the individual Permittees for the implementation of the IC/ID Programs described below. Per Section IX.E of the SAR Permit, the IC/ID program describes the components listed below. These components are important to support the IC/ID monitoring program.

a. An inventory and map of Permittees' MS4 facilities and major outfalls to receiving waters;
b. A schedule to conduct and implement systematic investigations of MS4 open channels and major outfalls;
c. Use of field indicators to identify potential illegal discharges;
d. A method to track illegal discharges to their sources, where feasible; and
e. Public education about illegal discharges and pollution prevention where problems are found or reported.

The following components are the focus of this IC/ID Monitoring Program and have been grouped into the following sections (applicable Permit Section):

- Permittees' MS4 Inventory (IX.E.a)
- Field Reconnaissance and Inspection (IX.E.b-d)
- IC/ID Follow-up Procedures (IX.E.b-d)
- Complaint Follow-up Actions
- Public education (IX.E.e)

5.1 PERMITTEES' MS4 INVENTORY

A desktop assessment is conducted to guide initial field screening and support initial IC/ID decisions. The desktop assessment of illicit discharge potential allows for the identification and prioritization of MS4 segments within each jurisdiction for inspection as required by the MRP. The assessment includes the following steps:

1. Compilation of available MS4 facility and major outfall inventory, mapping, and data for each jurisdiction.
2. Determination of discharge screening factors.
3. Screening for Illicit Discharge potential at the tributary area level.
4. Generation of major land use maps showing areas with highest potential for Illicit Discharge for field investigations (may be linked to GIS in the future).

Step 1: The District collects and consolidates individual Permittee MS4 facility maps for the MS4 Permit area into a single watershed-wide MS4 map, which is included in the Monitoring Annual Report. The MS4 facility map contains jurisdictional boundaries, MS4 infrastructure, and receiving waters within the SAR. The Permittee MS4 facility maps are currently produced in a variety of formats; however, the District has communicated the goal to the Permittees of maintaining MS4 facility maps in a GIS format in the future.

Step 2: Discharge screening factors have been identified and prioritized. The factors and their priorities are listed in Table 5-1 below. Permittees may adjust the priorities as necessary to reflect local conditions within their Local Implementation Plans (LIPs), however, any deviation from Table 5-1 will be documented in the Monitoring Annual Report.

Table 5-1: Prioritized Screening Factors for Desktop Assessment for IC/ID

Priority	Screening Factor	Definition
1 (High)	High Density of Generating Sites Zoned Industrial that (listed in order of priority): i. Immediately tributary to 303(d) Listed waters with perennial flow ii. Immediately tributary to non-303(d) Listed waters with perennial flow	Areas zoned for industrial use that exhibit a relatively high density of industries typically associated with gross pollutants (10 generating sites or five permitted sites per square mile). Considerations include: • Types of businesses in the area (i.e., from the business license inventory) • Commercial and Industrial Facility Stormwater inspections databases • Permitted dischargers within the SAR (under the CA General Industrial Permit or an individual NPDES Permit)
2 (Medium)	Areas subject to sediment loss	MS4 outfalls located within the drainage area of locations with high potential for sediment loss, such as active construction areas of new development.
3 (Low)	All other major outfalls	Major outfalls that do not fall into Priority 1 or 2 as defined above.

Step 3: Based on a desktop review of the maps produced in Step 1, a priority for each MS4 segment will be assigned.

Step 4: The final step of the desktop assessment is to code and verify data on the MS4 facility map from Step 1 with the reconnaissance priorities from Step 3. The prioritized MS4 facility map will be used for field reconnaissance, as described in the following section.

5.2 FIELD RECONNAISSANCE AND INSPECTION

Permittee field reconnaissance activities to identify IC/IDs will initially focus on Priority 1 areas, as described in Section 5.1. As Priority 1 areas are completed, field reconnaissance will focus on remaining areas in order of priority until all major outfalls have been investigated. Field reconnaissance will be conducted beginning January 2012. It is the program's goal that each Permittee investigate all major outfalls within their jurisdictions during the term of the MS4 Permit (i.e., by January 29, 2015).

