Enhanced Watershed Management Program for Malibu Creek Watershed

Submitted by:

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FINAL REPORT

April 27, 2016

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Executive Summary

The Malibu Creek Watershed Enhanced Watershed Management Program Group which includes the Cities of Agoura Hills, Calabasas, Hidden Hills, and Westlake Village; the County of Los Angeles, and the Los Angeles County Flood Control District, collaboratively developed an Enhanced Watershed Management Program (EWMP) to comply with requirements of the Los Angeles County Municipal Separate Storm Sewer System (MS4) Permit Order No. R4-2012-0175.

The Malibu Creek Watershed (MCW) covers 109 square miles at the northwestern end of Los Angeles County and the southern end of Ventura County. Nearly 80 percent of the watershed is open space with a suburban corridor along Route 101. The MCW poses unique challenges due to the topography of the land with steep ravines and densely vegetated riparian corridors. The MCW has a variety of different receiving waters, including creeks, lakes, and a lagoon, with some of the lakes resulting from construction of dams in the watershed. Additionally, a geologic formation known as the Monterey/Modelo formation presents significant natural sources of water quality impairments.

The primary objective of the EWMP is to implement control measures to achieve water quality objectives and protect water body beneficial uses. Along with the development of these controls it also seeks to provide flood protection, recreational benefits, water supply, and enhanced aesthetics. The EWMP was developed through a stakeholder process involving collaboration between the MCW EWMP Group, other watershed stakeholders regulated under other NPDES requirements, the Los Angeles Regional Water Quality Control Board, the U.S. Environmental Protection Agency (USEPA), environmental and community organizations, and the public. Stakeholder outreach was performed at multiple stages of EWMP development, which provided an opportunity for the public, as well as environmental and community groups (nongovernmental organizations), to provide input.

In developing the EWMP the existing water quality conditions in the MCW were evaluated, which included a characterization of stormwater and non-stormwater discharges from the MS4 and a characterization of receiving waters through an evaluation of water quality monitoring data. The Total Maximum Daily Loads (TMDLs) and the State's Clean Water Act Section 303(d) list were evaluated, and a review of water quality data was performed to identify exceedances of receiving water limitations not included in the 303(d) list. Using the evaluation of water quality conditions, water quality priorities were identified for the MCW, these priorities formed the basis for selection and prioritization of watershed control measures for the MCW. The MCW EWMP water quality prioritization process is consistent with the criteria prescribed by the MS4 Permit.

As part of the development of the EWMP, the MCW EWMP Group identified a suite of best management practices (BMPs) and implementation measures for the watershed to achieve compliance with water quality objectives. These BMPs and implementation measures are referred to in the MS4 Permit as watershed control measures. The watershed control measures identified for the MCW are discussed in Section 5. These include existing controls already implemented in the watershed and additional watershed control measures necessary to achieve water quality objectives. The additional watershed control measures include institutional and source controls, regional structural BMPs, and distributed BMPs.

A Reasonable Assurance Analysis (RAA) has been performed that demonstrates that the selected watershed control measures will result in compliance with the water quality objectives in the MCW. Section 6 of the EWMP describes the RAA, which uses the Watershed Management Modeling System (WMMS) to model water quality in the MCW and guide the selection of watershed control measures. The model evaluates the cost effectiveness of thousands of combinations of watershed control measures to provide guidance on the best approach to achieving water quality objectives.

The control measures selected for inclusion in the EWMP Implementation Plan are described in Section 5. The implementation plan identifies the elements and timeframe to achieve compliance in the MCW. It includes an implementation schedule as well as the stormwater and non-stormwater control measures to be implemented by each jurisdiction in the MCW.

The costs associated with the implementation plan are discussed in Section 8. Planning-level construction capital costs, and operations and maintenance costs for each of the structural BMPs were calculated. The costs for the distributed BMPs, in the form of green street projects, and the private regional BMP has been estimated using the cost equations applied from RAA Model. A financial strategy is also included in Section 8 that includes existing funding sources, potential funding sources, and a strategy for pursuing needed funding.

An adaptive management strategy is discussed in Section 9 that describes how the EWMP will be modified in an iterative and adaptive process in response to monitoring data, changes in regulations, and updated modeling results in order to achieve the desired water quality objectives in the watershed. While the adaptive management process will be performed on an annual basis to take into consideration new monitoring information, the EWMP and modeling will be fully updated during the ROWD development for the next Permit term (in the 2020 timeframe). At that time, the remaining regional BMPs and green streets identified in the EWMP will be re-evaluated and the remaining milestones reconsidered. Should the monitoring demonstrate that milestones are being achieved more quickly than anticipated; some implementation projects identified in the EWMP may not need to be implemented.

1 Background and Objectives of the EWMP

1.1 Introduction

The National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit Order No. R4-2012-0175 (MS4 Permit) establishes the waste discharge requirements for stormwater and non-stormwater discharges within the watersheds of Los Angeles County. The MS4 Permit was adopted by the Los Angeles Regional Water Quality Control Board (LARWQCB) on November 8, 2012, and it became effective on December 28, 2012. The MS4 Permit includes provisions that allow Permittees the flexibility to customize their stormwater programs to achieve compliance with receiving water limitations (RWLs) and water quality based effluent limits (WQBELs). To address the requirements of the MS4 Permit, the Permittees within the Malibu Creek Watershed (MCW) have chosen to implement an Enhanced Watershed Management Program (EWMP). The MCW EWMP Group consists of the Cities of Agoura Hills, Calabasas, Hidden Hills, and Westlake Village; the County of Los Angeles; and the Los Angeles County Flood Control District (LACFCD).

1.2 Background and EWMP Area Description

Malibu Creek Watershed covers 70,651 acres at the northwestern end of Los Angeles County and the southern end of Ventura County. It is the largest watershed to drain into Santa Monica Bay. Much of the MCW is open space under jurisdiction of the National and State Parks. Geographically, the EWMP addresses 32,992 acres. Table 1 provides a breakdown of the entire MCW land area by jurisdiction, and Table 2 provides a breakdown of the land area for the MCW EWMP Group. Approximately 27.2% of the watershed is unincorporated Los Angeles County and approximately 62% of the unincorporated land is under the jurisdiction of Federal and State Parks. The dominant land use in MCW is 80% vacant. Other land uses include 3% agricultural and recreational, 13% developed land uses of high and low density residential, 1% commercial and 1% industrial. The land uses in the MCW EWMP area are displayed in Figure 1.

Water bodies within MCW EWMP area include the following: Lindero Creek, Lake Lindero, Medea Creek, Palo Comado Creek, Cheseboro Creek, Las Virgenes Creek, Westlake Lake, Triunfo Creek, Stokes Creek, Malibou Lake, Malibu Creek, and Cold Creek. Historically, there is little flow during the summer months in the creeks in the MCW. Much of the natural flow that occurs during the summer in the upper tributaries originates from springs and groundwater seepage areas[1]. The subwatersheds and receiving waters in the MCW are shown in Figure 2.

Table 1: Land Area by Jurisdiction in the Malibu Creek Watershed

Watershed Agencies	EWMP Participation	Land Area (Acres)	Percentage of Land Area
Caltrans	No	342	0.48%
City of Agoura Hills	Yes	5,178	7.33%

[1] A report entitled "Water Quality in the Malibu Creek Watershed" developed by the Las Virgenes Municipal Water District and submitted to the Los Angeles Regional Water Quality Control Board on March 30, 2011 has concluded "dry-weather native flows in Malibu Creek from about mid-May through October are derived almost entirely from groundwater drainage and seepage."

City of Calabasas	Yes	4,941	6.99%
City of Hidden Hills	Yes	105	0.15%
City of Malibu	No	536	0.76%
City of Simi Valley	No	123	0.17%
City of Thousand Oaks	No	6,292	8.91%
City of Westlake Village	Yes	3,540	5.01%
County of Los Angeles	Yes	19,228	27.22%
County of Ventura	No	15,360	21.74%
Los Angeles County Flood Control District	Yes	N/A	N/A
National Park Service	No	6,881	9.74%
Santa Monica Mountains Conservancy	No	477	0.68%
State Parks	No	7,648	10.83%
Total Land Area (Acres)		**70,651**	**100%**

Table 2: MCW EWMP Group Land Area by Jurisdiction

EWMP Participating Agencies	Land Area (Acres)	Percentage of Land Area
City of Agoura Hills	5,178	15.70%
City of Calabasas	4,941	15.00%
City of Hidden Hills	105	0.30%
City of Westlake Village	3,540	10.70%
County of Los Angeles	19,228	58.30%
Los Angeles County Flood Control District	N/A	N/A
Total Land Area (Acres)	**32,992**	**100%**

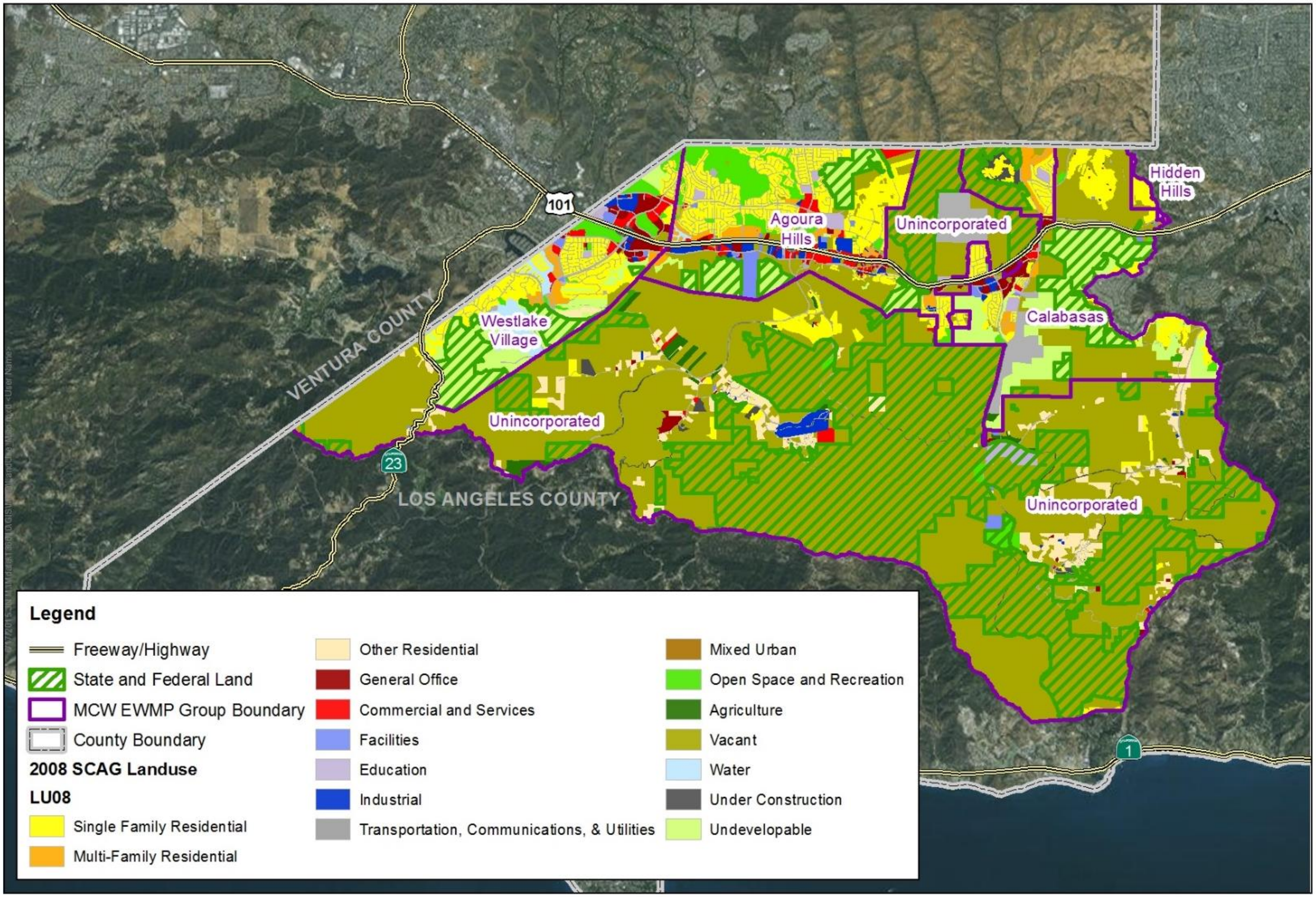

Figure 1: MCW Land Use Map

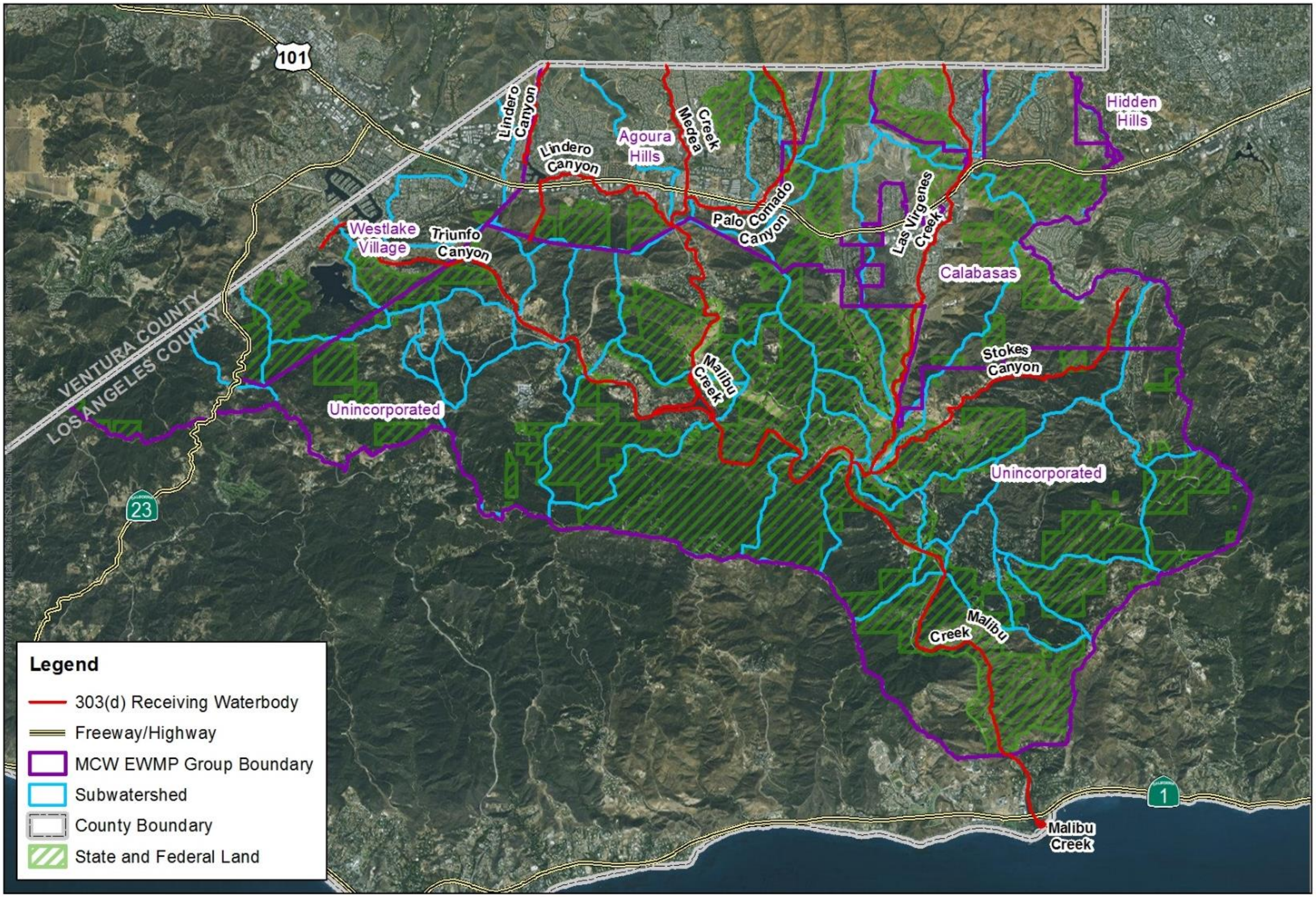

Figure 2: Malibu Creek Subwatersheds and Receiving Water Map

The western portion of the watershed drains the areas around Westlake and Triunfo Creek which are largely undeveloped. Most of the City of Westlake Village developed area consists of residential and commercial/industrial land use which is proximate to the lake. Nearly all the runoff from this watershed area is conveyed to Triunfo Creek and ultimately to Malibou Lake.

The eastern portion of the watershed consists of Hidden Hills, Calabasas, Los Angeles County and Ventura County. Las Virgenes Creek and Stokes Creek drain in a southeastern fashion prior to the confluence with Malibu Creek. Land use is mostly open space land in the upstream portion as well as the downstream portion. However, in the middle of the HUC-12 boundary lies Highway 101 where most of the developed land is located.

The northern portion of the watershed consists of Agoura Hills, Los Angeles County, and Ventura County. A large portion of Ventura County, upstream of Medea Creek, is developed, thus increasing the potential for runoff and pollutants. Drainage within this area consists of Medea Creek, Lindero Creek and Palo Comado Creek, which eventually confluences into Medea Creek. Land north of Highway 101 is mostly developed consisting of residential and commercial land use. Most of the land south of Highway 101 is open space with patchy residential areas.

The southern portion of the watershed consists of Los Angeles County and is largely under the jurisdiction of Federal and State Parks and includes Malibu Creek State Park. Land use in this part of the watershed is primarily open space and recreational. Triunfo Canyon Creek and Medea Creek confluence into Malibu Creek near the center of the watershed prior to discharging into the Pacific Ocean. The topography of the MCW is shown in Figure 3.

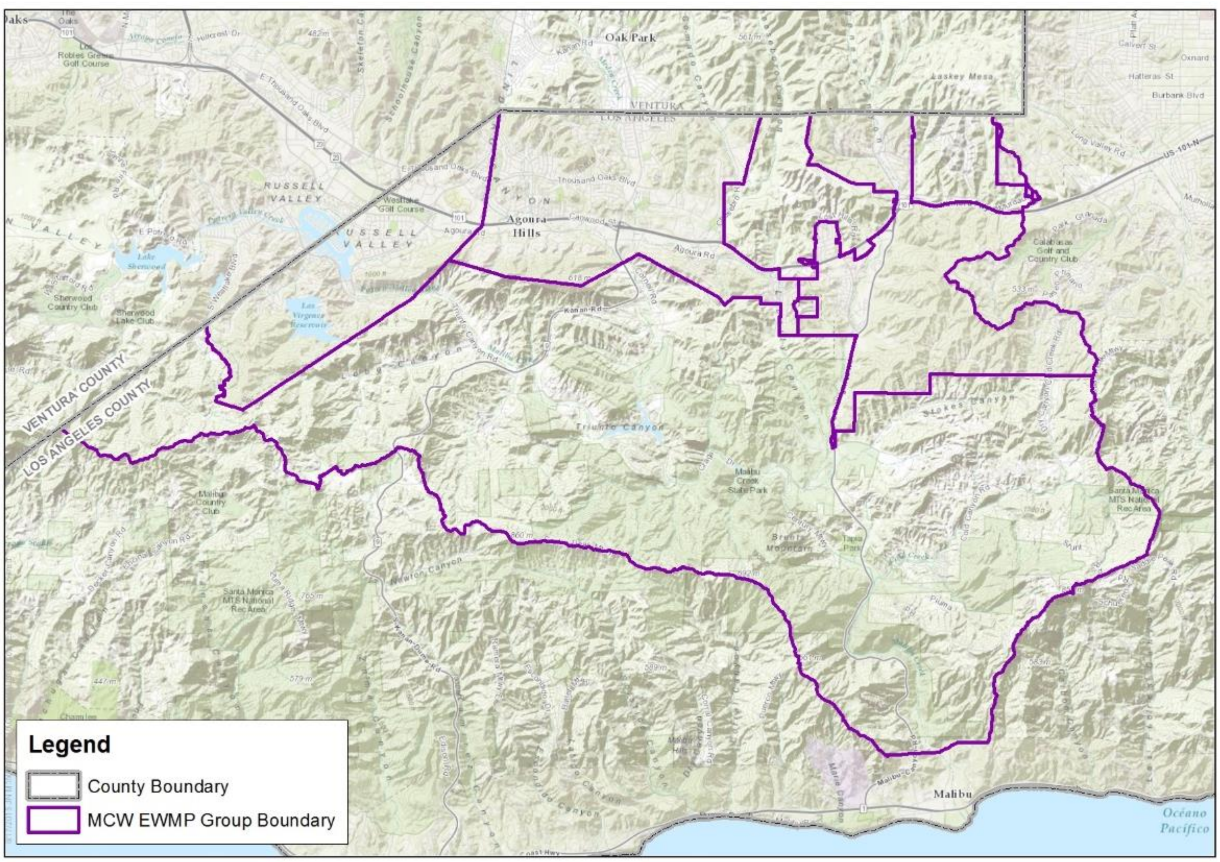

Figure 3: MCW Topography

The Monterey/Modelo formation is potentially a significant natural sources of water quality impairments[2]. The formation is composed of marine sediments that are natural sources of sulfate, metals, phosphorus, nitrogen and selenium. As groundwater discharges to surface waters in the MCW, substances leached from the Monterey/Model formation may contribute to water quality impairments. Although the effects of high levels of phosphorus and nitrogen in the MCW have not been fully assessed, research data supports the probability that receiving waters will become impaired by natural groundwater discharges originating from the Monterey/Model formation. Impairments are expected to be more likely to occur during the summer months. An overlay of the Monterey/Modelo formation outcrops (dark shaded areas) with the phosphate exceedances during the summer months is shown in Figure 4.

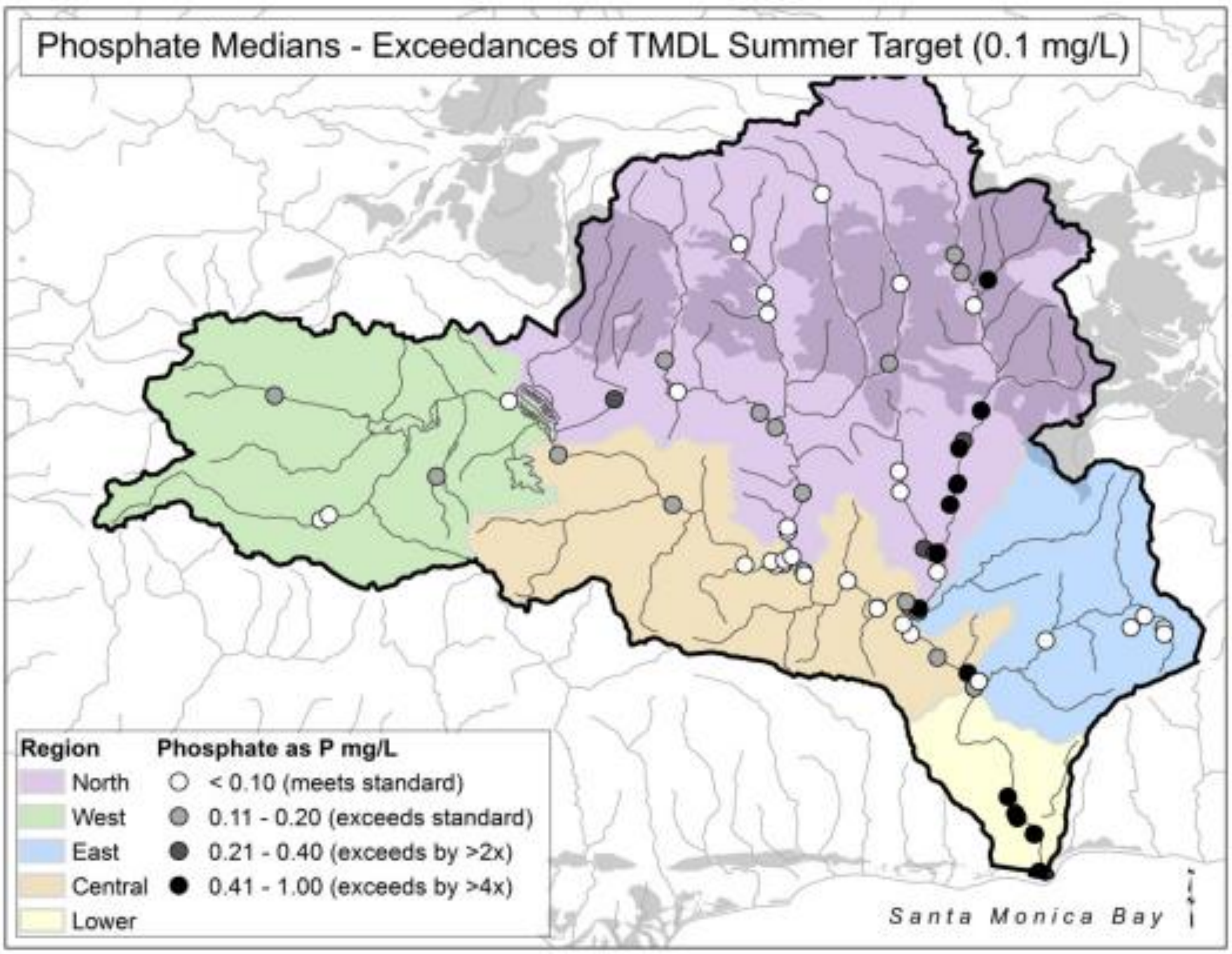

Figure 4: Correlation of Modelo Formation Outcrops with Phosphate Exceedances during Summer Months in MCW[2]

Water quality monitoring in the MCW has taken place since the early 1980s. 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 in the upper watershed, and a broader range of constituents. Monitoring

[2] http://www.lvmwd.com/your-water/epa-tmdl/water-quality-in-the-malibu-creek-watershed

has been conducted by many agencies, focusing on aspects, such as dry weather monitoring, biological surveys, and has also included habitat assessments.

Receiving water monitoring has been conducted by Heal the Bay, County of Los Angeles, Los Angeles County Flood Control District, Ventura County Watershed Protection District, City of Agoura Hills, City of Calabasas, City of Hidden Hills, City of Malibu, City of Westlake Village, Los Angeles Regional Water Quality Control Board, Surfrider Foundation, and University of California, Santa Barbara (UCSB). Current monitoring is being conducted by the Resource Conservation District, County of Los Angeles, Los Angeles County Flood Control District, Santa Monica Mountains, Las Virgenes Municipal Water District, Los Angeles County Department of Health Services, Los Angeles Regional Water Quality Control Board, Santa Monica Bay Keepers, Santa Monica Mountains National Recreation Area (SMMNRA), and Westlake Management Association. Additionally, as identified in the Coordinated Integrated Management Program (CIMP) for the MCW, the cities of Agoura Hills, Calabasas, Hidden Hills, and Westlake Village, the County of Los Angeles, and the Los Angeles Flood Control District, are implementing monitoring under the CIMP.

