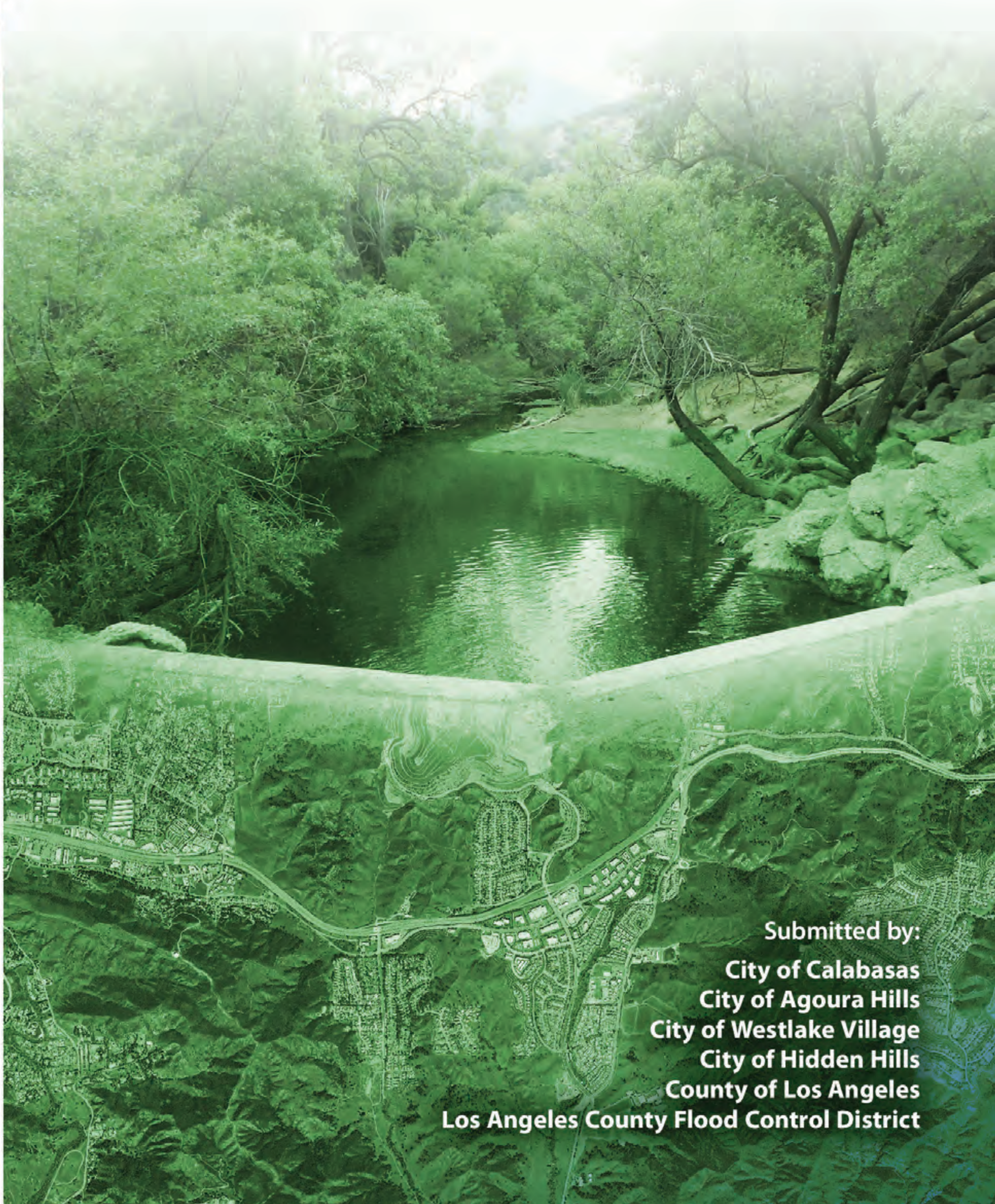
Malibu Creek Watershed
Coordinated Integrated Monitoring Plan



Submitted by:

City of Calabasas
City of Agoura Hills
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Table of Contents

Appendices

Figures

Tables

Executive Summary

The Coordinated Integrated Monitoring Program (CIMP) for Malibu Creek Watershed (MCW) was developed to gather data in order to evaluate water quality and the effectiveness of compliance measures in the MCW. The monitoring sites for receiving water monitoring, outfall monitoring, and special studies were selected to represent the water quality of the waterbodies in the MCW, the impact of Municipal Separate Storm Sewer System (MS4) discharges, and the effectiveness of Best Management Practices (BMPs).

The CIMP is coordinated with several parts of the Enhanced Watershed Management Program (EWMP) including the Reasonable Assurance Analysis (RAA) water quality model. The CIMP monitoring data is used to validate the predictions of the model and evaluate the impact of programmatic and other BMP measures on receiving water quality. The calibrated model is then used in the EWMP to assess the benefit of various BMP implementation scenarios.

The National Pollutant Discharge Elimination System (NPDES) MS4 Permit Order No. R4-2012-0175 (Permit) establishes water quality monitoring requirements for stormwater and non-stormwater discharges within the coastal watersheds of Los Angeles County. In compliance with the Permit, this CIMP includes monitoring procedures for:

- Receiving water monitoring;
- Stormwater outfall based monitoring;
- Non-stormwater outfall based monitoring;
- New Development/Re-development effectiveness tracking; and
- Regional studies.

The receiving water monitoring sites were selected to meet the requirements of the MS4 permit and to characterize subwatersheds draining to major reach segments within the Malibu watershed. Outfall monitoring will provide additional information to characterize potential sources of pollutants to the receiving water bodies, where impairments are known or identified in the CIMP monitoring program. The proposed monitoring sites are shown in Figure ES-1.

The Permit allows the flexibility to coordinate and streamline monitoring efforts to meet the Permit water quality compliance monitoring requirements through development of a CIMP. The Cities of Agoura Hills, Calabasas, Hidden Hills, and Westlake Village, the County of Los Angeles, and the Los Angeles County Flood Control District (LAFCD) worked together to develop the CIMP for the Malibu Creek Watershed.

This CIMP covers the portion of the Malibu Creek Watershed within the County of Los Angeles and upstream of the City of Malibu. Because Malibu Creek drains to Santa Monica Bay, that also has Total Maximum Daily Loads (TMDLs) and 303(d) listed impairments, the CIMP outlines a plan to estimate the loads from the CIMP area to Santa Monica Bay.

Malibu Creek Watershed

The Malibu Creek Watershed is located in the Los Angeles and Ventura Counties in Southern California. The watershed covers a 109 square mile area from the Santa Monica Mountains to Santa Monica Bay. The Malibu Creek Watershed includes several streams and lakes that flow primarily to the south and southeast directions into Malibu Creek and toward Malibu Lagoon and the Pacific Coast.

Several tributaries and lakes in the watershed have TMDLs and are included in the 303(d) list for water quality due to impairments of beneficial uses. TMDLs in the Malibu Creek Watershed have been developed for bacteria, trash, nutrients, and sediment related impairments. In addition, Santa Monica Bay has several TMDLs, including bacteria, trash (debris), DDT, and PCBs. The Santa Monica Bay TMDLs for bacteria and trash integrate the TMDL waste load allocations from the Malibu Creek TMDL.

Therefore, with the exception of the PCB and DDT TMDLs, compliance with the Santa Monica Bay TMDLs for jurisdictions in the Malibu Creek Watershed is based on the Malibu Creek TMDL allocations. Compliance with the PCB and DDT TMDLs is based on the waste load allocations assigned in the MS4 permit.

The Malibu Creek Watershed poses significant challenges for monitoring activities. The watershed has topography that limits safe access, such as steep ravines and densely vegetated riparian corridors. In addition, sensitive habitat and private property requires that permission be granted and other precautions be used to access certain areas.

Integrated Approach

The CIMP monitoring program integrates the five required primary monitoring elements and the objectives of the EWMP. Data collected during the receiving water monitoring program and the stormwater and non-stormwater outfall monitoring programs will be reviewed to understand the potential relationships between outfalls and receiving water impairments. Regional studies provide additional information to evaluate the condition of receiving waters. This information will be used to identify and prioritize the most effective compliance strategies as part of the EWMP.

The CIMP provides a framework to promote coordination between monitoring agencies for monitoring programs. In addition, the CIMP implements a multiple line of evidence approach. The information obtained from the receiving water monitoring program will be coordinated with outfall investigation and monitoring to identify potential sources and areas of concern. In addition, the type and extent of follow up monitoring and inspections will be based on initial inspection findings. The CIMP integrates and updates the plans for monitoring and investigation of TMDL pollutants, including bacterial indicators, nutrients, and trash.

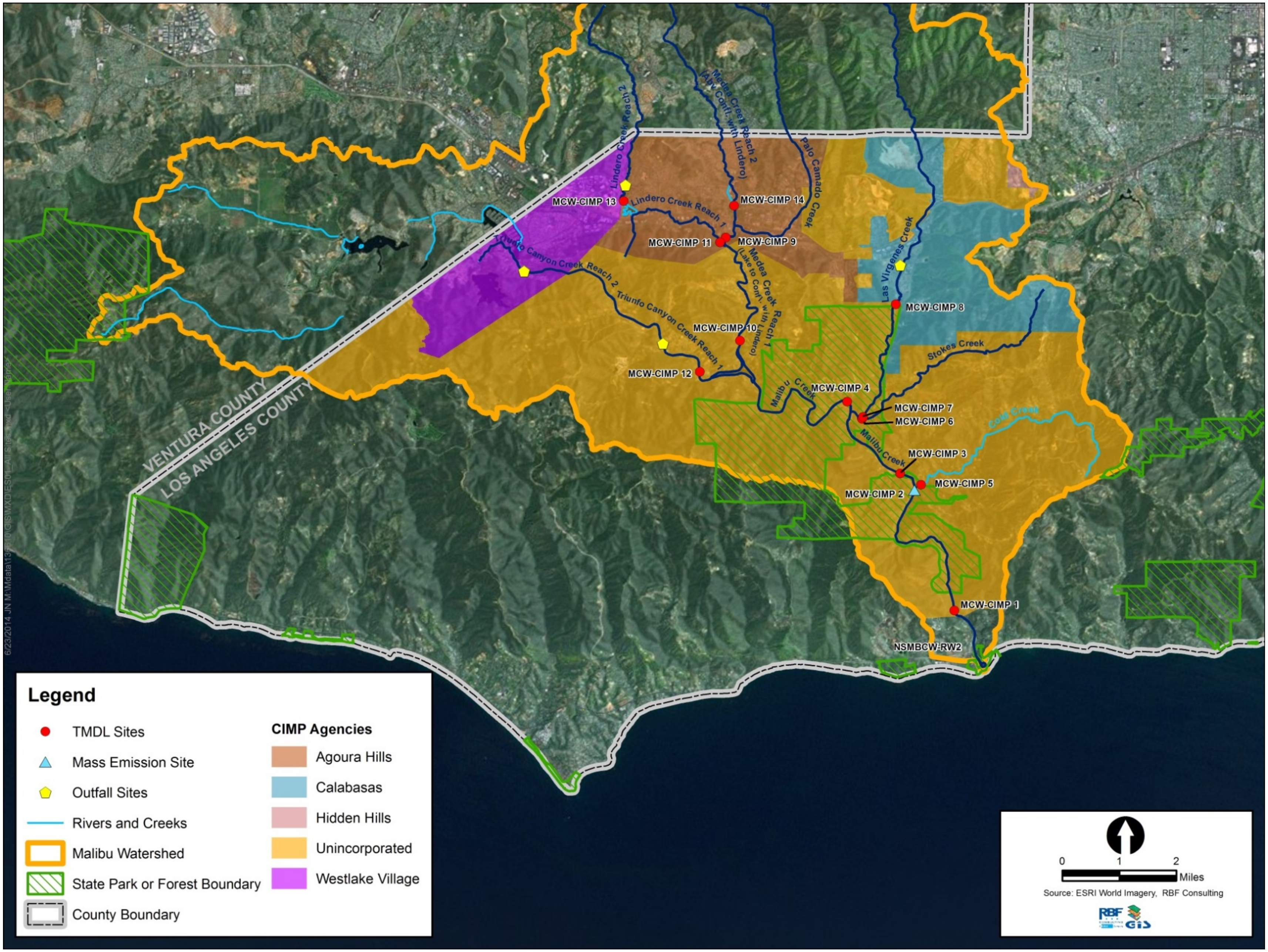
The monitoring program also collects information to be used in the EWMP to prioritize locations for implementation of BMPs where efforts will provide the most benefit to water quality in receiving waters. The EWMP is currently being developed, and it includes a water quality prioritization. The EWMP will specify the schedule for updates to the prioritization of water bodies for BMPs. The proposed monitoring sites are shown in Figure ES-1.

Receiving Water Monitoring Program

The receiving water monitoring program meets the requirements of the MS4 permit. The data will be used to characterize the runoff from subwatersheds draining to major reach segments within the Malibu watershed. Major reach segments are defined for this CIMP as reaches with TMDL WLAs, 303(d) listed impairments, or other receiving water limits (RWLs). Section VI of Attachment E of the MS4 permit includes requirements for the receiving water monitoring program. The permit requires that the Permittees conduct receiving water monitoring at:

1. TMDL receiving water compliance points, as designated in Regional Water Board Executive Officer approved TMDL Monitoring Plans,
2. Previously designated mass emission stations, and
3. Additional receiving water locations representative of the impacts from MS4 discharges.

Figure ES-1: Proposed CIMP Monitoring Sites



The receiving water quality monitoring information obtained through this program will be used to:

- assess compliance with water quality objectives (WQOs);
- calibrate and verify the Reasonable Assurance Analysis (RAA) model results for reach segments;
- evaluate the impact of BMPs, including source control, distributed and other structural BMPs, and programmatic efforts; and
- analyze spatial and temporal trends within the watershed to evaluate the impacts of compliance efforts.

Stormwater Outfall Monitoring

The CIMP includes a representative approach to characterize the stormwater discharge. The monitoring is intended to develop an understanding of the potential contributions from HUC-12 subwatersheds to receiving waters. One outfall per HUC-12 draining representative sources will be sampled under multiple stormwater events each year to characterize the discharge into the receiving waters. An analysis of the land use in each of the HUC-12 watersheds was performed to identify monitoring sites that are representative of the MS4 land use in each of the watersheds. Table ES -1 lists the locations, permittees, and geographic information about the stormwater outfall monitoring sites.

Table ES-1: Stormwater Outfall Monitoring Sites

HUC-12 Name (HUC-12 ID/ Total Outfall)	Permittee(s)	Monitoring Outfall ID (Latitude, Longitude)	Note
Potrero Valley Creek (180701040101 / 44)	Westlake Village	MCW-WLV122 (34.132436,-118.821499)	Open channel downstream of the lake.
Medea Creek (180701040102 / 39)	Agoura Hills	MCW-AGH191 (34.150688, -118.750108)	An open channel with at least one 36 inch diameter outfall nearby
Las Virgenes Creek (180701040103 / 46)	Calabasas	MCW-CAL606 (34.157689, -118.699158)	An open channel with at least one 36 inch diameter outfall.
Cold Creek-Malibu Creek (180701040104 / 8)	Unincorporated	MCW-MAL192 (34.11445, -118.779199)	Northwest side of the bridge at the intersection of Troutdale and Mulholland Hwy.

Non-Stormwater Outfall Monitoring Program

The non-stormwater outfall monitoring includes a tiered structure of investigation and monitoring to identify, investigate, and address potential sources of pollutants. Outfalls will be screened visually during dry weather conditions to identify locations with significant discharge. The outfalls will be prioritized based on the presence of discharge and the potential impact from the discharge (based on receiving water impairments and potential loading).

Follow up source investigations and efforts to eliminate dry weather flows will be initiated to identify potential sources for locations with high ambient concentrations of pollutants. These may include additional inspections, field measurements, collection of water or sediment samples for analysis, and source tracking.

Table ES-2: Receiving Water Monitoring Sites

Monitoring Site ID	MCW-CIMP 1	MASS EMISSION STATION S-02	MCW-CIMP 3	MCW-CIMP 4	MCW-CIMP 5	MCW-CIMP 6	MCW-CIMP 7	MCW-CIMP 8	MCW-CIMP 9	MCW-CIMP 10	MCW-CIMP 11	MCW-CIMP 12	MCW-CIMP 13	MCW-CIMP 14
Existing Site ID	MCW-2	Mass Emission S-02	MCW-3 / CMS_MC_1	MCW-4	MCW-5	MCW-6	MCW-7	CMS LVC 3	MCW-10	MCW-11	MCW-13 / CMS_LDC_2	MCW-16	CMS_LDC_1	CMS_MDC_1
Subwatershed	Lower Malibu Creek	Malibu Creek	Middle Malibu Creek	Upper Malibu Creek	Cold Creek	Stokes Creek	Lower Las Virgenes Creek	Lower Las Virgenes Creek	Palo Comado Creek	Lower Medea Creek	Lower Lindero Creek	Triunfo (Lower)	Upper Lindero (Reach 2)	Upper Medea (Reach 2)
Constituent	Frequency													
Bacteria TMDL														
E. coli	Weekly	3/2	Weekly	Weekly	Weekly	Weekly	Weekly		Weekly	Weekly	Weekly	Weekly		
Trash TMDL														
Trash			Monthly					Bi-monthly			Bi-monthly		Monthly	Bi-monthly
Nutrient TMDL														
Total Phosphorus		3/2					3/2			3/2	3/2			
Total Nitrogen		3/2					3/2			3/2	3/2			
Benthic Community Impairment TMDL [1]														
Total Phosphorus		3/2					3/2							
Total Nitrogen		3/2					3/2							
TSS		3/2					3/2							
Turbidity		3/2					3/2							
303(d)														
TSS							3 [3]			3 [3]		3 [3]/2 [4]		
Hardness		3 [5]								3 [5]		3 [5]/2 [4]		
Selenium		3/2					3/2			3/2	3/2			
Sulfates		3/2												
Lead / Mercury												3/2		
MS4 Receiving Water														
Flow, DO, pH, Conductivity, Temperature		3/2								3/2		3/2		
Aquatic Toxicity		2/1								2/1		2/1		
Constituents with MLs [2]		1/1								1/1		1/1		

Notes:

Where the frequency is noted with two numbers (i.e. 3/2), the first number is the number of wet weather monitoring events and the second is the number of dry weather monitoring events within a monitoring year (July 1 through June 30). For example, Aquatic Toxicity at MCW-CIMP 2 will be monitored during two wet weather events and one dry weather event.

[1] Some of the Benthic Community Impairment TMDLs constituents, SC-IBI, SC-O/E, Benthic Algal Coverage, will be assessed by the bioassessment program. Total Phosphorus is included for both the Nutrient TMDL and the Benthic Community Impairment TMDL.

[2] During the first year of the monitoring program, the monitoring program includes analysis of the constituents with minimum levels (MLs) that are listed on Table E-2 of the MRP during the first significant storm and the critical dry event. These constituents are shown in Table 9 of this report. Subsequent years will include monitoring for pollutants tested above the ML.

[3] For the sedimentation/siltation 303(d) listing, TSS will be monitored during wet weather.

[4] For dry weather when metals are monitored, TSS and Hardness will be monitored.

[5] Hardness is required at receiving water monitoring sites during wet weather.

The first step of the non-stormwater outfall monitoring program is to inventory the MS4 outfalls. The inventory includes outfalls identified from data maintained by the CIMP MS4 Stakeholders within the Malibu Creek Watershed and focuses on outfalls that are 36 inch or greater and 12" or greater in industrial areas located within the four HUC-12 sub-watersheds of Malibu Creek. The outfalls that have been inventoried will be screened to identify outfalls with significant discharges during the next step of the program. Where significant discharge is observed, follow up investigations based on the type of discharge are performed to identify the frequency of discharge at the site. Significant discharge will be defined after evaluation of the screening data. Once the outfalls with significant non-stormwater discharges have been identified, the outfalls will be prioritized and scheduled for follow up inspections and investigations.

Regional Monitoring Program

The LACFCD will continue to participate in the Regional Watershed Monitoring Program (Biosassessment Program) being managed by the Southern California Stormwater Monitoring Coalition (SMC). The LACFCD will contribute necessary resources to implement the bioassessment monitoring requirement of the MS4 permit on behalf of all permittees in Los Angeles County during the current permit cycle. Initiated in 2008, the SMC's Regional Bioassessment Program is designed to run over a five-year cycle. Monitoring under the first cycle concluded in 2013, with reporting of findings and additional special studies planned to occur in 2014. SMC, including LACFCD, is currently working on designing the bioassessment monitoring program for the next five-year cycle, which is scheduled to run from 2015 to 2019.

New Development and Re-Development Tracking Requirements in the NPDES Permit

Participating agencies have developed mechanisms for tracking new development/re-development projects that have been conditioned for post-construction BMPs pursuant to MS4 Permit Part VI.D.7. Agencies also have developed mechanisms for tracking the effectiveness of these BMPs pursuant to MS4 Permit Attachment E.X.

Schedule

In accordance with the Permit, the CIMP will be submitted to the Executive Officer of the Regional Water Board by June 30, 2014**.** Existing monitoring programs will continue to be conducted until this CIMP is approved. Regardless of approval of this CIMP, beginning in the summer of 2014 dry weather screening of major outfalls will commence. Implementation of new monitoring programs and modifications to existing monitoring programs will begin July 2015, or 90 days after the approval of the CIMP, whichever is later.

1 Introduction and Background

Malibu Creek Watershed (MCW) covers 109 square miles at the southwestern end of Los Angeles County and the southern end of Ventura County. It is the largest watershed to drain into the Santa Monica Bay. MCW geographically includes portions of unincorporated Los Angeles County and all or part of five cities: Westlake Village, Agoura Hills, Calabasas, Malibu, and Hidden Hills. Much of the MCW is open space under jurisdiction of the State and Santa Monica Mountains Conservancy. The Santa Monica Mountains National Recreation Area, including the Malibu Creek State Park, covers much of the watershed.

The MCW poses unique challenges due to the topography of the land with steep ravines and densely vegetated riparian corridors, which creates many dangerous and inaccessible areas that cannot be safely monitored and are not suitable for water quality BMP's. In addition, the Monterey/Modelo formation outcrops in the watershed are natural sources of sulfate, phosphate, metals, and selenium, and are believed to contribute to the MCW water quality impairments.

Water quality monitoring of the MCW has taken place since the early 1980s. The early work focused on bacteria and pathogens at and near the lagoon and beach. Starting in the mid to late 1990s, the focus expanded to include tributaries and the upper watershed and a broader range of constituents. The Los Angeles County Flood Control District has stormwater monitoring data dating back to the mid-1990s. LACFCD data is focused on water chemistry. Different agencies focus on different aspects such as dry weather monitoring, biological surveys, or habitat assessments. Monitoring has been, or is currently being, conducted by the LACFCD, Los Angeles County Department of Health Services, Las Virgenes Municipal Water District, Heal the Bay, City of Calabasas, City of Malibu, and Ventura County.

The MCW is subject to two different National Pollutant Discharge Elimination System (NPDES) MS4 Permits: the Ventura County MS4 Permit (Order No. R4-2009-0057) in the upper portion of the watershed and the Los Angeles County MS4 Permit (Order No. R4-2012-0175) in the lower part of the watershed, which is the subject of the MCW EWMP. Additionally, other entities within the watershed that could contribute pollutant loads, but are not part of the MCW EWMP Group, include State Parks, National Parks, and Caltrans who are subject to other MS4 Permits and other NPDES.

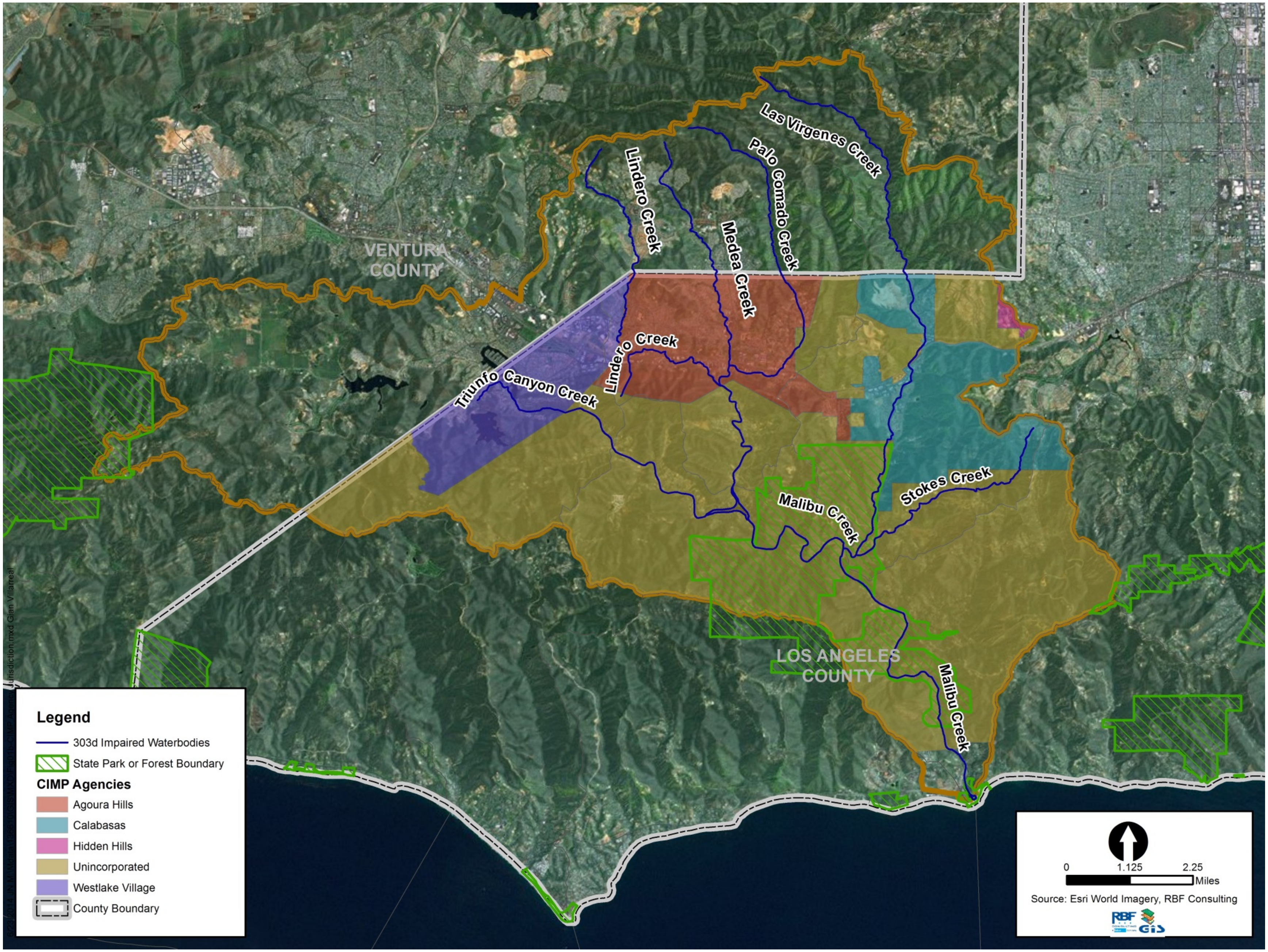
1.1 Objectives of the CIMP

This CIMP provides the approach and major elements of the monitoring plan for the CIMP MS4 Stakeholders within the Malibu Creek Watershed. The objectives of the surface water monitoring program are to:

- Assess the chemical, physical, and biological impacts of discharges from the MS4 on receiving waters.
- Assess compliance with receiving water limitations (RWLs) and water quality-based effluent limitations (WQBELs) established to implement TMDL wet weather and dry weather waste load allocations (WLAs).
- Characterize pollutant loads in MS4 discharges.
- Identify sources of pollutants in MS4 discharges.
- Measure the effectiveness of pollutant controls implemented under the MS4 Permit.

The proposed CIMP elements were developed with a focus on meeting these objectives. Although, all of the objectives listed above are interrelated, the receiving water monitoring program was developed primarily to provide data to support the first, second, and fifth objectives. The outfall monitoring program was developed to support the third, fourth, and fifth objectives. The new and re-development effectiveness tracking program provides additional support for the fifth objective listed above. To estimate pollutant loads, the information obtained through this CIMP will be evaluated in collaboration with the Reasonable Assurance Analysis (RAA) model for the EWMP.

Figure 1: CIMP Agency Jurisdictions in Malibu Creek Watershed



1.2 The Malibu Creek Watershed

The Malibu Creek Watershed is located in Los Angeles and Ventura Counties in Southern California. The watershed covers 109 square miles from the Santa Monica Mountains to Santa Monica Bay. The Malibu Creek Watershed includes several streams and lakes that flow in primarily south and southeast directions into Malibu Creek and toward Malibu Lagoon and the Pacific Coast.

Several tributaries and lakes in the watershed have TMDLs and are identified on the 303(d) list for water quality impairments of beneficial uses. TMDLs in the Malibu Creek Watershed have been developed for bacterial indicators, trash, nutrients, and impacts to benthic communities. In addition, Santa Monica Bay has several TMDLs, including bacteria, trash (debris), DDT, and PCBs. The Santa Monica Bay TMDLs for bacteria and trash integrate the TMDL allocations (waste load allocations (WLAs), load allocations, and margin of safety) from the Malibu Creek TMDL. Therefore, compliance with the Santa Monica Bay TMDLs for jurisdictions in the Malibu Creek Watershed is based on the Malibu Creek TMDL allocations.

The geography, topography, and geology of the watershed present several challenges. The geographical challenge is that the watershed is subject to two different NPDES MS4 Permits, the Ventura County MS4 Permit (Order No. R4-2009-0057) in the upper portion of the watershed and the Los Angeles County MS4 Permit (Order No. R4-2012-0175) in the lower part of the watershed, which is the subject of the MCW EWMP. This geography poses potential challenges for the lower portion of the watershed and the MCW EWMP, with the potential for discharge of pollutants from the upper portion of the watershed to the lower portion of the watershed. Additionally, other entities in the watershed, including State Parks, National Parks, and Caltrans, are subject to other MS4 Permits and other NPDES requirements, which may complicate collaboration for implementation. The topography presents challenges in that the watershed contains a significant amount of steep gradient terrain in the watershed. The geology presents challenges from the Monterey/Modelo formation outcrops in the watershed that are known to have elevated levels of sulfate, phosphate, metals, and selenium. There are also known natural springs in the watershed that have the potential to emanate from the Monterey/Modelo formation, which may be a natural source of pollutants and could have impacts on water quality. There are also several dams on Malibu Creek in the watershed, which act as sinks for sediment and pollutants.

The Malibu Creek Watershed poses significant challenges for monitoring activities. The watershed has topography that limits safe access, such as steep ravines and densely vegetated riparian corridors. In addition, sensitive habitat and private property requires that permission be granted and other precautions be used to access certain areas.

1.3 Schedule for Monitoring Program Submittals

The MS4 permit (Attachment E, Section IV, C) requires that each Permittee that is developing a CIMP[1] comply with the following schedule:

- By June 28, 2013 (six months after the effective date of the approval of the MS4 permit, December 28, 2012), each Permittee shall submit a letter of intent to the Executive Officer of the Regional Water Board describing whether it intends to follow a CIMP approach for each of the required monitoring plan elements.
- Permittees electing to develop an EWMP shall submit a CIMP plan to the Executive Officer of the Regional Water Board by June 30, 2014.

[1] Permittees not electing to develop a CIMP have other requirements that are outlined in the MS4 permit.

- Beginning summer of 2014, the dry weather screening of major outfalls will commence. Implementation of new monitoring programs and modifications to existing monitoring programs will be implemented beginning July 2015 or 90 days after the approval of the CIMP, whichever is later.
- Monitoring requirements pursuant to Order No. 01-182 and MRP CI 6948, and pursuant to approved TMDL monitoring plans identified in Attachment E, Table E-1 of the permit (the approved plans are discussed in Section 2.1 of this CIMP), shall remain in effect until the Executive Officer of the Regional Water Board approves the Permittee(s) CIMP plan(s).

2 Monitoring Requirements

The CIMP monitoring program includes five primary monitoring components:

1. **Receiving water monitoring** – performed at:
    a. Previously designated Mass Emission Stations,
    b. TMDL receiving water compliance points, and
    c. Receiving water locations representative of the impacts from MS4 discharges.
2. **Stormwater outfall monitoring** – Outfall monitoring is performed at locations representative of the land uses within the Permittee's jurisdiction (located within each HUC-12 watershed).
3. **Non-Stormwater outfall monitoring** – Initial screening of outfalls is conducted to identify significant non-stormwater flows. Additional monitoring is performed at outfalls with significant non-stormwater discharges that remain unaddressed after source identification.
4. **New Development/Re-development effectiveness tracking** – The program tracks whether the conditions in the building permit issued by the Permittee are implemented, and it ensures that the volume of stormwater associated with the design storm is retained on-site (as required by Part VI.D.7.c.i. of the Permit).
5. **Regional studies** – to further characterize the impact of the MS4 discharges on the beneficial uses of the receiving waters.

This CIMP includes all of these monitoring elements. The primary elements include TMDL monitoring requirements specified in approved TMDL Monitoring Plans (see Table E-1). The CIMP also includes modifications to improve the effectiveness of the program to align with the EWMP and provide information to the CIMP MS4 Stakeholders.

2.1 TMDL Monitoring Requirements

The Permit states that the CIMP must consider TMDL monitoring plans that have been developed and approved by the Executive Officer of the LARWQCB. Two TMDL monitoring plans have been developed for the Malibu Creek Watershed:

- The Malibu Creek and Lagoon Bacteria TMDL Compliance Monitoring Plan – The final plan was submitted to the LARWQCB on February 25, 2008 and approved on April 8, 2008.
- The Malibu Creek Watershed Trash Monitoring and Reporting Plan (TMRP) – The final plan was submitted to the LARWQCB on April 28, 2010, but has not yet been approved.

The U.S. Environmental Protection Agency (USEPA) has developed three TMDLs to address impairments in the Malibu Creek Watershed: the Malibu Creek Nutrient TMDL, TMDLs for Los Angeles Area Lakes[2],

[2] The USEPA developed TMDLs for Los Angeles Area Lakes include a TMDL for Mercury in Lake Sherwood. However, the lake is located within Ventura County and not included in this CIMP. Westlake Lake was 303(d) listed as impaired due to lead and is discussed in the USEPA report; however, it is currently achieving numeric targets and was not assigned a TMDL.

and the Malibu Creek and Lagoon TMDL for Sedimentation and Nutrients to address Benthic Community Impairments. The USEPA TMDLs do not have implementation plans with monitoring requirements, and monitoring plans have not been developed for either TMDL. The CIMP includes monitoring for the USEPA developed TMDLs within Malibu Creek.

TMDLs were developed by the LARWQCB for bacteria and trash in Santa Monica Bay. These TMDLs also include loads from Malibu Creek for bacterial indicators and trash based on the Malibu Creek TMDLs. One monitoring plan has been developed for the bacteria TMDLs in Santa Monica Bay, the Santa Monica Bay Beaches Bacterial (SMBBB) TMDLs Coordinated Shoreline Monitoring Plan (April 7, 2004). The USEPA also developed TMDLs for DDTs and PCBs in Santa Monica Bay.

2.1.1 Malibu Creek and Lagoon Bacteria TMDL

The Malibu Creek and Lagoon Bacteria TMDL (Bacteria TMDL) went into effect on January 24, 2006. The TMDL addresses bacterial indicator densities in Malibu Creek impacting the water contact recreation (REC-1) beneficial use of the creek, lagoon, and adjacent beach. The TMDL includes WLAs for point sources of discharge, including the MS4 system. Compliance with the TMDL is based on the number of allowable exceedances of single sample objectives and by meeting the geometric mean targets.

The Malibu Creek Bacteria TMDL was updated in a reconsideration amendment adopted June 7, 2012 by the Regional Water Quality Control Board (Resolution No. R12-009). The State Board approved the reconsideration amendment on March 19, 2013 and the California Office of Administrative Law (OAL) approved the revisions on September 27, 2013 (phone conversation with Kangshi Wang). The effective date of the reconsidered TMDL is currently pending. The reconsideration amendment includes revisions to some of the TMDL requirements, including a requirement to develop an outfall monitoring program.

The Malibu Creek and Lagoon Bacteria TMDL Compliance Monitoring Plan was established by the County of Los Angeles, in coordination with the County of Ventura, the Cities of Agoura Hills, Calabasas, Hidden Hills, Malibu, Thousand Oaks, and Westlake Village, and the California Department of Transportation, with feedback from the LARWQCB, Heal the Bay, and Santa Monica Bay Keeper. Implementation of the monitoring program was accomplished through a coordinated effort by the responsible agencies for that plan.

The Monitoring Plan was originally submitted to the LARWQCB on May 24, 2006. The plan was approved by the LARWQCB on September 11, 2007. On April 8, 2008, the LARWQCB approved a modification to the plan to clarify changes in the overall monitoring responsibilities and other issues.

Numeric targets established in the Bacteria TMDL include geometric mean and single sample limits for marine water and fresh water. The Basin Plan Amendment (BPA) states that if a site is out of compliance, the LARWQCB may require daily monitoring or initiation of an investigation until single sample events meet water quality objectives.

The BPA for the Bacteria TMDL identified seven monitoring sites and required a minimum of one site in each subwatershed. The Bacteria TMDL Monitoring Plan identifies 18 receiving water monitoring sites, as shown in Table 1.

Table 1: List of Existing Receiving Water Monitoring Sites for Bacteria TMDL Monitoring Program

Responsible Agencies	Site ID	Subwatershed	Coordinates
County of Los Angeles, Cities of Agoura Hills**, Calabasas, Hidden Hills, Malibu, and Westlake Village, and Caltrans	MCW-1*	Malibu Lagoon	N 34°02.069' W 118°40.969'
	MCW-2*	Lower Malibu Creek	N 34°02.825 W 118°41.371'
	MCW-3*	Middle Malibu Creek	N 34°04.654' W 118°42.105'
	MCW-4*	Upper Malibu Creek	N 34°06.001' W 118°43.364'
	MCW-5	Cold Creek	N 34°04.739' W 118°41.996'
	MCW-6	Stokes Creek	N 34°05.889' W 118°42.748'
	MCW-7*	Lower Las Virgenes Creek	N 34°05.769' W 118°43.072'
	MCW-10	Palo Comado Creek	N 34°08.585' W 118°45.468'
	MCW-11*	Lower Medea Creek	N 34°06.921' W 118°45.339'
	MCW-13	Lower Lindero Creek	N 34°08.892' W 118°45.842'
	MCW-16*	Triunfo Creek	N 34°06.438' W 118°46.073'
County of Ventura** and the City of Thousand Oaks	MCW-8b	Upper Las Virgenes	N 34°10.115' W 118°42.102'
	MCW-9	Cheeseboro Creek	N 34°049.082' W 118°44.058'
	MCW-12	Upper Medea Creek	N 34°10.230' W 118°45.765'
	MCW-14b	Upper Lindero Creek	N 34°09.943' W 118°47.268'
	MCW-15b	Westlake	N 34°09.263' W 118°48.693'
	MCW-17	Potrero Canyon	N 34°08.696' W 118°50.165'
	MCW-18	Hidden Valley	N 34°08.474' W 118°52.673'

Source: Malibu Creek and Lagoon Bacteria TMDL Compliance Monitoring Plan (Los Angeles County, 2007). These are all existing monitoring sites and are included in the CIMP within the receiving water monitoring program.