Table 5-2: Tentative Field Reconnaissance Schedule

Item	Tentative Date
Creation of inventory and map of MS4 facilities and major outfalls to receiving waters; Initial field reconnaissance for data verification.	Updates Provided in Annual Report
Completion of Desktop Reconnaissance	Updates Provided in Annual Report
IC/ID Investigation, Safety Training	May 2013 and September 2013 and annually thereafter
Detailed Field Reconnaissance	Beginning January 2012

Sources of dry weather flows may be permitted, allowable, or illegal. Permitted or allowed discharges as defined by the Permit Section IV are listed below. Any discharges that are not included in this listing are considered illegal and would warrant investigation by a Permittee.

- Discharges composed entirely of stormwater;
- Air conditioning condensate;
- Irrigation water from agricultural sources;
- Discharges covered by a NPDES permit, WDRs, or waivers issued by the Regional Board or State Board;
- Discharges from landscape irrigation, lawn/garden watering and other irrigation waters. These shall be minimized through public education and water conservation efforts, as prescribed under this Order Section XI.E. Residential Program;
- Passive foundation drains[7];
- Passive footing drains[8];
- Water from crawl space pumps[9];
- Non-commercial vehicle washing, (e.g., residential car washing (excluding engine degreasing) and car washing fundraisers by non-profit organization);
- Dechlorinated swimming pool discharges (cleaning wastewater and filter backwash shall not be discharged into the MS4 or to Waters of the U.S.);
- Diverted stream flows[10]; and
- Rising groundwaters[11] and natural springs.

[7] Allowed discharges only if the source water drained from the foundation is stormwater or uncontaminated groundwater. Discharges from contaminated groundwater may require coverage under the De Minimus Permit (Order No. R8-2009-0003, NPDES No. CAG998001) or General Groundwater Cleanup Permit (Order No. R8-2007-0008, NPDES Permit No CAG918001) or its latest version.

[8] See footnote 5, above.

[9] Allowed discharges only if the discharge is uncontaminated, otherwise permit coverage under the *De Minimus* Permit or Order No. 2006-0008-DWQ (NPDES No. CAG990002), General NPDES Permit for Discharges from Utility Vaults and Underground Structures to Surface Waters (General Permit-Utility Vaults).

[10] Diversion of stream flows that encroach into Waters of the U.S. requires a 404 permit from the US Army Corps of Engineers and a 401 Water Quality Certification from the Regional Board. Stream diversion that requires active pumping also requires coverage under the De Minimus Permit, Order No. R8-2009-0003.

[11] Discharge of rising groundwater and natural springs into surface water is only allowed if groundwater is uncontaminated. Otherwise, coverage under the General Groundwater Cleanup Permit, Order No. R8-2007-0008 may be required.

- Uncontaminated groundwater infiltration as defined in 40 CFR 35.2005(20) and uncontaminated pumped groundwater (as defined in Permit Appendix 4, glossary);
- Flows from riparian habitats and wetlands;
- Emergency firefighting flows (i.e., flows necessary for the protection of life and property do not require BMPs and need not be prohibited. However, appropriate BMPs to reduce the discharge of pollutants to the MEP must be implemented when they do not interfere with health and safety issues [see also Appendix K of the DAMP]);
- Waters not otherwise containing Wastes as defined in California Water Code Section 13050 (d); and
- Other types of discharges identified and recommended by the Permittees and approved by the Regional Board.

5.2.1 Field Screening Methods and Observations

The procedures below describe the method of tracking IC/ID discharges to their sources, where feasible, and are followed during MS4 inspections and field reconnaissance.

Materials needed:
- Digital camera;
- Handheld multi-meter capable of measuring pH, temperature, and specific conductivity;
- Field data sheet or similar form; and
- MS4 major outfalls map.

Procedures to conduct field screening and visual observations:
- Document on major outfall identification field data sheet.
- Complete field data sheet (Appendix B of Volume II) or similar form indicating all observations, including stains which may be indicative of recent active discharges. Field personnel will be trained at least annually to complete field data sheets correctly.
- If there is no active discharge, standing water, or other evidence of recent discharges (stains), reconnaissance is complete at that location. Note observations on field data sheet.
- If there is active discharge or evidence of recent IC/ID flow, an investigation will be necessary. At a minimum, the initial field team will estimate flow and collect the following field parameters – pH, temperature, and specific conductivity.
    - Estimate the flow (if present) on the field data sheet by measuring:
        - Width of the water surface;
        - Approximate depth of the water; and
        - Approximate flow velocity.
- Take photographs of the discharge and the point of entry to MS4.