There are several dischargers within the MCW that are not regulated under the Los Angeles County MS4 Permit. Entities within the watershed that could contribute pollutant loads (but are not subject to the Los Angeles County MS4 Permit and are not part of the MCW EWMP group) include:

- Ventura County
- California State Parks
- National Parks
- Caltrans
- Tapia Water Reclamation Facility

All of the above entities are subject to separate MS4 Permits except the Tapia Water Reclamation Facility, which is operated by the Las Virgenes Municipal Water District and is subject to an NPDES wastewater discharge permit.

1.3 Objectives of the EWMP

The primary objective of the EWMP is to achieve water quality objectives, and protect beneficial uses of the water bodies within the MCW EWMP Group's boundary through collaboration with stakeholders in the watershed. A major emphasis of the EWMP development process is identifying opportunities for multi-benefit regional projects within the MCW EWMP Group's jurisdiction that, wherever feasible, retain (i) all non-stormwater runoff and (ii) all stormwater runoff from the 85th percentile, 24-hour storm event for the drainage areas tributary to the projects. The EWMP helps facilitate other benefits in the watershed, including enhancements to flood protection and water supply. In drainage areas where retention of the 85th percentile, 24-hour storm event is not feasible, the EWMP includes a Reasonable Assurance Analysis (RAA) to demonstrate that applicable WQBELs and RWLs will be achieved through implementation of other watershed control measures. The EWMP also satisfies the following objectives:

- Is consistent with the provisions in Part VI.C.1.a.-f and VI.C.5-C.8 of the MS4 Permit Order No. R4-2012-0175;
- Incorporates applicable state agency input on priority setting and other key implementation issues;
- Meets water quality standards and other Clean Water Act (CWA) obligations by using provisions in the CWA and its implementing regulations, policies and guidance;
- Includes multi-benefit regional projects to ensure that MS4 discharges achieve compliance with all final WQBELs set forth in Part VI.E. and do not cause or contribute to exceedances of receiving

water limitations in Part V.A. by retaining through infiltration or capture and reuse the stormwater volume from the 85th percentile, 24-hour storm for the drainage areas tributary to the multi-benefit regional projects;

- In drainage areas where retention of the stormwater volume from the 85th percentile 24-hour event is not technically feasible the program includes other watershed control measures to ensure that MS4 discharges achieve compliance with all interim and final WQBELs set forth in Part VI.E. with compliance deadlines occurring after approval of an EWMP and to ensure that MS4 discharges do not cause or contribute to exceedances of RWLs in Part V.A.;
- Maximizes the effectiveness of capital and operation and maintenance funds through analysis of alternatives and the selection and sequencing of actions needed to address human health and water quality related challenges and non-compliance;
- Incorporates effective innovative technologies, approaches and practices, including green infrastructure;
- Ensures that existing requirements comply with technology-based effluent limitations and core requirements (e.g., elimination of non-stormwater discharges of pollutants through the MS4, and controls to reduce the discharge of pollutants in stormwater to the maximum extent practicable) are not delayed;
- Coordinates project design and development with other agencies and stakeholders to maximize funding opportunities and provide project benefits in addition to water quality; and
- Includes a financial strategy.

2 EWMP Stakeholder Process

2.1 EWMP Stakeholder Coordination

The MCW EWMP was developed through a collaborative stakeholder process inclusive of the MS4 Co-permittees, other agencies in the watershed regulated under other NPDES requirements, the LARWQCB, the U.S. Environmental Protection Agency (USEPA), environmental and community organizations, and the public. The MS4 Permit requires that the EWMP stakeholder process:

- Provide appropriate opportunity for meaningful stakeholder input.
- Provide EWMP Group participation in the permit-wide watershed management program Technical Advisory Committee (TAC).
- Incorporate applicable state agency input on priority setting and other key implementation issues.

The MCW EWMP stakeholder process ensured that:

- All stakeholders were included and input was heard.
- Information was provided in an open manner.
- Project stakeholder workshops and public outreach events were facilitated.
- Multiple options for the watershed were presented.
- Decisions were made with due consideration of all input.

2.1.1 Technical Advisory Committee Participation

The MCW EWMP Group member agencies have been actively participating in the permit-wide TAC process, comments and input received through the TAC haves been incorporated into the EWMP. In particular, TAC guidance on RAA development has been thoroughly integrated into the EWMP modeling process.

2.1.2 Agency Collaboration

Development of the EWMP was a collaborative effort among the agencies of the MCW EWMP Group and included coordination with other agencies in the watershed, including the Las Virgenes Municipal Water District (LVMWD), the National Park Service, and Ventura County Watershed Protection District. This coordination has provided the appropriate opportunity for stakeholder involvement in the watershed planning effort.

Coordination with LVMWD took place early in the development of the EWMP to obtain monitoring data to help develop water quality priorities for the MCW EWMP. Coordination with LVMWD continued regarding the potential for low-flow diversion projects that would divert flows to the LVMWD system and regional stormwater harvest and use projects in collaboration with LVMWD. Both of these proposals were determined to not be feasible at this time due to LVMWD concerns on treatment plant capacity and impacts to their NPDES discharge permit.

The National Park Service (NPS) was approached regarding the feasibility of siting regional BMPs in their jurisdiction. However, due to a perceived incompatibility with NPS uses at the locations, the potential sites were determined to not be viable. Coordination with the Ventura County Watershed Protection District began with the acquisition of monitoring data for the development of the water quality priorities for the MCW EWMP and is ongoing. Coordination with the North Santa Monica Bay Coastal Watersheds Group, located downstream of the MCW, and consisting of the City of Malibu, the County of Los Angeles, and the Los Angeles Flood Control District was ongoing through the development of the EWMP.

In addition to participation on the EWMP TAC, the MCW EWMP Group has also coordinated with Regional Board staff regarding the development of the EWMP. The MCW EWMP Group had two meetings with Regional Board Staff to discuss the MCW EWMP. The first meeting took place on April 3, 2014 to discuss the MCW EWMP Work Plan and the MCW EWMP 30 month projects. The second meeting took place on May 18, 2015 to discuss the EWMP including natural sources of pollutants and schedule for meeting Nutrients TMDL compliance. These meetings with Regional Board staff provided valuable input in developing the MCW EWMP, including setting priorities, implementation elements, and the EWMP implementation schedule.

2.1.3 Community Outreach

Community outreach was performed at key stages of EWMP development. This outreach provided an opportunity for the public, as well as environmental and community groups (nongovernmental organizations), to provide input. Outreach included posting draft documents on the stakeholder's websites to solicit public written comment regarding the plans, as well as public workshops to provide information to stakeholders and receive feedback on the EWMP documents.

In preparation for each of the public workshops, flyers were developed, distributed, and posted on the MCW cities' webpages, advertisements were placed in local newspapers, and a banner was posted at a major intersection near King Gillette Ranch to notify the public of the upcoming workshops.

Three public outreach workshops were held for the MCW EWMP in collaboration with the North Santa Monica Bay EWMP. All three workshops were held at King Gillette Ranch, which is operated by California State Parks, and located in the MCW. The first public workshop was held on May 22, 2014 and provided presentations regarding the MCW EWMP and the North Santa Monica Bay (NSMB) EWMP. The second public workshop was held on November 13, 2014 with the primary objective of presenting the preliminary list of projects for both the MCW EWMP and NSMB EWMP. The third public workshop was held on May 14, 2015 and the focus was on presenting the proposed projects, schedule, and cost for both the MCW EWMP and NSMB EWMP.

The public outreach workshops included an interactive question and answer (Q&A) session with the public, and provided an opportunity to interact with the co-permittees and consultant teams after the Q&A session. During the Q&A sessions, the public had an opportunity to ask questions and have an open discussion about the EWMP. Comment cards were also made available to everyone attending the workshops, all of which have been addressed. These workshops provided the appropriate opportunity for meaningful stakeholder input.

3 Existing Water Quality Conditions

One of the goals of this EWMP is to identify and address water quality priorities within the MCW EWMP Group area. In order to begin prioritizing water quality issues, an evaluation of existing water quality conditions of receiving waters was completed in compliance with section VI.C.5.a of the MS4 Permit. Water quality concerns fell into three categories: TMDLs, 303(d) listings, and other exceedances. Each is discussed further below.

3.1 TMDLs

TMDLs in this watershed were developed by both the USEPA and the LARWQCB. The USEPA has developed three TMDLs applicable to the MCW EWMP area, which are the Malibu Creek Nutrients TMDL, the Malibu Creek and Lagoon TMDL for Sedimentation and Nutrients to address Benthic Community Impairments, and the Santa Monica Bay PCB and DDT TMDL. In addition, the LARWQCB has developed trash (debris) and bacteria TMDLs for the Santa Monica Bay and the Malibu Creek Watershed. Because the Santa Monica Bay TMDLs integrate the waste load allocations from the Malibu Creek TMDLs, for jurisdictions in the MCW, compliance with the Santa Monica Bay bacteria and trash TMDLs is based on achieving the Malibu Creek TMDL allocations.

As is typical of EPA TMDLS, the Malibu Creek Nutrients TMDL, Malibu Creek and Lagoon TMDL for Sedimentation and Nutrients to address Benthic Community Impairments, and the Santa Monica Bay PCB and DDT TMDL do not include implementation schedules/plans. The Permit includes provisions based on the TMDLs for PCBs, DDT, and nutrients, but has not incorporated the EPA TMDL requirements for Sedimentation and Benthics into the permit at this time.

3.1.1 USEPA MCW Nutrients TMDL

The nutrient TMDL addresses nitrogen and phosphorus compounds for Malibu Creek and its tributaries, Malibu Lagoon, and lakes within the watershed. The TMDL was approved by the USEPA on March 21, 2003.

The TMDL does not include an implementation plan. However, the Permit includes WLAs and the final compliance date of December 28, 2017. WLAs are shown in Table 3.

Table 3: Permit Requirements for Nutrients TMDLs

Time Period	WLA	
	Nitrate as Nitrogen plus Nitrite as Nitrogen	Total Phosphorus
	Daily Maximum	Daily Maximum
Summer (April 15 to November 15)[3]	8 lbs/day	0.8 lbs/day
Winter (November 16 to April 14)	8 mg/L	n/a

3.1.2 USEPA Malibu Creek and Lagoon TMDLs for Sedimentation and Nutrients to address Benthic Community Impairments

The Benthic Community Impairments TMDLs were developed by the USEPA and approved on July 2, 2013. The TMDLs were developed to address the benthic macroinvertebrates and sedimentation in the Malibu

[3] The mass-based summer WLAs are calculated as the sum of the allocations for "runoff from developed areas" and "dry weather urban runoff."

Creek main stem and its main tributaries (Cold Creek, Stokes Creek and Las Virgenes Creek). The TMDLs are focused on the key stressors such as sedimentation and nutrient loading. The TMDL WLAs applicable to the MCW EWMP Group, which were used for demonstrating compliance, are shown in Table 4 below.

Table 4: Benthic Community Impairments TMDLs WLA

Constituent	WLA	WLA (Summer)	WLA (Winter)
Sedimentation	1,012 Tons/Year		
Total Nitrogen		1.0 mg/L	4.0 mg/L
Total Phosphorus		0.1 mg/L	0.2 mg/L

This TMDL has not been incorporated into the Permit; however, a plan to comply with this TMDL is included in this EWMP.

3.1.3 Malibu Creek Bacteria TMDL

The Malibu Creek Bacteria 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 maximum and by meeting the geometric mean targets. The TMDL was revised and the revised TMDL became effective on July 2, 2014.

Table 5 shows the compliance milestone deadlines for the TMDL.

Table 5: Bacterial Compliance Requirement Deadlines

Compliance Requirement	Date[1] (with extension)
TMDL Effective Date	January 24, 2006
Dry-Weather	January 24, 2012
Wet-Weather	July 15, 2021

The effluent limitations are provided in Table 6 below.

Table 6: Bacterial Indicator Effluent Limitations for Discharges to Malibu Creek and its Tributaries

Constituent	Effluent Limitation (MPN or cfu)	
	Daily Maximum	Geometric Mean
Total coliform	10,000/100 mL	1,000/100 mL
Fecal colifom	400/100 mL	200/100 mL
Enterococcus	104/100 mL	35/100 mL
E. coli	235/100 mL	126/100 mL

The number of exceedance days established for bacterial indicators within the permit are based on dry weather and wet weather conditions, the frequency of sampling (daily or weekly), and are group-based and established for each of the monitoring sites in the TMDL. Allowable exceedance days are shown in Table 7 and are effective as of July 2, 2014.

Table 7: Allowable Exceedance Days for Bacterial Indicators at Malibu Creek and its Tributaries

Time Period	Annual Allowable Exceedance Days of the Single Sample Objective (days)	
	Daily Sampling	Weekly Sampling
Dry-Weather (Year-round)	5	1
Wet Weather (Year-round)	15	2

3.1.4 Santa Monica Bay Beaches Bacteria TMDL

On January 24, 2002 and December 12, 2002, the LARWQCB adopted the dry weather and wet weather TMDLs for bacteria at Santa Monica Bay Beaches, respectively. Both TMDLs for bacterial indicators at Santa Monica Bay Beaches, became effective on July 15, 2003.

The Malibu Creek Watershed is one of several jurisdictional areas that discharge into the Santa Monica Bay. The Malibu Creek Watershed has a Bacteria TMDL which assigns WLAs to agencies within the watershed. The MCW, which discharges to the Santa Monica Bay, and its beaches, has the potential to contribute to the frequency of exceedances of the Santa Monica Bay Beaches Bacteria TMDL. Compliance with the Santa Monica Bay Beaches Bacteria TMDL, for agencies in the MCW, is reasonably based on the Malibu Creek Bacteria TMDL WLA. If the MCW Bacteria TMDL WLA is met, the MCW agencies are considered to be in compliance with the Santa Monica Bay Beaches Bacteria TMDL.

The compliance dates for the Santa Monica Bay Beaches Bacteria TMDLs are the same as those for the Malibu Creek Bacteria TMDL. The interim compliance date for the TMDLs is a 50% reduction toward the WLAs during wet weather that must be met in 2018, and final compliance is 100% of the WLAs that must be met by July 2021.

3.1.5 Malibu Creek Trash TMDL

The Malibu Creek Trash TMDL includes requirements for implementation of structural full capture trash devices and a Trash Monitoring and Reporting Plan (TMRP) to meet the compliance deadlines as listed on Table 8 below.

Table 8: Trash Compliance Requirement Deadlines

Compliance Requirement	Date
Effective Date	July 7, 2009
Implement TMRP	6 months after approval from Regional Board Executive Officer
20% Reduction[1]	July 7, 2013
40% Reduction[1]	July 7, 2014
60% Reduction[1]	July 7, 2015
80% Reduction[1]	July 7, 2016
100% Reduction[1]	July 7, 2017

Note:

[1] The reduction is assessed as installation of full capture systems or other measures to achieve the stated reduction from the baseline w aste load allocation

The Malibu Creek Trash TMDL Interim and Final Water Quality Based Effluent Limits are provided below.

Table 9: Malibu Creek Trash TMDL Interim & Final Water Quality Based Effluent Limits

Permittees	Baseline	July 7, 2013 (80%)	July 7, 2014 (60%)	July 7, 2015 (40%)	July 7, 2016 (20%)	July 7, 2017 (0%)
	Annual Trash Discharge (gals/yr)					
Agoura Hills	1810	1448	1086	724	362	0
Calabasas	673	539	404	269	135	0
Hidden Hills	71	57	43	28	14	0
Los Angeles County	1117	894	670	447	223	0
Westlake Village	143	114	86	57	29	0

Implementation of the Regional Board approved Trash Monitoring and Reporting Plan began on December 5, 2014. The milestone for the trash TMDL is for implementation of full capture systems or other measures to achieve a 100% reduction from the baseline waste load allocation by July 7, 2017.

Consistent with the submitted 2014-2015 annual report, the County of Los Angeles (County) has completed the installation of 218 full capture devices, which accounts for 90% of catch basins in the unincorporated areas of MCW. The percentage of Catch Basins presented does not include rural drainage inlets (RDIs), which have been grouped into the category of catch basins. However, RDIs are distinct and have the following characteristics, which require that they be treated differently than normal catch basins to provide the desired trash reduction:

- Are situated in sparsely developed or totally undeveloped areas.
- Have no curb and gutter to direct street flows.
- Are not connected to a storm drain system.
- Convey flows from one side of the road to the other, similar to a road culvert.
- Catch leaves and rocks.
- Installation of standard trash devices is infeasible

The County is in discussions with the LARWQCB to determine the best course of action in dealing with RDIs. By way of the LADPW catch basin cleanout contract, the County inspects these RDIs at least once a year and performs cleanouts as warranted by the inspections.

For the City of Calabasas, all (100%) of the catch basins within the MCW have been retrofitted. This includes 156 catch basins retrofitted with full capture devices and 107 catch basins retrofitted with partial capture devices (curb screens). For the City of Agoura Hills the City has successfully retrofitted a total of 226 units. The City is currently compiling a list of locations to include in the next Catch Basin Connector Pipe Screen & Filter Installation Project and is planning to release an RFP in early February. The City is planning to retrofit upwards of 200 catch basins that feed into the Lindero Canyon Creek. Through the Agoura Road Widening project, all existing and new catch basins in the project area will be retrofitted. These will be approximately 40 catch basins. The goal for now is to cover most if not all of the catch basins that discharge to Lindero Canyon Creek. After the Agoura Road Widening project is completed, the City will have retrofitted approximately 450 catch basins, which includes the 226 units that have already been retrofitted.

For the City of Hidden Hills, there are 19 catch basins in the MCW portion of the City. The City has implemented street sweeping in this residential area as a non-structural BMP to address the trash TMDL. The City complies with the trash TMDL requirements for this residential area through weekly street sweeping and the watershed's TMRP.

For the City of Westlake Village, the City has retrofitted all catch basins within the area subject to the trash TMDL.

3.1.6 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 became effective on March 20, 2012. Los Angeles County, Agoura Hills, Calabasas, and Westlake Village, along with other agencies, are assigned WLAs for debris in the TMDL. For the MCW agencies, compliance with Near and Offshore Debris TMDL requirements will be achieved through compliance with the Malibu Creek Trash TMDL.

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

The MCW EWMP Group reviewed facilities within their watersheds to determine if there are any industrial facilities or activities related to the manufacturing, handling, or transportation of plastic pellets. No such facilities or activities were found. As a result, monitoring for plastic pellets is not required in the watershed. However, 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 MCW EWMP Group will continue to review facilities within their jurisdictions to identify activities related to the manufacturing, handling, or transportation of plastic pellets. The Santa Monica Bay Nearshore and Offshore Debris TMDL Trash Interim and Final Water Quality Based Effluent Limits are provided below.

Table 10: Santa Monica Bay Nearshore and Offshore Debris TMDL Trash Interim & Final Water Quality Based Effluent Limits

Permittees	Baseline	Mar 20, 2016 (80%)	Mar 20, 2017 (60%)	Mar 20, 2018 (40%)	Mar 20, 2019 (20%)	Mar 20, 2020 (0%)
	Annual Trash Discharge (gals/yr)					
Agoura Hills	1044	835	626	418	209	0
Calabasas	1656	1325	994	663	331	0
Los Angeles County	5138	4110	3083	2055	1028	0
Westlake Village	3131	2505	1879	1252	626	0

3.1.7 Santa Monica Bay TMDL for DDT and PCBs

The Santa Monica Bay DDT and PCBs TMDL was developed by the USEPA and approved on March 26, 2012. The MS4 Permit requires that the permittees comply with total annual mass based WLAs of DDT and PCBs from sediment discharged to the bay. Determination of the total annual load is based on a three-year averaging period. The TMDL WLAs applicable to the MCW EWMP Group are shown in Table 11 below.

Table 11: Santa Monica Bay DDT and PCBs TMDL WLA

Constituents	Annual Mass-Based WLA (g/year)
DDT	27.08
PCB	140.25

3.2 303(d) Listings

Section VI.C.2.a. of the Permit requires EWMPs to address water bodies with exceedances of receiving water limitations identified on the State's Clean Water Act Section 303(d) List. The 2010 303(d) listed pollutants are shown in Table 12. The table includes the impairments identified in all sections of the 303(d) list, including 4a (TMDL developed), 4b (addressed through an action other than a TMDL), and 5 (TMDL needed). Receiving Water Limitations applicable to the Malibu Creek Watershed are provided in Appendix 8.

Table 12: 2010 303(d) Listings in the MCW within Los Angeles County

Water Body Name	Pollutant	TMDL Development Status	Method to Address Impairment
Lake Lindero	Algae	Malibu Creek Nutrient TMDL[1]	Not under EWMP/CIMP Stakeholders' Authority
Lake Lindero	Chloride	No TMDL	Not under EWMP/CIMP Stakeholders' Authority
Lake Lindero	Eutrophic	Malibu Creek Nutrient TMDL[1]	Not under EWMP/CIMP Stakeholders' Authority
Lake Lindero	Odor	Malibu Creek Nutrient TMDL[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	Malibu Creek Trash TMDL[2]	Not under EWMP/CIMP Stakeholders' Authority
Las Virgenes Creek	Benthic-Macroinvertebrate Bioassessments	Malibu Creek and Lagoon TMDLs for Sedimentation and Nutrients to Address Benthic Community Impairments[1]	Addressed in EWMP/CIMP
Las Virgenes Creek	Coliform Bacteria	Malibu Creek Bacteria TMDL[2]	Addressed in EWMP/CIMP
Las Virgenes Creek	Invasive Species	No TMDL	Addressed in EWMP/CIMP
Las Virgenes Creek	Nutrients (Algae)	Malibu Creek Nutrient TMDL[1]	Addressed in EWMP/CIMP
Las Virgenes Creek	Organic Enrichment/Low Dissolved Oxygen	Malibu Creek Nutrient TMDL[1]	Addressed in EWMP/CIMP
Las Virgenes Creek	Scum/Foam-unnatural	Malibu Creek Nutrient TMDL[1]	Addressed in EWMP/CIMP
Las Virgenes Creek	Sedimentation/Siltation	The Malibu Creek and Lagoon TMDL for Sedimentation and Nutrients to Address Benthic Community Impairments[1]	Addressed in EWMP/CIMP
Las Virgenes Creek	Selenium	No TMDL	Addressed in EWMP/CIMP
Las Virgenes Creek	Trash	Malibu Creek Trash TMDL[2]	Addressed in EWMP/CIMP
Lindero Creek Reach 1	Algae	Malibu Creek Nutrient TMDL[1]	Addressed in EWMP/CIMP
Lindero Creek Reach 1	Benthic-Macroinvertebrate Bioassessments	No TMDL	Addressed in EWMP/CIMP
Lindero Creek Reach 1	Coliform Bacteria	Malibu Creek Bacteria TMDL[2]	Addressed in EWMP/CIMP
Lindero Creek Reach 1	Invasive Species	No TMDL	Addressed in EWMP/CIMP
Lindero Creek Reach 1	Scum/Foam-unnatural	Malibu Creek Nutrient TMDL[1]	Addressed in EWMP/CIMP
Lindero Creek Reach 1	Selenium	No TMDL	Addressed in EWMP/CIMP
Lindero Creek Reach 1	Trash	Malibu Creek Trash TMDL[2]	Addressed in EWMP/CIMP
Lindero Creek Reach 2 (Above Lake)	Algae	Malibu Creek Nutrient TMDL[1]	Addressed in EWMP/CIMP
Lindero Creek Reach 2	Coliform Bacteria	Malibu Creek Bacteria TMDL[2]	Addressed in EWMP/CIMP

Water Body Name	Pollutant	TMDL Development Status	Method to Address Impairment
(Above Lake)			
Lindero Creek Reach 2 (Above Lake)	Scum/Foam-unnatural	Malibu Creek Nutrient TMDL[1]	Addressed in EWMP/CIMP
Lindero Creek Reach 2 (Above Lake)	Selenium	No TMDL	Addressed in EWMP/CIMP
Lindero Creek Reach 2 (Above Lake)	Trash	Malibu Creek Trash TMDL[2]	Addressed in EWMP/CIMP
Malibou Lake	Algae	Malibu Creek Nutrient TMDL[1]	Not under EWMP/CIMP Stakeholders' Authority
Malibou Lake	Eutrophic	Malibu Creek Nutrient TMDL[1]	Not under EWMP/CIMP Stakeholders' Authority
Malibou Lake	Organic Enrichment/Low Dissolved Oxygen	Malibu Creek Nutrient TMDL[1]	Not under EWMP/CIMP Stakeholders' Authority
Malibu Beach	DDT (Dichlorodiphenyltrichloroethane)	Santa Monica Bay TMDLs for DDTs and PCBs[1]	Outside of Region covered by the Malibu Creek EWMP/CIMP; Addressed in EWMP/CIMP
Malibu Beach	Indicator Bacteria	Malibu Creek Bacteria TMDL[2]	Addressed in EWMP/CIMP
Malibu Creek	Benthic-Macroinvertebrate Bioassessments	Malibu Creek and Lagoon TMDLs for Sedimentation and Nutrients to Address Benthic Community Impairments[1]	Addressed in EWMP/CIMP
Malibu Creek	Coliform Bacteria	Malibu Creek Bacteria TMDL[2]	Addressed in EWMP/CIMP
Malibu Creek	Fish Barriers (Fish Passage)	No TMDL	Addressed in EWMP/CIMP
Malibu Creek	Invasive Species	No TMDL	Addressed in EWMP/CIMP
Malibu Creek	Nutrients (Algae)	Malibu Creek Nutrient TMDL[1]	Addressed in EWMP/CIMP
Malibu Creek	Scum/Foam-unnatural	Malibu Creek Nutrient TMDL[1]	Addressed in EWMP/CIMP
Malibu Creek	Sedimentation/Siltation	Malibu Creek and Lagoon TMDLs for Sedimentation and Nutrients to Address Benthic Community Impairments[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	Malibu Creek Trash TMDL[2]	Addressed in EWMP/CIMP
Malibu Lagoon	Benthic Community Effects	Malibu Creek and Lagoon TMDLs for Sedimentation and Nutrients to Address Benthic Community Impairments[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	Malibu Creek Bacteria TMDL[2]	Outside of Region covered by the Malibu Creek EWMP/CIMP; Pollutant loads from stakeholders

Water Body Name	Pollutant	TMDL Development Status	Method to Address Impairment
			jurisdiction to be addressed in EWMP/CIMP
Malibu Lagoon	Eutrophic	Malibu Creek Nutrient TMDL[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	Malibu Creek Bacteria TMDL[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)	Malibu Creek Bacteria TMDL[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
Malibu Lagoon Beach (Surfrider)	Coliform Bacteria	Malibu Creek Bacteria TMDL[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)	Santa Monica Bay TMDLs for DDTs and PCBs[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)	Santa Monica Bay TMDLs for DDTs and PCBs[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	Malibu Creek Nutrient TMDL[1]	Addressed in EWMP/CIMP
Medea Creek Reach 1 (Lake to Confl. with	Coliform Bacteria	Malibu Creek Bacteria TMDL[2]	Addressed in EWMP/CIMP

Water Body Name	Pollutant	TMDL Development Status	Method to Address Impairment
Lindero)			
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	Malibu Creek Trash TMDL[2]	Addressed in EWMP/CIMP
Medea Creek Reach 2 (Abv Confl. with Lindero)	Algae	Malibu Creek Nutrient TMDL[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	Malibu Creek Bacteria TMDL[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	Malibu Creek Trash TMDL[2]	Addressed in EWMP/CIMP
Palo Comado Creek	Coliform Bacteria	Malibu Creek Bacteria TMDL[2]	Addressed in EWMP/CIMP
Santa Monica Bay Offshore/Nearshore	DDT (tissue & sediment)	Santa Monica Bay TMDLs for DDTs and PCBs[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	Santa Monica Bay Debris TMDL[2]	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	Fish Consumption Advisory	Santa Monica Bay TMDLs for DDTs and PCBs[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	PCBs (Polychlorinated biphenyls) (tissue & sediment)	Santa Monica Bay TMDLs for	Outside of Region covered by the

Water Body Name	Pollutant	TMDL Development Status	Method to Address Impairment
Offshore/Nearshore		DDTs and PCBs[1]	Malibu Creek EWMP/CIMP; Pollutant loads from stakeholders jurisdiction to be addressed in EWMP/CIMP
Santa Monica Bay Offshore/Nearshore	Sediment Toxicity	Santa Monica Bay TMDLs for DDTs and PCBs[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	Malibu Creek Bacteria TMDL[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	Malibu Creek Nutrient TMDL[1]	Not under EWMP/CIMP Stakeholders' Authority
Westlake Lake	Ammonia	Malibu Creek Nutrient TMDL[1]	Not under EWMP/CIMP Stakeholders' Authority
Westlake Lake	Eutrophic	Malibu Creek Nutrient TMDL[1]	Not under EWMP/CIMP Stakeholders' Authority
Westlake Lake	Lead	Los Angeles Area Lakes Nitrogen, Phosphorus, Mercury, Trash, Organochlorine Pesticides and PCBs TMDL[1]	Not under EWMP/CIMP Stakeholders' Authority
Westlake Lake	Organic Enrichment/Low Dissolved Oxygen	Malibu Creek Nutrient TMDL[1]	Not under EWMP/CIMP Stakeholders' Authority

Note: This table is the combined California 2010 303(d) list (combines category 4a, 4b and 5), meaning that the table include listings still requiring the development of a TMDL, those that have a completed TMDL approved by USEPA, and those that are being addressed by actions other than a TMDL.