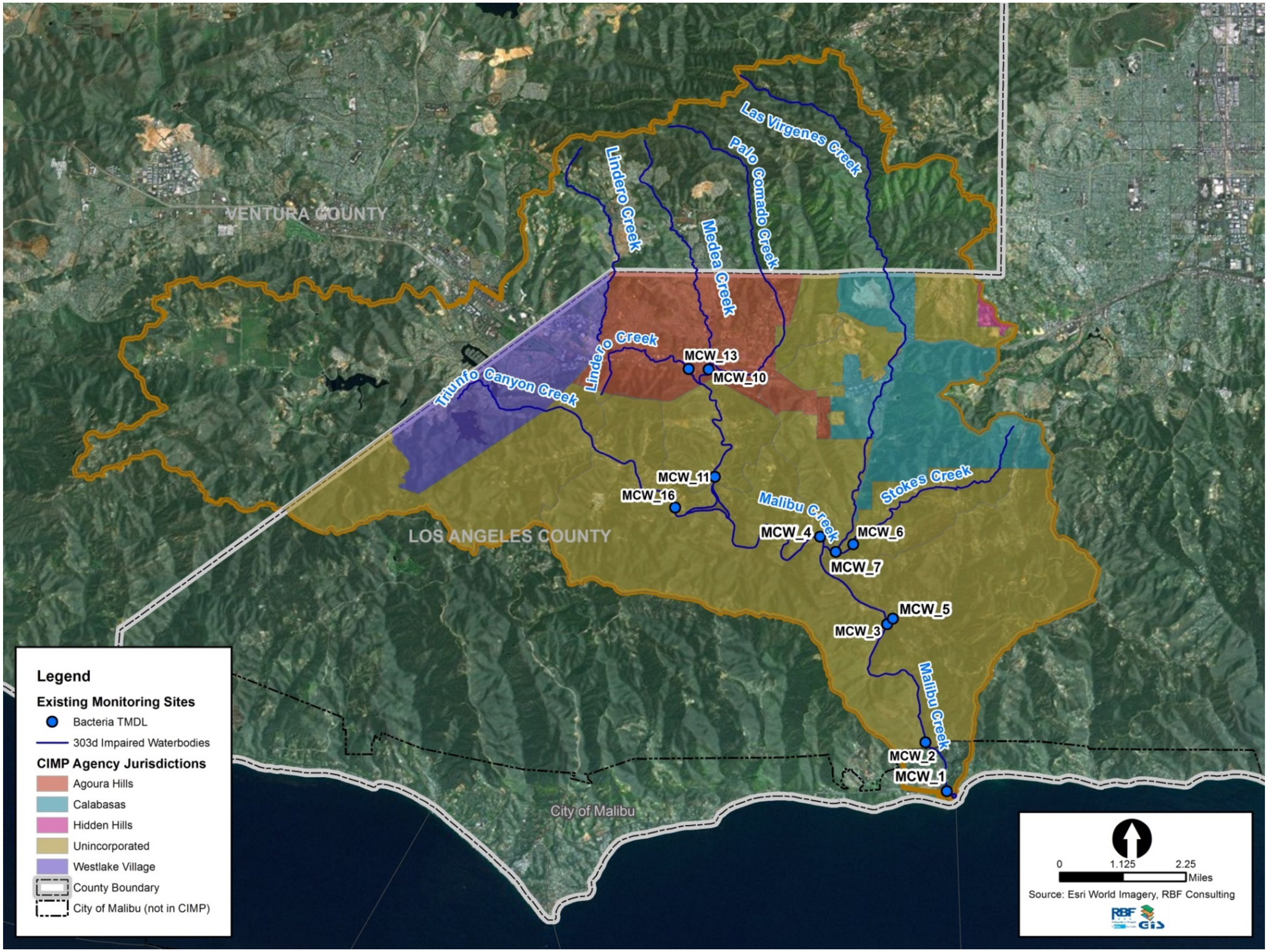
*Sampling Stations pursuant to LARWQCB Resolution 2004-19R (R12-009), Malibu Creek and Lagoon Bacteria TMDL Table 7-10.2

**Agency responsible for contracting or providing services

Eleven sites fall within the jurisdiction of County of Los Angeles, Cities of Agoura Hills, Calabasas, Hidden Hills, Malibu and Westlake Village. Seven of the sites were specified within Table 7-10.2 of Resolution No. R12-009 of the TMDL (as noted in the table); the other eleven sites identified in the Bacteria TMDL monitoring plan were based on areas where frequent REC-1 use is known to occur, availability of previous water quality data, perennial flow, and safe and legal access. The locations of the monitoring sites identified in the Bacteria TMDL monitoring plan are shown in Figure 2.

The Malibu Creek Bacteria TMDL Monitoring Plan agencies collect samples on a weekly basis. Following the identification of an exceedance, the monitoring plan specifies that follow up monitoring be performed during the first three years of the summer dry-weather period and the first six years of the winter dry-weather period.

Figure 2: Existing Bacteria TMDL Monitoring Sites



2.1.2 Malibu Creek Watershed Trash Monitoring and Reporting Plan (TMRP)

The Malibu Creek Trash TMDL went into effect on July 7, 2009. In addition to requirements to meet trash load reduction milestones, the TMDL required the stakeholders to develop and submit a trash monitoring and reporting plan (TMRP). The TMRP describes the methodologies to assess and monitor trash in the impaired subwatersheds of the Malibu Creek Watershed. The TMRP was required to include plans to assess and quantify the amounts of trash collected, the frequency, location, and reporting of monitoring, a metric to measure trash, and a prioritization of areas with the highest trash generation rates. In addition, the TMRP is required to include an evaluation of the effectiveness of the minimum frequency of assessment and collection (MFAC) and BMP programs.

The Malibu Creek Watershed TMRP was submitted by the Cities of Calabasas, Malibu, Westlake Village, Agoura Hills, and Hidden Hills, and the County of Los Angeles to the LARWQCB on April 28, 2010, but the plan has not yet received final approval from the LARWQCB (Los Angeles County, 2010).

The TMRP establishes two types of monitoring sites to meet the MFAC and TMRP requirements:

- Compliance Monitoring Sites (CMS); and
- General Assessment Sites (GAS).

The CMS are specific locations within impaired water bodies within the watershed chosen to be representative of the defined reach described in the Basin Plan Amendment for the TMDL. The CMS locations are shown in Figure 3. Information on the location and proposed monitoring frequency is presented in Table 2. The frequencies included in the TMRP were modified from the TMDL to allow the responsible agencies to accurately and adequately assess the impacts of trash in the watershed. To streamline the trash monitoring program and retain monitoring collection on each of the existing reaches included in the TMDL and TMRP, the trash monitoring data for Las Virgenes Creek will be collected at one monitoring site in Lower Las Virgenes Creek. The trash monitoring program is discussed in Section 4.4. The trash monitoring sites proposed will serve to fulfill trash TMDL monitoring requirements including the development of the trash baseline allocation and identification of sources via the detailed collection taking place at the site.

Figure 3: TMRP Compliance Monitoring Sites

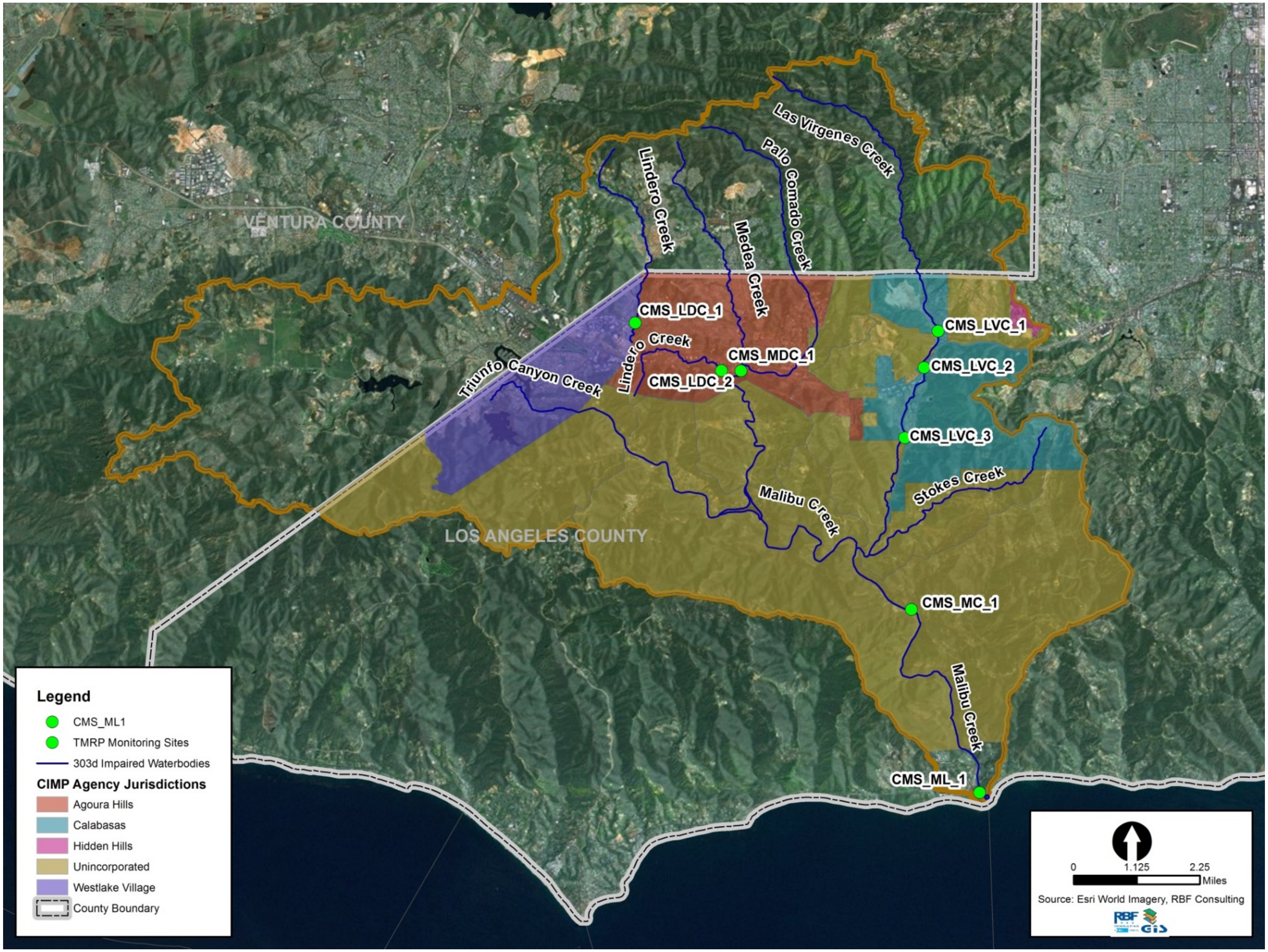


Table 2: TMRP Compliance Monitoring Site Descriptions

Site Number	Subwatershed	Frequency	Location
CMS ML 1	Malibu Lagoon	Bimonthly	Just upstream of the Pacific Coast Highway (PCH) crossing, on the left bank upstream from the bridge.
CMS MC 1	Malibu Creek	Monthly	On the west bank immediately upstream of the Malibu Creek Canyon Road crossing and downstream of the Tapia WWTP facility (34° 4'54.19"N; 118°42'15.88"W). Just upstream of MCW 3 and Mass Emission Station S02.
CMS LVC 1	Las Virgenes Creek	Bimonthly	In the concrete flood control channel, upstream of the Parkmor Road crossing (34° 9'13.55"N; 118°41'48.11"W).
CMS LVC 2	Las Virgenes Creek	Bimonthly	In the restored stream channel, just upstream of the Rondell Street crossing and downstream of the Hwy 101 freeway crossing (34° 8'39.59"N; 118°42'3.57"W).
CMS LVC 3	Las Virgenes Creek	Bimonthly	In the concrete channel just downstream of the Lost Hills Road crossing (34° 7'33.91"N; 118°42'24.64"W). Adjacent to an old MCWMP site, LV2.
CMS MDC 1	Medea Creek	Bimonthly	In the concrete channel upstream of the confluence with Cheeseboro Creek and just downstream of the Agoura Road crossing (34° 8'35.31"N; 118°45'28.71"W). This site is near site MCW 10 (located on Palo Comado Creek).
CMS LDC 1	Lindero Creek	Monthly	In the concrete channel just upstream of the Thousand Oaks Boulevard crossing and just downstream of the golf facility driving range (34° 9'19.21"N; 118°47'27.56"W). Adjacent to an old MCWMP site, LIN1.
CMS LDC 2	Lindero Creek	Bimonthly	In the engineered channel just downstream of the Agoura Road crossing (34° 8'35.36"N; 118°45'50.51"W). This site is adjacent to site MCW 13.

The GAS were intended to identify high trash generating areas upstream of CMS locations, site specific BMP effectiveness monitoring, site specific conditions before BMP implementation (both full and partial capture systems), specific land use characterization, and other applications as deemed necessary by the participating responsible parties. The GAS were intended to gather additional data on high trash generating areas impacting CMS, to potentially identify sources of trash, characterize land use trash generation, and also to verify the effectiveness of BMPs. These were not considered points of compliance for TMDL milestones and reductions. The GAS were designed to change over time as necessary to gather information about different areas of interest. No specific GAS locations were identified in the TMRP, but the TMRP did define a process to identify these.

The outfall monitoring locations include an assessment of trash immediately downstream of the outfall and are discussed in Chapters 4 and 5.

The assessment method chosen in the TMRP is a modified version of the Rapid Trash Assessment Protocol (RTAP), California Regional Water Quality Control Board, San Francisco Bay Region, November 15, 2004 (developed by members of the San Francisco Bay LARWQCB's Surface Water Ambient Monitoring Program [SWAMP]) combined with elements from the Oxnard City Corps Storm Drain Keeper Program. The RTAP was modified for the goals of this TMRP and MFAC program. The modifications include the addition of several metrics to allow a variety of options for defining the baseline and a removal of the "scoring" portion of the RTAP. The additional metrics to be assessed include the number of trash bags, weight of trash collected, and total trash collection time per site.

2.1.3 TMDL for Nutrients in the Malibu Creek Watershed (USEPA)

The USEPA TMDL for nutrients in the Malibu Creek Watershed was approved on March 21, 2003. The TMDL does not include an implementation plan with monitoring requirements and a schedule to comply with the TMDL. However, it does include recommendations for monitoring. In addition, the Permit requires that the time schedule to achieve the final numeric WLAs must not exceed five years from the effective date of the Permit. This CIMP includes monitoring for nutrients and nutrient-related effects within Las Virgenes Creek, Lindero Creek, Medea Creek, and Malibu Creek. The USEPA report recommends that monitoring be conducted for:

- Dissolved oxygen
- Ammonia,
- Nitrate,
- Total nitrogen,
- Percent algal cover, and
- Chlorophyll *a*.

2.1.4 Malibu Creek and Lagoon TMDL for Sedimentation and Nutrients (USEPA)

The USEPA developed the Malibu Creek and Lagoon TMDL for Sedimentation and Nutrients to address Benthic Community Impairments. The draft TMDL was released in December 2012 and was approved by the USEPA on July 2, 2013. The TMDL includes numeric targets and WLAs for sediment and nutrients in Malibu Creek and Lagoon but does not include an implementation plan with monitoring requirements and a schedule to comply with the TMDL. Tributaries not separated from Malibu Creek by a lake or reservoir are assigned WLAs, including Stokes Creek, Cold Creek, and Las Virgenes Creek. The numeric targets that apply to Malibu Creek and those tributaries are assessed using:

- California Stream Condition Index (CSCI), which combines scores from the California O/E and the California pMMI;
- California O/E Ratio (O/E), where O is the number of taxa observed in a sample and E is the expected number of taxa;
- California predictive Multi-Metric Index (pMMI) – Southern California Index of Biological Integrity (SC-IBI);
- Benthic Algal Coverage;
- Dissolved Oxygen;
- Natural Sedimentation Rate (Total Suspended Solids or TSS, Turbidity); and
- Nutrient Concentrations (TN, TP).

The numeric targets for the TMDL for Malibu Lagoon are:

- Benthic community diversity,
- Dissolved oxygen, and
- Nutrient concentrations (TN, TP).

2.1.5 Santa Monica Bay Bacteria TMDLs

On December 12, 2002, the LARWQCB adopted two TMDLs for bacterial indicators at Santa Monica Bay Beaches, for wet-weather and dry-weather.

The Santa Monica Bay watershed is separated into several jurisdictions, one of which includes Malibu Creek. Because the municipalities within Malibu Creek Watershed are assigned WLAs within the Malibu Creek Bacteria TMDL, they are not assigned separate WLAs for these areas for the SMB Bacteria TMDL. Westlake Village, Agoura Hills, and Hidden Hills are not assigned WLAs in the SMB Bacteria TMDL; Calabasas is named as a responsible party for Topanga Canyon.

Los Angeles County, Agoura Hills, Calabasas, West Lake Village, and Hidden Hills all contributed to the Santa Monica Bay Beaches Bacterial TMDLs Coordinated Shoreline Monitoring Program along with Ventura County, Thousand Oaks, City of Malibu, Caltrans, Simi Valley and California Department of Parks and Recreation. In the past, monitoring was conducted at SMB-MC-1 (Malibu Point on Malibu State Beach), SMB-MC-2 (Breach Point of Malibu Lagoon), and SMB-MC-3 (Malibu Pier on Carbon Beach). The City of Los Angeles, Department of Public Works Bureau of Sanitation, Environmental Monitoring Division (EMD) and the Los Angeles County Department of Health Services (LACDHS) performed sample collection and analysis for these sites.

2.1.6 TMDL for Debris in the Near and Offshore Santa Monica Bay

The Santa Monica Bay Debris TMDL was adopted by the LARWQCB on November 4, 2010 and it became effective on March 20, 2012. Los Angeles County, Agoura Hills, Calabasas, and Westlake Village are assigned WLAs for debris in the TMDL, along with other agencies. Hidden Hills is assigned WLAs for the Malibu Creek Trash TMDL, but not in the SMB Debris TMDL. Compliance with associated trash TMDL requirements for the Malibu Creek Watershed is achieved through the Malibu Creek Trash TMDL. Jurisdictions and agencies within Malibu Creek are required to prepare a plan to address plastic pellets in the watershed.

Under the Santa Monica Bay TMDL for Debris in the Near and Offshore TMDL, jurisdictions identified as responsible parties for point sources of trash in the existing Malibu Creek Trash TMDL shall either prepare a Plastic Pellet Monitoring and Reporting Plan (PMRP) or demonstrate that a PMRP is not required under certain circumstances.

The Malibu Creek CIMP Stakeholders reviewed facilities within their watersheds to determine if any have industrial facilities or activities related to the manufacturing, handling, or transportation of plastic pellets. Currently facilities or activities within the jurisdiction of the stakeholders within the Malibu Creek Watershed are not included in this category. As a result, monitoring for plastic pellets is not required in the watershed; however, the stakeholders will develop a Plastic Pellet Spill Response Plan. Los Angeles County has prepared a PMRP for the unincorporated areas within the Santa Monica Bay watershed including Malibu Creek. The PMRP was submitted to the RWQCB on September 20, 2013. The stakeholders will continue to review facilities within their jurisdictions to identify initiation of activities related to the manufacturing, handling, or transportation of plastic pellets.

2.1.7 Santa Monica Bay TMDL for DDT and PCBs

The Santa Monica Bay Debris TMDL was developed by the USEPA and approved on March 26, 2012. The MS4 Permit includes WLAs for DDT and PCBs for the bay expressed as a total annual load of pollutants from sediment discharged to the bay. The permit requires that stakeholders comply with the WLAs based on a three-year averaging period.

The TMDL has recommendations for stormwater monitoring and establishes waste load allocations for stormwater discharge. The Malibu Creek CIMP stakeholders will coordinate with the North Santa Monica Bay Coastal Watersheds Group to collect PCBs and DDTs data from their Malibu Creek monitoring location.

2.2 303(d) Listings

The permit also requires that the Permittees monitor constituents included in the 303(d) list for surface water bodies within the watershed. The latest approved 303(d) list is the 2010 list. The impairments included in the 2010 list are shown in Table 3. Some of the impairments have been incorporated into TMDLs since the 2010 list was released, and these are identified in the supporting notes to Table 3. The State Water Resources is reviewing data submitted for an update to the 303(d) list, but the 303(d) list will not be updated until 2016.

Table 3: 2010 303(d) Listings in the Malibu Creek Watershed

Water Body Name	Pollutant	TMDL Development Status	Method to Address Impairment
Lake Lindero	Algae	TMDL Developed[1]	Not under EWMP/CIMP Stakeholders' Authority
Lake Lindero	Chloride	No TMDL	Not under EWMP/CIMP Stakeholders' Authority
Lake Lindero	Eutrophic	TMDL Developed[1]	Not under EWMP/CIMP Stakeholders' Authority
Lake Lindero	Odor	TMDL Developed[1]	Not under EWMP/CIMP Stakeholders' Authority
Lake Lindero	Selenium	No TMDL	Not under EWMP/CIMP Stakeholders' Authority
Lake Lindero	Specific Conductivity	No TMDL	Not under EWMP/CIMP Stakeholders' Authority
Lake Lindero	Trash	TMDL Developed[2]	Not under EWMP/CIMP Stakeholders' Authority
Lake Sherwood	Algae	TMDL Developed[1]	Not under EWMP/CIMP Stakeholders' Authority
Lake Sherwood	Ammonia	TMDL Developed[1]	Not under EWMP/CIMP Stakeholders' Authority
Lake Sherwood	Eutrophic	TMDL Developed[1]	Not under EWMP/CIMP Stakeholders' Authority
Lake Sherwood	Mercury (tissue)	No TMDL	Not under EWMP/CIMP Stakeholders' Authority
Lake Sherwood	Organic Enrichment/Low Dissolved Oxygen	TMDL Developed[1]	Not under EWMP/CIMP Stakeholders' Authority
Las Virgenes Creek	Benthic-Macroinvertebrate Bioassessments	No TMDL	Addressed in EWMP/CIMP
Las Virgenes Creek	Coliform Bacteria	TMDL Developed[2]	Addressed in EWMP/CIMP
Las Virgenes Creek	Invasive Species	No TMDL	Addressed in EWMP/CIMP
Las Virgenes Creek	Nutrients (Algae)	TMDL Developed[1]	Addressed in EWMP/CIMP
Las Virgenes Creek	Organic Enrichment/Low Dissolved Oxygen	TMDL Developed[1]	Addressed in EWMP/CIMP
Las Virgenes Creek	Scum/Foam-unnatural	TMDL Developed[1]	Addressed in EWMP/CIMP
Las Virgenes Creek	Sedimentation/Siltation	No TMDL	Addressed in EWMP/CIMP
Las Virgenes Creek	Selenium	No TMDL	Addressed in EWMP/CIMP
Las Virgenes Creek	Trash	TMDL Developed[2]	Addressed in EWMP/CIMP
Lindero Creek Reach 1	Algae	TMDL Developed[1]	Addressed in EWMP/CIMP
Lindero Creek Reach 1	Benthic-Macroinvertebrate Bioassessments	No TMDL	Addressed in EWMP/CIMP
Lindero Creek Reach 1	Coliform Bacteria	TMDL Developed[2]	Addressed in EWMP/CIMP
Lindero Creek Reach 1	Invasive Species	No TMDL	Addressed in EWMP/CIMP
Lindero Creek Reach 1	Scum/Foam-unnatural	TMDL Developed[1]	Addressed in EWMP/CIMP
Lindero Creek Reach 1	Selenium	No TMDL	Addressed in EWMP/CIMP
Lindero Creek Reach 1	Trash	TMDL Developed[2]	Addressed in EWMP/CIMP
Lindero Creek Reach 2 (Above Lake)	Algae	TMDL Developed[1]	Addressed in EWMP/CIMP
Lindero Creek Reach 2 (Above Lake)	Coliform Bacteria	TMDL Developed[2]	Addressed in EWMP/CIMP
Lindero Creek Reach 2 (Above Lake)	Scum/Foam-unnatural	TMDL Developed 1	Addressed in EWMP/CIMP

Water Body Name	Pollutant	TMDL Development Status	Method to Address Impairment
Lindero Creek Reach 2 (Above Lake)	Selenium	No TMDL	Addressed in EWMP/CIMP
Lindero Creek Reach 2 (Above Lake)	Trash	TMDL Developed[2]	Addressed in EWMP/CIMP
Malibou Lake	Algae	TMDL Developed[1]	Not under EWMP/CIMP Stakeholders' Authority
Malibou Lake	Eutrophic	TMDL Developed[1]	Not under EWMP/CIMP Stakeholders' Authority
Malibou Lake	Organic Enrichment/Low Dissolved Oxygen	TMDL Developed[1]	Not under EWMP/CIMP Stakeholders' Authority
Malibu Beach	DDT (Dichlorodiphenyltrichloroethane)	TMDL Developed[1]	Outside of Region covered by the Malibu Creek EWMP/CIMP
Malibu Beach	Indicator Bacteria	TMDL Developed[2]	Outside of Region covered by the Malibu Creek EWMP/CIMP
Malibu Creek	Benthic-Macroinvertebrate Bioassessments	TMDL Developed[1]	Addressed in EWMP/CIMP
Malibu Creek	Coliform Bacteria	TMDL Developed[2]	Addressed in EWMP/CIMP
Malibu Creek	Fish Barriers (Fish Passage)	TMDL Developed[1]	Addressed in EWMP/CIMP
Malibu Creek	Invasive Species	TMDL Developed[1]	Addressed in EWMP/CIMP
Malibu Creek	Nutrients (Algae)	TMDL Developed[1]	Addressed in EWMP/CIMP
Malibu Creek	Scum/Foam-unnatural	TMDL Developed[1]	Addressed in EWMP/CIMP
Malibu Creek	Sedimentation/Siltation	TMDL Developed[1]	Addressed in EWMP/CIMP
Malibu Creek	Selenium	No TMDL	Addressed in EWMP/CIMP
Malibu Creek	Sulfates	No TMDL	Addressed in EWMP/CIMP
Malibu Creek	Trash	TMDL Developed[2]	Addressed in EWMP/CIMP
Malibu Lagoon	Benthic Community Effects	TMDL Developed[1]	Outside of Region covered by the Malibu Creek EWMP/CIMP; Pollutant loads from stakeholders jurisdiction to be addressed in EWMP/CIMP
Malibu Lagoon	Coliform Bacteria	TMDL Developed[2]	Outside of Region covered by the Malibu Creek EWMP/CIMP; Pollutant loads from stakeholders jurisdiction to be addressed in EWMP/CIMP
Malibu Lagoon	Eutrophic	TMDL Developed[1]	Outside of Region covered by the Malibu Creek EWMP/CIMP; Pollutant loads from stakeholders jurisdiction to be addressed in EWMP/CIMP
Malibu Lagoon	Swimming Restrictions	TMDL Developed[2]	Outside of Region covered by the Malibu Creek EWMP/CIMP; Pollutant loads from stakeholders jurisdiction to be addressed in EWMP/CIMP
Malibu Lagoon	Viruses (enteric)	TMDL Developed[2]	Outside of Region covered by the Malibu Creek EWMP/CIMP; Pollutant loads from stakeholders jurisdiction to be addressed in EWMP/CIMP
Malibu Lagoon	pH	No TMDL	Outside of Region covered by the Malibu Creek EWMP/CIMP; Pollutant loads from stakeholders jurisdiction to be addressed in EWMP/CIMP

Water Body Name	Pollutant	TMDL Development Status	Method to Address Impairment
Malibu Lagoon Beach (Surfrider)	Coliform Bacteria	TMDL Developed[2]	Outside of Region covered by the Malibu Creek EWMP/CIMP; Pollutant loads from stakeholders jurisdiction to be addressed in EWMP/CIMP
Malibu Lagoon Beach (Surfrider)	DDT (Dichlorodiphenyltrichloroethane)	TMDL Developed[1]	Outside of Region covered by the Malibu Creek EWMP/CIMP; Pollutant loads from stakeholders jurisdiction to be addressed in EWMP/CIMP
Malibu Lagoon Beach (Surfrider)	PCBs (Polychlorinated biphenyls)	TMDL Developed[1]	Outside of Region covered by the Malibu Creek EWMP/CIMP; Pollutant loads from stakeholders jurisdiction to be addressed in EWMP/CIMP
Medea Creek Reach 1 (Lake to Confl. with Lindero)	Algae	TMDL Developed[1]	Addressed in EWMP/CIMP
Medea Creek Reach 1 (Lake to Confl. with Lindero)	Coliform Bacteria	TMDL Developed[2]	Addressed in EWMP/CIMP
Medea Creek Reach 1 (Lake to Confl. with Lindero)	Sedimentation/Siltation	No TMDL	Addressed in EWMP/CIMP
Medea Creek Reach 1 (Lake to Confl. with Lindero)	Selenium	No TMDL	Addressed in EWMP/CIMP
Medea Creek Reach 1 (Lake to Confl. with Lindero)	Trash	TMDL Developed[2]	Addressed in EWMP/CIMP
Medea Creek Reach 2 (Abv Confl. with Lindero)	Algae	TMDL Developed[1]	Addressed in EWMP/CIMP
Medea Creek Reach 2 (Abv Confl. with Lindero)	Benthic-Macroinvertebrate Bioassessments	No TMDL	Addressed in EWMP/CIMP
Medea Creek Reach 2 (Abv Confl. with Lindero)	Coliform Bacteria	TMDL Developed[2]	Addressed in EWMP/CIMP
Medea Creek Reach 2 (Abv Confl. with Lindero)	Invasive Species	No TMDL	Addressed in EWMP/CIMP
Medea Creek Reach 2 (Abv Confl. with Lindero)	Sedimentation/Siltation	No TMDL	Addressed in EWMP/CIMP
Medea Creek Reach 2 (Abv Confl. with Lindero)	Selenium	No TMDL	Addressed in EWMP/CIMP
Medea Creek Reach 2 (Abv Confl. with Lindero)	Trash	TMDL Developed[2]	Addressed in EWMP/CIMP
Palo Comado Creek	Coliform Bacteria	TMDL Developed[2]	Addressed in EWMP/CIMP
Santa Monica Bay Offshore/Nearshore	DDT (tissue & sediment)	TMDL Developed[1]	Outside of Region covered by the Malibu Creek EWMP/CIMP; Pollutant loads from stakeholders jurisdiction to be addressed in EWMP/CIMP
Santa Monica Bay Offshore/Nearshore	Debris	TMDL Developed[2]	Outside of Region covered by the Malibu Creek EWMP/CIMP; Pollutant loads from stakeholders jurisdiction to be addressed in EWMP/CIMP

Water Body Name	Pollutant	TMDL Development Status	Method to Address Impairment
Santa Monica Bay Offshore/Nearshore	Fish Consumption Advisory	TMDL Developed[1]	Outside of Region covered by the Malibu Creek EWMP/CIMP; Pollutant loads from stakeholders jurisdiction to be addressed in EWMP/CIMP
Santa Monica Bay Offshore/Nearshore	PCBs (Polychlorinated biphenyls) (tissue & sediment)	TMDL Developed[1]	Outside of Region covered by the Malibu Creek EWMP/CIMP; Pollutant loads from stakeholders jurisdiction to be addressed in EWMP/CIMP
Santa Monica Bay Offshore/Nearshore	Sediment Toxicity	TMDL Developed[1]	Outside of Region covered by the Malibu Creek EWMP/CIMP; Pollutant loads from stakeholders jurisdiction to be addressed in EWMP/CIMP
Stokes Creek	Coliform Bacteria	TMDL Developed[2]	Addressed in EWMP/CIMP
Triunfo Canyon Creek Reach 1	Lead	No TMDL	Addressed in EWMP/CIMP
Triunfo Canyon Creek Reach 1	Mercury	No TMDL	Addressed in EWMP/CIMP
Triunfo Canyon Creek Reach 1	Sedimentation/Siltation	No TMDL	Addressed in EWMP/CIMP
Triunfo Canyon Creek Reach 2	Benthic-Macroinvertebrate Bioassessments	No TMDL	Addressed in EWMP/CIMP
Triunfo Canyon Creek Reach 2	Lead	No TMDL	Addressed in EWMP/CIMP
Triunfo Canyon Creek Reach 2	Mercury	No TMDL	Addressed in EWMP/CIMP
Triunfo Canyon Creek Reach 2	Sedimentation/Siltation	No TMDL	Addressed in EWMP/CIMP
Westlake Lake	Algae	TMDL Developed[1]	Not under EWMP/CIMP Stakeholders' Authority
Westlake Lake	Ammonia	TMDL Developed[1]	Not under EWMP/CIMP Stakeholders' Authority
Westlake Lake	Eutrophic	TMDL Developed[1]	Not under EWMP/CIMP Stakeholders' Authority
Westlake Lake	Lead	TMDL Developed[1]	Not under EWMP/CIMP Stakeholders' Authority
Westlake Lake	Organic Enrichment/Low Dissolved Oxygen	TMDL Developed[1]	Not under EWMP/CIMP Stakeholders' Authority

Notes:

[1] TMDL developed by the USEPA

[2] TMDL developed by the LARWQCB

In some of the watersheds, natural sources likely cause or contribute to these stressors (LARWQCB, 2012). According to an assessment conducted by the LVMWD/TSD JPA (LVMWD/TSD JPA, 2012) in 2010-2011, the Monterey/Modelo Formation outcrops in the watershed are known to have elevated levels of sulfate, phosphate, metals, and selenium. The study found that the high background levels of biostimulatory substances associated with the formation likely have a negative impact on benthic communities downstream.

2.3 Previous Monitoring Programs

Numerous monitoring programs have been conducted in the Malibu Creek Watershed. Several of these are implemented by agencies participating in this coordinated integrated monitoring plan. This monitoring plan considered opportunities to coordinate with other stakeholders where coordination would provide mutual benefit.

Figure 4 shows locations of monitoring sites for the monitoring programs that have been implemented in the watershed and were considered during development of the plan. Table 4 includes additional information about the sites. Several, but not all, of the programs are ongoing as shown in Table 4. Many of these programs were implemented by agencies participating in the CIMP. Monitoring for the bacteria TMDL, mass emission monitoring, and other monitoring required by the permit are included in this CIMP.

Figure 4: CIMP Agency Existing Monitoring Sites

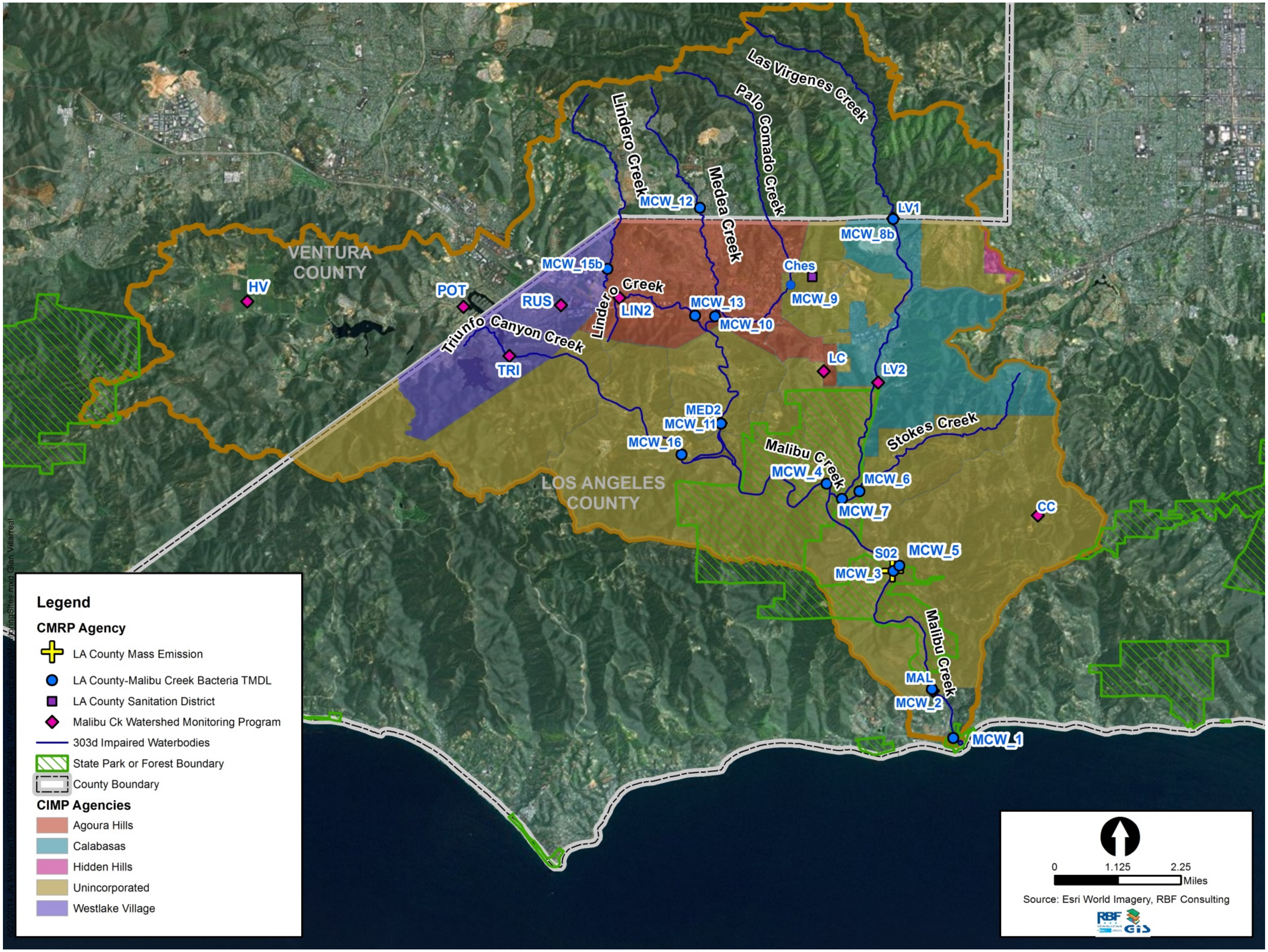


Table 4: Existing Monitoring Programs in the Malibu Creek Watershed

Monitoring Program	Collection Agency	Location of Samples	Year(s) Data Collected
Benthic Macroinvertebrate Bioassessment (SMC)	Los Angeles County	Las Virgenes/ Malibu Creek/ Cold Creek/Triunfo	2003-2011
Tapia WRF NPDES Permit MRP – Bioassessment Monitoring	Las Virgenes MWD/ Triunfo Sanitation District Joint Powers Authority (TSD JPA)	Malibu Creek/ Malibu Lagoon/ Las Virgenes Creek	2006-2013
BMI	Southern California Coastal Water Research Project	Miscellaneous	2009
Heal the Bay Stream Team	Heal the Bay	Multiple/Variable	1998-2010
Tapia WRF NPDES Permit MRP – Receiving Water Monitoring	Las Virgenes Municipal/TSD JPA	Malibu Creek, Malibu Lagoon, Las Virgenes Creek	1971-2013
Bacteria TMDL Monitoring Program	Los Angeles County Department of Public Works/Agoura Hills	Malibu Creek	2009- 2013
Los Angeles County Sanitation District	Los Angeles County Sanitation District	Malibu Creek WS/ Cheeseboro Creek	1999-2009
LARWQCB TMDL Monitoring	LARWQCB	Malibu Creek/ Las Virgenes Creek	2013 [2]
Mass Emission MS4 Monitoring[1]	Los Angeles County Flood Control District	MS4 Mass Emission Station S-02	1995-to date
Malibu Creek Watershed Monitoring Program	City of Calabasas, Agoura Hills, Westlake Village, and Malibu, and County of Los Angeles, and LVMWD/TSD JPA	Malibu Creek Watershed	2005-2007
Microbial Source Tracking	Los Angeles County Flood Control/ Los Angeles County Public Works	Malibu Creek Watershed	2013-2015 [3]
National Park Service (NPS) MEDN Monitoring Program	Santa Monica Mountains National Recreation Area (SMM-NRA)	Malibu Creek Watershed	2006-2011
Tributary Monitoring	Los Angeles County Flood Control District	Malibu Creek Watershed	2011-2013
Malibu Lagoon Bacteria and Nutrient Study	United States Geological Survey	Malibu Creek, Malibu Lagoon, wells, and ocean	2009-2010
Ventura Co Bacteria TMDL Monitoring Program	Ventura County	Ventura County	2008-2013

Notes:
N/A – Not available
[1] One mass emission station is located in Malibu Creek Watershed.
[2] Correspondence with LARWQCB (August 13, 2013).
[3] Anticipated monitoring period for the study.

