VOLUME II:

QUALITY ASSURANCE PROJECT PLAN

Revised November 2012

GROUP A ELEMENTS: PROJECT MANAGEMENT

1. TITLE AND APPROVAL SHEETS

Quality Assurance Project Plan

Project Name:	Riverside County Flood Control and Water Conservation District Consolidated Monitoring Program
Date:	November 30, 2012
Name of Responsible Organization:	Riverside County Flood Control and Water Conservation District

PROGRAM ORGANIZATION:

Title	Name	Signature	Date
Chief of Watershed Protection Division	Jason E. Uhley		
NPDES Program Manager QA Officer	David H. Garcia		
District Monitoring Program Manager	Robert Collacott		

APPROVAL SIGNATURES - SMR

REGIONAL WATER QUALITY CONTROL BOARD:

Title	Name	Signature	Date
RWQCB – San Diego Executive Officer	David W. Gibson		
RWQCB – San Diego QA Officer			

APPROVAL SIGNATURES - SAR

REGIONAL WATER QUALITY CONTROL BOARD:

Title	Name	Signature	Date
RWQCB – Santa Ana Executive Officer	Kurt V. Berchtold		
RWQCB – Santa Ana QA Officer			

APPROVAL SIGNATURES - WWR

REGIONAL WATER QUALITY CONTROL BOARD:

Title	Name	Signature	Date
RWQCB – Colorado River Basin Executive Officer	Robert E. Perdue		
RWQCB – Colorado River Basin QA Officer			

Below is an example of the Consultant Approval and Responsibilities form. Forms are required to be signed by each consultant working with the District and Copermittees to implement and adhere to the requirements set forth in the CMP. Signed and completed forms are available in Appendix O.

Consultant Approval and Responsibilities Form

Riverside County Quality Assurance Project Plan for Water Quality Monitoring

Consultant Name

Address	
County Monitoring Project Name and Elements	
District Agreement Number and Approval Date	
Consultant Project Manager	
Signature	
Phone Number	
E-mail	
Consultant Quality Assurance Officer	
Signature	
Phone Number	
E-mail	

The consultant Project Manager is responsible for implementing monitoring activities and data management in accordance with the requirements of this QAPP and the corresponding elements of a Project's Monitoring Plan. The Quality Assurance (QA) Officer is responsible for quality assurance and quality control procedures for sampling and data management procedures in this QAPP. The QA officer will review and assess procedures during the project against QAPP requirements. The consultant Project Manager will report all findings to the QA Officer and District's Program Manager, including all requests for corrective action. The QA Officer and/or District's Program Manager may stop monitoring activities if there are significant deviations from required practices or if there is evidence of a systematic failure.

The consultant will be responsible for ensuring QAPP/Monitoring Plan compliance by subconsultants hired on a single or various elements of the Monitoring Project named above.

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ACRONYMS AND ABBREVIATIONS

BMI	Benthic Macroinvertebrate
BMP	Best Management Practice
BOD	Biological Oxygen Demand
CASQA	California Association of Stormwate Quality Agencies
CCC	Criteria Continuous Concentration
CEDEN	California Environmental Data Exchange Network
CMC	Criteria Maximum Concentration
CMP	Consolidated Program for Water Quality Monitoring
COC	Chains of Custody
CPOM	Coarse Particulate Organic Matter
CSBP	California State Bioassessment Protocol
CTR	California Toxics Rule
District	Riverside County Flood Control and Water Conservation District
DO	Dissolved Oxygen
DOC	Dissolved Organic Carbon
EDD	Electronic Data Deliverable
EPT taxa	Ephemeroptera, Plecoptera and Trichoptera taxa
FY	Fiscal Year
GIS	Geographical Information System
HSA	Hydrologic Sub-Area
HU	Hydrologic Unit
IAH	High Priority Inland Aquatic Habitat
IBI	Southern California Index of Biological Integrity
IC/ID	Illegal Connection/Illicit Discharge
ID	Identification
IDDE	Illicit Discharge Detection and Elimination
JRMP	Jurisdictional Runoff Management Plan
LCS	Laboratory Control Sample
LESJWA	Lake Elsinore/San Jacinto Watershed Agency
LID	Low Impact Development

MDL	Method Detection Limit
ML	State Board Minimum Level
MLS	Mass Loading Station
MRP	Monitoring and Reporting Program
MS4	Municipal Separate Storm Sewer System
NAL	Non-Stormwater Action Level
NPDES	National Pollutant Discharge Elimination System
NWS	National Weather Service
Permittees	County of Riverside, the incorporated Cities, and Riverside County Flood Control and Water Conservation District
pH	
PHab	Physical habitat assessment
PoP	Probability of Precipitation
QAMP	Quality Assurance Management Plan
QAPP	Quality Assurance Project Plan
QC	Quality Control
QPS	Quantitative Precipitation Statement
RL	Reporting Limits
RWB	Reachwide Benthos
SAL	Stormwater Action Level
San Diego Water Board	San Diego Regional Water Quality Control Board
SAR	Santa Ana Region
SCCWRP	Southern California Watershed Research Project
SMC	Southern California Stormwater Monitoring Coalition
SMR	Santa Margarita Region
SOP	Standard Operating Procedure
SRM	Standard Reference Materials
State Board MLs	State Board Minimum Level RLs
SWAMP	Surface Water Ambient Monitoring Program
SWQTF	Stormwater Quality Standards Task Force
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
Triad	Water quality assessment using chemistry, Toxicity, and Bioassessment lines of evidence
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WER	Water Effects Ratio
WQO	Water Quality Objective
WWR	Whitewate River Region

3. DISTRIBUTION LIST OF APPROVED QAPP

Table 3-1: Approved QAPP Distribution List

Title:	Name (Affiliation)	No. of Copies
San Diego Regional Water Quality Control Board Executive Officer	David W. Gibson	1
Santa Ana Regional Water Quality Control Board Executive Officer	Kurt V. Berchtold	1
Colorado River Regional Water Quality Control Board Executive Officer	Robert E. Perdue	1
Chief of Watershed Protection Division	Jason E. Uhley	1
NPDES Program Manager QA Manager	David H. Garcia	1
District Program Manager	Robert Collacott (*Interim)*	1
Consultant Project Managers	Project Manager	1 (each)

4. PROJECT/TASK ORGANIZATION

4.1 Involved Parties and Roles

The Riverside County Flood Control and Water Conservation District (District) serves as the Principal Permittee for Santa Ana Regional Water Quality Control Board (Santa Ana Regional Board) Order Number R8-2010-0033 and San Diego Regional Water Quality Control Board (San Diego Regional Board) Order Number R9-2010-0016, and serves as a Co-Principal Permittee with the County of Riverside for Colorado River Regional Water Quality Control Board (Colorado River Regional Board) Order Number R7-2008-001. Table 4-1 provides a list of the three applicable Municipal Separate Storm Sewer System (MS4) permits issued by the respective Regional Boards and the designated Permittees, including the County of Riverside, the incorporated Cities, and the Riverside County Flood Control and Water Conservation District. As Principal Permittee, the District is responsible for administering the required monitoring programs, including processing contracts and service agreements for laboratory, consulting and interagency services in accordance with the MS4 permit requirements. Under past and current rounds of MS4 permits, the District has also been responsible for collecting samples required under the MS4 permits, ensuring that the samples are analyzed at a certified laboratory and analyzing the resulting data. Co-Permittees may also conduct monitoring activities, such as water quality sampling and field reconnaissance, either under the umbrella of the Consolidated Monitoring Program (CMP) or due to MS4 permit-specific monitoring requirements.

Table 4-1 List of NPDES Permits and Permittees

Permit	Principal Permittee	Copermittees
Colorado River Regional Board Order No. R7-2008-001 NPDES Permit No. CAS617002	County of Riverside Riverside County Flood Control and Water Conservation District	Coachella Valley Water District City of Banning City of Cathedral City City of Coachella City of Desert Hot Springs City of Indian Wells City of Indio City of La Quinta City of Palm Desert City of Palm Springs City of Rancho Mirage

Table 4-1 List of NPDES Permits and Permittees (continued)

Permit	Principal Permittee	Co-Permittees
Santa Ana Regional Board Order No. R8-2010-0033 NPDES Permit No. CAS618033	Riverside County Flood Control and Water Conservation District	City of Beaumont City of Moreno Valley City of Calimesa City of Murrieta[1] City of Canyon Lake City of Norco City of Corona City of Perris County of Riverside City of Riverside City of Hemet City of San Jacinto City of Lake Elsinore City of Wildomar[1] City of Menifee[2] City of Eastvale City of Jurupa Valley
San Diego Regional Board Order No. R9-2010-0016 NPDES Permit No. CAS0108766	Riverside County Flood Control and Water Conservation District	City of Murrieta[1] County of Riverside City of Temecula City of Wildomar[1] City of Menifee[2]

[1] The Cities of Murrieta and Wildomar are solely regulated by the San Diego Regional Board.
[2] The City of Menifee is solely regulated by the Santa Ana Regional Board.

Robert Collacott is the Monitoring Program Manager and has the responsibility for the following:

- Oversight of all Monitoring Program work items, coordinating participating entities and collection of data, reviewing project data and reporting the monitoring results per MS4 permit requirements.
- Oversight of field data collection and compliance with monitoring procedures in this Quality Assurance Project Plan (QAPP).
- Compilation of all monitoring data and developing the Annual Monitoring Reports. Submitting the Annual Monitoring Reports to the Watershed Coordinators for inclusion in the comprehensive Annual Report and timely submittal to the respective Regional Boards.
- Oversight and coordination of Monitoring and Laboratory Consultants and their respective Projects.

David Garcia is designated as the District's Quality Assurance (QA) Manager for this program. As such, he is responsible for CEQA compliance and QA/QC management of data collected under the CMP.

The Annual Monitoring Reports will be provided to the MS4 Permit Manager responsible for Annual Report submissions to the Regional Boards. Eric Lomeli is the MS4 Permit Manager for the Santa Margarita Region (SMR) and is responsible for submitting the SMR Annual Report to the San Diego Regional Board. Steven Horn is the MS4 Permit Manager for the Santa Ana Region (SAR) and is responsible for submitting the SAR Annual Report to the Santa Ana Regional Board. Scott Bruckner is the MS4 Permit Manager for the Whitewater River Region WWR and is responsible for submitting the WWR Annual Report to the Colorado River Regional Board.

Steve Clark is the Hydstra Data Manager for the District and is responsible for maintaining an accurate and complete data set in the District's Hydstra database. Penny Nanney manages the NPDES Section's Water Quality Data Management and Quality Control; she is responsible for quality control and assurance of all incoming data as well as the generation of data deliverables in a SWAMP compatible format.

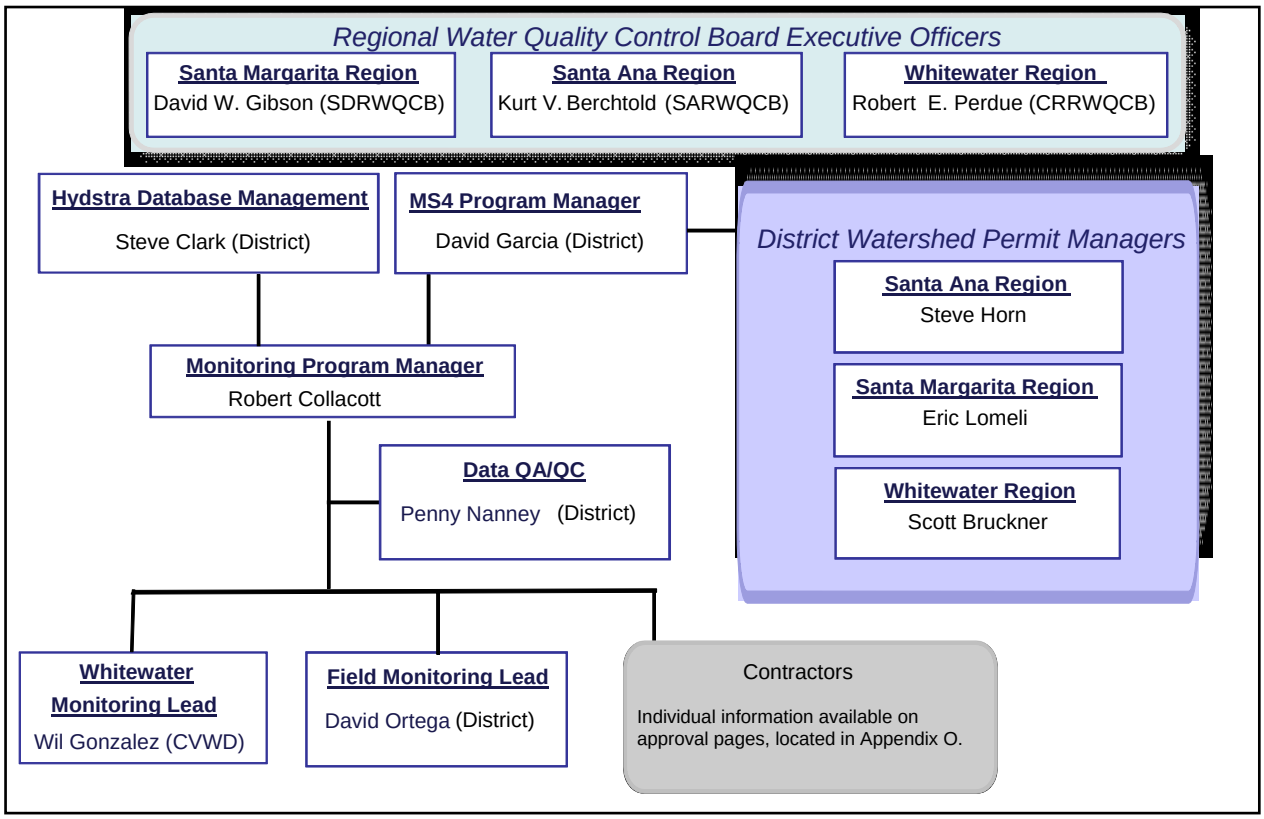
Consultant roles and responsibilities are available on the consultant approval pages located in Appendix O.

Table 4-2: Program Personnel – Contact Information

Name	Organizational Affiliation	Title	Contact Information
David W. Gibson	San Diego Regional Board	Executive Officer	9174 Sky Park Court, Suite 100 San Diego, CA 92123-4340 Ph: 858.467.2952 (main) E-mail: dgibson@waterboards.ca.gov
Kurt V. Berchtold	Santa Ana Regional Board	Executive Officer	3737 Main Street, Suite 500 Riverside, CA 92501-3348 Ph: 951.782.4130 (main) E-mail: kberchtold@waterboards.ca.gov
Robert E. Perdue	Colorado River Regional Board	Executive Officer	73-720 Fred Waring Drive, Suite 100 Palm Desert, CA 92260 Ph: 760.346.7491 (main) E-mail: rperdue@waterboards.ca.gov
Jason Uhley	District	Chief of Watershed Protection Division	Ph: 951.955.1273 E-mail: juhley@rcflood.org
David Garcia	District	MS4 Program Manager QA Officer	Ph: .951.955.1330 Email: dhgarcia@rcflood.org
Robert Collacott	District	Monitoring Program Manager	Ph: 951.955.2901 E-mail: rdcollacott@rcflood.org
Penny Nanney	District	Data QA/QC	Ph: 951.955.1325 E-Mail: pnanney@rcflood.org
David Ortega	District	Field Monitoring and IC/ID	Ph. 951.955.4390 E-mail: djortega@rcflood.org
Steve Bigley	Coachella Valley Water District	Monitoring Program Manager	Ph: 760.398.2651 E-mail: sbigley@cvwd.org

Consultant roles and responsibilities are available on the consultant approval pages, located in Appendix O.

Figure 4-1: Project Organizational Chart



4.2 Quality Assurance Officer Role

David Garcia is the District's Monitoring Program Quality Assurance (QA) Manager. The QA Manager's role is to establish the quality assurance and quality control procedures in this QAPP as part of the overall project, and to review and assess all procedures during the project against QAPP requirements. The District's QA Manager, through the Monitoring Program Manager, will work closely with the consultants and laboratories to implement this project in compliance with the requirements of the QAPP. The District's QA Manager, through the Monitoring Program Manager, may stop any actions, including those conducted by any laboratory or consultant, if there are significant deviations from required practices or if there is evidence of a systematic failure.

4.3 Persons Responsible for QAPP Update and Maintenance

The District's Monitoring Program Manager and QA Manager are responsible for maintaining this QAPP. Changes and updates to this QAPP may be made by the District's Program Manager and QA Manager. The Program Manager will be responsible for making the changes and making sure these updates are provided to each of the participating agencies.

5. PROBLEM DEFINITION/BACKGROUND

5.1 Problem Statement

According to the MS4 Permits for the SMR, SAR and WWR, the discharge of Pollutants and/or increased flows from MS4s may threaten or impair Beneficial Uses or adversely affect human health. A number of Receiving Water bodies within the Permittees collective jurisdictional boundaries are listed as impaired on the Clean Water Act 40 CFR Section 303(d) list. Table 5-1 provides a summary of the 2010 303(d) listings by watershed and Receiving Water. The Permittees developed a Consolidated Program for Water Quality Monitoring (CMP) within their collective jurisdictional boundaries to meet the requirements of the MS4 permits and manage the quality of Urban Runoff. The CMP has been implemented by the Permittees since 1994. The CMP is designed to characterize the potential sources and nature of discharges from urban land uses in order to develop effective management measures to protect the Receiving Water bodies.

Table 5-1 2010 303(d) List

2010 303(d) List		
Watershed	**Receiving Water body**	**Impairing Pollutants**
Santa Margarita Region (SMR) (by sub-area)		
De Luz (HSA 902.21)	De Luz Creek	Iron Manganese Nitrogen Sulfates
Gavilan (HSA 902.22)	Sandia Creek	Iron Sulfates
	Santa Margarita River (Upper)	Toxicity
Murrieta (HSA 902.32)	Long Canyon	Chlorpyrifos *E.coli* Fecal Coliform Iron Manganese
French (HSA 902.33)	Warm Springs Creek	Chlorpyrifos *E.coli* Fecal Coliform Iron Manganese Phosphorus Total Nitrogen as N
Gertrudis (HSA 902.42)	Santa Gertrudis Creek	Chlorpyrifos Copper *E.coli* Fecal Coliform Iron Manganese Phosphorus

Table 5-1 2010 303(d) List (continued)

2010 303(d) List		
Watershed	**Receiving Water body**	**Impairing Pollutants**
Santa Margarita Region (SMR) (by sub-area)		
Pauba (HSA 902.51)	Temecula Creek	Chlorpyrifos Copper Phosphorus TDS Toxicity
	Redhawk Channel	Chlorpyrifos Copper Diazinon *E.coli* Fecal Coliform Iron Manganese Nitrogen Phosphorus TDS
Wolf (HSA 902.52)	Murrieta Creek	Chlorpyrifos Copper Iron Manganese Phosphorus Nitrogen Toxicity
Santa Ana Region (SAR)		
Middle Santa Ana River HA Split 801.20	Santa Ana River, Reach 3	Bacterial Indicators Copper (wet only)
	Santa Ana River, Reach 4	Pathogens
Perris Valley HA 802.10	Canyon Lake	Bacterial Indicators Nutrients
Elsinore Valley HA 802.30	Lake Elsinore	Nutrients Orgranic Enrichment/Low DO PCBs Sediment Toxicity Unknown Toxicity
Gilman Hot Springs HSA 802.21	Lake Fulmor	Pathogens
Whitewater Region (WWR)		
Coachella HA 719.40	Coachella Valley Storm Water Channel	DDT Dieldrin Pathogens PCBs Toxaphene

This table will be revised to reflect updates to the 303(d) List.