[1] TMDL developed by the USEPA.
[2] TMDL developed by the LARWQCB.

3.3 Other Exceedances of Receiving Water Limitations

A review of water quality monitoring data was performed to identify exceedances of receiving water limitations not included in the 303(d) list or TMDLs. Reaches and pollutants were determined based on the median concentration for samples collected between 2000 and 2010. Only pollutants with a minimum of five samples collected over this period were considered. The median was chosen to be consistent with the exhaustive study released by the LVMWD in 2012, *Water Quality in the Malibu Creek Watershed, 1971-2010* in compliance with Regional Board Order No. R4-2010-0165. The minimum number of five samples is consistent with the *Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List* that includes five samples as the minimum number of measured exceedances needed to place a water segment on the Section 303(d) list for conventional (or other) pollutants (State Water Resources Control Board, Amended 2015). Only waterbodies identified within the MCW EWMP Group area were included. Waterbodies with identified exceedances are shown in Table 13 along with the monitoring site name, monitoring program, and the period of data collection. Additional information about the monitoring site locations and monitoring programs is provided in Section 4 of this report, and a map is provided that shows all of the monitoring site locations, including those in Table 13. Receiving Water Limitations applicable to the Malibu Creek Watershed are provided in Appendix 8.

Table 13: MCW Water Body-Pollutant Combinations (for Exceedances of Receiving Water Limitations with no TMDL or 303(d) Listing) with Monitoring Sites and Program Information

Waterbody	Constituent	Monitoring Site	Monitoring Program	Data Collection
Cheeseboro Creek	Specific Conductivity	Ches	LA County Sanitation Districts, Calabasas Landfill Surface Water Quality Monitoring	1999-2009
Cheeseboro Creek	Specific Conductivity	MCW_9	Ventura County Bacteria TMDL Monitoring	2008-2009
Cheeseboro Creek	Specific Conductivity	J_CHEESEBRO	National Park Service MEDN Water Quality Monitoring	2006-2010
Cheeseboro Creek	Sulfate	Ches	LA County Sanitation Districts, Calabasas Landfill Surface Water Quality Monitoring	1999-2009
Cheeseboro Creek	Sulfate	J_CHEESEBRO	National Park Service MEDN Water Quality Monitoring	2006-2010
Cheeseboro Creek	TDS	Ches	LA County Sanitation Districts, Calabasas Landfill Surface Water Quality Monitoring	1999-2009
Cheeseboro Creek	Phosphate as P	J_CHEESEBRO	National Park Service MEDN Water Quality Monitoring	2006-2010
Cheeseboro Creek	Chloride	Ches	LA County Sanitation Districts, Calabasas Landfill Surface Water Quality Monitoring	1999-2009
Cheeseboro Creek	Chloride	J_CHEESEBRO	National Park Service MEDN Water Quality Monitoring	2006-2010
Las Virgenes Creek	Specific Conductivity	LV2	Malibu Creek Watershed Monitoring Program	2005-2007

Waterbody	Constituent	Monitoring Site	Monitoring Program	Data Collection
Las Virgenes Creek	Specific Conductivity	LVCreek_Farm_LV 3	Las Virgenes Municipal Water District	1971-2010
Las Virgenes Creek	Specific Conductivity	LVCreek_WhiteOak _LV4	Las Virgenes Municipal Water District	1971-2010
Las Virgenes Creek	Specific Conductivity	RSW_MC001F	Las Virgenes Municipal Water District	1971-2010
Las Virgenes Creek	Specific Conductivity	RSW_MC002F	Las Virgenes Municipal Water District	1971-2010
Las Virgenes Creek	Specific Conductivity	RSW_MC003F	Las Virgenes Municipal Water District	1971-2010
Las Virgenes Creek	Specific Conductivity	RSW_MC007D	Las Virgenes Municipal Water District	1971-2010
Las Virgenes Creek	Specific Conductivity	S_LLASVIR	National Park Service MEDN Water Quality Monitoring	2005-2010
Las Virgenes Creek	Sulfate	LVCreek_Farm_LV 3	Las Virgenes Municipal Water District	1971-2010
Las Virgenes Creek	Sulfate	LVCreek_WhiteOak _LV4	Las Virgenes Municipal Water District	1971-2010
Las Virgenes Creek	Sulfate	RSW_MC001F	Las Virgenes Municipal Water District	1971-2010
Las Virgenes Creek	Sulfate	RSW_MC002F	Las Virgenes Municipal Water District	1971-2010
Las Virgenes Creek	Sulfate	RSW_MC003F	Las Virgenes Municipal Water District	1971-2010
Las Virgenes Creek	Sulfate	RSW_MC007D	Las Virgenes Municipal Water District	1971-2010
Las Virgenes Creek	Sulfate	S_LLASVIR	National Park Service MEDN Water Quality Monitoring	2005-2010
Las Virgenes Creek	TDS	LVCreek_Farm_LV 3	Las Virgenes Municipal Water District	1971-2010
Las Virgenes Creek	TDS	LVCreek_WhiteOak _LV4	Las Virgenes Municipal Water District	1971-2010
Las Virgenes Creek	TDS	RSW_MC001F	Las Virgenes Municipal Water District	1971-2010
Las Virgenes Creek	TDS	RSW_MC002F	Las Virgenes Municipal Water District	1971-2010
Las Virgenes Creek	TDS	RSW_MC003F	Las Virgenes Municipal Water District	1971-2010
Las Virgenes Creek	TDS	RSW_MC007D	Las Virgenes Municipal Water District	1971-2010

Waterbody	Constituent	Monitoring Site	Monitoring Program	Data Collection
Liberty Canyon Creek	*E. coli*	LC	Malibu Creek Watershed Monitoring Program	2005-2007
Liberty Canyon Creek	Specific Conductivity	LibertyCanyonCrkat SewerXing	Las Virgenes Municipal Water District	2003-2005
Liberty Canyon Creek	Specific Conductivity	LC	Malibu Creek Watershed Monitoring Program	2005-2007
Liberty Canyon Creek	Specific Conductivity	R1_LIBCYN	National Park Service MEDN Water Quality Monitoring	2006-2010
Liberty Canyon Creek	Specific Conductivity	R3_LIBCYN	National Park Service MEDN Water Quality Monitoring	2009-2010
Liberty Canyon Creek	Sulfate	LibertyCanyonCrkat SewerXing	Las Virgenes Municipal Water District	2003-2005
Liberty Canyon Creek	Sulfate	R1_LIBCYN	National Park Service MEDN Water Quality Monitoring	2006-2010
Liberty Canyon Creek	TDS	LibertyCanyonCrkat SewerXing	Las Virgenes Municipal Water District	2003-2005
Liberty Canyon Creek	Phosphate as P	LC	Malibu Creek Watershed Monitoring Program	2005-2007
Liberty Canyon Creek	Phosphate as P	LibertyCanyonCrkat SewerXing	Las Virgenes Municipal Water District	2003-2005
Liberty Canyon Creek	Phosphate as P	R1_LIBCYN	National Park Service MEDN Water Quality Monitoring	2006-2010
Liberty Canyon Creek	Phosphate as P	R3_LIBCYN	National Park Service MEDN Water Quality Monitoring	2009-2010
Lindero Creek Reach 2	Specific Conductivity	LIN1	Malibu Creek Watershed Monitoring Program	2005-2007
Lindero Creek Reach 2	Specific Conductivity	LinderoCrk_LakeInl et_L2	Las Virgenes Municipal Water District	1971-2010
Lindero Creek Reach 2	Specific Conductivity	LinderoCrkatVentur aCoLine_L1	Las Virgenes Municipal Water District	1971-2010
Lindero Creek Reach 2	Specific Conductivity	LinderoGolf_SoEnd SmallPond_L3	Las Virgenes Municipal Water District	1971-2010
Medea Creek Reach 1	Specific Conductivity	MED2	Malibu Creek Watershed Monitoring Program	2005-2007
Medea Creek Reach 1	Specific Conductivity	S_LMEDCRK	National Park Service MEDN Water Quality Monitoring	2005-2010
Medea Creek Reach 2	Specific Conductivity	MedeaCrk_atBayLa urelSch_M1	Las Virgenes Municipal Water District	1971-2010
Medea Creek Reach 2	Specific Conductivity	S_UMEDCRK	National Park Service MEDN Water Quality Monitoring	2005-2010

Waterbody	Constituent	Monitoring Site	Monitoring Program	Data Collection
Medea Creek Reach 2	Sulfate	S_UMEDCRK	National Park Service MEDN Water Quality Monitoring	2005-2010

3.4 Source Assessment

A review of the County data for illicit connections/illegal discharges elimination (IC/IDE) programs, industrial/commercial facilities pollutant control programs, development construction programs, and public agency activities programs reported in the 2013-2014 annual report does not identify any specific pollutant sources in the MCW.

Similar review of data for the City of Calabasas for IC/IDE programs, industrial/commercial facilities pollutant control programs, development construction programs, public agency activities programs reported in the 2013-2014 annual report does not identify any specific pollutant sources in the MCW.

Similar review of data for the cities of Agoura Hills, Hidden Hills and Westlake Village for IC/IDE programs, Industrial/Commercial Facilities Pollutant Control programs, Development Construction programs, Public Agency Activities programs reported in the 2013-2014 Annual Report does not identify any specific pollutant sources in the Malibu Creek Watershed. The City of Thousand Oaks, Ventura County, and State Park lands in the upper watershed, which are outside of the MCW EWMP group, are potential sources of pollutants, which are recorded at our receiving water monitoring sites.

Currently, non-stormwater outfall screening source investigations are underway but have yet to be completed in the MCW and so, based on current source investigations, there are no known or suspected stormwater or non-stormwater pollutant sources in discharges to the MS4 and from the MS4 to receiving waters for the MCW.

Appendix 6A – Model Calibration and Parameters includes model results that indicate the amount of surface runoff and pollutant loads from urban areas. Figure 6A-1 and 6A-19 of Appendix 6 present the amount of surface runoff (in acre feet and inches per acre) from various urban (MS4) and non-MS4 (e.g., horse facilities) areas. Figures 6A-20 through 6A-23 present unit-area pollutant loads from various land uses in the watershed, which discharge to the MS4 and from the MS4 to receiving waters.

3.5 Natural Sources of Pollutants in the MCW

Water quality monitoring data and studies performed in the MCW indicate that natural sources of pollutants exist. The Monterey/Modelo formation presents significant natural sources of water quality impairments including nitrogen and phosphorus (USGS Project Proposal, 2012). In addition, the Monterey/Modelo formation outcrops in the watershed are natural sources of sulfate, metals, and selenium (USGS Project Proposal, 2012) (Hibbs, 2012). These natural sources of pollutants, if verified, would be expected to have a significant effect on the amount, configuration, and schedule of the watershed control measures to be implemented as a part of this EWMP. To provide a better understanding of the impacts of the Monterey/Modelo formation on water quality in the MCW, a study is proposed as part of the implementation plan in Section 7.5 of this EWMP.

4 Water Quality Priorities

This section presents the approach used to prioritize reaches within the MCW for installation of BMPs. Reaches are identified based on pollutant listings and are prioritized consistent with the requirements of the MS4 permit (Section 3). All reaches that are named in TMDLs, or on the 2010 303(d) list, or identified through water quality monitoring as having exceedances of RWL were included in the prioritization.

Table 12 identifies monitoring programs that have been conducted in the MCW. The table includes the name of the monitoring program, the agencies that collected the data, the number of sites for each of program, the type of data/parameters collected, and the years that the data were collected. Data from these programs were reviewed to conduct the reach prioritization and to identify Category 3 pollutants as described below.

Table 14: Assessed Monitoring Programs in MCW

Monitoring Program	Collection Agency	Location of Samples	Year(s) Data Collected
Benthic Macroinvertebrate Bioassessment (SC-IBI)	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
Los Angeles Regional Board TMDL Monitoring	Los Angeles Regional Board	Malibu Creek/ Las Virgenes Creek	N/A
Mass Emission MS4 Monitoring*	Los Angeles County Flood Control District	MS4 Mass Emission Site 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
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
Microbial Source Tracking	Los Angeles County Flood Control/ Los Angeles County Public Works	Malibu Creek Watershed	
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

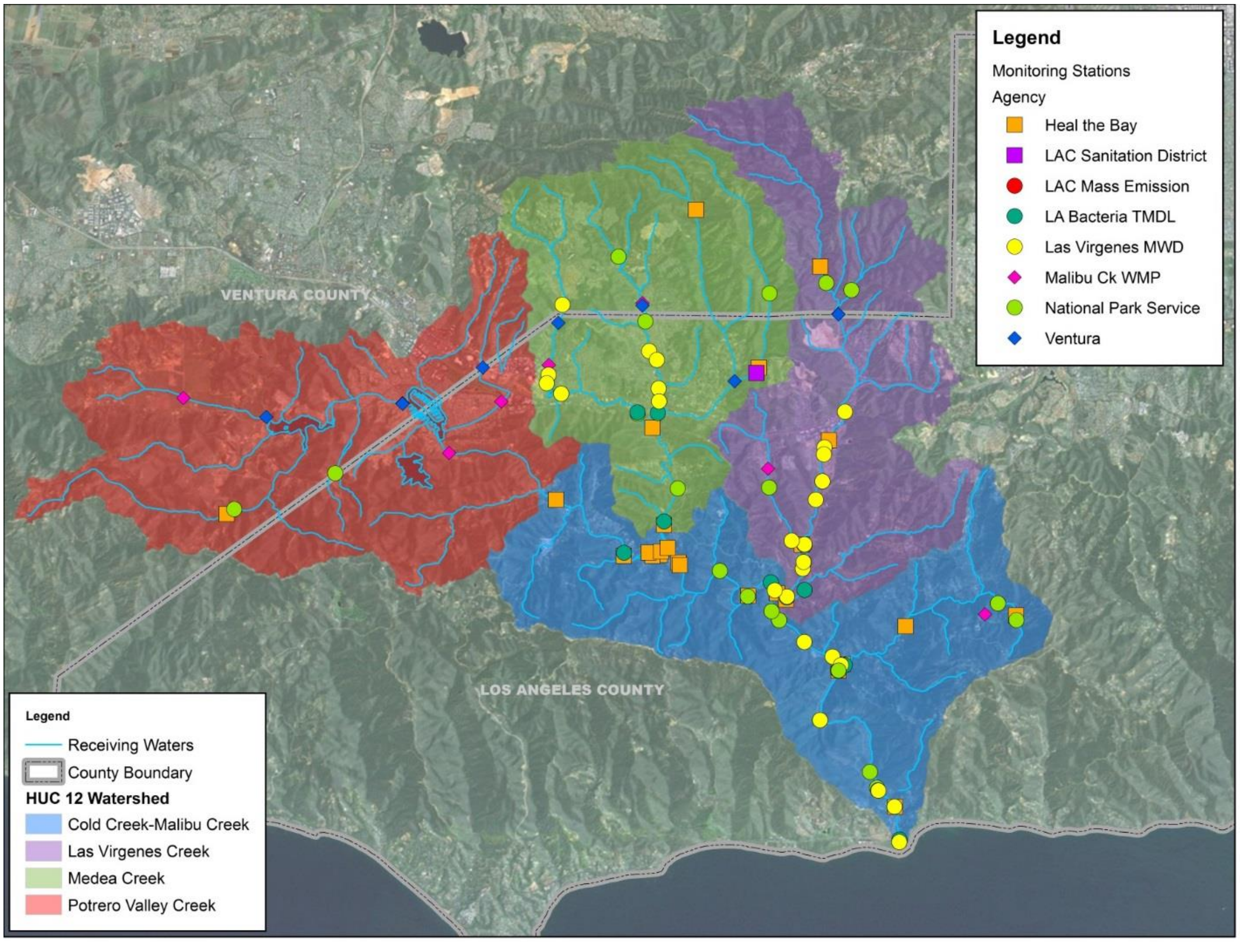

Figure 5: Monitoring Locations in MCW

4.1 Waterbody Pollutant Classification

The Permit includes three categories for water body-pollutant classification:

Category 1 (Highest Priority): Water body-pollutant combinations for which water quality-based effluent limitations and/or receiving water limitations are established Part VI.E and Attachments M of the MS4 Permit;

Category 2 (High Priority): Pollutants for which data indicate water quality impairment in the receiving water according to the State's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Listing Policy) and for which MS4 discharges may be causing or contributing to the impairment; and

Category 3 (Medium Priority): Pollutants for which there are insufficient data to indicate water quality impairment in the receiving water according to the State's Listing Policy, but which exceed applicable receiving water limitations contained in this Order and for which MS4 discharges may be causing or contributing to the exceedance.

The MCW EWMP prioritization approach as shown on Figure 6 below is consistent with the criteria in the Permit.

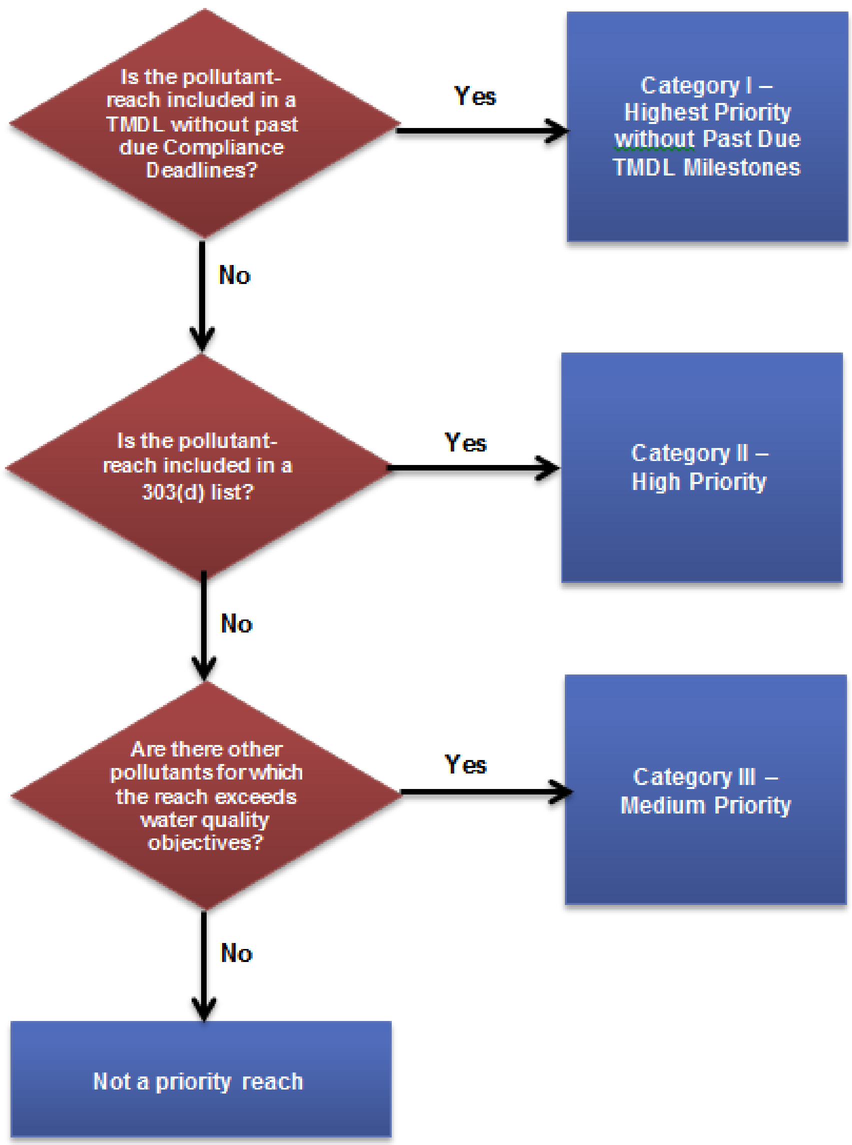

Figure 6: Pollutant-Reach Prioritization Methodology Flow Chart

The water bodies in the MCW EWMP area were prioritized based on the aforementioned categories, requirements, and methodology. The results are presented in Table 15 below which lists the reaches, water quality impairments, and prioritization results. The results of the prioritization guide both the selection of watershed control measures and the EWMP implementation schedule. This prioritization, along with the MCW EWMP RAA, calculated BMP load reduction, and implementation feasibility was used to schedule BMP implementation. The "Highest Priority" water bodies in the MCW are the focus of the MCW EWMP and have a significant effect on the type, size, and implementation timing of the watershed control measures included in the MCW EWMP implementation schedule.

Table 15: Water Body Prioritization from the MCW 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	X	X	X	X
	Total Phosphorus	X	X	X		X	X	X	X	X	X	X	X	X
	Nitrate as Nitrogen plus Nitrite as Nitrogen	X	X	X		X	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		
	TSS		X	X				X				X		
	Turbidity		X	X				X				X		
	Dissolved Oxygen		X	X				X				X		
	Ammonia		X	X				X				X		
	Chlorophyll *a*		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				X				
	Selenium [2]			X		X	X	X	X	X				
	Sulfates							X						
	Lead												X	X
	Mercury												X	X

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
Water Quality Objective Exceedances - Category 3 - Medium Priority														
Water Quality Objective Exceedances	Chloride	X												
	Phosphate as P	X			X									
	Specific Conductivity	X		X	X		X		X	X				
	Sulfate	X		X	X					X				
	TDS	X		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 (conductivity and selenium)

5 Watershed Control Measures

The MCW EWMP Group has identified a suite of best management practices (BMPs) and implementation measures for the watershed to meet the Water Quality Based Effluent Limits (WQBELs) and Receiving Water Limitations (RWLs). These BMPs and implementation measures are referred to in the MS4 Permit as watershed control measures. The following sections identify the existing and planned control measures in the watershed, as well as the approach to, and prioritization of the identified additional control measures.

5.1 Existing Control Measures

The Permittees have been implementing the Countywide Storm Water Quality Management Program (SQMP) to manage municipal stormwater and urban runoff discharges since adoption of the 2001 NPDES MS4 Permit (Order No. 01-182). The 2002 SQMP included six separate stormwater management programs:

- Public Information and Participation Program (PIPP)
- Industrial/Commercial Facilities Program
- Planning and Land Development Program
- Development Construction Program
- Public Agency Activities Program
- Illicit Connections and Illicit Discharges Elimination (IC/IDE) Program

The following subsections identify the existing institutional and structural BMPs in the watershed.

5.1.1 Existing Minimum Control Measures

The MCW EWMP Group is continuing to implement the minimum control measures (MCMs) which were originally required under the 2001 MS4 Permit, as well as implementing the MCM requirements as written in the Los Angeles County MS4 Permit (Order No. R4-2012-0175 as amended by State Water Board Order WQ 2015-0075). An inventory of the existing MCMs in the MCW is provided in Table 16 through Table 22.

The Public Information and Participation Program will be implemented as written in the Los Angeles County MS4 Permit (Order No. R4-2012-0175 as amended by State Water Board Order WQ 2015-0075).

Table 16: Public Information and Participation Program

Permittee	Residential Outreach Program	Public reporting (e.g., 888-CLEAN-LA)	Community Pollution Prevention and Cleanup (e.g., Cleanups and Catch Basin Stenciling)
City of Agoura Hills	X	X	X
City of Calabasas	X	X	X
City of Hidden Hills	X	X	X
City of Westlake Village	X	X	X
County of Los Angeles	X	X	X
Los Angeles County Flood Control District	X	X	X

All Permittees promote the informational website, CleanLA.com. The website offers environmentally responsible programs that are available for residents, businesses, and governmental agencies, and includes a reporting program for the public to report water quality violations. In addition, some of the

Permittees have posted videos on their websites that discuss the sources of constituents and their associated BMPs to prevent impacts to receiving water bodies. The tables below provide a summary of the various activities and programs the MCW EWMP Group has implemented and will maintain through the implementation of this EWMP.