3 CIMP Monitoring Approach

The CIMP includes five monitoring elements that are coordinated with the EWMP to provide an understanding of water quality in the watershed, the impacts of MS4 discharges, and the benefits of BMP implementation. These five elements are:

1. Receiving water monitoring;
2. Stormwater outfall based monitoring;
3. Non-stormwater outfall based monitoring;
4. New Development/Re-development effectiveness tracking
5. Regional studies.

Existing monitoring will continue to be conducted and beginning summer of 2014, the dry weather screening of major outfalls will commence. Implementation of new monitoring programs and modifications to existing monitoring programs will begin July 2015, or 90 days after the approval of the CIMP, whichever is later.

Data collected during these monitoring efforts will be reviewed annually to understand relationships between MS4 discharges and will be used to:

- Assess the impacts of discharges from the MS4 on receiving waters,
- Assess compliance with Total Maximum Daily Load (TMDL) dry and wet weather WLAs, receiving water limitations (RWLs) and water quality based effluent limitations (WQBELs),
- Characterize pollutant loads from MS4 discharges,
- Identify sources of pollutants in the watershed,
- Characterize the effectiveness of source controls and other BMPs,
- Assess point source loads for the Reasonable Assurance Analysis (RAA) model, and
- Validate the assumptions for receiving waters in the RAA water quality model.

The CIMP provides a framework to promote coordination between monitoring agencies for monitoring programs. A unified monitoring and analysis program will promote efficiency and consensus. The information obtained from the receiving water monitoring program is coordinated with outfall investigation and monitoring to identify potential sources and areas of concern. Receiving water monitoring and outfall monitoring data will also be used to calibrate and validate the EWMP water quality model.

As part of the EWMP, a data analysis to determine water quality priorities for the watershed has been conducted based on the prioritization methodology defined in the MS4 permit. The water quality prioritization evaluates waterbody-pollutant combinations based on TMDL impairments, 303(d) listed impairments, and other exceedances of receiving water limits. While the water quality priorities analysis will be finalized as part of the EWMP development, an initial characterization of the water quality priorities has been developed. The water quality priorities analysis is utilized in the CIMP to define the parameters that will be monitored at each site. Since the analysis is reach specific, different parameters will be monitored at different monitoring locations. The initial analysis used to develop the parameters to be monitored at each site is shown in Table 5.

Table 5: Water Body Prioritization from the Malibu Creek Watershed EWMP

Reach		Cheeseboro Creek	Cold Creek (tributary to Malibu Creek)	Las Virgenes Creek	Liberty Canyon Creek	Lindero Creek Reach 1	Lindero Creek Reach 2	Malibu Creek	Medea Creek Reach 1	Medea Creek Reach 2	Palo Comado Creek	Stokes Creek	Triunfo Canyon Creek Reach 1	Triunfo Canyon Creek Reach 2
TMDLs - Category 1 - Highest Priority with Past Due TMDL Milestones														
Bacterial Indicator TMDLs	E. coli (dry)			X		X	X	X	X	X	X	X		
Trash	Trash			X		X	X	X	X	X				
TMDLs - Category 1 - Highest Priority without Past Due TMDL Milestones														
Bacterial Indicator TMDLs	E. coli (wet)			X		X	X	X	X	X	X	X		
Nutrients/ Nutrient Related	Total Nitrogen		X	X		X	X	X	X	X		X		
	Total Phosphorus		X	X		X	X	X	X	X		X		
Benthic Community Impairments (TMDL)	Sedimentation		X	X				X				X		
	Total Nitrogen		X	X				X				X		
	Total Phosphorus		X	X				X				X		
303(d) - Category 2 - High Priority														
303(d) listed impairments	Benthic - Macroinvert Assessments					X				X				X
	Sedimentation/ Siltation								X	X			X	X
	Fish Barriers (Fish Passage) [1]							X						
	Invasive species [2]					X				X				
	Selenium [2]			X		X	X	X	X	X				
	Sulfates							X						
	Lead												X	X
	Mercury												X	X
Water Quality Objective Exceedances - Category 3 - Medium Priority														
Water Quality Objective Exceedances	Chloride	X												
	Phosphate as P	X			X									
	Specific Conductivity	X			X						X			
	Sulfate	X			X									
	TDS	X			X									
	E. coli				X									

Notes:

[1] 303(d) listed impairment not based on pollutant
[2] 303(d) listed impairment may not be the result of MS4 discharge (invasive species and selenium)

3.1 Monitoring Site Selection

The CIMP includes receiving water monitoring sites, outfall monitoring locations for stormwater and non-stormwater, and regional studies. Monitoring sites were chosen with consideration of safety, accessibility, and representativeness of the impaired reaches. Field reconnaissance was performed at new sites to make sure that they meet the safety and accessibility requirements for CIMP monitoring.

The CIMP MS4 Stakeholders are coordinating with Ventura County, Las Virgenes Municipal Water District, North Santa Monica Bay Coastal Watersheds EWMP Group, State Parks and other agencies within the Malibu watershed to consolidate monitoring and reduce redundancy between different monitoring programs within the Malibu Creek Watershed.

Dry weather outfall monitoring sites will be identified through the screening of outfalls which is expected to occur in late 2014. Under this program, the CIMP MS4 Stakeholders will conduct an inventory of the MS4 outfalls within their jurisdictions in the Malibu Creek Watershed and identify outfalls with significant sources of dry weather/non-stormwater discharge. Follow up monitoring will be performed at sites with significant discharge as defined after completion of the dry weather/non-stormwater outfall screening program.

The resolution to amend the Malibu Creek Bacteria TMDL (Resolution No. R12-009, Attachment A) required that the responsible jurisdictions and agencies submit an outfall monitoring plan within six months of the effective date (the resolution is not yet in effect). It is anticipated that the outfall monitoring plan will be required to propose:

- an adequate number of representative outfalls to be sampled;
- a sampling frequency; and
- protocol for enhanced outfall monitoring as a result of an in-stream exceedance.

The CIMP addresses these requirements by incorporating stormwater and non-stormwater outfall monitoring programs. No specific outfall monitoring sites are identified in the Malibu Creek and Lagoon Bacteria TMDL Compliance Monitoring Plan (or for trash in the TMRP). However, this CIMP pairs outfall monitoring sites with receiving water monitoring sites.

Site details are provided for each of the monitoring elements in following sections. Existing monitoring sites were obtained from the responsible agencies and evaluated for suitability in meeting permit monitoring requirements. Existing sites were preferred due to accessibility, safe access, and a record of monitoring data exists that can be augmented to help define trends. If an existing location met the monitoring requirements (as is discussed below), the existing location was incorporated into the CIMP. If existing monitoring locations were not feasible, a desktop evaluation was performed to identify potential new locations for a monitoring site. The site evaluation included opportunities to consolidate monitoring and reduce redundancy between monitoring programs.

Field surveys were conducted at sites identified during the desktop analysis. The site access was evaluated, and information was collected on the route to access the site to determine whether there were safety concerns. Factors considered include steep slopes, safe locations from which to collect samples at the waterbody or outfall, and any limits on legal access. Notes and photographs were collected during the field surveys.

3.2 Sampling and Lab Methodology

All monitoring activities are conducted in accordance with the Standard Provisions for Monitoring described in Attachment D of the MS4 Permit and in 40 CFR Section 122.41(j)(1). Grab samples will be collected at all receiving water monitoring sites other than at the Mass Emission Station S-02 . Automatic samplers will be implemented to collect samples at the stormwater outfall monitoring locations. The appropriate equipment will be used to collect samples, and field collection procedures will be performed as required by the Surface Water Ambient Monitoring Program (SWAMP). Laboratory analysis will be performed by accredited labs as shown in Appendix B, where accreditation is available for constituents of interest. Additional information about the methodology, Standard Operating Procedures (SOPs), and quality assurance/quality control (QA/QC) are provided in Appendix B, or they will be available through the contractor conducting the analysis and sample collection. The SOPs and QA/QC were adapted from practices implemented by the County of Los Angeles and the California Department of Transportation (Caltrans).

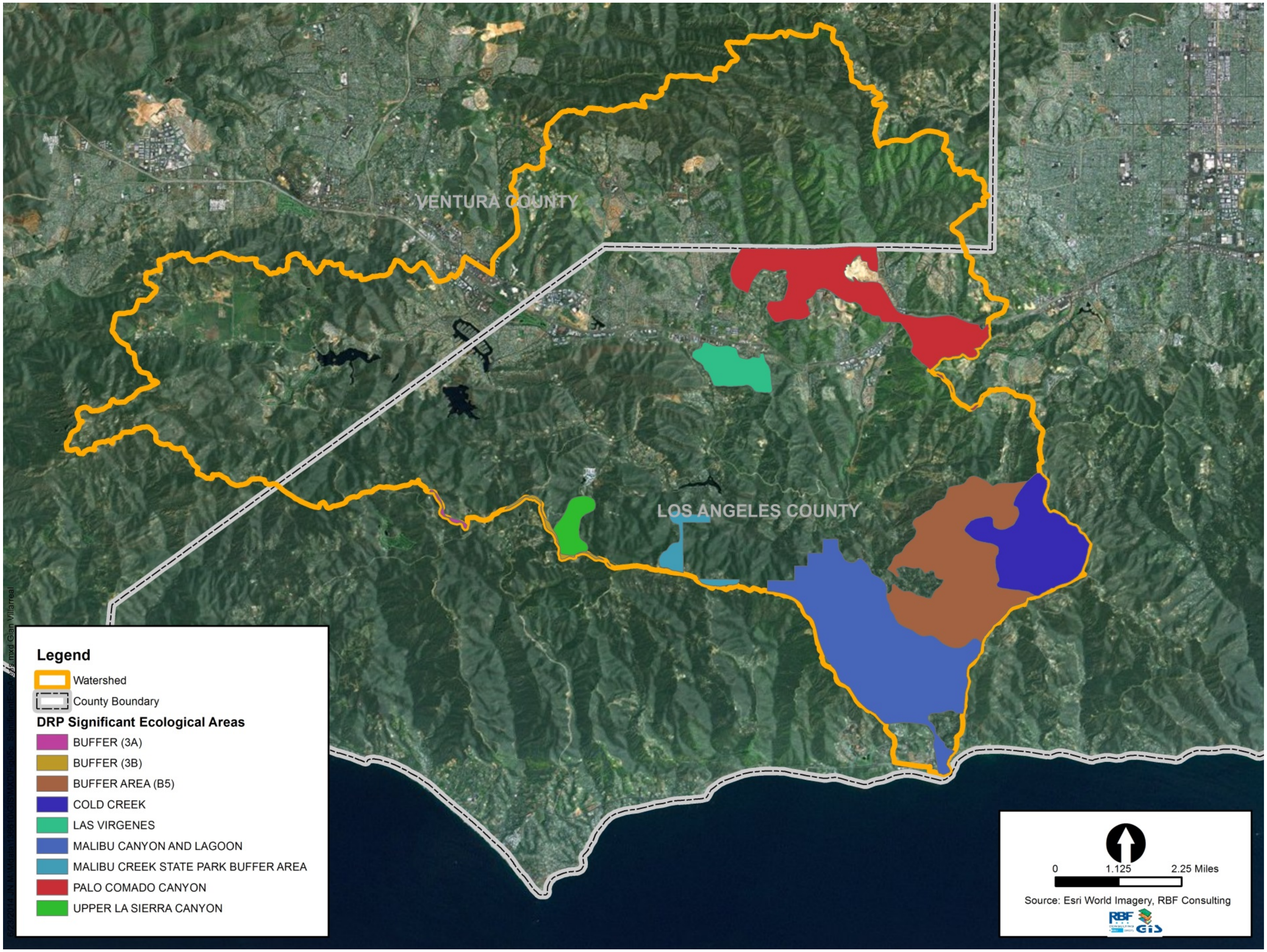
Field personnel are fully trained to use proper sample and data collection methods as detailed in the SWAMP requirements and in compliance with the QA/QC protocols. Field personnel will have the appropriate safety training, review the CIMP methodology and protocols, and carry copies of the standard operating procedures (SOPs) during field activities. All personnel will take appropriate precautions to ensure safety and not place themselves, or others, at risk of harm to conduct monitoring activities. Field personnel will not attempt to perform monitoring activities at any location that cannot be accessed safely or where right of entry cannot be obtained. In addition, field personnel take precautions to minimize any site or wildlife disturbances.

The Malibu Creek Watershed includes a large portion of areas considered to be significant ecological areas (SEA) within the Santa Monica Mountains. These areas are “determined to possess an example of biotic resources that cumulatively represent biological diversity for the purposes of protecting biotic diversity, as part of the Los Angeles County general plan or the City general plan” (Los Angeles County, 2013). A map of the SEAs in the watershed is provided in Figure 5.

Data records are maintained as specified in 40 CFR Section 122.41(j)(1) for field and laboratory activities. Field notes are maintained during all field activities. These notes detail the weather conditions on the day of sample collection, the exact location and time of sample collection and sample ID, site conditions, the presence of trash or wildlife, odors, water characteristics (color, clarity), approximate flow levels. All samples will be properly labeled with the sample ID, collection date and time, site ID, and the name of the sample collector.

Lab records are maintained for a period of at least five years, including records of calibration and maintenance of equipment, copies of all reports, and records of data. The retained information also includes the analytical method, date, exact location and time of analysis and measurements, individual performing the measurements, and the results.

Figure 5: Significant Ecological Areas in the Malibu Creek Watershed



3.3 Reporting

Annual reports are submitted by the Permittees by December 15 of each year. The annual reports include the data collected during monitoring activities. The annual reports will cover the monitoring period of July 1 through June 30. Additionally, the MRP specifies semi-annual, electronic submittal of receiving water and outfall monitoring data. To fulfill this requirement the monitoring year will be split as shown in Table 6.

Table 6. Receiving Water and Outfall Monitoring Electronic Data Submittal Schedule

Monitoring Period	Data Submittal
July 1 through December 31	By June 15th of the following year
January 1 through June 30	By December 15th, included with the Annual Monitoring Report

As specified in Section XVIII of the Permit, the Annual reports include all data and strategies collected, control measures, and the assessments conducted by the Permittees within the Malibu Creek Watershed. The reports will include:

a. An Integrated Monitoring Compliance Report that summarizes any exceedances of:
    i. Outfall-based stormwater monitoring data,
    ii. Wet weather receiving water monitoring data,
    iii. Dry weather receiving water data, and
    iv. Non-stormwater outfall monitoring data.

   The report describes efforts to mitigate and/or eliminate non-stormwater discharges, or address stormwater discharges that exceed water quality based effluent limitations, non-stormwater action levels, or caused or contributed to aquatic toxicity;

b. Assessment of the stormwater control measure data collected under this CIMP, including the New Development and Re-development Projects;
c. Assessment of non-stormwater control measure data collected under this CIMP;
d. Supporting data and information.

4 Receiving Water Monitoring

MS4 receiving water monitoring is conducted during wet and dry weather at sampling sites on the main stem of Malibu Creek and each of the tributaries to characterize levels of pollutants in each of these subwatersheds. The permit requires that the Permittees conduct receiving water monitoring at:

- Mass Emission Stations previously designated;
- TMDL Receiving Water Monitoring Sites based on locations designated in Regional Water Board Executive Officer approved TMDL Monitoring Plans
- receiving water monitoring sites representative of the impacts from MS4 discharges.

The objectives of the receiving water monitoring are to:

- Determine whether the receiving water limitations are being achieved;
- Assess trends in pollutant concentrations over time, or during specified conditions; and
- Determine whether the designated beneficial uses are fully supported as determined by water chemistry, as well as aquatic toxicity and bioassessment monitoring.

To achieve the objectives of the CIMP and EWMP, receiving water monitoring locations were identified at the downstream ends of major reach segments. These locations include the impacts from upstream MS4 discharges and enable estimates of pollutant loads from the upstream drainage area, and thus analysis of compliance with TMDL WLAs. Furthermore, the receiving water monitoring site for each upstream segment provides estimates of the upstream loads, so that the specific load for each subwatershed can be estimated.

The site locations have been coordinated with the water quality model used in the EWMP RAA. The model outputs are located at outlets of subwatersheds. Therefore, receiving water monitoring sites near the downstream at subwatersheds provide data for calibration and validation of model results. The calibrated and validated water quality model provides an estimation of water quality at other locations of interest with higher confidence.

After reviewing the pollutant prioritization table, potential locations for receiving water monitoring sites were identified through a desktop analysis. The desktop analysis started at the downstream end of reach segment and moved upstream through the watershed along the reach to identify potential locations with access to the stream. Where existing monitoring sites were identified in close proximity to the subwatershed outlet, these were selected for field verification.

Three lakes within the Malibu Creek Watershed are assigned WLAs for TMDLs or included in the 303(d) list for water quality impairments, Westlake Lake, Lake Lindero, and Malibou Lake. These are privately owned lakes and monitoring at these lakes is not included as part of this CIMP.

4.1 Receiving Water Monitoring Sites

Fourteen receiving water monitoring sites will be monitored under this CIMP. The constituents monitored and sample collection frequency varies for the sites. Each site is designated for specific types of monitoring. The monitoring at each site is based on the impairments for each reach and the purpose of monitoring at the site (e.g., mass emission, TMDL, 303(d) listing, etc.). At least one site on each TMDL or 303(d) impaired reach within the jurisdiction of the CIMP MS4 Stakeholders will be monitored for those constituents. Several of the reaches adjacent to the boundary with Ventura County, will be monitored by Ventura County and are thus not included in this CIMP. Sites designated in the trash and bacteria TMDL monitoring plans are included in the CIMP, so that for several reaches, there may be more than one site at which monitoring data will be collected. Aquatic toxicity and other general MS4 constituents (these are defined later in this section) will be monitored at three receiving water monitoring sites representing major subwatersheds. Field measurements will be collected at receiving water monitoring sites.

Two of the sites designated in the bacteria TMDL monitoring plan were re-located in this CIMP. Site MCW-CIMP 9 is located approximately 1,000 feet downstream of site MCW-10. MCW-CIMP 11 was moved 1,500 feet downstream of MCW-13. The sites are more representative of Palo Comado Creek and Lower Lindero Creek. The sites more closely match the conditions of the streams; whereas, the sites identified in the bacteria TMDL monitoring plan were located where the streams daylight from underground box culverts. In addition, resuspension of bed sediments was identified as a potential concern at the previous monitoring site locations.

A brief summary of each of the receiving water monitoring sites is provided in Table 6. Descriptions and additional information about the locations of each of the sites is provided in Appendix A. A detailed discussion of the monitoring constituents and frequencies is provided in Table 11. The table includes the reach location, the Site ID of existing monitoring programs at that location, and purpose of monitoring at each site. In addition, the table includes the agency responsible for existing monitoring activities at each site and additional notes.

Table 7: Selected Receiving Water Monitoring Sites

Proposed Site ID	Existing Site ID	Reach	Agency Currently Conducting Monitoring	Sample Collection Type	Impairment/ Monitoring Requirement	Notes on Site
MCW-CIMP 1	MCW-2 [1]	Lower Malibu Creek	CMP	Grab	TMDL	Assigned compliance requirements in the Bacteria TMDL
MASS EMISSION STATION S-02	Mass Emission S-02	Malibu Creek	LACFCD	Automatic Sampler	Mass Emission Station, TMDL, 303(d)	Previously designated mass emission station.
MCW-CIMP 3	MCW-3 / CMS_MC_1	Middle Malibu Creek	City of Agoura Hills / County of Los Angeles	Grab / Observation and collection	TMDL	Assigned compliance requirements in the Bacteria TMDL; Designated as CMS_MC_1 in the Trash TMDL monitoring plan.
MCW-CIMP 4	MCW-4	Upper Malibu Creek	CMP	Grab	TMDL	Assigned compliance requirements in the Bacteria TMDL.
MCW-CIMP 5	MCW-5	Cold Creek	CMP	Grab	TMDL	Designated in the Bacteria TMDL monitoring plan.
MCW-CIMP 6	MCW-6	Stokes Creek	CMP	Grab	TMDL	Designated in the Bacteria TMDL monitoring plan.
MCW-CIMP 7	MCW-7	Lower Las Virgenes Creek	CMP	Grab	TMDL, 303(d)	Assigned compliance requirements in the Bacteria TMDL.
MCW-CIMP 8	CMS LVC 3	Lower Las Virgenes Creek	City of Calabasas	Observation and collection	TMDL	Designated in the Trash TMDL monitoring plan.
MCW-CIMP 9[1]	Downstream of MCW-10	Palo Comado Creek	CMP	Grab	TMDL	Designated in the Bacteria TMDL monitoring plan.
MCW-CIMP 10	MCW-11	Lower Medea Creek	CMP	Grab	MS4 Receiving Monitoring Site, TMDL, 303(d)	Assigned compliance requirements in the Bacteria TMDL.
MCW-CIMP 11[1]	Downstream of MCW-13 / CMS_LDC_2	Lower Lindero Creek	CMP	Grab / Observation and collection	TMDL, 303(d)	Designated in the Bacteria TMDL monitoring plan; Designated as CMS_LDC_2 in the Trash TMDL monitoring plan.

Proposed Site ID	Existing Site ID	Reach	Agency Currently Conducting Monitoring	Sample Collection Type	Impairment/ Monitoring Requirement	Notes on Site
MCW-CIMP 12	MCW-16	Triunfo (Lower)	CMP	Grab	MS4 Receiving Monitoring Site, TMDL, 303(d)	Assigned compliance requirements in the Bacteria TMDL.
MCW-CIMP 13	CMS_LDC_1	Upper Lindero Creek (Reach 2 and Lake Lindero)	Not currently monitored	Observation and collection	TMDL	Designated as CMS_LDC_1 in the Trash TMDL monitoring plan
MCW-CIMP 14	CMS_MDC_1	Upper Medea (Reach 2)	Not currently monitored	Observation and collection	TMDL	Designated as CMS_MDC_1 in the Trash TMDL monitoring plan
NSMBCW-RW2	-	Malibu Creek	Not currently monitored	Grab	TMDL	To be monitored by the North Santa Monica Bay Coastal Watersheds Group

Notes:

[1] Water quality samples at the Palo Comado and Lower Lindero Creeks were previously collected where the streams daylight from concrete box channels. To be more reflective of the receiving water quality of these reaches, these sites were relocated into natural channel sections several hundred feet downstream from the concrete outlet structures.

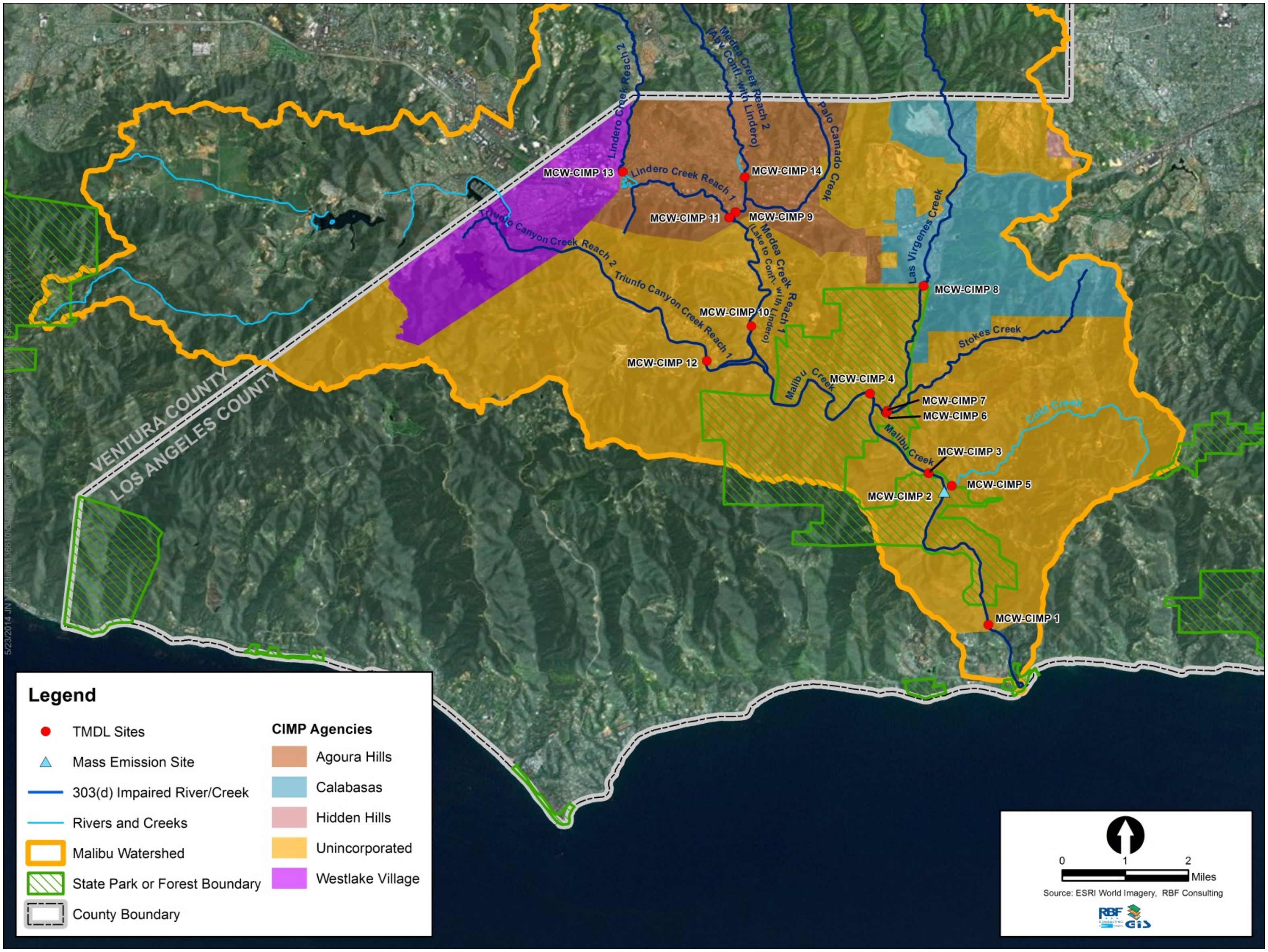
Monitoring at the bacteria TMDL monitoring sites is being performed under an approved coordinated monitoring plan. Agoura Hills is the lead agency for the bacteria TMDL monitoring under that TMDL monitoring plan.
CMP – Coordinated Monitoring Plan

As listed in the table, monitoring will be performed at the mass emission station and at sites throughout the watershed as established in the monitoring plans for the Bacteria TMDL and Trash TMDL. The CIMP MS4 Stakeholders are coordinating with Ventura County for monitoring at Upper Lindero Creek and Upper Medea Creek.

Several sites are proposed for trash monitoring in addition to other constituents. However, the frequency of monitoring for trash and other constituents varies.

Figure 6 below shows the CIMP receiving water monitoring sites .

Figure 6: Proposed Receiving Water Monitoring Sites



4.1.1 Mass emission Station

Mass Emission Station S-02 is an existing mass emission station with a robust existing dataset. The Los Angeles County Flood Control District (LACFCD) has been conducting monitoring at the site as part of its Core Monitoring Program. The goals of the mass emission system are to:

- Estimate the Mass Emission from the MS4
- Assess mass emission trends
- Determine whether the MS4 is contributing to exceedances of water quality standards by comparing results to applicable standards, including the Los Angeles Region Water Quality Control Plan (Basin Plan) and the California Toxics Rule (CTR).

The site is located on Malibu Creek just downstream from the confluence with Cold Creek and within the Cold Creek-Malibu Creek HUC-12 watershed. It is adjacent to Los Angeles County Stream Gage F130-9-R near Malibu Canyon Road, and south of Piuma Road. The tributary drainage area to the station is 104.9 square miles (of the 109.9 square miles that drains the entire Malibu Creek Watershed) (County of Los Angeles 2008). Because of the location of the site and the existing dataset, the site enables evaluation of long term temporal trends for a large portion of the upstream watershed. Monitoring continues at this location as a part of the CIMP.

The mass emission station in Malibu is equipped with an automatic sampler, including an integral flow meter for flow-composited sample collection. The LACFCD collects grab samples to test conventional pollutants and bacteria and composite samples for other pollutants.

Monitoring at the mass emission station will be conducted for the:

- TMDLs for bacteria, nutrients, and benthic community impacts;
- 303(d) parameters;
- Field parameters (flow, DO, conductivity, temperature);
- Aquatic Toxicity; and
- Constituents from Table E-2 with Associated Minimum Levels (MLs).

A list of the TMDL monitoring constituents is presented in Table 7. For the TMDL regarding benthic community impacts, the monitoring at the mass emission station will include nutrients, dissolved oxygen, chlorophyll a, TSS, and turbidity.

Table 8: TMDL Monitoring Constituents

Requirement	Monitoring Constituent
Bacteria TMDL	*E. coli* (Bacteria TMDL[1])
Trash TDML	Trash (Trash TMDL)
Nutrient TMDL	Total Phosphorus
	Total Nitrogen
Benthic Community Impairment TMDL	Dissolved oxygen
	Total Nitrogen
	Total Phosphorus
	TSS
	Turbidity
	Benthic Algal Coverage[2]
	Benthic Community Diversity[2]
	Predictive Multi-Metric Index (pMMI) – SC-IBI[2]
	California Stream Condition Index (CSCI) – O/E[2]

Notes:
[1] Prior to the reconsideration amendment adopted in Resolution No. R12-009, fecal coliform was included as a numeric target for both geometric mean and single sample limits; however, the resolution states that fecal coliform is no longer a numeric target.
[2] Addressed as part of[2] the SMC 5-year Regional Plan.

The 303(d) listed parameters that will be analyzed at the mass emission station include those that Malibu Creek is listed for in the 2010 303(d) list. The 303(d) monitoring constituents are listed in Table 8. 303(d) listed parameters will be monitored at three wet weather and two dry weather events per year. For the wet weather monitoring, the sites are monitored at the first significant storm event of the year and two additional storm events per season.

Table 9: 303 (d) Monitoring Constituents

Requirement	Monitoring Constituent
Other impairments identified on the CWA section 303(d) List for the receiving water or downstream receiving waters (Note: 303(d) listed pollutants are required to be monitored for the impaired and tributary water bodies)	Selenium (at Las Virgenes Creek, Lindero Creek Reach 1 and Reach 2, Malibu Creek, Madea Creek Reach 1, and Medea Creek Reach 2)
	Sulfates (at Malibu Creek)
	Lead (at Triunfo Canyon Creek Reach 1)
	Mercury (at Triunfo Canyon Creek Reach 1)
For wet weather, if the receiving water is listed on the CWA Section 303(d) list for sedimentation, siltation or turbidity:	TSS/SSC
For dry weather, when metals are monitored:	TSS
	Hardness

Data collected at the site will enable estimates of pollutant loads from the entire portion of the watershed within the jurisdiction of the CIMP MS4 Stakeholders. The site will also be used to estimate loads from the Malibu Creek CIMP jurisdiction to downstream receiving water.

The data collected at Mass Emission Station S-02 will be compared to the applicable water standards, used to estimate pollutant loads and trends, and to evaluate the correlations between constituents of concern and TSS.

4.1.2 Permit Receiving Water Monitoring Program

As noted in Section 4.1, monitoring at each site is based on the TMDL and 303(d) impairments at each reach and meeting all the objectives of the CIMP. Therefore, constituents monitored will vary from site to site based on the aforementioned impairments. Sites designated as Permit receiving water monitoring sites include monitoring for constituents with MLs, aquatic toxicity, and other general constituents.

Permit Receiving water monitoring sites will be monitored at three wet weather and two dry weather events per year for most constituents. Wet weather monitoring will occur at the first significant storm event of the year and two additional storm events per season. Dry weather monitoring will occur during the historically driest month and on one additional event. The constituents that will be monitored are shown in Table 9.

Table 10: Receiving Water Monitoring Constituents

Requirement	Monitoring Constituent
MS4 Permit (Wet and Dry Weather)	Flow, DO, pH, Specific Conductivity, and Temperature
MS4 Permit (Dry Weather)	Hardness
SMB TMDLs (pollutants not included in Malibu TMDLs) at Mass Emission Station S-02)	DDT[2]
	PCBs (sediment)[2]
	Debris
Two storm events and one dry event (once during the first significant storm event of the year, and during the historically driest month of the year)	Aquatic Toxicity
One wet weather and one dry weather event. (once during the first significant storm event of the year, and during the historically driest month of the year)	Table E-2 Constituents

Note:
[1] Flow will be measured where present. If no flow exists at the site during a monitoring event, photographs of the site and field notes will be collected.
[2] The CIMP MS4 Stakeholders will coordinate with the North Santa Monica Bay Coastal Watersheds Group to collect data on PCBs and DDT for Malibu Creek.

4.1.3 Program Constituents with Associated Minimum Levels

Constituents with MLs will be monitored the first year of implementation during one wet weather and one dry weather event. Monitoring for these constituents will be conducted at the MS4 receiving water monitoring locations and is required during the first significant storm event and during August the historically driest month.

Where the parameter is not detected at the Method Detection Limit (MDL) for its respective test method or the result is below the lowest applicable water quality objective, it need not be further analyzed. If a parameter is detected exceeding the lowest applicable water quality objective during wet weather then the parameter is analyzed for the remainder of the effective permit period during wet weather at the receiving water monitoring station where it was detected. If a parameter is detected exceeding the lowest applicable water quality objective during dry weather then the parameter will be analyzed for the remainder of the effective period of the permit during dry weather at the receiving water monitoring station where it was detected.

The constituents listed in Table E-2 of the MS4 permits with associated MLs are shown in Table 10. The CIMP streamlines the analytes by incorporating analytes as allowed by the MS4 Permit and removing pollutants with associated MLs that have been monitored within the Malibu Creek Watershed but have not been historically detected.

4.2 TMDL Receiving Water Monitoring

The TMDL Monitoring Program includes monitoring to evaluate compliance with TMDL requirements for

- Bacterial indicators
- Trash monitoring
- Nutrient monitoring
- Monitoring for nutrient and sediment related to benthic community impairment

This CIMP includes monitoring sites established in the monitoring plans for the bacteria and trash TMDLs. The frequency of monitoring for these two impairments is based on the TMDL monitoring plans. If the reaches are impaired for other TMDLs, samples will also be collected at these sites for those TMDLs. The frequency of monitoring for other TMDL impairments will be three wet weather and two dry weather events.

4.2.1 Bacteria TMDL

All of the sites designated in the TMDL monitoring plan will continue to be monitored under this CIMP. As part of the preparation of the CIMP, historical data were reviewed. Data at several sites showed that there are very few exceedances at CIMP 1 (Lower Malibu Creek), CIMP 5 (Cold Creek), and CIMP 6 (Stokes Creek). Although existing monitoring shows that these sites had few exceedances of the TMDL targets, monitoring will be continued until sufficient data are collected to delist these reaches.

Two of the sites designated in the bacteria TMDL monitoring plan have been updated for the CIMP. Site MCW-CIMP 9 is located approximately 1,000 feet downstream of site MCW-10. MCW-CIMP 11 was moved 1,500 feet downstream of MCW-13. These sites are more representative of the reach segments that they are intended to characterize, Palo Comado Creek and Lower Lindero Creek, and resuspension of bed sediments at the previous monitoring site locations had been observed that may impact the monitoring data.

Monitoring for the bacteria TMDL will include analysis for *E. coli*. This is consistent with the most current requirements for the TMDL as updated during the reconsideration of the TMDL in 2012. The updates to the Bacteria TMDL were adopted by the LARWQCB through Resolution No. R12-009 (June 7, 2012). The resolution and reconsideration amendment revised the numeric targets of the TMDL at fresh waters designated for water contact recreation to be based on *E. coli* density. As a result, the TMDL no longer includes fecal coliform as a numeric target for compliance.

For bacteria TMDL sites, monitoring will be conducted on a weekly basis. When possible, the same day will be used for consistency (Tuesday has been used for previous analyses and may continue to be used under the CIMP).

4.2.2 Trash TMDL

Trash monitoring data will be collected monthly or bimonthly at each site in accordance with the Trash Monitoring and Reporting Plan (TMRP) submitted to the LARWQCB on April 29, 2010. The TMRP is hereby incorporated into this CIMP as Attachment K and modified as follows. To streamline the trash monitoring program and retain monitoring collection on each of the existing reaches included in the TMDL and TMRP, the trash monitoring data for Las Virgenes Creek will be collected in Lower Las Virgenes Creek at MCW-CIMP 8. Two additional sites proposed in the TMRP along Las Virgenes Creek, CMS LVC1 and CMS LVC 2 will not be monitored. This monitoring site will be located at the TMRP named site CMS LVC 3.

The information collected during each monitoring event is based on the RTAP, and it will involve collecting information about the trash present along a 100 foot section of the stream. Trash monitoring will not be performed at areas deemed inaccessible due to limited access or safety concerns .

The CIMP MS4 Stakeholders are implementing full capture trash devices in the watershed. After implementation of the full capture devices in areas upstream of the designated trash monitoring sites, the stakeholders will continue to perform monitoring for trash at the designated monitoring sites for a period of two years. After this two year period, if trash is not found in deleterious amounts, monitoring will be discontinued and the CIMP MS4 stakeholders will perform annual trash collection at the named receiving water monitoring sites for non-point sources of trash.

For each monitoring event, the field crew will walk the 100 foot section of the stream. As the field crew encounters trash, the items will be collected in trash bags using a trash collection device. During the trash collection, the crew will fill out a trash assessment worksheet to record the numbers of different types of trash items that are collected both in stream and on the banks of the stream. Additional information about the condition of the site and the monitoring event will be collected. After the monitoring event, the information about the trash will be estimated from the worksheet and the total weight of the trash collected will be estimated. In addition, the numbers and size of trash bags filled will be recorded.

4.2.3 Nutrient TMDL

Nutrient monitoring will be conducted at four monitoring locations within the watershed: Malibu Creek, Las Virgenes Creek, Lindero Creek, and Medea Creek. Monitoring for nutrient-related constituents of concern will be conducted during:

- Two dry weather events per year (the critical dry period and the following dry event)
- The first significant storm event of the year
- Two additional storm events per season

Analysis will be performed on samples for nutrients and other related parameters (including dissolved oxygen, percent algal cover, and chlorophyll *a*) as listed in Table 10.

4.2.4 Benthic Community Impairments

Monitoring for benthic community impairments will include monitoring for sediment and nutrient related constituents of concern and also bioassessment monitoring. The bioassessment monitoring program is described in the regional monitoring section of this CIMP. The monitoring for constituents of concern will be conducted at reach monitoring locations within the watersheds for Malibu Creek, Las Virgenes Creek, Lindero Creek, and Medea Creek. Monitoring for nutrient and sediment related constituents of concern will be conducted during:

- Two dry weather events per year (one summer dry event and one winter dry event);
- The first significant storm event of the year; and
- Two additional storm events per season.

Analysis will be performed on samples for sediment and nutrients and other related parameters (including dissolved oxygen, ammonia, nitrate, total nitrogen, and chlorophyll *a*) as listed in Table 10. Several of these parameters are related to parameters that will be monitored for the TMDL for nutrients. The benthic community diversity, pMMI SC-IBI, and CSCI O/E will be assessed in the bioassessment.

4.2.5 Santa Monica Bay TMDL for DDT and PCBs

The CIMP MS4 stakeholders will coordinate with the NSMP CIMP stakeholders to monitor for DDT and PCBs. The monitoring site where samples will be collected is in the downstream portion of the Malibu Creek Watershed within the City of Malibu. Monitoring for PCB and DDT will be coordinated with North Santa Monica Bay Coastal Watersheds EWMP group at receiving water site NSMBCW-RW2 as shown in Figure 6 and Table 7.