5.2 Decisions or Outcomes

The CMP is designed to assess the condition of the Receiving Waters, monitor Pollutants in storm and non-stormwater effluent from the MS4, and conduct Special Studies to address Conditions of Concern. The CMP is intended to meet the following goals:

1. Assess compliance with Order Nos. R7-2008-0001, R8-2010-0033, and R9-2010-0016;
2. Measure and improve the effectiveness of the Permittees' runoff management programs;
3. Assess the chemical, physical, and biological impacts to Receiving Waters resulting from MS4 discharges;
4. Characterize stormwater discharges;
5. Identify sources of specific Pollutants;
6. Prioritize drainage and sub-drainage areas that need management actions;
7. Detect and eliminate IC/IDs to the MS4;
8. Assess the overall health of Receiving Waters; and
9. Provide information to implement required BMP improvements.

The goal of the MS4 Urban Runoff program is to manage the quality of Urban Runoff to prevent impacts to Receiving Waters within the Permittees' collective jurisdictions. The CMP approach is driven by the following 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?
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 the Receiving Water problem(s)?
5. Are conditions in the Receiving Water getting better or worse?

This information will be provided to the Regional Boards in the Permittee's Monitoring Annual Reports. The Permittees participate in the Regional Watershed Monitoring Program which aims to address the following questions:

- What is the condition of streams in Southern California?
- What are the major stressors to aquatic life?
- Are conditions in locations of special interest getting better or worse?

The goal of this QAPP is to:

- Identify roles and responsibilities.
- Outline the monitoring programs implemented as part of the CMP in accordance with MS4 permit requirements.
- Standardize the methods and procedures used by multiple entities implementing the CMP activities.
- Define quality assurance and control standards to generate data of consistent and known quality.
- Schedule the timeline for program implementation and deliverables to facilitate timely submittals.

5.3 Water Quality or Regulatory Criteria

Water quality or regulatory criteria will be used to initiate source investigations, further assessment of related Pollutants-of-Concern, and possible management strategies. These objectives will vary by Region, therefore, the numerical and narrative Water Quality Objectives WQOs) are provided in the SMR, SAR and WWR Monitoring Plans (Volumes III, IV and V, respectively).

6. PROJECT/TASK DESCRIPTION

6.1 Work Statement and Produced Products

As provided in the MS4 Permit MRPs, the monitoring programs include monitoring of Receiving Waters, MS4 discharge monitoring, and Illicit Connection/Illegal Discharge (IC/ID) monitoring, and various watershed-specific special studies. Additionally, all regions will continue to participate in regional monitoring programs such as Southern California Monitoring Coalition (SMC), the California Stormwater Quality Association (CASQA), and/or other regional groups or efforts.

Santa Margarita Region

The SMR monitoring programs include:

Receiving Water Monitoring
- Mass Loading Station (MLS) Monitoring
- Stream Assessments
- Follow up Approach and Actions

MS4 Outfall Monitoring
- MS4 Discharge Monitoring
- Non-Stormwater Discharge and IDDE Monitoring
- Source Investigations

High Priority Inland Aquatic Habitat Monitoring
- Outfall and Receiving Water Monitoring
- Source Identification Monitoring

SMR monitoring also requires the following special studies:

- Sediment toxicity study
- Trash and litter investigation
- Agricultural, federal and tribal input study
- MS4 and Receiving Water maintenance study*
- Intermittent and ephemeral stream perennial conversion study*
- Stormwater Monitoring Coalition (SMC) Regional Monitoring of Southern California Coastal Watersheds

* These special studies required under the SMR MRP have been deleted in lieu of submittal of a "Low Impact Development Retention Impacts Study" as authorized by the Regional Board[1].

Santa Ana Region

The SAR monitoring program includes:

Receiving Water Monitoring:
- Receiving Water Monitoring
- Water Column Toxicity
- Stream Assessments/Bioassessments
- Toxicity Identification Evaluation (TIE)/Toxicity Reduction Evaluation (TRE)

MS4/Outfall Monitoring
- Mass Emission Station Monitoring

[1] Smith, James G., Letter to Jason Uhley, Riverside County Flood Control and Water Conservation District Re: Modification of Special Study Requirements in Attachment E of Order No. R9-2010-0016, September 14, 2012.

- Illegal Connection/Illicity Discharge (IC/ID) Monitoring

Special Studies

- Middle Santa Ana River Bacterial Indicator TMDL Monitoring
- Lake Elsinore Nutrient Monitoring
- Hydromodification
- Low Impact Development (LID) BMP Monitoring

Whitewater Region

The WWR monitoring program includes:

- Receiving Water Monitoring
- Outfall Monitoring

6.2 Constituents to Be Monitored and Measurement Techniques

Samples will be analyzed for conventional constituents, nutrients, metals, petroleum products, pesticides, organics and volatile organic compounds. Table 6-1 provides a master list of in-situ field parameters and associated units inclusive of all MS4 permits and monitoring programs. A master constituent list is provided in Table 6-2 providing constituents, target Reporting Limits (RL) and analytical method requirements inclusive of all three MS4 permits and monitoring programs. The District selected the most conservative RLs to meet or exceed the requirements of all the MS4 permits and to apply to all monitoring programs covered by this CMP. The MS4 permit-specific monitoring plans provided in Volumes II, III, and IV contain constituent lists tailored to each permit and monitoring program requirements. Inclusion of constituents in this master list does not imply that all constituents be analyzed in any given program; the master list includes all constituents that have the potential to be analyzed.

Project RLs have been set to reflect project-specific objectives, and are based on analytical methods, method detection limit (MDLs), or expected levels of target analytes, in accordance with the Surface Water Ambient Monitoring Program (SWAMP) (SWAMP, 2008). Per the SWAMP QAPP (SWAMP, 2008), if a project's RLs exceed those presented in Appendix C of the SWAMP QAPP there is no need to obtain a waiver.

SWAMP was developed to document ambient water quality conditions in surface waters and was not developed to monitor effluents or discharges covered under the MS4 permits and waste discharge requirements (SWAMP, 2008). SWAMP RLs are most applicable to the Dry Weather monitoring programs conducted in Receiving Water bodies within the Regions. The Storm Event data and MS4 data are expected to have a different range of target analytes than Dry Weather in Receiving Water. RLs in this table represent the State Board Minimum Level (ML) RLs, which are required under the MRP for constituents listed as Priority Pollutants in the California Toxics Rule (CTR), and SWAMP recommended RLs. For this program, State Board MLs only apply to metals. 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 6-1: Master List of In-situ Field Parameters

Hydstra	Parameter[(a)]	Units	Method
1435	Conductivity	µS/cm	Field Meter/SM 4500-O
1710	Dissolved Oxygen	mg/L	Field Meter/SM 4500 H+B
1205	pH	pH units	Field Meter/SM2510 B
1655	Temperature	°Celsius	Field Meter/SM2550 B
810	Turbidity	NTU	Field Meter/SM2130B

In-situ field parameters will be measured using a hand held meter. However, in the case of instrument malfunction, field crews may request the laboratory to analyze selected constituents using the methods listed.

Table 6-2: Master List of Analytical Constituents

Hydstra No.	Constituent	Units	Method	State Board ML	SWAMP Target RL
	Field Parameters				
1435	Dissolved Oxygen, field	mg/l	Field Meter/SM 4500-O	None	None
1710	pH, field	pH units	Field Meter/SM 4500 H+B	None	None
1205	Specific Conductance, field	µmhos/cm	Field Meter/SM 2510 B	None	None
1655	Temperature, field	°Celsius	Field Meter/SM 2550 B	None	None
1690	Turbidity, field	NTU	Field Meter/SM 2130B	None	None
	Conventionals, Nutrients, and Hydrocarbons				
1051	Ammonia as Nitrogen	mg/L	SM 4500 NH3	None	0.1
1425	Biological Oxygen Demand (5 day)	mg/L	EPA 405.1 / SM 5210 B	None	2.0
1430	Chemical Oxygen Demand	mg/L	EPA 410.1-.4 / SM 5220	None	5.0
1195	Color	Units	SM 2120 B	None	None
1490	Phosphorus, Dissolved	mg/L	EPA 365.2 / SM 4500 P B E	0.1	None
1154	Dissolved Organic Carbon	mg/L	EPA 415.1 / SM 5310 B	0.6	
	Fluorescence	TBD	TBD	None	None
1255	Fluoride	mg/L	TBD	None	None
1225	Detergents - Methylene Blue Actives (MBAS)	mg/L	SM 5540 C	None	None
1325	Nitrate, as N	mg/L	EPA 300.0	None	0.01
1330	Nitrite, as N	mg/L	EPA 300.0 / SM 4500 NO2 B	None	0.1
1355	Nitrogen, Total	mg/L	Calculation	None	None
1365	Nitrogen, Total Inorganic	mg/L	Calculation	None	None

Table 6-2: Master List of Analytical Constituents (continued)

Hydstra No.	Constituent	Units	Method	State Board ML	SWAMP Target RL
1360	Nitrogen, Total Kjeldahl (as N)	mg/L	EPA 351.2	None	0.5
1380	Oil and Grease	mg/L	EPA 1664 A	None	1.4
1480	Ortho Phosphorus	mg/L	SM 4500 P E	0.1	
1640	Sulfate	mg/L	EPA 300.0A / SM 54500-SO4 E	1.0	
1625	Total Dissolved Solids	mg/L	SM 2540 C / EPA 160.1	1.0	
1155	Total Organic Carbon	mg/L	SM 5310 B	None	0.6
1265	Total Hardness (as $CaCO_3$)	mg/L	EPA 200.7 / SM 3120 B	None	1
1485	Total Phosphorus	mg/L	SM 4500-P B E	None	0.05
1500	Total Potassium	mg/L	EPA 200.7	None	None
	Total Residual Chlorine	mg/L	SM 4500 Cl G	None	None
1630	Total Suspended Solids	mg/L	SM 2540 D / EPA 160.2	None	0.5
1270	Total Petroleum Hydrocarbons (TPH)	mg/L	EPA 8015M	None	None
	Metals (Total and Dissolved)				
1065	Antimony	µg/L	EPA 200.8	0.5	None
1070	Arsenic	µg/L	EPA 1632	2.0	0.3
1090	Barium	µg/L	EPA 200.8	None	None
1120	Beryllium	µg/L	EPA 200.8	0.5	None
1135	Boron	µg/L	EPA 200.7/200.8	None	0.01
1145	Cadmium	µg/L	EPA 200.8	0.25	0.01
1185	Chromium, Hexavalent	µg/L	EPA 200.8	0.25	
1180	Chromium, Total	µg/L	EPA 200.8	None	0.1
1186	Chromium, Trivalent	µg/L	EPA 200.8	0.25	
1210	Copper	µg/L	EPA 200.8	0.5	0.01
1285	Iron	µg/L	EPA 200.8	50	
1290	Lead	µg/L	EPA 200.8	0.5	0.01
1305	Manganese	µg/L	EPA 200.8	1.0	
1310	Mercury	µg/L	EPA 200.8	None	0.2
1320	Nickel	µg/L	EPA 200.8	1.0	0.02
1520	Selenium	µg/L	EPA 200.8	2.0	0.3
1535	Silver	µg/L	EPA 200.8	0.25	0.02
1665	Thallium	µg/L	EPA 200.8	1.0	None
1700	Zinc	µg/L	EPA 200.8	1.0	0.1

Table 6-2: Master List of Analytical Constituents (continued)

Hydstra No.	Constituent	Units	Method	State Board ML	SWAMP Target RL
	Microbiology				
1077	*Escherichia coli*	MPN/100mL	SM 9223 B	None	2
1087	*Enterococcus*	colonies/100 mL	SM 9230C/EPA 1600	None	1
1075	Fecal Coliform	MPN/100mL	SM 9221 E	None	2
1080	Fecal Streptococci	MPN/100mL	SM 9230B	None	None
1085	Total Coliform	MPN/100mL	SM 9221 B	None	2
	Acid & Base/Neutral Compounds				
2025	1,2,4 Trichlorobenzene	µg/L	EPA 625	10	None
2050	1,2-Diphenylhydrazine	µg/L	EPA 8270C	1	None
2030	1,2-Dichlorobenzene	µg/L	EPA 624	2	0.08
2055	1,3-Dichlorobenzene	µg/L	EPA 624	2	0.08
2060	1,4-Dichlorobenzene	µg/L	EPA 624	2	0.08
2070	2,4,6-Trichlorophenol	µg/L	EPA 625	10	10
2075	2,4-Dichlorophenol	µg/L	EPA 625	5	10
2080	2,4-Dimethylphenol	µg/L	EPA 625	2	10
2085	2,4-Dinitrophenol	µg/L	EPA 625	5	10
2090	2,4-Dinitrotoluene	µg/L	EPA 625	5	None
2100	2,6-Dinitrotoluene	µg/L	EPA 625	5	None
2110	2-Chloronaphthalene	µg/L	EPA 625	10	10
2115	2-Chlorophenol	µg/L	EPA 625	5	10
2120	2-Methyl-4,6-Dinitrophenol	µg/L	EPA 625	5	10
2125	2-Nitrophenol	µg/L	EPA 625	10	10
2130	3,3'-Dichlorobenzidine	µg/L	EPA 625	5	None
2155	3-Methyl-4-Chlorophenol	µg/L	EPA 625	None	10
2150	4-Bromophenyl Phenyl Ether	µg/L	EPA 625	5	None
2160	4-Chlorophenyl Phenyl Ether	µg/L	EPA 625	5	10
2165	4-Nitrophenol	µg/L	EPA 625	10	10
1005	Acenaphthene	µg/L	EPA 8270 SIM	1	10
1010	Acenaphthylene	µg/L	EPA 8270 SIM	10	10
1060	Anthracene	µg/L	EPA 8270 SIM	10	10
1093	Benzidine	µg/L	EPA 625	5	None
1095	Benzo(a)Anthracene	µg/L	EPA 8270 SIM	0.05	None
1096	Benzo(a)Pyrene	µg/L	EPA 8270 SIM	0.05	None
1097	Benzo(b)Fluoranthene	µg/L	EPA 8270 SIM	0.05	None

Table 6-2: Master List of Analytical Constituents (continued)

Hydstra No.	Constituent	Units	Method	State Board ML	SWAMP Target RL
	Acid & Base/Neutral Compounds				
1098	Benzo(ghi)Perylene	µg/L	EPA 8270 SIM	0.05	None
1099	Benzo(k)Fluoranthene	µg/L	EPA 8270 SIM	0.05	None
1127	Bis(2-Chloroethoxy)Methane	µg/L	EPA 625	5	10
1128	Bis(2-Chloroethyl)Ether	µg/L	EPA 625	1	10
1129	Bis(2-Chloroisopropyl)Ether	µg/L	EPA 625	2	None
1131	Bis(2-Ethylhexyl)Phthalate	µg/L	EPA 625	5 or 10	None
1101	Butylbenzyl Phthalate	µg/L	EPA 625	10	None
1190	Chrysene	µg/L	EPA 8270 SIM	10	10
1230	Dibenzo(a,h)Anthracene	µg/L	EPA 8270 SIM	10	None
1234	Diethyl Phthalate	µg/L	EPA 8270 SIM	2	10
1236	Dimethyl Phthalate	µg/L	EPA 8270 SIM	2	10
2255	Di-n-Butyl Phthalate	µg/L	EPA 8270 SIM	10	10
2260	Di-n-Octyl Phthalate	µg/L	EPA 8270 SIM	10	None
1245	Fluoranthene	µg/L	EPA 8270 SIM	1	10
1250	Fluorene	µg/L	EPA 8270 SIM	10	10
2315	Hexachlorobenzene	µg/L	EPA 8260B	1	None
2320	Hexachlorobutadiene	µg/L	EPA 625	1	None
2325	Hexachlorocyclopentadiene	µg/L	EPA 625	5	10
2330	Hexachloroethane	µg/L	EPA 625	1	10
2335	Indeno(1,2,3-cd)Pyrene	µg/L	EPA 8270 SIM	10	None
2340	Isophorone	µg/L	EPA 8270 SIM	1	None
1315	Naphthalene	µg/L	EPA 8270 SIM	1	None
1331	Nitrobenzene	µg/L	EPA 625	1	None
2355	N-Nitrosodimethylamine	µg/L	EPA 625	5	None
2350	N-Nitrosodi-n-Propylamine	µg/L	EPA 625	5	None
2360	N-Nitrosodiphenylamine	µg/L	EPA 625	1	None
1447	Pentachlorophenol	µg/L	EPA 625	5	None
1455	Phenanthrene	µg/L	EPA 8270 SIM	5	10
1459	Phenol	µg/L	EPA 625	1	10
1505	Pyrene	µg/L	EPA 8270 SIM	10	10

Table 6-2: Master List of Analytical Constituents (continued)

Hydstra No.	Constituent	Units	Method	State Board ML	SWAMP Target RL
	Pesticides and PCBs				
1073	Aspon	µg/L	EPA 8141A	None	0.05
1074	Atrazine	µg/L	EPA 8141A	None	None
1068	Azinphos-ethyl	µg/L	EPA 8141A	None	0.05
1069	Azinphos-methyl	µg/L	EPA 8141A	None	0.05
1153	Carbophenothion	µg/L	EPA 8141A	None	0.05
1163	Chlorfenvinphos	µg/L	EPA 8141A	None	0.05
1178	Chlorpyrifos	µg/L	EPA 8141A	None	0.02
1179	Chlorpyrifos methyl	µg/L	EPA 8141A	None	0.05
1214	Ciodrin (Crotoxyphos)	µg/L	EPA 8141A	None	0.05
1213	Coumaphos	µg/L	EPA 8141A	None	0.05
1218	Demeton-O	µg/L	EPA 8141B	None	None
1219	Demeton-S	µg/L	EPA 8141A	None	0.02
1227	Diazinon	µg/L	EPA 8141A	None	0.05
1314	Dibrom (Naled)	µg/L	EPA 8141A	None	0.05
1229	Dichlofenthion	µg/L	EPA 8141A	None	0.05
1239	Dichlorvos	µg/L	EPA 8141A	None	0.05
1226	Dicrotophos	µg/L	EPA 8141A	None	0.05
1221	Dimethoate	µg/L	EPA 8141A	None	0.05
1223	Dioxathion	µg/L	EPA 8141A	None	0.05
1224	Disulfoton	µg/L	EPA 8141A	None	0.05
1241	EPN	µg/L	EPA 8141A	None	0.05
1242	Ethion	µg/L	EPA 8141A	None	0.05
1244	Ethyl Parathion	µg/L	EPA 8141A	None	0.05
1246	Famphur	µg/L	EPA 8141A	None	0.05
1516	Fenchlorophos (Ronnel)	µg/L	EPA 8141A	None	0.05
1247	Fenitrothion	µg/L	EPA 8141A	None	0.05
1248	Fensulfothion	µg/L	EPA 8141A	None	0.05
1249	Fenthion (Mercaptophos)	µg/L	EPA 8141A	None	0.05
1256	Fonophos (Dyfonate)	µg/L	EPA 8141A	None	0.05
1069	Guthion (Azinphos methyl)	µg/L	EPA 8141A	None	0.05
1291	Leptophos	µg/L	EPA 8141A	None	0.05
1301	Malathion	µg/L	EPA 8141A	None	0.05
1302	Merphos	µg/L	EPA 8141A	None	0.05
1304	Mevinphos	µg/L	EPA 8141A	None	0.05