In general, the following field water quality measures have been used by the Permittees to help determine whether an IC/ID is occurring at the time of a field visit or investigation. The following guidance may be used:

- Specific Conductance >25% higher than WQO (i.e., > 1,000 µmhos/cm);
- pH below 6.5 or above 8.5;
- Temperature that is unusual compared to ambient air temperature (i.e., extremely hot or cold flow that is not influenced by current weather at site); and
- Unusual staining in/near major outfall, unusual color or cloudiness (i.e., sediment) evident in discharge, or unusual odor(s).

If any of these thresholds are exceeded, follow-up reconnaissance and source identification is initiated and described in the following Section 5.3.

5.3 IC/ID FOLLOW-UP PROCEDURES

This section addresses follow-up reconnaissance/source identification procedures conducted due to findings from Section 5.2 above, as well as for complaint calls as described in Section 5.4 and IC/Ds identified during routine monitoring described in Sections 3 and 4. When it has been determined from the MS4 inspection/reconnaissance results that an observed discharge warrants investigation, such as when field parameter thresholds are exceeded (Section 5.2 above), a source investigation will be conducted by the Permittee.

Source Investigation

Confirm discharge is occurring and assess if discharge may be a threat to human health or the environment. If the discharge may be a threat to health or the environment, implement Permittee Enforcement and Compliance Strategy procedures as described in the Permittee's LIP and notify the Regional Board/California Emergency Management Agency within 24 hours.

Complete IC/ID Incident Reporting Form and IC/ID Incident Investigation Report (QAPP Appendix N or similar form).

- Review Table 5-3 on following page (recreated from Table 2 of the IDDE Guidance Manual), and note land use types and any generating sites in the area and any activities observed.
- Trace discharge as far upstream as possible to determine source.

If the source cannot be identified:

Active discharge with flow –

- Field measurements are collected and documented (outlined above) where there is no other evidence of the IC/ID source.
- Provide appropriate public education material (Section 5.5 below) in area of IC/ID or complaint.

No active discharge but evidence of IC/ID is present at time of investigation –

- Mark location for future follow-up. Follow-up visit(s) will confirm if the IC/ID has recurred and will attempt to locate source. If IC/ID has not recurred or has been eliminated, note on IC/ID form (or similar) and close complaint/investigation.
- Provide appropriate public education material (Section 5.5 below) in area of IC/ID or complaint.

If the source is identified:

- Determine if the discharge is permitted or allowable (see Section 5.2). Discussions with property owners and others near the source of the discharge will be necessary.
- If a permitted, allowed, or exempted discharge is exposed to a source of pollutants (e.g., recently-applied fertilizers or pesticides), it will be treated as an Illegal Discharge. Refer incident to Regional Board.
- If discharge is permitted, request copy of regulatory permit, District Encroachment Permit, or any other document authorizing the discharge. No further action is required where the source is determined to be a permitted, allowed, or exempted discharge. Permitted discharges that are perceived to be a threat to human health or the environment will be reported to the Regional Board/California Emergency Management Agency.
- If discharge is not clearly permitted or allowable, implement Permittee Enforcement and Compliance Strategy procedures as described in the Permittee's LIP.
- If the incident is part of a HazMat incident, report to the Incident Commander upon arrival. Coordinate with the HazMat team and only collect samples with approval of the Incident Commander as samples may be done in conjunction with future legal action. *Under no circumstances should a site be entered or field measurements collected if conditions are unsafe.*

Table 5-3: Indirect Discharge Generating Sites

Chapter 1: The Basics of Illicit Discharges

Table 2: Land Uses, Generating Sites and Activities That Produce Indirect Discharges