Table 17: Public Education Activities

Permittee	Public Education Video Title
Agoura Hills	• The Clean Water Act & Our Backyards http://www.ci.agoura-hills.ca.us/government/departments/public-works-engineering/water-quality/the-clean-water-act-our-backyards
Calabasas	• The Clean Water Act & Our Backyards • MCW Monitoring • Stormwater Catch Basin Screening http://www.cityofcalabasas.com/green-city/stewardship.html#water
County of Los Angeles	• The Clean Water Act And Our Back Yards http://www.youtube.com/watch?v=QdIxiaSJxf4

The Industrial/Commercial Facilities Program will be implemented as written in the Los Angeles County MS4 Permit (Order No. R4-2012-0175 as amended by State Water Board Order WQ 2015-0075).

Table 18: Industrial/Commercial Facilities Program

Permittee	Track Critical Industrial/ Commercial Sources	Educate Critical Industrial/ Commercial Sources	Inspect Critical Industrial/ Commercial Sources
City of Agoura Hills	X	X	X
City of Calabasas	X	X	X
City of Hidden Hills	N/A[1]	N/A[1]	N/A[1]
City of Westlake Village	X	X	X
County of Los Angeles	X	X	X
Los Angeles County Flood Control District	N/A	N/A	N/A

[1] The City of Hidden Hills does not have industrial and commercial sources.

The Planning and Land Development Program will be implemented as written in the Los Angeles County MS4 Permit (Order No. R4-2012-0175 as amended by State Water Board Order WQ 2015-0075).

Table 19: Planning and Land Development Program

Permittee	Smart growth Practices (Compact Development, Directing Development Toward Existing Communities via Infill, Safeguarding ESAs)	Minimize Soil Compaction, Minimize Impervious Footprint, Employ LID	Maintain Existing Riparian Buffers	Trash Receptacles Maintained as Necessary	Site Design and Landscape Planning	Efficient Irrigation
City of Agoura Hills	X	X	X	X	X	X
City of Calabasas	X	X	X	X	X	X
City of Hidden Hills	N/A	X	N/A	X	X	X
City of Westlake Village	X	X	X	X	X	X
County of Los Angeles	X	X	X	X	X	X
Los Angeles County Flood Control District	N/A	N/A	N/A	X	X	N/A

ESA – Endangered Species Act

LID – Low Impact Development

The Development Construction Program will be implemented as written in the Los Angeles County MS4 Permit (Order No. R4-2012-0175 as amended by State Water Board Order WQ 2015-0075).

Table 20: Development Construction Program

Permittee	Require Implementation of Erosion and Sediment Control BMPs	Construction Site Inventory	Construction Plan Review	Construction Site Inspection	Rumble Plates and Portable Equipment Washers	Hydroseeding Slopes Post Grading
City of Agoura Hills	X	X	X	X	X	X
City of Calabasas	X	X	X	X	X	X
City of Hidden Hills	X	X	X	X	X	X
City of Westlake Village	X	X	X	X	X	X
County of Los Angeles	X	X	X	X	X	X
Los Angeles County Flood Control District	N/A	N/A	N/A	N/A	N/A	N/A

The Public Agency Activities Program will be implemented as written in the Los Angeles County MS4 Permit (Order No. R4-2012-0175 as amended by State Water Board Order WQ 2015-0075).

Table 21: Public Agency Activities Program

Permittee	City of Agoura Hills	City of Calabasas	City of Hidden Hills	City of Westlake Village	County of Los Angeles	Los Angeles County Flood Control District
Public Construction Activities	X	X	X	X	X	X
Public Facility Inventory	X	X	X	X	X	X
Inventory of Existing Development for Retrofitting Opportunities	X	X	X	X	X	N/A
Public Agency Facility and Activity Management	X	X	X	X	X	X
Vehicle and Equipment Washing	X	X	X	X	X	X
Landscape, Park and Recreational Facilities Management	X	X	X	X	X	X
Catch Basin Cleaning	X	X	X	X	X	X
Trash Management at Public Events	X	X	X	X	X	N/A
Storm Drain Maintenance	X	X	X	X	X	X
Eliminate Infiltration Seepage from Sanitary Sewers	X	X	X	X	X	N/A
Street, Roads and Parking Facilities Maintenance	X	X	X	X	X	X
Catch Basin Labels	X	X	X	X	X	X
Open Channel Signage	X	X	X	X	X	X
Fueling Areas	X	X	N/A	X	X	X

The Illicit Connections and Illicit Discharge Elimination Program will be implemented as written in the Los Angeles County MS4 Permit (Order No. R4-2012-0175 as amended by State Water Board Order WQ 2015-0075).

Table 22: Illicit Connections and Illicit Discharges Elimination Program

Permittee	IC/IDE Program
City of Agoura Hills	X
City of Calabasas	X
City of Hidden Hills	X
City of Westlake Village	X
County of Los Angeles	X
Los Angeles County Flood Control District	X

In addition to the aforementioned programs and activities implemented by the EWMP Group, The County of Los Angeles has adopted a water conservation ordinance applicable to the Unincorporated Areas of the MCW. The ordinance establishes requirements and proscribes activities for the items listed below:

- Hose watering prohibition.
- Watering of lawns and landscaping.
- Indoor plumbing and fixtures.
- Washing vehicles.
- Public eating places.
- Decorative fountains.
- Procedural requirements.

Similarly, the Las Virgenes Municipal Water District (LVMWD) has adopted several policies to enforce water conservation measures which include the following:

- Irrigation is prohibited between the hours of 10 a.m. and 5 p.m.
- Irrigation may not occur during periods of rain or in the 24 hours following rainfall of an inch or more.
- Irrigation may not run off the property into streets, gutters or onto adjacent properties.
- The washing down of sidewalks, parking areas and driveways is not permitted unless an approved water broom is used.
- A trigger nozzle is required on hoses used for home car washing.
- Hotels and motels must give multi-night guests the option to retain towels and linens during their stay.

In addition to promoting water conservation, these policies assist with the elimination of dry weather MS4 discharges in the watershed.

5.1.2 Existing Source Controls

The Permittees currently employ source control BMPs to prevent the generation and spread of pollutants such as bacteria, trash, and sediment. An inventory of source control BMPs currently implemented by the MCW EWMP Group was performed and the results are presented in Table 23.

Table 23: Existing Source Control BMPs Implemented[1]

BMP Type	Permittee					
	Agoura Hills	Calabasas	Hidden Hills	Westlake Village	County of Los Angeles[2]	Los Angeles County Flood Control District
Covered Material Bunkers	3	-	-	-	2	-
Covered Trash Bins	11	-	-	-	740	-
Dog Parks	-	1	-	1	-	-
Enhanced Street Sweeping	3	-	-	52	3	-
Extra Trash Cans	-	-	-	-	106	-
Restaurant Vent Traps	-	-	-	-	1	-
Bird Deterrent Spikes	-	-	-	-	1	-
Erosion Control	-	-	-	-	1	-
Fiber Rolls	-	-	-	-	50	-
Recycle Bins	-	-	-	-	27	-
Sandbag Barriers	-	-	-	-	2	-
Slope Stabilization	-	-	-	-	1	-

[1] Source: Los Angeles County 2011-12 Municipal Stormwater Permit Unified Annual Report

[2] Represents those BMPs implemented in the Malibu Creek and Rural Santa Monica Bay Watershed identified in the 2001 MS4 Permit

5.1.3 Existing Structural BMPs

A review of the existing structural BMPs identified several regional and distributed BMPs that are operated and maintained within the watershed. Existing regional and distributed BMPs within the watershed are summarized in Table 24 and Table 25, respectively.

Table 24: Existing BMPs

ID	Permittee	Regional BMP Name	Subwatershed	Regional BMP Type
1	City of Calabasas	Las Virgenes near De Anza	Lower Las Virgenes Creek	Infiltration Basin
2	City of Agoura Hills	Agoura Hills Median Bioswale Retrofit	Lower Lindero Creek	Infiltration Bioswale
3	City of Westlake Village	Citywide Median Bioswale Retrofit	Westlake	Infiltration Bioswale

Table 25: Existing Distributed BMPs Installed and Maintained on Public Land[1]

Treatment BMP Type	Permittee					
	Agoura Hills	Calabasas	Hidden Hills	Westlake Village	County of Los Angeles[2]	Los Angeles County Flood Control District
Bioretention	-	1	-	-	-	-
Biofiltration Chamber & Remediation	4	1				
Bioswales	-	-	-	4	-	-
Infiltration Trench	5	-	-	2	12	-
Permeable Pavement	25					
Debris Boom/Net	-	-	-	-	-	1
End-of-Pipe Nets	-	156	-	-	-	-
Floating Trash Booms	2	-	-	1	-	-
Hydrodynamic separators	6	8	-	2	6	-
Inserts and Screens	84	270	-	4	286[3]	-

[1] Source: Los Angeles County 2011-12 Municipal Stormwater Permit Unified Annual Report

[2] Represents those BMPs implemented in the Malibu Creek and Rural Santa Monica Bay Watershed as reported in the 2011-12 Municipal Stormwater Permit Unified Annual Report

[3] Consistent with the submitted 2014-2015 annual report, the County of Los Angeles (County) has completed the installation of 218 full capture devices in the MCW.

5.1.4 Existing Multi-Benefit Projects

Analysis of the Integrated Regional Water Management Plan (IRWMP) for the Greater Los Angeles County Region identified two existing projects that included multiple objectives:

- Citywide Smart Irrigation Control System. The City of Calabasas finished the installation of a citywide Smart Irrigation Controller system in October 2014. The system consolidated 58 pre-existing controllers into 52 weather based evapotranspiration smart controllers. All city-owned and managed facilities such as street parkways, medians, city parks and freeway interchanges have been upgraded to the new system. The overarching goals of the citywide Smart Irrigation Control System is to reduce water used by the City of Calabasas for landscaping purposes by a minimum of 20% while significantly reducing the amount of urban run-off entering both of the watersheds the City of Calabasas straddles. The City of Calabasas began this project before the onset of the State of California's worst drought in recorded history. Water conservation is now an issue of greater importance in California, landscape irrigation is harder and harder to justify as sub-surface water supplies are strained. This technology is essential for the reduction water waste and consumption. Phase two was completed and ready for use in January 2015, and constitutes a major upgrade and expansion of reclaimed water irrigation system on Thousand Oaks Boulevard. Approximately 3½ acres of parkways and medians, 11,000 linear feet of new recycled (purple) irrigation pipe were installed; six remote control valves (RCV) were added; deep watering bubblers were installed on both sides of all trees; and 1,500 drip bubblers were installed for shrub and plant irrigation of the landscaped right of way area.

Figure 7: Las Virgenes Creek Restoration Project Phase I

- The Las Virgenes Creek Restoration Project in the City of Calabasas. The project replaced 400 linear feet of concrete with a native creek side habitat while meeting flood control requirements. The project enhances the biological environment, plant native vegetation, and displays the importance of environmental stewardship to the community's youth through the addition of an educational gazebo. The multiple benefits of the project include water quality improvement, wildlife protection, habitat enhancement, flood control, recreation (including a footpath and trail), and public outreach. Figure 7 above includes photos of the project.
- The City of Calabasas will continue their efforts during the Las Virgenes Creek Restoration - Phase II. The project site is a 1.5 mile reach of Las Virgenes Creek. Phase II project area begins just South of Agoura Road and ends at the Lost Hills road culvert across from Juan Bautista De Anza Park. Throughout this reach, most of the creek maintains a natural soft bottom, in several locations cement structures have been installed to stabilize banks or channelize the stream for short distances. Las Virgenes Creek has been significantly altered from its natural state, including realignment and straightening of the natural channel geometry to a trapezoidal channel. The channel is not geomorphically stable and failing in several areas, notably downstream of Meadow Creek Lane. Invasive plant species have also taken hold. Many areas of the creek bank are failing and continued erosion has significantly increased the sediment and nutrient loading of the creek. The primary goal includes creek and riparian corridor restoration, erosion and sediment control and biotechnical slope and bank stabilization and fish habitat enhancement. This work is to be accomplished in a way that improves channel flood carrying capacity while improving riparian habitat conditions. The restoration effort will cover approximately 27 acres and will take place in 2016. The work will consist of clearing invasive plant species, removing flood flow obstructions, limbing, clearing, and planting native species. Figure 8 below depict the eroded areas that will be repaired as part of this project.

Figure 8: Las Virgenes Creek Restoration Project Phase II

- The MCW Water Conservation Project combines and integrates a project developed by the City of Westlake Village to reduce urban runoff and conserve water on City-owned public lands, with a project developed by the Las Virgenes Municipal Water District (LVMWD) to reduce urban runoff and conserve water on residential parcels in the Watershed. The purpose of this project was to compare the efficiency of four different irrigation scheduling techniques: (1) Soil Moisture Sensors, (2) Atmometer, (3) Reference Plant Evapotranspiration, and (4) Professional Judgment. Each method was used to irrigate 16 individually metered sites (4 replicates) in the City of Westlake Village. The project had three phases. Phase 1 involved measuring each site and collecting 12 months' water use data prior to new equipment installation and/or irrigation scheduling changes. Phase 2 involved installing irrigation controllers, environmental sensors, and communications. Phase 3 included a side-by-side comparison.

5.2 Existing Special Studies

Bacteria are ubiquitous organisms that occur and propagate naturally in both urban and undeveloped settings. Nearly eighty percent of MCW consists of undeveloped land. Because so much of the dry and wet weather flows in Malibu Creek and its tributaries comes from undeveloped land a clear understanding of bacteria sources within the watershed has been elusive.

The County of Los Angeles and the Los Angeles County Flood Control District are currently conducting a Microbial Source Tracking Study to try and determine sources of receiving water bacterial exceedances within the Malibu Creek Watershed. Because existing monitoring sites used to identify bacteria levels are located in receiving water bodies that receive inflows from several sources, including MS4 discharges and overland flow from undeveloped land, existing monitoring data has not elucidated sources of observed bacteria levels. However, it is expected that results of the Microbial Source Tracking Study, in coordination with CIMP monitoring data, will help identify sources of bacteria in the watershed and provide guidance to the EWMP Group in planning future actions. Final results and conclusions from this study were not available in time to include in this EWMP plan. At this point in time, the results of the RAA provide the best guidance to implementation of BMPs in the watershed.

5.3 Enhanced Control Measures

5.3.1 BMP Strategy & Approach

An optimized BMP implementation strategy was developed for the MCW EWMP based on water quality improvement, constructability, multiple benefits, and cost. The BMP hierarchy that resulted from the optimization strategy is shown in Figure 9.

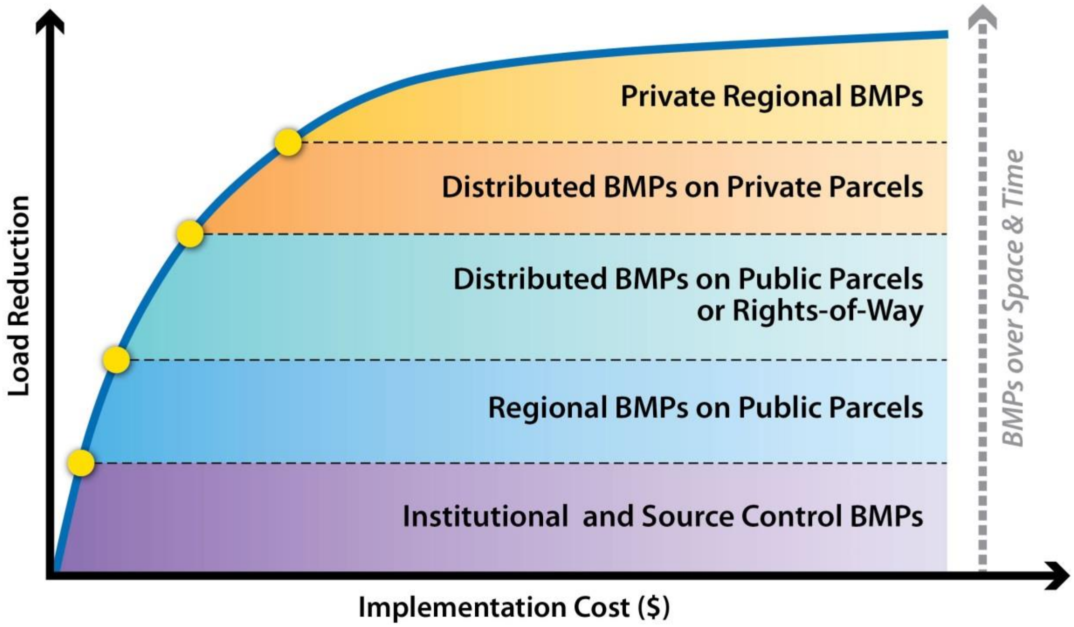

Figure 9: EWMP BMP Hierarchy

This hierarchy provides a guiding principle for evaluating BMPs to meet compliance in the MCW. The BMPs identified in this hierarchy were developed and evaluated for pollutant reduction and integrated into the RAA model that ultimately identifies what BMPs are needed in the watershed to meet permit compliance. The institutional and source controls are discussed in Section 5.3.2, the regional BMPs on public parcels in Section 5.3.3, and the distributed BMPs on public parcels or rights of way in Section 5.3.4.

Based on the initial results of the RAA model, utilizing institutional and source controls alone will not fully achieve compliance for all pollutants of concern. Based on the initial result, additional distributed BMPs on public parcels and rights of way in the form of green streets were evaluated and integrated into the overall BMP implementation approach. With the integration of green streets, compliance was still not fully achieved; therefore, public and private regional BMP’s where identified to treat the required additional volume. The results are detailed in Section 7 of this EWMP. The BMPs identified for implementation are focused on providing treatment of the anthropogenic sources of pollutants in the watershed. The natural sources of pollutants in the MCW require further research for their effects on water quality to be fully understood.

5.3.2 Institutional and Source Control BMPs

As part of the approach identified in the EWMP Work Plan, institutional and source control BMPs are the first to be implemented in the watershed, and their implementation will reduce the number of structural BMPs needed. The approach for implementing institutional and source control BMPs is based on managing the sources of the primary pollutants of concern in the MCW. The primary pollutants of concern in the watershed are bacteria, nutrients, and trash. The listing of institutional and source controls was organized by the primary pollutant of concern they are designed to remove (Table 26). The institutional and source control BMPs identified in this section were integrated into the RAA and a schedule for their implementation is identified in Section 7.2.1. Although the MCW EWMP Group has requested a Time Schedule Order for the dry-weather requirements of the Malibu Creek Bacteria TMDL, the institutional and source controls identified in this section—in particular, Section 5.3.2.2 Bacteria, and the Non-

Stormwater Controls in Section 7.4—as well as identified structural BMPs, serve as the elements of the strategy to achieve water quality-based effluent limitations established by the Malibu Creek Bacteria TMDL.

5.3.2.1 Bacteria

The institutional and source controls proposed in the MCW EWMP build upon previous work that identified BMP effectiveness. The bacteria institutional and source control BMPs selected for implementation in the MCW were based on the 2006 Los Angeles County Technical Memo[4] that evaluated the effectiveness of non-structural BMPs for compliance with the MCW Dry- and Wet-Weather Bacteria TMDL. The bacteria institutional and source control BMPs selected for the MCW EWMP are the non-structural BMPs from the 2006 LA County tech memo that:

- Were rated with an above average effectiveness rating for reducing bacteria and a low or medium risk of implementation;
- Had applicability to both wet and dry weather; and
- Were not currently being implemented in the watershed.

The selected institutional and source controls to address sources of bacteria in the MCW were integrated into the water quality model and are described in the following subsections. Based on the discussion in Section 5.3.2.5, the institutional source controls identified below were allocated a 5% reduction of bacteria in the RAA water quality model for the MCW.

5.3.2.1.1 Pet Waste

Pet waste can be a significant source of bacteria in urban areas. The following source control BMPs, effective in reducing pet waste, were identified as part of the bacteria source control strategy for implementation in the MCW:

Outreach to Pet Owners Linking Waste to Bacterial Loading – Direct outreach to pet owners in the MCW will be performed to educate the pet owners that there is a link between animal wastes and bacteria concentrations in water bodies. The outreach will include development of outreach materials that provide information about this linkage and why it is important to collect pet waste. The outreach materials will also include information regarding the linkage of nutrient loading to pet waste.

Pet Waste Bag Dispensers – Pet waste bag dispensers will be placed at high pet traffic locations in the watershed. An analysis of the high pet traffic locations will be performed for the watershed including key locations, such as trailheads and parks. In addition to the dispensers, interpretive signs will be placed that educate pet owners about the linkage of animal wastes and bacteria concentrations in water bodies and why it is important to pick up after your pet. These interpretive signs will also include information on the linkage of nutrient loading to pet waste.

Pet Store/Vet/Shelter POS Campaign – Outreach materials regarding the link between pets and bacterial loading of water bodies will be developed and placed at pet related point of sale facilities in the MCW, which will provide critical information to pet owners at high pet owner traffic areas. The outreach materials will also provide information regarding the linkage of nutrient loading to pet waste.

[4] Los Angeles County Watershed Management Division. (2006). Final Technical Memorandum Task 4.4: Evaluation of Non-Structural BMP Options. http://www.cityofcalabasas.com/pdf/documents/environmental-services/malibu-creek-watershed-bacteria/Appendix-B/Final-TM-4-4.pdf

5.3.2.1.2 Trash Receptacles

Trash receptacles have the potential to be a significant source of bacteria if not properly used and maintained. The following source control and institutional measures to reduce bacteria discharging from trash receptacles were identified as part of the bacteria source control strategy for the MCW.

Signs on or near Trash Dumpsters to Keep Lids Closed – The primary issue related to bacteria for trash receptacles is that lids are left off, which allows for the receptacle to collect rainwater. The rainwater then leaks out of the receptacle carrying bacteria. To address this issue, signage instructing residents to keep the lids closed will be posted on or near all trash dumpsters in the MCW. This measure will also help reduce trash discharge in the watershed.

Letters and Outreach Materials to Trash Haulers and Businesses – Trash haulers have a significant impact on how waste receptacles are managed, operated and maintained, resulting in potential discharge of bacteria. Letters will be periodically sent to all trash haulers and businesses operating in the MCW that will identify the issue of keeping lids closed and other effective management practices for trash dumpsters and receptacles. Outreach materials related to bacteria and trash in the watershed will also be provided with the letters. This measure also helps reduce trash discharge in the watershed.

Properly Designed Trash Storage Areas – Ensuring that trash storage areas are designed effectively will help to prevent the discharge of bacteria. Proper design of trash storage areas is part of the source control strategy for bacteria in the MCW and will be required by each jurisdiction[5] in the MCW. New trash storage areas must either have drainage from adjoining roofs and pavement diverted around the trash storage areas or should be designed with roofs to prevent rainwater from entering the trash receptacles. This measure also helps reduce trash discharge in the watershed.

Increase Frequency of Trash Collection at Restaurants – A potential source of bacteria from restaurants is overflowing trash receptacles. This measure will pursue requiring restaurants that have consistently overflowing trash receptacles to increase the frequency of trash collection to twice the current frequency. This measure will also help reduce trash discharge in the watershed.

5.3.2.1.3 Equestrian/Livestock Facilities

Equestrian and livestock facilities were identified as a potential source of bacteria and nutrient loading in the MCW. The measures identified in this section are designed to significantly reduce the discharge of these pollutants from equestrian facilities in the watershed.

Update the Inventory of Areas with Confined Animals – An update of the confined animal facilities will be performed in the MCW periodically.

Create Updated Equestrian BMP Outreach Materials and Equestrian/Livestock Facility Education – Outreach materials for equestrian and livestock facilities that would identify effective best management practices to reduce the discharge of bacteria from these facilities will be developed. The materials will be distributed to all of the equestrian and livestock facilities in the watershed and outreach will be performed for each facility periodically, but at least once each permit term.

Outreach for Equestrian Users Emphasizing Cleaning up After Horses & Post Signs at City and County-owned Trailheads – Outreach information will be developed and provided to equestrian users regarding

[5] Unincorporated Los Angeles County is covered in the Watershed by the Santa Monica Mountains Local Coastal Program, Local Implementation Plan (Adopted 2014) which already includes requirement 22.44.1340 Water Resources F.8. Commercial, industrial, and multi-unit residential trash storage areas must have drainage from adjoining roofs and pavement diverted around the area, must be screened or walled to prevent off-site transport of trash, and shall be inspected and cleaned regularly.

horse waste and the importance of cleaning up horse waste. Additionally, signs will be posted at City and County-owned trailheads designated for equestrian users to clean up horse waste. The signs will also require equestrian users to not clean out horse trailers in parking lots.

Exclusion Fences – Bacteria and nutrient loading to streams can be reduced through the installation of exclusion fences in areas of the watershed where livestock and horses graze. Implementation of exclusion fences will be required where there is a potential for livestock and horses to graze adjacent to watercourses.[6] This control measure will be pursued by the cities in the watershed where grazing is present. Costs associated with installing exclusion fences on property where livestock and/or horses were not previously present will be the responsibility of the property owner. This control measure also includes educating the owners of the equestrian and livestock facilities on the use of exclusion fences.

Manure Management[7] – Outreach materials will be developed and provided to those facilities that manage manure. The manure can either be composted or stored prior to disposal in a manner that will prevent the manure from coming into contact with runoff and precipitation. This control measure also requires soiled bedding and manure to be removed from stalls on a daily basis and stored in seepage free containers prior to disposal. Manure stockpiles will also be restricted in concentrated flow paths or adjacent to receiving waters. Implementation of this control measure will be pursued to apply to those facilities related to animals and manure management.

5.3.2.2 Nutrients

Nutrients are difficult to control in the MCW, as there are significant natural sources of nutrients in the watershed that are not under the control of the EWMP Group. The institutional and source controls identified below are focused on reducing nutrients; however, many of the bacteria institutional and source controls identified above also reduce nutrients. Based on the discussion in Section 5.3.2.5, the nutrient institutional source controls identified below, in addition to the bacteria source controls (which also reduce nutrients), were allocated a 5% reduction of nutrients in the RAA water quality model for the MCW.

5.3.2.2.1 Educational Materials and Workshops on Water Efficient Landscaping & Fertilizer Reduction

Education materials for water efficient landscaping, as well as landscape irrigation and fertilizer reduction will be developed for distribution in the MCW. These materials will be used in workshops to encourage residents and businesses in the watershed to implement water efficient landscaping, eliminate over irrigation, and reduce fertilizer application. These workshops may be co-developed with UC Extension or environmental groups, such as the Surfrider Foundation with their Ocean Friendly Gardens program. This measure also helps reduce bacteria discharge in the watershed. This measure will be implemented early as part of the EWMP and will contribute to 100% elimination of non-stormwater flows by December 2017 as identified in Section 7.4 of the EWMP.