4.3 Monitoring Events

The constituents and frequencies for the receiving water monitoring sites are provided in Table 11. The frequency of monitoring at each site depends on the purpose of the monitoring at that site and the pollutants that are analyzed.

4.3.1 Wet Weather Monitoring

During the first year of monitoring, wet weather events will be initiated when there is a 70 percent chance of 0.25 inches of rain within a 24-hour period. Rainfall will be measured from Los Angeles County controlled rain gauges within the Malibu Creek Watershed. Because a significant storm event is based on predicted rainfall, it is recognized that this monitoring may be triggered without 0.25 inches of rainfall actually occurring. In this case, the monitoring event will still qualify as meeting this requirement provided that sufficient sample volume is collected to do all required laboratory analysis. Documentation will be provided showing the predicted rainfall amount. If a sufficient number of events are not collected early in the wet season, the CIMP MS4 Stakeholders will consider adjusting the threshold for initiation of monitoring.

Data will be collected to consider wet weather events to be defined as rainfall that creates an increase of flow by 20 percent (as proposed in the permit). During wet weather events, rainfall amounts will be recorded, and the flow in reaches will be estimated. This information will be compared with the base flow to evaluate the relationship between rainfall and increases in flow (above base flow) at monitoring sites. The results will be included in the annual monitoring report for the first year of monitoring. After reviewing the data collected during the first year, the CIMP MS4 Stakeholders will consider adjusting the predicted rainfall needed to initiate monitoring. The consistency between sites (the flow increase at different sites will likely vary in response to a given amount of rainfall) and frequency of these events will be considered in the decision. Sampling events will be separated by a minimum of three days of dry conditions (less than 0.1 inches of rain each day).

During wet weather conditions, the CIMP MS4 Stakeholders conduct monitoring at the receiving water monitoring sites (Mass Emission Station

S-02 and the TMDL sites as shown in Table 11) during the first significant storm event of the year. In addition, two storm events are monitored during the year. Aquatic toxicity is monitored twice per year during wet weather conditions at site S-02 (Mass Emission Station), CIMP 12, and CIMP 14.

Receiving water monitoring activities are coordinated with outfall monitoring to the greatest extent practical. As described further below, CIMP outfall monitoring sites are coordinated with the nearest downstream receiving water monitoring site so that the potential impacts from MS4 discharges can be evaluated. When possible, downstream receiving water monitoring sites are monitored after the upstream outfall.

4.3.2 Dry Weather Monitoring

During dry weather conditions, the CIMP MS4 Stakeholders conduct monitoring at the receiving water monitoring sites and Mass Emission Station S02 at a minimum of two times per year. In addition, the agencies conduct monitoring at the sites shown in Table 11 at the frequency shown. At a minimum, one of the events at each site is monitored during the month with the historically lowest instream flows, or where instream flow data are not available, or during the historically driest month of August. Aquatic toxicity is monitored once per year during the critical dry weather condition.

Dry weather events are defined as periods with no rainfall above 0.1inches within the 72 hours preceding the sample collection event, as measured from Los Angeles County controlled rain gauges within the Malibu Creek Watershed.

Table 11 shows the monitoring frequencies at the respective monitoring sites.

Table 11: Receiving Water Monitoring Sites with Constituents and Frequencies

Monitoring Site ID	MCW-CIMP 1	MASS EMISSION STATION S-02	MCW-CIMP 3	MCW-CIMP 4	MCW-CIMP 5	MCW-CIMP 6	MCW-CIMP 7	MCW-CIMP 8	MCW-CIMP 9	MCW-CIMP 10	MCW-CIMP 11	MCW-CIMP 12	MCW-CIMP 13	MCW-CIMP 14
Existing Site ID	MCW-2	Mass Emission S-02	MCW-3/ CMS_MC_1	MCW-4	MCW-5	MCW-6	MCW-7	CMS LVC 3	MCW-10 (Downstream)	MCW-11	MCW-13 (Downstream)/ CMS_LDC_2	MCW-16	CMS_LDC_1	CMS_MDC_1
Subwatershed	Lower Malibu Creek	Malibu Creek	Middle Malibu Creek	Upper Malibu Creek	Cold Creek	Stokes Creek	Lower Las Virgenes Creek	Lower Las Virgenes Creek	Palo Comado Creek	Lower Medea Creek	Lower Lindero Creek	Triunfo (Lower)	Upper Lindero (Reach 2)	Upper Medea (Reach 2)
Constituent	**Frequency**													
Bacteria TMDL														
E. coli	Weekly	3/2	Weekly	Weekly	Weekly	Weekly	Weekly		Weekly	Weekly	Weekly	Weekly		
Trash TMDL														
Trash			Monthly					Bi-monthly			Bi-monthly		Monthly	Bi-monthly
Nutrient TMDL														
Total Phosphorus		3/2					3/2			3/2	3/2			
Total Nitrogen		3/2					3/2			3/2	3/2			
Benthic Community Impairment TMDL [1]														
Total Phosphorus		3/2					3/2							
Total Nitrogen		3/2					3/2							
TSS		3/2					3/2							
Turbidity		3/2					3/2							
303(d)														
TSS							3 [3]			3 [3]		3 [3]/2 [4]		
Hardness		3 [5]								3 [5]		3 [5]/2 [4]		
Selenium		3/2					3/2			3/2	3/2			
Sulfates		3/2												
Lead / Mercury												3/2		
MS4 Receiving Water														
Flow, DO, pH, Conductivity, Temperature		3/2								3/2		3/2		
Aquatic Toxicity		2/1								2/1		2/1		
Constituents with MLs [2]		1/1								1/1		1/1		

Notes:
Where the frequency is noted with two numbers (i.e. 3/2), the first number is the number of wet weather monitoring events and the second is the number of dry weather monitoring events within a monitoring year (July 1 through June 30). For example, Aquatic Toxicity at MCW-CIMP 2 will be monitored during two wet weather events and one dry weather event.

[1] Some of the Benthic Community Impairment TMDLs constituents, SC-IBI, SC-O/E, Benthic Algal Coverage, will be assessed by the bioassessment program. Total Phosphorus is included for both the Nutrient TMDL and the Benthic Community Impairment TMDL.

[2] During the first year of the monitoring program, the monitoring program includes analysis of the constituents with minimum levels (MLs) that are listed on Table E-2 of the MRP during the first significant storm and the critical dry event. These constituents are shown in Table 9 of this report. Subsequent years will include monitoring for pollutants tested above the ML.

[3] For the sedimentation/siltation 303(d) listing, TSS will be monitored during wet weather.

[4] For dry weather when metals are monitored, TSS and Hardness will be monitored.

[5] Hardness is required at receiving water monitoring sites during wet weather.

5 Stormwater Outfall Based Monitoring

The objectives of the stormwater outfall based monitoring program include the following:

a) Determine the quality of a Permittee's discharge relative to municipal action levels, as described in Attachment G of the Permit.
b) Determine whether a Permittee's discharge is in compliance with applicable stormwater WQBELs derived from TMDL WLAs.
c) Determine whether a Permittee's discharge causes or contributes to an exceedance of receiving water limitations.

5.1 Permit Requirements

The MS4 permit requires that the Permittees implement a stormwater outfall monitoring program during wet weather conditions. The permit details the following criteria that must be considered to select sites for the stormwater monitoring program:

1. The stormwater outfall based monitoring program must be representative of the CIMP MS4 Stakeholders' discharge with at least one major outfall per sub-watershed (HUC-12) drainage area.
2. The drainage(s) to the selected outfall(s) are representative of the land uses within the Permittees' jurisdiction.
3. The desktop survey must select outfalls with configurations that should facilitate accurate flow measurement and in consideration of safety of monitoring personnel.
4. The specific location of sample collection may be within the MS4 upstream of the actual outfall to the receiving water if field safety or accurate flow measurement require it.

5.2 Approach

A representative approach to characterize the stormwater discharge is employed. To accomplish this, one outfall is selected per HUC-12 with a tributary land use that is representative of the land uses within the HUC-12. Discharges will be sampled during three stormwater events each year to characterize the water quality discharged into the receiving waters. The timing of outfall monitoring will coincide with downstream receiving water monitoring. This approach is expected to work well in characterizing stormwater discharges and evaluating their impacts on receiving waters.

A desktop GIS exercise was conducted to determine the outfall sites within each of the HUC-12 sub-watersheds of the Malibu Creek Watershed to be sampled. Known stormwater outfalls (n=137) were overlayed on all available data within the Permittee(s) jurisdiction; this included:

- surface water bodies;
- HUC-12 boundaries;
- land use;
- effective impervious area (EIA);
- jurisdictional boundaries;
- open channel and underground pipes 36 inches in diameter or greater;
- dry weather diversions; and
- major outfalls catchment areas.

The results of this study are shown in Figure 7 and summarized in Table 11.

Figure 7: CIMP Database Summary Map

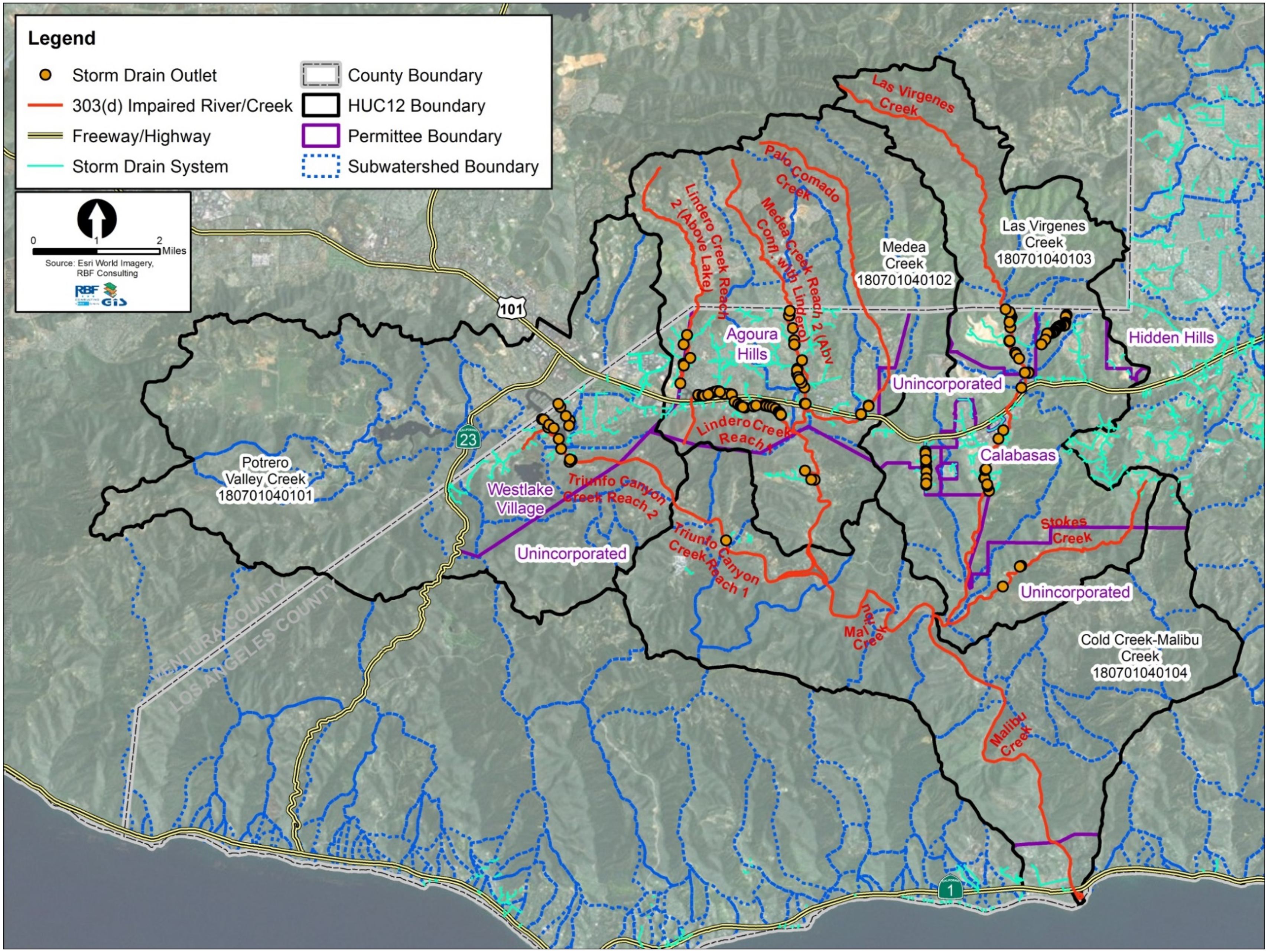


Table 12: HUC-12 Malibu Creek Sub-watershed Land Use Summary

Land Use (2008 SCAG)	Potrero Valley Creek (HUC-12 ID: 180701040101)		Medea Creek (HUC-12 ID: 180701040102)		Las Virgenes Creek (HUC-12 ID: 180701040103)		Cold Creek-Malibu Creek (HUC-12 ID: 180701040104)	
	Acres	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
Single Family Residential	760.5	9.9%	1,587.1	21.1%	1,008.2	9.6%	290.7	1.7%
Multi-Family Residential	111.0	1.4%	177.1	2.4%	156.9	1.5%	1.3	0.0%
Other Residential	265.9	3.5%	8.5	0.1%	62.0	0.6%	985.1	5.6%
General Office	137.7	1.8%	77.3	1.0%	127.3	1.2%	72.0	0.4%
Commercial and Services	107.5	1.4%	224.7	3.0%	36.5	0.3%	65.4	0.4%
Facilities	42.6	0.6%	138.7	1.8%	32.6	0.3%	89.4	0.5%
Education	35.7	0.5%	81.4	1.1%	181.3	1.7%	–	0.0%
Industrial	71.8	0.9%	139.9	1.9%	27.4	0.3%	151.6	0.9%
Transportation, Communications, & Utilities	25.1	0.3%	156.3	2.1%	461.9	4.4%	10.8	0.1%
Mixed Urban	–	0.0%	–	0.0%	2.5	0.0%	–	0.0%
Open Space and Recreation	197.2	2.6%	621.1	8.3%	78.6	0.8%	108.9	0.6%
Agriculture	120.0	1.6%	6.7	0.1%	43.6	0.4%	133.4	0.8%
Vacant	3,980.6	51.8%	2,932.1	39.1%	5,846.2	55.9 %	15,018.3	86.0%
Water	305.6	4.0%	15.1	0.2%	–	0.0%	0.3	0.0%
Under Construction	23.9	0.3%	5.4	0.1%	90.5	0.9%	51.1	0.3%
Undevelopable	1,130.9	14.7%	677.2	9.0%	1,786.6	17.1 %	108.7	0.6%
Unknown	364.4	4.7%	657.6	8.8%	511.8	4.9%	377.1	2.2%
Total	**7,680**	**100%**	**7,506**	**100%**	**10,454**	**100%**	**17,465**	**100%**

MS4 outfalls are typically found in developed areas of a watershed, and the Malibu Creek Watershed is largely undeveloped. As a result the land uses tributary to the proposed stormwater outfall sites cannot be truly representative of the overall HUC-12 sub-watershed land use. However, since the objective of outfall monitoring is to evaluate the effects of MS4 discharges on receiving waters, selecting outfalls with tributary land use similar to the developed land uses within the HUC-12 is considered appropriate. Given this rational outfall sites were selected within each HUC-12 subwatershed based on land use characteristics that were representative of the developed portion of the HUC-12.

Field investigations were performed to evaluate access, safety, and any other potential restrictions. The chosen outfall monitoring site location, description, and permittee (owner), for each HUC-12 are listed in Table 13 and the land use summary is reported in Table 14. Figures 8–11 show the location of the outfall monitoring site in relation to the known outfalls in each HUC-12. Additional site information can be found in Appendix D.

Table 13: Malibu Creek Watershed Potential Monitoring Sites Summary

HUC-12 Name (HUC-12 ID / Total Outfall)	Permittee(s)	Monitoring Outfall ID (Latitude, Longitude)	Description
Potrero Valley Creek (180701040101 / 44)	Westlake Village	TRUNFOC-095A (34.155, -118.7912)	27 inch RCP; northeast of Triunfo Canyon Creek and Lindero Canyon Rd.
Medea Creek (180701040102 / 39)	Agoura Hills	LNDRC-074 (34.150688, -118.750108)	48 inch RCP; northwest of Lindero Creek and Thousand Oaks Blvd.
Las Virgenes Creek (180701040103 / 46)	Calabasas	LAVCR-054 (34.157689, -118.699158)	102 inch RCP ; northeast of Lost Hills Rd and Cold Springs St.

HUC-12 Name (HUC-12 ID / Total Outfall)	Permittee(s)	Monitoring Outfall ID (Latitude, Longitude)	Description
Cold Creek-Malibu Creek (180701040104 / 8)	Unincorporated	TRUNFOC-035 (34.11445, -118.779199)	36 inch RCP; northwest side of the bridge at the intersection of Troutdale and Mulholland Hwy.

Table 14: Outfall Monitoring Site Drainage Area Land Use Summary

Land Use (2008 SCAG)	Potrero Valley Creek (HUC-12 ID: 180701040101)		Medea Creek (HUC-12 ID: 180701040102)		Las Virgenes Creek (HUC-12 ID: 180701040103)		Cold Creek-Malibu Creek (HUC-12 ID: 180701040104)	
	Acres	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
Single Family Residential	1.52	5.3%	27.5	42.8%	74.40	12.0 %	-	-
Multi-Family Residential	21.75	75.9%	-	-	-	-	-	-
Other Residential	-	-	-	-	-	-	7.71	43.0%
General Office	-	-	-	-	33.63	5.5%	0.31	1.7%
Commercial and Services	-	-	0.5	0.7%	8.78	1.4%	0.34	1.9%
Facilities	-	-	-	-	12.90	2.1%	-	-
Education	-	-	-	-	0.22	0.0%	-	-
Industrial	-	-	-	-	20.80	3.3%	-	-
Transportation, Communications, & Utilities	5.04	17.6%	10.4	16.1%	225.45	36.5 %	3.14	17.5%
Mixed Urban	-	-	-	-	-	-	-	-
Open Space and Recreation	0.15	0.5%	1.4	2.2%	4.15	0.7 %	-	-
Agriculture	-	-	-	-	-	-	-	-
Vacant	-	-	-	-	216.94	35.1 %	6.43	35.9%
Water	-	-	-	-	-	-	-	-
Under Construction	-	-	-	-	-	-	-	-
Undevelopable	0.18	0.6%	24.5	38.1	20.41	3.3%	-	-
Unknown	-	-	-	-	-	-	-	-
Total	**28.6**	**100%**	**64.4**	**100%**	**617.7**	**100%**	**17.9**	**100%**

Figure 8: Potrero Valley Creek Watershed Monitoring Map

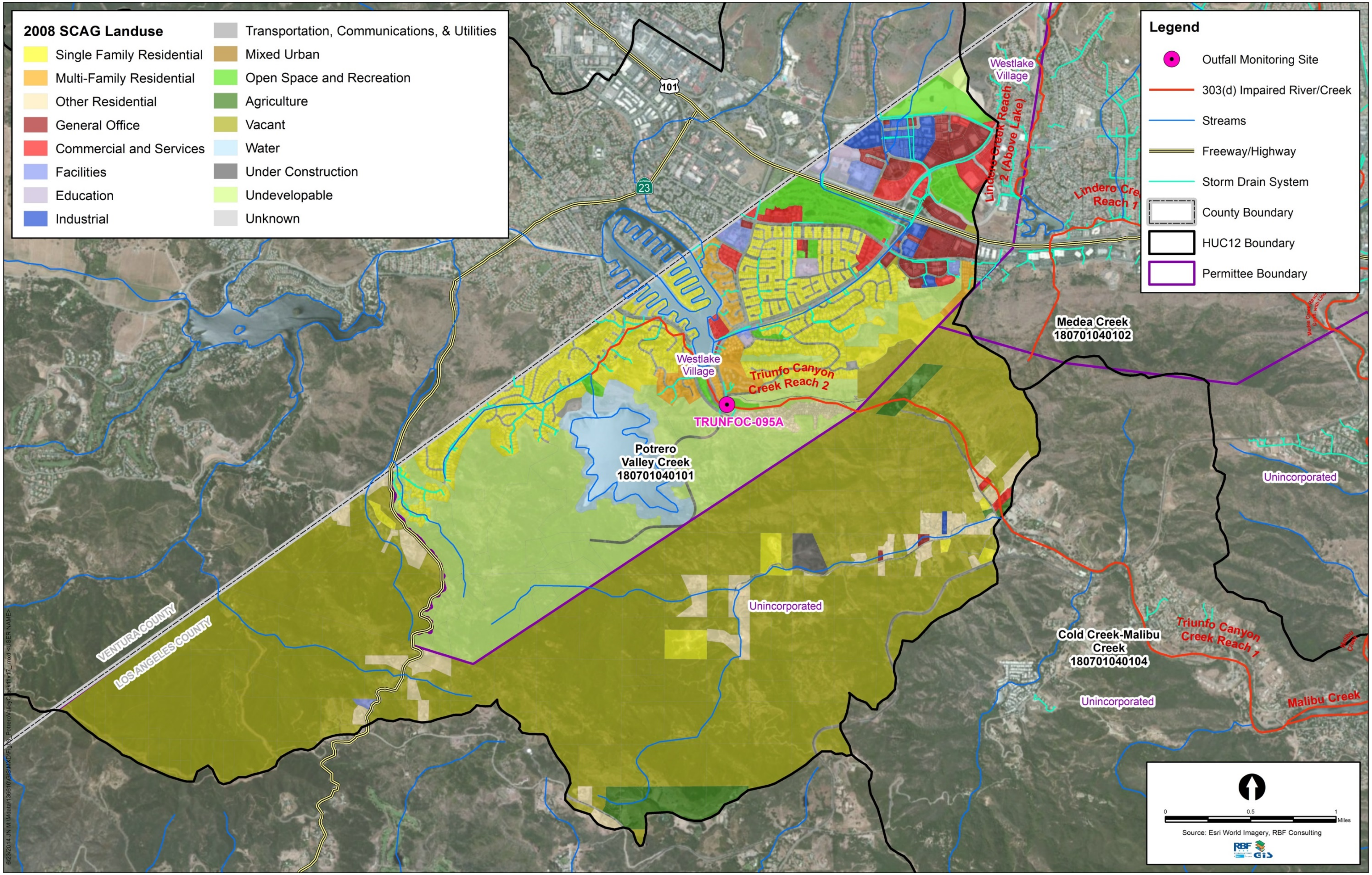


Figure 9: Madea Creek Watershed Monitoring Map

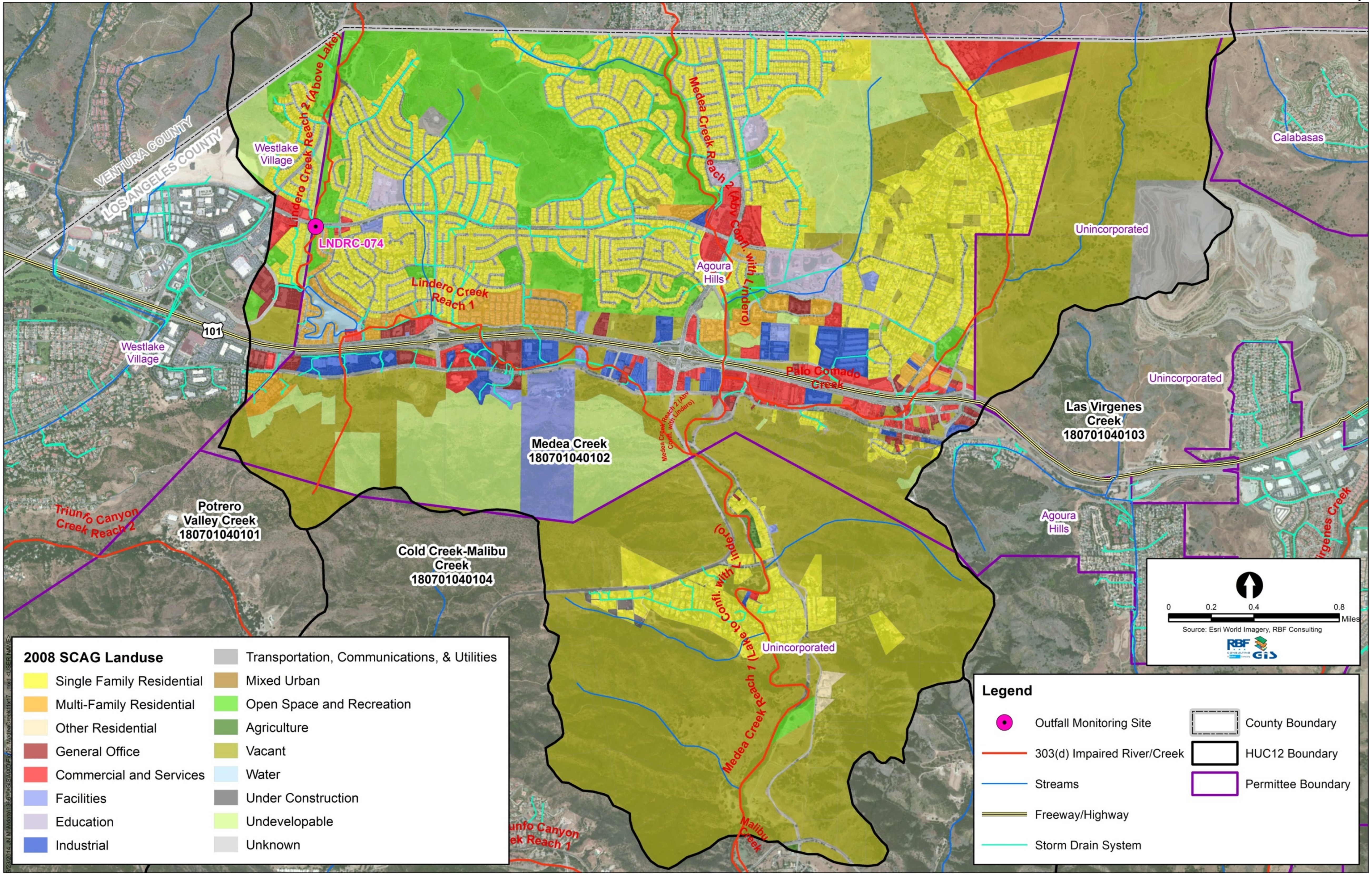

VENTURA COUNTY
LOS ANGELES COUNTY
Westlake Village
Lindero Creek Reach 2 (Above Lake)
LNDRC-074
Lindero Creek Reach 1
Medea Creek Reach 2 (Abv Conf. with Lindero)
Agoura Hills
Calabasas
Unincorporated
101
Palo Comado Creek
Medea Creek 180701040102
Las Virgenes Creek 180701040103
Potrero Valley Creek 180701040101
Triunfo Canyon Creek Reach 2
Cold Creek-Malibu Creek 180701040104
Medea Creek Reach 1 (Lake to Confl. with Lindero)
Malibu Creek
0 0.2 0.4 0.8 Miles
Source: Esri World Imagery, RBF Consulting
2008 SCAG Landuse
Single Family Residential
Multi-Family Residential
Other Residential
General Office
Commercial and Services
Facilities
Education
Industrial
Transportation, Communications, & Utilities
Mixed Urban
Open Space and Recreation
Agriculture
Vacant
Water
Under Construction
Undevelopable
Unknown
Legend
Outfall Monitoring Site
303(d) Impaired River/Creek
Streams
Freeway/Highway
Storm Drain System
County Boundary
HUC12 Boundary
Permittee Boundary

Figure 10: Las Virgenes Watershed Monitoring Map

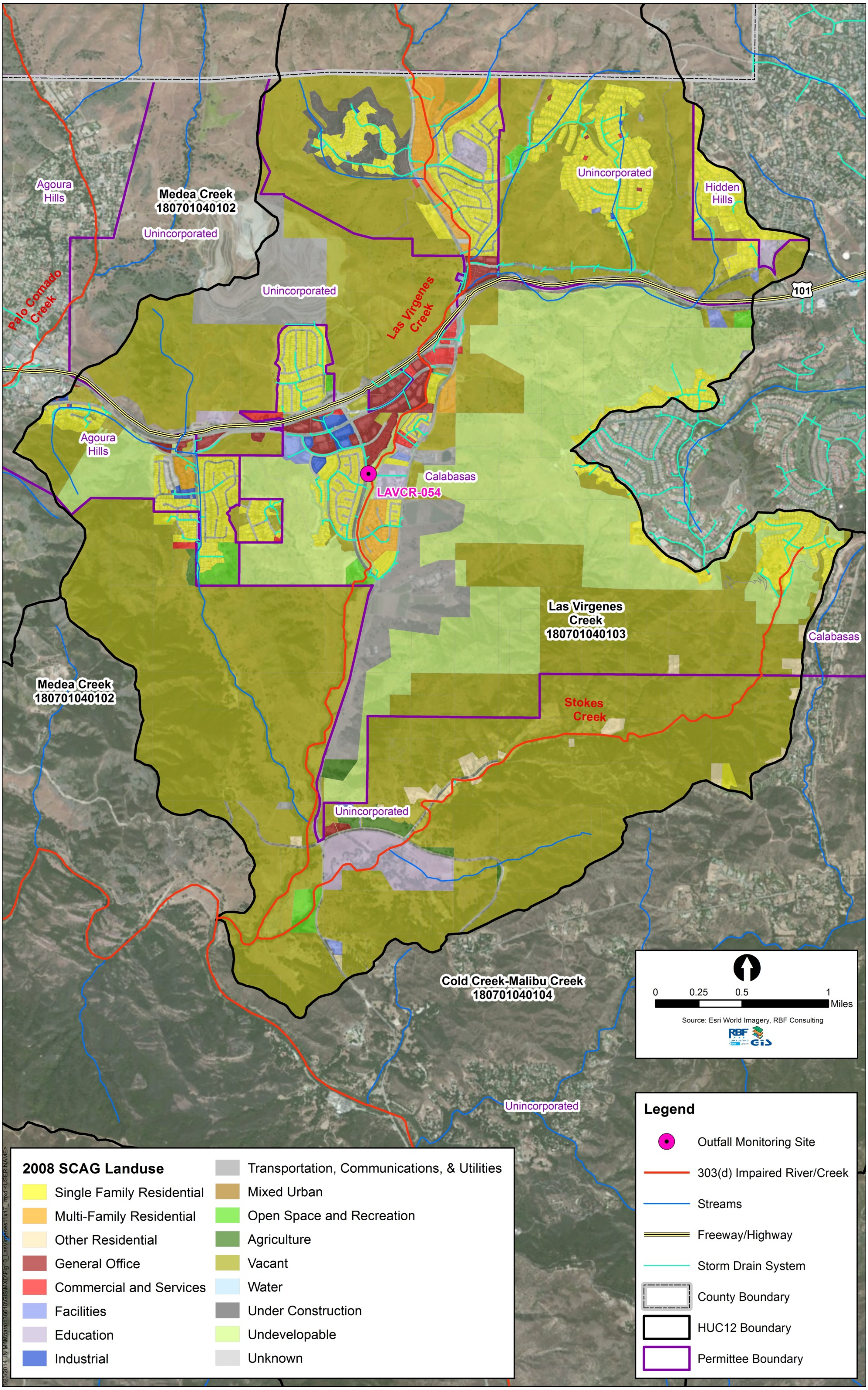
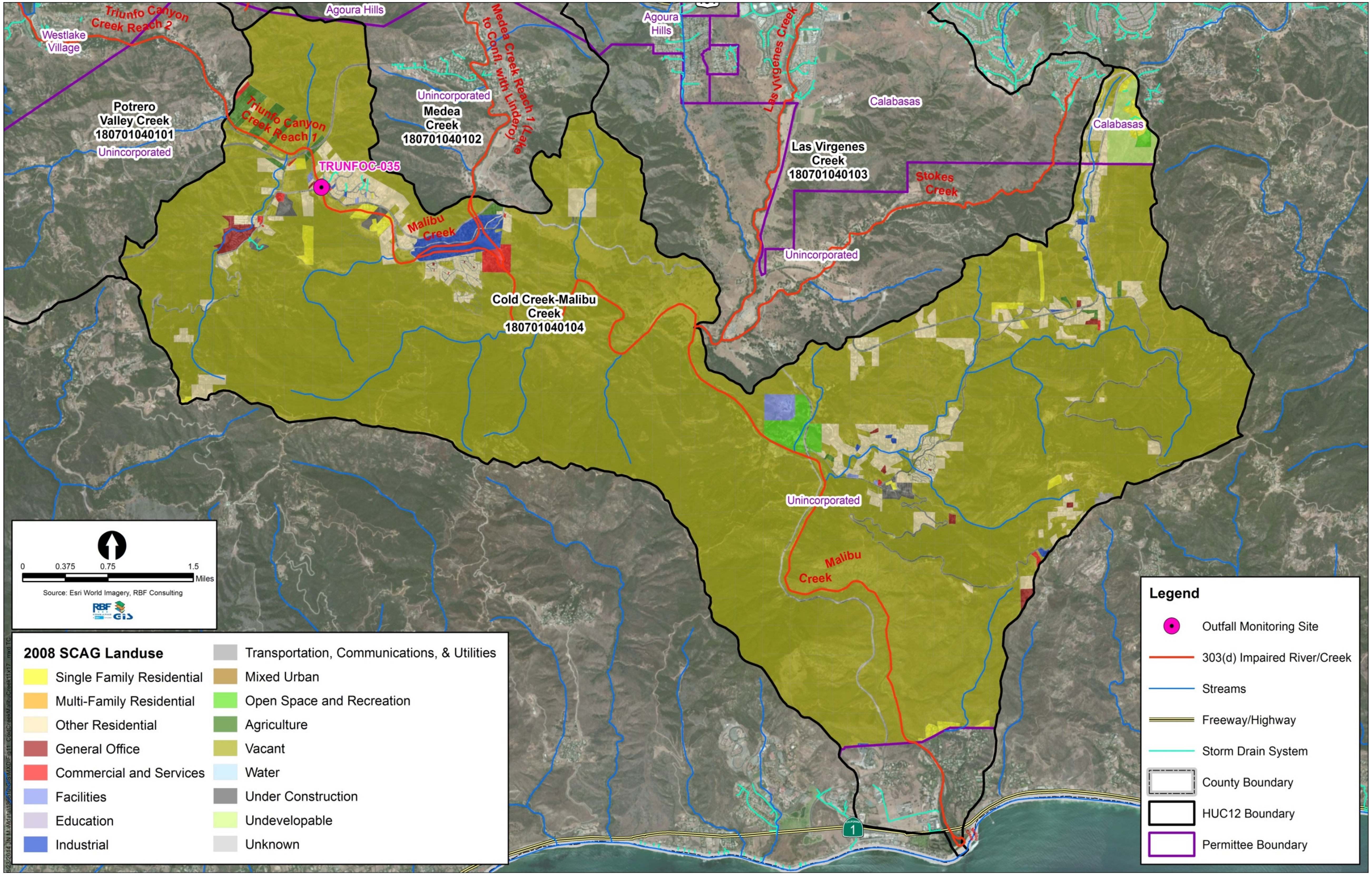


Figure 11: Cold Creek-Malibu Creek Watershed Monitoring Map



5.3 Monitoring Approach

Wet weather poses significant challenges for monitoring stormwater discharges from the MS4. Beyond safety concerns regarding outfalls and/or alternative access points; representative sampling and equipment security are major considerations. All of these restrictions have and will continue to be considered as monitoring activities commence. The selected outfalls will be monitored during wet weather conditions as follows:

1. Monitoring of stormwater discharges at the selected locations will occur during wet weather conditions resulting from the first rain event of the year, and at least two additional wet weather events within the same wet weather season. Permittees will target the first storm event of the storm year with a predicted rainfall of at least 0.25 inch at a seventy percent (70%) probability of rainfall at least 24 hours before the event start time. Because a significant storm event is based on predicted rainfall, it is recognized that this monitoring may be triggered without 0.25 inches of rainfall actually occurring. In this case, the monitoring event will still qualify as meeting this requirement provided that sufficient sample volume is collected to do all required laboratory analysis. Documentation will be provided showing the predicted rainfall amount. Permittees will target subsequent storm events that forecast sufficient rainfall and runoff ; however, the Permittees may adjust the criteria for monitoring events. Sampling events will be separated by a minimum of three days of dry conditions (less than 0.1 inch of rain each day).
2. At a minimum, the constituents in Section 5.3.1 will be monitored unless a surrogate pollutant has been approved by the Executive Officer of the Los Angeles Regional Water Quality Control Board (RWQCB).
3. Sampling sites will be outfitted with automatic samplers to collect a flow-weighted composite sample of the stormwater discharge over a 24-hour period or for the period of stormwater discharge if less than 24 hours.
4. The outfall sampling event will coincide with the receiving water monitoring activities.

Due to the temporal requirements and financial burden associated with installing auto-sampler stations at the outfall sites, a phased approach will be employed. Two outfall sampling sites will be installed each of the first two years of this monitoring program. Sampling will not commence at each of the stations until the completion of the auto sampler installation.

5.3.1 Constituents

The requirements for the outfall monitoring program are outlined in section VII of Attachment E of the permit. Constituents to be monitored at each outfall are based on the impairments previously identified at that reach and results from receiving water monitoring performed as part of this CIMP. These parameters include constituents with MLs (from Table E-2 of the permit), TMDL impairments, 303(d) listed impairments, or other exceedances of receiving water limitations. Monitoring of constituents identified in MLs (Table E-2 of the permit) will be triggered by results of the receiving water monitoring as described in Section 4 of the CIMP. The constituents monitored initially at each of the stormwater outfall monitoring stations are outlined in Table 15.

Table 15: List of Parameters and Constituents required for Stormwater Outfall Monitoring

HUC-12	Potrero Valley	Medea Creek	Las Virgenes	Cold Creek-Malibu Creek
Bacteria TMDL *(E. coli)*				
E. coli	X	X	X	X
Trash TMDL				
Trash		X	X	X
Nutrient TMDL				
Total Phosphorus		X	X	X
Total Nitrogen		X	X	X
Benthic Community Impairment TMDL				
Total Phosphorus			X	X
Total Nitrogen			X	X
TSS			X	X
Turbidity	X	X	X	X
Field Measurements				
Flow, DO, pH, Conductivity, Temperature	M	M	M	M
303(d) Listed Pollutants				
Sedimentation / Siltation – TSS	D	D		
Benthic Community Impairment TMDL – Total Phosphorus, TSS, Turbidity	D	D		
Hardness & TSS	M	M	M	M
Selenium		D	D	D
Sulfates				D
Lead / Mercury	D			
Aquatic Toxicity and Table E-2 Constituents (assigned MLs)				
Aquatic Toxicity	O	O	O	O
Constituents with MLs	E	E	E	E

[1] Hardness and TSS tests will be conducted in a lab.

M – Required during each event
X – Required to be monitored where downstream receiving waters have a WLA assigned in a TMDL.
D – Required to be monitored where downstream receiving waters are 303(d) listed for the specific pollutant of concern
O – To occur when triggered by recent receiving water toxicity monitoring.. Refer to Section 6.3.
E – To be monitored at the outfalls in the following monitoring the year following detection in downstream receiving waters. Table E-2 constituents detected above relevant objectives in downstream receiving water and not otherwise addressed by TMDLs.

6 Non-Stormwater Outfall Based Monitoring

6.1 Permit Requirements

The non-stormwater outfall based monitoring plan identifies potential sources of pollutants during non-stormwater conditions. The objectives of the non-stormwater outfall based monitoring program include the following:

a) Determine whether a Permittee's discharge is in compliance with applicable non-stormwater WQBELs derived from TMDLs.
b) Determine whether a Permittee's discharge exceeds non-stormwater action levels, as described in Attachment G of this Order.
c) Determine whether a Permittee's discharge contributes to or causes an exceedance of receiving water limitations.
d) Assist a Permittee in identifying illicit discharges as described in Part VI.D.10 of the Permit.