Table 6-2: Master List of Analytical Constituents (continued)

Hydstra No.	Constituent	Units	Method	State Board ML	SWAMP Target RL
	Pesticides and PCBs				
1303	Methyl Parathion	µg/L	EPA 8141A	None	0.05
1309	Monocroptophos	µg/L	EPA 8141A	None	0.05
1461	Phorate	µg/L	EPA 8141A	None	0.05
1463	Phosmet	µg/L	EPA 8141A	None	0.05
1464	Phosphamidon	µg/L	EPA 8141A	None	0.05
1243	Prophos (Ethoprop)	µg/L	EPA 8141A	None	0.05
1536	Simanzine	µg/L	EPA 8141A	None	0.05
1651	Sulfotepp	µg/L	EPA 8141A	None	0.05
1132	Sulprofos (Bolstar)	µg/L	EPA 8141A	None	0.05
1662	TEPP	µg/L	EPA 8141A	None	0.05
1663	Terbufos	µg/L	EPA 8141A	None	0.05
1633	Tetrachlorvinphos (Stirifos)	µg/L	EPA 8141A	None	0.05
1672	Thionzin (Thionazin)	µg/L	EPA 8141A	None	0.05
1673	Tokuthion	µg/L	EPA 8141A	None	0.05
1687	Trichlorfon	µg/L	EPA 8141A	None	0.05
1688	Trichloronate	µg/L	EPA 8141A	None	0.05
2135	4,4'-DDD	µg/L	EPA 8081A	0.05	0.002
2140	4,4'-DDE	µg/L	EPA 8081A	0.05	0.002
2145	4,4'-DDT	µg/L	EPA 8081A	0.01	0.005
1013	Aldrin	µg/L	EPA 8081A	0.005	0.002
2170	alpha-BHC	µg/L	EPA 8081A	0.01	None
2270	alpha-Endosulfan	µg/L	EPA 8081A	0.02	None
2210	beta-BHC	µg/L	EPA 8081A	0.005	None
2265	beta-Endosulfan	µg/L	EPA 8081A	0.01	None
	Carbamates	µg/L	EPA 531.1/EPA 632.1,/EPA 8318	TBD	
2215	Chlordane	µg/L	EPA 8081A	0.1	0.002
1174	Chlorpyrifos	µg/L	EPA 8141A	0.5	
2250	delta-BHC	µg/L	EPA 8081A	0.005	None
1715	Diazinon	µg/L	EPA 8141A	0.5	
1233	Dieldrin	µg/L	EPA 8081A	0.01	0.002
2275	Endosulfan Sulfate	µg/L	EPA 8081A	0.05	0.002
2285	Endrin	µg/L	EPA 8081A	0.01	0.002
2280	Endrin Aldehyde	µg/L	EPA 8081A	0.01	0.005
2380	gamma-BHC (lindane)	µg/L	EPA 8081A	0.02	None

Table 6-2: Master List of Analytical Constituents (continued)

Hydstra No.	Constituent	Units	Method	State Board ML	SWAMP Target RL
	Pesticides and PCBs				
2310	Heptachlor	µg/L	EPA 8081A	0.01	0.002
2305	Heptachlor Epoxide	µg/L	EPA 8081A	0.01	0.002
1301	Malathion	µg/L	EPA 8141A	0.5	
1681	Toxaphene	µg/L	EPA 8081A	0.5	None
	Polychlorinated Biphenyls (PCBs)				
2175	Aroclor-1016	µg/L	EPA 8082	0.5	None
2180	Aroclor -1221	µg/L	EPA 8082	0.5	None
2185	Aroclor -1232	µg/L	EPA 8082	0.5	None
2190	Aroclor -1242	µg/L	EPA 8082	0.5	None
2195	Aroclor -1248	µg/L	EPA 8082	0.5	2.5
2200	Aroclor -1254	µg/L	EPA 8082	0.5	1
2205	Aroclor -1260	µg/L	EPA 8082	0.5	1
	Pyrethroids				
2410	Allethrin	ng/L	EPA 8270 C by GC-MS-SIM	None	None
2412	Bifenthrin	ng/L	EPA 8270 C by GC-MS-SIM	None	None
2414	Cyfluthrin	ng/L	EPA 8270 C by GC-MS-SIM	None	None
2416	Cypermethrin	ng/L	EPA 8270 C by GC-MS-SIM	None	None
2418	Danitol	ng/L	EPA 8270 C by GC-MS-SIM	None	None
2420	Deltamethrin	ng/L	EPA 8270 C by GC-MS-SIM	None	None
2422	Esfenvalerate	ng/L	EPA 8270 C by GC-MS-SIM	None	None
2424	Fenvalerate	ng/L	EPA 8270 C by GC-MS-SIM	None	None
2426	Fluvalinate	ng/L	EPA 8270 C by GC-MS-SIM	None	None
2428	L-cyhalothrin	ng/L	EPA 8270 C by GC-MS-SIM	None	None
2429	Permethrin, -cis	ng/L	EPA 8270 C by GC-MS-SIM	None	None
2431	Permethrin, -trans	ng/L	EPA 8270 C by GC-MS-SIM	None	None
2430	Permethrin, TOTAL	ng/L	EPA 8270 C by GC-MS-SIM	None	None
2432	Phenothrin	ng/L	EPA 8270 C by GC-MS-SIM	None	None
2434	Prallethrin	ng/L	EPA 8270 C by GC-MS-SIM	None	None
2436	Resmethrin	ng/L	EPA 8270 C by GC-MS-SIM	None	None
2438	Tetramethrin	ng/L	EPA 8270 C by GC-MS-SIM	None	None
2440	Deltamethrin: Tralomethrin	ng/L	EPA 8270 C by GC-MS-SIM	None	None
2442	Esfenvalerate: Fenavalarate	ng/L	EPA 8270 C by GC-MS-SIM	None	None

Table 6-2: Master List of Analytical Constituents (continued)

Hydstra No.	Constituent	Units	Method	State Board ML	SWAMP Target RL
	Volatiles				
2000	1,1,1-Trichloroethane	µg/L	EPA 624	2	0.08
2005	1,1,2,2-Tetrachloroethane	µg/L	EPA 624	1	0.08
2010	1,1,2-Trichloroethane	µg/L	EPA 624	2	0.08
2015	1,1-Dichloroethane	µg/L	EPA 624	1	0.08
2020	1,1-Dichloroethylene	µg/L	EPA 624	2	0.08
2040	1,2-Dichloroethane	µg/L	EPA 624	2	0.08
2045	1,2-Dichloropropane	µg/L	EPA 624	1	0.08
1682	1,2-Trans-Dichloroethylene	µg/L	EPA 624	2	0.08
1683	1,3-Dichloropropylene	µg/L	EPA 624	None	None
2105	2-Chloroethylvinyl Ether	µg/L	EPA 624	1	NA
1011	Acrolein	µg/L	EPA 624	5	None
1012	Acrylonitrile	µg/L	EPA 624	2	None
1092	Benzene	µg/L	EPA 624	2	0.08
1142	Bromoform	µg/L	EPA 624	2	0.08
1156	Carbon Tetrachloride	µg/L	EPA 624	2	0.08
2220	Chlorobenzene	µg/L	EPA 624	2	0.08
1231	Chlorodibromomethane	µg/L	EPA 624	2	0.08
2225	Chloroethane	µg/L	EPA 624	2	None
2230	Chloroform	µg/L	EPA 624	2	0.08
1141	Dichlorobromomethane	µg/L	EPA 624	2	0.08
2290	Ethylbenzene	µg/L	EPA 624	2	0.08
1143	Methyl Bromide	µg/L	EPA 624	2	None
2235	Methyl Chloride	µg/L	EPA 624	2	None
1308	Methylene Chloride	µg/L	EPA 624	None	None
1661	Tetrachloroethylene	µg/L	EPA 624	2	0.08
1671	Toluene	µg/L	EPA 624	2	0.08
1684	Trichloroethylene	µg/L	EPA 624	2	0.08
1698	Vinyl Chloride	µg/L	EPA 624	2	None

Table 6-2: Master List of Analytical Constituents (continued)

Hydstra No.	Constituent	Units	Method	State Board ML	SWAMP Target RL
	Other Toxic Pollutants				
1063	Asbestos, total	MFL	EPA 600 R 94 134, 100.2	TBD	None
2064	2,3,7,8-TCDD (Dioxin)	pg/L	EPA 1613 B Modified	TBD	TBD
1215	Cyanide, total	µg/L	SM 4500 CNE	5.0	None
1460	Phenols, total	µg/L	EPA 420.2	None	None
	Toxicity				
2506	*Ceriodaphnia dubia*, acute	% survival	EPA-821-R-02-012	None	None
2505	*Ceriodaphnia dubia*, chronic	% survival	EPA-821-R-02-013	None	None
2401	*Pimephales promelas*, acute	% survival	EPA-821-R-02-012	None	None
	Pimephales promelas, chronic	% survival	EPA-821-R-02-013	None	None
2400	*Hyalella azteca*, acute	% survival	EPA-821-R-02-012	None	None
	Hyalella azteca, chronic	% survival	EPA-821-R-02-013	None	None
2403	*Pseudokirchneriella subcapitata*, chronic	% growth	EPA-821-R-02-013	None	None

6.3 Program Schedule

Table 6-3 presents a schedule for the CMP work plans, monitoring and data deliverables, and reports including completion dates and frequency of submittal. Program deliverables are described in Section 21 of this document and in further detail in the Monitoring Plans provided in Volumes II, III and IV of the CMP.

Table 6-3: Program Schedule Timeline

Submittal	Completion Date	Frequency
Work Plans, QAPP, and MPs		
SMR Plans		
Description of Proposed Monitoring Program	June 1, 2012	One Time
Monitoring Programs for Receiving Waters and MS4 Discharge	June 1, 2012	One Time
Draft Storm Event MS4 Discharge Monitoring Program	June 1, 2012	One Time
Draft High Priority Inland Aquatic Habitat Monitoring	April 1, 2012	One Time
Draft Sediment Toxicity Special Study	April 1, 2012	One Time
Draft Trash and Litter Impairment Special Study	September 1, 2012	One Time
Draft Agricultural, Federal and Tribal Input Study	September 1, 2012	One Time
Draft MS4 and Receiving Water Maintenance Study*	April 1, 2012	One Time
Draft Intermittent and Ephemeral Stream Perennial Conversion Study*	April 1, 2013	One Time
SAR Plans		
Revised CMP	May 29, 2011	One Time
WWR Plans	No requirement	No requirement
Monitoring and Data Deliverables		
Monitoring Deliverables include Post-storm Tech Memos and Post-event Tech Memos	Within 10 days of monitoring activity	Per event
Analytical Laboratory Reports and EDDs	Within 3 weeks of sample receipt (BMI data within 6 weeks of sample receipt)	Per event
Annual Data Deliverable	Submit with Annual Reports	Annual
Reporting		
SMR Reports		
Permittees submit Interim Monitoring Program Annual Report	October 31, 2012	One Time
Receiving Waters and MS4 Discharge Monitoring Annual Reports	Starting October 1, 2013	Annual
SAR Reports		
Triennial Report	February 15	2010, 2013, 2016
Monitoring Annual Report	***SMR*** – October 1 ***SAR*** – November 30 ***WWR*** – January 15	**Annual**

*Deleted in lieu of submittal of a "Low Impact Development Retention Impacts Study" as authorized by the San Diego Regional Board[2].

6.4 Geographical Setting

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, respectively) and MS4 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 the western 40% of Riverside County.

The Santa Margarita River Watershed within the Permittee's jurisdiction is located in the south to southwest portion of the District, and is referred to as the Santa Margarita Region (SMR). The Lower Santa Margarita Watershed, located in the northern portion of San Diego County, including Camp Pendleton, is governed by a separate MS4 Permit and not within the Permittee's jurisdiction. The SMR is the portion of the watershed upstream of the confluence of Murrieta and Temecula Creeks and is located in the south and southwest portions of the District. The SMR encompasses 576 square miles and includes five municipalities within Riverside County. Land uses are predominately non-urban, comprising over 80% of the SMR. As of January 1, 2008, the population of Riverside County was about 2.1 million. About 13% of the population, or 273,000 people, reside in the SMR. Roughly 19% of that population lives in unincorporated areas, with the rest residing in the cities of Menifee, Murrieta, Temecula and Wildomar.

The Santa Ana River Watershed within the Permittee's jurisdiction is located in the northwestern corner of Riverside County, and is referred to as the Santa Ana Region (SAR). The SAR is bounded on the south by the SMR, on the east by the Salton Sea Watershed, on the southwest by Orange County and on the northwest by San Bernardino County. The SAR, including the San Jacinto River sub-watershed, encompasses 1,603 square miles (22 percent of the 7,300 square miles within Riverside County) and includes 12 of the 24 municipalities within Riverside County. About 1,141,100 (64% of the Riverside County population) live within the SAR - approximately 802,500 persons residing within the 15 municipalities and an additional 338,600 persons residing in the unincorporated area. The areas of the most significant recent growth in population in the SAR include the Cities of Corona, Hemet, Riverside and portions of unincorporated Riverside County (e.g., Eastvale area).

The Whitewater River Watershed within the Copermittee's jurisdiction is located in the eastern portion of the District, and is referred to as the Whitewater River Region (WWR). The WWR is bound by the San Gorgonio Pass and extends southeast through the urbanized areas of Coachella Valley to the Salton Sea. The San Jacinto Mountains bound the Coachella Valley in the southwest; the San Gorgonio Mountains, Indio Hills and Mecca Hills bound the Coachella Valley in the northeast. The generally northwest to southeast trending drainage area of the Coachella Valley is part of the Salton Basin, a large low-lying area within the Colorado Desert. The majority of the valley drains to the Whitewater River and its tributaries, which discharge into the northern portion of the Salton Sea. The WWR encompasses 350 square miles and includes 13 municipalities within Riverside County. Land uses are predominately non-urban, comprising over 60% of the watershed and do not fall under the jurisdiction of the District under the 2008 WWR Permit. Urban land uses, such as residential, commercial and industrial, encompass 3.5% of the WWR. As of 2005, the population of the urbanized areas of the WWR was approximately 400,000, with roughly 50,000 of that population residing in unincorporated areas of Riverside County.

[2] Smith, James G., Letter to Jason Uhley, Riverside County Flood Control and Water Conservation District RE: Modification of Special Study Requirements in Attachment E of Order No. R9-2010-0016, September 14, 2012.

6.5 Constraints

There are access, safety and time constraints for site selection and implementation of sampling activities covered under the CMP:

- Special Studies: Special Studies that require separate Quality Assurance Plans will be included in their individual Work Plans and/or as an addendum to this QAPP.
- Monitoring Program Updates: New monitoring programs will require field reconnaissance to identify sample locations representative of the targeted conditions. The QAPP Appendix C will be updated to include the sample locations, GPS coordinates and site description.
- Permission to install equipment from the jurisdiction's Operations and Maintenance Department: Installation of equipment must not interfere with the functional operations of the surrounding facility or activity.
- Coordination with the Department of Fish and Game: If sampling sites are located within a restricted access Department of Fish and Game park or property then the field team must acquire the necessary permit(s) to remove samples from creeks and/or surrounding habitat, to access the property, and to install permanent or semi-permanent equipment.
- Compliance with black-out periods established by the California Department of Fish and Game and/or established periods of sensitivity (i.e., nesting, mating, spawning) of endangered species that have been determined to inhabit sampling areas.
- Coordination with city or private property owners: The Field Monitoring Coordinator will work with the District to contact cities and/or private property owners to make the necessary arrangements to sample.
- Unsafe or hazardous sampling conditions: Safety concerns will be addressed on a site-by-site basis to avoid sampling in unsafe conditions. Due to the hazard of flash flooding in the WWR, sampling will be conducted when there is sufficient sunlight and no sampling will occur when there is a flash flood warning or watch.

7. QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

Field and laboratory data quality objectives have been selected to specify an acceptable range of quantity and quality of data to support the program objectives. The data quality categories are described below. Data quality objectives for this project are presented in Table 7-1. Field data quality objectives are provided in Table 7-2 and analytical data quality objectives are provided in Table 7-3.

Table 7-1: Applicable Data Quality Objectives

Measurement or Analyses Type	Applicable Data Quality Objective
Field Testing, pH, Conductivity, Temperature, Flow	Accuracy, Precision, Completeness
Laboratory Testing, Metals	Accuracy, Precision, Completeness
Laboratory Testing, Conventionals	Accuracy, Precision, Completeness
Laboratory Testing, Nutrients	Accuracy, Precision, Completeness
Laboratory Testing, Petroleum Products	Accuracy, Precision, Completeness
Laboratory Testing, Microbiology	Accuracy, Precision, Completeness
Laboratory Testing, Organics	Accuracy, Precision, Completeness
Laboratory Testing, Toxicity	Accuracy, Precision, Completeness

Accuracy is the closeness or agreement of the test response to the true or reference value. Accuracy will be determined by measuring one or more analytes selected from performance testing samples or standard solutions from sources other than those used for calibration. The accuracy of chemical measurements will be checked by performing tests on standards prior to and/or during sample analysis at the laboratory. The concentration of the standards will be unknown to the analyst until after measurements are determined.

Recovery is the accuracy of an analytical test measured against a known analyte addition to a sample, such as with a matrix spike. Recovery measurements will be determined by laboratory spiking of a replicate sample with a known analyte concentration at two times the original sample concentration when possible. If recoveries are not within the accepted criteria, including the respective laboratory's acceptance criteria, the sample shall be reprocessed for re-analysis.

For this program, accuracy will be measured by method blanks, matrix spikes, standard reference materials and Laboratory Control Samples. For Microbiology, positive and negative controls will be used to assess accuracy.

Precision describes how well repeated measurements agree. Precision measurements will be determined on laboratory replicates. Precision objectives apply to replicate/split samples collected during field sampling and laboratory analysis as part of Quality Control requirements. For this program, precision will be measured by matrix spikes duplicates, laboratory duplicates and field duplicates.

Completeness is the number of analyses generating useable data for each analysis divided by the number of samples collected for that analysis. The method used under this QAPP to determine completeness is a comparison of the number of measurements anticipated to be collected against the number of measurements actually collected that meet their respective data quality objectives. It is expected that 90 percent of all measurements will be taken as anticipated, including accounting for adverse weather conditions, safety concerns and equipment problems.

SWAMP Target RLs, when available, are included to account for method sensitivity in addition to State Board MLs as defined by the Inland Surface Water and Enclosed Bays and Estuaries Policy and levels

able to be obtained by the laboratory. Laboratory RLs may also be utilized when more stringent than those recommended by SWAMP. Specific data quality objectives are presented in Tables 7-2 and 7-3.