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[6] Unincorporated Los Angeles County is covered in the Watershed by the Santa Monica Mountains Local Coastal Program, Local Implementation Plan) which already includes requirement 22.44.1450 Livestock and Equine Management that includes provisions for the exclusion of livestock and horses from streams/drainage courses, wetlands, and within 100 feet of the outer edge of any riparian habitat or a natural drainage course.

[7] Unincorporated Los Angeles County is covered in the Watershed by the Santa Monica Mountains Local Coastal Program, Local Implementation Plan (Adopted 2014) which already includes requirement 22.44.1450 Livestock and Equine Management that includes provisions for proper manure management.

5.3.2.3 Trash

Trash is primarily being addressed by the installation of full capture trash devices in the majority of the watershed. However, additional trash controls identified in this section are also being implemented to decrease trash in the watershed.

Street Sweeping – Street sweeping is a measure that reduces trash discharges. Each of the municipalities will continue to sweep streets and will evaluate the potential for enhanced street sweeping in their jurisdiction. In addition, the current street sweeping programs will be enhanced with advanced sweeping technologies in residential areas that require additional pollutant reduction when the contracts are re-bid. As part of the advanced sweeping technologies, the County, as well as the City of Calabasas, will be implementing Regenerative Air Street Sweepers. The County, which currently operates its own fleet of three street sweepers in MCW, has already replaced one of its traditional broom sweepers with a regenerative air sweeper and expects to replace several additional traditional sweepers throughout the County as the existing equipment reaches the end of its useful life. The current contract for the City of Calabasas is up for re-bid by the summer of 2016. Both the County and City of Calabasas will be implementing this advanced technology before the end of 2016. The City of Agoura Hills' street sweeping contract is up for rebid in June 2016. A request for proposal (RFP) will be distributed in three months and will include a request for advanced street sweeping technologies. The City of Hidden Hills is a gated community managed by a homeowners association, which also provides street sweeping, and as a result, is not in control of street sweeping contracts. The City of Westlake Village' street sweeping contract is up for rebid in April 2017 and will be implementing vacuum sweeper technology.

Storm Drain Marking – Storm drain stencils are highly visible source controls that are typically placed adjacent to storm drain inlets. The stencil contains a brief statement that dumping of improper materials into the storm water conveyance system is prohibited. All jurisdictions in the watershed will continue to stencil or mark all storm drain inlets in their jurisdiction. The stencil will state "NO DUMPING – DRAINS TO OCEAN" or similar.

Trash Receptacles – Each jurisdiction has installed public trash receptacles within their jurisdiction and will continue to manage these receptacles with best practices and evaluate the placement of additional trash receptacles at high trash generation locations within their jurisdictions. This measure also helps reduce bacteria discharge in the watershed.

Creek Cleanups – Each City in the watershed will host at least one creek cleanup on a creek in their jurisdiction annually. These cleanups provide an opportunity to educate the public about litter and the environmental problems it causes. These cleanups can be done in coordination with environmental groups in the watershed.

5.3.2.4 Institutional Controls Pollutant Removal Matrix

Many of the institutional controls identified for implementation in the MCW remove multiple pollutants of concern. Table 26 identifies the pollutants of concern that are removed by the institutional and source controls that will be implemented as part of the EWMP. The multiple pollutants removed also support the 5% reduction of both bacteria and nutrients for the institutional and source controls in the MCW water quality model.

Table 26: Matrix of Associated Pollutants for Enhanced Institutional and Source Controls

Institutional/Source Control	Pollutants		
	Bacteria	Nutrients	Trash
Pet Waste			
Outreach to pet owners linking waste to bacterial loading	X	X	

Institutional/Source Control	Pollutants		
	Bacteria	Nutrients	Trash
Pet waste bag dispensers	X	X	
Pet store/vet/shelter POS campaign	X	X	
Trash Receptacles			
Signs on or near trash receptacles to keep lids closed	X		X
Letters and outreach materials to trash haulers and businesses	X		X
Properly design trash storage areas	X		X
Industrial Commercial			
Increase frequency of trash collection at restaurants	X		X
Equestrian/Livestock Facilities			
Update the inventory of areas with confined animals and educate property owners on bacteria	X	X	
Create updated equestrian BMP outreach materials and equestrian/livestock facility education	X	X	
Outreach for equestrian users emphasizing cleaning up after horses; post signs at city and county-owned trailheads	X	X	
Exclusion fences	X	X	
Manure management	X	X	
Education materials and workshops on water efficient landscaping & fertilizer reduction	X	X	
Trash			
Advanced street sweeping	X		X
Storm drain marking			X
Trash receptacles	X		X
Creek cleanups			X

5.3.2.5 Institutional and Source Control BMPs Performance Analysis

Performance of the institutional and source control management practices listed in Table 26 above is difficult to quantify. This is a result of both a lack of literature information and thus a lack of clear consensus on their ability to remove pollutant load, and a high level of variability in effectiveness within different watersheds. The MCW EWMP approach to evaluating the possible benefits is to apply a cumulative effect calculation. The cumulative effect calculation has been applied to specific pollutants in particular types of discharges. The calculated reductions are designed to reflect a conservatively low estimation of the cumulative effect of the institutional and source control BMPs identified above. For trash, implementation of full capture devices throughout the developed portion of the watershed, in combination with the institutional and source controls for trash, is expected to meet the trash reduction requirements identified in the Malibu Creek Trash TMDL.

MCW EWMP source control load reductions applied in the RAA model are focused on bacteria and nutrients. Many of these BMPs may also have benefits for others pollutants, such as sediment and lead; however, they are not quantified in the RAA model, as additional study would be needed to quantify the removal benefits for these other pollutants. Trash is not included in the RAA model and thus the benefits of these BMPs will be discussed with TMRP compliance in the following sections. Based on the proposed institutional and source control BMPs identified above, the following cumulative reductions were incorporated into the RAA model; however actual load reductions achieved may be more or less than modeled and will be updated as CIMP monitoring data becomes available:

- Urban sources of bacteria – 5%
- Urban sources of total nitrogen – 5%
- Urban sources of total phosphorus – 5%
- Horse facilities sources of bacteria – 5%

- Horse facilities sources of total nitrogen – 5%
- Horse facilities sources of total phosphorus – 5%

5.3.3 Regional Structural BMPs

Regional structural BMPs on public parcels are the second step in the MCW EWMP BMP implementation hierarchy. Regional BMPs are defined as multi-benefit regional projects that, wherever feasible, retain (i) all non-storm water runoff and (ii) all storm water runoff from the 85th percentile, 24-hour storm event for the drainage areas tributary to the projects, while also achieving other benefits including flood control and water conservation.

Additionally, one streamflow treatment/retention facility at site MEC-12 is proposed for implementation in the MCW. This facility serves as a stormwater harvest and use system, which will remove streamflow, provide treatment, and retain the captured streamflow for non-potable uses. Runoff that is captured and treated as part of this Project can be used for a variety of applications to offset potable water demand. In the Los Angeles area, treated urban runoff has been used for surface irrigation, toilet flushing, and industrial applications. Urban runoff can also be used for subsurface irrigation without requiring treatment. The City is currently widening Agoura Road, which is set to be completed in early 2016. The City of Agoura Hills has evaluated using the treated water from this Project to offset irrigation demand corresponding with the Agoura Road median and parkway planters, as Agoura Road is located adjacent to the Project site and will incorporate a variety of planting once the project is complete. Additionally the city has explored the treatment to be integrated into the project including UV treatment and ozone treatment.

When these regional BMPs on public parcels are exhausted distributed BMPs on public parcels will be implemented. The approach used to identify the regional BMPs is identified in Section 5.3.3.1.

5.3.3.1 Approach for Identification of Regional BMP Projects

This section of the EWMP describes the efforts to identify and evaluate potential regional project opportunities for integrating structural BMPs and to develop a prioritized list of regional BMP projects to improve water quality associated with developed areas within the watershed. Potential regional structural BMPs include infiltration basins, underground infiltration chambers, extended detention basins, subsurface wetlands, riparian enhancements, free surface flow wetlands or a treatment train consisting of a combination of such BMPs.

The Watershed was surveyed for opportunities using the following information:

Aerial Imagery Information – Aerial photography from the 2011 Los Angeles Region Imagery Acquisition Consortium (LAR-IAC) dataset provides an accurate understanding of the local land uses, terrain, and density of vegetation, physical obstructions, and utilities. Specific land uses such as parks, parking lots, and open space that are potentially suitable for the implementation of regional facilities were of particular interest.

Ownership of parcels – Parcels in GIS format provided by the different Permittees typically include information related to the ownership and the assessor's estimate of the parcel. Some of the potential sites identified are owned by government agencies or conservation organizations, including the United States Government, the California Mountain Recreation and Conservation Authority (MRCA), and the California State Parks. Public parcels including county-owned parcels, municipal parks, and municipal golf courses were carefully evaluated for opportunities.

Tributary Area Served – The identification process focuses on sub-regional and regional-scale opportunities to use maximum drainage area for retention or treatment by a structural BMP. Parcels that are adjacent to channels draining mostly natural tributary drainage area will be considered as low-priority regional opportunities. The topography helped delineate the tributary areas.

Proximity to Existing Drainage Facilities – Cost-effectiveness of the regional opportunities is partly driven by the need for offsite infrastructure improvements, including diversion structures and piping. The investigation focused on sites adjacent to or near significant named streams, improved channels, and storm drains. Regional BMPs that receive discharges through gravity were preferred in the effort to minimize high operation and maintenance costs associated with the implementation of pumps and lift stations, and increase the overall reliability of the BMPs constructed.

Topography – The 2-foot contours helped evaluate whether reasonable hydraulic modifications and infrastructures are necessary, or if stormwater can gravity drain to and from the regional facility.

5.3.3.1.1 Identification of Regional *BMP Projects in the MCW*

The initial phase of the BMP site selection process included using geographic information systems (GIS) analysis, aerial topography, storm drain information, and geotechnical information to find locations for placement of regional BMPs. The following factors were considered when identifying potential suitable BMP site locations: land availability, topography, hydrology, existing storm water infrastructure, land ownership, physical site constraints, maintenance access, and areas of high pollutant loading. Forty-one new sites were identified and analyzed in addition to the existing 113 sites incorporated from the MCW Feasibility Study (Los Angeles County Department of Public Works (LACDPW), 2010). A limited number of potential regional BMP sites in the MCW were feasible due to constraints such as topography, proximity to stormwater infrastructure, geotechnical considerations, and other site constraints.

Most of the regional BMP sites identified are located in the relatively urbanized areas of MCW. These sites are located in public parks or open land and are the most effective in pollutant removal because the tributary runoff is mostly from developed areas. Site screening was conducted within the developed areas of Agoura Hills, Calabasas, Hidden Hills and Westlake Village and the unincorporated LA County area. Some of the potential regional BMP locations were not considered in the final process because there was little to no drainage area, no soil permeability, and/or no storm drain near the site. The following subsections identify the elements of the approach used for the identification of specific regional BMP types in the MCW.

5.3.3.1.2 BMP Information

The following provides brief descriptions of the types of BMP evaluated for integration as regional BMPs. Pollutant removal information and maintenance information for these BMPs is provided in Table 27.

- **Infiltration basins and/or underground infiltration chambers** are designed to decrease runoff volume through groundwater recharge and remove pollutants through filtration, as well as biological and chemical reactions within the soil matrix. Infiltration basin facilities are built within permeable soils that provide temporary storage of stormwater runoff and do not typically include a structural outlet (Figure 10).

Figure 10: Infiltration Basin

- **Extended detention basins** have outlets designed to detain stormwater runoff from a water quality design storm for a designated period of 36 to 48 hours to allow particles and associated pollutants to settle out of the water column. Unlike wet ponds, these facilities do not have a large permanent pool that is sustained during dry periods. Extended detention ponds can also provide flood control benefits if they are designed to include additional flood detention storage (Figure 11).

Figure 11: Extended Detention Basin

- **Constructed wetlands or wet basins** offer wildlife habitat, erosion control, surface water storage, flood control, ground water recharge, and pollutant removal. Constructed wetlands and wet basins have a permanent pool of water and pollutant removal is achieved through settling and biological uptake of wetland plants (Figure 12).

Figure 12: Wetland Basin

- **Bioretention areas** are LID BMPs that reduce stormwater runoff by intercepting rainfall on a vegetative canopy, and through evapotranspiration and infiltration reduce the volume of stormwater runoff from a drainage area. A bioretention system typically includes an up to 3-foot top layer of a specified soil and compost mixture underlain by a gravel-filled temporary storage pit dug into the in-situ soil. The design of bioretention areas typically includes an overflow drain for larger storm events but may not include an underdrain. An underdrain is used when soils are not adequate for infiltration, so the bioretention system can drain. Bioretention systems provide the benefit of reducing the volume of stormwater runoff and retaining the pollutants in the stormwater runoff. Bioretention typically can be integrated into landscaping (Figure 13).

Figure 13: Bioretention BMP

- **Biofiltration devices** are LID BMPs that reduce stormwater pollutant discharges by intercepting rainfall on a vegetative canopy, through infiltration treatment and/or evapotranspiration, filtration, and other biological and chemical processes. As stormwater passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded, and sequestered by the soil and plants (Figure 14).

Figure 14: Biofiltration Device

- **Media filters** are usually two-chambered, including a pretreatment settling basin and a filter bed filled with sand or other absorptive filtering media. As stormwater flows into the first chamber, large particles settle out, and then finer particles and other pollutants are removed as stormwater flows through the filtering media in the second chamber (Figure 15).

Figure 15: Media Filter

Table 27: BMP Pollutant Removal and Maintenance

BMP Type	Maintenance Activity	Pollutant Removal Benefit[1] (MCW Pollutants of Concern)				
		Bacteria	Nutrients	Trash	Metals	TSS
Bioretention	• Annual inspection of structural components • Trash removal • Inspection for adequate drain time • Vegetation/mulch maintenance and replacement	High	Medium	High	High	High
Infiltration Basin	• Inspection for adequate drain time • Trash removal • Sediment removal • Vegetation trimming	High	High	High	High	High
Infiltration Chamber	• Inspect for infiltration performance (fouling, blockage, damage,) • equipment repair/maintenance • Sediment removal (vacuum) • Trash removal	High	High	High	High	High
Extended Detention Basin	• Inspection for adequate drain time • Trash removal • Sediment removal • Vegetation trimming	Low	Low	High	Medium	Medium
Wet Basin/ Constructed Wetlands	• Inspection for adequate drain time • Sediment removal • Vegetation thinning/trimming • Vector control	High	Medium	High	High	High
Media Filter	• Inspection for adequate drain time • Sedimentation chamber: trash removal and sediment removal • Media chamber: media replacement	Low	Low	High	High	High

[1] Source: California Stormwater Quality Association (CASQA) BMP Handbook

5.3.3.1.3 Desktop Survey

The approach for identifying potential structural BMP site locations included the development of site selection criteria that was used in performing a desktop survey using GIS and relevant GIS layers as well as aerial imagery. The BMP siting and selection tasks were as follows:

- Identifying the boundaries of the applicable jurisdictions in the MCW;
- Identifying public and private vacant parcels with nearby storm drains on fairly moderate to flat slopes and limited physical obstructions;
- Identifying tributary drainage areas larger than 10 acres;
- Identifying the type of soil within the potential location;
- Identifying the available potential BMP footprint;
- Identifying the parcel owner; and
- Identifying the type of BMP that compliments the potential site constraints.

Hydrologic soil data was developed by Fugro Consultants based on a U.S. Department of Agriculture soils map and used as a preliminary indicator to identify whether an infiltration BMP was feasible at each site.

5.3.3.1.4 BMP *Selection & Sizing*

When selecting the type of BMP, the hierarchy of BMPs was considered in the order of retention (highest priority), biofiltration, and detention (lowest priority). BMPs considered in the BMP preliminary sizing methodology were those BMPs identified in Section 5.3.3.1.2 as well as low flow diversions. It should be noted that potential low flow diversions were considered, however after discussions with Las Virgenes Municipal Water District (LVMWD) it was determined that low flow diversions to their sanitary sewer were not feasible. Retention was the preferred option for all regional projects, site constraints permitting. If site constraints prohibited retention, other BMPs were used and the RAA was completed for the areas where retention is not feasible for the 90th percentile storm. Retention of the 85th percentile, 24-hour storm event is feasible and is planned for the drainage areas of regional BMP sites TC-02 and LVC-14. For the other drainage areas of the watershed, the RAA demonstrates that the proposed watershed control measures will achieve the water quality based effluent limitations and receiving water limitations.

Design considerations for the listed BMPs were assessed from the *Stormwater BMP Design and Maintenance Manual* (LACDPW, 2009), as well as from the California Stormwater Quality Association (CASQA) *New Development and Redevelopment Handbook* Treatment Control BMPs Fact Sheets (CASQA, 2004). General design considerations include:

- Maximizing the hydraulic residence time (HRT) flow-based BMPs, such as dry vegetated swales.
- Minimizing the effective depth of ponding water in volumetric-based BMPs to promote both the exposure to ultraviolet rays and the presence of riparian vegetation, increasing the treatment capabilities for bacteria.
- Maximizing the flow path in detention and retention basins by increasing the length-to-width ratio (L: W).
- Maximizing the HRT for BMPs to remove pollutants in an engineered media, such as bioretention systems and sand media filters by increasing media filter thickness and decreasing matrix hydraulic conductivity (the amount of void spaces).

Although the final sizing of the regional BMP locations was later performed as part of the BMP modeling for the RAA, the objective of preliminary sizing was to maximize, site-by-site, the water quality benefits associated with implementing each BMP. The objective consisted of finding an effective balance between maximizing the volume of water to be captured and treated, and optimizing the removal capabilities of each BMP. Constraints considered in the preliminary sizing included type of BMP, available footprint, and removal efficiency.

5.3.3.1.5 *Initial BMP Prioritization*

Potential locations for the regional BMP projects based on the desktop survey results and the potential sites from the Malibu Creek Watershed Feasibility Study (LACDPW, 2010) were prioritized using the BMP prioritization methodology identified below. This initial prioritization provided the baseline for identifying the sites with the greatest potential to retain the volume equivalent to the 85th percentile, 24-hour storm event. Based on the BMP prioritization method, a preliminary list of regional BMP project sites was developed. Ultimately, the results of the BMP modeling as part of the RAA, provided in Section 6, finalized the prioritization for the regional BMP project sites.

<u>Initial BMP Prioritization Methodology</u>

This section explains the methodology used for initial prioritization of the identified potential BMP sites. The initial BMP prioritization allowed the MCW EWMP Group to rank potential BMPs based on their capacity to effectively treat the tributary water quality volume. The ranking process is based on the development of a benefit score that is obtained through evaluation of independent variables. The applied methodology is an alternative to the method presented in the Structural BMP Prioritization Methodology manual (LACDPW, 2006). The overall benefit score considers three independent scores defined by:

- BMP Type (40%)
- Water quality volume (20%)
- Pollutants of concern within a sub watershed (40%)

BMP Type

The best available BMP type for removing pollutants are retention BMPs (such as an infiltration basin), however retention BMPs are not always feasible based on site constraints. In situations where retention BMPs are infeasible, other BMPs such as biofiltration facilities, have been selected but are not as effective as retention BMPs. These alternative BMPs received a lower weighted score, reducing their priority ranking.

Water Quality Volume

The second factor in scoring regional project sites was the storage volume of a BMP in relation to its drainage area. If an infiltration BMP has a storage capacity of 20 acre-feet compared to another with 5 acre-feet with similar drainage area, then the 20 acre-foot BMP will have a greater weighted score. Water quality volumes are the best metric to reduce pollutant loads and the score is represented by the storage of one BMP ($WQVi$) divided by the BMP that has the most storage ($WQV(MAX)$). This will generate a weighted score with the highest potential score of 1 ($\frac{WQV(MAX)}{WQV(MAX)}$).

Subwatershed Pollutant Ranking

Considering that E. coli and total phosphorus are the “limiting pollutants” for wet weather and E. coli for dry weather, as identified by the RAA, Table 28 provides a ranking of each subwatershed’s potential for pollutant reduction. Each subwatershed is ranked “High”, “Medium”, or “Low”, with “High” being the greatest potential for pollutant reduction. Together with Table 29, a numerical value is assigned to each of the subwatersheds.

Table 28: Subwatershed Pollutant Ranking

Subwatershed	Ranking Priority
Westlake	High
Lower Lindero Creek	High
Malibu Lagoon	High
Upper Lindero Creek	High
Upper Medea Creek	High
Lower Las Virgenes	High
Potrero Canyon Creek	High
Hidden Valley Creek	High
Stokes Creek	High
Lower Medea Creek	High
Middle Malibu Creek	Medium
Lower Malibu Creek	Medium
Upper Las Virgenes	Medium
Palo Comado Creek	Medium
Cheseboro Creek	Medium
Triunfo Creek	Low
Cold Creek	Low
Upper Malibu Creek	Low

Table 29: Subwatershed Prioritization Sub-factor

Ranking Priority	Sub-factor
High	1.00
Medium	0.75
Low	0.50

This numeric value for the subwatersheds is shown as a weighted sub-factor in Table 30. Additionally, Table 30 includes a weighted sub-factor for BMP Type and Water Quality Volume.

Table 30: Prioritization Weighting Factors

<table>
<tr><th>Key factors</th><th>Sub-factors</th><th>Variables</th><th>Weights</th><th>Percent Weight</th></tr>
<tr><td rowspan="7">Water Quality Benefits</td><td rowspan="3">BMP Type</td><td>Retention</td><td>1.00</td><td rowspan="3">40%</td></tr>
<tr><td>Biofiltration</td><td>0.500</td></tr>
<tr><td>Detention</td><td>0.250</td></tr>
<tr><td>Water Quality Volume</td><td>$\frac{WQVi}{WQV(MAX)}$</td><td>1</td><td>20%</td></tr>
<tr><td rowspan="3">Subwatershed Pollutant Ranking</td><td>High</td><td>1</td><td rowspan="3">40%</td></tr>
<tr><td>Medium</td><td>0.75</td></tr>
<tr><td>Low</td><td>0.5</td></tr>
<tr><td colspan="3">OVERALL WATER QUALITY SCORE</td><td></td><td>100%</td></tr>
</table>

A resultant value of 1 corresponds to the best BMP option. Resultant values of less than 1 are less desirable, however, the higher the value the better. In conducting the BMP prioritization and preparing the preliminary list of regional BMP projects, only water quality was evaluated. The rationale behind the initial prioritization weighting of factors of 40% for BMP Type, 20% for Water Quality Volume, and 40% for Subwatershed Pollutant Rankings is based on 1) prioritizing retention based BMPs which assists significantly with achieving water quality objectives in the MCW and 2) focusing on addressing those subwatersheds where the “limiting pollutants” are an impairment.

The Regional BMP Projects were then placed into three tiers (A, B, and C). The Tier A projects are the highest priority projects and will be the first projects to be implemented. The B projects are the next set of projects for implementation, and will be implemented after the Tier A projects. Tier C projects were projects located on private parcels and will be implemented last due to the cost and complex nature of land acquisition or obtaining easements. The selection and prioritization process for projects on private parcel BMPs followed the same selection and prioritization process, for the regional BMPs located within the public right of way. Timeframes for implementation of the public and private regional BMPs are identified in Section 7 and the associated Section 7 appendices.

5.3.3.1.6 *Cost Estimates*

Detailed costs estimates were developed using line item estimation for all the elements for construction of the BMPs. Estimation was based on construction of similar BMP projects. Additional information on the cost analysis can be found in Section 8.

5.3.3.1.7 Constructability Analysis

A constructability analysis was performed for each of the identified regional BMP sites in order to understand if a BMP was feasible for construction. The constructability was determined by analysis of the following information for each BMP site:

- Is the slope less than or equal to 5%;
- Is the BMP footprint within 100 feet of bridges and wells, and/or within 20 feet of buildings, slopes or pavement;
- Does the BMP treat more than runoff from roadway;
- Is there potential for maintenance access; and
- Are the site’s soil properties favorable for infiltration.

Those BMPs where the answer to all of the information above is positive were deemed to have a high constructability rating.

5.3.3.1.8 *Preliminary Environmental Analysis*

A preliminary Environmental Analysis was conducted for the regional BMP project sites. The preliminary Environmental Analysis provides a preliminary review of applicable environmental and regulatory permitting regulations of the proposed structural BMP construction throughout the MCW, specifically within the context of the California Environmental Quality Act (CEQA), National Environmental Policy Act (NEPA), Section 404 of the Clean Water Act (CWA), Section 10 of the Rivers and Harbors Act, the California Porter-Cologne Water Quality Control Act, the California Coastal Act, and Sections 1600-1616 of the California Fish and Game Code.

The environmental review identified in the analysis is patterned after the Initial Study Checklist recommended by the CEQA Guidelines for the environmental review process. While not a formal CEQA document, the analysis was intended to provide a preliminary review of the general topical areas discussed under CEQA for future analysis. Potential environmental and regulatory boundaries were evaluated based on above-ground observations within the proposed approximate BMP footprints. While in the field, environmental constraints, jurisdictional areas and potentially sensitive habitat (e.g., oak trees and vegetation) were recorded. All sites were walked as access permitted. For areas with limited access, visual observations were made from public rights-of-way.

5.3.3.1.9 *Geotechnical Studies*

Geotechnical studies were completed for eight regional BMP sites. Field exploration included drilling two temporary borings and three temporary wells to a maximum target borehole depth of 30 feet and 15 feet or less if groundwater or refusal was encountered, respectively. Three constant- or falling-head permeability tests were conducted in each hole, and the groundwater levels were monitored. Laboratory Testing was conducted by taking undisturbed ring samples. Permeability (vertical flow rate) tests were conducted and verified the 10-foot minimum vertical separation from the groundwater level to the proposed BMP invert.

5.3.3.2 Proposed Regional BMP

The list of proposed regional BMP projects for implementation in the MCW is identified in Table 31 below. A map showing the locations of the proposed regional BMPs is given in Figure 16.