The Non-Stormwater Outfall Screening Program is a multi-step process to identify and address non-stormwater discharges to the receiving waters. The following outfall screening and monitoring process is intended to meet the objectives of Part IX.A of the MRP:

1. Develop criteria or other means to ensure that all outfalls with significant non-stormwater discharges are identified and assessed during the Permit term.
2. For outfalls determined to have significant non-stormwater flow, determine whether flows are the result of illicit connections/illicit discharges (IC/IDs), authorized or conditionally exempt non-stormwater flows, natural flows, or from unknown sources.
3. Refer information related to identified IC/IDs to the IC/ID Elimination Program (Part VI.D.10 of the Permit) for appropriate action.
4. Based on existing screening or monitoring data or other institutional knowledge, assess the impact of non-stormwater discharges (other than identified IC/IDs) on the receiving water.
5. Prioritize monitoring of outfalls considering the potential threat to the receiving water and applicable TMDL compliance schedules.
6. Conduct monitoring or other investigations to identify the source of pollutants in non-stormwater discharges.
7. Use the results of the screening process to evaluate the conditionally exempt non-stormwater discharges identified in Parts III.A.2 and III.A.3 of the Permit and take appropriate actions pursuant to Part III.A.4.d of the Permit for those discharges that have been found to be a source of pollutants. Any future reclassification shall occur per the conditions in Parts III.A.2 or III.A.6 of the Permit.
8. Conduct monitoring or assess existing monitoring data to determine the impact of non-stormwater discharges on the receiving water.
9. Maximize the use of Permittee resources by integrating the screening and monitoring process into existing or planned CIMP efforts.

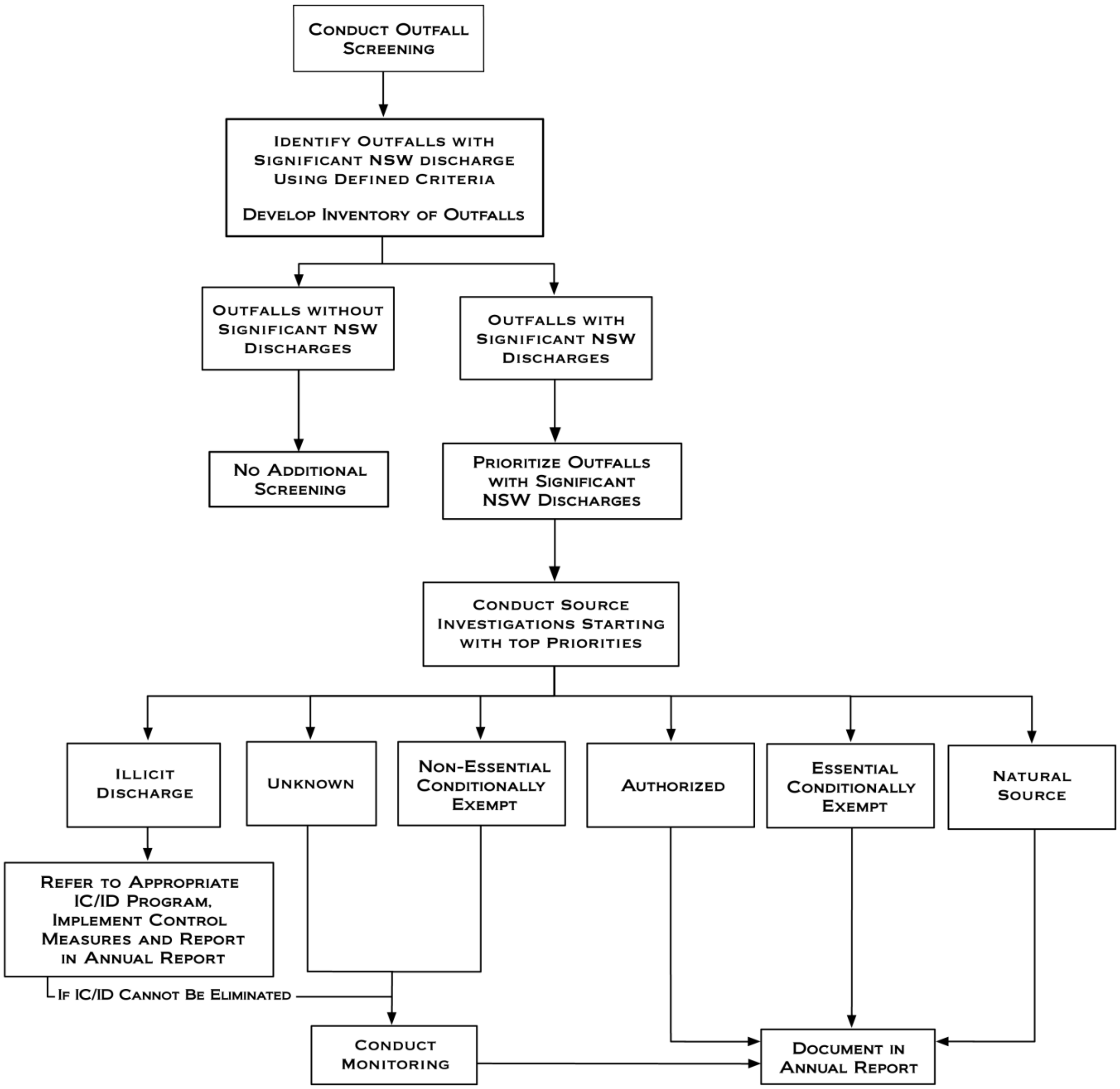
The non-stormwater screening process consists of the steps outlined in Error! Reference source not found..

Table 16: Non-Stormwater Outfall Screening and Monitoring Program Summary

Element	Description
Develop MS4 outfall database	Develop a database of all major outfalls with descriptive information, linked to GIS.
Outfall screening	A screening process will be implemented to collect data for determining which outfalls exhibit significant NSW discharges.
Identification of outfalls with NSW discharge	Based on data collected during the Outfall Screening process, identify outfalls with NSW discharges.
Inventory of outfalls with significant NSW discharge	Develop an inventory of major MS4 outfalls with known significant NSW discharges and those requiring no further assessment.
Prioritize source investigation	Use the data collected during the screening process to prioritize significant outfalls for source investigations.
Identify sources of significant discharges	For outfalls exhibiting significant NSW discharges, perform source investigations per the prioritization schedule. If not exempt or unknown, determine abatement process.
Monitor discharges exceeding criteria	Monitor outfalls that have been determined to convey significant NSW discharges comprised of either unknown or non-essential conditionally exempt discharges, or continuing discharges attributed to illicit discharges must be monitored.

Figure 12 outlines the overall approach for this section in a flowchart highlighting the individual tasks to accomplish compliance on the above requirements.

Figure 12: Outline of the Non-Stormwater Outfall Program



6.2 Outfall Database

The non stormwater outfall screening program requires the development of an MS4 outfall database by the time that the CIMP is submitted. The objective of the MS4 database is to geographically link the characteristics of the outfalls within the EWMP area with watershed characteristics including: subwatershed, waterbody, land use, and effective impervious area. The database must contain the elements described in Error! Reference source not found.. The information will be compiled into geographic information systems (GIS) layers. Not all information was available at this time for submittal as part of the CIMP. Most items currently not available will be collected through implementation of the Non-Stormwater Outfall Screening Program as noted in the table footnotes. As the data becomes available, it will be entered into the database. Each year, the storm drains, channels, outfalls, and associated database will be updated to incorporate the most recent characterization data for outfalls with significant non-stormwater discharge. The updates will be included as part of the annual reporting to the Regional Water Board.

6.3 Non-Stormwater Outfall Screening

6.3.1 Initial NSW Outfall Screening Process

The NSW outfall screening program will begin with a field check of all major outfalls as defined in the permit[3] in the database to gather the necessary field information to populate the database. During the initial field screening, outfalls will be observed during dry weather, at least 72 hours after a rain event of 0.1 inches or greater. During the initial field screening, the following information will be gathered:.

a. Date, Time, Weather
b. Photos of outfall and receiving water using a GPS-enabled camera
c. Coordinates of outfall
d. Physical descriptions of outfall, site condition, and accessibility
e. Discharge characteristics, such as odor and color
f. Presence of flow greater than trickle or no flow
g. Receiving water characteristics

After the initial event, NSW outfalls where flow greater than a trickle was observed during the initial screening event will be revisited for two more events. During the second and third screening events, all of the information listed above will be gathered. In addition, visual field estimates of flow will be gathered.

6.3.2 Identification of Outfalls with Significant Non-Stormwater Discharges

The three initial outfall screening events will be used to define the outfalls that require no further assessment and outfalls with significant non-stormwater discharges. Outfalls will be noted as requiring "No Further Assessment" in the outfall database if:

a. No flow is observed from the outfall.
b. The source is confirmed to be from NPDES permitted, categorically exempt essential flow or natural flow, or
c. Flow is categorized as not significant.

The MRP (Part IX.C.1) states that one or more of the following characteristics may determine significant non-stormwater discharges:

- Discharges from major outfalls subject to dry weather TMDLs.
- Discharges for which monitoring data exceeds non-stormwater action levels (NALs).
- Discharges that have caused or may cause overtopping of downstream diversions.

[3] Major outfalls defined as 36" or greater (or equivalent with drainage area of more than 50 acres) or 12" or greater (or equivalent with drainage area of 2 acres or more) that drain areas zoned as industrial.

- Discharges exceeding a proposed threshold discharge rate as determined by the Group Members.
- Other characteristics as determined by the EWMP Group and incorporated within the screening program.

The data collected during the outfall screening process, along with other information about the outfall catchment area, will be utilized to determine which outfalls observed to be flowing during the screening process will be categorized as having “significant discharge.” Many factors will be taken into consideration when determining significant outfall discharges and may include the following criteria:

- Proximity of the outfall to the main stem of Malibu Creek where TMDLs apply.
- The discharges have caused or have the potential to cause overtopping of downstream diversions.
- Field measurements and any other available water quality data for the outfall.
- Outfall has persistent flows, meaning flow was observed on two or more of the three screenings.
- Characteristics of the catchment area, including but not limited to, presence of permitted discharges in the area, land use characteristics, and previous IC/ID results.

Outfalls with significant non-stormwater discharge will also be designated in an inventory to be included in the MS4 outfall database.

6.3.3 Inventory of MS4 Outfalls

An inventory of MS4 outfalls must be developed identifying those outfalls with known significant non-stormwater discharges and those requiring no further assessment (Part IX.D of the MRP). If the MS4 outfall requires no further assessment, the inventory must include the rationale for the determination of no further action required. The inventory will be included in the outfall database. Each year, the inventory will be updated to incorporate the most recent characterization data for outfalls with significant non-stormwater discharges.

The following physical attributes of outfalls with significant non-stormwater discharges must be included in the inventory. These characteristics will be collected as part of the screening process described in Section 6.3.2:

1. Date and time of last visual observation or inspection
2. Outfall alpha-numeric identifier
3. Description of outfall structure including size (e.g., diameter and shape)
4. Description of receiving water at the point of discharge (e.g., natural, soft-bottom with armored sides, trapezoidal, concrete channel)
5. Latitude/longitude coordinates
6. Nearest street address
7. Parking, access, and safety considerations
8. Photographs of outfall condition
9. Photographs of significant NSW discharge (or indicators of discharge) unless safety considerations preclude obtaining photographs. If unable to access the outfall to take a picture, consider finding an upstream manhole to check for flows and take a picture.
10. Estimation of discharge rate
11. All diversions either upstream or downstream of the outfall
12. Observations regarding discharge characteristics such as turbidity, odor, color, presence of debris, floatables, or characteristics that could aid in pollutant source identification.

13. Water flow condition in the receiving water at the point of discharge (dry, ponding, flowing, or tidal influence).

6.3.4 Outfall Source Identification

Once the major outfalls exhibiting significant NSW discharges have been identified through the screening process, the EWMP Group will prioritize the outfalls for further source investigations. The MRP identifies the following prioritization criteria for outfalls with significant NSW discharges:

1. Outfalls discharging directly to receiving waters with WQBELs or receiving water limitations in the TMDL provisions where final compliance deadlines have passed.
2. All major outfalls and other outfalls that discharge to a receiving water subject to a TMDL will be prioritized according to TMDL compliance schedules.
3. Outfalls for which monitoring data exist and indicate recurring exceedances of one or more of the Action Levels identified in Attachment G of the Permit.
4. All other major outfalls identified to have significant non-stormwater discharges.

The EWMP Group will additionally consider the following criteria to establish the prioritization schedule:

- Rate of discharge based on visual flow observations
- Size of outfall
- Discharges with odor, color, or cloudiness.
- Results of the field measurements of pH, temperature, DO, and EC
- Presence of flow in the receiving water

Once the prioritization is complete, a source identification schedule will be developed. The scheduling will focus on the outfalls with the highest priorities first. Unless the results of the field screening justify a modification to the schedule in the MRP, the schedule will ensure that source investigations are completed on no less than 25% of the outfalls with significant NSW discharges by December 28, 2015 and 100% by December 28, 2017.

6.2.3 Source Investigations

Source investigations will be conducted using site-specific procedures based on the characteristics of the NSW discharge and the techniques used by the EWMP members' IC/ID programs. investigations may include:

1. Identifying permitted discharges within the catchment area.
2. Identifying if the flow is from a channelized stream or creek.
3. Compiling and reviewing available resources including past monitoring and investigation data, land use/MS4 maps, aerial photography, and property ownership information.
4. Following dry weather flows from the location where they are first observed in an upstream direction along the conveyance system.
5. Gathering field measurements to characterize the discharge.

Based on these results, permittees will classify the sources identified in the investigation into one of six categories defined below and conduct the required follow up action:

1. Authorized: If the source is determined to be an NPDES permitted discharge, the source must be documented and included in the annual report.
2. Essential Conditionally Exempt NSW discharges: If the source is determined to be a discharge subject to Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA),

or a conditionally exempt essential discharge, the Group Member must document the source and include in their annual report.

3. Natural flows: If the source is determined to be natural flows, the Group Member must document the source and include in their annual report.
4. IC/ID: If the source is determined to be an illicit discharge, the Group Member must implement procedures to eliminate the discharge consistent with IC/ID requirements and document actions. If attempts to terminate discharge are unsuccessful, document actions and conduct monitoring consistent with the MRP.
5. Non-essential Conditionally Exempt NSW discharges: For non-essential conditionally exempt discharges: conduct monitoring consistent with Part IX.G of the MRP to determine whether the discharge should remain conditionally exempt or be prohibited and document actions. Conduct monitoring consistent with the MRP.
6. Unknown sources: If the source is unknown, if attempts to terminate discharge are unsuccessful, document actions and conduct monitoring consistent with the MRP.

For outfalls with NSW flow determined to be authorized, natural, or essential conditionally exempt, the investigation will be concluded and the next highest priority outfall will be investigated and reported as part of the annual report. For sites where investigations determine that the source of the discharge is non-essential, conditionally exempt, an illicit discharge, or unknown, further investigation may be conducted to eliminate the discharge or demonstrate that it is not causing or contributing to receiving water impairments. If part of the investigation finds that any of the authorized or conditionally exempt

essential non-storm water discharges identified in Parts III.A.1.a through III.A.1.c, III.A.2.a, or III.A.3 of the L.A. County MS4 permit is a source of pollutants that causes or contributes to an exceedance of applicable receiving water limitations and/or water quality-based effluent limitations, the Permittee shall notify the Regional Water Board within 30 days if the non-storm water discharge is an authorized discharge with coverage under a separate NPDES permit or authorized by USEPA under CERCLA in the manner provided in Part III.A.1.b above, or a conditionally exempt essential non-storm water discharge or emergency non-storm water discharge. In some cases this may require programmatic or structural BMPs to be implemented. Where Permittees determine that the NSW discharge will be addressed through modifications to programs or by structural BMP implementation, the Permittee will incorporate the approach into the implementation schedule developed in the EWMP. The outfall then can be lowered in priority for investigation, such that the next highest priority outfall can be addressed. All activities results should be maintained in the permittee's outfall database and summarized in the annual report.

6.4 Non-Stormwater Discharge Monitoring

If it is determined that an outfall has significant discharges comprised of either unknown or conditionally exempt non-stormwater discharges, continuing discharges must be monitored. The follow up monitoring will be coordinated with the dry weather receiving water monitoring schedule, so that the impacts of outfalls on receiving waters can be evaluated. As described in Chapter 4 of this report, dry weather receiving water monitoring will be conducted during two dry weather events. Monitoring will be conducted along with the following dry weather receiving water monitoring event and continue until the flow is satisfactorily resolved by :

- BMP treatment to stop the flow,
- the flow can be attributed to an allowable source, or
- the flow is proven to not contribute to any downstream impairment.

6.4.1 Monitoring Sites

The NSW outfall monitoring sites will be determined after source investigation of significant NSW discharges is concluded.

6.4.2 Monitored Parameters, Frequency, and Duration of Monitoring

The requirements for constituents to be monitored are outlined in Part VIII.G.1.a-e of the MRP. Outfalls will be monitored for all required constituents except toxicity. Toxicity monitoring is only required when triggered by recent receiving water toxicity monitoring where a toxicity identification evaluation (TIE) on the observed receiving water toxicity test was inconclusive. An overview of the constituents required to be monitored in the MRP at each NSW outfall monitoring site is listed in Table 17.

Table 17: Summary of Non-Stormwater Outfall Monitoring Parameters

Classification Identified in Permit	Preliminary List of Parameter(s)
General	Flow, hardness, pH, DO, temperature, SEC, and TSS
Pollutants assigned TMDL WLAs	
Pollutants identified for 303(d)-Listed receiving waters	
Toxicity	To be determined
Parameters in Table E-2 of the MRP if they are identified as exceeding applicable water quality objectives	To be determined

[1] Dioxin measured and assessed as 2,3,7,8-TCDD only.

The MRP specifies the following monitoring frequency for NSW outfall monitoring as:

- For outfalls subject to a dry weather TMDL, the monitoring frequency shall be per the approved TMDL monitoring plan or as otherwise specified in the TMDL or as specified in an approved CIMP.
- For outfalls not subject to dry weather TMDLs, approximately quarterly for first year.
- Monitoring can be eliminated or reduced to twice per year, beginning in the second year of monitoring if pollutant concentrations measured during the first year do not exceed WQBELs, NALs or water quality standards for pollutants identified on the 303(d) List.

While a monitoring frequency of four times per year is specified in the Permit, it is inconsistent with the dry weather receiving water monitoring requirements. The receiving water monitoring requires two dry weather monitoring events per year. Additionally, during the term of the current Permit, outfalls are required to be screened at least once and those with significant NSW discharges will be subject to a source investigation. As a result, the EWMP Group will perform NSW outfall monitoring events twice per year. The NSW outfall monitoring events will be coordinated with the dry weather receiving water monitoring events to allow for an evaluation of whether the NSW discharges are causing or contributing to an observed exceedance of water quality objectives in the receiving water.

Since many of the NSW sources are intermittent, it is not expected that flow will exist during all sampling events. In these instances, no sample will be collected. Grab samples will be collected at sites with NSW flow as per the attached SOPs. An example QA/QC protocol and field measurement and chain of custody forms are provided in Appendix H. The constituents measured at each outfall will be dictated by the same criteria as stormwater outfall Section 5 and outlined in Table 14 based on the HUC-12 watershed where they are located and the downstream impairments.

6.4.3 Adaptive Monitoring

Monitoring for NSW discharges will be more dynamic than either the receiving water or SW outfall monitoring. As NSW discharges are addressed, monitoring at the outfall will cease. Additionally, if monitoring demonstrates that discharges do not exceed any WQBELs, NALs, or water quality standards for pollutants identified on the 303(d) list, monitoring will cease at an outfall after the first year. Thus, the number and location of outfalls monitored has the potential to change on an annual basis.

6.5 Non-Stormwater Outfall Monitoring Summary

NSW outfall monitoring sites will be determined after the screening events are completed and significant discharges are identified. Parameters that will be monitored at each NSW outfall site will depend upon the receiving water to which the NSW outfall monitoring site discharges.

The MRP specifies the following monitoring frequency for NSW outfall monitoring as:

- For outfalls subject to a dry weather TMDL, the monitoring frequency shall be per the approved TMDL monitoring plan or as otherwise specified in the TMDL or as specified in an approved CIMP.
- For outfalls not subject to dry weather TMDLs, approximately quarterly for first year.
- Monitoring can be eliminated or reduced to twice per year, beginning in the second year of monitoring if pollutant concentrations measured during the first year do not exceed WQBELs, NALs or water quality standards for pollutants identified on the 303(d) List.

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6.5.1 Adaptive Monitoring

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6.6 Non-Stormwater Outfall Monitoring Summary

NSW outfall monitoring sites will be determined after the screening events are completed and significant discharges are identified. Parameters that will be monitored at each NSW outfall site will depend upon the receiving water to which the NSW outfall monitoring site discharges.

7 Regional Studies

The permit requires that the responsible agencies perform regional studies to characterize the impact of the MS4 discharges on the beneficial uses of the receiving waters. TMDL special studies, SMC monitoring, and background monitoring were considered in this CIMP.

7.1 Special Studies

The TMDLs in the Malibu Creek Watershed do not require special studies to be conducted by the CIMP MS4 Stakeholders. The Nutrient TMDL for the Malibu Creek Watershed includes recommendations for special studies that are being considered as part of the EWMP. This section also presents potential special studies that could provide benefit to understand the potential sources for water quality impairments in the watershed.

7.1.1 Bacteria TMDL

The Malibu Bacteria TMDL does not require that the CIMP MS4 Stakeholders conduct special studies. However, several studies on the sources and dynamics of bacterial indicators and pathogens in the watershed have been conducted or are in progress in Malibu and Southern California. These studies aid in understanding the impact of natural sources of indicator bacteria and build a better understanding of sources at reference sites and within the Malibu Creek Watershed.

The County of Los Angeles has initiated a microbial source tracking study (MST) to determine whether the sources of bacteria are of anthropogenic or non-anthropogenic origin. If the sources are determined to be anthropogenic, the study will track the sources to their origin and identify the land uses and drainage areas that contribute to the problematic tributaries. The study includes ten sites proposed for sample collection in the CIMP. In addition, the study includes an outfall monitoring program. The findings of the source tracking study provide valuable information to identify potential sources of discharge that may be contributing loads to the MS4 and help improve efforts to reduce and eliminate the loads. Where possible monitoring data from the Microbial Source Tracking Study will be used to guide bacteria monitoring performed under the CIMP.

The Bacteria TMDL also requires that the State Parks conduct a study of bacteria loadings from birds in the Malibu Lagoon. The results from the State Parks study could help the agencies contributing to the CIMP characterize natural loads to impaired waters. Little information has been released from the State Parks about the plan and schedule for the study, but the CIMP MS4 Stakeholders continue to follow the progress, review the findings when they are made available, and adjust the CIMP as necessary.

The US Geological Survey conducted a study in cooperation with the City of Malibu to identify potential sources of bacteria at Malibu Lagoon and Surfrider Beach. They found that bacterial indicators from wastewater treatment systems are often absent in samples from wells. The report suggests that these are impacted by filtration, sorption, death, and predation between the sources and receiving waters. The study included additional research into potential sources of the bacterial indicators. Natural sources such as birds have been suggested, and high levels of bacterial indicators were identified in kelp washed up on the beach (USGS 2011).

The ongoing and recent studies on fecal bacterial indicators in the Malibu Creek Watershed are anticipated to provide valuable information to better understand sources and loads. The CIMP includes analysis of the results. These study results are coordinated with the EWMP implementation actions.

7.1.2 Nutrient TMDL

The Nutrient TMDL (USEPA TMDL) does not require special studies.

The CIMP MS4 Stakeholders will collect nutrient information through the monitoring program that can be used to analyze the impact of upstream reductions on receiving waters. The CIMP MS4 Stakeholders will continue to coordinate with other stakeholders who are conducting monitoring in the watershed to evaluate the impact of nutrients on water quality in the lagoon.

7.2 SMC Regional Monitoring (Bioassessment)

The SMC Regional Watershed Monitoring Program was initiated in 2008 to coordinate in-stream monitoring efforts and add consistency for the design, frequency and indicators. This program is conducted in collaboration with the Southern California Coastal Water Research Project (SCCWRP), State Water Board's Surface Water Ambient Monitoring Program, three Southern California Regional Water Quality Control Boards (Los Angeles, Santa Ana, and San Diego) and the Counties of Los Angeles, Ventura, Orange, Riverside, San Bernardino and San Diego. SCCWRP acts as the facilitator to organize the program and completes data analysis and report preparation.

The SMC monitoring program is intended to coordinate and leverage existing monitoring efforts to produce regional estimates of water quality condition, improve comparability and quality assurance between data sets, maximize data availability, and reduce monitoring expenditures

Sampling occurs in 15 coastal southern California watersheds. Sites are sampled randomly across three land use types (open space, urban and agriculture). Six sites are sampled per year for each watershed. The Permittees support monitoring at the sites within watershed management areas that overlap with their jurisdictional area. Six random sites are assessed annually in the Santa Monica Bay Watershed Management area (LARWQCB, 2012a).

The LACFCD will continue to participate in the Regional Watershed Monitoring Program (Biosassessment Program) being managed by the Southern California Stormwater Monitoring Coalition (SMC). The LACFCD will contribute necessary resources to implement the bioassessment monitoring requirement of the MS4 permit on behalf of all permittees in Los Angeles County during the current permit cycle. Initiated in 2008, the SMC's Regional Bioassessment Program is designed to run over a five-year cycle. Monitoring under the first cycle concluded in 2013, with reporting of findings and additional special studies planned to occur in 2014. SMC, including LACFCD, is currently working on designing the bioassessment monitoring program for the next five-year cycle, which is scheduled to run from 2015 to 2019.

8 New Development and Re-Development Tracking Requirements in the NPDES Permit

Participating agencies have developed mechanisms for tracking new development/re-development projects that have been conditioned for post-construction BMPs pursuant to MS4 Permit Part VI.D.7. Agencies also have developed mechanisms for tracking the effectiveness of these BMPs pursuant to MS4 Permit Attachment E.X.

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Appendix A – Site Descriptions

Table A-1: Receiving Water Monitoring Sites

Name	Previous Site ID(s)	Latitude, Longitude	Notes	Pictures
MCW-CIMP 1	MCW-2	N 34° 02.825’ W 118° 41.371’	Inside Serra Canyon Community at 23500 Palm Canyon. This site is located three miles below Tapia. This site is accessed through a private community off of PCH called Serra.	
MASS EMISSION STATION S-02	Mass Emission S-02	N/A	The Malibu Creek monitoring station is located in the creek at the existing stream gauge station (i.e., Stream Gauge F130-9-R) near Malibu Canyon Road, south of Piuma Road. The tributary watershed to Malibu Creek at this location is 104.9 square miles, and the entire Malibu Creek Watershed is 109.9 square miles. This station can also be found in the Thomas Guide, page 628, H-1.	

Name	Previous Site ID(s)	Latitude, Longitude	Notes	Pictures
MCW-CIMP 3	MCW-3; CMS_MC_1	N 34° 4'56.85" W 118° 42'25.25"	Site located on the west bank immediately upstream of the Malibu Creek Canyon Road crossing and downstream of the Tapia WWTP facility.	 
MCW-CIMP 4	MCW-4	N 34° 06.001' W 118° 43.364'	This site is located at Malibu Creek in Los Angeles County unincorporated area, above the confluence with Las Virgenes Creek.	

Name	Previous Site ID(s)	Latitude, Longitude	Notes	Pictures
MCW-CIMP 5	MCW-5	N 34° 04.739’ W 118° 41.996’	From 101 Freeway, go south on Las Virgenes Road. Make a left on Piuma Road. Off of Piuma Road, between Crater Camp Drive and Live Oak Circle Drive.	
MCW-CIMP 6	MCW-6	N 34° 05.889’ W 118° 42.748’	This site is located in Malibu Creek State Park. Once you enter Malibu Creek State Park from the Las Virgenes Road entrance, pass the booth and make an immediate left onto the gravel road. Continue down the road until you reach the tan and green building. Access to the creek is located behind the tan and green building.	
MCW-CIMP 7	MCW-7	N 34° 05.769’ W 118° 43.072’	This site is located in Malibu Creek State Park. It is off a bridge near the Las Virgenes Road entrance. Site is located directly above area that is used for recreation so the results are not skewed by contributions of bacteria from recreational users.	

Name	Previous Site ID(s)	Latitude, Longitude	Notes	Pictures
MCW-CIMP 8	CMS_LVC_3	N 34° 7'34.01" W 118° 42'24.61"	Site located in the concrete channel just downstream of the Lost Hills Road crossing	
MCW-CIMP 9	Downstream of MCW-10	N 34°08.585' W 118°45.468'	From the 101 Freeway, exit Kanan Road and go south. The site is located approximately 1,000 feet downstream of site MCW-10. The site is accessible from the shoulder of Cornell Road.	
MCW-CIMP 10	MCW-11	N 34°06.921' W 118°45.339'	This site is situated in Paramount Ranch (Santa Monica Mountains National Recreation Area) at the Cornell Road entrance at the bridge at the edge of the parking lot.	

Name	Previous Site ID(s)	Latitude, Longitude	Notes	Pictures
MCW-CIMP 11	MCW-13; CMS_LDC_2	N 34° 8'24.41" W 118° 45' 41.72"	Site located downstream of the Agoura Road crossing. The site is located approximately 1,500 feet downstream of MCW-13. The site is accessible from a pull-out along Kanan Road.	
MCW-CIMP 12	MCW-16	N 34°10.230' W 118°45.765'	Site is located at the west end of Tamarind Street and is accessed by climbing down publicly accessed embankment. Sample is taken upstream of the pedestrian bridge.	
MCW-CIMP 13	CMS_LDC_1	N 34° 9'20.26" W 118°47'27.41"	Site located in the concrete channel just upstream of Thousand Oaks Boulevard crossing and just downstream of the golf facility driving range	

Name	Previous Site ID(s)	Latitude, Longitude	Notes	Pictures
MCW-CIMP 14	CMS_MDC_1	N 34° 8’32.96” W 118°45’30.13”	Site located in the concrete channel upstream of the confluence with Cheeseboro Creek and just downstream of the Agoura Road crossing.	

Table A-2: Malibu Creek Watershed Outfall Monitoring Sites

HUC-12 Name (HUC-12 ID/ Total Outfall)	Permittee(s)	Monitoring Outfall ID (Latitude, Longitude)	Notes	Pictures
Potrero Valley Creek (180701040101/ 44)	Westlake Village	TRUNFOC-095A (34.155, -118.7912)	The sampling site (the outfall) is located east of Lindero Canyon Road. The outfall is just below the northernmost light pole located on the bridge. From Lindero Canyon Road, the outfall is approximately 90 feet. The site can also be accessed from Ridgeford drive on the north side of the outfall. There is a dirt slope to be traversed to get down to outfall for sampling. Samples will be collected directly from the outfall.	 

HUC-12 Name (HUC-12 ID/ Total Outfall)	Permittee(s)	Monitoring Outfall ID (Latitude, Longitude)	Notes	Pictures
Medea Creek (180701040102/ 39)	Agoura Hills	LNDRC-074 (34.150688, -118.750108)	The sampling site (the outfall) is located north of E Thousand Oaks Blvd, on the west side of the creek. The site can be accessed from E. Thousand Oaks Blvd just east of Sienna Way, but west of Lake Lindero Drive. Samples will be collected directly from the outfall.	 
Las Virgenes Creek (180701040103/ 46)	Calabasas	LAVCR-054 (34.157689, -18.699158)	The sampling site (the outfall) is located on the north side of the bridge on the Lost Hills Road side of the stream bank. The site can be accessed from Lost Hills Road. If traveling north, the site is just past Cold Springs Street. There is a pedestrian bridge crossing over the stream; The outfall can be accessed from the top by way of a grouted rip rap slope or from the side along a vegetated path. Samples will be collected directly from the outfall.	 

HUC-12 Name (HUC-12 ID/ Total Outfall)	Permittee(s)	Monitoring Outfall ID (Latitude, Longitude)	Notes	Pictures
Cold Creek-Malibu Creek (180701040104/ 8)	Los Angeles County	TRUNFOC-035 (34.11445, -118.779199)	The sampling site (outfall location) is on the northwest side of the bridge near the intersection of Troutdale Drive and Mulholland Highway. The site can be accessed from north of the intersection of Mulholland Hwy and Waring Drive. Vehicular access is available through an existing Los Angeles County Public Work fence; or the site can be accessed from the walkway just east of the gate. Site is also accessible through the Peter Strauss Ranch/Santa Monica Mountains National Recreation Area.	 

Appendix B – Quality Assurance/Quality Control

(Adapted from the Los Angeles County 2012-2013 Annual Monitoring Report and Caltrans Guidance Manual: Stormwater Monitoring Protocols – July 2000)

Quality assurance/quality control (QA/QC) is an essential component of the monitoring program. valuation of Analytes and QA/QC Specifications for Monitoring Program (Woodward-Clyde, 1996) describes the procedures used for bottle labeling, chain-of-custody (COC) tracking, sampler equipment checkout and setup, sample collection, field blanks to assess field contamination, field duplicate samples, and transportation to the laboratory. An important part of the QA/QC plan is the continued education of field personnel. Field personnel will be trained from the onset and will be informed regarding new or revised stormwater sampling techniques on a continual basis. Field personnel also will evaluate the field activities required by the QA/QC plan, and the plan updated if necessary. Accurate data will be obtained by proper monitoring station setup, water sample collection, sample transport, and laboratory analyses.

QA/QC for sampling processes included proper collection of the samples to minimize the possibility of contamination. Samples will be collected in clean sample bottles, sterilized by the laboratory. Sampling personnel will be trained according to the field sampling standard operating procedures (SOPs). Additionally, the field staff will be made aware of the significance of the project's detection limits and the requirement to avoid contamination of samples.

Field Setup Procedures

Automated field sampling sites will be at fixed locations, with the sampler placed on a public road or flood control right-of-way or other acceptable location. Following the initial sample collection, field staff will prepare the sampler to collect subsequent samples (dry weather mode) until the entire set has been completed for that station. Manual samples may be collected by field staff at the time they pre-programmed the auto sampler to begin collecting at each station. Inspection of visible hoses and cables will be performed to ensure proper working conditions according to the station design. Inspection of the intake tube, pressure transducer, and auxiliary pump was performed during daylight hours in normal (i.e., non-storm) conditions. The automated samplers will be checked at the beginning of the storm (i.e., during grab sample collection) to ensure proper working condition and to determine whether flow composite samples will be collected properly. Dry weather collection techniques will be similarly performed for both grab samples and 24-hour composite samples. When a complete set of samples had been collected for a given event, the bottles will be removed from the sampler and packed with ice and foam insulation inside individually marked ice chests. COC forms will be completed by field staff before transporting the samples to the laboratory. Under no circumstances will samples be removed from the ice chest during transportation from the field to the laboratory.

Grab Sampling Techniques

Where practical, all grab samples will be collected by direct submersion at mid-stream, mid-depth using the following procedures:

- Follow the standard sampling procedures.
- Remove the lid, submerge the container to mid-stream/mid-depth, let the container fill and secure the lid. In the case of mercury samples, remove the lid underwater to reduce the potential for contamination from the air.
- Place the sample on ice.

- Collect the remaining samples including quality control samples, if required, using the same protocols described above.

Bottle Preparation

A minimum of three sets of bottles will be prepared for each monitoring station so that change-outs could be made quickly between closely occurring storms. Bottle labels included the following information:

- LACFCD's Field Sample Identification (FSID) number (Mass Emission Station) or other Sample ID Number.
- Station (site) number.
- Station (site) name.
- Laboratory analysis requested.
- Date (written at time of sampling).

Bottles will be cleaned at the laboratory prior to use, labeled, and stored in sets. Each station will be provided with the same number, type, and size bottles for each rotation, unless special grab samples will be required. Clean composite sample bottles with sterile stoppers will be placed in the automated sampler when samples will be collected. This practice ensured readiness for the next storm event. All bottles not in use at the time of sampling will be stored in clean dry conditions for later use. Composite sample bottles will be limited to a maximum of 2.5 gallons each, to ensure ease of handling.

Chain-of-Custody Procedure

COC procedures (Woodward-Clyde, 1996) will be used for all samples throughout the collection, transport, and analytical process. Samples will be considered to be in custody if they were: (1) in the custodian's possession or view (2) retained in a secured place (under lock) with restricted access, or (3) placed in a container and secured with an official seal to prevent the sample from being reached without breaking the seal. COC records, field logbooks, and field tracking forms will be the principal documents used to identify samples and to document possession. The COC procedures will be initiated during sample collection. A COC record will be provided with each sample or group of samples. Each person with sample custody signed the form and ensured the samples will not be left unattended unless properly secured. Documentation of sample handling and custody included the following:

- Bottle label information (i.e., the LACFCD FSID number, station (site) number, station (site) name, laboratory analysis requested, and date (written at time of sampling)).
- Time (written at time of sampling).
- Number of bottles.
- Temperature of sample.
- Sampler(s), laboratory and sampler/courier signatures, and time(s) sample(s) changed possession (completed upon sample transfer(s)).

New Zealand Mud Snails

Due to concern about the spread of New Zealand Mud Snails, additional decontamination of monitoring equipment between Malibu MES and tributary monitoring stations was conducted. A designated set of sampling equipment (exclusive of temperature and pH field meters) will be used for each of the stations in the Malibu watershed (Malibu MES and tributary stations), and decontaminated before and after each event. Decontamination procedures as described by the California Department of Fish and Game (Hosea and Finlayson, 2005) will be employed and include immersion of sampling equipment in Sparquat 256.

Field meters use sensitive osmotic membranes for use in measurement of pH. Therefore, the use of freezing or Sparquat 256 as a decontamination method was not employed. Field meters will be visually inspected after use at each location; and all snails, mud, algae, and debris will be removed. The meters will be then thoroughly rinsed on-site with tap water and allowed to dry completely. Visual inspection of the field meters was completed prior to departure from the station and before use at the next monitoring location.

Laboratory QA/QC

All data reported by the analytical laboratory must be carefully reviewed to determine whether the project's data quality acceptability limits or objectives (DQOs) have been met. This section describes a process for evaluation of all laboratory data, including the results of all QA/QC sample analysis.

Before any results are reported by the laboratory, the deliverable requirements should be clearly communicated to the laboratory, as described in the "Laboratory Data Package Deliverables" discussion on Page B-4.

The current section discusses QA/QC data evaluation in the following two parts:

A. Initial Data Quality Screening
B. Data Quality Evaluation

The initial data quality screening identifies problems with laboratory reporting while they may still be corrected. When the data reports are received, they should be immediately checked for conformity to chain of custody requests to ensure that all requested analyses have been reported. The data are then evaluated for conformity to holding time requirements, conformity to reporting limit requests, analytical precision, analytical accuracy, and possible contamination during sampling and analysis. The data evaluation results in rejection, qualification, and narrative discussion of data points or the data as a whole. Qualification of data, other than rejection, does not necessary exclude use of the data for all applications. It is the decision of the data user, based on specifics of the data application, whether or not to include qualified data points.

INITIAL DATA QUALITY SCREENING

The initial screening process identifies and corrects, when possible, inadvertent documentation or process errors introduced by the field crew or the laboratory. The initial data quality control screening should be applied using the following three-step process:

1. Verification check between sampling and analysis plan (SAP), chain of custody forms, and laboratory data reports

Chain of custody records should be compared with field logbooks and laboratory data reports to verify the accuracy of all sample identification and to ensure that all samples submitted for analysis have a value reported for each parameter requested. Any deviation from the SAP that has not yet been documented in the field notes or project records should be recorded and corrected, if possible.