Table 7-2: Data Quality Objectives for Field Measurements

Group	Parameter	Unit	Accuracy	Precision	Range	Completeness
Field Parameters	Conductivity	µS/cm	±3%	±1%	0-9.99%	90%
	Dissolved Oxygen	mg/L	±0.2 or ±2% air	0.1 or ±1% air	0-19.99 or 0-199% saturated air	90%
	pH	pH units	±0.1	±0.05	0-14	90%
	Temperature	°Celsius	±1	±0.3	0-55	90%
	Turbidity	NTU	±5	±3	0-800	90%

Note: SWAMP requirement present, recommendations only.

Table 7-3: Data Quality Objectives for Laboratory Analyses

Group	Constituent	Units	Accuracy	Precision (% RPD)	Recovery	Completeness
General Chemistry (Water Analysis)	All Constituents	Varied	80-120	0-25	80-120%	90%
Metals (Water Analysis)	Total and Dissolved Trace Metals	µg/L	50-155%	0-25	75-125%	90%
Microbiology (Water Analysis)	All Constituents	Varied	NA	0-25	NA	90%
Nutrients (Water Analysis)	All Constituents	mg/l	70-130%	0-25	80-120%	90%
Organics (Water Analysis)	Polynuclear Aromatic Hydrocarbons, Pesticides, and PCBs	ng/L	50-150	0-25	10-210%	90%
	Volatiles	µg/L	50-150	0-25	10-210%	90%
	Synthetic Pyrethroid Pesticides	ng/L	65-125%	0-25	10-210%	90%
Other Toxicants	All Constituents	µg/L				90%
Toxicity (Water Analysis)	Acute and Chronic	% survival	The Reference Toxicant Test result must fall within 2 standard deviations of the cumulative mean. No statistical difference for lab control water.	NA	NA	90%

Note: Target RLs are provided for each constituent in Table 6-2.

8. SPECIAL TRAINING NEEDS/CERTIFICATION

8.1 Specialized Training or Certifications

All primary and secondary field samplers are required to receive training in safety and sampling protocols and procedures prior to engaging in any field activities. Primary and Secondary Field Samplers for the District are named in the District's Storm Patrol Manual, page 12. The District's Storm Patrol Manual is updated annually. At a minimum, sampling personnel will have completed the following annual training:

- Safety awareness;
- Review of field sampling hazards, safety rules and pre-sampling site visit;
- Field equipment use and calibration; and
- Sampling Standard Operating Procedures (SOPs) in accordance with the QAPP and Monitoring Plans.

E. S. Babcock and Sons, Inc., Environmental Laboratories (Babcock) is certified for chemical testing by the National Environmental Lab Accreditation Program (NELAP, No. 02101CA) and the California Environmental Laboratory Approval Program (CA ELAP, No. 2698). If any subcontractors are utilized by consultants or laboratories, they too must adhere to the training and certification requirements described.

8.2 Training and Certification Documentation

The District, sampling agencies, monitoring and laboratory consultants will maintain records of training at their respective offices as presented in Table 8-1. Documentation includes the date of the training, the topic and the name of the instructor.

8.3 Training Personnel

Field crews will be properly trained in the use of monitoring equipment and proper sampling techniques in accordance with the QAPP and Monitoring Plans by the District, sampling agencies and monitoring consultants. The respective consultant Project Managers and/or Monitoring Leads are responsible for training field staff prior to field activities and conducting training sessions as needed throughout the course of the program.

Laboratory analysts shall be properly trained in analytical methods and clean analysis techniques.

Table 8-1: Specialized Personnel Training or Certification

Specialized Training Course Title or Description	Training Provider	Personnel Receiving Training/ Organizational Affiliation	Location of Records and Certificates*
District Sampling SOPs and Health and Safety Training	District Monitoring Program Manager	District Field Sampling Staff	1995 Market Street Riverside, CA 92501
Agency Sampling SOPs and Health and Safety Training	Agency Project Manager or Monitoring Lead	Agency Field Staff	(see respective Agency approval pages located in Appendix O)
Consultant Sampling SOPs and Health and Safety Training	Consultant Project Manager or Monitoring Lead	Consultant Project Team Field Staff	(see respective Consultant approval pages)
Laboratory Certifications	Laboratory Project Manager	Laboratory Staff	(see respective Consultant approval pages)

*Training records are kept at each agency or consultant's respective offices.

9. DOCUMENTS AND RECORDS

Ultimately, all electronic data generated by the CMP will be managed and stored by the District. Upon completion of each year's monitoring activities, all data and records will be managed and kept by the District. Copies of records will be maintained for a minimum of five years after project completion. Additional information on document and record retention is contained in Table 9-1 below.

Project plans will be distributed to the participating entities and the District will retain a copy of the final project plans and a record of any amendments conducted throughout the course of the project. Laboratories and the District will store laboratory results and Chain of Custody (COC) forms for five years from the time the annual data deliverable is submitted. All field observations and measurements will be recorded in the Field Data Sheets provided in Appendix B. Field Data Sheets include sample collection records, field measurements, field observation records, and any deviations from standard sampling protocols. Field data sheets and COCs will be scanned and stored in electronic *.pdf format by the District's Program Manager for a minimum of five years from the time the study is completed. Data records will be maintained by the consultant's Project Team and by the District for a minimum of five years from the time the annual data deliverable is submitted. Project reports will be maintained by the District.

Table 9-1: Document and Record Retention, Archival, and Disposition Information

	Identify Type Needed	Retention	Archival	Disposition
Project Plans	QAPP	District	The District will retain a copy and review after each event.	The District will retain a copy for final disposition.
	Monitoring Plans	District	The District will retain a copy and review after each event.	The District will retain a copy for final disposition.
Analytical Records	Laboratory Reports	District, Laboratory Consultant(s)	The District will retain a copy and review after each event.	The District will retain a copy for final disposition.
	EDD	District, Laboratory Consultant(s)	The District will retain a copy and review after each event.	The District will retain a copy for final disposition.
Data Records	Stream Assessment Data and Hydrology Data	District, Monitoring Consultant(s)	The District will retain a copy and review after each event.	The District will retain a copy for final disposition.
Monitoring Reports	Monitoring Annual Reports	District	The District will retain a copy and review after each event.	The District will retain a copy for final disposition.
Annual Reports	Annual Reports	District	The District will retain a copy and review after each event.	The District will retain a copy for final disposition.

GROUP B ELEMENTS: DATA GENERATION AND ACQUISITION

10. SAMPLING PROCESS DESIGN

The QAPP describes the purpose, frequency and type of sampling conducted for each monitoring program included in the CMP. Additional details of the sampling process and design are discussed in the SMR, SAR, and WWR Monitoring Plans, provided as Volumes III, IV and V respectively, of the CMP.

10.1 Summary of Monitoring Programs

10.1.1 Santa Margarita Region

The following monitoring programs are conducted in the SMR to meet the goals of the CMP and requirements of the NPDES permit. Additional details of the sampling process and design for the SMR monitoring programs are provided in Volume III of the CMP. Table 10-1 presents the SMR Sampling Schedule for each monitoring program described in this section including Wet and Dry Weather components, number of events, estimated number of sample locations, sample matrices and the years of implementation.

The SMR Receiving Water monitoring effort is comprised of the following monitoring components:

- **Mass Loading Station (MLS) Monitoring:** The purpose of the MLS monitoring is to characterize the Receiving Water conditions relative to reference conditions during Storm Events and Dry Weather. MLS will be monitored during the first Storm Event and two more Storm Events during the Wet Season and during two Dry Weather monitoring events. During the Storm Events monitored at MLS', a flow-weighted composite and grab samples will be collected in order to analyze for the applicable list of constituents. During Dry Weather monitoring events, a 24-hour time-weighted composite and grab samples will be collected in order to analyze for the full list of constituents as provided in the Monitoring Plan, Volume III of the CMP. Flow measurements will be recorded for the duration of monitoring at MLSs, and will be utilized to calculate Pollutant loads.

  The definition of Wet Weather may differ by watershed, but, in general, falls between October 1st and April 30th. In an ephemeral watershed, the first Storm Event of the year that falls under the USEPA recommended criteria may not result in runoff from surrounding lands. Mobilization criteria and guidance for Storm Event monitoring is described in this QAPP as well as each Monitoring Plan.

- **Stream Assessment:** The purpose of stream assessment is to assess the cumulative impacts of discharges to benthic invertebrates and algae in the receiving waters. Stream Assessments will be conducted at six stations during May or June of each year. Assessments will be comprised of field measurements, collection of water samples for chemical and Toxicity analyses, the collection of benthic macroinvertebrates and algae samples, and a physical habitat assessment.

- **Follow-up Approach and Actions:** Follow-up analysis is based on a combination of compliance and assessment approaches. Under the compliance approach, chemistry results from Receiving Water monitoring stations are compared to compliance and Water Quality Standards as described in Section 2.0. Under the assessment (also referred to as Triad) approach, the chemistry, Toxicity and Bioassessment lines of evidence are weighed as described in the individual Monitoring Plans provided in Volumes III, IV and IV. Follow-up actions include, but are not limited to, additional

data collection, Toxicity Identification Evaluations (TIEs) and upstream source identification studies:

- TIEs: When there is evidence of Toxicity, TIEs may be utilized in the follow-up approach. The purpose of TIEs is to identify the possible cause of Toxicity. TIEs do not require additional samples to be collected. IF there is evidence of toxicity in a sample, then a TIE is conducted on the remaining volume of that sample. Once the cause of Toxicity has been identified, measures must be implemented to reduce or eliminate the Pollutant discharge.
- Upstream Source Identification: If needed, a source investigation component may be conducted to facilitate the implementation of source control measures. Upstream source identification study workplans will be developed on a case-by-case basis.

The purpose of MS4 Monitoring is to characterize Storm Event and Dry Weather monitoring event discharges from MS4 Outfalls within the SMR hydrologic subareas, to comply with WQOs, Non-Stormwater Action Levels (NALs) and Stormwater Action Levels (SALs), and to identify upstream sources of Pollutants causing priority water quality problems. The MS4 monitoring is comprised of four monitoring components:

- **Storm Event Discharge Monitoring:** MS4 Outfall stations will be monitored during one Storm Event each year in three-year rotations until a representative percentage of identified MS4 Outfalls have been sampled within each hydrologic subareas (containing MS4 Outfalls). Flow-weighted composites will be collected at each station during the first 24 hours of the stormwater discharge or for the entire stormwater discharge if it is less than 24 hours. Grab samples will be collected during the monitored event in order to analyze for the full suite of constituents as provided in the SMR Monitoring Plan, Volume III of the CMP.

- **Dry Weather Discharge Monitoring:** Each MS4 Outfall station will be sampled once each year in three-year rotations until a representative percentage of identified MS4 Outfalls have been sampled within each hydrologic subareas (containing MS4 Outfalls). At each site, a grab or a 1-hour flow-weighted composite will be collected and analyzed.

- **Source Identification/IDDE Monitoring:** MS4 Outfall monitoring results will be compared to applicable SALs or NALs to identify any exceedances. Follow-up procedures may be initiated upon discovery of a SAL or NAL exceedance in a sample and are further defined in the Copermittee's respective Jurisdictional Runoff Management Plans (JRMPs).

The purpose of the High Priority Inland Aquatic Habitat (IAH) Monitoring is to monitor Pollutants in stormwater and non-stormwater discharges from the MS4 and within the Receiving Waters to address the impacts of these habitats. IAH Monitoring is comprised of two monitoring components:

- **Outfall and Receiving Water Monitoring:** MS4 Outfall stations will be monitored concurrently with Receiving Water Stations located upstream and downstream of the MS4 Outfall location. Paired MS4 Outfall and Receiving Water monitoring will occur once each year during a Storm Event and once each year for a Dry Weather monitoring event. Twenty-four hour time-weighted composites will be collected for Storm Event chemistry and grab samples will be collected in order to analyze for the full suite of constituents as provided in the SMR Monitoring Plan, Volume III of the CMP. Dry Weather monitoring for chemistry, Bacteriological, and *in-situ* field measurements will be collected as grab samples. Flow monitoring will be conducted during both Storm Event and Dry Weather monitoring events.

- **Source Identification Monitoring:** Source investigations will be conducted in accordance with Storm Event MS4 Discharge and Dry Weather Action Levels and IDDE Monitoring Programs.

The SMR MS4 Permit requires special studies listed in Section 6.1 to be conducted as part of the CMP. Per the MS4 Permit, individual workplans will be developed for each study and submitted to the San Diego Regional Board for review according to the timeline and schedule presented in Table 6-2. The SMR special studies are outlined in Table 6-2; workplans will be added to the Santa Margarita Monitoring Plan as they are submitted to the San Diego Regional Board.

10.1.2 SAR Monitoring Programs

The following monitoring programs are conducted in the SAR to meet the goals of the CMP and requirements of the MS4 permit. Additional details of the sampling process and design for the SAR monitoring programs are provided in Volume IV of the CMP. Table 10-2 presents the SAR Sampling Schedule for each monitoring program described in this section including Storm Event and Dry Weather monitoring components, number of monitoring events, estimated number of sample locations, sample matrices, and the years of implementation.

The purpose of the SAR Receiving Water monitoring is to characterize the Receiving Water quality and determine the impacts of Urban Runoff. The SAR Receiving Water monitoring program is comprised of the following four components:

- **Receiving Water Monitoring:** At minimum, two Receiving Water stations will be monitored during Storm Event and Dry Weather conditions. During two Dry Weather monitoring events, discrete (grab) samples will be collected at the Receiving Water stations. During two Storm Events, flow-weighted composite samples will be collected at Receiving Water stations. Additionally, samples will be tested for Acute and Chronic Toxicity to meet the requirements of the Water Column Toxicity Monitoring Program.

- **Water Column Toxicity Monitoring:** The purpose of this program is to determine if there may be impacts of Urban Runoff on Toxicity of the Receiving Water by testing aquatic species collected from the Receiving Waters. During two Storm Events, samples will be analyzed for Acute and Chronic Toxicity. The Storm Event component of the Water Column Toxicity Monitoring will be conducted simultaneously with two of the Receiving Water Storm Events as previously mentioned. During two Dry Weather monitoring events, Receiving Water samples will be analyzed for Acute and Chronic Toxicity. According to the SAR Permit, this requirement can be satisfied by participating in regional Bioassessment efforts. The follow-up approach is also presented in the SAR Monitoring Plan in Volume IV of the CMP.

- **Stream Assessments:** The purpose of the stream assessments is to assess the cumulative impacts of discharges to benthic invertebrates and algae in the Receiving Waters. Stream assessments will be conducted at four to five (4-5) sample locations within the Santa Ana and San Jacinto Watersheds in cooperation with the SMC's Regional Bioassessment program. Stream assessments will be conducted once per year during the Dry Weather index period (approximately May-June annually).

- **Follow up Approach and Actions:** Follow up analysis is based on a combination of compliance and assessment approaches. Under the compliance approach, chemistry results from Receiving Waters monitoring stations are compared to compliance and Water Quality Standards as

described in Section 2.0. Under the assessment (also referred to as Triad) approach, the chemistry, Toxicity and Bioassessment lines of evidence are weighed as described in the individual Monitoring Plans provided in Volumes II, III and IV. Follow-up actions include, but are not limited to, additional data collection, Toxicity Identification Evaluations (TIEs) and upstream source identification studies.

- TIEs: When there is evidence of Toxicity, TIEs may be utilized in the follow-up approach. The purpose of TIEs is to identify the possible cause of Toxicity. TIEs do not require additional samples to be collected. If there is evidence of Toxicity in a sample, then a TIE is conducted on the remaining volume of that sample. Once the cause of Toxicity has been identified, measures must be implemented to reduce and/or eliminate the Pollutant discharge.
- TREs: Based on TIE results, a TRE component may be conducted to facilitate the implementation of source control measures. TRE work plans will be developed on a case by case basis.

The purpose of the SAR MS4 Outfall and Mass Emissions Monitoring Program (Core Monitoring Program) is to monitor Pollutants in stormwater effluent from the MS4 and to conduct special studies to address areas of concern as they may appear.

- **Mass Emission Station Monitoring:** The MRP requires outfall monitoring at seven Core Stations, referred to in the MRP as Mass Emissions Stations. During three Storm Events and two Dry Weather monitoring events at the seven Core stations, grab samples will be collected and analyzed for the constituents presented in the SAR Monitoring Plan, provided in Volume IV of the CMP.

- **IC/ID Monitoring:** IC/ID monitoring will occur as needed as indicated by Core station outfall monitoring results. Monitoring will consist of field observations and collection of field parameter measurements. If additional follow-up is necessary, source identification will be adaptive and will vary based on the field measurement results of each specific outfall and adjacent land uses suspected to contribute to unauthorized discharges in the MS4.

The SAR MS4 Permit requires Special Studies listed in Section 6.1 of this QAPP to be conducted as part of the CMP. Special studies each contain their own workplan. The SAR Special Studies are briefly described in the SAR Monitoring Plan provided in Volume IV of the CMP.

10.1.3 WWR Monitoring Programs

The following monitoring programs are conducted in the WWR to meet the goals of the CMP and requirements of the WWR MS4 permit. Additional details of the sampling process and design for the WWR monitoring programs are provided in Volume V of the CMP.[3] Table 10-3 presents the current WWR Sampling Schedule for each monitoring program described in this section including Storm Event and Dry Weather monitoring components, number of monitoring events, estimated number of sample locations, sample matrices and the years of implementation.

The purpose of the WWR Receiving Water monitoring is to characterize water quality in and evaluate the health of the Receiving Waters. During two Dry Weather monitoring events, discrete (grab) samples will be collected at one monitoring location. Grab samples will be collected at one monitoring location during

[3] Volume V of the CMP is included in *draft* form. The WWR Monitoring Plan will be finalized upon the renewal of the Whitewater River Region MS4 permit, anticipated in 2013, incorporating any new monitoring and reporting requirements. Upon completion, the CMP will be implemented in its entirety (Volumes II and V) within the WWR.

two Storm Events. When there is hydraulic connectivity of the Whitewater River throughout the WWR, a second monitoring location is sampled during Storm Events as required by the WWR MS4 permit.

The purpose of the WWR Outfall Monitoring is to characterize discharges from MS4 outfalls, potential impacts to Receiving Waters during Storm Events and identify potential IC/IDs during Dry Weather conditions. Grab samples will be collected at three monitoring locations during two Storm Events. During two Dry Weather monitoring events, grab samples and field measurements will be collected at three monitoring locations, which may coincide with quarterly IC/ID investigations. Source investigations will be conducted where there is evidence of irregular flow or water quality concerns based on the Dry Weather monitoring event results.