The list of proposed regional BMPs (Table 31) identified for implementation in the MCW includes the following information:

- BMP site ID with abbreviation by subwatershed
- BMP type
- Jurisdiction implementing the BMP
- Parcel ownership
- BMP footprint
- Tiered Ranking

Table 31: List of Regional BMPs

Site ID	BMP Type	Implementing Jurisdiction	Parcel Ownership	BMP Footprint (ac)	BMP Volume (ac-ft)	BMP DA 85th % Volume (ac-ft)[1]	Design Date	Completion Date	Water Quality Ranking Tier	Multiple Benefits
TC-02	Bioretention	LA County	LA County	0.19	0.875	0.735	12/2019	07/2021	A	Flow Reduction, Groundwater Recharge, Habitat
LVC-14	Regional EWMP Project - Infiltration Chamber/Stormwater Harvest and Use	LA County	LA County/City of Calabasas	0.49	3.00	2.99	08/2017	12/2017	A	Flow Reduction, Groundwater Recharge or Water Supply
TC-37	Infiltration Basin	Westlake Village	City of Westlake Village	1.590	3.18	1.2	12/2019	07/2021	A	Flow Reduction, Groundwater Recharge
MEC-12	Streamflow Capture Facility – Infiltration Chamber/ Stormwater Harvest and Use	Agoura Hills	LA County Flood Control District	0.21	0.42	N/A[2]	12/2019	07/2021	A	Flow Reduction, Groundwater Recharge or Water Supply

Site ID	BMP Type	Implementing Jurisdiction	Parcel Ownership	BMP Footprint (ac)	BMP Volume (ac-ft)	BMP DA 85th % Volume (ac-ft)[1]	Design Date	Completion Date	Water Quality Ranking Tier	Multiple Benefits
TC-35	Stormwater Harvest and Use	Westlake Village	City of Westlake Village	0.55	1.10	18.18	12/2019	07/2021	B	Flow Reduction, Water Supply
LC-02	Infiltration Chambers/ Stormwater Harvest and Use	Agoura Hills	City of Agoura Hills	0.43	0.86	1.09	07/2017	12/2017	B	Flow Reduction, Groundwater Recharge or Water Supply
MEC-09	Stormwater Harvest and Use	Agoura Hills	City of Agoura Hills	0.48	0.96	12.62	07/2017	12/2017	B	Flow Reduction, Water Supply
TC-29	Infiltration Chambers	Westlake Village	City of Westlake Village	0.27	0.54	3.86	12/2019	07/2021	B	Flow Reduction, Groundwater Recharge

1 The storm water volume from the 85th percentile, 24-hour storm event, for the drainage area of the Regional BMP.

2 MEC-12 is a Streamflow Capture Facility and so the drainage area is 1,619 acres and so calculating the 85th percentile volume is not applicable.

Except for TC-02, LVC-14, and TC-37, the BMP volumes listed in Table 31 are less than the 85th percentile, 24-hour storm event for the tributary drainage area of these BMPs. This is because the BMP footprints were limited due to lack of available space at each location. Although the BMP volumes are less than the 85th percentile, 24-hour storm event for the tributary area of the BMPs, the applicable water quality based effluent limitations will still be met with the implementation of all BMPs throughout the entire MCW as discussed in the RAA and later sections of the EWMP.

Infiltration capabilities and constraints are discussed in further detail in Section 5.3.3.5 for each of the proposed sites. Although some sites do contain conditions which are not conducive to infiltration, every BMP type is designed to retain the maximum amount of volume based on the BMP footprint through the use of infiltration, bioretention, or stormwater harvest and use. Total BMP capacities for each sub-watershed are provided in the tables located in Appendix 7C. These tables show treatment capacities at various stages of implementation. These treatment capacities include the regional retention BMPs, green streets, and LID ordinances.

Non-stormwater runoff (dry weather runoff) has to date not been calculated; however, as the non-stormwater outfall monitoring is completed in the future, estimations of dry weather runoff can be made. Since dry weather runoff volumes are typically less than the 85th percentile water quality volume, it is reasonable to estimate that all of the dry weather runoff tributary to the proposed regional BMPs will be treated within the regional BMPs.

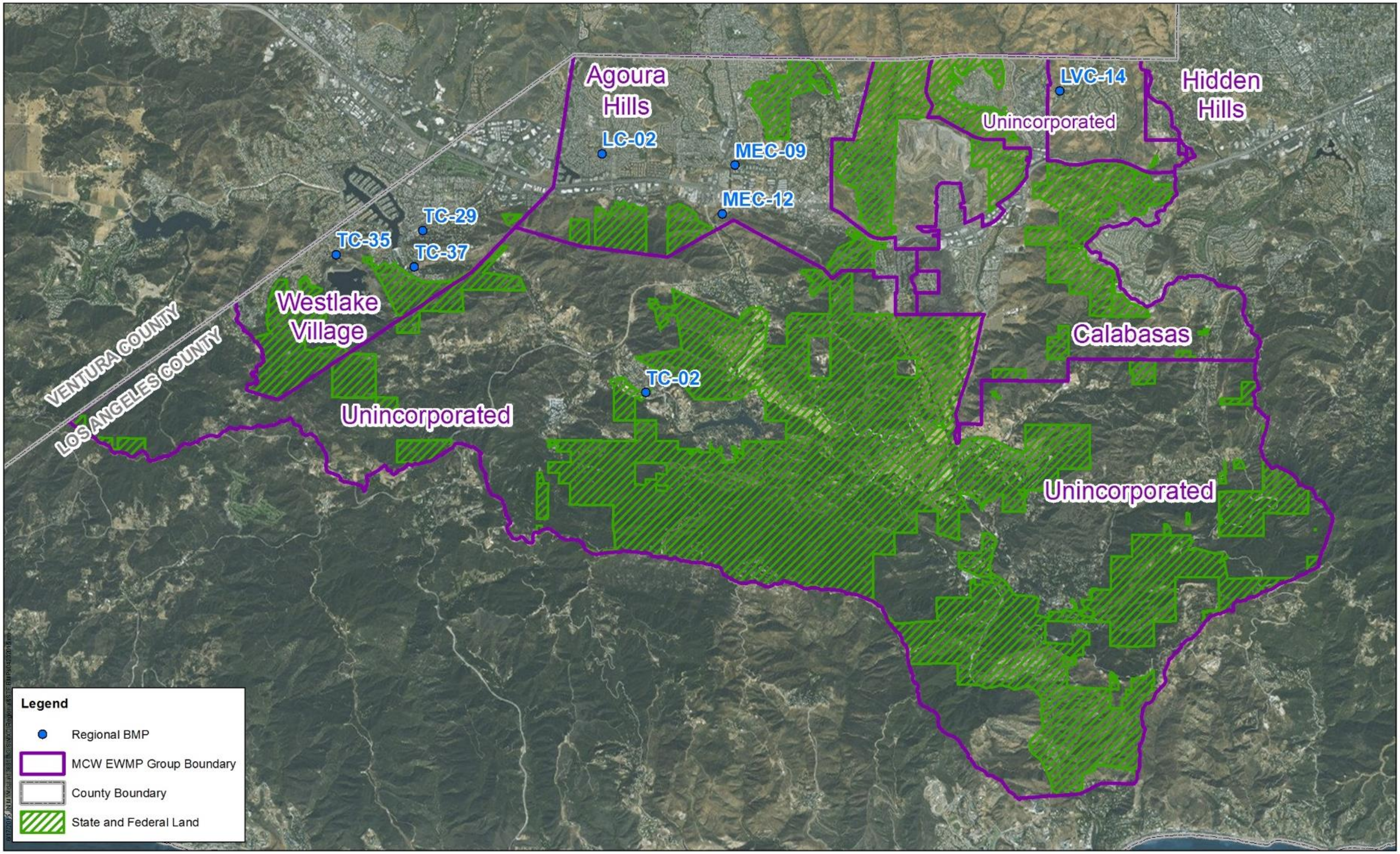

Figure 16: Location of Proposed Regional BMP Projects

5.3.3.3 Regional BMP Project Constructability Analysis

A constructability analysis was performed to identify if specific parameters were present at the Regional BMP project locations to understand if construction is feasible. Table 32 identifies five parameters that, if present, may make the BMP highly constructible

Table 32: Constructability Analysis Checklist

BMP ID	Is the drainage area greater than one acre?	Is the slope less than or equal to 5%?	Is the BMP footprint greater than 100 feet of bridges and wells, and/or 20 feet of buildings?	Does the BMP treat more than runoff from roadway?	Is there potential for maintenance access?
LC-02	Y	N	Y	Y	Y
LVC-14	Y	Y	Y	Y	Y
MEC-09	Y	Y	Y	Y	Y
MEC-12	Y	Y	Y	Y	Y
TC-02	Y	Y	Y	Y	Y
TC-29	Y	Y	Y	Y	Y
TC-35	Y	Y	Y	Y	Y
TC-37	Y	Y	Y	Y	Y

5.3.3.4 Regional BMP Projects Preliminary Environmental Assessment

A preliminary Environmental Analysis was conducted to analyze the potential project sites relative to applicable environmental and regulatory permitting regulations. The environmental assessment identifies potential environmental constraints associated with the siting of potential BMPs and is provided in Appendix B. This preliminary Environmental Analysis (Analysis) provides a preliminary review of applicable environmental and regulatory permitting regulations of the proposed structural BMP construction throughout the MCW.

All proposed BMP locations have the potential to result in short-term construction-related impacts to air quality, biological resources, cultural resources, geology and soils, and greenhouse gas emissions. None of the proposed BMP locations will result in adverse short-term or long-term operational impacts to aesthetics, agricultural and forestry resources, hydrology and water quality, land use/planning, mineral resources, or population and housing. BMP sites LVC-14, TC-29, TC-35, LC-02, and MEC-09 are located within public parks and have the potential to temporarily limit public access to recreational facilities. BMP sites TC-02, TC-37, and MEC-12 are not located within public parks and do not have the potential to impact recreational resources. No adverse post-construction operational impacts are anticipated for any of the projects identified. As a general measure, the need for regulatory permits when impacting waters of the US/State will vary based on the specific siting of each BMP. BMP sites LVC-14, TC-29, TC-35, and LC-02 are not located within or adjacent to waters of the US/State and do not have the potential to impact waters of the US/State. BMP sites MEC-09, TC-02, TC-37, and MEC-12 are situated near waters of the US/State and, based on the specific siting of each BMP, may require regulatory permits prior to construction, a through determination of which has not yet been conducted.

5.3.3.5 Regional BMP Projects Geotechnical Study Results

Geotechnical investigations were performed for Tier A and Tier B Regional BMP sites. The subsurface materials at site TC-35 were not tested for infiltration rate due to the shallow water table encountered at approximately 9.5 feet below ground surface (bgs). Water was encountered at approximately 13 to 15 feet bgs at site TC-37 and corrected infiltration rates ranged from about 0.1 to 0.7 inches per hour.

Groundwater was encountered as shallow as 9 feet bgs as site LC-02 and corrected infiltration rates were determined to be less than 0.1 inches per hour. At Site LVC-14 groundwater was encountered as shallow as about 19 feet bgs and corrected infiltration rates were less than 0.1 inches per hour at all tested locations. Water was not encountered at Site TC-29 due to shallow hand exploration refusal. Corrected infiltration rates ranged from less than 0.1 inch per hour to 0.8 inches per hour. Infiltration testing was not performed at site MEC-09 due to shallow groundwater encountered at approximately 7 feet bgs. Groundwater was encountered at approximately 13 feet bgs at site MEC-12 and corrected measurements indicated infiltration rates all fell below 0.1 inches per hour. Groundwater was not encountered at site location TC-02 to the ultimate depths explored of approximately 20 feet bgs. Corrected infiltration test results at that location indicated rates on the order of about 0.5 to 2.8 inches per hour. All reported infiltration rate results have been corrected for lateral flow only, as recommended by the LA County LIDBMPG (2014). The complete geotechnical report is included in Appendix C.

5.3.3.6 Private Regional BMP Outreach Program

To being the process of implementation of regional BMPs on private land a private regional BMP outreach program will begin when the MCW EWMP is approved by the Los Angeles Regional Board. The program will entail coordination with private land owners about placement of regional BMPs on their property. The initial coordination will be with large commercial and industrial facilities in the subwatersheds of the Malibu Creek Watershed where private regional BMPs are needed to meet compliance. The locations of the private regional BMPs will also be coordinated with locations of the planned green street projects to ensure that double treatment does not occur.

5.3.4 Distributed BMPs on Public Parcels - Green Streets

The next set of BMPs in the prioritization scheme is the application of distributed BMPs on public parcels and rights of way. Public right of way in the watershed, in the form of streets and roads, are the primary areas where distributed BMPs will be implemented. Green streets provide an opportunity to integrate distributed BMPs into public street and road right of way. Green streets include BMPs such as bioretention and pervious pavement to reduce stormwater flow and provide treatment or retention of stormwater. Green streets also provide multiple benefits in addition to stormwater management including traffic calming, enhanced pedestrian safety by slowing down traffic and separating travel ways from pedestrians, reducing urban heating by reduction of the heat island effect through removal of impervious surfaces, increased property values, and aesthetic benefits. Green street features include vegetated sidewalks, bioretention planters, vegetated swales, permeable paving, and street trees as identified in Figure 17 and Figure 18.

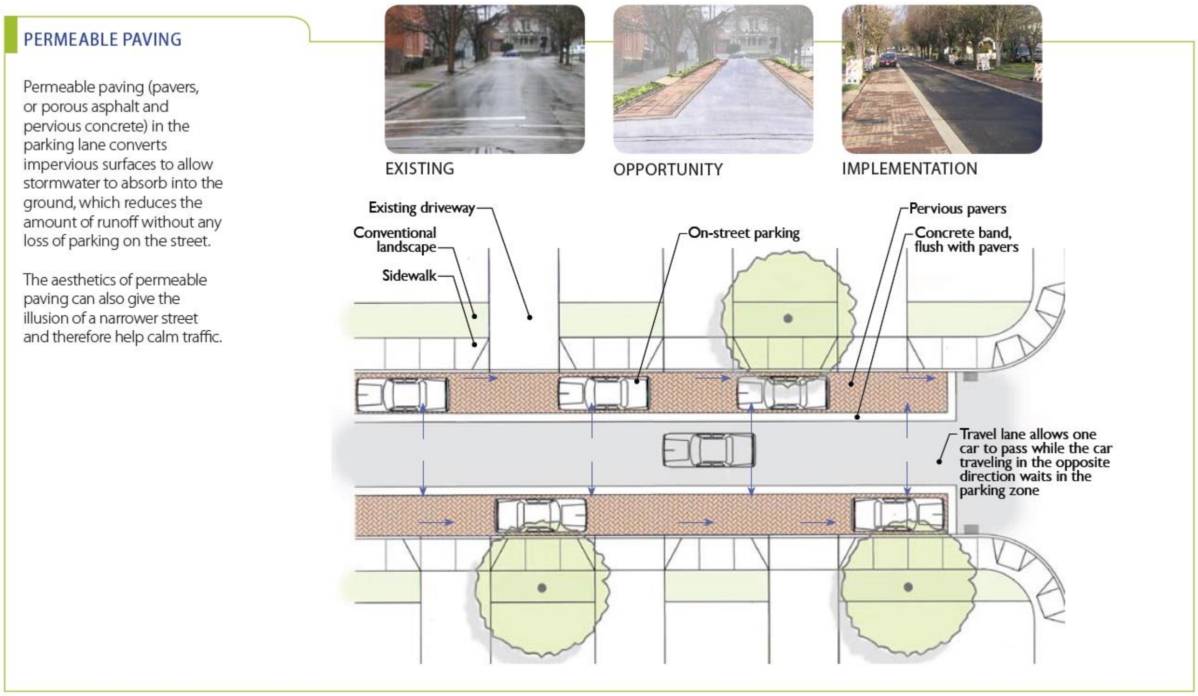

Figure 17: Green Streets with Permeable Pavement (EPA, 2009)

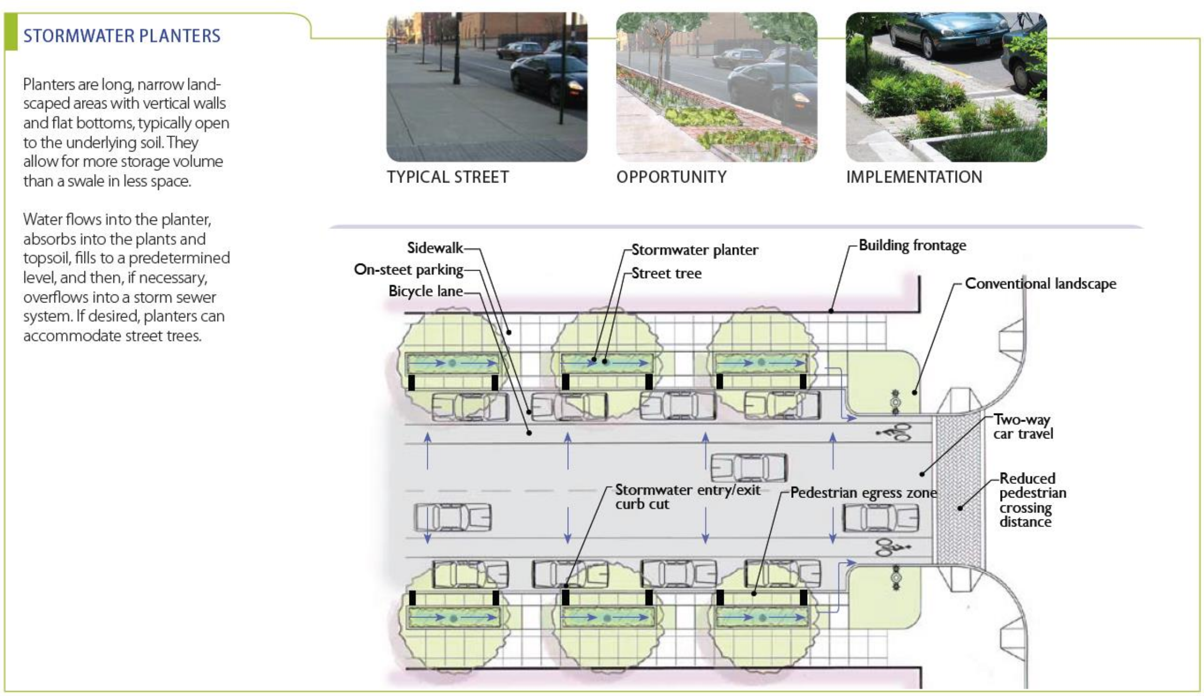

Figure 18: Green Streets with Stormwater Planters (EPA, 2009)

Bioretention is a common element in green streets and provides significant pollutant and volume reduction benefits for stormwater. Bioretention consists of a detention layer, an engineered soil layer that is made up of sand and compost, and plants. The compost in the planting soil provides adsorption sites for hydrocarbons, heavy metals, nutrients and other pollutants. Storm water storage is also provided by the voids in the planting soil as well as the gravel near the underdrains. The stored water and nutrients in the water and soil are then available to the plants for uptake. Pollutant removal efficiency for bioretention systems is 100% as they are retention based BMPs that filter and infiltrate water and pollutants into the underlying soil. Alternatively, in areas with poor infiltration, biofiltration (i.e. bioretention with underdrains) is a good alternative that provides variable pollutant removal efficiency in a distributed and/or green street setting.

5.3.4.1 Areas Available for Green Streets

An analysis was performed to identify the potential areas for green streets in the MCW. Table 33 identifies the total developed land area in the MCW EWMP area that is planned for treatment by regional structural BMP projects. The total developed area in the EWMP portion of the MCW is 9,625 acres, of which treatment is planned for 23% or 2,231 acres by the regional structural BMP projects. This means that 77% of the remaining developed land can be evaluated for incorporation of green streets to assist in achieving compliance. Figure 19 shows the developed land use within the MCW EWMP group area as well as the area planned for treatment by regional BMPs.

Table 33: Total Urbanized Land and Area Planned for Treatment by Regional Structural BMP Projects

Watershed	Developed Area Treated (ac)	Developed Area (ac)	Treatment through Regional BMP Projects (%)
Cold Creek-Malibu Creek	35	793	4%
Las Virgenes Creek	168	2247	8%
Medea Creek	1606	3835	42%
Potrero Valley Creek	477	2751	17%
Total MCW	**2,286**	**9626**	**24%**

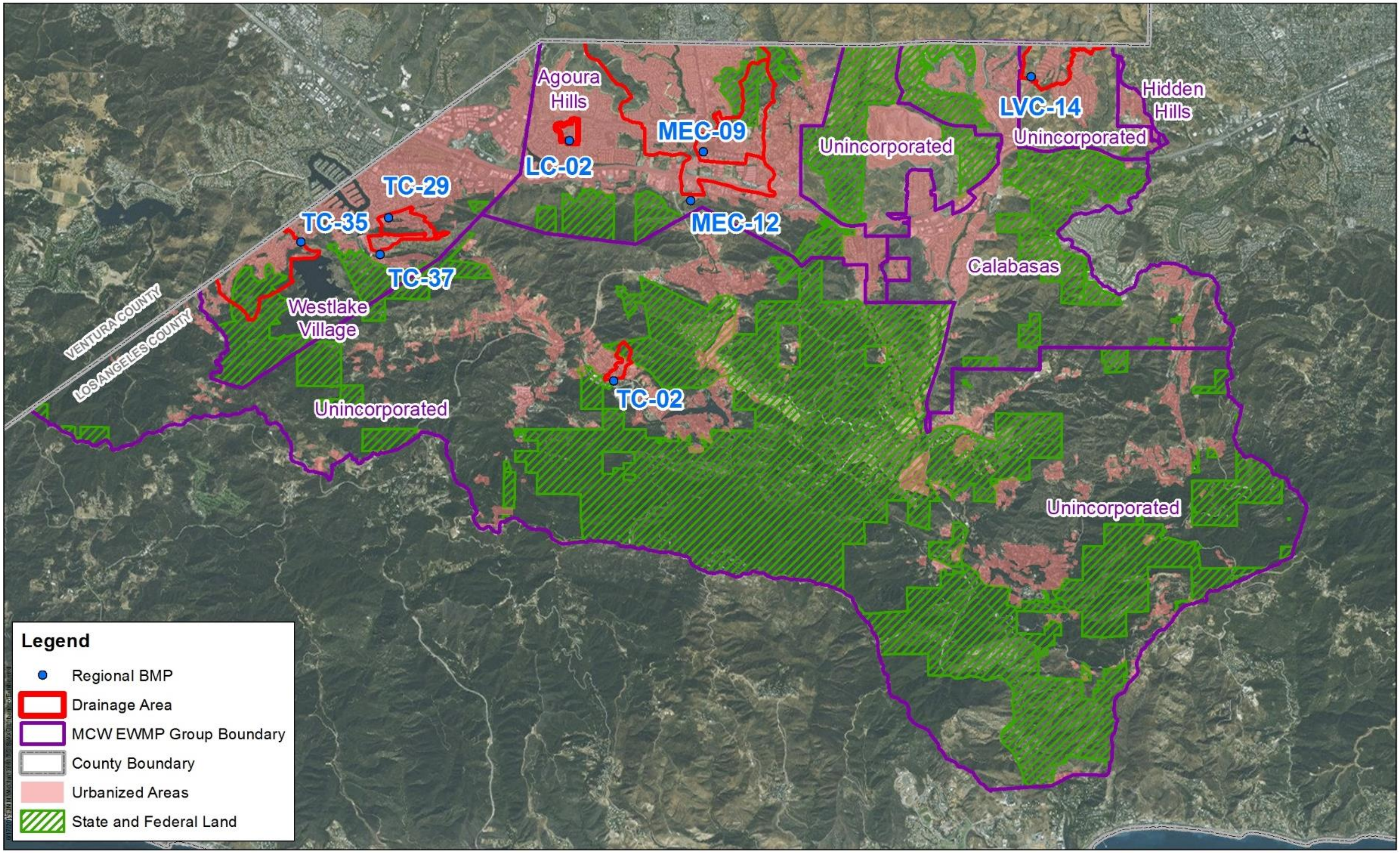

Figure 19: Map of the Total Urbanized Area and Area Planned for Treatment by Regional Structural BMP Projects.

5.3.4.2 Implementation of Green Streets

The Green Street implementation approach included evaluation of developed areas, not already planned for treatment by regional BMP projects, and was dependent on site constraints such as: specific soil conditions, depth to ground water, and presence of storm drains. The following scenarios were evaluated through the RAA with an 85th percentile water quality storm, consistent with the MS4 Permit:

1. Bioretention with no underdrain (volume based – full retention of design storm); and
2. Biofiltration (bioretention with underdrain; volume based – treatment of the design storm).

The resulting detailed analysis and identification of the Green Street BMP Performance goals separated by jurisdiction is found in Section 7.3 and in Appendix 7A. Streets available for green street implementation in the MCW EWMP group area are shown in Figure 20 below.