Land Use	Generating Site	Activity that Produces Discharge
Residential	• Apartments • Multi-family • Single Family Detached	• Car Washing • Driveway Cleaning • Dumping/Spills (e.g., leaf litter and RV/boat holding tank effluent) • Equipment Washdowns • Lawn/Landscape Watering • Septic System Maintenance • Swimming Pool Discharges
Commercial	• Campgrounds/RV parks • Car Dealers/Rental Car Companies • Car Washes • Commercial Laundry/Dry Cleaning • Gas Stations/Auto Repair Shops • Marinas • Nurseries and Garden Centers • Oil Change Shops • Restaurants • Swimming Pools	• Building Maintenance (power washing) • Dumping/Spills • Landscaping/Grounds Care (irrigation) • Outdoor Fluid Storage • Parking Lot Maintenance (power washing) • Vehicle Fueling • Vehicle Maintenance/Repair • Vehicle Washing • Washdown of greasy equipment and grease traps
Industrial	• Auto recyclers • Beverages and brewing • Construction vehicle washouts • Distribution centers • Food processing • Garbage truck washouts • Marinas, boat building and repair • Metal plating operations • Paper and wood products • Petroleum storage and refining • Printing	• All commercial activities • Industrial process water or rinse water • Loading and un-loading area washdowns • Outdoor material storage (fluids)
Institutional	• Cemeteries • Churches • Corporate Campuses • Hospitals • Schools and Universities	• Building Maintenance (e.g., power washing) • Dumping/Spills • Landscaping/Grounds Care (irrigation) • Parking Lot Maintenance (power washing) • Vehicle Washing
Municipal	• Airports • Landfills • Maintenance Depots • Municipal Fleet Storage Areas • Ports • Public Works Yards • Streets and Highways	• Building Maintenance (power washing) • Dumping/Spills • Landscaping/Grounds Care (irrigation) • Outdoor Fluid Storage • Parking Lot Maintenance (power washing) • Road Maintenance • Spill Prevention/Response • Vehicle Fueling • Vehicle Maintenance/Repair • Vehicle Washing

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5.4 COMPLAINT FOLLOW-UP ACTIONS

Complaints may be received from a member of the public via phone, email, or direct communications; from in-house staff (or field staff, inspectors, and maintenance crews); or from other agencies (other county agency, a neighboring city, or state agency). In the event that a Permittee has received a complaint call the following section provides general guidance. Based on the location described by the complaint report the Permittee should determine the jurisdiction responsible for the follow-up actions and notify the appropriate point of contact (QAPP Appendix K). For complaints falling within a Permittee's jurisdiction it is recommended that they follow their internal enforcement protocols. Refer to Section 5.6 regarding complaint records. The following general guidance is recommended for follow-up actions to a complaint call.

Generally, for incoming complaints, Permittee personnel having jurisdiction and who are trained in IC/ID investigations collect information from the complainant and begin the *IC/ID Incident Reporting Form* (See QAPP Appendix N or similar form). The incident is categorized according to location and type of discharge. For a non-MS4 facility (i.e., commercial site), the appropriate City or County NPDES coordinator or alternate point of contact is notified (QAPP Appendix K or similar form). Referrals to City and/or the Regional Board are made within two business days if the incident occurred at an industrial business or construction site. When the incident discharges to a natural waterway with no MS4 connectivity, the appropriate Code Enforcement staff is notified, as required per the SAR Permit. If the Illicit Discharge is to a District facility, the District's IC/ID staff or Regional MS4 Permit Coordinator is immediately notified. Reporting requirements are described in the DAMP and specific jurisdictional procedures are further outlined in each Permittee's LIP.

The following are general procedures for following up on non-stormwater discharges for which a complaint has been reported. These may vary between Permittee jurisdictions; please refer to the respective Permittee's LIP for specific procedures.

- Neighbor disputes involving non-stormwater issues are a civil matter. Complaints are referred to appropriate Permittee or Code Enforcement department (QAPP Appendix K).
- Health hazards with no MS4 connectivity – Refer complaint to Department of Environmental Health. QAPP Appendix K provides contact information.
- Flooding issue with no pollutant issue – Complaints are referred to the District Project Planning Section at 951.955.1200. The Project Planning Section has implemented internal procedures for handling flooding complaint issues.
- Complaints occurring on private property where the owner of the property is in violation, e.g., accumulated rubbish, construction without permits, junk yard, and abandoned vehicles – The appropriate Permittee or Code Enforcement Department is contacted. See QAPP Appendix K for a list of contacts by community and the local Code Enforcement office that handles these complaints.
- If sewage or treated effluent is involved, the Unified Sanitary Sewer Spill Response Procedure (DAMP Appendix I) is implemented.

When it has been determined that the incident (from complaints) warrants investigation refer to general guidance in Section 5.3.