10.1.4 Regional Monitoring Program: Applicable to SMR, SAR, and WWR.

The Permittees continually collaborate in regional efforts to tackle issues within Riverside County to those that extend beyond jurisdictional boundaries. The following groups are watershed-specific and, in addition to District staff, the Permittees are represented in the following groups:

- Santa Ana/Santa Margarita Technical Advisory Committee
- Santa Ana/Santa Margarita Management Steering Committee
- Whitewater River Region Desert Task Force
- Lake Elsinore/San Jacinto Watershed Authority (LESJWA)
- Canyon Lake/Lake Elsinore TMDL Task Force
- Stormwater Quality Standards Task Force
- Middle Santa Ana River TMDL Task Force

In general, the Permittees are represented by District staff in the following regional organizations:

- Southern California Stormwater Monitoring Coalition (SMC)
- California Stormwater Quality Association (CASQA)
- American Society of Civil Engineers - Stormwater Committee, San Bernardino/Riverside Counties Branch

10.1.5 Regional Watershed Monitoring Program

The program aims at assessing the regional health of southern California's rivers and streams and is motivated by the State's Surface Water Ambient Monitoring Program (SWAMP) and the Southern California SMC. Permittees of Riverside County's three MS4 Permits are represented on the SMC by the District. The SMC member agencies are:

- Los Angeles Regional Board
- Santa Ana Regional Board
- San Diego Regional Board
- California Department Transportation
- City of Long Beach
- City of Los Angeles, Watershed Protection Division
- County of Orange, Public Facilities and Resources Department
- County of San Diego Stormwater Management Program
- County of San Bernardino Stormwater Program
- Los Angeles County Flood Control District

- Riverside County Flood Control and Water Conservation District (District)
- Southern California Coastal Water Research Project (SCCWRP)
- SWRCB
- USEPA, Office of Research and Development
- Ventura County Watershed Protection District

10.2 Types of Sampling Locations

This section provides a description of the type of sample locations that will be monitored in the different programs. Sample locations are described in each of the watershed-specific Monitoring Plans provided in Volumes III, IV and V of the CMP. In general, all sites will consider safety and access conditions of each site prior to selection. A comprehensive list including station name, GPS coordinates and a brief description is provided in Appendix C.

Receiving Water Stations:
Receiving water sites are located on the main river systems within each Region. For the SMR, the Mass Loading Stations are Receiving Water monitoring locations. For SAR, the Receiving Water stations are located near the bottom of the Region, but adjacent to a mixture of land uses, including urban areas. For the WWR, two Receiving Water stations are identified in the MS4 Permit; however, one location is ephemeral and is not monitored during the Dry Season.

Reference Station:
Reference Stations are sites that are within a portion of the Watershed similar to the urbanized area but are considered to have minimal influence from urban land uses. Reference Stations will be identified using protocols outlined in "A Qualitative Tool for Assessing the Integrity of Southern California Streams".

Stream Assessment Stations:
Stream assessments will be conducted at Receiving Water and Reference Stations as outlined in the SMR and SAR Permits. Specific information is contained in the respective Monitoring Plans of this CMP (Volumes III and IV, respectively).

MS4 Outfall Monitoring Locations:
MS4 Outfall monitoring locations will be located at the end-of-pipe prior to discharge to Receiving Waters and as outlined in Volumes III through V. Typically, MS4 sampling locations may include the discharge at the end-of a pipe, a ditch, or a channel. Additional MS4 monitoring locations may be added to ensure that MS4 monitoring locations are representative of Urban Runoff. According to 40 C.F.R. §122.26(b)(5) the definition of a Major Outfall is:

> …a municipal separate storm sewer outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than circular pipe which is associated with a drainage area of more than 50 acres); or for municipal separate storm sewers that receive storm water from lands zoned for industrial activity (based on comprehensive zoning plans or the equivalent), an outfall that discharges from a single pipe with an inside diameter of 12 inches or more or from its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or more).

- SMR has 20 hydrologic subareas, seven of which contain MS4 facilities under the jurisdiction of the Copermittes. A maximum of eight MS4 Outfall locations will be monitored each year in

three-year rotations until a representative percentage of all identified Major Outfalls have been monitored.

- SAR has seven mass emissions stations or Core monitoring locations identified in the MS4 permit.

- WWR has three Outfalls identified in the MS4 permit.

Table 10-1: SMR Sampling Schedule

SMR Sampling Program	Program Component	Matrix	Number of Events Per Year	Estimated Number of Sample Locations	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017
Receiving Water Monitoring	Dry Weather	Water	2	3	X	X	X	X	X
	Storm Event	Water	3	3	X	X	X	X	X
	Toxicity – Storm Event	Water	3	3	X	X	X	X	X
	Toxicity – Dry	Water	2	3	X	X	X	X	X
	TIEs/TREs	Water	Conditional[(a)]	Conditional[(a)]	X	X	X	X	X
	Stream Assessments/ Bioassessments (Dry Weather)	Water, Algae, BMI, Toxicity	1	6	X	X	X	X	X
MS4 Outfall Monitoring	Storm Event (SAL)	Water	1	8	X	X	X	X	X
	Dry Weather (NAL)		1	8	X	X	X	X	X
	IDDE/Source Assessment		TBD	TBD	X	X	X	X	X
High Priority Inland Aquatic Habitat	MS4 Outfall – Storm Event	Water	1	TBD	TBD	TBD	TBD	TBD	TBD
	Receiving Water (upstream & downstream) – Storm Event	Water	1	TBD	TBD	TBD	TBD	TBD	TBD
	MS4 Outfall – Dry	Water	1	TBD	TBD	TBD	TBD	TBD	TBD
	Receiving Water (upstream & downstream) –Dry	Water	1	TBD	TBD	TBD	TBD	TBD	TBD

Table 10-1: SMR Sampling Schedule (continued)

SMR Sampling Program	Program Component	Matrix	Number of Events Per Year	Estimated Number of Sample Locations	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017
Special Studies	Sediment Toxicity	Sediment	1 (Dry Weather, in conjunction with Stream Assessment)	4	X	X			
	Trash & Litter Investigation	N/A	2 (Storm Event) 2 (Dry Weather)	TBD	TBD				
	Agricultural, Federal & Tribal Input	Water	1 (Storm Event)	TBD	TBD				
	MS4 & Receiving Water Maintenance[(c)]	NA	NA						
	Intermittent and Ephemeral Stream Perennial Conversion[(c)]	N/A	NA						
	SMC Regional Monitoring of Southern California Coastal Watersheds[(b)]	Water, Algae, BMI, Toxicity	1 (Dry Weather)	2	X[(b)]				

[(a)] Conditional – Follow up actions and TIEs/TREs are dependent on the results from the associated events and will vary.
[(b)] *aka* SMC Regional Bioassessment Program. Fiscal Year 2012-2013 is the final year of the SMC Regional Study. The Stream Assessment monitoring component of the SMR MRP continues elements of the SMC Regional Bioassessment Program for the remainder of the Permit Term.
[(c)] Deleted in lieu of submittal of a "Low Impact Development Retention Impacts Study" as authorized by the San Diego Regional Board[4].

[4] Smith, James G., Letter to Jason Uhley, Riverside County Flood Control and Water Conservation District RE: Modification of Special Study Requirements in Attachment E of Order No. R9-2010-0016, September 14, 2012.

Table 10-2: SAR Sampling Schedule

SAR Sampling Program	Program Component	Matrix	Number of Events Per Year	Estimated Number of Sample Locations	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Receiving Water Monitoring	Dry Weather	Water	2	2		X	X	X	X
	Storm Event	Water	2	2		X	X	X	X
	Water Column Toxicity – Storm Event	Water	2	2		X	X	X	X
	Water Column Toxicity – Dry	Water	2 (1 in conjunction with stream assessments)	2	X	X	X	X	X
	TIEs/TREs	Water	Conditional[(a)]	Conditional[(a)]	X	X	X	X	X
	Stream Assessments/ Bioassessments (Dry Weather) [(b)]	Water, Algae, BMI, Toxicity	1	5	X[(b)]	X[(b)]	X[(b)]	X	X
MS4 Monitoring	Mass Emission – Storm Event	Water	3	7	X	X	X	X	X
	Mass Emission - Dry		2	7	X	X	X	X	X
	IC/ID		TBD	TBD	X	X	X	X	X

(a) Conditional – Follow up actions and TIEs/TREs are dependent on the results from the associated events and will vary.
(b) In Fiscal Years 2011-2012 and 2012-2013, stream assessments will be conducted in conjunction with the SMC Regional Bioassessment Program. Stream assessments will be conducted at the designated Dry Weather Receiving Water monitoring stations beginning in Fiscal Year 2013-2014.

Table 10-3: WWR Sampling Schedule

WWR Sampling Program	Program Component	Matrix	Number of Events Per Year	Estimated Number of Sample Locations	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Receiving Water Monitoring	Dry Weather	Water	2	1	X	X	X	X	X
	Storm Event	Water	2	2[(a)]	X	X	X	X	X
MS4 Monitoring	Storm Event	Water	2	3		X	X	X	X
	Dry Weather		2	3		X	X	X	X
	Quarterly IC/ID		4 (2 conducted with Dry Weather sampling)	3		X	X	X	X

[(a)] Samples will be collected at the Upper Whitewater River when there is hydraulic connectivity throughout the WWR, as evidenced by regional stormwater flows detected at Golf Center Parkway per the WWR Permit.

10.3 Preparation and Logistics

The following preparation and logistics procedures and guidelines will be incorporated into the implementation of the monitoring programs described above and outlined in Tables 10.1 through 10.3.

Weather Tracking

Weather will be tracked throughout the Wet Weather season, typically from October through April, or until all required Storm Events have been captured. Weather will be continuously monitored by utilizing the resources of the National Weather Service (NWS) as well as local ALERT systems and any other internet resources that could prove beneficial.

Sampling Event Selection Criteria

Sampling for Storm Events and Dry Weather monitoring events will be initiated once criteria specific to each monitoring program has been met, as available in the individual Monitoring Plans located in Volumes III-V, and in accordance with the Storm Event mobilization criteria below.

Storm Event Mobilization Criteria

The definition of Wet Season may differ by Region but, in general, falls between October 1st and April 30th; specific MS4 Permit requirements are discussed in the each respective monitoring plan. Storm Event 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:
>
> - The District will follow the procedure outlined in Exhibit 2.7 of USEPA NPDES Storm Water Guidance Document (EPA 833-B-92-001), included below as Figure 10-1.
> - Pursuant to EPA 833-B-92-001, a representative event is between:
> - 0.27" in 6 hours and
> - 0.81" in 18 hours, when possible.
> - Pursuant to NWS standard practice, "Likely" represents a Probability of Precipitation (PoP) of at least 60%.

Due to the ephemeral nature of the SMR, SAR, and WWR, the first Storm Event that falls under the USEPA-recommended criteria may not result in runoff discharges from the MS4s. The representative 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"[5]. The derivation is presented in Table 10-4.

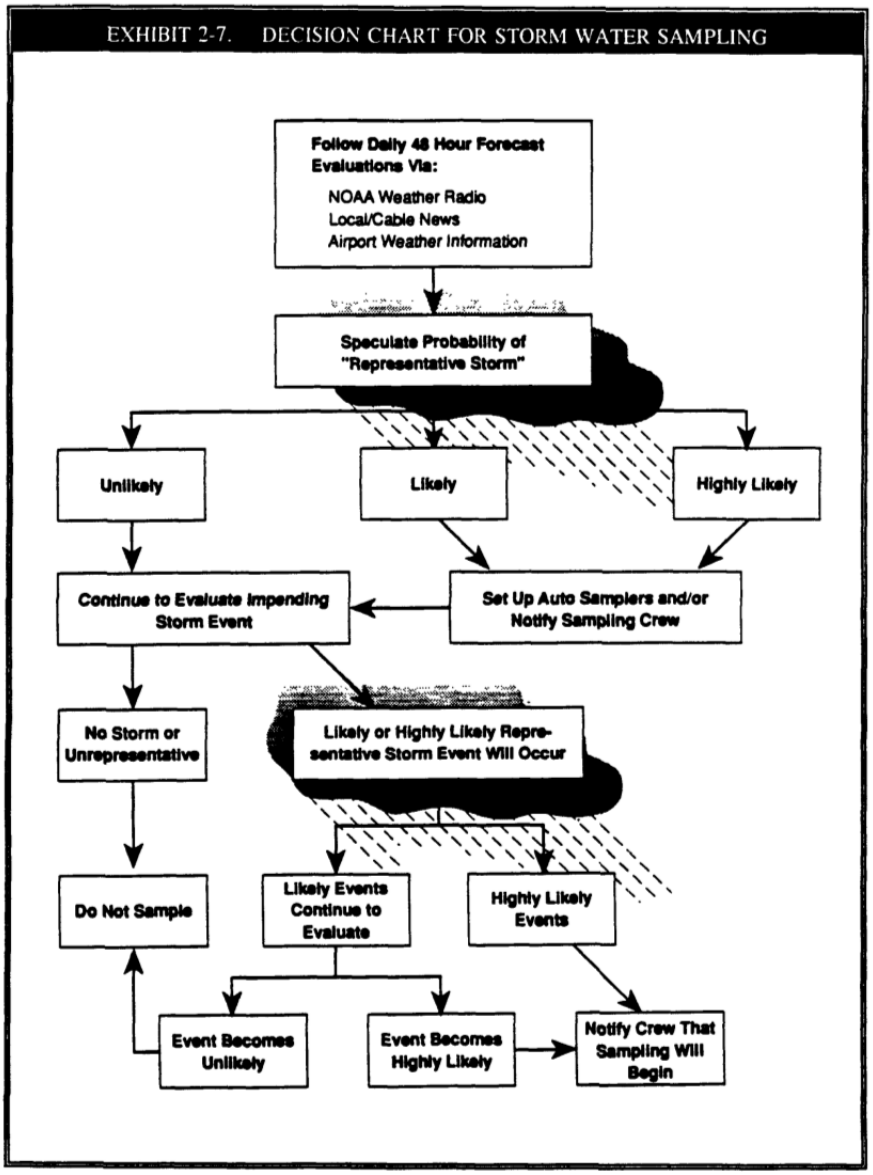
[5] Exhibit 2-8 "Rain Zones of the United States", Pacific Southwest Region. *NPDES Storm Water Sampling Guidance Document.* U.S. EPA Document No. 833-B-92-001.

Table 10-4: Derivation of District Representative Storm

Event Type	Duration (hours)[(a)]	Volume (inches)
Pacific Southwest Average Event	11.6	0.54
50% Average Event	5.8	0.27
150% Average Event	17.4	0.81

(a) In order to simplify the durations above to align with the 6-hour durations issued by the NWS's Qualitative Precipitation Statements, the representative storm for the District's jurisdictional area is 0.27" in 6 hours to 0.81" in 18 hours.

Figure 10-1: USEPA Decision Chart for Storm Event Sampling



Staffing

A staffing plan will be prepared prior to each sampling event that designates sampling teams, monitoring locations for each team, field coordinators, and sample coordinators. Monitoring will be performed by teams of two field personnel. When necessary, a runner will be utilized to deliver grab samples to the laboratory to ensure that short holding times for constituents are met. Field crews will not be mobilized during or near certain holidays if the mobilization or laboratory analysis should continue through that holiday. This includes the following holidays:

- Thanksgiving and the day after Thanksgiving
- Christmas Eve and Christmas Day
- New Year's Eve and New Year's Day

Station Preparation

When mobilization criterion has been met and sampling is to occur, field personnel will perform the following pre-sampling duties to ensure stations are operational:

- Flow monitoring equipment onsite and running (if utilized)
- Automated samplers onsite and running (if utilized)
- Flow or time pacing set (if automated samplers are utilized)
- Sampler trigger set (if automated samplers are utilized)
- Iced bottles/coolers with ice onsite
- Bottle sets assembled
- Field meter calibrated (if *in-situ* field measurements are required)

11. SAMPLING METHODS

This section describes the types of field collection methods and procedures to implement the various monitoring programs described in Tables 10.1 through 10.3. Additional details of the sampling methodology used for each monitoring program are discussed in the SMR, SAR, and WWR Monitoring Plans, provided as Volumes III, IV and V of the CMP, respectively.

Field Observations and Documentation:

Field observations and measurements will be recorded on the Field Data Sheet provided as Appendix B to this QAPP. Field observations will be recorded during each monitoring activity in order to put chemical results into context with site conditions at the time of sampling. Field data sheets will be used to record general observations such as weather, debris/trash observed, color and clarity of the water, odor and any other conditions of interest. Whenever possible, any data being recorded will be verified, such as stage, flow meter status and sampler status. Field data sheets will also be used to document any equipment failure that may occur during sampling activities.

The following general information should be entered during each site visit:

- Station ID
- Date and Time
- Monitoring Project Name
- Field Team
- Runoff characteristics
- Flow estimations
- Field measurements
- Equipment condition/calibration (if applicable)

- Conveyance Type
- Weather Conditions
- Equipment failures (if applicable)
- Miscellaneous comments

During Storm Events, additional data will be recorded on the Field Data Sheet at the end of a Storm Event. Data will be logged by a flow meter (if utilized) and will be downloaded after the storm; however, if downloaded data is lost for any reason, the data recorded on the field datasheet acts as a back-up. The following data will be collected at all stations when automatic sampling technologies are utilized:

Total Flow Volume (liters) – Total volume of water that passed the station during the storm
Composite Sample Aliquot Count – Total aliquots attempted, the number of aliquots missed, and the total number of successful aliquots
Total Rain (inches) – Total accumulated rainfall in centimeters since the start of the storm, measured each time the rain bucket tips
Sample Volume (liters) – Total volume of sample collected during the storm

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 (Visited, Not Sampled). Photographs will also be taken to document the dry conditions. Although this scenario is unlikely during Storm Events, the same documentation procedures will be followed if a monitoring location is observed to be dry or the precipitation forecasted did not produce flow sufficient to collect required sample volumes.

***In-situ* Field Measurements:**

In-situ field measurements will vary by program and Region but may include the following list of constituents:

- Conductivity (Specific Conductance, Electronic Conductivity)
- Turbidity
- Dissolved Oxygen (DO)
- Water Temperature
- Salinity (optional; may be useful for certain types of wastes)
- Total Dissolved Solids
- Oxidation-Reduction Potential (optional; useful if sewage is suspected)

Field measurements for the constituents listed above are the preferred method under the CMP. *In-situ* field measurements will be collected during composite sample collection (i.e., collected between the first and last composite sample aliquot) or during grab sampling activities, if composite samples are not required. Field measurement values and collection times will be recorded on the field data sheet.

In-situ water quality measurements will be made in the field by placing the probe(s) directly in the water column. A secondary container may be used if the water depth does not allow the probe to be completely submerged. Probes should be exposed to flow in a representative portion of the stream or discharge. If there is no flow (i.e., ponded) or a secondary container is required to make measurements, the probe should be gently agitated, particularly when making DO measurements using polarographic (Clark Cell) probes.

If meters fail in the field, field crews will instruct the laboratory to analyze for required constituents that were not collected in the field and will record this modification on the field data sheet. Additional volume for laboratory analyses of field measurements are accounted for in bottle lists, available in Volumes III

through V, requiring no additional sample collection by field crews in the case of a meter failure. All trouble shooting and corrective actions will be recorded in the calibration log and/or field datasheet.

Composite Sampling:

Flow-weighted composite - A composite sample is a series of aliquots collected over the course of a Storm Event that is weighted by the flow rate. To collect a flow-weighted composite sample an automated sampler is utilized in conjunction with a flow meter to obtain a representative sample. Sample aliquots will be collected according to a sample pacing and programmed during pre-storm preparation. The sample pacing is determined by estimating the volume of runoff from the predicted amount of rainfall, the drainage area and the runoff coefficient. The sample pacing is determined by dividing the total runoff volume by the number of samples needed to satisfy the water volume requirement for analysis. The following equation is used to determine sample pacing:

$$\text{Sample Pacing} = \frac{P \times A \times C}{\text{Number of Aliquots}}$$

Where:
P = inches of rainfall anticipated
A = drainage area
C = runoff coefficient for drainage area

Each field team should be aware of the current status of each of its stations to determine which one will fill a bottle first so they can be onsite before the bottle fills. If the station has been programmed for the accurate amount of rainfall, changing the composite bottle should not be necessary. Pacing settings should take into account the volume of sample required to meet all analytical needs. If pacing changes are required, the bottle must be changed at the time of changing the pacing. The pacing value associated with each bottle must be reported to the analytical laboratory to allow proper sample compositing.