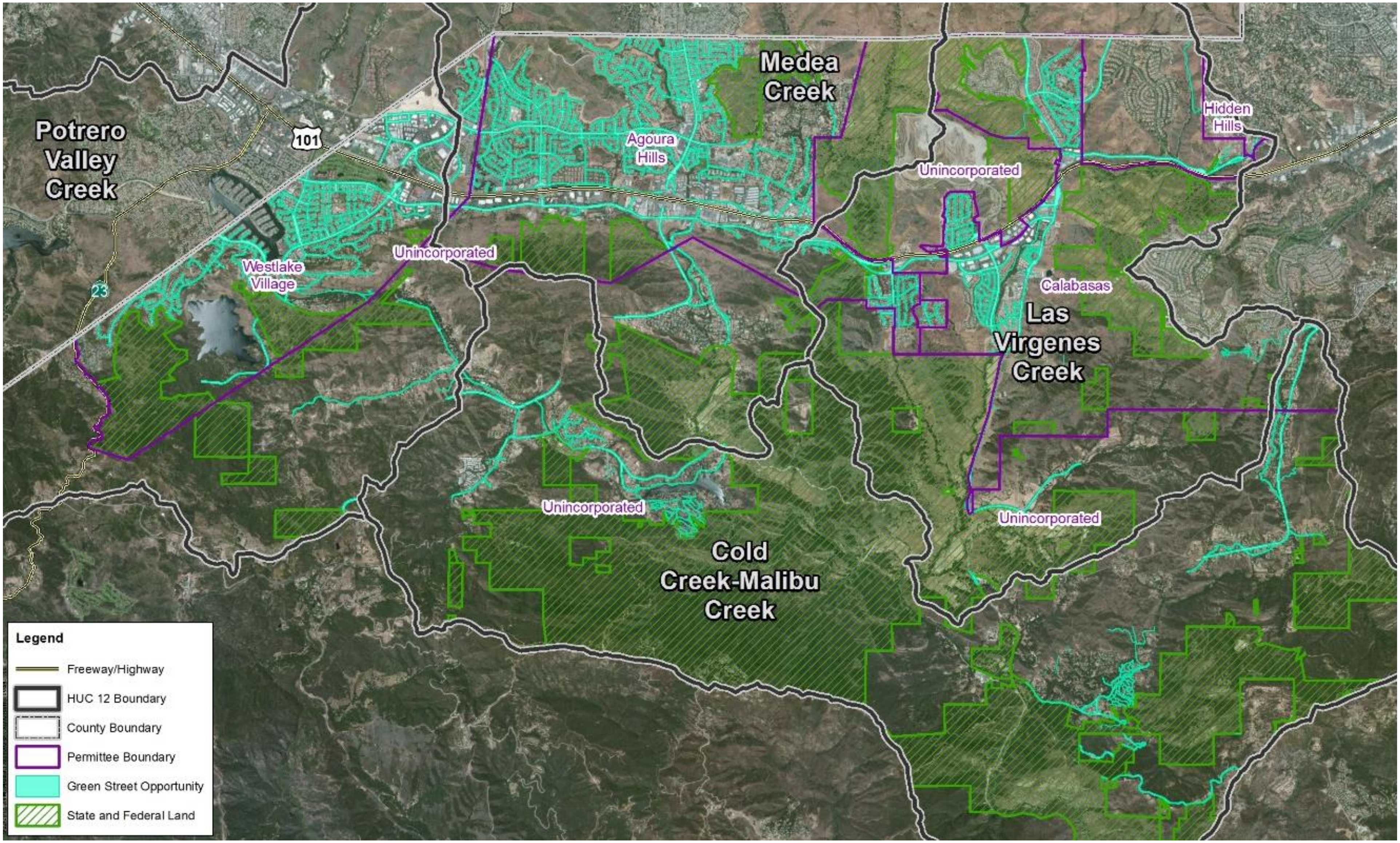

Figure 20: MCW Green Street Opportunity Locations

6 Reasonable Assurance Analysis (RAA)

A key element of the EWMP is the RAA, which is described by the Permit as a process to demonstrate "that the activities and control measures…will achieve applicable WQBELs and/or RWLs with compliance deadlines during the Permit term" (Permit section C.5.b.iv.(5), page 63). While the Permit prescribes the RAA as a quantitative *demonstration* that control measures will be effective, the RAA also promotes a modeling process to support the EWMP Group with *selection* of control measures. In particular, the RAA was used to evaluate the many different scenarios/combinations of institutional, distributed, and regional control measures (described in Section 5) that could potentially be used to achieve the water quality objectives of the Permit, and was then used to select the control measures specified in the EWMP Implementation Plan (described in Section 7).

This section describes key elements of the RAA including the following:

- Modeling system used for the RAA (6.1)
- Baseline critical conditions and required pollutant reductions (6.2)
    - Baseline model calibration (6.2.1)
    - Water quality targets (6.2.2)
    - Critical conditions for wet weather and dry weather (6.2.3)
    - Selection of limiting pollutants (6.2.4)
    - Required interim and final pollutant reduction (6.2.5)
- Representation of control measures in RAA (6.3)
- Approach for selecting control measures for the EWMP Implementation Plan (6.4)

As referenced throughout this section, many details of the RAA are provided in the RAA appendices, including several sub-appendices. In 2014, the Regional Board issued RAA Guidelines (LARWQCB 2014), which outline expectations for developing RAAs, and those guidelines were followed closely during development of this RAA.

6.1 Modeling System used for the RAA

The Watershed Management Modeling System (WMMS) is the modeling system used to conduct the RAA for the MCW EWMP. WMMS is specified in the Permit as an approved tool to conduct the RAA. The LACDPW, through a joint effort with United States Environmental Protection Agency (USEPA), developed WMMS specifically to support informed decisions for managing stormwater. WMMS is a comprehensive watershed model of the entire Los Angeles County area that includes the unique hydrology and hydraulics features and characterizes water quality loading, fate, and transport for all of the key TMDL constituents (LACDPW 2010a, 2010b). The ultimate goal of WMMS is to identify cost-effective water quality improvement projects through an integrated, watershed-based approach. A version of WMMS[8] is

[8] The version of WMMS used for this RAA was enhanced from the version available for download. Enhancements include updates to calibration parameters according to the RAA Guidelines (LARWQCB, 2014), more refined BMP routing assumptions, and application of an updated two-tier, jurisdiction-based BMP optimization approach. Although the baseline WMMS model included all areas in the watershed for configuration and calibration, areas within Ventura County, State/Federal Parks (Figure 21), and the Calabasas Landfill (416.4 acres in Unincorporated Los Angeles County) were not included in modeling for determination of EWMP Group required pollutant reductions (Calabasas Landfill has a separate NPDES permit).

available for public download from Los Angeles County Department of Public Works website (http://dpw.lacounty.gov/wmd/wmms/).

The entire WMMS domain encompasses Los Angeles County's coastal watersheds of approximately 3,100 square miles, representing 2,655 subwatersheds. Of those, the MCW EWMP area encompasses 68 subwatersheds[9] (Figure 21).

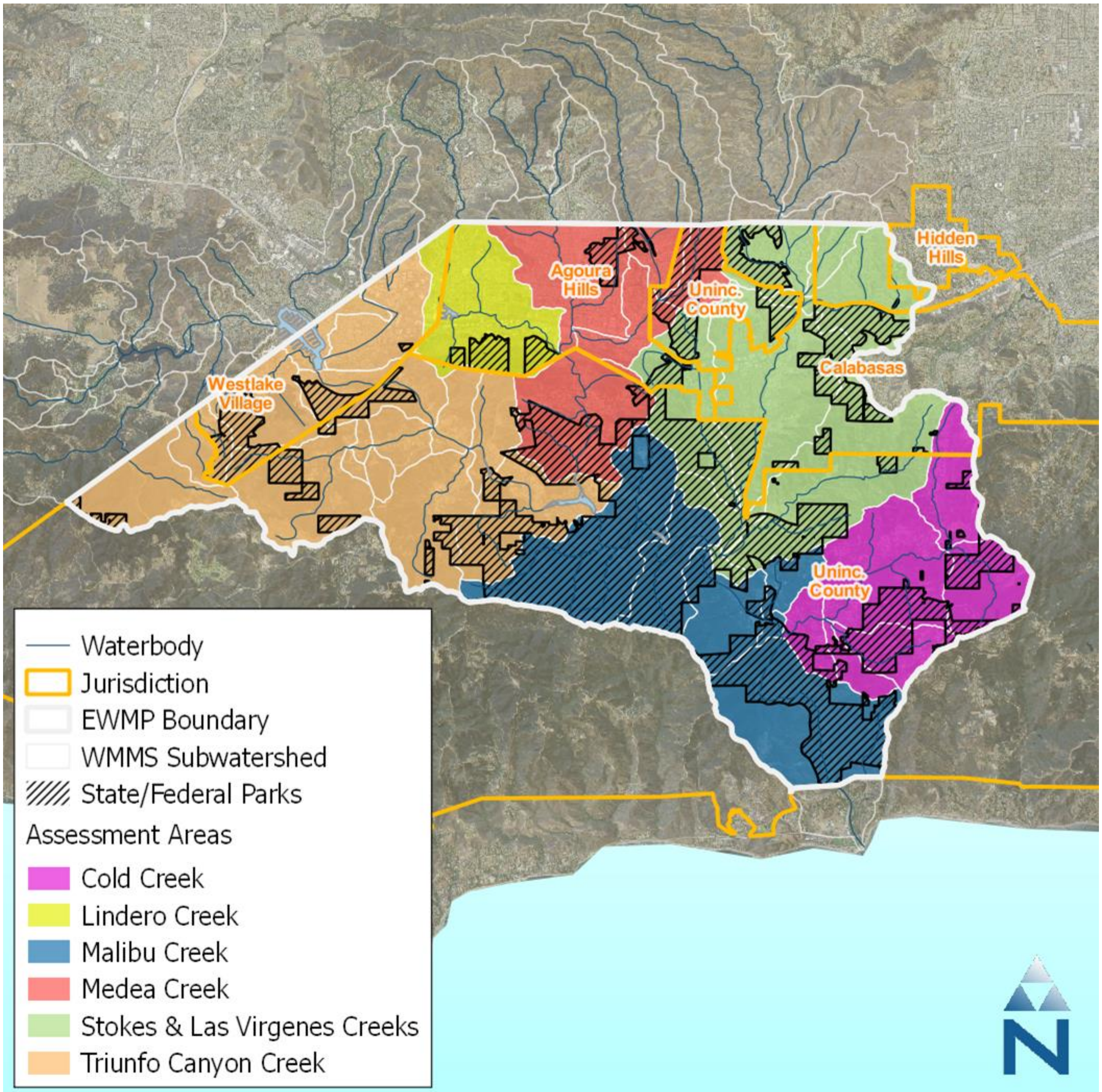

Figure 21: MCW EWMP Area and 68 Subwatersheds Represented by WMMS

[9] To support evaluation of regional BMPs, some of these subwatersheds were further grouped by "pour point" to receiving waters.

WMMS is a suite of three modeling tools to support BMP planning:

1. A watershed model for prediction of baseline hydrology and pollutant loading (Loading Simulation Program – C+ [LSPC]);
2. A model for simulating the performance of control measures in terms of flow, concentration and load reduction (System for Urban Stormwater Treatment Analysis and Integration [SUSTAIN]); and
3. A tool for running millions of potential scenarios and optimizing/selecting control measures based on cost-effectiveness (also within SUSTAIN).

The LSPC and SUSTAIN models within WMMS are described in more detail in the following subsections.

6.1.1 Watershed Model – LSPC

The watershed model included within WMMS is the Loading Simulation Program C++ (LSPC) (Tetra Tech and USEPA 2002; USEPA 2003; Shen et al. 2004). LSPC is a watershed modeling system for simulating watershed hydrology, erosion, and water quality processes, as well as in-stream transport processes. LSPC also integrates a GIS, comprehensive data storage and management capabilities, and a data analysis/post-processing system into a convenient Windows-based environment. The algorithms of LSPC are identical to a subset of those in the Hydrologic Simulation Program–FORTRAN (HSPF) model with selected additions, such as algorithms to dynamically address land use change over time. USEPA's Office of Research and Development (Athens, Georgia) first made LSPC available as a component of USEPA's National TMDL Toolbox (http://www.epa.gov/athens/wwqtsc/index.html). LSPC has been further enhanced with expanded capabilities since its original public release.

6.1.2 BMP Performance and Selection Model – SUSTAIN

The System for Urban Stormwater Treatment and Analysis Integration (SUSTAIN) was developed by USEPA to support practitioners in developing cost-effective management plans for municipal stormwater programs and evaluating and selecting BMPs to achieve water quality goals (USEPA 2009; http://www2.epa.gov/water-research/system-urban-stormwater-treatment-and-analysis-integration-sustain). SUSTAIN was specifically developed as a decision-support system for selection and placement of BMPs at strategic locations in urban watersheds (See Figure 20). It includes a process-based continuous simulation BMP module for representing flow and pollutant transport routing through various types of structural BMPs. This simulation provides the *primary application* of SUSTAIN – simulating the performance of selected stormwater control measures.

The *secondary application* of SUSTAIN is BMP selection, which is based on cost-benefit of different BMP alternatives. The SUSTAIN model in WMMS includes a cost database[10] comprised of typical BMP cost data from a number of published sources including BMPs constructed and maintained in Los Angeles County (LACDPW 2010a, 2010b). SUSTAIN considers certain BMP properties as "decision variables," meaning they are allowed to vary within a given range during model simulation to support BMP selection and placement optimization. As BMP sizes and locations change, so do cost and performance. SUSTAIN runs iteratively to generate a cost-effectiveness curve comprised of millions of BMP scenarios (e.g., the model was used for the EWMP to evaluate the different combinations of green infrastructure as compared to regional BMPs, and provides a recommendation on the most cost-effective scenario)[11].

[10] The BMP cost database from WMMS was updated to be consistent with parallel EWMP development efforts in the region, as described in Section 6.3.3.

[11] For the EWMP, optimization was conducted at the jurisdictional-level using SUSTAIN as opposed to the watershed-level using the Nonlinearity-Interval Mapping Scheme (NIMS) component of WMMS.

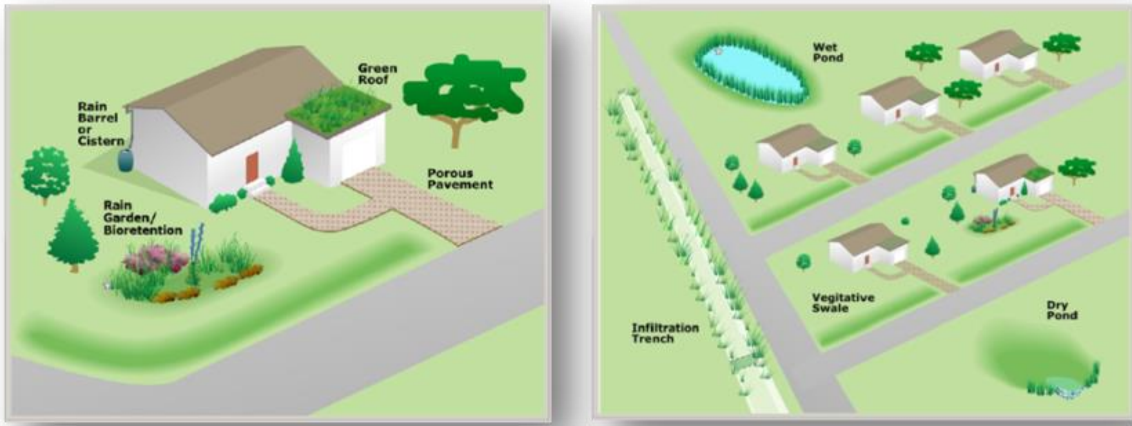

Figure 22: SUSTAIN Model Interface Illustrating BMP Opportunities in Watershed Settings

6.2 Baseline Critical Conditions and Required Pollutant Reductions

This section describes the application of the LPSC model to simulate current conditions, identify critical conditions and calculate required pollutant reductions. The calculated required reductions drive the extent of the control measures to be implemented by the EWMP under the EWMP Implementation Plan.

6.2.1 Baseline Model Development and Calibration

A fundamental element of the RAA is simulating baseline / existing conditions in the watershed prior to implementation of control measures. For the MCW RAA, baseline conditions were simulated using the LSPC watershed model in WMMS, including predictions of flow rate and pollutant concentrations over a 10-year period, as follows:

- The evaluation period for hydrology is October 1, 2000 to September 30, 2010[12].
- For water quality calibration, modeled EMCs were paired and compared for the range of coincident sampling dates
- Simulated pollutants include total suspended solids, E. coli, total nitrogen, and total phosphorus.
- An hourly time step was used to simulate the flow rate and pollutant concentration at each of the subwatershed outlets for comparison with observed data.
- The model explicitly accounts for effects of major hydraulic structures in the watershed including impoundments, such as Malibu Lake, Westlake Lake, and Century Lake.

To encourage accurate representation of existing/baseline conditions, the RAA Guidelines provide "model calibration criteria" for demonstrating the baseline predictions are accurate and to ensure the "calibrated model properly assesses all the variables and conditions in a watershed system" (LARWQCB 2014). Detailed hydrology and water quality calibrations were performed for the MCW RAA, as follows (see Figure 23 for a map of hydrology and water quality calibration stations):

[12] All stormwater control measures implemented prior to September 30, 2011 are assumed implicitly represented within the baseline conditions.

- Hydrology calibration: the long-term streamflow gage (F130) located on Malibu Creek just below the confluence of Cold Creek. This gage, operated by LACFCD, provided a long-term historical record spanning a wide range of wet and dry-weather conditions in the watershed.
- Water quality calibration: the water quality calibration process for the MCW RAA leveraged two primary monitoring datasets: (1) for wet-weather, the large-scale receiving water monitoring data was collected by LACFCD at the mass emission station on Malibu Creek (S02, collocated with the F130 flow gage). (2) For dry weather, the RSW MC Dataset highlighted the influence of the Las Virgenes Water District facilities on Las Virgenes Creek and the main stem of Malibu Creek downstream of the confluence.

A comparison of the calibrated hydrology model to the RAA Guidelines is shown in Table 34 and the water quality calibration is shown in Table 35. The baseline (LSPC) model performs quite well for representing existing hydrologic and water quality conditions. Details of the baseline model development and calibration are presented in Appendix 6A.

Table 34: Summary of Hydrology Calibration Performance by Baseline Model

Location	Model Period	Hydrology Parameter	Modeled vs. Observed	RAA Guidelines Performance Assessment
Malibu Creek Below Cold Creek (LA DPW F130)	10/1/2000 – 9/30/2010	Total Annual Volume	-4.5%	Very Good
		Highest 10% of Flows	-8.3%	Very Good
		Annual Storm Volume	-13.8%	Good

Table 35: Summary of Wet-Weather Water Quality Calibration Performance by Baseline Model

Malibu Creek Mass Emission Station (S02)			
Water Quality Parameter	**EMC Sample Count**	**Modeled vs. Observed Load (% Error)**	**RAA Guidelines Performance Assessment**
E. Coli [1]	20	4.19%	Very Good
Total Nitrogen	19	13.41%	Very Good
Total Phosphorus	19	6.28%	Very Good
Total Sediment[2]	43	-35.81%	Fair

[1] E. coli was assumed to have a 1:1 translator with fecal coliform.

[2] Bank erosion not modeled in LSPC—peak flow was used as a surrogate indicator for the sedimentation target (see Section 6.4.1).

The model was able to calibrate to total sediment with a "fair" performance. This is due to the fact that bank erosion, a major source of sediment in the watershed (USEPA 2013), is different from any of the sources explicitly available in the model. Sediment sources from bank erosion are sometimes estimated as gulley/rill erosion using the scour routines from the land. However, a limitation of that approach is that scour is defined by runoff predictions from individual land segments, which may or may not have the same power and distribution as instream flow. Another limitation of that approach is that bank failure tends to happen when the banks are in a destabilized state, which may be after a storm or during a drought, neither of which is a function of flow energy. One way to account for bank erosion and improve the model calibration in the future is to simulate it externally using another model that is better-suited for representing that process, and then adding it to the model as an external source. However, as such a detailed approach was not used in the Benthic TMDL, this approach was not determined necessary for the RAA. Rather, an approach was used in the RAA that provides consistency with the linkage analysis used in the Benthic TMDL, which relies on modeled flows for assessing potential for sediment transport and necessary reductions (see Section 6.4.1). With modeled flows calibrated with "very good" performance, the flow-based surrogate indicator provided increased assurance over an alternative sediment-load-based indicator.

As shown in Figure 23, the LVMWD RSW MC Dataset for MCW captured conditions in Las Virgenes Creek and Malibu Creek. Eighty-six sampling dates coincided with the model simulation period. The data captured instream dry-weather conditions because the samples were collected almost exclusively during dry weather conditions. Only seven out of the 86 samples were coincident with measureable rainfall (i.e., > 0.1 inch) occurring in the watershed. The remaining samples occurred between two and 200 days after measurable rainfall, with more than 50 percent of samples taken at least two weeks after measurable rainfall. Figure 24 is a schematic and map that shows the location of the LVMWD RSW MC stations relative to two primary dry-weather nutrient sources to Malibu Creek. There were a number of observations worth noting among the LVMWD RSW MC Dataset:

- The two upstream "control" gages had lower total nitrogen and total phosphorus levels than the downstream gages
- 09U (below Malibu Lake) has lowest nutrient levels
- The data show some impact of Rancho Las Virgenes on dry-weather total nitrogen and total phosphorus levels in Las Virgenes Creek and downstream Malibu Creek
- Most Elevated total nitrogen levels observed one to two weeks following a storm
- Elevated levels sustained at 01U (Malibu Creek), downstream of confluence
- Tapia WWTP has notable impact on total nitrogen and total phosphorus levels in Malibu Creek
- Total nitrogen levels gradually decreased below Tapia in Malibu Creek
- One of the gages (11D), located in Malibu Lagoon, had lower total nitrogen and total phosphorus levels, suggesting that impoundments are nutrient sinks, most likely due to biological activities.

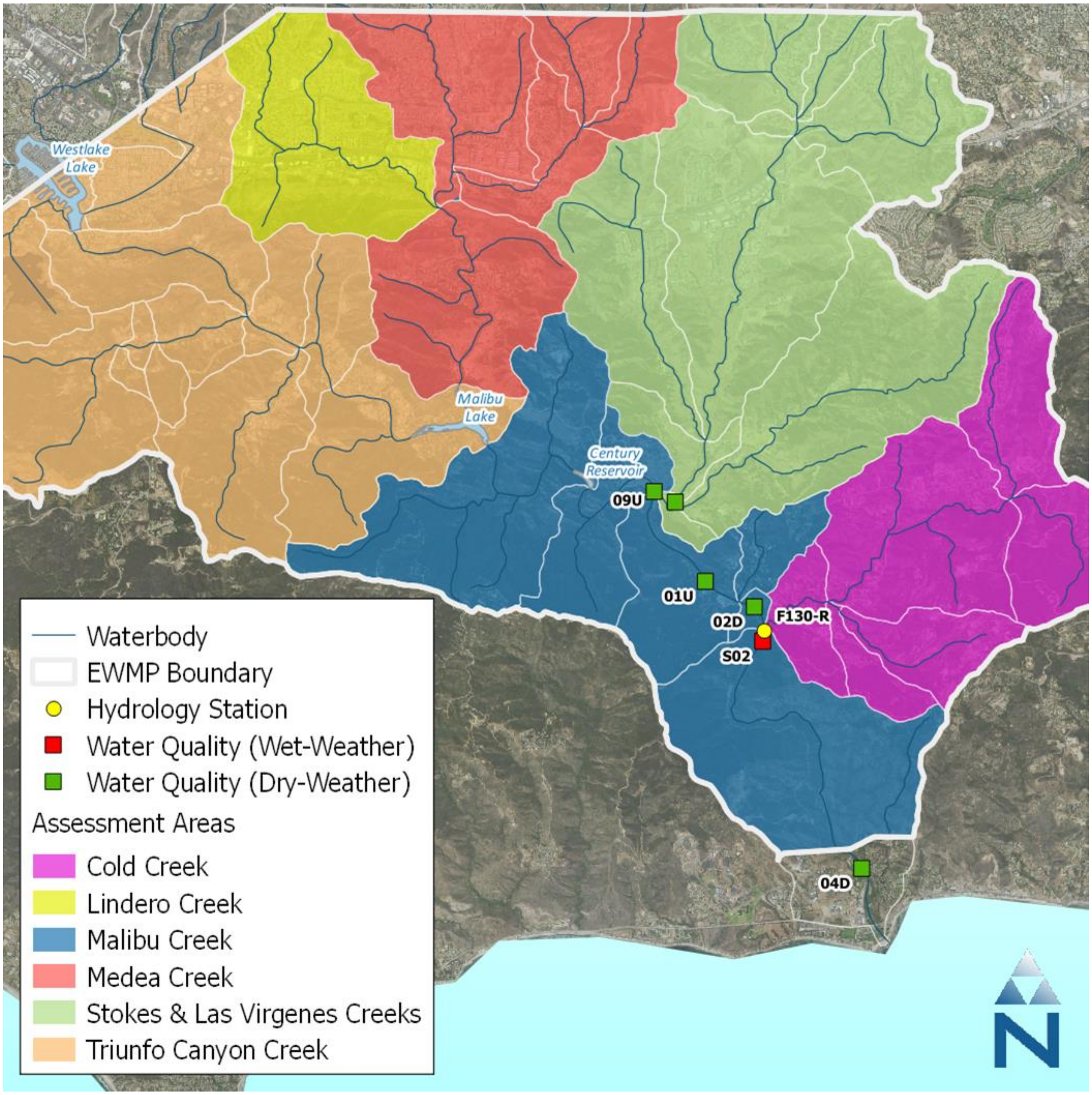

Figure 23: Hydrology and Water Quality Calibration Stations for MCW RAA.

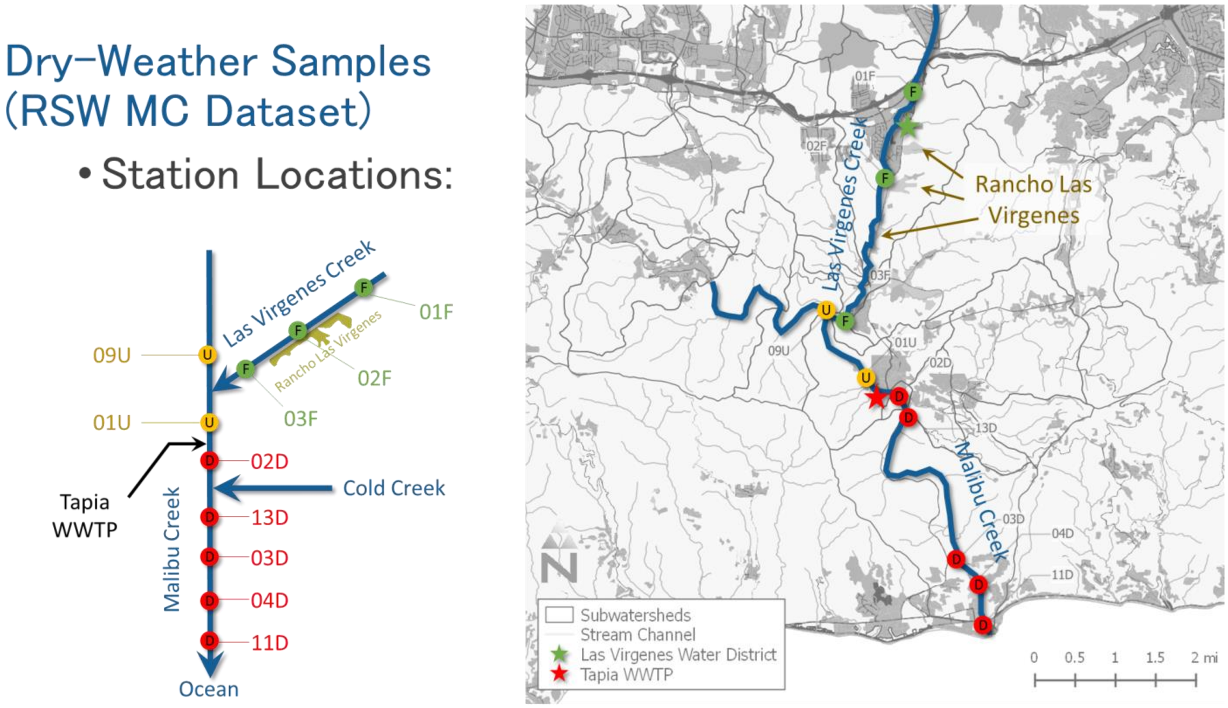

Figure 24: Location of RSW MC monitoring stations relative to Ranchos Las Virgenes and Tapia WWTP.