Sample representativeness should also be assessed in this step. The minimum acceptable storm capture parameters (number of aliquots and percent storm capture)per amount of rainfall are specified in Section 10. Samples not meeting these criteria are generally not analyzed; however, selected analyses can be run at the stakeholder's discretion. If samples not meeting the minimum sample representativeness criteria are analyzed, the resulting data should be rejected ("R") or qualified as estimated ("J"), depending upon whether the analyses will be approved. Grab samples should be taken according to the timing protocols specified in the SAP.

Deviations from the protocols will result in the rejection of the data for these samples or qualification of the data as estimated. The decision to reject a sample based on sample representativeness should be made prior to the submission of the sample to the laboratory, to avoid unnecessary analytical costs.

2. Check of laboratory data report completeness.

As discussed in Section 12, the end product of the laboratory analysis is a data report that should include a number of QA/QC results along with the environmental results. QA/QC sample results reported by the lab should include both analyses requested by the field crew (field blanks, field duplicates, lab duplicates and MS/MSD analysis), as well as internal laboratory QA/QC results (method blanks and laboratory control samples).

There are often differences among laboratories in terms of style and format of reporting. The data reviewer should verify that the laboratory data package includes the following items:

- A narrative that outlines any problems, corrections, anomalies, and conclusions.
- Sample identification numbers.
- Sample extraction and analysis dates.
- Reporting limits for all analyses reported.
- Results of method blanks.
- Results of matrix spike and matrix spike duplicate analyses, including calculation of percent recovered and relative percent differences.
- Results of laboratory control sample analyses.
- Results of external reference standard analyses.
- Surrogate spike and blank spike analysis results for organic constituents.
- A summary of acceptable QA/QC criteria (RPD, spike recovery) used by the laboratory.

Items missing from this list should be requested from the laboratory.

3. Check for typographical errors and apparent incongruities.

The laboratory reports should be reviewed to identify results that are outside the range of normally observed values. Any type of suspect result or apparent typographical error should be verified with the laboratory. An example of a unique value would be if a dissolved iron concentration has been reported lower than 500 mg/L for every storm event monitored at one location and then a value of 2500 mg/L is reported in a later event. This reported concentration of 2500 mg/L should be verified with the laboratory for correctness.

Besides apparent out-of-range values, the indicators of potential laboratory reporting problems include:

- Significant lack of agreement between analytical results reported for laboratory duplicates or field duplicates.
- Consistent reporting of dissolved metals results higher than total or total recoverable metals.
- Unusual numbers of detected values reported for blank sample analyses.
- Inconsistency in sample identification/labeling.

If the laboratory confirms a problem with the reported concentration, the corrected or recalculated result should be issued in an amended report, or if necessary the sample should be re-analyzed. If laboratory results are changed or other corrections are made by the laboratory, an amended laboratory report should be issued to update the project records.

Data Quality Evaluation

The data quality evaluation process is structured to provide systematic checks to ensure that the reported data accurately represent the concentrations of constituents actually present in stormwater. Data evaluation can often identify sources of contamination in the sampling and analytical processes, as well as detect deficiencies in the laboratory analyses or errors in data reporting. Data quality evaluation allows monitoring data to be used in the proper context with the appropriate level of confidence.

QA/QC parameters that should be reviewed are classified into the following categories:

- Reporting limits
- Holding times

- Contamination check results (method, field, trip, and equipment blanks)
- Precision analysis results (laboratory, field, and matrix spike duplicates)
- Accuracy analysis results (matrix spikes, surrogate spikes, laboratory control samples, and external reference standards)

Each of these QA/QC parameters should be compared to data quality acceptability criteria, and is also known as the project's data quality objectives (DQOs). The key steps that should be adhered to in the analysis of each of these QA/QC parameters are:

1. Compile a complete set of the QA/QC results for the parameter being analyzed.
2. Compare the laboratory QA/QC results to accepted criteria (DQOs).
3. Compile any out-of-range values and report them to the laboratory for verification.
4. Prepare a report that tabulates the success rate for each QA/QC parameter analyzed.

This process should be applied to each of the QA/QC parameters as discussed below.

Reporting Limits

Stormwater quality monitoring program DQOs should contain a list of acceptable reporting limits that the lab is contractually obligated to adhere to, except in special cases of insufficient sample volume or matrix interference problems. The reporting limits used should ensure a high probability of detection. Table 12-1 provides recommended reporting limits for selected parameters.

Holding Times

Holding time represents the elapsed time between sample collection time and sample analysis time. Calculate the elapsed time between the sampling time and start of analysis, and compare this to the required holding time. For composite samples that are collected within 24-hours or less, the time of the final sample aliquot is considered the "sample collection time" for determining sample holding time. For analytes with critical holding times (≤48 hours), composite samples lasting longer than 24-hours require multiple bottle composite samples. Each of these composite samples should represent less than 24 hours of monitored flow, and subsamples from the composites should have been poured off and analyzed by the laboratory for those constituents with critical holding times (see Section 12). It is important to review sample holding times to ensure that analyses occurred within the time period that is generally accepted to maintain stable parameter concentrations. Table 12-1 contains the holding times for selected parameters. If holding times are exceeded, inaccurate concentrations or false negative results may be reported.

Samples that exceed their holding time prior to analysis are qualified as "estimated", or may be rejected depending on the circumstances.

Contamination

Blank samples are used to identify the presence and potential source of sample contamination and are typically one of four types:

1. Method blanks are prepared and analyzed by the laboratory to identify laboratory contamination.
2. Field blanks are prepared by the field crew during sampling events and submitted to the laboratory to identify contamination occurring during the collection or the transport of environmental samples.
3. Equipment blanks are prepared by the field crew or laboratory prior to the monitoring season and used to identify contamination coming from sampling equipment (tubing, pumps, bailers, etc.).
4. Trip blanks are prepared by the laboratory, carried in the field, and then submitted to the laboratory to identify contamination in the transport and handling of volatile organics samples.

5. Filter blanks are prepared by field crew or lab technicians performing the sample filtration. Blank water is filtered in the same manner and at the same time as other environmental samples. Filter blanks are used to identify contamination from the filter or filtering process.

If no contamination is present, all blanks should be reported as “not detected” or “nondetect” (e.g., constituent concentrations should not be detected above the reporting limit). Blanks reporting detected concentrations (“hits”) should be noted in the written QA/QC data summary prepared by the data reviewer. In the case that the laboratory reports hits on method blanks, a detailed review of raw laboratory data and procedures should be requested from the laboratory to identify any data reporting errors or contamination sources. When other types of blanks are reported above the reporting limit, a similar review should be requested along with a complete review of field procedures and sample handling. Often times it will also be necessary to refer to historical equipment blank results, corresponding method blank results, and field notes to identify contamination sources. This is a corrective and documentative step that should be done as soon as the hits are reported.

If the blank concentration exceeds the laboratory reporting limit, values reported for each associated environmental sample must be evaluated according to USEPA guidelines for data evaluations of organics and metals (USEPA, 1991; USEPA, 1995) as indicated in Table B-1.

Table B-1: USEPA Guidelines for Data Evaluation

Step	***Environmental Sample***	***Phthalates and other common contaminants***	***Other Organics***	***Metals***
1.	Sample > 10X blank concentration	No action	No action	No action
2.	Sample < 10X blank concentration	Report associated environmental results as “non-detect” at the reported environmental concentration.	No action	Results considered an “upper limit” of the true concentration (note contamination in data quality evaluation narrative).
3.	Sample < 5X blank concentration	Report associated environmental results as “non-detect” at the reported environmental concentration.	Report associated environmental results as “non-detect” at the reported environmental concentration.	Report associated environmental results as “non-detect” at the reported environmental concentration.

Specifically, if the concentration in the environmental sample is less than five times the concentration in the associated blank, the environmental sample result is considered, for reporting purposes, “not-detected” at the environmental sample result concentration (phthalate and other common contaminant results are considered non-detect if the environmental sample result is less than ten times the blank concentration). The laboratory reports are not altered in any way. The qualifications resulting from the data evaluation are made to the evaluator’s data set for reporting and analysis purposes to account for the apparent contamination problem. For example, if dissolved copper is reported by the laboratory at 4 mg/L and an associated blank concentration for dissolved copper is reported at 1 mg/L, data qualification would be necessary. In the data reporting field of the database (see Section 14), the dissolved copper result would be reported as 4 mg/L), the numerical qualifier would be reported as “<”, the reporting limit would be left as reported by the laboratory, and the value qualifier would be reported as “U” (“not detected above the reported environmental concentration”).

When reported environmental concentrations are greater than five times (ten times for phthalates) the reported blank "hit" concentration, the environmental result is reported unqualified at the laboratory-reported concentration. For example, if dissolved copper is reported at 11 mg/L and an associated blank concentration for dissolved copper is reported at 1 mg/L, the dissolved copper result would still be reported as 11 mg/L.

Precision

Duplicate samples provide a measure of the data precision (reproducibility) attributable to sampling and analytical procedures. Precision can be calculated as the relative percent difference (RPD) in the following manner:

$$RPDi = 2 * |Oi - Di| / (Oi + Di) * 100\%$$

where:

RPDi = Relative percent difference for compound i

Oi = Value of compound i in original sample

Di = Value of compound i in duplicate sample

The resultant RPDs should be compared to the criteria specified in the project's DQOs. The DQO criteria shown in Table B-2 below are based on the analytical method specifications and laboratory-supplied values. Project-specific DQOs should be developed with consideration to the analytical laboratory, the analytical method specifications, and the project objective. Table B-2 should be used as a reference point as the least stringent set of criteria for monitoring projects.

Laboratory and Field Duplicates

Laboratory duplicates are samples that are split by the laboratory. Each half of the split sample is then analyzed and reported by the laboratory. A pair of field duplicates is two samples taken at the same time, in the same manner into two unique containers. Subsampling duplicates are two unique, ostensibly identical, samples taken from one composite bottle. Laboratory duplicate results provide information regarding the variability inherent in the analytical process, and the reproducibility of analytical results. Field duplicate analysis measures both field and laboratory precision, therefore, it is expected that field duplicate results would exhibit greater variability than lab duplicate results. Subsampling duplicates are used as a substitute for field duplicates in some situations and are also an indicator of the variability introduced by the splitting process.

The RPDs resulting from analysis of both laboratory and field duplicates should be reviewed during data evaluation. Deviations from the specified limits, and the effect on reported data, should be noted and commented upon by the data reviewer. Laboratories typically have their own set of maximum allowable RPDs for laboratory duplicates based on their analytical history. In most cases these values are more stringent than those listed in Table B-2. Note that the laboratory will only apply these maximum allowable RPDs to laboratory duplicates. In most cases field duplicates are submitted "blind" (with pseudonyms) to the laboratory.

Environmental samples associated with laboratory duplicate results greater than the maximum allowable RPD (when the numerical difference is greater than the reporting limit) are qualified as "J" (estimated). When the numerical difference is less than the RL, no qualification is necessary. Field duplicate RPDs are compared against the maximum allowable RPDs used for laboratory duplicates to identify any pattern of problems with reproducibility of results. Any significant pattern of RPD exceedances for field duplicates should be noted in the data report narrative.

Corrective action should be taken to address field or laboratory procedures that are introducing the imprecision of results. The data reviewer can apply "J" (estimated) qualifiers to any data points if there is clear evidence of a field or laboratory bias issue that is not related to contamination. (Qualification based on contamination is assessed with blank samples.)

Laboratories should provide justification for any laboratory duplicate samples with RPDs greater than the maximum allowable value. In some cases, the laboratory will track and document such exceedances, however; in most cases it is the job of the data reviewer to locate these out-of-range RPDs. When asked to justify excessive RPD values for field duplicates, laboratories most often will cite sample splitting problems in the field. Irregularities should be included in the data reviewer's summary, and the laboratory's response should be retained to document laboratory performance, and to track potential chronic problems with laboratory analysis and reporting.

Accuracy

Accuracy is defined as the degree of agreement of a measurement to an accepted reference or true value. Accuracy is measured as the percent recovery (%R) of spike compound(s).

Percent recovery of spikes is calculated in the following manner:

$$\%R = 100\% * [(Cs - C) / S]$$

where:

%R = percent recovery

Cs = spiked sample concentration

C = sample concentration for spiked matrices

S = concentration equivalent of spike added

Accuracy (%R) criteria for spike recoveries should be compared with the limits specified in the project DQOs. A list of typical acceptable recoveries is shown in Table B-2. As in the case of maximum allowable RPDs, laboratories develop acceptable criteria for an allowable range of recovery percentages that may differ from the values listed in Table B-2.

Percent recoveries should be reviewed during data evaluation, and deviations from the specified limits should be noted in the data reviewer's summary. Justification for out of range recoveries should be provided by the laboratory along with the laboratory reports, or in response to the data reviewer's summary.

Laboratory Matrix Spike and Matrix Spike Duplicate Samples

Evaluation of analytical accuracy and precision in environmental sample matrices is obtained through the analysis of laboratory matrix spike (MS) and matrix spike duplicate (MSD) samples. A matrix spike is an environmental sample that is spiked with a known amount of the constituent being analyzed. A percent recovery can be calculated from the results of the spike analysis. A MSD is a duplicate of this analysis that is performed as a check on matrix recovery precision. MS and MSD results are used together to calculate RPD as with the duplicate samples. When MS/MSD results (%R and RPD) are outside the project specifications, as listed in Table B-2, the associated environmental samples are qualified as "estimates due to matrix interference". Surrogate standards are added to all environmental and QC samples tested by gas chromatography (GC) or gas chromatography-mass spectroscopy (GC-MS). Surrogates are non-target compounds that are analytically similar to the analytes of interest. The surrogate compounds are spiked into the sample prior to the extraction or analysis. Surrogate recoveries are evaluated with respect to the laboratory acceptance criteria to provide information on the extraction efficiency of every sample.

External Reference Standards

External reference standards (ERS) are artificial certified standards prepared by an external agency and added to a batch of samples. ERS's are not required for every batch of samples, and are often only run quarterly by laboratories. Some laboratories use ERS's in place of laboratory control spikes with every batch of samples. ERS results are assessed the same as laboratory control spikes for qualification purposes (see below). The external reference standards are evaluated in terms of accuracy, expressed as the percent recovery (comparison of the laboratory results with the certified concentrations). The laboratory should report all out-of-range values along with the environmental sample results. ERS values are qualified as biased high" when the ERS recovery exceeds the acceptable recovery range and "biased low" when the ERS recovery is smaller than the recovery range.

Laboratory Control Samples

LCS analysis is another batch check of recovery of a known standard solution that is used to assess the accuracy of the entire recovery process. LCSs are much like ERS's except that a certified standard is not necessarily used with LCSs, and the sample is prepared internally by the laboratory so the cost associated with preparing a LCS sample is much lower than the cost of ERS preparation. LCSs are reviewed for percent recovery within control limits provided by the laboratory. LCS out-of-range values are treated in the same manner as ERS out-of-range values. Because LCS and ERS analysis both check the entire recovery process, any irregularity in these results supersedes other accuracy-related qualification. Data are rejected due to low LCS recoveries when the associated environmental result is below the reporting limit.

A flow chart of the data evaluation process, presented on the following pages as Figures B-1 (lab-initiated QA/QC samples) and B-2 (field-initiated QA/QC), can be used as a general guideline for data evaluation. Boxes shaded black in Figures B-1 and B-2 designate final results of the QA/QC evaluation.

Table B-2: Quality Control Requirements

Quality Control Sample Type	QA Parameter	Frequency(1)	Acceptance Limits	Corrective Action
Quality Control Requirements – Field				
Equipment Blanks	Contamination	5% of all samples(2)	<MDL	Identify equipment contamination source. Qualify data as needed.
Field Blank	Contamination	5% of all samples	<MDL	Examine field log. Identify contamination source. Qualify data as needed.
Field Duplicate	Precision	5% of all samples	RPD < 25% if |Difference| > RL	Reanalyze both samples if possible. Identify variability source. Qualify data as needed.
Quality Control Requirements – Laboratory				
Method Blank	Contamination	1 per analytical batch	< MDL	Identify contamination source. Reanalyze method blank and all samples in batch. Qualify data as needed.
Lab Duplicate	Precision	1 per analytical batch	RPD < 25% if |Difference| > RL	Recalibrate and reanalyze.
Matrix Spike	Accuracy	1 per analytical batch	80-120% recovery for GWQC 75-125% for Metals 50-150% Recovery for Pesticides (3)	Check LCS/CRM recovery. Attempt to correct matrix problem and reanalyze samples. Qualify data as needed.
Matrix Spike Duplicate	Precision	1 per analytical batch	RPD < 30% if |Difference| > RL	Check lab duplicate RPD. Attempt to correct matrix interference and reanalyze samples. Qualify data as needed.
Laboratory Control Sample (or CRM or Blank Spike)	Accuracy	1 per analytical batch	80-120% Recovery for GWQC 75-125% for Metals 50-150% Recovery for Pesticides(3)	Recalibrate and reanalyze LCS/ CRM and samples.
Blank Spike Duplicate	Precision	1 per analytical batch	RPD < 25% if |Difference| > RL	Check lab duplicate RPD. Attempt to correct matrix problem and reanalyze samples. Qualify data as needed.
Surrogate Spike (Organics Only)	Accuracy	Each environmental and lab QC sample	30-150% Recovery3	Check surrogate recovery in LCS. Attempt to correct matrix problem and reanalyze sample. Qualify data as needed.

MDL = Method Detection Limit RL = Reporting Limit RPD = Relative Percent Difference

LCS = Laboratory Control Sample/Standard CRM = Certified/ Standard Reference Material

GWQC = General Water Quality Constituents

"Analytical batch" refers to a number of samples (not to exceed 20 environmental samples plus the associated quality control samples) that are similar in matrix type and processed/prepared together under the same conditions and same reagents (equivalent to preparation batch).

Equipment blanks will be collected by the field crew before using the equipment to collect sample.

Or control limits set at +3 standard deviations based on actual laboratory data.

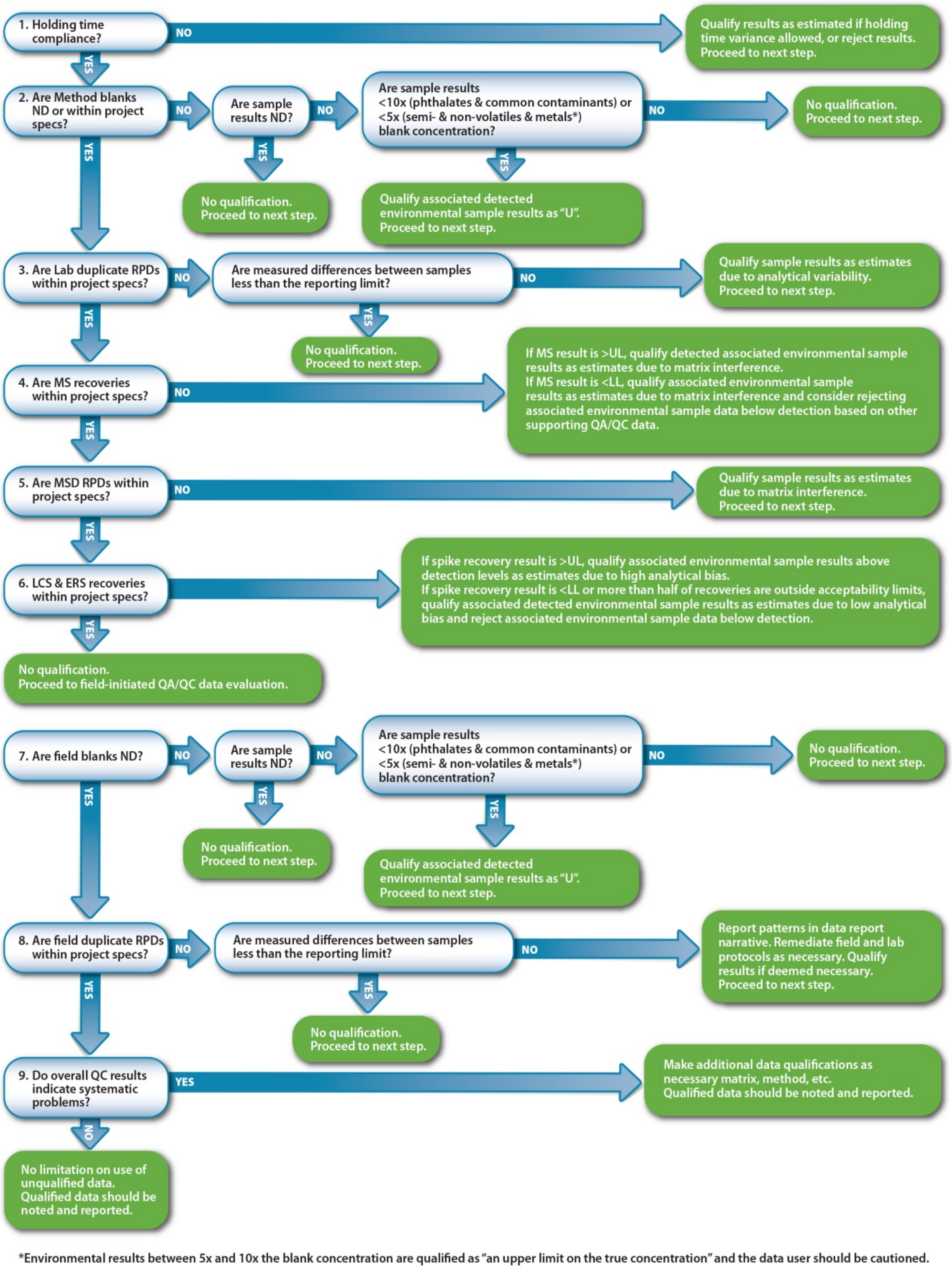


Figure B-1: Technical Data Evaluation for Lab- and Field-Initiated QA/QC Samples

Appendix C – Analytical Method Requirements and Water Quality Objectives for Constituents

(Listed in MRP Table E-2)

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
CONVENTIONAL POLLUTANTS								
Oil and Grease	5	mg/L	EPA 1664A SM 5520 B	28 d	G / Cool, ≤ 6 °C, HCl, H_2SO_4, or H_3PO_4 to pH < 2	Basin Plan	Waters shall not contain oils, greases, waxes or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.	
Total Phenols	100	µg/L	EPA 420.1 SM 5530 D	28 d	G / Cool, ≤ 6 °C, H_2SO_4 to pH < 2	CTR Human Health Protection (Sources of Drinking water)	21,000	µg/L
Cyanide (Total)	5	µg/L	SM 4500 CN F ASTM D7511	14 d	P, FP, G / Cool, ≤ 6 °C, NaOH to pH > 10, reducing agent if oxidizer present	NSWAL[5] Malibu Creek WMA[6] Average Monthly	4.3	µg/L
						NSWAL Malibu Creek WMA Daily Maximum	8.3	µg/L
						Basin Plan	200	µg/L
						CTR Freshwater (1 hr avg.)	22	µg/L
						CTR Freshwater (4 day avg.)	5.2	µg/L

[4] ‘‘P’’ is for polyethylene; ‘‘FP’’ is fluoropolymer (polytetrafluoroethylene (PTFE); Teflon®), or other fluoropolymer, ‘‘G’’ is glass; ‘‘PA’’ is any plastic that is made of a sterilizable material (polypropylene or other autoclavable plastic); ‘‘LDPE’’ is low density polyethylene.
[5] NSWAL: Non-Storm Water Action Level as defined by Los Angeles County Permit Order No. R4-2012-0175 Attachment G.
[6] WMA = Watershed Management Area

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
pH	0 - 14	N/A	Field (EPA 150.2) SM 4500 H B	Field (15 m)	P, FP, G / Cool, ≤ 6 °C	MS4 MAL[7]	7.7	pH
						Basin Plan	The pH of inland surface waters shall not be depressed below 6. 5 or raised above 8. 5 as a result of waste discharges. Ambient pH levels shall not be changed more than 0. 5 units from natural conditions as a result of waste discharge. The pH of bays or estuaries shall not be depressed below 6. 5 or raised above 8. 5 as a result of waste discharges. Ambient pH levels shall not be changed more than 0. 2 units from natural conditions as a result of waste discharge.	
Temperature	None	°F	SM 2550 B	Field (15 minutes)	P, FP, G / None	Basin Plan	The natural receiving water temperature of all regional waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses. Alterations that are allowed must meet the requirements below. For waters designated WARM, water temperature shall not be altered by more than 5 °F above the natural temperature. At no time shall these WARM designated waters be raised above 80 °F as a result of waste discharges. For waters designated COLD, water temperature shall not be altered by more than 5 °F above the natural temperature.	

[7] MAL = Municipal Action Level as defined by Los Angeles County Permit Order No. R4-2012-0175 Attachment G.

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
Dissolved Oxygen	Sensitivity to 5 mg/L	mg/L	Field SM 4500 O G	Field (15 m)	G, Bottle and top / None	Basin Plan	At a minimum (see specifics below), the mean annual dissolved oxygen concentration of all waters shall be greater than 7 mg/L, and no single determination shall be less than 5.0 mg/L, except when natural conditions cause lesser concentrations. The dissolved oxygen content of all surface waters designated as WARM shall not be depressed below 5 mg/L as a result of waste discharges. The dissolved oxygen content of all surface waters designated as COLD shall not be depressed below 6 mg/L as a result of waste discharges. The dissolved oxygen content of all surface waters designated as both COLD and SPWN shall not be depressed below 7 mg/L as a result of waste discharges.	
BACTERIA (single sample limits)								
Fecal coliform (fresh waters)	20	MPN/100 ml	SM 9221 C E	8 h	PA, G / Cool < 10 °C, 0.0008% $Na_2S_2O_3$	SMB Beaches and Malibu Creek & Lagoon TMDL (daily maximum)	400	MPN/100mL
						SMB Beaches and Malibu Creek & Lagoon TMDL (geometric mean)	200	MPN/100mL
						Basin Plan (Total Coliform over 7 day period)	1.1	MPN/100mL
E. coli (fresh waters)	1	MPN/100 ml	SM 9221 F	8 h	PA, G / Cool < 10 °C, 0.0008% $Na_2S_2O_3$	NSWAL Malibu Creek WMA, Malibu Creek TMDL (daily maximum)	235	MPN/100mL
						NSWAL Malibu Creek WMA (geometric mean)	126	MPN/100mL

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
GENERAL CONSTITUENTS								
Dissolved Phosphorus[8]	0.05	mg/L	EPA 365.3	28 d	P / Cool, ≤ 6 °C, H_2SO_4 to pH < 2	Basin Plan	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses.	
Total Phosphorus	0.05	mg/L	SM 3120 B EPA 365.1	28d	G / Cool, ≤ 6 °C, H_2SO_4 to pH < 2	MS4 MAL	0.80	mg/L
						Malibu Creek & Lagoon TMDL WLA[9] (summer)	0.1	mg/L
						Malibu Creek & Lagoon TMDL WLA (winter)	0.2	mg/L
						Malibu Creek Watershed Nutrients TMDL RWL (Summer daily maximum)	0.8 (based on 0.1 numeric target)	lbs/day
Turbidity	0.1	NTU	EPA 180.1 SM 2130 B	48 h	P, FP, G / Cool, ≤ 6 °C	Basin Plan	Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in natural turbidity attributable to controllable water quality factors shall not exceed the following limits: Where natural turbidity is between 0 and 50 NTU, increases shall not exceed 20%. Where natural turbidity is greater than 50 NTU, increases shall not exceed 10%. Allowable zones of dilution within which higher concentrations may be tolerated may be defined for each discharge in specific Waste Discharge Requirements.	

[8] All dissolved constituents must be filtered upon arrival at analysis laboratory as the official US EPA holding time is 15 minutes.

[9] WLA = Wasteload Allocation

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
Total Suspended Solids (TSS)	2	mg/L	SM 2540 D	7 d	P, FP, G / Cool, ≤ 6 °C	Basin Plan	Waters shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses.	
						MS4 MAL	264.1	mg/L
Suspended Sediment Concentration (SSC) – For Malibu Creek Only (TMDL)	0.5	mg/L	ASTM D-3977-97	7 d	P, G / Cool to ≤6º C, store in the dark	Basin Plan	Waters shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses.	
Total Dissolved Solids (TDS)	2	mg/L	SM 2540 C	7 d	P, FP, G / Cool, ≤ 6 °C	Basin Plan – Malibu Creek Watershed (Table 3-8)	2,000	mg/L
						USEPA Secondary MCL	500	mg/L
						CA Dept. Public Health Recommended Upper Level	1,000	mg/L
						CA Dept. Public Health Recommended Short-term Level	1,500	mg/L
Volatile Suspended Solids (VSS)	2	mg/L	SM 2540 E EPA 160.4	7 d	P, FP, G / Cool, ≤ 6 °C	Basin Plan	Waters shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses.	
Sulfate	0.50	mg/L	EPA 300.0	28 d	P, FP, G / Cool, ≤ 6 °C	Basin Plan – Malibu Creek (Table 3-8)	500	mg/L
Total Organic Carbon (TOC)	1	mg/L	SM 5310C	28 d	P, FP, G / Cool, ≤ 6 °C, HCl, H_2SO_4, or H_3PO_4 to pH < 2	None	None	N/A
Total Petroleum Hydrocarbons (extractable fraction, i.e., diesel and motor oil range hydrocarbons)	5	mg/L	EPA 8015B	14 d to ext. / 40 d to analyze	G / Cool, ≤ 6 °C	None	None	none
Biochemical Oxygen Demand	2	mg/L	5210 B	48 h	P, FP, G / Cool, ≤ 6 °C	Basin Plan	Waters shall be free of substances that result in increases in the BOD which adversely affect beneficial uses.	

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
Chemical Oxygen Demand	20-900	mg/L	EPA 410.4 SM 5220 D	28 d	P, FP, G / Cool, ≤ 6 °C, H_2SO_4 to pH < 2	MAL	247.5	mg/L
Total Ammonia-Nitrogen (NH_3-N)	0.1	mg/L	EPA 350.1	28 d	P, FP, G / Cool, ≤ 6 °C, H_2SO_4 to pH < 2	Basin Plan	Varies based on pH and temperature for Cold waters and Warm Waters (Table 3-1 to 3-4 of Basin Plan)	
Total Kjeldahl Nitrogen (TKN)	0.1	mg/L	EPA 351.2	28 d	P, FP, G / Cool, ≤ 6 °C, H_2SO_4 to pH < 2	MS4 MAL	4.59	mg/L
Nitrate+Nitrite (NO_2+NO_3 as N)	0.1	mg/L	EPA 300.0	28 d	P, FP, G / Cool, ≤ 6 °C, H_2SO_4 to pH < 2	MS4 MAL	1.85	mg/L
						Basin Plan	10 as NO_3-N + NO_2-N	mg/L
						Basin Plan – Malibu Creek	10 as NO_3-N + NO_2-N	mg/L
						Malibu Creek Watershed Nutrients TMDL (summer daily maximum)	8 (based on 1.0 mg/L numeric target)	lbs/day
						Malibu Creek Watershed Nutrients TMDL (winter daily maximum)	8	mg/L
Total Nitrogen (TKN+ NO_2-N+NO_3-N)	N/A		Sum of TKN, Nitrate, and Nitrite	N/A	N/A	Malibu Creek & Lagoon Benthic TMDL (summer)	0.65	mg/L
						Malibu Creek & Lagoon Benthic TMDL (winter)	4.0	mg/L

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
Alkalinity	2	mg/L	EPA 310.2 SM 2320B	14 d	P, FP, G / Cool, ≤ 6 °C	USEPA National Recommended Water Quality Criteria (Freshwater)	20,000	ug/L
Specific Conductance	1	umho/cm	EPA 120.1 SM 2510B	Field (15 min) Lab 28 d	P, FP, G / Cool, ≤ 6 °C	CA Dept. Public Health Secondary MCL	900	µmhos/cm
Total Hardness (as $CaCO_3$)	2	mg/L	EPA 130.1	6 mo	P, FP, G / HNO_3 or H_2SO_4 to pH < 2	None	None	N/A
Methylene Blue Active Substances (MBAS)	500	µg/L	SM 5540 C	48 h	P, FP, G / Cool, ≤ 6 °C	CA Dept. Public Health Secondary MCL	500	µg/L
						Basin Plan Federal MCL	500	µg/L
Chloride	2	mg/L	EPA 300.0 SM 4110B	28 d	P, FP, G / None	Basin Plan – Malibu Creek	500	mg/L
Fluoride	100	µg/L	EPA 300.0 SM 4110B	28 d	P / None	CA Dept. Public Health MCL (drinking water)	2,000	µg/L
						Basin Plan	Varies with Temperature (Table 3-6)	µg/L
Methyl tertiary butyl ether (MTBE)	1000	µg/L	EPA 624	7	G, FP-lined septum / Cool ≤ 6 °C, 0.008% $Na_2S_2O_3$	CA Dept. Public Health MCL (drinking water)	13	µg/L
						CA Dept. Public Health Secondary MCL	5	µg/L
Perchlorate	4	µg/L	EPA 314.0	28	P / None	CA Dept. Public Health MCL (drinking water)	6	µg/L

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
METALS (TOTAL & DISSOLVED[10] FRACTIONS)			EPA 200.8 SM 3125B	6 mo	P, FP, G / HNO_3 to pH < 2, or at least 24 hours prior to analysis			
Aluminum	100	µg/L	--	--	--	Basin Plan MCL	1,000	µg/L
						USDFG[11] (4 d)	87	µg/L
						USDFG (1 hr)	750	µg/L
Antimony	0.5	µg/L	--	--	--	Basin Plan MCL	6	µg/L
Arsenic	1	µg/L	--	--	--	Basin Plan MCL	50	µg/L
						CTR Freshwater (1 hr avg.) dissolved	340	µg/L
						CTR Freshwater (4 day avg.) dissolved	150	µg/L
Beryllium	0.5	µg/L	--	--	--	Basin Plan MCL	4	µg/L
Cadmium	0.25	µg/L	--	--	--	MS4 MAL	2.52	µg/L
						Basin Plan MCL	5	µg/L
						CTR Freshwater (1 hr avg.) total	=(EXP(1.128*LN(Hardness)-3.6867))	µg/L
						CTR Freshwater (1 hr avg.) dissolved	=(EXP(1.128*LN(Hardness)-3.6867)) *(1.136672-(LN(Hardness)*0.041838))	µg/L
						CTR Freshwater (4 day avg.) total	=(EXP(0.7852*LN(Hardness)-2.715))	µg/L

[10] All dissolved constituents must be filtered upon arrival at analysis laboratory. The official US EPA holding time is 15 minutes.
[11] US Department of Fish and Game

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
						CTR Freshwater (4 day avg.) dissolved	=(EXP(0.7852*LN(Hardness)-2.715)) * (1.101672-(LN(Hardness)*0.041838))	µg/L
Chromium	0.5	µg/L	--	--	--	MS4 MAL	20.20	µg/L
						Basin Plan MCL	50	µg/L
Chromium (Hexavalent)	5	µg/L	EPA 218.6	28 d	P, FP, G / Cool, ≤ 6 °C, $(NH_4)_2SO_4$ / NH_4OH, pH = 9.3-9.7	CTR Freshwater (1 hr avg.) dissolved	16	µg/L
						CTR Freshwater (4 day avg.) dissolved	11	µg/L
Copper	0.5	µg/L	--	--	--	MS4 MAL (Total Fraction)	71.12	µg/L
						CTR Freshwater (1 hr avg.) total	=(EXP(0.9422*LN(Hardness)-1.7))	µg/L
						CTR Freshwater (1 hr avg.) dissolved	=(EXP(0.9422*LN(Hardness)-1.7))*(0.96)	µg/L
						CTR Freshwater (4 day avg.) total	=(EXP(0.8545*LN(Hardness)-1.702))	µg/L
						CTR Freshwater (4 day avg.) dissolved	=(EXP(0.8545*LN(Hardness)-1.702))*(0.96)	µg/L
Iron	100,	µg/L	--	--	--	CA Dept. Public Health Secondary MCL	300	µg/L
Lead	0.5	µg/L	--	--	--	MS4 MAL	102.00	µg/L
						CTR Freshwater (1 hr avg.) total	=(EXP(1.273*LN(Hardness)-1.46))	µg/L

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
						CTR Freshwater (1 hr avg.) dissolved	=(EXP(1.273*LN(Hardness)-1.46))*(1.46203-(LN(Hardness)*0.145712))	µg/L
						CTR Freshwater (4 day avg.) total	=(EXP(1.273*LN(Hardness)-4.705))	µg/L
						CTR Freshwater (4 day avg.) dissolved	=(EXP(1.273*LN(Hardness)-4.705))*(1.46203-(LN(Hardness)*0.145712))	µg/L
Nickel	1	µg/L	--	--	--	MS4 MAL	27.43	µg/L
						Basin Plan MCL	100	µg/L
						CTR Freshwater (1 hr avg.) total	=(EXP(0.846*LN(Hardness)+2.255))	µg/L
						CTR Freshwater (1 hr avg.) dissolved	=(EXP(0.846*LN(Hardness)+2.255))*(0.998)	µg/L
						CTR Freshwater (4 day avg.) total	=(EXP(0.846*LN(Hardness)+0.0584))	µg/L
						CTR Freshwater (4 day avg.) dissolved	=(EXP(0.846*LN(Hardness)+0.0584))*(0.997)	µg/L
Selenium	1	µg/L	--	--	--	NSWAL Malibu Creek WMA Daily Maximum	8.2	µg/L
						NSWAL Malibu Creek WMA Average Monthly	4.1	µg/L
						Basin Plan MCL	50	µg/L
						CTR Freshwater (1 hr avg.) total	20	µg/L

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
						CTR Freshwater (4 day avg.) total	5.0	µg/L
Silver	0.25	µg/L	--	--	--	CTR Freshwater (max instant.) (total silver)	=(EXP(1.72*LN(Hardness)-6.59))	µg/L
Thallium	1	µg/L	--	--	--	Basin Plan MCL	2	µg/L
Zinc	1	µg/L	--	--	--	MS4 MAL	641.3	µg/L
						CTR Freshwater (1 hr avg.) total	=(EXP(0.8473*LN(Hardness)+0.884))	µg/L
						CTR Freshwater (1 hr avg.) dissolved	=(EXP(0.8473*LN(Hardness)+0.884))*(0.978)	µg/L
						CTR Freshwater (4 day avg.) total	=(EXP(0.8473*LN(Hardness)+0.884))	µg/L
						CTR Freshwater (4 day avg.) dissolved	=(EXP(0.8473*LN(Hardness)+0.884))*(0.986)	µg/L
Total & Dissolved[12] Mercury	0.5	µg/L	EPA 245.1	90 d	FP, G, and FP-lined cap / 5 mL/L 12N HCl or 5 mL/L BrCl	NSWAL	0.051	µg/L
						MS4 MAL	0.32	µg/L
						Basin Plan MCL	2	µg/L

[12] All dissolved constituents must be filtered upon arrival at analysis laboratory. The official US EPA holding time is 15 minutes.

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
						CTR Human Health Protection (30-d avg; fish consumption only)	0.051	µg/L
VOLATILE ORGANIC COMPOUNDS								
2-Chloroethyl vinyl ether[13]	1	µg/L	624[2]	7 d	G, FP-lined septum **/** Cool ≤ 6 °C, 0.008% $Na_2S_2O_3$	None	None	µg/L
SEMIVOLATILE ORGANIC COMPOUNDS			EPA 625 SM 6410 B	7 d to ext. / 40 d to analyze	G, FP-lined cap **/** Cool ≤ 6 °C, 0.008% $Na_2S_2O_3$			
ACID COMPOUNDS								
2-Chlorophenol	2	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	120	µg/L
4-Chloro-3-methylphenol	1	µg/L	--	--	--	USEPA National Recommended Water Quality Criteria (Taste & Odor)	3,000	µg/L
2,4-Dichlorophenol	1	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	93	µg/L
2,4-Dimethylphenol	2	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	540	µg/L

[13] Permit MRP Table E-2 lists 2-Chloroethyl vinyl ether as a base/neutral semi-volatile organic compound.