Time-weighted composite - During Dry Weather sampling, time-weighted composite samples may be collected using automated samplers. To collect a time-weighted composite sample, the sampler will be programmed to collect aliquots at discrete intervals over a specified time period, which varies by Dry Weather program. If a time-weighted composite is collected over a 24-hour period, aliquots will be collected at the program-specific time interval for the 24-hour monitoring period monitored using automated sampling equipment. When a time-weighted composite is collected over a 1-hour period, a minimum of four aliquots will be collected manually at 15-minute intervals. If the flow conditions of the discharge or stream allow for increased intervals, then the total number of aliquots and time intervals will be recorded on the field datasheet.

Field duplicates will not be collected on 24-hour composite samples as this would require a complete and separate second sampling system. Field duplicates may be collected on one-hour composite samples depending on the volume and expected duration of the discharge.

Grab Sampling:

Storm drains will be inspected prior to grab sample collection, and debris will be removed. Grab water samples will be collected by inserting the sample container under or down current of the discharge, with the container opening facing upstream. Less accessible sampling points may require the use of grab poles and buckets to collect grab samples. If samples cannot be safely collected directly or with a grab pole samples may be collected with a peristaltic pump using Teflon® and silicone tubing. Grab water samples

will be collected from the horizontal and vertical center of the channel. The following sample handling protocols will be followed when collecting samples to minimize the possibility of contamination:

- Previously unused (new) sample bottles will be employed. Sample bottles and bottle caps will be protected from contact with solvents, dust or other contaminants during storage and bottle handing. Sample bottles will not be reused until the laboratory has cleaned and blanked the containers.
- Field personnel will make an effort, within reason, to prevent large gravel and uncharacteristic floating debris from entering the sample containers. Personnel will also make an effort to not disturb sediments that may be at the bottom of the channel.
- The inside of the sampling container will not be touched to the maximum extent practicable during preparation and sampling activities.
- Vehicle engines will be turned off during sampling activities to minimize exposure of samples to exhaust fumes.
- All samples will be collected in accordance with the "clean sampling" techniques outlined in Appendix D.
- Manual water grab samples will be collected by inserting the transfer container under or down current of the direction of flow, with the container opening facing upstream. For microbiology water grab samples, containers will contain sodium thiosulfate ($Na_2S_2O_3$) to neutralize the impact of chlorine that may be in the stormwater at the immediate time of collection.
- Sample containers with liquid preservatives such as nitric acid will not be overfilled to avoid flushing out the required preservative.
- Once sample containers are filled, they will be promptly placed on ice, in a clean cooler (target temperature 6 degrees Celsius), in the dark and transported to the laboratory for processing to meet holding times.

Benthic Macroinvertebrate Collection:

Benthic Macroinvertebrate (BMI) samples will be collected according to the SWAMP Bioassessment SOP for the Reachwide Benthos Procedure provided in Appendix F. The first step in implementing a stream assessment is to delineate the monitoring reach and the 11 main transects through the following steps; a summary of this process is provided below:

SWAMP's standard BMI (and algae) sampling layout consists of a 150-meter reach or a 250-meter reach, depending upon the average wetted width of the channel. If the average wetted width is less than or equal to 10 meters, use 150 meters for the monitoring reach length. If the average wetted width is greater than 10 meters, use a 250 meter long reach. Features that should not be present within a monitoring reach are: tributaries, "end-of-pipe" outfalls, bridge crossings, changes between natural and man-made channel bottoms, waterfalls and impoundments (dams and weirs). Try to stay out of the channel as much as possible to avoid disturbing the stream bottom, which could compromise the samples and data that will be collected. Always work starting from the downstream end of the reach, moving upstream.

The monitoring reach will be divided into 11 equidistant main transects that will be arranged perpendicularly to the direction of flow. Main transects are designated "A" through "K". There will also be 10 additional transects (designated "inter-transects"), one between each pair of adjacent main transects, to give a total of 21 transects per monitoring reach. Inter-transects are designated by their nearest upstream and downstream main transects ("AB", "BC", etc.).

The Reachwide Benthos Procedure method can be used to sample any wadeable stream reach. The sampling approach used may vary by individual channel characteristics. For the Reachwide Benthos Procedure method, the BMI sub-sampling positions alternate between left, center, and right portions of the transects, as field personnel proceed upstream from one transect to the next. In high-gradient systems, sampling locations are defined as the points at 25 percent ("left"), 50 percent ("center") and 75 percent ("right") of the wetted width of the stream. Low-gradient streams, characterized as having a slope of 1% or less, comprise the majority of the District's streams monitored under the CMP. In low gradient streams, the Reachwide Benthos Procedure "margin-center-margin" method is utilized where channel substrates are nearly uniform, resulting in low diversity within the majority of the channel.

Algae Sample Collection:

Algae samples, when collected in conjunction with SWAMP bioassessments, must be collected prior to Physical Habitat Assessment data collection to avoid disturbance of the algae. Algae samples will be collected at the 11 main transects utilized in the Physical Habitat Assessment. After collection, the 11 sub-samples will be composited into a single sample per site (sampling reach). Algae sample collection may be used for the following types of data collection, each with specific sub-sampling procedures: collection of samples for taxonomic identification of diatoms and soft-bodied algae; collection of samples for determination of biomass based on chlorophyll *a* and ash-free dry mass; and estimation of percent algal cover. Detailed sampling methods are provided in the SWAMP Algae Field SOP located in Appendix G.

Physical Habitat Assessment:

Physical Habitat Assessment is designed to assess the physical habitat conditions of the stream reach to aid interpretation of the chemical, BMI and algae data and will be implemented according to the full suite Physical Habitat Assessment as described in the SWAMP Bioassessment SOP (Appendix F). Once all BMI and algae samples have been collected at a given transect, Physical Habitat Assessment data collection may begin according to the full Physical Habitat Assessment protocol described in Appendix F.

The Physical Habitat Assessment data to be collected includes the following:

- Wetted width
- Bankfull width
- Bankfull height
- Pebble count: Transect substrates
- Depth
- Particle size class
- Coarse Particulate Organic Matter
- Algal cover
- Macrophytes
- Dry substrates
- Bank stability
- Human influence
- Densitometer readings (canopy cover)

Sediment Sampling:

Sediment Toxicity samples will be collected as a composite along a cross-section of the creek. A surface sample will be collected using a pre-cleaned stainless steel spoon from the top two inches of sediment at locations approximately 25 percent, 50 percent, and 75 percent across the channel. Sediment samples will be collected after the collection of water samples. Samplers should avoid disturbing and cross contamination of surface sediments.

Rainfall:

During monitored Storm Events at stations requiring flow-weighted composites and extended flow monitoring, a tipping bucket rain gauge will be used in conjunction with automated sampling and flow monitoring equipment. A tipping bucket rain gauge is configured with a small "bucket" that holds a known amount of rainfall. When the bucket fills, it tips the water out, momentarily closes a switch, then resets itself and starts the process again. The data logger/controller counts each switch closure to calculate rainfall totals. The rain gauges used for this program tip after every 0.01 inch of rain.

Flow Measurements:

Extended flow monitoring: Stations that require extended flow monitoring will require a temporary installation of flow monitoring equipment and paired automated sampling equipment. Flow rates will be monitored using a flow meter with an ultrasonic sensor. A submerged bubbler may also be installed as a measuring device. The sensor will continuously measure stage (stream height) and relay that information to the flow meter. The flow meter will continuously calculate flow rates by inserting the stage information into the preprogrammed discharge equation or by utilizing velocity measured by the ultrasonic sensor. Using this system, the flow meter will be able to actuate the automated sampler to achieve a flow-weighted composite sample. Sampling and flow equipment will be monitored manually.

The flow meters will measure and log flow levels, rainfall and sample history. One-minute average flow and rainfall data will be recorded in the flow meters. The flow meters convert instantaneous flow into total runoff volume. Data containing storm and hydrological information is electronically stored in the flow meter, with each monitoring event stored separately. The recorded information includes:

- Flow rates
- Time of peak flow rate
- Cumulative rainfall
- Rainfall intensity
- Discharge volume totals
- Time of each sample
- Success or failure of each sample

Instantaneous flow measurements: Programs that do not require extended flow measurements will take instantaneous flow measurements at the time of sampling. Flow will be estimated using one of the following methods:

Area-Velocity Method
This method is useful when low flows are present. This method requires the physical measurement of the depth (D), and width (W) of flowing water. Estimate the velocity (V) and calculate discharge based on the following equation:

Equation 1: Discharge (ft^3/sec) = Velocity (ft/sec) x Depth (ft) x Width (ft)

Partially-Filled Pipe Method
This method is useful when substantial flow is coming through a pipe or out of an outfall. Measure the water depth and inside pipe diameter and apply the following formula using the partially filled pipe formula chart in Table 10-4.

D = water depth.
d = *inside* pipe diameter.

Calculate D/d.
Find the tabulated (Ta) value on the partially filled pipe formula chart below using the D/d value (i.e., if D/d = 0.263 then Ta =0.1623).
Find the area using the formula: $a = Ta*d^2$.
Multiply area (a) by the water velocity.
Convert to desired value.

Table 10-5: Partially Filled Pipe Tabulated Value (Ta) Chart

Tabulated Value (Ta) as Determined by the Tenths and Hundredths of the Quotient of D/d										
D = Depth of water d = diameter of the pipe Ta = Tabulated Value (i.e. if D/d = 0.263 then Ta = 0.1623)										
D/d	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0013	0.0037	0.0069	0.0105	0.0147	0.0192	0.0242	0.0294	0.0350
0.1	0.0409	0.0470	0.0534	0.0600	0.0668	0.0739	0.0817	0.0885	0.0951	0.1039
0.2	0.1118	0.1199	0.1281	0.1365	0.1440	0.1535	0.1623	0.1711	0.1800	0.1890
0.3	0.1982	0.2074	0.2187	0.2280	0.2355	0.2450	0.2540	0.2642	0.2780	0.2836
0.4	0.2934	0.3032	0.3130	0.3220	0.3328	0.3428	0.3527	0.3627	0.3727	0.3827
0.5	0.3980	0.4030	0.4130	0.4230	0.4330	0.4430	0.4520	0.4620	0.4720	0.4820
0.6	0.4920	0.5020	0.5120	0.5210	0.5310	0.5400	0.5500	0.5590	0.5690	0.5780
0.7	0.5870	0.5960	0.6050	0.6140	0.6230	0.6320	0.6400	0.6490	0.6570	0.6660
0.8	0.6740	0.6810	0.6890	0.6970	0.7040	0.7120	0.7190	0.7250	0.7320	0.7360
0.9	0.7450	0.7500	0.7560	0.7610	0.7660	0.7710	0.7750	0.7790	0.7820	0.7840

Timed Object Method

Drop a floatable object such as a leaf or twig in the water, time (T) how long it takes to move a measured distance (D). Estimate or measure the channel cross-sectional area, then calculate the volumetric flow rate using the following equation:

$$Q = \frac{A*D}{T}$$

United States Geological Survey (USGS) Flow Gauge – Flow may be determined by using an available USGS flow gauge within close proximity of the sample location.

Field Corrective Actions:

Any failures (e.g., instrument failures) that occur during data collection will be the responsibility of the field crew conducting the work. Crews will carry basic spare parts and consumables with them to the field, and will have access to spare parts to be stored at their respective agency. In the case of field instruments, problems will be addressed through instrument cleaning, repair or replacement of parts or the entire instrument, as warranted. If meters fail in the field, field crews will instruct the laboratory to analyze for required constituents that were not collected in the field and will record this modification on the Field Data Sheet, and notify the Program Manager immediately. All trouble shooting and corrective

actions will be recorded in the calibration log and/or field datasheet. Records of all repairs or replacements of field instruments will be maintained at the offices of field sampling personnel.

Table 11-1: SMR Sampling Programs and Sampling Methods

A description of sampling locations is provided in the Monitoring Plan, Volume III.

Sampling Program (Monitoring Locations)	Program Component	Matrix	Analytical Categories	# Samples (field duplicates)[(a)]	Type of Sampling
Receiving Water/Mass Loading Stations (3)	Dry Weather[(b)]	Water	Field Parameters, Chemistry, Microbiology	3 (1)	Time-weighted Composite or Grab
	Stream Assessment[(b)] (6)	Water, Algae, BMI	Field Parameters, Chemistry, Microbiology, Toxicity	6 (1)	Time-weighted Composite or Grab
	Storm Event	Water	Field Parameters, Chemistry, Microbiology	9 (1)	Flow-weighted Composite and grab
	Follow up Approach and Actions	Water	No additional analyses are required. Field Parameters, Chemistry and Toxicity, may be collected as part of source investigation.	Conditional	Grabs
MS4 Monitoring (8, rotating)	Non-stormwater/IDDE Dry Weather	Water	Field Parameters, Chemistry, Microbiology	8 (1)	Time-weighted Composite or Grab
	Source ID Monitoring		Conditional based on elevated levels in primary samples.	TBD (NA)	Time-weighted Composite or Grab
	Storm Event		Field Parameters, Chemistry, Microbiology	8 (1)	Flow-weighted Composite and grab
	Source ID Monitoring		Conditional based on elevated levels in primary samples.	TBD (NA)	Time-weighted Composite or Grab
High Priority Inland Aquatic Habitat Monitoring (TBD)[c]	Storm Event	Water	Field Parameters, Chemistry, Microbiology	TBD (1)	Time-weighted Composite
	Dry Weather		Field Parameters, Chemistry, Microbiology	TBD (1)	Time-weighted Composite

Conditional – Follow up actions and source investigations are dependent on the results from the associated events and will vary each year.

(a) Field duplicates are not required for flow-weighted composite or 24-hour time-weighted composite samples, but are required for grab samples and one-hour time-weighted composite samples.

(b) One Dry Weather monitoring event will coincide with a stream assessment; therefore, the samples are accounted for once under the stream assessment program.

(c) The Stream Assessment Monitoring Program has six (6) sample locations unlike the rest of the Receiving Waters Monitoring Program, which have three (3) sample locations.

Table 11-2: SAR Sampling Programs and Sampling Methods

A description of sampling locations is provided in the Monitoring Plan, Volume IV.

Sampling Program (Monitoring Stations)	**Program Component**	**Matrix**	**Analytical Categories**	**# Samples (field duplicates[a])**	**Type of Sampling**
Receiving Water (2)	Dry Weather	Water	Field Parameters, Chemistry, Microbiology, Toxicity	4 (1)[b]	Grab
	Stream Assessment[c] (5)	Water, Algae, BMI	Field Parameters, Chemistry, Microbiology, Toxicity	5 (1)	Grab
	Storm Event	Water	Field Parameters, Chemistry, Microbiology, Toxicity	4 (NA)	Grab
	Water Column Toxicity – Storm Event	Water	Acute and Chronic Toxicity	4	Grab
	Water Column Toxicity – Dry Weather	Water	Acute and Chronic Toxicity	4 (NA)[b]	Grab
	Follow up Approach and Actions	Water	No additional analyses are required. Field Parameters, Chemistry and Toxicity, may be collected as part of source investigation.	Conditional[d]	Grabs, if necessary
MS4 Monitoring (7)	Non-stormwater Dry Weather	Water	Field Parameters, Chemistry, Microbiology	14 (1)	Grab
	Source ID Monitoring		Conditional[d]	Conditional[d]	Grab
	Storm Event		Field Parameters, Chemistry, Microbiology	21 (1)	Grab
	Source ID Monitoring		Conditional[d]	Conditional[d]	Grab

(a) Frequency of field duplicates are based on 1 per 20 samples annually. Reflects events noted in Table 10.2.
(b) Samples will be captured with stream assessments during one Dry Weather monitoring event.
(c) The Stream Assessment Monitoring Program has five sample locations unlike the rest of the Receiving Waters Monitoring Program, which has two sample locations.
(d) Conditional – Follow up actions and source investigations are dependent on the results from the associated events and will vary each year.

Table 11-3: WWR Sampling Programs and Sampling Methods

A description of sampling locations is provided in the Monitoring Plan, Volume IV.

Sampling Program (Monitoring Stations)	**Program Component**	**Matrix**	**Analytical Categories**	**# Samples (field duplicates)**	**Type of Sampling**
Receiving Water (2)[a]	Dry Weather	Water	Field Parameters, Chemistry, Microbiology	2[b] (1)	Grab or composite
	Storm Event	Water	Field Parameters, Chemistry, Microbiology	4-6[b] (NA)	Grab or composite
MS4 Monitoring (3)	Non-stormwater Dry Weather	Water	Field Parameters, Chemistry, Microbiology	6-9[b] (1)	Grab or composite
	Storm Event		Field Parameters, Chemistry, Microbiology	6-9[b] (1)	Grab or composite
	Quarterly IC/ID Monitoring[c]		Field Parameters, Conditional[d]	12, Conditional[d]	Grab or composite

(a) The Upper Whitewater River Receiving Water is not required to be sampled during Dry Weather, and is sampled during Storm Events only when flow is present at Golf Center Parkway. Two Storm Events are assumed for sample counts.
(b) One additional sample may be required to be analyzed for Priority Pollutants between WWR MS4 Permit years 2 through 4.
(c) Monitoring may occur in conjunction with two Dry Weather monitoring events.
(d) Conditional – Additional constituent analysis, follow up actions, and source investigations are dependent on the results from the associated monitoring events and may vary each event.

12. SAMPLE HANDLING AND CUSTODY

This section describes the general samples handling and custody procedures used by all field and laboratory personnel.

12.1 Sample Handling Protocols

The laboratory will provide appropriate sample containers for the samples as indicated in Monitoring Plans. At the time of sample collection, the sample labels will be completed in the field with the date and time. The Sample IDs will also be entered directly onto the Field Data Log Sheets and the COC Forms. The COCs will be pre-printed along with the bottle labels when feasible. The COCs will be completed in the field with dates, times and sample team names, and will be cross-checked with the bottles to make sure proper samples have been collected. The COC form for this project is attached in Appendix A.

All samples bottles will be labeled with the following information:

Required	Recommended (in addition)
Sample ID (unique)	Project name
Site ID	Monitoring Program
Sample date	Bottle Size and Type
Sample time	Bottle __ of __
Sampler's initials	
Preservative	
Grab or Composite	
Client	
Field Tests/Remarks/Analysis*	

* Analysis may be listed on the bottle or "see attached list" may be referenced on the bottle when a separate list is provided to the laboratory prior to the monitoring event.

The following sample handling protocols will be followed when collecting samples to minimize the possibility of contamination:

Composite sampling requires multiple automated aliquots to be transferred into a composite bottle. After the aliquots are collected, the bottle will be tightly capped.

Once sample containers are filled, they will be promptly placed on ice, (target temperature = $4^{o}C$) and transported to the laboratory for processing to meet holding times. All necessary pre-processing for analysis, such as filtration and acidification, will take place in the laboratory by certified personnel.

After the field crew collects and delivers the samples to the laboratory, the laboratory will conduct the analysis within the holding times, as specified in individual monitoring programs, available in Volumes III through V. These field and laboratory activities will be coordinated to make sure all samples are handled within the proper holding times and analyses are completed within holding times. With composite samples, the start of holding times is considered to be the time that the last aliquot was collected.