5.5 PUBLIC EDUCATION AND OUTREACH OVERVIEW

Public education is an essential part of a municipal stormwater program because changing public behavior can create a real reduction in pollutants. When a community has a clear understanding of where the pollution comes from, how it can affect them, and what they can do to stop it, they are more likely to support the program, change their own practices, and help educate others.

The Watershed Protection Program's strategic plan for public education has been developed by the Public Education Strategic Taskforce (PEST) to engage Riverside County residents in actions protective of the County's streams, rivers, which is built upon the many successes of the current program and carries out activities and projects that include:

- Maintaining the 24/7 illegal dumping hotline;
- Monthly eNews Bulletin;
- Program Website (rcwatershed.org);
- Outreach campaign to eliminate over-irrigation;
- Business outreach to landscape professionals; and
- Continuation of a school-aged children education outreach program.

The Program's goals consist of continued efforts to increase stormwater pollution prevention awareness and its impact on the environment; to educate residents and local businesses with the goal of shaping their attitude towards minimizing stormwater pollution and to maintain compliance with the MS4 Permit. In addition to improving water quality, helping the public understand the problems associated with stormwater runoff can help build overall support for the stormwater program.

The Permittees participate in and contribute to the Riverside County Watershed Protection Program which provides educational materials on the subject of water quality, urban runoff, and both storm and non-stormwater discharges to residents, businesses, developers, contractors, and schools through public events and online sources. For more information refer to the outreach webpage: https://www.rcwatershed.org/.

5.6 IC/ID MONITORING RESULTS DATABASE

All sampling data collected as part of the IC/ID monitoring program, including incident response information are tracked individually by each Permittee and included in their Annual Report. In compliance with the Permit (Sections III.A.1.m and IX.H), the District will track and compile information that is gathered and entered by the Permittees (see Sections 5.1 thru 5.3) into an IC/ID database. The database will consist of a Master spreadsheet that has been developed and formatted by the District. The primary goal of the data collection will be to compare the monitoring results with the applicable WQO's for receiving waters and to determine the effectiveness of the overall Urban Runoff Management Program.

6.0 SPECIAL STUDIES

In addition to the program described in Sections 3.0 through 6.0, four additional monitoring components are required by the MRP. Stand-alone work plans have been developed and approved for these components independently of this CMP. The four monitoring components are:

- TMDL/303(d) Listed Waterbody Monitoring
- Regional Watershed Monitoring
- Hydromodification Monitoring
- Low Impact Development BMP Monitoring

These monitoring programs are briefly described below.

6.1 TMDL/303(D) LISTED WATERBODY MONITORING

The District participates in two TMDL monitoring programs: the MSAR Bacterial Indicator TMDL and the Lake Elsinore/Canyon Lake Nutrient TMDL. Each TMDL has its own work plan, separate from this CMP. Brief descriptions of the TMDLs are provided below.

MSAR Bacterial Indicator TMDL
The Permittees are required to monitor and report the effectiveness of implemented BMPs in the watershed to determine their progress toward compliance with Water Quality Based Effluent Limitations required under the TMDL. Through the Middle Santa Ana TMDL Workgroup, the Permittees submitted the Urban Source Evaluation Plan and a monitoring plan. Work plans, QAPP's and reports are submitted by the Workgroup on behalf of all stakeholders named in the TMDL and may be viewed and/or downloaded at:
http://www.sawpa.org/task-forces/regional-water-quality-monitoring-task-force/#geographic-setting

Lake Elsinore/Canyon Lake Nutrient TMDL
The Permittees are required to monitor and report the effectiveness of implemented BMPs in the watershed to determine their progress towards compliance with Water Quality Based Effluent Limitations required under the TMDL. Monitoring under the San Jacinto Lake Elsinore/Canyon Lake Nutrient TMDL is implemented through the TMDL's Task Force. Results of that monitoring effort are submitted by the Task Force on behalf of all stakeholders named in the TMDL. The Lake Elsinore/Canyon Lake Nutrient TMDL Monitoring operates under its own work plan and QAPP, which may be viewed and/or downloaded at:
http://www.sawpa.org/task-forces/lake-elsinore-canyon-lake-tmdl-task-force/#monitoring-program

6.2 REGIONAL MONITORING PROGRAMS

Certain monitoring programs have been incorporated into regional efforts and are available in the applicable regional monitoring plan. Regional efforts are utilized when possible. Per the MRP, the District continues to participate in the following Regional Monitoring Programs, discussed below in Sections 6.2.1 through 6.2.3. Updates, where available, in these regional programs will be provided in the Monitoring Annual Reports.