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
2,4-Dinitrophenol	5	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	70	µg/L
2-Nitrophenol	10	µg/L	--	--	--	None	None	N/A
4-Nitrophenol	5	µg/L	--	--	--	None	None	N/A
Pentachlorophenol	2	µg/L	--	--	--	CTR Fresh Water (4 day avg.)	=EXP(1.005*pH-5.134)	µg/L
						CTR Freshwater (1 hr avg.)	=EXP(1.005*pH-4.869)	µg/L
Phenol	1	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	21,000	µg/L
2,4,6-Trichlorophenol	10	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	2.1	µg/L
BASE/NEUTRAL COMPOUNDS								
Acenaphthene	1	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	1,200	µg/L
Acenaphthylene	2	µg/L	--	--	--	None	None	N/A
Anthracene	2	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	9,600	µg/L
Benzidine	5	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.00012	µg/L

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
1,2 Benzanthracene	5	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.0044	µg/L
Benzo(a)pyrene	2	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.0044	µg/L
						Basin Plan Federal MCL	0.2	µg/L
Benzo(g,h,i)perylene	5	µg/L	--	--	--	None	None	N/A
3,4 Benzoflouranthene	10	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.0044	µg/L
Benzo(k)flouranthene	2	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.0044	µg/L
Bis(2-Chloroethoxy) methane	5	µg/L	--	--	--	None	None	N/A
Bis(2-Chloroisopropyl) ether	2	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	1,400	µg/L
Bis(2-Chloroethyl) ether	1	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.031	µg/L
Bis(2-Ethylhexl) phthalate	5	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	1.8	µg/L
4-Bromophenyl phenyl ether	5	µg/L	--	--	--	None	None	N/A

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
Butyl benzyl phthalate	10	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	3,000	µg/L
2-Chloronaphthalene	10	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	1700	µg/L
4-Chlorophenyl phenyl ether	5	µg/L	--	--	--	None	None	N/A
Chrysene	5	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.0044	µg/L
Dibenzo(a,h)anthracene	0.1	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.0044	µg/L
1,3-Dichlorobenzene	1	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	400	µg/L
1,4-Dichlorobenzene	1	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	400	µg/L
						Basin Plan Federal MCL	5	µg/L
1,2-Dichlorobenzene	1	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	2,700	µg/L
						Basin Plan Federal MCL	600	µg/L

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
3,3-Dichlorobenzidine	5	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.04	µg/L
Diethyl phthalate	2	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	23,000	µg/L
Dimethyl phthalate	2	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	313,000	µg/L
Di-n-Butyl phthalate	10	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	2,700	µg/L
2,4-Dinitrotoluene	5	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.11	µg/L
2,6-Dinitrotoluene	5	µg/L	--	--	--	USEPA Toxicity LOEL	330 (acute) 230 (chronic)	µg/L
4,6 Dinitro-2-methylphenol	5	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	13.4	µg/L
1,2-Diphenylhydrazine	1	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.04	µg/L
Di-n-Octyl phthalate	10	µg/L	--	--	--	USEPA Toxicity LOEL	940 acute 3 chronic	µg/L
Fluoranthene	0.05	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	300	µg/L

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
Fluorene	0.1	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	1,300	µg/L
Hexachlorobenzene	1	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.00075	µg/L
						Basin Plan Federal MCL	1	µg/L
Hexachlorobutadiene	1	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.44	µg/L
Hexachloro-cyclopentadiene	5	µg/L	--	--	--	CA Dept. Public Health MCL (drinking water)	50	µg/L
						CTR Human Health Protection (Sources of Drinking water)	240	µg/L
						Basin Plan Federal MCL	50	µg/L
Hexachloroethane	1	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	1.9	µg/L
Indeno(1,2,3-cd)pyrene	0.05	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.0044	µg/L
Isophorone	1	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	8.4	µg/L

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
Naphthalene	0.2	µg/L	--	--	--	USEPA Toxicity LOEL	2300 acute 620 chronic	µg/L
Nitrobenzene	1	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	17	µg/L
N-Nitroso-dimethyl amine	5	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.00069	µg/L
N-Nitroso-diphenyl amine	1	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	5.0	µg/L
N-Nitroso-di-n-propyl amine	5	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.005	µg/L
Phenanthrene	0.05	µg/L	--	--	--	None	None	N/A
Pyrene	0.05	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	960	µg/L
1,2,4-Trichlorobenzene	1	µg/L	--	--	--	CA Dept. Public Health MCL (drinking water)	5	µg/L
						Basin Plan Federal MCL	70	µg/L
CHLORINATED PESTICIDES			EPA 1699	7 d to ext. / 40 d to analyze	G, FP-lined cap **/** Cool ≤ 6 °C, pH 5-9, 0.008% $Na_2S_2O_3$			
Aldrin	0.005	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.00013	µg/L

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
alpha-BHC	0.01	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.0039	µg/L
beta-BHC	0.005	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.014	µg/L
delta-BHC	0.005	µg/L	--	--	--	None	None	N/A
gamma-BHC (lindane)	0.02	µg/L	--	--	--	CTR Freshwater (1 hr avg.)	0.95	µg/L
						Basin Plan Federal MCL	0.2	µg/L
alpha-chlordane	0.1	µg/L	--	--	--	Basin Plan Federal MCL	0.1	µg/L
gamma-chlordane	0.1	µg/L	--	--	--	Basin Plan Federal MCL	0.1	µg/L
4,4'-DDD	0.00004	µg/L	--	--	--	Annual WLA Permit Att. M	27.08	g/yr
4,4'-DDE	0.00008	µg/L	--	--	--	SMB DDT TMDL Water Column Target	0.00017	µg/L
4,4'-DDT	0.00008	µg/L	--	--	--			
Dieldrin	0.01	µg/L	--	--	--	CTR Freshwater (4 day avg.)	0.056	µg/L
						CTR Freshwater (1 hr avg.)	0.24	µg/L
alpha-Endosulfan	0.02	µg/L	--	--	--	CTR Freshwater (4 day avg.)	0.056	µg/L
						CTR Freshwater (max instant.)	0.22	µg/L
beta-Endosulfan	0.01	µg/L	--	--	--	CTR Freshwater (4 day avg.)	0.056	µg/L

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
						CTR Fresh Water (max instant.)	0.22	µg/L
Endosulfan sulfate	0.05	µg/L	--	--	--	USEPA 24 hr avg	0.056	µg/L
Endrin	0.01	µg/L	--	--	--	CTR Freshwater (4 day avg.)	0.036	µg/L
						CTR Freshwater (1 hr avg.)	0.086	µg/L
						Basin Plan Federal MCL	2	µg/L
Endrin aldehyde	0.01	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking water)	0.76	µg/L
Heptachlor	0.01	µg/L	--	--	--	CTR Freshwater (4 day avg.)	0.0038	µg/L
						CTR Fresh Water (max instant.)	0.52	µg/L
						Basin Plan Federal MCL	.01	µg/L
Heptachlor epoxide	0.01	µg/L	--	--	--	CTR Freshwater (4 day avg.)	0.0038	µg/L
						CTR Freshwater (max instant.)	0.52	µg/L
						Basin Plan Federal MCL	.01	µg/L
Toxaphene	0.5	µg/L	--	--	--	CTR Freshwater (4 day avg.)	0.0002	µg/L
						CTR Freshwater (1 hr avg.)	0.73	µg/L
						Basin Plan Federal MCL	3	µg/L

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
POLYCHLORINATED BIPHENYLS								
Total PCBs (sum of 166 congeners)	range for all congeners: 0.000005-0.000020	µg/L	EPA 1668A	1 yr to extract / 1 yr to analyze	G, FP-lined cap **/** Cool ≤ 6 °C	Basin Plan (30 day average)	0.014	µg/L
	Total PCBs: 0.000020	µg/L				Basin Plan (1 day average)	0.030	µg/L
						Basin Plan (Human Health)	0.000070	µg/L
						SMB PCB TMDL Water Column Target	0.000019	µg/L
						PCB TMDL Annual WLA (Permit Att. M)	140.25	g/yr
						CA Dept. Public Health MCL (drinking water)	0.5	µg/L
						CTR Freshwater (4 day avg.)	0.014	µg/L
						CTR Human Health Protection (Sources of Drinking water)	0.00017	µg/L
ORGANOPHOSPHATE PESTICIDES			EPA 525.2	7 d to ext. / 40 d to analyze	G, FP-lined cap **/** Cool ≤ 6 °C, pH 5-9			
Atrazine	2	µg/L	--	--	--	CA Dept. Public Health MCL (drinking water)	1	µg/L
						Basin Plan Federal MCL	3	µg/L

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
Chlorpyrifos	0.05	µg/L	--	--	--	CADFG Freshwater Aquatic Life (4 day Avg)	0.014	µg/L
						CADFG Freshwater Aquatic Life (1 hr maximum)	0.02	µg/L
Cyanazine	2	µg/L	EPA 629 / 507	--	--	None	None	N/A
Diazinon	0.01	µg/L	--	--	--	CADFG Freshwater Aquatic Life (4 day Avg)	0.05	µg/L
						CADFG Freshwater Aquatic Life (1 hr maximum)	0.08	µg/L
Malathion	1	µg/L	--	--	--	USEPA National Recommended Water Quality Criteria for Freshwater Aquatic Life (max instant.)	0.1	µg/L
Prometryn	2	µg/L	--	--	--	None	None	N/A
Simazine	2	µg/L	--	--	--	CA Dept. Public Health MCL (drinking water)	4	µg/L
						Basin Plan Federal MCL	4	µg/L
						USEPA National Recommended Water Quality Criteria for Freshwater Aquatic Life (max instant.)	10	µg/L

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[4] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
HERBICIDES				7 d to ext. / 40 d to analyze	G, FP-lined cap / Cool ≤ 6 °C, pH 5-9			
2,4-D	10	µg/L	EPA 615 SM 6640B	--	--	CA Dept. Public Health MCL (drinking water)	70	µg/L
						Basin Plan Federal MCL	70	µg/L
Glyphosate	5	µg/L	EPA 547	--	--	CA Dept. Public Health MCL (drinking water)	700	µg/L
2,4,5-TP-SILVEX	0.5	µg/L	EPA 615 SM 6640B	--	--	USEPA National Recommended Water Quality Criteria for Human Health	10	µg/L
						Basin Plan Federal MCL	50	µg/L

Data Sources:

Los Angeles County Permit Order No. R4-2012-0175

USEPA Santa Monica Bay TMDL for DDTs and PCBs (March 2012)

Los Angeles Region Basin Plan CH. 3 Water Quality Objectives (1994)

State Water Resources Control Board Online Water Quality Goals Database: (http://www.waterboards.ca.gov/water_issues/programs/water_quality_goals/search.shtml)

USEPA Federal Register Vol. 77, No. 97, Part II. Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act; Analysis and Sampling Procedures (May 2012)

Quality Assurance Program Plan (QAPP), The State of California's Surface Water Ambient Monitoring Program (SWAMP) (September 2008

Appendix D – Trash Monitoring Worksheets

Malibu Creek Watershed Trash Assessment Worksheet

Watershed/Stream:	**Date:**	**Start Time:**
Monitoring Staff:	**Site ID:**	**End Time:**
Total Pieces In Stream:	**Total Pieces On Banks:**	**Grand Total Trash:**
Volume (# trash bags):	**Weight (lbs): In Stream- On Banks-**	**Total Weight Outside Site (lbs):**
Width Right Bank (ft):	**Width Left Bank (ft):**	**Photo #'s (from camera)**
Dumped %	**Hazardous Waste Log (Y/N)**	**Intractable Trash Log (Y/N)**

Plastic/ Styrofoam:	**# in Stream:**	**# on Banks:**		**Source I.D.**	**% Algae**	**Wear & Tear**
Specific Description of Items Found:						
Other Observations:						

Paper Products/ Biodegradable:	**# in Stream:**	**# on Banks:**		**Source I.D.**	**% Algae**	**Wear & Tear**
Specific Description of Items Found:						
Other Observations:						

Household Items	**# in Stream:**	**# on Banks:**		**Source I.D.**	**% Algae**	**Wear & Tear**
Specific Description of Items Found:						
Other Observations:						

Landscape Materials	**# in Stream:**	**# on Banks:**		**Source I.D.**	**% Algae**	**Wear & Tear**
Specific Description of Items Found:						
Other Observations:						

Aluminum/Metal:	# in Stream:	# on Banks:		Source I.D.	% Algae	Wear & Tear
Specific Description of Items Found:						
Other Observations:						

Automotive:	# in Stream:	# on Banks:		Source I.D.	% Algae	Wear & Tear
Specific Description of Items Found:						
Other Observations:						

Toxic/ Hazardous Material:	# in Stream:	# on Banks:		Source I.D.	% Algae	Wear & Tear
Specific Description of Items Found:						
Other Observations:						

Glass:	# in Stream:	# on Banks:		Source I.D.	% Algae	Wear & Tear
Specific Description of Items Found:						
Other Observations:						

Bio/Hazardous:	# in Stream:	# on Banks:		Source I.D.	% Algae	Wear & Tear
Specific Description of Items Found:						
Other Observations:						

Personal Effects:	# in Stream:	# on Banks:		Source I.D.	% Algae	Wear & Tear
Specific Description of Items Found:						
Other Observations:						

Sports Equipment:	# in Stream:	# on Banks:		Source I.D.	% Algae	Wear & Tear
Specific Description of Items Found:						
Other Observations:						

Miscellaneous:	# in Stream:	# on Banks:		Source I.D.	% Algae	Wear & Tear
Specific Description of Items Found:						
Other Observations:						

Appendix E – Sample Field Forms

Chain of Custody Collection Date:_________________________ Client/Project:__________________________

Sampled By Organization: Samplers:					Analyze (container size & type / preservation & filtration)						
Destination Lab: Address: Phone:											
Sample ID	**Sampling Location**	**Sample Time**	**Sample Matrix**	**Collection Temp °C**							Notes/ Observations:
Observations / Weather / last rain / Comments / etc.:											

Delivery Method / Notes:	Arrival Condition, Time/Date, Temp, Notes:
Relinquished by: ____________________ ________ ______________ (Signature) Date Time ____________________ ________ ______________ (Signature) Date Time	Received by: ____________________ ________ ______________ (Signature) Date Time ____________________ ________ ______________ (Signature) Date Time

Data Review (Initials/Date) ______________________

<u>Sampled by</u>
Organization:
Samplers:

Field Measurements

Instrumentation used for measurements:

Date/time of calibration:

Analysis Type	Depth	Temperature	Temperature	pH	Dissolved Oxygen	Dissolved Oxygen	Conductivity	pH 7.0 check
Analysis Results Units	(m)	air (^{o}C)	water (^{o}C)	(SU)	(mg/L)	(%/L)	(uS/cm)	(SU)

Sample Site ID									
Sample Location									
Lab Sample ID									
Sampling Date									
Sampling Time									

Sample Site ID									
Sample Location									
Lab Sample ID									
Sampling Date									
Sampling Time									

Sample Site ID									
Sample Location									
Lab Sample ID									
Sampling Date									
Sampling Time									

Sample Site ID									
Sample Location									
Lab Sample ID									
Sampling Date									
Sampling Time									

Sample Site ID									
Sample Location									
Lab Sample ID									
Sampling Date									
Sampling Time									

Analyst: ______________________________ Approved by: ___________________________________ Date: _________________________

Quality Control Officer

Field Log Collection Date:_______________________________ Client/Project:___________________________

<table>
<tr><td>Sampled By
Organization:
Samplers:</td><td>Site ID / Description
/Location:</td></tr>
<tr><td colspan="2">Observations / Weather / Qualitative Water Quality / Comments / etc.:</td></tr>
<tr><td colspan="2">Flow Measurements:
Velocity
Meter:</td></tr>
<tr><td>Delivery Method / Notes:</td><td>Arrival Condition, Time/Date, Temp, Notes:</td></tr>
<tr><td>Sampler 1:
__________________ ________ ____________
(Signature) Date Time</td><td>Sampler 2:
__________________ ________ ____________
(Signature) Date Time</td></tr>
</table>

____

Data Review (Initials/Date) ____________________

Appendix F – LACFCD Background Information

In 1915, the Los Angeles County Flood Control Act established the LACFCD and empowered it to manage flood risk and conserve stormwater for groundwater recharge. In coordination with the United States Army Corps of Engineers the LACFCD developed and constructed a comprehensive system that provides for the regulation and control of flood waters through the use of reservoirs and flood channels. The system also controls debris, collects surface storm water from streets, and replenishes groundwater with storm water and imported and recycled waters. The LACFCD covers the 2,753 square-mile portion of Los Angeles County south of the east-west projection of Avenue S, excluding Catalina Island. It is a special district governed by the County of Los Angeles Board of Supervisors, and its functions are carried out by the Los Angeles County Department of Public Works. The LACFCD service area is shown in Figure F- 1.

Unlike cities and counties, the LACFCD does not own or operate any municipal sanitary sewer systems, public streets, roads, or highways. The LACFCD operates and maintains storm drains and other appurtenant drainage infrastructure within its service area. The LACFCD has no planning, zoning, development permitting, or other land use authority within its service area. The permittees that have such land use authority are responsible under the Permit for inspecting and controlling pollutants from industrial and commercial facilities, development projects, and development construction sites. (Permit, Part II.E, p. 17.)

The MS4 Permit language clarifies the unique role of the LACFCD in storm water management programs: "[g]iven the LACFCD's limited land use authority, it is appropriate for the LACFCD to have a separate and uniquely-tailored storm water management program. Accordingly, the storm water management program minimum control measures imposed on the LACFCD in Part VI.D of this Order differ in some ways from the minimum control measures imposed on other Permittees. Namely, aside from its own properties and facilities, the LACFCD is not subject to the Industrial/Commercial Facilities Program, the Planning and Land Development Program, and the Development Construction Program. However, as a discharger of storm and non-storm water, the LACFCD remains subject to the Public Information and Participation Program and the Illicit Connections and Illicit Discharges Elimination Program. Further, as the owner and operator of certain properties, facilities and infrastructure, the LACFCD remains subject to requirements of a Public Agency Activities Program." (Permit, Part II.F, p. 18.)

Consistent with the role and responsibilities of the LACFCD under the Permit, the [E]WMPs and CIMPs reflect the opportunities that are available for the LACFCD to collaborate with permittees having land use authority over the subject watershed area. In some instances, the opportunities are minimal, however the LACFCD remains responsible for compliance with certain aspects of the MS4 permit as discussed above.

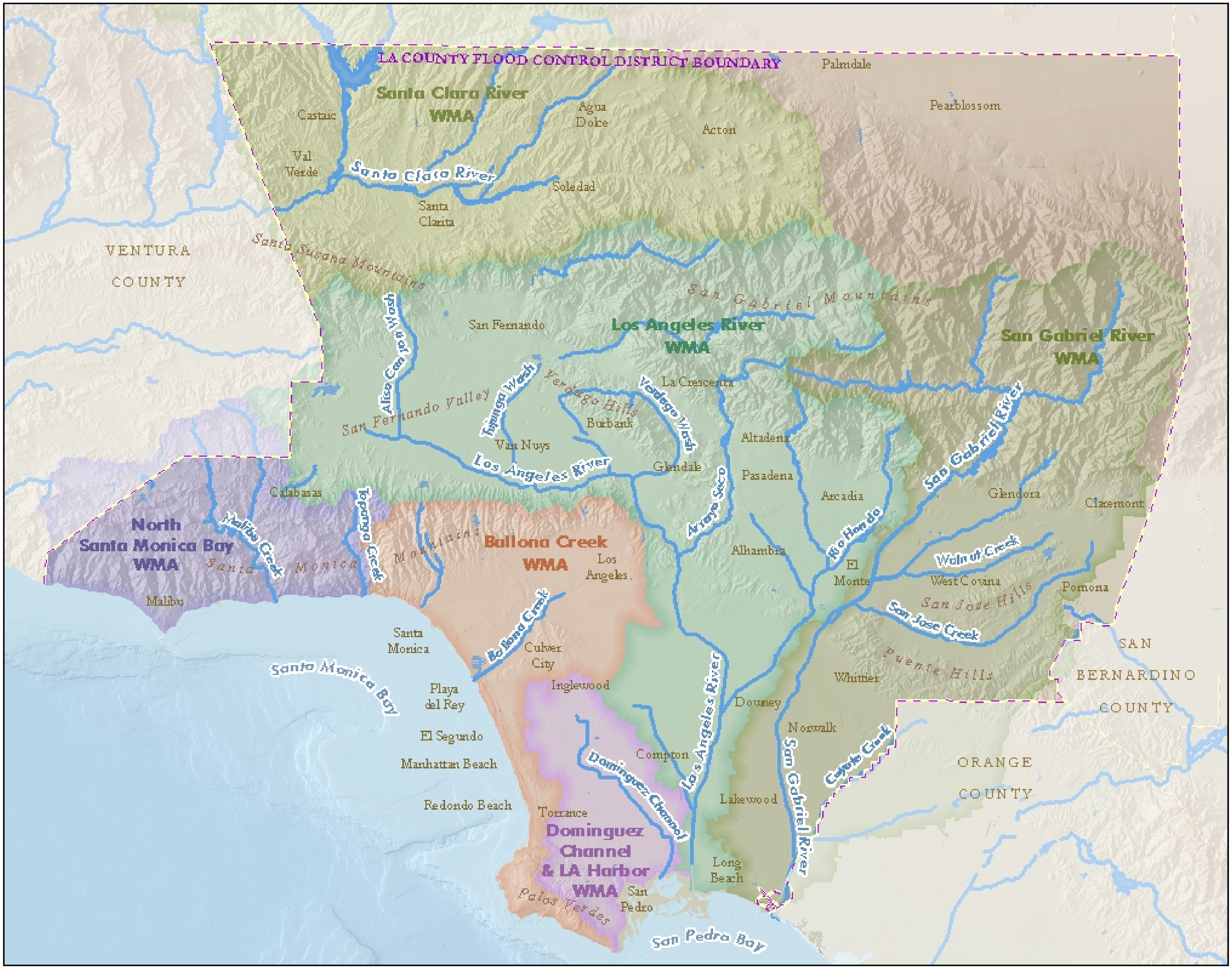


Figure F-1: Los Angeles County Flood Control District Service Area

Appendix G – Malibu Creek Watershed Trash Monitoring and Reporting Plan

[INSERT NEW MAPS HERE]

Appendix H – Water Toxicity Testing and TIE Approach

Water Toxicity Testing and Toxicity Identification Evaluations

Aquatic toxicity testing supports the identification of best management practices (BMPs) to address sources of toxicity in urban runoff. The following outlines the approach for conducting aquatic toxicity monitoring and evaluating results. Control measures and management actions to address confirmed toxicity caused by urban runoff are addressed by the EWMP, either via currently identified management actions or those that are identified via adaptive management of the EWMP.

The approach to conducting aquatic toxicity monitoring is presented in Figure H-1, which describes a general evaluation process for each sample collected as part of routine sampling conducted twice per year in wet weather and once per year in dry weather. Monitoring begins in the receiving water and the information gained is used to identify constituents for monitoring at outfalls to support the identification of pollutants that need to be addressed in the EWMP. The sub-sections below describe the process and its technical and logistical rationale.

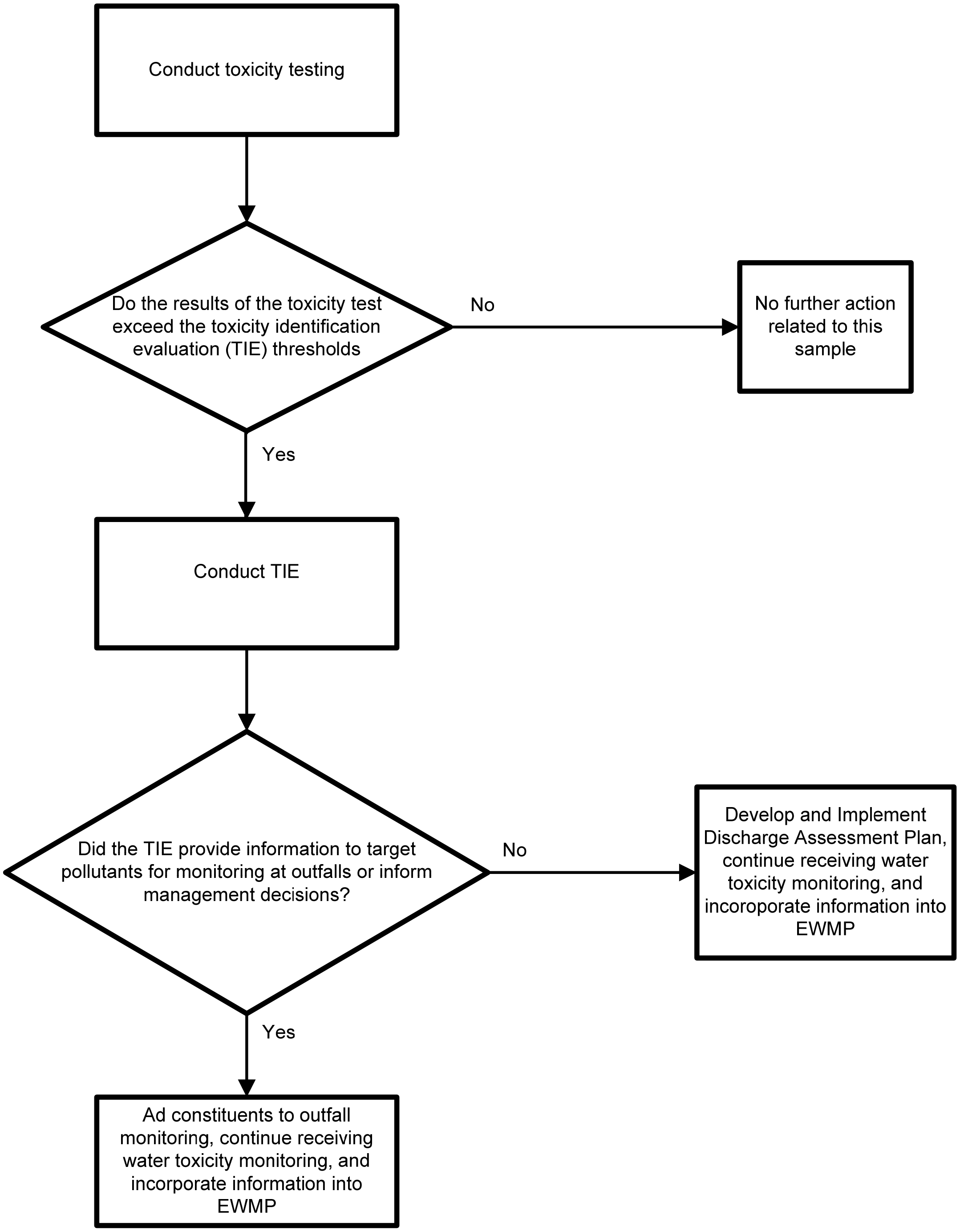


Figure H-1. Generalized Aquatic Toxicity Assessment Process

Sensitive Species Selection

The Permit Monitoring and Reporting Program (MRP) (page E-32) states that a sensitivity screening to select the most sensitive test species should be conducted unless "a sensitive test species has already been determined, or if there is prior knowledge of potential toxicant(s) and a test species is sensitive to such toxicant(s), then monitoring shall be conducted using only that test species." Previous relevant studies conducted in the watershed should be considered. Such studies may have been completed via previous MS4 sampling, wastewater NPDES sampling, or special studies conducted within the watershed. The following sub-sections discuss the species section process for assessing aquatic toxicity in receiving waters.

Freshwater Sensitive Species Selection

As described in the MRP (page E-31), if samples are collected in receiving waters with salinity less than1 part per thousand (ppt), or from outfalls discharging to receiving waters with salinity less than 1 ppt, toxicity tests should be conducted on the most sensitive test species in accordance with species and short-term test methods in *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA/821/R-02/013, 2002; Table IA, 40 CFR Part 136). The freshwater test species identified in the MRP are:

- A static renewal toxicity test with the fathead minnow, *Pimephales promelas* (Larval Survival and Growth Test Method 1000.04).
- A static renewal toxicity test with the daphnid, *Ceriodaphnia dubia* (Survival and Reproduction Test Method 1002.05).
- A static renewal toxicity test with the green alga, *Selenastrum capricornutum* (also named *Raphidocelis subcapitata*) (Growth Test Method 1003.0).

The three test species were evaluated to determine if either a sensitive test species had already been determined, or if there is prior knowledge of potential toxicant(s) and a test species is sensitive to such toxicant(s). In reviewing the available data in the Los Angeles River, Ballona Creek, and the Dominguez Channel watersheds, organophosphate pesticides, pyrethroids and/or metals have been identified as problematic and are generally considered the primary aquatic life toxicants of concern found in urban runoff. Given the knowledge of the presence of these potential toxicants in the watershed, the sensitivities of each of the three species were considered to evaluate which is the most sensitive to the potential toxicants in the watersheds.

Ceriodaphnia dubia has been reported as a sensitive test species for historical and current use pesticides and metals, and studies indicate that it is more sensitive to the toxicants of concern than *P. promelas* or *S. capricornutum*. In its aquatic life copper criteria document, the USEPA reports greater sensitivity of *C. dubia* to copper (species mean acute value of 5.93 µg/l) compared to *Pimephales promelas* (species mean acute value of 69.93 µg/l; EPA, 2007). *C. dubia*'s relatively higher sensitive to metals is common across multiple metals. Additionally, researchers at the University of California, Davis reviewed available reported species sensitivity values in developing pesticide criteria for the Central Valley Regional Water Quality Control Board. The UC Davis researchers reported higher sensitivity of *C. dubia* to diazinon and bifenthrin (species mean acute value of 0.34 µg/l and 0.105 µg/l) compared to *P. promelas* (species mean acute value of 7804 µg/l and 0.405 µg/l; Palumbo et al., 2010a,b). Additionally, a study of the City of Stockton urban stormwater runoff found acute and chronic toxicity to *C. dubia*, with no toxicity to *S. capricornutum* or *P. promelas* (Lee and Lee, 2001). The toxicity was attributed to organophosphate pesticides, indicating a higher sensitivity of *C. dubia* compared to *S. capricornutum* or *P. promelas*. While *P. promelas* is generally less sensitive to metals and pesticides, this species can be more sensitive to ammonia than *C. dubia*. However, as ammonia is not typically a constituent of concern for urban runoff and ammonia is not consistently observed above the toxic thresholds in the watershed, *P. promelas* is not considered a particularly sensitive species for evaluating the impacts of urban runoff in receiving waters in the watershed.

While *Selenastrum capricornutum* is a species sensitive to herbicides; however, while sometimes present in urban runoff, herbicides are not identified as a potential toxicant in the watershed. Additionally, *S. capricornutum* is not considered the most sensitive species as it is not sensitive to pyrethroids or organophosphate pesticides and is not as sensitive to metals as *C. dubia*. Additionally, the *S. capricornutum* growth test can be affected by high concentrations of suspended and dissolved solids, color, and pH extremes, which can interfere with the determination of sample toxicity. As a result, it is common to manipulate the sample by centrifugation and filtration to remove solids to conduct the test; however, this process may affect the toxicity of the sample. In a study of urban highway stormwater runoff (Kayhanian et. al, 2008), the green alga response to the stormwater samples was more variable than the *C. dubia* and the *P. promelas* and in some cases the alga growth was possibly enhanced due to the presence of stimulatory nutrients. Also, in a study on the City of Stockton urban stormwater runoff (Lee and Lee, 2001) the *S. capricornutum* tests rarely detected toxicity where the *C. dubia* and the *P. promelas* regularly detected toxicity.

As *C. dubia* is identified as the most sensitive to known potential toxicant(s) typically found in receiving waters and urban runoff in the freshwater potions of the watershed and has demonstrated toxicity in programs within the watershed, *C. dubia* is selected as the most sensitive species. The species also has the advantage of being easily maintained in-house mass cultures. The simplicity of the test, the ease of interpreting results, and the smaller volume necessary to run the test, make the test a valuable screening tool. The ease of sample collection and higher sensitivity will support assessing the presence of ambient receiving water toxicity or long term effects of toxic stormwater over time. As such, toxicity testing in the freshwater portions of the watershed will be conducted using *C. dubia*. However, *C. dubia* test organisms are typically cultured in moderately hard waters (80-100 mg/L $CaCO_3$) and can have increased sensitivity to elevated water hardness greater than 400 mg/L $CaCO_3$), which is beyond their typical habitat range. Because of this, in instances where hardness in site waters exceeds 400 mg/L ($CaCO_3$), an alternative test species may be used. *Daphnia magna* is more tolerant to high hardness levels and is a suitable substitution for *C. dubia* in these instances (Cowgill and Milazzo, 1990).

Testing Period

The following describes the testing periods to assess toxicity in samples collected in the watershed during dry and wet weather conditions.

Freshwater Testing Periods

As wet weather conditions in the region generally persist for less than the acute and chronic testing periods (typically 48 hours and 7 days, respectively), the shorter of the two testing methods, in the case of *C. dubia* acute testing measuring survival, will be used for wet weather toxicity testing. Utilization of chronic tests on wet weather samples generates results that are not representative of the conditions found in the receiving water intended to be simulated by toxicity testing. Acute toxicity tests are utilized to be consistent with the relatively shorter exposure periods of species in the watershed to potential toxicants introduced by urban runoff during storm events. Acute testing to assess survival endpoints will be conducted in accordance with *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA, 2002b).

Chronic toxicity tests will be used to assess both survival and reproductive/growth endpoints for *C. dubia* in dry weather samples. Chronic testing will be conducted on undiluted samples in accordance with *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (USEPA, 2002a).

Toxicity Endpoint Assessment and Toxicity Identification Evaluation Triggers

Acute and chronic toxicity test endpoints will be analyzed, per the MRP, using the Test of Significant Toxicity (TST) t-test approach specified by the USEPA (USEPA, 2010). The Permit specifies that the chronic in-stream waste concentration (IWC) is set at 100% receiving water for receiving water samples and 100% effluent for outfall samples. Using the TST approach, a t-value is calculated for a test result and compared with a critical t-value from USEPA's TST Implementation Document (USEPA, 2010). Follow-up triggers are generally based on the Permit specified statistical assessment as described below.

For acute C. dubia toxicity testing, if a statistically significant 50% difference in mortality is observed between the sample and laboratory control, a toxicity identification evaluation (TIE) will be performed. TIE procedures are discussed in detail in the following section. Experience conducting TIEs in receiving waters in the region supports using a 50% mortality trigger to provide a reasonable opportunity for a successful TIE. During TMDL monitoring in the Calleguas Creek Watershed (CCW) in 2003 and 2004, TIEs were initiated on samples exceeding the 50% threshold (the majority of which displayed 100% mortality. In that study, toxicity degraded in approximately 40% of the samples on which TIE procedures were conducted making the TIE unsuccessful (and effectively useless in pinpointing specific toxicants). The Los Angeles Regional Board approved monitoring program for the CCW Toxicity TMDL utilizes a 50% threshold for TIE initiation. Additionally, a 50% mortality threshold is utilized in the Ventura County MS4 Permit.

For chronic C. dubia toxicity testing, if a statistically significant 50% difference in mortality is observed between the sample and laboratory control, a TIE will be performed. If a statistically significant 50% difference in a sub-lethal endpoint is observed between the sample and laboratory control, a confirmatory sample will be collected from the receiving water within two weeks of obtaining the results of the initial sample. If a statistically significant 50% difference in mortality or sub-lethal endpoint is observed between the sample and laboratory control on the confirmatory sample, a TIE will be performed.

For the chronic marine and estuarine tests, the percent effect will be calculated. The percent effect is defined as the difference between the mean control response and the mean IWC response divided by the control response, multiplied by 100. A TIE will be performed if the percent effect value is equal to or greater than 50 percent.

TIE procedures will be initiated as soon as possible after the toxicity trigger threshold is observed to reduce the potential for loss of toxicity due to extended sample storage. If the cause of toxicity is readily apparent or is caused by pathogen related mortality (PRM) or epibiont interference with the test, the result will be rejected, if necessary, a modified testing procedure will be developed for future testing.

In cases where significant endpoint toxicity effects greater than 50% are observed in the original sample, but the follow-up TIE positive control "signal" is not statistically significant, the cause of toxicity will be considered non-persistent. No immediate follow-up testing is required on the sample. However, future test results should be evaluated to determine if parallel TIE treatments are necessary to provide an opportunity to identify the cause of toxicity

Toxicity Identification Evaluation Approach

The results of toxicity testing will be used to trigger further investigations to determine the cause of observed laboratory toxicity. The primary purpose of conducting TIEs is to support the identification of management actions that will result in the removal of pollutants causing toxicity in receiving waters.

Successful TIEs will direct monitoring at outfall sampling sites to inform management actions. As such, the goal of conducting TIEs is to identify pollutant(s) that should be sampled during outfall monitoring so that management actions can be identified to address the pollutant(s).

The TIE approach is divided into three phases as described in USEPA's 1991 Methods for Aquatic Toxicity Identification and briefly summarized as follows:

- Phase I utilizes methods to characterize the physical/chemical nature of the constituents which cause toxicity. Such characteristics as solubility, volatility and filterability are determined without specifically identifying the toxicants. Phase I results are intended as a first step in specifically identifying the toxicants but the data generated can also be used to develop treatment methods to remove toxicity without specific identification of the toxicants.
- Phase II utilizes methods to specifically identify toxicants.
- Phase III utilizes methods to confirm the suspected toxicants.

A Phase I TIE will be conducted on samples that exceed a TIE trigger described in Section 6.4.2. Water quality data will be reviewed to future support evaluation of potential toxicants. TIEs will perform the manipulations described in Table 19. TIE methods will generally adhere to USEPA procedures documented in conducting TIEs (USEPA, 1991, 1992, 1993a-b).

Table H-1. Toxicity Identification Evaluation sample manipulations

TIE Sample Manipulation	Expected Response
pH Adjustment (pH 7 and 8.5)	Alters toxicity in pH sensitive compounds (i.e., ammonia and some trace metals)
Filtration or centrifugation	Removes particulates and associated toxicants
Ethylenedinrilo-Tetraacetic Acid (EDTA)	Chelates trace metals, particularly divalent cationic metals
Sodium thiosulfate (STS) addition	Reduces toxicants attributable to oxidants (i.e., chlorine) and some trace metals
Piperonyl Butoxide (PBO)	Reduces toxicity from organophosphate pesticides such as diazinon, chlorpyrifos and malathion, and enhances pyrethroid toxicity
Carboxylesterase addition[1]	Hydrolyzes pyrethroids
Solid Phase Extraction (SPE) with C18 column	Removes non-polar organics (including pesticides) and some relatively non-polar metal chelates
Sequential Solvent Extraction of C18 column	Further resolution of SPE-extracted compounds for chemical analyses
No Manipulation	Baseline test for comparing the relative effectiveness of other manipulations

[1] Carboxylesterase addition has been used in recent studies to help identify pyrethroid-associated toxicity (Wheelock et al., 2004; Weston and Amweg, 2007). However, this treatment is experimental in nature and should be used along with other pyrethroid-targeted TIE treatments (e.g., PBO addition).

The Watershed Management Group will identify the cause(s) of toxicity using the treatments in Table 18 and, if possible, using the results of water column chemistry analyses. After any initial determinations of the cause of toxicity, the information may be used during future events to modify the targeted treatments to more closely target the expected toxicant or to provide additional treatments to narrow the toxicant cause(s). Moreover, if the toxicant or toxicant class is not initially identified, toxicity monitoring during subsequent events will confirm if the toxicant is persistent or a short-term episodic occurrence.