After the laboratory receives the water samples, the certified laboratory technicians will dispense the sample contents into containers that contain the required volume, as specified in individual monitoring programs, available in Volumes III through V. The laboratory will preserve the water samples using the appropriate preservatives and the laboratory will conduct the analysis within the maximum holding time

limits. When applicable, the sample handling and custody procedures described are in compliance with SWAMP SOP, as defined in the SWAMP Quality Assurance Management Plan, Appendix D "Field Collection of Water Samples."

12.2 Sample ID Format

Sample IDs for the monitoring programs under this CMP will follow the same general format to reduce field and laboratory errors and improve data management. The sample IDs will have the same general format that includes the sampling year, event code, last three digits of the station ID number, and a two digit sample code. When samples are collected from multiple sample points at one monitoring location as in the case of the High Priority Inland Aquatic Habitat Monitoring or Source Identification Studies, the three digit station ID number will be followed by a specific code identifying the sample point. Below are details of the segments of the sample IDs followed by some examples of proper Sample ID labeling:

General Sample ID Format:
[Sample Year] – [Event Code] – [Station Code] – [Sample Code]

Format Detail:

- **Sample Year** – The sample year is the fiscal year in which sampling is taking place. For example, if a sample is collected in October of 2010, that falls within the fiscal year of 2010-2011, therefore the Sample Year for that Sample ID is '1011'.
- **Event Code** – The event code designates if the sample is a Storm Event or Dry Weather monitoring event sample by a 'W' or 'D', respectively. The sequential event number for that season follows the letter. For example, W1 would be the first Storm Event for a given sample year and D2 would be the second Dry Weather monitoring event for a given sample year.
- **Station Code** – The last three digits of the Station ID as assigned by the District. For example, Temecula Creek Station ID 902LTC777 is contained in the Sample ID as '777' and Warm Springs Channel Station ID 902WMS397 is contained in the Sample ID as '397'.
  - If the samples are collected as part of the High Priority Inland Aquatic Habitat Monitoring, three sample points are associated with one monitoring location. For these monitoring locations a sample is collected from the outfall, upstream in the Receiving Water and downstream in the Receiving Water. These samples are identified by the letters A, B and C moving downstream. For example:
    - 397A – Sample collected from the Receiving Water, upstream of Outfall 397
    - 397B – Sample collected directly from Outfall 397
    - 397C – Sample collected from the Receiving Water, downstream of Outfall 397
  - If samples are collected as part of a Source Identification Study, samples will be collected on an as-needed basis moving upstream from the original monitoring location. These samples will be identified with an 'S' following the station.
  - ID number to indicate they are source identification samples associated with the original sample location. Given that the number of samples for a source identification study is unknown, the 'S' will be followed by an ascending digit to indicate the sample number moving upstream from the original monitoring point. For example:
    - 397S1 – The first source ID sample collected upstream from the original 397 monitoring location.

  - 397S6 – The sixth source ID sample collected upstream from the original 397 monitoring location.

- **Sample Code** – The sample code designates if the sample is a primary sample, a field duplicate sample, or a field blank sample. The codes are as follows:
  - 01 – Primary Sample
  - 02 – Field Duplicate
  - 03 – Field Blank
  - 04 – Trip Blank

General Sample ID Examples:

1. Sample ID: 1011-D2-777-01 (2010-2011 year, 2nd Dry Weather monitoring event, Temecula Creek Site 902LTC777, Primary Sample)

12.3 Chain-of-Custody Procedures

COCs will be pre-printed along with the bottle labels when feasible. The COCs will contain the same data as the labels, including the name of the laboratory the samples are being submitted to, and, in some cases as needed, even greater detail. The COCs will be completed in the field with dates, times and sample team names, and will be cross-checked with the bottles to make sure proper samples have been collected. The COC form being used for projects under this CMP is attached in Appendix B.

The COC forms for the samples will be transported with the samples to the analytical laboratory. Sampled water will be kept properly chilled and transferred to an analytical laboratory within holding times. When custody of the samples is transferred to the laboratory courier, the COC will be signed and dated, and a Xerox or *.pdf copy will be sent from the laboratory to the District and/or other monitoring personnel. The COCs will be reviewed by personnel at the receiving laboratories to ensure that no samples have been lost in transport. The laboratories will also verify that each sample has been received and analyzed within holding times.

13. ANALYTICAL METHODS

The majority of constituents for this project will be analyzed using USEPA-required, State Board-required, and/or SWAMP-required methods and RLs. If laboratory-suggested reporting limits are more stringent than those recommended by SWAMP, laboratory-suggested reporting limits will be applied. Table 6-2 summarizes required information regarding analytical methods. For details regarding the Quality Assurance measure or performance criteria for each analytical method, refer to Sections 7 and 14. The MS4 Permit-specific monitoring plans provided in Volumes III, IV and V contain constituent lists, holding time criteria, and Water Quality Objectives tailored to each MS4 Permit and monitoring program requirements.

13.1 Laboratory Analysis

The appropriate preservation and preparation methods will be conducted for each parameter. All samples will be analyzed for the listed constituents within their respective hold times. Analyses methods are consistent with those described in the Standard Methods for the Examination of Water and Wastewater (APHA *et al*, 2005) and USEPA standard methods. The list of constituents, measurement techniques and RLs are presented in Table 6-2.

13.2 Sample Disposal Procedures

After analysis, including QA/QC procedures, any excess sample will be disposed of by the analytical laboratories.

13.3 Corrective Action Procedures

Corrective action is taken when an analysis is deemed suspect for some reason. The reasons include exceedances of the Relative Percent Difference ranges, recoveries and blanks. The corrective action varies somewhat from analysis to analysis, but the procedure typically involves the following:

- A check of procedures;
- A review of documents and calculations to identify possible errors;
- Correction of errors;
- A re-analysis of the sample extract, if sufficient volume is available, to determine if results can be improved; and
- A complete reprocessing and re-analysis of additional sample material, if sufficient volume is available, and if the holding time has not been exceeded.

Any failures (e.g., instrument failures) that occur during laboratory analyses will be the responsibility of the laboratory conducting the work. The QA Officer at each laboratory has procedures in place to follow when failures occur, and will identify individuals responsible for corrective action and develop appropriate documentation. Any corrective actions taken will be documented in the laboratory's hard copy deliverable or in a Corrective Action Plan. For more information on laboratory QA procedures please refer to their QA Manual available in Appendix A (electronic version only). Laboratory contact information is available in Appendix O.

14. QUALITY CONTROL

This section addresses QA/QC activities associated with both field sampling and laboratory analyses. The field QA/QC samples are used to evaluate potential contamination and sampling error introduced prior to submittal of samples to the analytical laboratory. Laboratory QA/QC activities provide information needed to assess laboratory contamination, analytical precision and analytical accuracy. If any QA/QC standards are not met, the appropriate corrective actions will be taken in accordance with Section 8.3 of this document and the laboratory QA manual, available in Appendix A. Laboratory contact information is available in Appendix O.

14.1 Field Sampling Quality Control

Sampling quality control uses the following field quality control samples used to evaluate sampling error, potential contamination and precision of sampling methodology. The results of the field quality control data will be included with the environmental sample data in lab reports and SWAMP compatible EDDs with the exception of equipment blank results which will be provided separately prior to any sampling activities. Table 14.1 describes the frequency and acceptance limits for each type of field quality control samples.

1. **Field Blanks** – Field blanks verify that field conditions, field sampling activities and air deposition are non-contaminating. A sample bottle is filled with reagent-grade, analyte-free de-ionized water in the field during a sampling event. Field blanks will not be conducted on flow-weighted or 24-hour time-weighted composite samples. Field blanks will be analyzed for the full suite of constituents being analyzed from grab samples for that particular sampling event and/or project.
2. **Field Duplicates** – Field duplicates evaluate sampling error introduced by both field sampling and laboratory analyses. Field duplicates are submitted blind to the laboratory. Procedures for collecting field duplicates should be the same as those used for collecting field samples. Duplicates of manual grab samples will be collected by filling two grab sample containers at the same time or in rapid sequence. Field duplicates will not be conducted on flow-weighted or 24-hour time-weighted composite samples. Field duplicates will be analyzed for the same suite of analyses as the primary grab samples.
3. **Equipment Blanks** – Equipment blanks verify that the re-usable sampling containers and tubing are contaminant free prior to sampling. If sampling containers or tubing are re-used then equipment/bottles will be cleaned and blanked. When containers are not pre-certified or provided from a laboratory then one container per batch ordered will be blanked prior to use in sample collection. Field blanks will be analyzed for a representative set of constituents.
4. **Travel Blanks** – Travel or trip blanks verify that volatile organic analysis samples are handled and transported from the field to the laboratory without contamination. One volatile organic analysis vial with reagent water free of volatile contaminants is transported to the site in the same cooler as the empty sample containers. The travel blank is handled like a sample but never opened and then returned to the laboratory. Travel blanks will be analyzed for VOCs and/or SVOCs only.

Table 14-1: Field Sampling Quality Control

Field QC	Frequency	Acceptance Limits
Equipment or Container Blanks	Once per batch of equipment.	Concentrations should be below the RL.
Field Blank[(a)]	Amount equal to 5% of all program samples, water samples only.	Concentrations should be below the RL.
Field Duplicate[(a)]	Amount equal to 5% of all program samples.	Relative Percent Difference range of 0-25% [(b)].
Travel Blank	For VOCs/SVOCs only, Amount equal to 5% of all program samples.	Concentrations should be below the RL.

(a) Field Blanks and Field Duplicates will not be conducted on flow-weighted composites or 24-hour time-weighted composites.
(b) Acceptance limits are not applicable if the concentration of either the primary or duplicate sample is less than the RL.

14.2 Laboratory Quality Control Analyses

Laboratory quality control analyses will include the use of laboratory replicates, method blanks, MS/MSDs, laboratory control samples and Standard Reference Materials as described below. Laboratory quality control results will be provided in a laboratory report and SWAMP compatible EDD with a batch identification number to correlate with the corresponding environmental sample data set. Table 14.2 describes the frequency and types of quality control samples for each constituent category.

1. **Laboratory Replicate/Split** – A sample is split by the laboratory into two portions and each portion is analyzed. Once analyzed, the results are evaluated by calculating the Relative Percent Difference between the two sets of results. This serves as a measure of the reproducibility, or precision, of the sample analysis. Typically, replicate results should fall within an accepted Relative Percent Difference range, depending upon the analysis.
2. **Method Blanks** – A method blank is an analysis of a known clean sample matrix that has been subjected to the same complete analytical procedure as the field sample to determine if potential contamination has been introduced during processing. Blank analysis results are evaluated by checking against RLs for that analyte. Results obtained should be less than the RL for each analyte. For Toxicity, laboratory control water will be tested based on the manipulations performed on one or more of the ambient samples and will be consistent with the USEPA method guidance.
3. **Matrix Spike and Matrix Spike Duplicates (MS/MSDs)** – The purpose of matrix spikes and matrix spike duplicates are to determine how the matrix of the sample affects both the precision and bias associated with the results. Matrix spikes and matrix spike duplicates involve adding a known amount of the chemical(s) of interest to one of the actual samples being analyzed. One sample is split into three separate portions. One portion is analyzed to determine the concentration of the analyte in question in an un-spiked state. The other two portions are spiked with a known concentration of the analytes of interest. The recovery of the spike, after accounting for the concentration of the analyte in the original sample, is a measure of the accuracy of the analysis. An additional precision measure is made by calculating the Relative Percent Difference of the duplicate spike recoveries. Both the Relative Percent Difference values and spike recoveries are compared against accepted and known method dependent acceptance limits. Results outside these limits are subject to corrective action.

4. **Standard Reference Material** – A Standard Reference Material is a sample containing a known and certified amount of the analyte of interest and is typically analyzed with the analyst not knowing the analyte concentration. Standard Reference Materials are typically purchased from independent suppliers who prepare them and certify the analyte concentrations. Results are evaluated by comparing results obtained against the known quantity and the acceptable range of results supplied by the manufacturer. For Toxicity, accuracy will be measured with the use of a reference toxicant test that must be conducted per batch for species from commercial supplier settings or monthly for species raised within a laboratory.

5. **Laboratory Control Sample** – The laboratory control sample procedure involves spiking known amounts of the analyte of interest into a known, clean, sample matrix to assess the possible matrix effects on spike recoveries. High or low recoveries of the analytes in the matrix spikes may be caused by interferences in the sample. Laboratory control samples assess these possible matrix effects since the laboratory control sample is known to be free from interferences.

6. **Surrogate compounds** – Surrogate compounds accompany organic measurements in order to estimate losses of the target analyte during sample extraction and analysis. If there is any loss of the surrogate compound during preparation and analysis then it is presumed that the target analyte experienced a similar loss. Surrogate results will be reported with the corresponding organic results for each sample analyzed.

7. **Dilution Samples** – For dilutions carried out to facilitate analysis, all reported results must be corrected for the dilution and flagged to identify that a sample was diluted. Corresponding batch QA samples must be analyzed at the same dilution factor as the analytical batch.

8. **Benthic Macroinvertebrates** – Accuracy will be determined annually by having 20 percent of the samples re-analyzed and validated to CSBP Level 3 (genus level) by a professional taxonomist.

Table 14-3: Analytical Quality Control

Analyte	Laboratory Replicate	Method Blank	MS/MSD	SRM	LCS[a]
General Chemistry[b]	✓	✓	✓	✓	✓
Total and Dissolved Trace Metals	✓	✓	✓	–	–
Microbiology	✓	–	–	✓[c]	–
Organics					
Polynuclear Aromatic Hydrocarbons (PAHs)	–	✓	✓	✓	–
Pesticides	–	✓	✓	✓	–
Aroclor PCBs	–	✓	–	–	–
Synthetic Pyrethroid Pesticides by NCI-GCMS	–	✓	✓	✓	–
Volatiles	–	✓	✓	✓	–
Toxicity	–	✓	–	✓[d]	–
Other Toxicants	–	✓	–	✓	–

Frequency: Laboratory quality control samples will be analyzed once per analytical batch. An analytical batch is defined as 20 samples or less and may include samples from multiple projects.

(a) According the SWAMP requirements, the Lab Control Sample is an alternate method of assessing accuracy when a Standard Reference Material is not available.

(b) Most general chemistry constituents are addressed by SWAMP requirements, however, some are not and quality control analyses will be conducted based on the standard methods.

(c) For Microbiology, the Standard Reference Material is the analysis of positive and negative controls.

(d) For Toxicity, the SRM is a reference toxicant test that must be conducted per batch for species from commercial supplier settings or monthly for species raised within a laboratory.

15. INSTRUMENT/EQUIPMENT TESTING, INSPECTION AND MAINTENANCE

All field equipment will be tested, inspected and maintained according to manufacturer specifications. Sample equipment testing, inspection and maintenance shall be performed on a general schedule of semi-annually or on an event basis as-needed, no more than seven days before a monitoring event (Table 15-1). Replacement parts will be installed as necessary and may be stored onsite in the monitoring shed or brought to the site with field crews. General descriptions of field equipment to be used for the monitoring programs covered under this QAPP are as follows:

Data Logging Flow Meter

Data logging flow meters measure, calculate and log flow data based on a set of continuous measurements and programmed information. Water stage is measured using a bubbler level meter or a pressure transducer. A bubbler level meter translates the proportional relationship of the hydrostatic pressure associated with releasing air bubbles from the bubbler orifice into the height of water above the bubbler orifice. Pressure transducers work in a similar manner except the pressure of the water acts directly on the pressure transducer installed in the water column. The flow meters may incorporate a velocity sensor to measure water velocity using Doppler technology, which rates the velocity of particles in the water. The flow meter allows for programming of the geometry of the conveyance and based on input from the water level sensor and velocity, if applicable, the flow meter calculates instantaneous flow rates. The flow meters also have inputs for a rain gauge, sampler communication and telemetry devices.

Automated Sampler

Automated samplers are programmable to collect time-weighted or flow-weighted composite samples. Samples are collected using Teflon® or Teflon®-lined intake tubing and silicone peristaltic pump tubing. When collecting time-weighted composites, the sampler can be programmed to collect sample aliquots based on desired time intervals. When collecting flow-weighted composites the sampler is programmed to collect samples based on data received from the flow meter. Samplers can be volume calibrated to collect aliquots of a desired volume. Samplers can be equipped with a distributor arm to deliver samples to multiple bottles, if desired. Other settings can be made to the samplers, including start/stop triggers such as high or low water level, which is transmitted via a flow meter. The samplers can also be set to deliver a notification to the data logging flow meter every time an aliquot is collected along with the sample status of "success" or "failure" to provide a record of sample history.

Tipping Bucket Rain Gauge

A tipping bucket rain gauge has a bucket inside that is calibrated to tip once a set volume of water associated with 0.01 inch of rainfall has accumulated. Each time the bucket tips a switch is momentarily closed, sending a signal to the data logging flow meter and it is recorded as 0.01 inch of rainfall with a date/time stamp.

Data Telemetry Unit

Data telemetry units can be used in areas where cellular data service is available to communicate remotely with the data logging flow meter. This allows for remote control of flow meter setting, sample pacings, data downloading and program initiation or completion.

Field Water Quality Probes

Field water quality probes are used to collect *in-situ* water quality measurements in the field by placing directly in the water column or in a secondary container if the water depth does not allow the probe to be completely submerged. Probes should be exposed to flow in a representative portion of the stream or discharge. If there is no flow (i.e., ponded) or a secondary container is required to make measurements, the probe should be gently agitated, particularly when making DO measurements using polarographic

(Clark Cell) probes. Probes can either be individual or part of a multi-parameter meter (sonde). Probes should be calibrated per manufacturer specification prior to use in the field.

Power

The automated sampling equipment and flow meters will be powered by 12-VDC power sources. The power sources will be either 12-VDC deep-cycle marine batteries or 12-VDC Gel Cell batteries. At each monitoring station, one battery will be used to power the automated samplers and another will power the flow meters and modems. A 30-watt solar panel may be installed at long-term stations, if desired, to keep the batteries charged. If a solar panel is installed a solar panel voltage regulator will be installed to regulate the voltage from the panel to the battery to allow for safe charging.

Equipment Security Housing

Fiberglass or metal equipment enclosures may be used at monitoring stations where access allows. The enclosures will house all monitoring equipment. The enclosures will be bolted to the concrete monitoring pads and locked to secure the monitoring equipment.

Permanent Station Installation

Monitoring stations installed as "permanent" stations are intended to remain in the same location for multiple years or indefinite periods of time. This type of installation typically includes installing a security housing to contain a flow meter, automated sampler, battery, solar panel and regulator, and rain gauge. Sample tubing, bubbler tubing and/or AVB sensors are routed to the discharge through conduit and mounted to stationary features or buried to provide long-term protection. If desired, the station electronics may be removed during the summer months to avoid potential overheating and damage. Sample tubing should be replaced with clean tubing at the beginning of each monitoring season as dictated by each monitoring program.