- SMC Regional Monitoring of Southern California
- SCCWRP Regional Hydromodification study
- LID BMP Monitoring

In addition, the District participates in the following regional monitoring programs which are not discussed in this monitoring plan:

- CASQA Pesticide Regulatory Subcommittee support
- CASQA Monitoring and Science Subcommittee (District participating as Co-Chair)
- SMC Executive Steering Committee (District participating as Chair in 2020-2021)
- SMC Laboratory Intercalibration
- SMC Standardized Reporting for Water Quality Monitoring Programs
- SMC Water Quality Index and Visualization
- Participation in the Statewide Toxicity Testing Policy Development

The most current SMC Annual Report, current program workplans, and other project reports may be viewed and/or downloaded from the SMC website (http://socalsmc.org/).

6.2.1 SMC Regional Bioassessment Monitoring

Bioassessment monitoring for both outfalls and receiving waters during one dry weather event is administered in conjunction with SMC bioassessments as a part of the SMC Regional Monitoring of Southern California Watersheds special study. The workplan is available in "Bioassessment Survey of the Stormwater Monitoring Coalition, Technical Report 849" (SCCWRP, 2015). Updates applicable to the SAR will be provided in the Monitoring Annual Reports. The 2021-2025 SMC Regional Monitoring workplan is under development and will be referenced in the next Annual Progress Report as available.

6.2.2 SMC Regional Hydromodification Monitoring Program

In accordance with the MRP requirement, the Permittees participated in the Regional Hydromodification Study initiated in 2007 and completed in 2013. This effort was undertaken by the SMC and coordinated by SCCWRP for the development of tools which evaluate the susceptibility of a stream to hydromodification impacts to improve water quality and the overall condition of streams in Southern California by reducing channel degradation, excessive erosion and sedimentation of downstream receiving waters, and delivery of particle-bound pollutants. The goal of this project was to develop a series of assessment tools and predictive models (applicable to a range of stream types) that support implementation of hydromodification management measures. This project produced tools to help answer the following questions:

1. Which streams are at the greatest risk of hydromodification effects?
2. What are the anticipated effects (in terms of increased erosion, sedimentation or habitat loss) associated with increases in impervious cover?
3. What are some potential management measures that could be implemented to offset hydromodification effects? How effective are they likely to be?

   In general this effort concludes and recommends that performance and effectiveness monitoring of hydromodification monitoring can be addressed by multi-year monitoring programs typically managed by municipalities and other local entities. Whereas trends and ambient conditions must be addressed over longer time scales (e.g., decadal) through cooperative regional monitoring that involves multiple entities, including state, regional, and local agencies and grant programs. The hydrologic and sediment supply performance standards established in the associated HMP are based on the most recent state of the hydromodification management science (SCCWRP, 2012). It is generally acknowledged that SCCWRP's formulation of regional standards for hydromodification management may serve as a baseline for development of HMPs for specific regions in Southern California. The tools developed from this effort can be viewed on SCCRWPs website at:

http://www.sccwrp.org/ResearchAreas/Stormwater/AssessmentAndManagementOfHydromodification.aspx

The SMC Regional Hydromodification Study was implemented under a separate workplan and was used in reference during the development of the SAR Hydromodification Monitoring Plan as referenced in Section 6.3.

6.2.2 Low Impact Development (LID) BMP Monitoring

Per the MRP, Permittees are required to continue participation in the SMC LID BMP monitoring study. The SMC LID BMP study is designed to provide LID BMP Manual and Training Materials that may be used by programs throughout southern California. The District's headquarters has been retrofitted to monitor the performance of LID features in the field, illustrate LID features in training workshops, and assist in the development of technical guidance regarding LID features. The LID BMP Monitoring Plan operates under its own workplan which may be obtained by contacting the District.

Additional information regarding the LID BMP Monitoring can be found at:

http://socalsmc.org/wp-content/uploads/2017/01/SoCalLID_Manual_FINAL_040910.pdf

6.3 HYDROMODIFICATION MONITORING PROGRAM

The Permittees participated in the SMC Regional Hydromodification Study (refer to Section 6.2.2 above) in accordance with the MRP requirement to aid the development of a Hydromodification Monitoring Plan (HMP) as part of the Watershed Action Plan (WAP). The purpose is to assess the effectiveness of hydromodification management and assist in predicting the effects of urbanization on stream stability within the SAR.