As the primary goals of conducting TIEs is to identify pollutants for incorporation into outfall monitoring, narrowing the list of toxicants following Phase I TIEs via Phase II or III TIEs is not necessary if the toxicant class determined during the Phase I TIE is sufficient for 1) identifying additional pollutants for outfall monitoring and/or 2) identifying control measures. Thus, if the specific pollutant(s) or the analytical class of pollutant (e.g., metals that are analyzed via EPA Method 200.8) are identified then sufficient information is available to inform the addition of pollutants to outfall monitoring.

Phase II TIEs may be utilized to identify specific constituents causing toxicity in a given sample if information beyond what is gained via the Phase I TIE and review of chemistry data provide is needed to identify constituents to monitor or management actions. Phase III TIEs will be conducted following any Phase II TIEs.

For the purposes of determining whether a TIE is inconclusive, TIEs will be considered inconclusive if:

- The toxicity is persistent (i.e., observed in the positive control), and
- The cause of toxicity cannot be attributed to a class of constituents (e.g., insecticides, metals, etc.) that can be targeted for monitoring.

If a combination of causes that act in a synergistic or additive manner are identified or if the toxicity can be removed with a treatment or via a combination of the TIE treatments or the analysis of water quality data collected during the same event identify the pollutant or analytical class of pollutants, the result of a TIE is considered conclusive.

Note that the MRP (page E-33) allows a TIE Prioritization Metric (as described in Appendix E of the Stormwater Monitoring Coalition's Model Monitoring Program) for use in ranking sites for TIEs. However, as the extent to which TIEs will be conducted is unknown, prioritization cannot be conducted at this time. However, prioritization may be utilized in the future based on the results of toxicity monitoring and an approach to prioritization will be developed through the CIMP adaptive management process and will be described in future versions of the CIMP.

Discharge Assessment

The Watershed Management Group will prepare a Discharge Assessment Plan if TIEs conducted on consecutive sampling events are inconclusive. The discharge assessment will be conducted after consecutive inconclusive TIEs, rather than after one, because of the inherit variability associated with the toxicity and TIE testing methods.

The Discharge Assessment Plan will consider the observed potential toxicants in the receiving water and associated urban runoff discharge above known species effect levels and the relevant exposure periods compared to the duration of the observed toxicity. The Discharge Assessment Plan will identify:

- If desired, additional receiving water toxicity monitoring to be conducted to further evaluate the spatial extent of receiving water toxicity.
- The test species to be utilized. If a species is proposed that is different than the species utilized when receiving water toxicity was observed, justification for the substitution will be provided.
- The number and location of monitoring sites and their spatial relation to the observed receiving water toxicity.
- The number of monitoring events that will be conducted, a schedule for conducting the monitoring, and a process for evaluating the completion of the assessment monitoring.

The Discharge Assessment Plan will be submitted to Los Angeles Regional Board staff for comment within 60 days of receipt of notification of the second consecutive inconclusive result. If no comments are received within 30-days, it will be assumed that the approach is appropriate for the given situation and the Plan should be implemented within 90-days of submittal.

Follow Up on Toxicity Testing Results

The MRP (page E-33) indicates the following actions should be taken when a toxicant or class of toxicants is identified through a TIE:

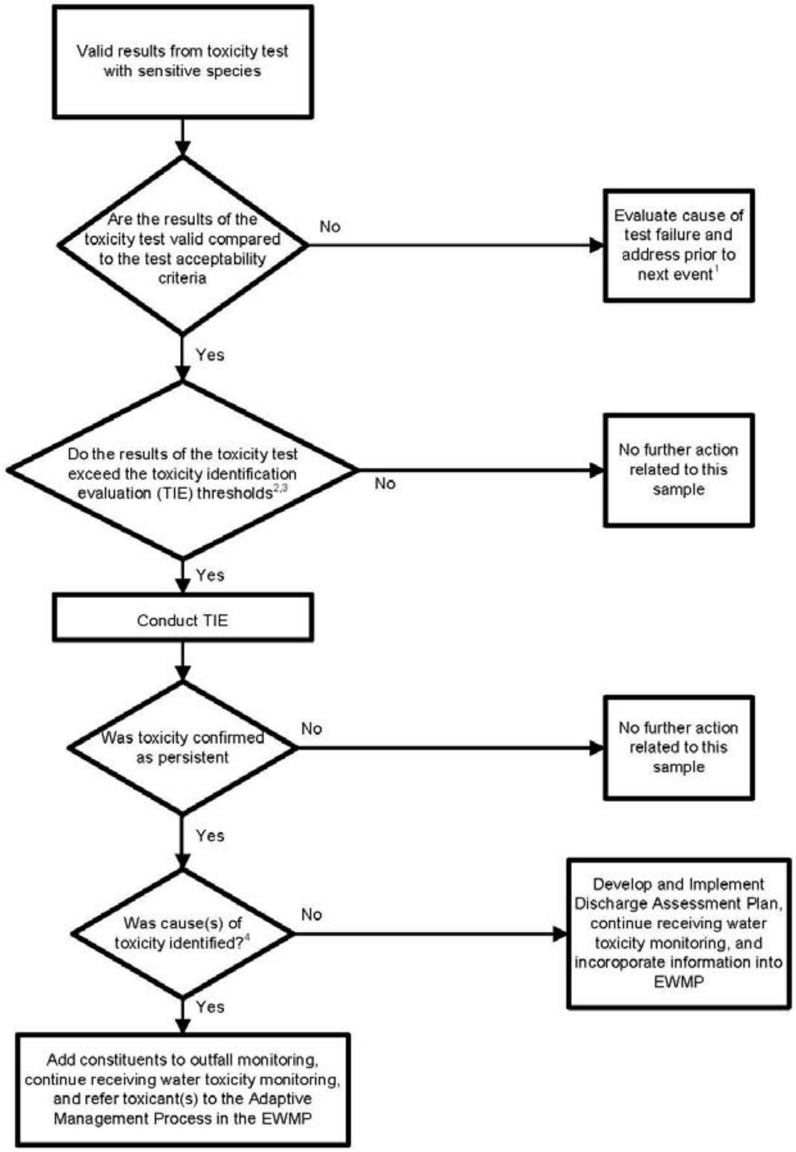
1. Group Members shall analyze for the toxicant(s) during the next scheduled sampling event in the discharge from the outfall(s) upstream of the receiving water location.
2. If the toxicant is present in the discharge from the outfall at levels above the applicable receiving water limitation, a toxicity reduction evaluation (TRE) will be performed for that toxicant.

The list of constituents monitored at outfalls identified in the CIMP will be modified based on the results of the TIEs. Monitoring for those constituents will occur as soon as feasible following the completion of a successful TIE (i.e., the next monitoring event that is at least 45 days following the toxicity laboratory's report transmitting the results of a successful TIE).

The requirements of the TREs will be met as part of the adaptive management process in the EWMPs rather than conducted via the CIMP. The identification and implementation of control measures to address the causes of toxicity are tied to management of the stormwater program, not the CIMP. It is expected that the requirements of TREs will only be conducted for toxicants that are not already addressed by an existing Permit requirement (i.e., TMDLs) or existing or planned management actions.

Summary of Aquatic Toxicity Monitoring

The approach to conducting aquatic toxicity monitoring as described in the previous sections is summarized in detail in Figure H-2. The intent of the approach is to identify the cause of toxicity observed in receiving water to the extent possible with the toxicity testing tools available, thereby directing outfall monitoring for the pollutants causing toxicity with the ultimate goal of supporting the development and implementation of management actions.



Footnotes

1. Test failure includes pathogen or epibiont interference, which should be addressed prior to the next toxicity sampling event.
2. For freshwater, the TIE threshold is >50% mortality in an acute (wet weather) or chronic (dry weather) sample. If a >50% effect in a sub-lethal endpoint for chronic test is observed, a follow up sample will be collected within two weeks of the completion of the initial sample collection. If the follow up sample exhibits a greater than 50% effect, a TIE will be initiated.
3. For marine and estuarine waters, the TIE threshold is a percent effect value of equal to or greater than 50 percent. Follow up samples will be collected within two weeks of the completion of the initial sample collection and a TIE initiated.
4. The goal of conducting the Phase I TIE is to identify the cause of toxicity so that outfall monitoring can incorporate the toxicant(s) into the list of constituents monitored during outfall monitoring. Thus if the specific toxicant(s) or the analytical class of toxicants (i.e., metals that are analyzed via EPA Method 200.8) are identified sufficient information is available to inform the addition of pollutants to the list of pollutants monitored during outfall monitoring.

Figure H-2. Detailed Aquatic Toxicity Assessment Process

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Appendix I – Stormwater Monitoring Program Constituents with Associated Minimum Levels

(From Table E-2 in Attachment E of the MS4 Permit)

Constituents	Type	MLs[14]	Units
Oil and Grease	Conventional Pollutants	5	mg/L
Total Phenols	Conventional Pollutants	0.1	mg/L
Cyanide	Conventional Pollutants	0.005	mg/L
pH	Conventional Pollutants	0 – 14	mg/L
Temperature	Conventional Pollutants	N/A	mg/L
Dissolved Oxygen	Conventional Pollutants	Sensitivity to 5 mg/L	mg/L
Total coliform (marine waters)	Bacteria (single sample limits)	10,000	MPN/100ml
Enterococcus (marine waters)	Bacteria (single sample limits)	104	MPN/100ml
Fecal coliform (marine & fresh waters)	Bacteria (single sample limits)	400	MPN/100ml
E. coli (fresh waters)	Bacteria (single sample limits)	235	MPN/100ml
Dissolved Phosphorus	General	0.05	mg/L
Total Phosphorus	General	0.05	mg/L
Turbidity	General	0.1 NTU	mg/L
Total Suspended Solids	General	2	mg/L
Total Dissolved Solids	General	2	mg/L
Volatile Suspended Solids	General	2	mg/L
Total Organic Carbon	General	1	mg/L
Total Petroleum Hydrocarbon	General	5	mg/L
Biochemical Oxygen Demand	General	2	mg/L
Chemical Oxygen Demand	General	20-900	mg/L
Total Ammonia-Nitrogen	General	0.1	mg/L
Total Kjeldahl Nitrogen	General	0.1	mg/L
Nitrate-Nitrite	General	0.1	mg/L
Alkalinity	General	2	mg/L
Specific Conductance	General	1 ohm/cm	mg/L
Total Hardness	General	2	mg/L
MBAS	General	0.5	mg/L
Chloride	General	2	mg/L
Fluoride	General	0.1	mg/L
Methyl tertiary butyl ether (MTBE)	General	1	mg/L
Perchlorate	General	4 µg/L	mg/L
Aluminum	Metals (Dissolved & Total)	100	µg/L
Antimony	Metals (Dissolved & Total)	0.5	µg/L
Arsenic	Metals (Dissolved & Total)	1	µg/L
Beryllium	Metals (Dissolved & Total)	0.5	µg/L
Cadmium	Metals (Dissolved & Total)	0.25	µg/L
Chromium (total)	Metals (Dissolved & Total)	0.5	µg/L
Chromium (Hexavalent)	Metals (Dissolved & Total)	5	µg/L
Copper	Metals (Dissolved & Total)	0.5	µg/L
Iron	Metals (Dissolved & Total)	100	µg/L
Lead	Metals (Dissolved & Total)	0.5	µg/L
Mercury	Metals (Dissolved & Total)	0.5	µg/L
Nickel	Metals (Dissolved & Total)	1	µg/L
Selenium	Metals (Dissolved & Total)	1	µg/L

[14] MLs are established at the lowest applicable water quality objective or method detection limit by the permit. If monitoring at a site detects levels above the ML, the parameter shall be analyzed at that site for the remainder of the effective period of the permit.

Constituents	Type	MLs[14]	Units
Silver	Metals (Dissolved & Total)	0.25	µg/L
Thallium	Metals (Dissolved & Total)	1	µg/L
Zinc	Metals (Dissolved & Total)	1	µg/L
2-Chlorophenol	Semivolatile Organic Compounds (Acids)	2	µg/L
4-Chloro-3-methylphenol	Semivolatile Organic Compounds (Acids)	1	µg/L
2,4-Dichlorophenol	Semivolatile Organic Compounds (Acids)	1	µg/L
2,4-Dimethylphenol	Semivolatile Organic Compounds (Acids)	2	µg/L
2,4-Dinitrophenol	Semivolatile Organic Compounds (Acids)	5	µg/L
2-Nitrophenol	Semivolatile Organic Compounds (Acids)	10	µg/L
4-Nitrophenol	Semivolatile Organic Compounds (Acids)	5	µg/L
Pentachlorophenol	Semivolatile Organic Compounds (Acids)	2	µg/L
Phenol	Semivolatile Organic Compounds (Acids)	1	µg/L
2,4,6-Trichlorophenol	Semivolatile Organic Compounds (Acids)	10	µg/L
Acenaphthene	Semivolatile Organic Compounds (Base/ Neutral)	1	µg/L
Acenaphthylene	Semivolatile Organic Compounds (Base/ Neutral)	2	µg/L
Anthracene	Semivolatile Organic Compounds (Base/ Neutral)	2	µg/L
Benzidine	Semivolatile Organic Compounds (Base/ Neutral)	5	µg/L
1,2 Benzanthracene	Semivolatile Organic Compounds (Base/ Neutral)	5	µg/L
Benzo(a)pyrene	Semivolatile Organic Compounds (Base/ Neutral)	2	µg/L
Benzo(g,h,i)perylene	Semivolatile Organic Compounds (Base/ Neutral)	5	µg/L
3,4 Benzoflouranthene	Semivolatile Organic Compounds (Base/ Neutral)	10	µg/L
Benzo(k)flouranthene	Semivolatile Organic Compounds (Base/ Neutral)	2	µg/L
Bis(2-Chloroethoxy) methane	Semivolatile Organic Compounds (Base/ Neutral)	5	µg/L
Bis(2-Chloroisopropyl) ether	Semivolatile Organic Compounds (Base/ Neutral)	2	µg/L
Bis(2-Chloroethyl) ether	Semivolatile Organic Compounds (Base/ Neutral)	1	µg/L
Bis(2-Ethylhexl) phthalate	Semivolatile Organic Compounds (Base/ Neutral)	5	µg/L
4-Bromophenyl phenyl ether	Semivolatile Organic Compounds (Base/ Neutral)	5	µg/L
Butyl benzyl phthalate	Semivolatile Organic Compounds (Base/ Neutral)	10	µg/L
2-Chloroethyl vinyl ether	Semivolatile Organic Compounds (Base/ Neutral)	1	µg/L
2-Chloronaphthalene	Semivolatile Organic Compounds (Base/ Neutral)	10	µg/L
4-Chlorophenyl phenyl ether	Semivolatile Organic Compounds (Base/ Neutral)	5	µg/L

Constituents	Type	MLs[14]	Units
Chrysene	Semivolatile Organic Compounds (Base/ Neutral)	5	µg/L
Dibenzo(a,h)anthracene	Semivolatile Organic Compounds (Base/ Neutral)	0.1	µg/L
1,3-Dichlorobenzene	Semivolatile Organic Compounds (Base/ Neutral)	1	µg/L
1,4-Dichlorobenzene	Semivolatile Organic Compounds (Base/ Neutral)	1	µg/L
1,2-Dichlorobenzene	Semivolatile Organic Compounds (Base/ Neutral)	1	µg/L
3,3-Dichlorobenzidine	Semivolatile Organic Compounds (Base/ Neutral)	5	µg/L
Diethyl phthalate	Semivolatile Organic Compounds (Base/ Neutral)	2	µg/L
Dimethyl phthalate	Semivolatile Organic Compounds (Base/ Neutral)	2	µg/L
di-n-Butyl phthalate	Semivolatile Organic Compounds (Base/ Neutral)	10	µg/L
2,4-Dinitrotoluene	Semivolatile Organic Compounds (Base/ Neutral)	5	µg/L
2,6-Dinitrotoluene	Semivolatile Organic Compounds (Base/ Neutral)	5	µg/L
4,6 Dinitro-2-methylphenol	Semivolatile Organic Compounds (Base/ Neutral)	5	µg/L
1,2-Diphenylhydrazine	Semivolatile Organic Compounds (Base/ Neutral)	1	µg/L
di-n-Octyl phthalate	Semivolatile Organic Compounds (Base/ Neutral)	10	µg/L
Fluoranthene	Semivolatile Organic Compounds (Base/ Neutral)	0.05	µg/L
Fluorene	Semivolatile Organic Compounds (Base/ Neutral)	0.1	µg/L
Hexachlorobenzene	Semivolatile Organic Compounds (Base/ Neutral)	1	µg/L
Hexachlorobutadiene	Semivolatile Organic Compounds (Base/ Neutral)	1	µg/L
Hexachloro-cyclopentadiene	Semivolatile Organic Compounds (Base/ Neutral)	5	µg/L
Hexachloroethane	Semivolatile Organic Compounds (Base/ Neutral)	1	µg/L
Indeno(1,2,3-cd)pyrene	Semivolatile Organic Compounds (Base/ Neutral)	0.05	µg/L
Isophorone	Semivolatile Organic Compounds (Base/ Neutral)	1	µg/L
Naphthalene	Semivolatile Organic Compounds (Base/ Neutral)	0.2	µg/L
Nitrobenzene	Semivolatile Organic Compounds (Base/ Neutral)	1	µg/L
N-Nitroso-dimethyl amine	Semivolatile Organic Compounds (Base/ Neutral)	5	µg/L
N-Nitroso-diphenyl amine	Semivolatile Organic Compounds (Base/ Neutral)	1	µg/L
N-Nitroso-di-n-propyl amine	Semivolatile Organic Compounds (Base/ Neutral)	5	µg/L
Phenanthrene	Semivolatile Organic Compounds (Base/ Neutral)	0.05	µg/L
Pyrene	Semivolatile Organic Compounds (Base/ Neutral)	0.05	µg/L
1,2,4-Trichlorobenzene	Semivolatile Organic Compounds (Base/ Neutral)	1	µg/L

Constituents	Type	MLs[14]	Units
Aldrin	Chlorinated Pesticides	0.005	µg/L
alpha-BHC	Chlorinated Pesticides	0.01	µg/L
beta-BHC	Chlorinated Pesticides	0.005	µg/L
delta-BHC	Chlorinated Pesticides	0.005	µg/L
gamma-BHC (lindane)	Chlorinated Pesticides	0.02	µg/L
alpha-chlordane	Chlorinated Pesticides	0.1	µg/L
gamma-chlordane	Chlorinated Pesticides	0.1	µg/L
4,4'-DDD	Chlorinated Pesticides	0.05	µg/L
4,4'-DDE	Chlorinated Pesticides	0.05	µg/L
4,4'-DDT	Chlorinated Pesticides	0.01	µg/L
Dieldrin	Chlorinated Pesticides	0.01	µg/L
alpha-Endosulfan	Chlorinated Pesticides	0.02	µg/L
beta-Endosulfan	Chlorinated Pesticides	0.01	µg/L
Endosulfan sulfate	Chlorinated Pesticides	0.05	µg/L
Endrin	Chlorinated Pesticides	0.01	µg/L
Endrin aldehyde	Chlorinated Pesticides	0.01	µg/L
Heptachlor	Chlorinated Pesticides	0.01	µg/L
Heptachlor Epoxide	Chlorinated Pesticides	0.01	µg/L
Toxaphene	Chlorinated Pesticides	0.5	µg/L
Aroclor-1016	PolyChlorinated Biphenyls	0.5	µg/L
Aroclor-1221	PolyChlorinated Biphenyls	0.5	µg/L
Aroclor-1232	PolyChlorinated Biphenyls	0.5	µg/L
Aroclor-1242	PolyChlorinated Biphenyls	0.5	µg/L
Aroclor-1248	PolyChlorinated Biphenyls	0.5	µg/L
Aroclor-1254	PolyChlorinated Biphenyls	0.5	µg/L
Aroclor-1260	PolyChlorinated Biphenyls	0.5	µg/L
Atrazine	Organophosphate Pesticides	2	µg/L
Chlorpyrifos	Organophosphate Pesticides	0.05	µg/L
Cyanazine	Organophosphate Pesticides	2	µg/L
Diazinon	Organophosphate Pesticides	0.01	µg/L
Malathion	Organophosphate Pesticides	1	µg/L
Prometryn	Organophosphate Pesticides	2	µg/L
Simazine	Organophosphate Pesticides	2	µg/L
2,4-D	Herbicides	10	µg/L
Glyphosate	Herbicides	5	µg/L
2,4,5-TP-SILVEX	Herbicides	0.5	µg/L

The list of analytes was streamlined by incorporating analytes as allowed by the MS4 Permit and removing pollutants with associated MLs that have been monitored within the Malibu Creek Watershed but have not been historically detected.

Appendix J – Storm Drain Channel and Outfall Map

(From Section 7 in Attachment E of the MS4 Permit)

The following maps provide the information to comply with Section VII – Outfall Based Monitoring of Appendix E of the MS4 Permit.

Figure J-1. CIMP Overall Map

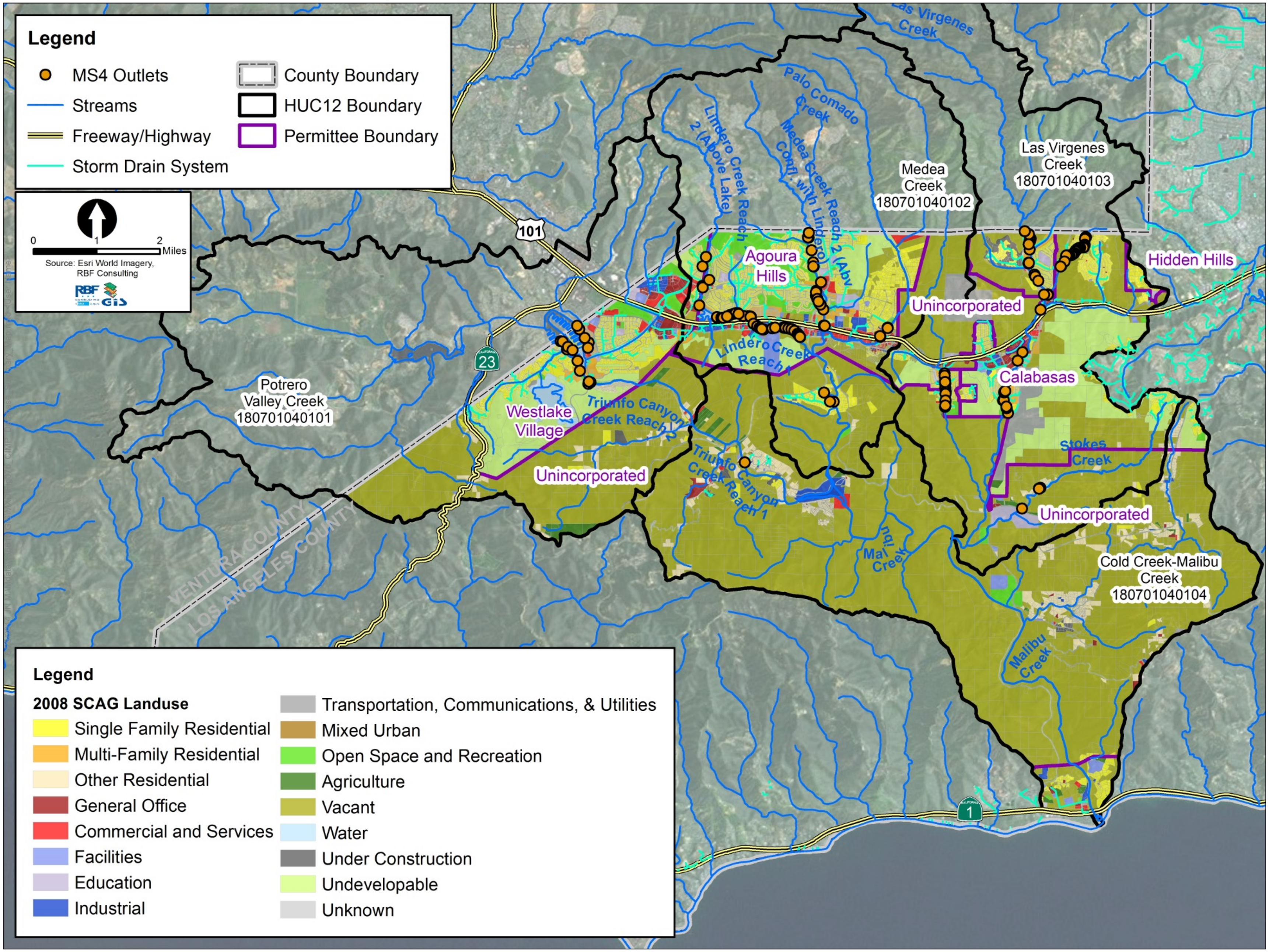


Figure J-2. Cold Creek

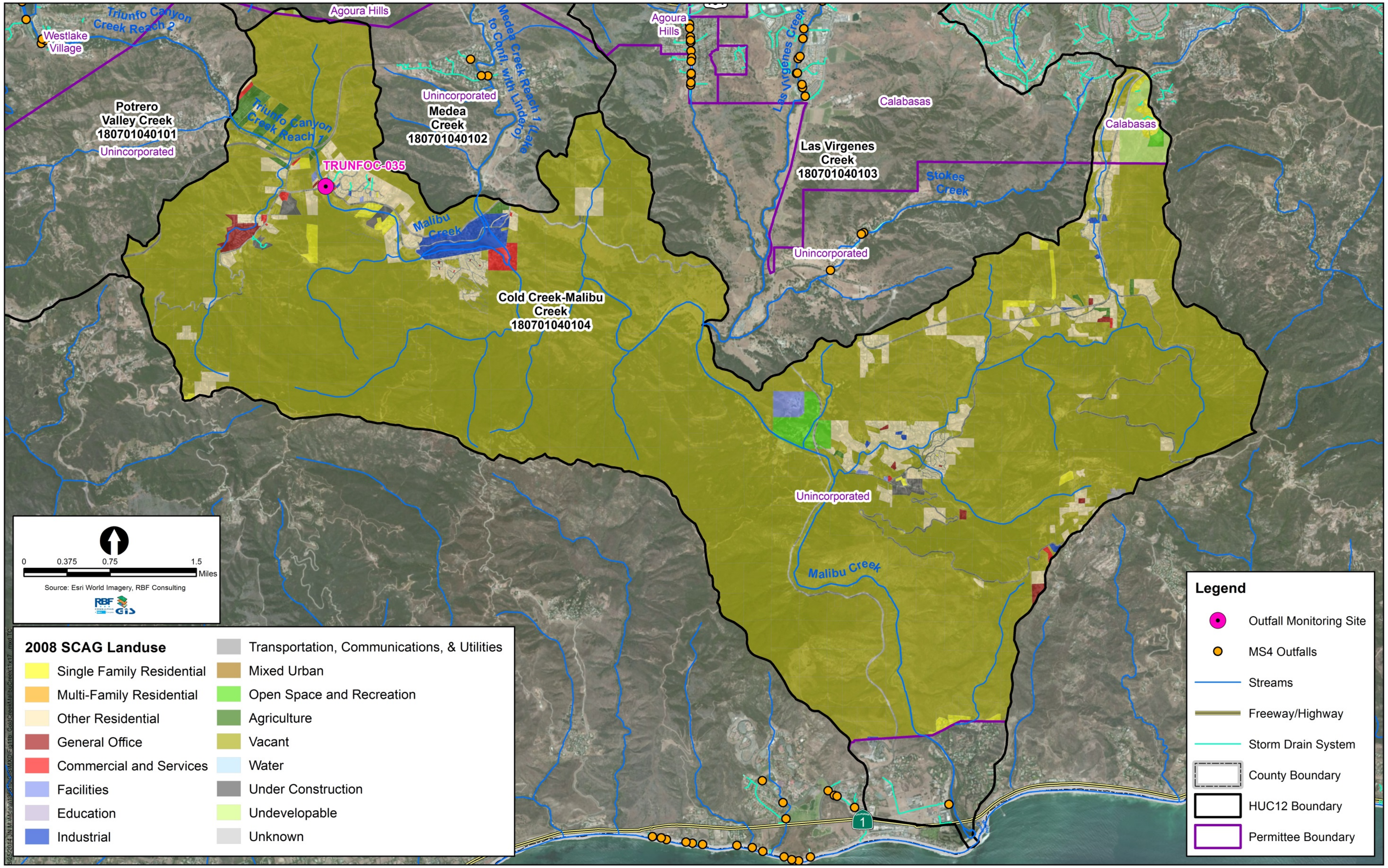


Figure J-3. Las Virgenes

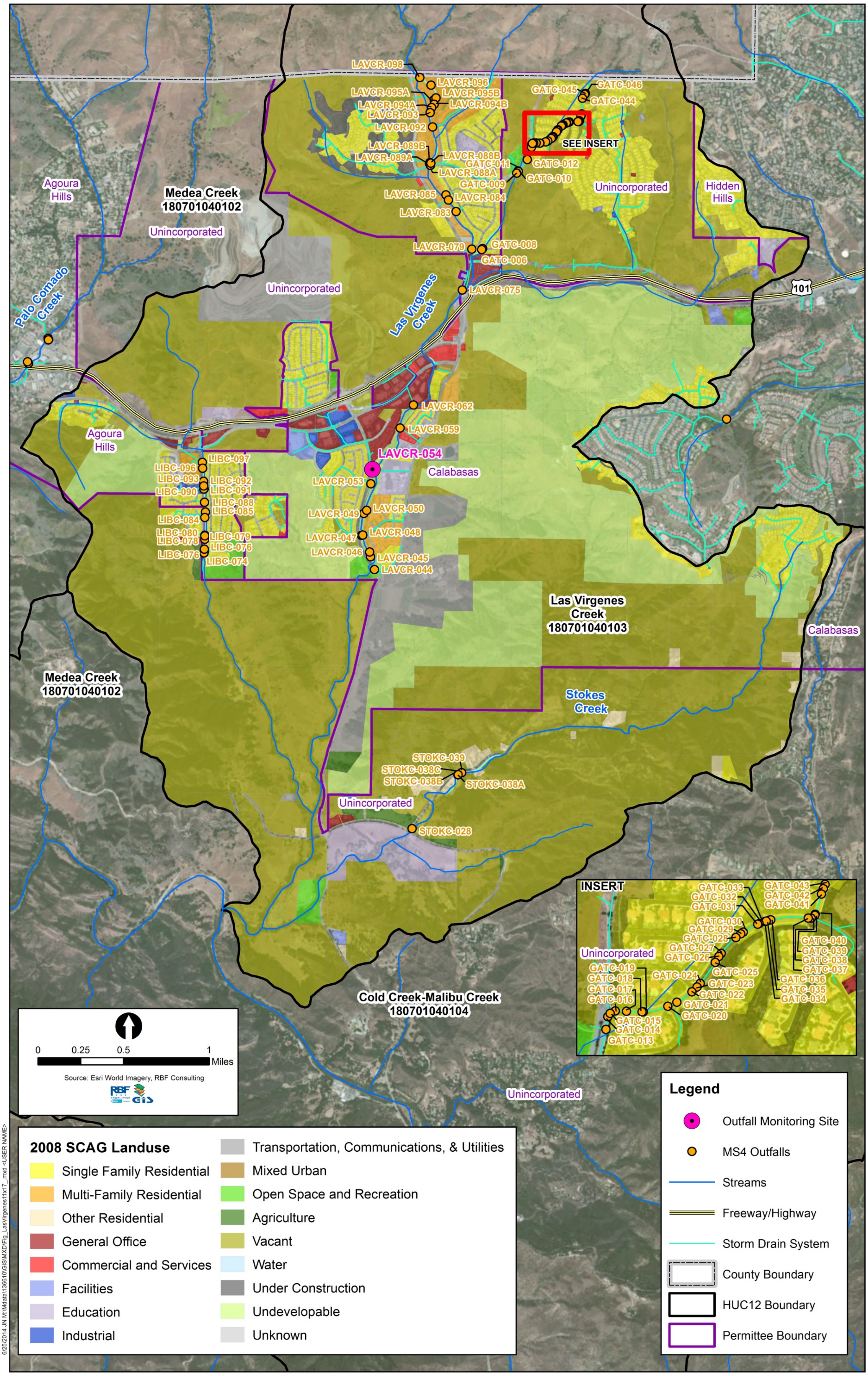


Figure J-4. Madea Creek

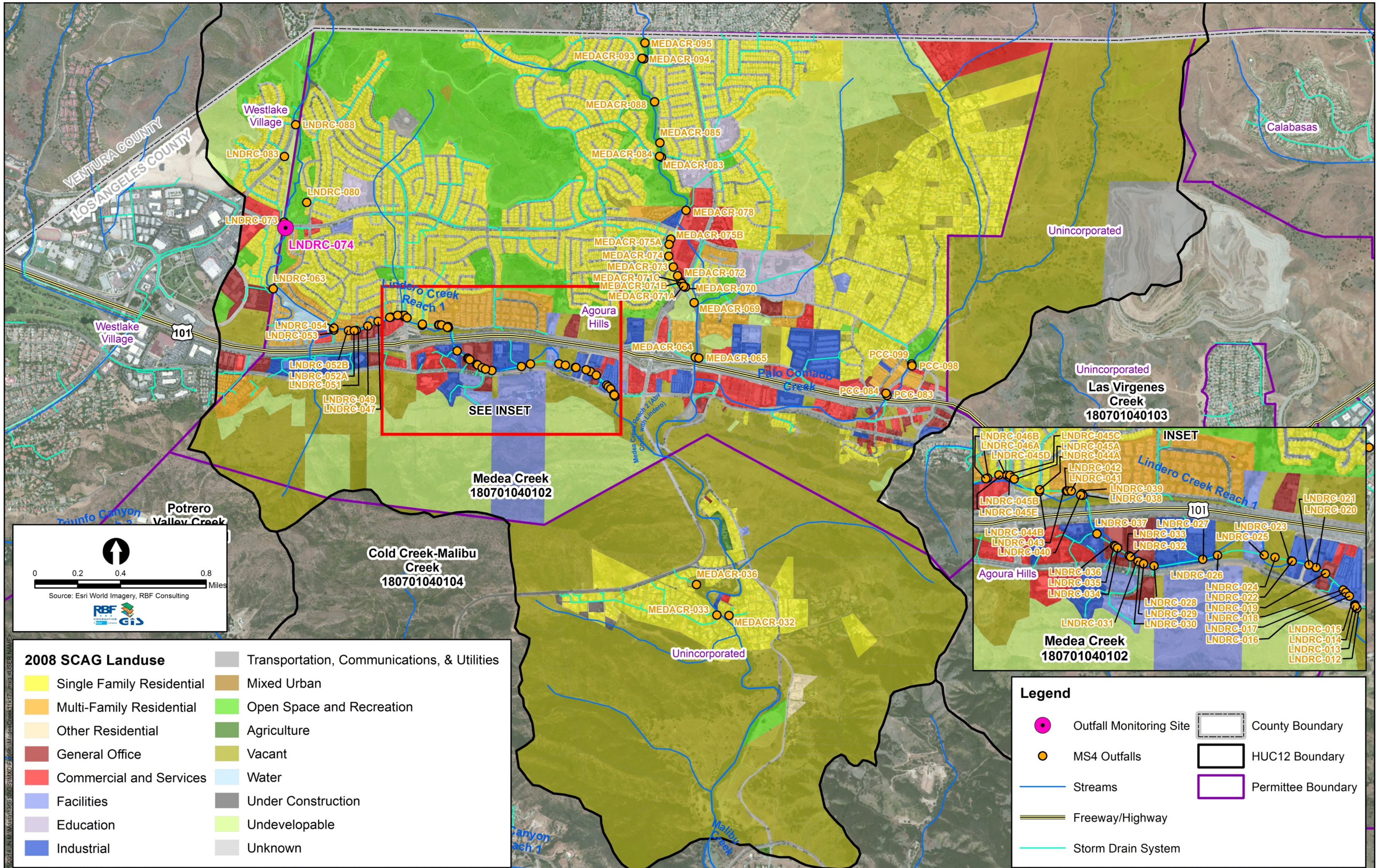
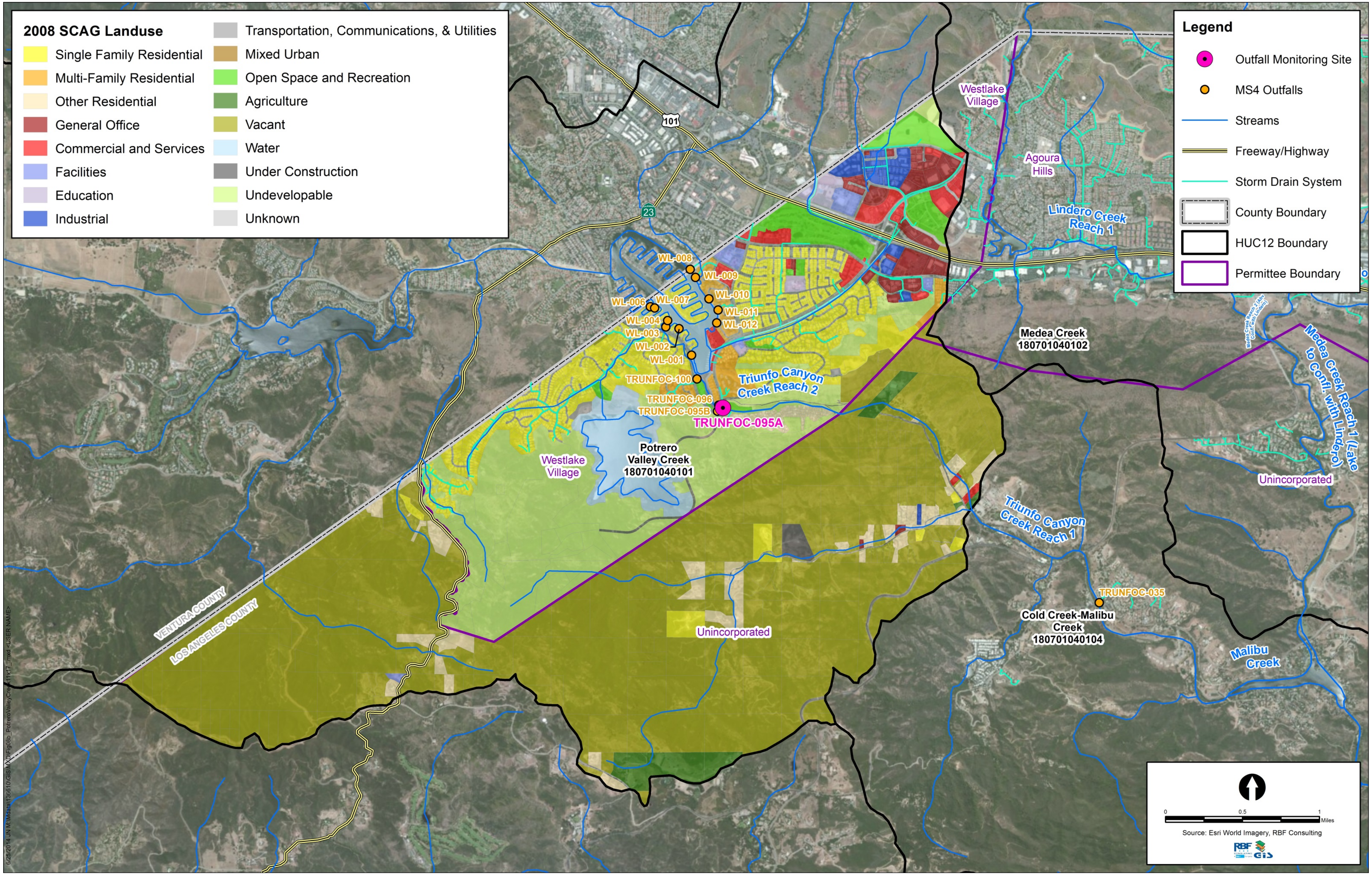


Figure J-5. Potrero Valley Creek



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