Temporary Station Installation

Monitoring stations installed as "temporary" stations are intended to remain onsite for short periods of time such as a single monitoring event or a single season with a few events. This type of installation typically involves mounting sampling tubing, bubbler tubing and/or AVB probes in the discharge using expansion rings or similar light-duty methods of installation. The tubing and probe cables are not typically shrouded in conduit and can either be removed between sampling events or coiled and stored onsite, depending on site characteristics and channel access. Monitoring electronics are placed onsite during pre-monitoring activities and may be locked together or to stationary features if available. Monitoring electronics are removed at the completion of sampling activities.

Handheld Flow Meter

Handheld flow meters are used to measure instantaneous water velocity. These meters can be used to take a single measurement or to conduct stream gauging in accordance with United States Geological Survey (USGS) stream gauging protocols (Rantz, 1982). Some handheld flow meters have the capability to store data points during stream gauging and output a final discharge value.

Handheld Global Positioning System (GPS) Unit

Handheld GPS units are used to locate the position of sites based on latitude and longitude. Units should be equipped with differential capabilities to provide higher accuracy. Users should allow time for the unit to communicate with satellites prior to use to obtain accurate position data.

Table 15-1: Testing, Inspection, and Maintenance of Field Equipment and Monitoring Instruments

Equipment	Maintenance/ Testing/Inspection Activity	Responsible Person	Frequency	SOP Reference
Data Logging Flow Meter	Maintenance and Inspection	Deploying agency or Consultant	Semi-annually or as needed	Manufacturer O&M Manual
Automated Sampler	Maintenance and Inspection	Deploying agency or Consultant	Semi-annually or as needed	Manufacturer O&M Manual
Tipping Bucket Rain Gauge	Maintenance and Inspection	Deploying agency or Consultant	Semi-annually or as needed	NA
Data Telemetry Unit	Maintenance and Inspection	Deploying agency or Consultant	Semi-annually or as needed	Manufacturer O&M Manual
Field Water Quality Meter(s)	Maintenance and Inspection	Deploying agency or Consultant	Semi-annually or as needed	Manufacturer(s) O&M Manual(s)

All laboratory equipment is tested, inspected and maintained based on manufacturer recommendations and accepted laboratory protocols. The laboratories maintain testing, inspection and maintenance practices as part of their method SOPs maintained in their laboratories by their Laboratory Director/QA Officer and can be provided upon request.

All field instrument testing, inspection and maintenance frequencies are consistent with SWAMP QAMP Appendix 4. Monitoring consultants will maintain instrument testing, inspection and maintenance practices as part of the method SOPs and recorded in calibration logs at their respective offices. The District's QA Officer has reviewed these practices and finds them in conformity with SWAMP requirements.

16. INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

Calibration of field meters will be performed no more than seven days prior to a sampling event, or as-needed. A calibration log will be maintained for all meters used in the field. All meters will be calibrated according to the manufacturer's operations manual. Any parameters that do not require frequent calibration per manufacturer recommendation will be checked in a known standard for verification and documentation purposes. Calibration logs will be kept on file at the District. For District-owned equipment, instructions for calibration and measurements are provided in Appendix M.

All laboratory equipment is calibrated based on manufacturer recommendations and accepted laboratory protocols. The laboratories maintain calibration practices as part of their method SOPs maintained in their laboratories by their Laboratory Director/QA officer and can be provided upon request.

Calibration for all flow meters and automated samplers will be conducted prior to installation and, thereafter, no more than seven days before a monitoring event. The data logging flow meter and automated sampler will be calibrated per the manufacturer's operation manual. For flow meter calibration, the recorded water level will be checked by comparing the level to actual levels while the water level sensor is submerged in water of a known level. Computational calibrations cannot be

performed but deviations from known values are documented and the equipment will be replaced or repaired as necessary. For automated sampler calibration, the aliquot volume will be calibrated using a graduated flask or beaker.

All field instrument calibration frequencies are consistent with SWAMP QAMP Appendix 4. Laboratory consultants maintain calibration practices as part of their method SOPs. The District's QA Officer has reviewed these practices and finds them in conformity with SWAMP requirements.

17. INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

All glassware, sample bottles and collection equipment, including tubing, will be inspected prior to use. All ordered supplies will be examined for damage as they are received. Bottles and caps will be inspected for damage prior to sampling, and only sound bottles with intact threads will be used. The container caps will be tested for tightness prior to transport of samples.

The monitoring agency's/consultant's Project Manager will ensure sufficient field supplies are on hand prior to the start of sampling for each period. Field supplies will be stored at each respective monitoring agency's/consultant's offices or onsite in a monitoring shed. Laboratory supplies will be stored at the laboratories conducting the work.

Table 17-1: Inspection/Acceptance Testing Requirements for Consumables and Supplies

Project-Related Supplies/Consumables	Inspection/Testing Specifications	Acceptance Criteria	Frequency	Responsible Individual
Pre-Cleaned Sample Containers	Open container	Lids screwed on bottles	100%	Sampling agency or Consultant
Laboratory Glassware	Dirty	Clean	100%	Laboratory Consultant
Lab Solvents and Acids	Leaks	No cracks or chips	Prior to use	Laboratory Consultant
19-Liter Glass or 1-Liter Glass	If not certified pre-cleaned then laboratory blanked	Pass blanking analysis	New bottles each monitoring year	Laboratory Consultant, Sampling agency or Consultant
Silicone Tubing	Laboratory cleaned and blanked	Pass blanking analysis	New tubing at start of fiscal year	Laboratory Consultant, Sampling agency or Consultant
Teflon Tubing	Laboratory cleaned and blanked	Pass blanking analysis	New tubing at start of fiscal year	Laboratory Consultant, Sampling agency or Consultant

18. NON-DIRECT MEASUREMENTS (EXISTING DATA)

Historical monitoring data and fire data collected by an outside agency will be used in the Monitoring Annual Report to identify trends and conduct comparisons.

19. DATA MANAGEMENT

Data will be submitted in a standardized SWAMP-compatible format developed by the SMC[6] in order to standardize the data provided by multiple entities, document data quality to ease the comparison of data sets and to facilitate timely submittals. The District will compile the monitoring and analytical data, and provide the data set(s) to San Diego, Santa Ana and Colorado River Regional Boards in the respective Annual Monitoring Reports and deliverables. Data is submitted to the California Environmental Data Exchange Network (CEDEN) Regional Data Center at SCCWRP annually. Any intentional deviations from SWAMP protocols or requirements not specified in this QAPP (Volume II) or the Monitoring Plans (Volumes III, IV or V) will be provided in the respective Monitoring Annual Report.

19.1 Hydraulic Data

The respective monitoring agency's or consultant's Project Manager is responsible for hydraulic data management of their respective monitoring project and will track the data logger results, which include rainfall, sampling history and discharge (velocity, stage and instantaneous flow) data, when applicable. The original electronic data logger files will be saved electronically as Insight files on the project file. Sampling teams will manually check the data logger results while at the site. The visual discharge and precipitation observed by field crews during the storm and the precipitation posted for nearby sites on the NWS website will be compared to the logged data. If a large discrepancy exists, all equipment will be checked for malfunction. Any other site problems, such as debris clogging the conduits, will be checked and eradicated during the monitoring event. After each Storm Event, the logged data will be screened for the following major items:

- A check of the meter and sampler settings associated with each data logger file, including Station ID and units, to verify that correct information matches the flow data set. Incorrect settings will be re-programmed for future events.
- A data gap check to identify time periods with no recorded data during the monitoring event. Any data gaps will be identified, logged and investigated.
- A check of the discharge start time and precipitation start time.
- A check of rainfall intensity and discharge values throughout the monitoring event to verify that the discharge increased and decreased when the rainfall intensity increased and decreased.
- A check of the number of samples and discharge to verify that the frequency of sampling increased when discharge increased.

19.2 Field Observations and In-situ Measurements

The District Program Manager will review all Field Data Log Sheets for completeness, maintain the original hard copies and scan electronic copies (*.pdf) for storage in the project file. Photographs of the monitoring sites taken by field personnel will be uploaded into the project file within three business days of field visits. Field team members will name the photographs using the photograph naming convention developed specifically for a particular monitoring project. Calibration logs for handheld meters will be reviewed by the Project Manager and saved in the project file. Copies of field data sheets, photographs and calibration logs will be delivered to the District within fourteen (14) calendar days of each monitoring event, along with any post-storm technical memoranda and data.

[6] *Standardized data exchange formats for the stormwater monitoring coalition*. 2004. L. Cooper, K. Schiff, R. Smith. Technical Report 421. Southern California Coastal Water Research Project. Westminster, CA.

19.3 Analytical Data

The laboratories will provide data in both *.pdf copies of lab reports and in a SWAMP-compatible electronic format. A SWAMP-compatible template will ensure that the data files can be uploaded to the SWAMP regional database as required by the permits. SWAMP Compatible Data Guidance Manuals are provided in Appendix I. The Laboratory Project Manager will review all lab reports and EDDs for accuracy, completeness and compatibility with SWAMP. Chemistry analytical results will be submitted to the District in *.pdf format and as a SWAMP compatible EDD within three (3) weeks of receipt of samples.

Within seven (7) days from receipt, the District Program Manager will screen preliminary data deliverables for the following major items:

- A 100-percent check between electronic data provided by the laboratory and the hard copy reports
- Conformity check between the Chain-of-Custody Forms and laboratory reports
- A check for laboratory data report completeness
- A check for typographical errors on the laboratory reports
- A check for suspect values, flagged data and review of laboratory QA data

After the District Program Manager has made the necessary corrections or revisions and verified the data meets the quality requirements of the CMP and QAPP, the data will be uploaded in the Hydstra database. The District maintains its rainfall and water quality data in a proprietary integrated data management system known as Hydstra©[7]. The Hydstra© software system was installed early in FY 1999-2000. It uses stringent quality control procedures and includes a set of data analysis and reporting procedures. Water quality data collected by other Permittees may also be stored in the District's database. The Hydstra database will incorporate a number of quality control checks and queries to further verify and validate data. The Hydstra Data Manager will control the access to the project's database. Hydstra data entry procedures are provided in Appendix M. The laboratory EDDs will be maintained in a file separate to the cumulative database so the original SWAMP compatible EDDs are maintained and can be used as a reference. If data is reissued, the file name will include the date and the word "revised". To manage the revision and prevent duplicate entries, the erroneous dataset will be removed from the database prior to uploading the revised dataset.

19.4 Bioassessment Data

The District Program Manager and/or consultant Project Manager will review all lab reports and EDDs for accuracy, completeness and compatibility with SWAMP. Lab reports and EDDs will be stored by the District and/or consultant in the project file. Bioassessment and Toxicity analytical results will be provided to the District in hard copy format and as an EDD within six (6) weeks of receipt of samples.

19.5 Technical Memorandums

Technical Memorandum will be developed to provide the District's Monitoring Program Manager with a summary of the activities conducted.

[7] Although Hydstra is a proprietary data management system, the program supports export of data in commonly used spreadsheet and database formats. The use of trademark or brand names does not connote a recommendation of a particular product.

Post-Storm Technical Memorandum: Consultants will develop and submit a Post-Storm Technical Memorandum to the District for monitoring projects under their charge and a SWAMP-compatible EDD following each monitored storm event, as applicable. The deliverable will contain the following:

- A Post-Storm Technical Memorandum summarizing the Storm Event
- Hydrographs containing flow, rainfall and sample information
- Hydraulic data in a SWAMP-compatible EDD
- Field data sheets
- Photographs
- Calibration logs

The hydrographs will be created using the data logger results, rainfall data and sample information, and will be submitted in Microsoft Excel format. The Post-Storm Technical Memorandum and field forms will be submitted in *.pdf format.

Post-Event Technical Memorandum: Consultants will develop and submit a Post-Event Technical Memorandum to the District following each stream assessment or Dry Weather event for monitoring projects under their charge. The deliverable will contain the following:

- A Post-Dry Weather Monitoring Event Technical Memorandum summarizing the event, locations monitored, samples collected, and constituents
- Analytical data in a SWAMP-compatible EDD
- Field data sheets
- Photographs
- Calibration logs

Laboratories will provide analytical laboratory reports and a corresponding SWAMP-compatible EDD to the District within three (3) weeks of receipt of samples.

GROUP C ELEMENTS: ASSESSMENTS AND RESPONSE ACTIONS

20. ASSESSMENTS AND RESPONSE ACTIONS

The Program's QA Officer has the power to halt all sampling and analytical work by a consultant if the deviations noted are considered detrimental to data quality.

The District Program Manager will be responsible for the day-to-day oversight of consultant monitoring activities, laboratory analyses, and/or data reporting. Any failures (e.g., instrument failures) that occur during data collection and/or laboratory analyses will be the responsibility of the field crew or laboratory conducting the work, respectively. It is the responsibility of the consultant Project Mangers to report any assessments and proposed corrective actions to the District Program Manager.

Three types of assessments will be performed as part of this project to ensure that the sampling and analysis activities are in accordance with the approved QAPP. They are as follows:

1. **Surveillance of Sample Collection Activities:** The District Program Manager will be responsible for oversight of sampling activities and will review field datasheets to verify that the samples were collected in accordance with QAPP requirements. If the District Program Manager finds any of the field activities to be in violation of QAPP requirements, the District Program Manager has the authority to stop these activities until corrective actions are successfully implemented. Corrective actions could include additional training to improve field team performance and QAPP compliance, or appropriate re-sampling of sites, as needed. The District Program Manager will report all such actions to the NPDES Program Manager and document it in the project file. This information will be communicated regularly between the District Program Manager and the NPDES Program Manager.
2. **Data Quality Assessment:** Each Laboratory Manager will be responsible for providing a summary of QA/QC data to the District Monitoring Program Manager, who will consult with the NPDES Program Manager to verify that the performance criteria of the QAPP were met. This will occur following receipt of each report from the contract laboratory. If it is determined that the precision and accuracy objectives were not met the District Program Manager will notify the Laboratory Manager and District Project Director. The Laboratory Manager will review laboratory techniques to minimize errors, and samples will be re-analyzed, if possible.
3. **Assessment of Data Entry:** Once the performance criteria are met and the data has been submitted to the District, the District Program Manager will review data files to ensure that errors are detected and corrected. If necessary, the District may request a revised dataset from the Consultant. The District will retain original data files and qualified data will be retained in the District's database. Data is qualified according to SWAMP protocols in the District's database.

21. REPORTS TO MANAGEMENT

The section documents reports to the QA Officer describing the findings of program oversight and assessment activities taken by the Monitoring Program Manager.

Table 21-1: Reports to Management

Type of Report	Frequency	Projected Delivery Dates(s)	Person(s) Responsible for Report Preparation	Report Recipients
Progress Report	Quarterly	15 days after the end of each quarter	Monitoring Program Manager	David Garcia
Final Assessment Report	Annual	June 30th	Monitoring Program Manager	David Garcia

GROUP D ELEMENTS: DATA VALIDATION AND USABILITY

22. DATA REVIEW, VERIFICATION AND VALIDATION REQUIREMENTS

All analytical data will be reviewed and compared to the Data Quality Objectives described in Section 7 of this QAPP, along with the applicable QA/QC practices. If results fail to meet any Data Quality Objective, the District Monitoring Project Manager and/or the District QA Officer will flag them for further review. Batch QA samples will be reviewed to determine the potential cause of failure to meet the Data Quality Objective. Data will be separated into three categories: data meeting all Data Quality Objectives (acceptable data), data failing precision or recovery criteria (further investigation warranted) and data failing to meet accuracy criteria (data is rejected).

If further investigation is warranted based on data failing precision or recovery criteria, all aspects of the data will be assessed for data quality by the District Monitoring Program Manager. At that point, the data will either be accepted or rejected. If accepted, the data will be flagged with a "J" per USEPA specifications. If data fails to meet accuracy criteria, or the cause of the failure cannot be identified and rectified, the data will be excluded from inclusion in the study results. All rejected data will be retained in the Monitoring Program database, and qualified as "rejected". The ultimate decision of whether to accept or reject a data point will be made by the District Monitoring Program Manager in consultation with the District Project QA Officer.

If the analysis for more than ten percent of any given analyte fails to meet the Data Quality Objective, the Project Manager and Project QA Officer will meet to discuss the appropriateness of the Data Quality Objective and any potential modifications. All proposed modifications of Data Quality Objectives shall require a reissuance of the QAPP.

23. VERIFICATION AND VALIDATION METHODS

Data verification is the process of evaluating the completeness, correctness and conformance of the dataset against the method, procedural or contractual requirements. The goal of data validation is to evaluate whether the data quality goals established during the planning phase have been achieved (USEPA 2002). Data quality indicators will be continuously monitored by the analyst producing the data (i.e., field and lab personnel), as well as the District Monitoring Program Manager, with assistance from the District QA Manager, throughout the project to ensure that corrective actions are taken in a timely manner. Data validation is an analyte- and sample-specific process that extends verification to determine the analytical quality of the dataset (USEPA 2002). Laboratory and field personnel responsible for conducting QA analysis will be responsible for documenting when data do not meet measurement quality objectives as determined by data quality indicators.

23.1 Data Verification and Validation Responsibilities

Data collected in the field will be validated and verified by the District Monitoring Program Manager and/or consultant Project Manager. The laboratories will maintain COCs and sample manifests.

Laboratory validation and verification of the data generated is the responsibility of the respective Project Manager. Laboratories will maintain analytical reports in a database format as well as all QA/QC documentation for the laboratory. The Laboratory QA Officer will perform checks of all of its records.

The District QA Officer and Monitoring Program Manager are responsible for oversight of data collection and the initial analysis of the raw data obtained from the field and the contracted laboratory. All data records will be checked visually and recorded as checked by initials and dates.

Reconciliation and correction of any data that fails to meet the Data Quality Objectives will be done by the District Monitoring Program Manager in consultation with the District Project QA Officer and any consultant/agency Project Managers. Any corrections require a unanimous agreement that the correction is appropriate.

23.2 Process for Data Verification and Validation

Data verification and validation for sample collection and handling activities will consist of the following tasks:

- Verification that the sampling activities, sample locations, number of samples collected and type of analysis performed is in accordance with QAPP requirements;
- Documentation of any field changes or discrepancies;
- Verification that the field activities (including sample location, sample type, sample date and time, name of field personnel, etc.) were properly documented;
- Verification of proper completion of sample labels and COC forms, and secure storage of samples; and
- Verification that all samples recorded on COC forms were received by the laboratory.

Data verification and validation for the sample analysis activities will include all of the following:

- Verification that appropriate methodology has been followed;
- Verification that instrument calibrations have been adequately conducted;
- Verification that QC samples meet performance criteria;
- Verification that analytical results are complete; and
- Verification that documentation is complete.

Verification and validation of data entry includes:

- Sorting data to identify missing or mistyped (too large or too small) values;
- Double-checking all typed values; and
- Verification that correct data types correspond to database fields (i.e., text for text, integers for integers, number for numbers, dates for dates, times for times, etc.).

24. RECONCILIATION WITH USER REQUIREMENTS

The Storm Event, Dry Weather and extended flow monitoring data produced by this Monitoring Program will be used by the District to complete assessment and annual reporting. The Draft and Final Reports produced by the District will evaluate potential sources of the Pollutants-of-Concern throughout the MS4 and Receiving Water conditions using Dry Weather and Storm Event monitoring data associated with this Program. Data will be evaluated to identify and prioritize locations that may need management actions and the sources of contaminants. The limitations and assumption of the data will be provided to allow the District to determine the data's usefulness. Data will be qualified in the Monitoring Program database to identify any data considered suspect, rejected or estimated.