As described in the HMP, each hydromodification station will be monitored via field surveying for at least one event per Permit term. The hydromodification monitoring observations and measurements will be collected in accordance with the HMP schedule. To provide a standardized assessment of the presence and condition of vegetation and habitat integrity, relevant attributes of the California Rapid Assessment Method (CRAM) module for riverine wetland (QAPP Appendix P) will be applied for initial site visits at the approved HMP ~~select~~ monitoring locations. These included the hydrology, physical structure, and biotic structure attributes of the protocol. These attributes evaluate metrics including channel stability, riverine entrenchment ratio, structural patch richness, topographic complexity, and plant community composition and structure. CRAM is a protocol developed and calibrated to be used state-wide and is thereby applicable to the wide variety of ecological and climate regimes present in California. When CRAM is conducted, it will be conducted in accordance with State guidelines and quality control standards described within the approved SWAMP SOP's and tools will be used as described on the State Water Boards website. The methods and standards described in the Hydromodification Management Plan Evaluation Program Appendix G of the Watershed Action Plan (2017) are based on the hydromodification susceptibility guidance information developed by SCCWRP. It is generally acknowledged that SCCWRP's formulation of regional standards for hydromodification management may serve as a baseline for development of HMPs for specific regions in Southern California. These hydromodification tools can be viewed on SCCRWPs website. In general, the majority of the methods which will be utilized during hydromodification monitoring are borrowed from standardized protocols which are also being applied in the 2015-2019 (SMC) Regional Monitoring Program described in section 6.2.2 above.

The WAP and its supporting documents were approved in April 2017. The SAR HMP Evaluation Program extends through fiscal year 2021. This period of evaluation is necessary to implement monitoring, analyze data from selected sites, and account for spatial and temporal variability of the conditions in the SAR. Implementation of the SAR Evaluation Program will be discussed in the SAR annual reports.

7.0 DATA RECORDS, MANAGEMENT, AND REPORTING

7.1 EVENT DATA RECORDS AND CHAINS OF CUSTODY (COC)

Achieving a high quality data set requires rigorous documentation of field activities and defensible COCs, as well as timely review of laboratory data. This section reviews the data required to be recorded on the field data sheets, sample labels, COCs, and laboratory turnaround time for data reports and SWAMP compatible Electronic Data Deliverables (EDDs).

Field Data Sheets
During sampling activities, a record of the monitoring event, including grab sample times, and *in-situ* field measurements, will be recorded electronically via the Survey 123 application or on a paper field data sheet per the standard documentation procedures detailed in Section 11 of Volume II: QAPP. Appendix B to the QAPP contains an example of the paper form and guide sheet for using the application. Field data sheets will document site or station ID, station name, sample ID(s), sample date, sample time, site conditions, including flow and/or ponded water, connectivity between MS4 discharges and surface receiving waters, sources of water and relative contribution of sources (including rising groundwater) the presence of trash, and any other applicable issues and information. Field personnel will be trained at least annually to complete field data sheets correctly both electronically and on paper. Field data sheets and COCs will be reviewed immediately following each mobilization, and discrepancies resolved while memories are fresh.

Sample Labeling and COCs
Sample Identification numbers (Sample IDs) on all COC forms must match those on the sample bottles, laboratory reports and EDDs. Detailed COC and bottle labeling requirements are provided in Section 12 of Volume II: QAPP. Sample IDs include:

- Sampling year,
- Event code,
- Station Code (last three digits of the station ID number), and
- Two digit code that designates the sample as a primary, field duplicate, or field blank sample.
  - 01=Primary Sample; 02=Field Duplicate; 03=Field Blank; 04=Trip Blank

Example sample IDs are described below:

Ex.1 Wet Weather
1011-W1-040-01
(2010-2011 year, 1st Wet Weather Event, Corona Storm Drain Site 801CRN040, Primary Sample)

Ex.2 Wet Weather QA/QC
1011-W1-040-02
(2010-2011 year, 1st Wet Weather Event, Corona Storm Drain Site 801CRN040, Field Duplicate)

Ex.3 Dry Weather
1213-D2-040-01
(2012-2013 year, 2nd Dry Weather Event, Corona Storm Drain Site 801CRN040, Primary Sample)

Laboratory Reporting and EDDs
Laboratory data analysis reports and EDDs will be SWAMP compatible and will follow the guidelines set forth in Section 14 of Volume II: QAPP. Properly formatted laboratory reports and EDDs must be received by the District within three weeks of sample delivery to the lab. Any revised reports or EDDs are due to the District one week after comments/revisions are provided to the laboratory.

7.2 DATA MANAGEMENT

Water quality data management will be initiated through the use of COCs and field data sheets during monitoring and sample relinquishment to the laboratory. The COC form for this Project is attached in Appendix A of the QAPP (CMP Volume II). The Field Data Sheet is located in Appendix B of Volume II: QAPP. Overall sample handling and management of data will be consistent with SWAMP procedures for monitoring projects.

Analytical data quality control checks will be conducted by the laboratory and the District. The laboratory will provide data to the District in both a SWAMP compatible EDD and hard copy formats within three weeks (21 days total) of a monitored event. The District will conduct QA/QC of laboratory data, EDDs, and all documentation according to procedures set forth in the QAPP.

Data may also be obtained and combined with data from other agencies and organizations from both regional and statewide monitoring programs. Data from other agencies will be managed in the same form as data collected by the District.

7.3 REPORTING

The District, as the lead Permittee of the MRP, will collaborate with the Permittees for reporting of data. A summary of reporting requirements and the reporting schedule, per the MRP, are provided below.

7.3.1 Program Effectiveness Assessment and Reporting

All updates to this CMP and status, data, and assessments and updates to the monitoring program will be reported in the Monitoring Annual Report, as part of the Annual Progress Report submittal due November 30th annually, starting in 2012. The MRP sets forth annual reporting requirements, including:

- Program implementation status review (including compliance and non-compliance with the SAR Permit)
- BMP effectiveness assessment under the IC/ID program and the DAMP
- BMP effectiveness assessment regarding changes in population and land use in relation to pollutants causing or contributing to exceedances of WQOs
- Compliance status with Receiving Water Limitations
- Overall program assessment, including water quality improvements and pollutant load reductions
- LIP program modifications and improvements
- Assessments of modifications to the Water Quality Management Plans (WQMPs) or the DAMP for CWA compliance and requirements to reduce the discharge of pollutants
- A summary, evaluation, and discussion of monitoring results from the previous year and any subsequent changes to the monitoring programs for the following year, including:
  - Mass Emissions Monitoring
  - Water Column Toxicity Monitoring
  - IC/ID Monitoring
  - Receiving Water Monitoring

  - Bioassessment Monitoring
  - All special studies and regional monitoring programs
- A fiscal resources analysis progress report
- Major changes to plans and policies
- Revisions to the implementation agreement, including a copy of the signature page, if revised
- Permittee stormwater ordinance review, including ordinance enforcement for non-exempt non-stormwater discharges into the MS4

Formatting and Additional Submission Requirements

The standard report format will be used. The report will be submitted in electronic and paper format and will be SWAMP up-loadable and searchable, including EDDs, using the "Standardized Data Exchange Formats" document, as referenced in the MRP. A duly authorized representative of each Permittee is responsible for providing signatures for each submittal provided to the District, as principal Permittee.

Additional submissions are available in Section V of the MRP.

7.3.2 Monitoring Annual Report Schedule

Per the MRP, the District, on behalf of the Permittees, will provide Monitoring Annual Reports to the Regional Board according to the reporting schedule provided in Table 7-1, starting with the 2011-2012 monitoring annual report.

Table 7-1: Reporting Schedule

Submittal	MRP Section	Reporting Frequency	Due Date	Date
CMP Review	III.C.	Review within 12 months of SAR Permit adoption	1/29/11	Completed 12/2010
CMP Revision[1]	III.C.	Revise within 16 months of SAR Permit Adoption and as needed	5/29/11	Submitted 5/31/2011
Triennial Report	III.D.1.b	Every three years	2/15/10 2/15/13 2/15/16	
Monitoring Annual Report	III.D.2	Annually, included in the Annual Report	November 30	1st due 11/30/2012
Annual Progress Report	III.D.2	Annually	November 30	1st due 11/30/2012

[1] The CMP is a living document that is reviewed, revised and submitted with the annual report as needed.

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