Five out of the ten LVMWD RSW MC stations coincided with reach outlets in LSPC. Modeled instream concentrations for the coincident sampling dates were compared at each of those five locations. Station 03F captured conditions at the outlet of Las Virgenes Creek (downstream of Rancho Las Virgenes). Two "control" stations, 09U and 01U, monitored conditions upstream of the confluence of Malibu Creek with Stokes/Las Virgenes Creek and upstream of Tapia WWTP, respectively. Station 02D captured conditions immediately downstream of Tapia WWTP before the confluence with Cold Creek, while 04D monitored conditions downstream of the Cold Creek confluence. Figure 25 and Figure 26 show the range of modeled total nitrogen and total phosphorus levels, respectively, at the five coincident gages for paired modeled-versus-observed samples. One synoptic sampling date is highlighted in each figure to highlight the variation on a specific day (December 5, 2006) in the monitoring record.

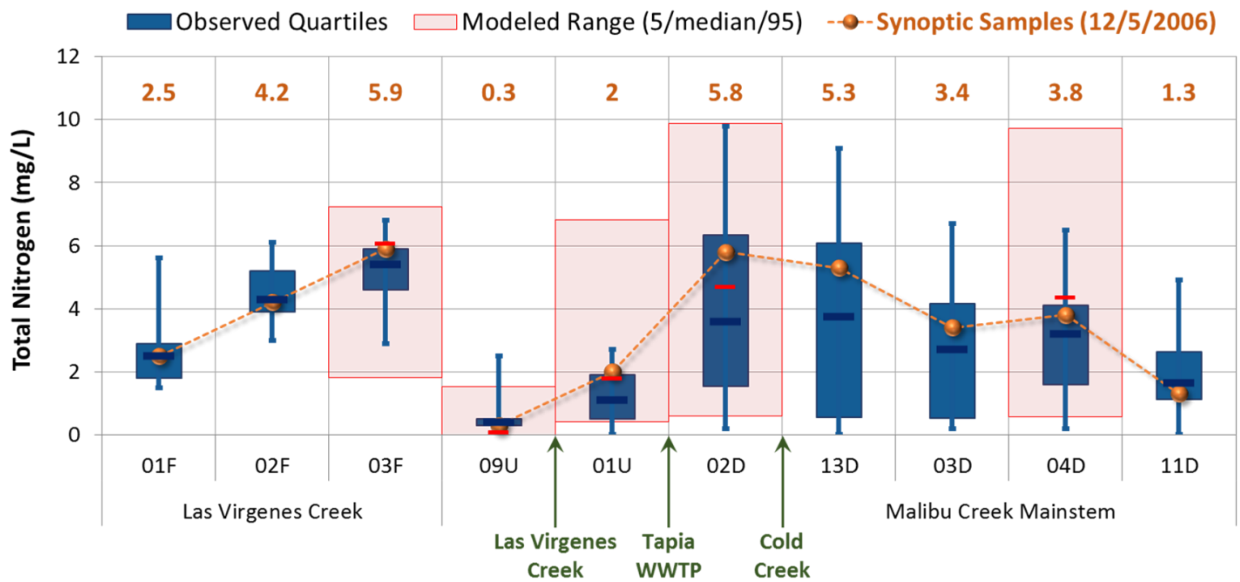

Figure 25: Modeled versus observed dry-weather Total Nitrogen at selected RSW MC Stations.

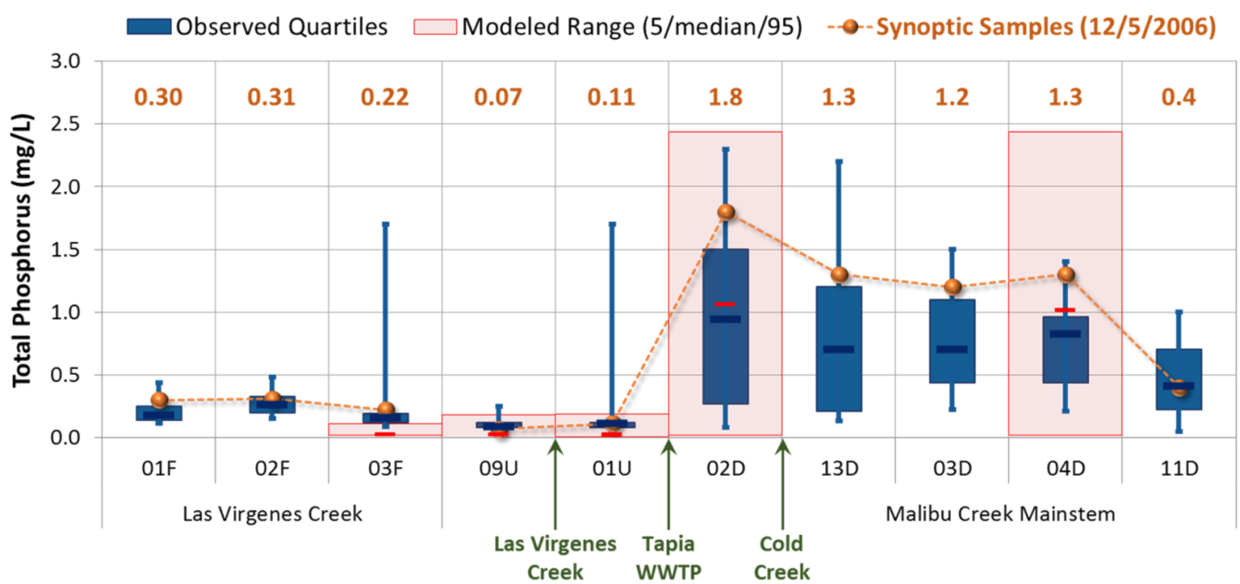

Figure 26: Modeled versus observed dry-weather Total Phosphorus at selected RSW MC Stations.

In summary, the modeled wet-weather pollutants match very well with observed data at ME station S02. Modeled dry-weather levels also follow the trends observed in the RSW MC Dataset. Instream nutrient transformations are not explicitly modeled in this configuration. First-order decay is used to approximate losses and transformations. The model captured the impacts of low-flow dominant sources, making it a reasonable candidate for sensitivity analysis of dry-weather source impacts.

6.2.2 Water Quality Targets

The RAA is designed to achieve the RWLs and WQBELs of the MS4 Permit, which are derived from applicable TMDLs (see Attachment M of the Permit) and the Basin Plan (see Receiving Water Limitations, Section V of the Permit). In particular, the RAA addresses the Water Quality Priorities identified in Sections 3 and 4 of this EWMP. The RWLs and WQBELs serve as the “water quality targets”, or loads or concentrations to be achieved through implementation of the control measures specified by the EWMP. Not all pollutants are directly modeled; the pollutants that are the most problematic and generally require the most stormwater treatment are directly modeled – total suspended solids, total nitrogen, total phosphorus, and E. coli. The targets for MCW Water Quality Priorities are listed in Table 36, organized by pollutant class.

6.2.3 Critical Conditions

The following subsections describe the critical conditions for wet weather (stormwater) and dry weather (non-stormwater).

6.2.3.1 Wet Weather Critical Conditions

A key consideration of the RAA is the “critical condition” under which water quality targets must be achieved. Stormwater management for different size storms generally requires different size BMPs. For example, for most pollutants management of a 90th percentile storm requires larger BMPs than management of a median (50th percentile) storm. The RAA Guidelines specify the RAA for final compliance should be based on critical conditions, for example, the 90th percentile flow rates and/or the critical conditions specified by applicable TMDLs (LARWQCB 2014). For the MCW RAA, two primary wet weather critical conditions were considered as follows:

1. **Critical bacteria storm:** for addressing *E. coli* impairments, the “critical bacteria storm” is the 90th percentile wet day when bacteria RWLs apply. Bacteria RWLs were assumed to *not* apply on days subject to Allowable Exceedance Days. The bacteria TMDL allows 15 Exceedance Days annually. As such, the critical condition for the RAA is the 90th percentile, 16th wettest day of the year. The critical condition was defined to provide reasonable assurance of compliance on the 16th wettest day in nine of 10 years, which is consistent with the TMDL and RAA Guidelines. Within each water year between 2000 and 2010, the 16th wettest day was determined (the first day when RWLs apply). For the 10-year simulation, there are 10 of those days (one per year), and the 2nd wettest is the critical bacteria storm (the 2nd highest of 10 values is the 90th percentile). The simulated critical bacteria storm is a 24-hour storm. The EWMP retains[13] the runoff from the critical bacteria storm from each subwatershed outlet, prior to discharge to receiving waters to achieve *E. coli* WQBELs.

[13] Addressing bacteria though retention of the critical bacteria storm has several benefits for the RAA. First, the RAA for bacteria is essentially based on hydrology, rather than prediction of bacteria concentrations/loads, which can be challenging given the variability of bacteria concentrations in the environment and multitude of potential bacteria sources. By emphasizing retention prior to discharge to receiving waters, the RAA acknowledges that few stormwater control measures can reliably treat bacteria to concentrations below applicable RWLs. Note: the depth of rainfall that generates the critical bacteria storm varies by subwatershed, based on historical rainfall at rain gages in the EWMP area (e.g., generally larger storms at higher elevations and smaller storms at lower elevations). Subwatersheds where bacteria concentrations are predicted to be below E. coli RWLs in 100% of the time steps during the 10-year simulation are excluded from retaining the critical bacteria storm (generally, only watersheds with 0% impervious area meet this exclusion condition).

2. **90th percentile <u>nutrient</u> Exceedance Volume:** to address total nitrogen and total phosphorus Water Quality Priorities, the 90th percentile daily flow condition was used. As an analog to daily flow volume, the MCW RAA analyzes the volume of runoff during each rolling 24-hour period[14] of the 10-year simulation when water quality targets were exceeded, referred to as the "Exceedance Volume" (see Figure 27). The storm that produces the 90th percentile Exceedance Volume[15] is the critical condition for management[16] of nutrients in stormwater by MCW EWMP. The Exceedance Volume differs for total nitrogen and total phosphorus and for different subwatersheds (end-of-pipe) and assessment areas (instream) depending on land use, imperviousness, slope, etc. The EWMP manages (retains and/or treats) the Exceedance Volume from each of the 68 subwatersheds in the MCW area to achieve nutrient RWLs.

These critical conditions form the basis of the planning control measures for inclusion in the EWMP.

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[14] A duration of 24-hours was selected for several reasons. First, TMDLs for sedimentation and nutrients to address benthic community impairments (USEPA 2013) uses a daily flow rate as the critical condition for expression of daily loads and thus 24-hours is an analogous duration. Second, the 24-hour duration allows the Exceedance Volume to be directly compared to the runoff volume from the 85th percentile, 24-hour storm. Finally, stormwater control measures are generally sized to manage an individual storm – and thus the 24-hour Exceedance Volume is much more relevant to BMP sizing than an annual runoff volume.

[15] The Exceedance Volume is an appropriate metric for RAA critical conditions because the *volume* of stormwater to be managed ultimately drives the capacity of control measures in the EWMP. The Exceedance Volume allows the volume to be defined based on applicable RWLs and assures attainment of RWLs. For example, a storm that generates a large volume of stormwater runoff with pollutant concentrations slightly above the RWLs is more difficult to manage than a storm that generates a small volume of runoff with concentrations that greatly exceed the RWLs. In addition, the Exceedance Volume is dependent on the water quality target / RWLs – if a target / RWL is increased then the volume of stormwater to be managed is decreased.

[16] For nutrients, the term "manage" incorporates both retention and treatment approaches (unlike bacteria, which is based on retention). Retention of the Exceedance Volume for nutrients assures attainment of metals RWLs. Treatment of the Exceedance Volumes to concentrations below the RWLs also assures RWL attainment. Furthermore, institutional control measures reduce pollutant build-up on watershed surfaces and thus can decrease the Exceedance Volume.

Table 36: Targets for Priority Water Quality Pollutants in MCW

Pollutant Class	Pollutant	Modeled?	Target for RAA				Assessment Area where Target Applies					
			Dry Weather	Source	Wet Weather	Source	Malibu Creek	Cold Creek	Stokes & Las Virgenes Creeks	Medea Creek	Lindero Creek	Triunfo Canyon Creek
Bacteria[1]	E. coli	Yes	126 MPN /100mL	Basin Plan	235 MPN/ 100mL	Basin Plan	×	×	×	×	×	×
Nutrients[2]	Total Phosphorus	Yes	0.1 mg/L	TMDL	--	--	×	×	×	×	×	×
	Total Nitrogen	Yes	1.0 mg/L	TMDL	8.0 mg/L	TMDL	×	×	×	×	×	×
Benthic Community Impacts[3]	Total Phosphorus	Yes	0.1 mg/L	TMDL	0.2 mg/L	TMDL	×	×	×			
	Total Nitrogen	Yes	1.0 mg/L	TMDL	4.0 mg/L	TMDL	×	×	×			
	Sediment	Yes	--	--	Based on flow [4]	TMDL	×	×	×			
Metals	Lead	No[5]	18.6 ug/L[6]	CTR	476.8 ug/L[6]	CTR						×
	Mercury	No[7]	0.051 ug/L			CTR						×
	Selenium	No[8]	5.0 ug/L			CTR						×
Sulfate		No[8]	500 mg/L			Basin Plan	×					

[1] The Bacteria TMDL allows 15 wet Allowable Exceedances per year. Dry weather target based on 30-day geometric mean WQO while wet weather target is based on single sample maximum WQO.

[2] Applicable to the MCW Nutrient TMDL (USEPA 2003) and associated creeks.

[3] Applicable to the Malibu Creek TMDL for Sedimentation and Nutrients to Address Benthic Community Impairments (USEPA 2011) and associated creeks.

[4] Sediment TMDL (USEPA 2011) target translated from a 38% reduction in "work" to a 43% reduction in peak flow for the 2-year events based on the ratio of pre-development and post-development peak flow.

[5] No water quality data were available for Triunfo Canyon Creek to assess lead concentrations, but zero exceedances of the lead target were observed at mass emission station S02 for wet or dry weather. Therefore, lead was not modeled and reductions of lead are expected by meeting nutrient and bacteria targets for Triunfo Canyon Creek. See Section 6.2.5 for further discussion of limiting pollutants.

[6] Dry weather target based on chronic criteria and wet weather target based on acute criteria. With an average hardness at mass emission station S02 of 730 mg/L as CACO3, targets based on the maximum hardness specified in CTR at 400 mg/L.

[7] No water quality data were available for Triunfo Canyon Creek to assess mercury concentrations, but based on data collected at mass emission station S02 from 2006-2013, 2 out of 26 samples exceeded reporting limits (0.1-0.5 ug/L) for dry weather, and 1 out of 25 samples exceeded the same reporting limits for wet weather. Detectable mercury concentrations above the target at SO2 could result from sources within WWTP effluent. With reporting limits above the target, and analysis based on data at S02 (below WWTP effluent), results are inconclusive regarding mercury levels that may occur in Triunfo Canyon Creek. Therefore, mercury was not modeled, but reductions of mercury will result by meeting the E. coli target for Triunfo Canyon Creek. See Section 6.2.5 for further discussion of limiting pollutants.

[8] USEPA (2011) states that sources of selenium and sulfate are naturally occurring in the MCW due to local geology, and therefore were not modeled. See Section 6.2.5 for further discussion of limiting pollutants.

Table 37 shows the exceedance volume summary statistics for the Malibu Creek Watershed.

Table 37: Exceedance Volume Summary Statistics for Malibu Creek

Exceedance Volume Statistics (units of acre-feet)	RAA Assessment Area (at watershed mouth)					
	Malibu Creek	Cold Creek	Stokes & Las Virgenes Creeks	Lindero Creek	Medea Creek	Triunfo Canyon Creek
E. coli [1]						
Number of non-zero Exceedance Volumes in dataset used to calculate 90th percentile	10	10	10	10	10	10
Average EV	114	6	17	42	54	24
10th percentile EV	8	0.3	2	0	9	2
25th percentile EV	17	0.5	4	0	13	5
Median EV	51	2	12	0	40	17
75th percentile EV	116	3	24	27	71	32
90th percentile EV	580	45	63	316	201	85
Total Phosphorus						
Number of non-zero Exceedance Volumes in dataset used to calculate 90th percentile	7,305	1,940	4,172	--	--	--
Average EV	329	16	57	--	--	--
10th percentile EV	116	2	9	--	--	--
25th percentile EV	148	3	17	--	--	--
Median EV	218	5	32	--	--	--
75th percentile EV	379	28	67	--	--	--
90th percentile EV	726	96	135	--	--	--

[1] For *E. coli*, the entire volume of runoff is assumed an Exceedance Volume. For the 10-year simulation, the 16th-wettest day in each year (10 values) is identified and the 2nd-ranked is the 90th percentile value (the 2nd highest of 10 values is the 90th percentile).

[2] For total phosphorus, the storm that generates the 90th percentile Exceedance Volume in the 10-year simulation is the critical condition (based on analyzing 87,660 rolling 24-hour periods in the 10-year simulation).

Figure 27 below illustrates how the nutrient exceedance volume is calculated for critical condition determination.

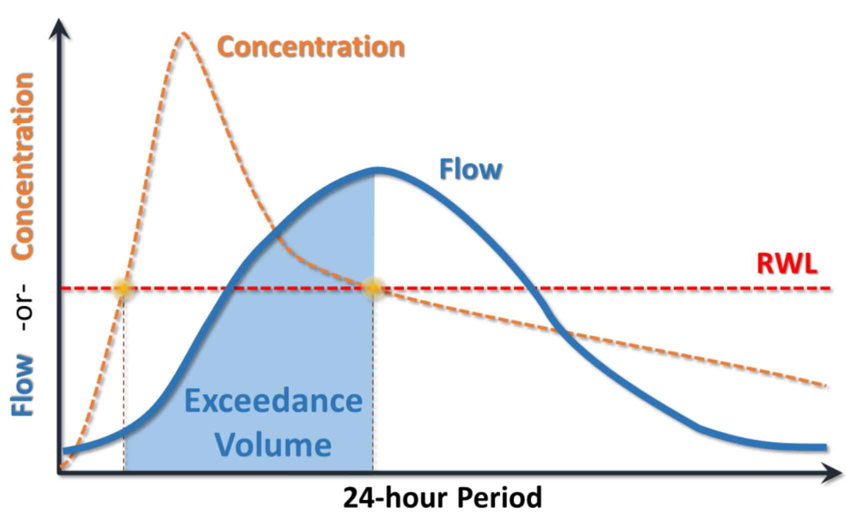

Figure 27: Illustration of How Nutrient Exceedance Volume is calculated for Critical Condition Determination

6.2.4 Limiting Pollutant Selection

The RAA Guidelines allow the EWMP to be developed with consideration of a "limiting pollutant", or the pollutant that drives BMP capacity (i.e., control measures that address the limiting pollutant will also address other pollutants). The detailed limiting pollutant selection and justification for each Water Quality Priority pollutant[17] is provided in Table 38. The limiting pollutants are as follows:

- Wet weather – total phosphorus and E. coli: according to the Exceedance Volume analysis and review of monitoring data, control of total phosphorus and E. coli requires BMP capacities that are the largest among the Water Quality Priority pollutants, and thus control of total phosphorus and E. coli has assurance of addressing the other MCW wet weather Water Quality Priorities. The RAA for MCW first identifies the control measures to attain bacteria WQBELs (through retention of the critical bacteria storm), and then identifies additional capacity needed to achieve total phosphorus concentration-based TMDL waste load allocations (where applicable, during the total phosphorus critical condition).
- Dry weather – E. coli: among all the pollutants monitored during dry weather at mass emission stations in LA County, E. coli most frequently exceeds RWLs. Attainment of dry weather RWLs for E. coli in MCW will require at least a 99% reduction[18] in E. coli loading, which is anticipated to require significant control measures and/or reductions in non-stormwater discharges. As such, control of E. coli during dry weather has assurance of addressing the other MCW dry weather Water Quality Priorities.

As shown in Figure 28, the RAA sequentially addresses the limiting pollutants in stormwater and non-stormwater based on the limiting pollutant analysis.

It is important to distinguish between reasonable assurance and required implementation actions when considering limiting pollutants. While control of total phosphorus and E. coli has reasonable assurance of addressing other Water Quality Priorities, it is not necessary to fully control total phosphorus and E. coli to address the other Water Quality Priorities. For example, as shown in Table 38, exceedances of lead during dry weather are rare and thus existing MCMs and control measures have reasonable assurance of attaining lead RWLs during dry weather. As such, if exceedances of lead during dry weather occur during EWMP implementation, then compliance determination should not be based on the status of implementation of total phosphorus and E. coli control measures. Instead, compliance determination should be based on evaluation of whether the existing level of implementation for MCMs and control measures (as of June 2015) has been maintained.

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[17] Mercury was evaluated as a potential limiting pollutant for Triunfo Canyon Creek. Based on mercury data collected at ME station S02 from 2006-2013, 2 out of 26 samples exceeded reporting limits (0.1-0.5 ug/L) for dry weather, and 1 out of 25 samples exceeded the same reporting limits for wet weather. Detectable mercury concentrations above the target at SO2 could result from sources within WWTP effluent. With reporting limits above the target, and analysis based on data at S02 (below WWTP effluent), results are inconclusive regarding mercury levels in Triunfo Canyon Creek. However, it is expected that mercury reductions will be less than those required for E. coli.
Lead was evaluated as a potential limiting pollutant for Triunfo Canyon Creek. However, based on wet (n=25) and dry (n=26) samples collected at ME station S02 from 2006-2013, there were no exceedances of RWLs.
Selenium and sulfate were not evaluated as potential limiting pollutants because sources are naturally occurring in MCW due to local geology (USEPA 2011).

[18] Based on data analysis of dry weather samples from Malibu Creek and tributary stations, the reduction of the 90th percentile (n = 21 samples) E. coli concentration to achieve the RWL of 126 MPN per 100 mL is 99%, the reduction of the 90th percentile (n = 63 samples) total nitrogen concentration to achieve the WQBEL of 1.0 mg/L is 73%, and the reduction of the 90th percentile (n = 63 samples) total phosphorus concentration to achieve the WQBEL of 0.1 mg/L is 89%.

Table 38: Limiting Pollutant Selection and Justification for RAA

Pollutant Class	Pollutant	RAA approach to Addressing Pollutant: Wet Weather RWLs & WQBELs Addressed by:	Justification for control approach	Dry Weather RWLs & WQBELs Addressed by:	Justification for control approach
Bacteria [1]	*E. coli*	*E. coli* controls	*E. coli* is the limiting pollutant for assessment areas where total phosphorus (associated with Benthic Community Impacts) is not applicable.	Elimination of dry-weather discharges through non-stormwater outfall screening and source identification protocol identified in the MCW CIMP.	Based on the first round of non-stormwater outfall screening performed for all of the primary outfalls in the MCW most outfalls were observed not to have dry-weather discharges. If dry weather discharge at an outfall does exist, the source identification protocol identified in the MCW CIMP will be used to eliminate the source of the dry weather discharge for that outfall. Further information about this approach is provided in Section 6.4.3.
Nutrients [2]	Total Nitrogen	Total phosphorus controls	The volumes of stormwater to be managed for total phosphorus control are greater than volumes for control of total nitrogen.		
	Total Phosphorus	Not applicable – not a Water Quality Priority for wet weather conditions.			
Benthic Community Impacts [3]	Total Nitrogen	Total phosphorus controls	The volumes of stormwater to be managed for total phosphorus control are greater than volumes for control of total nitrogen.		
	Total Phosphorus	Total phosphorus controls	Where applicable, the volumes of stormwater to be managed for total phosphorus control are greater than volumes for control of *E. coli*		
	Sediment	Total phosphorus controls	The volumes of stormwater to be managed for *E. coli* and total phosphorus control are sufficient to reduce peak flows and meet the sediment target within creeks.	Not applicable – not a Water Quality Priority for dry weather conditions.	
Metals	Lead	Existing MCMs and BMPs	Impairment is on Triunfo Canyon Creek, but no data are available to assess historic concentrations. Based on data at ME Station S02 on Malibu Creek, there were no exceedances of the RWL.	Existing MCMs and BMPs	Impairment is on Triunfo Canyon Creek, but no data are available to assess historic concentrations. Based on data at ME Station S02 on Malibu Creek, there were no exceedances of the RWL.
	Mercury	*E. coli* controls	Impairment is on Triunfo Canyon Creek, but no data are available to assess historic concentrations[4].	*E. coli* controls	Impairment is on Triunfo Canyon Creek, but no data are available to assess historic concentrations[4]
	Selenium	Existing MCMs and BMPs	USEPA (2013) states that sources of selenium is naturally occurring in the	Existing MCMs and BMPs	USEPA (2013) states that sources of selenium is naturally occurring in the MCW due to local geology.

Pollutant Class	Pollutant	RAA approach to Addressing Pollutant			
		Wet Weather RWLs & WQBELs Addressed by:	Justification for control approach	Dry Weather RWLs & WQBELs Addressed by:	Justification for control approach
			MCW due to local geology.[5]		
Sulfate, TDS, and Specific Conductivity		Existing MCMs and BMPs	USEPA (2013) states that sources of sulfate is naturally occurring in the MCW due to local geology.	Existing MCMs and BMPs	USEPA (2013) states that sources of sulfate. TDS, and specific conductivity are naturally occurring in the MCW due to local geology.

1 – E. coli Exceedance Volumes were consistently below total phosphorus Exceedance Volumes (where total phosphorus RWLs apply).

2 – Applicable to the MCW Nutrient TMDL (USEPA 2003) and associated creeks.

3 – Applicable to the Malibu Creek & Lagoon TMDL for Sedimentation and Nutrients to Address Benthic Community Impairments (USEPA 2013) and associated creeks.

4 – No water quality data were available for Triunfo Canyon Creek to assess mercury concentrations, but based on data collected at mass emission station S02 from 2006-2013, 2 out of 26 samples exceeded reporting limits (0.1-0.5 ug/L) for dry weather, and 1 out of 25 samples exceeded the same reporting limits for wet weather. Detectable mercury concentrations above the target at SO2 could result from sources within WWTP effluent. With reporting limits above the target, and analysis based on data at S02 (below WWTP effluent), results are inconclusive regarding mercury levels that may occur in Triunfo Canyon Creek. Therefore, mercury was not modeled, but reductions of mercury will result from control measures that address nutrient and E. coli targets for Triunfo Canyon Creek.

5 – The MCW EWMP Group will be performing a Natural Sources of Pollutants Special Study, as identified in Section 7.5, that will evaluate naturally occurring selenium in the MCW.

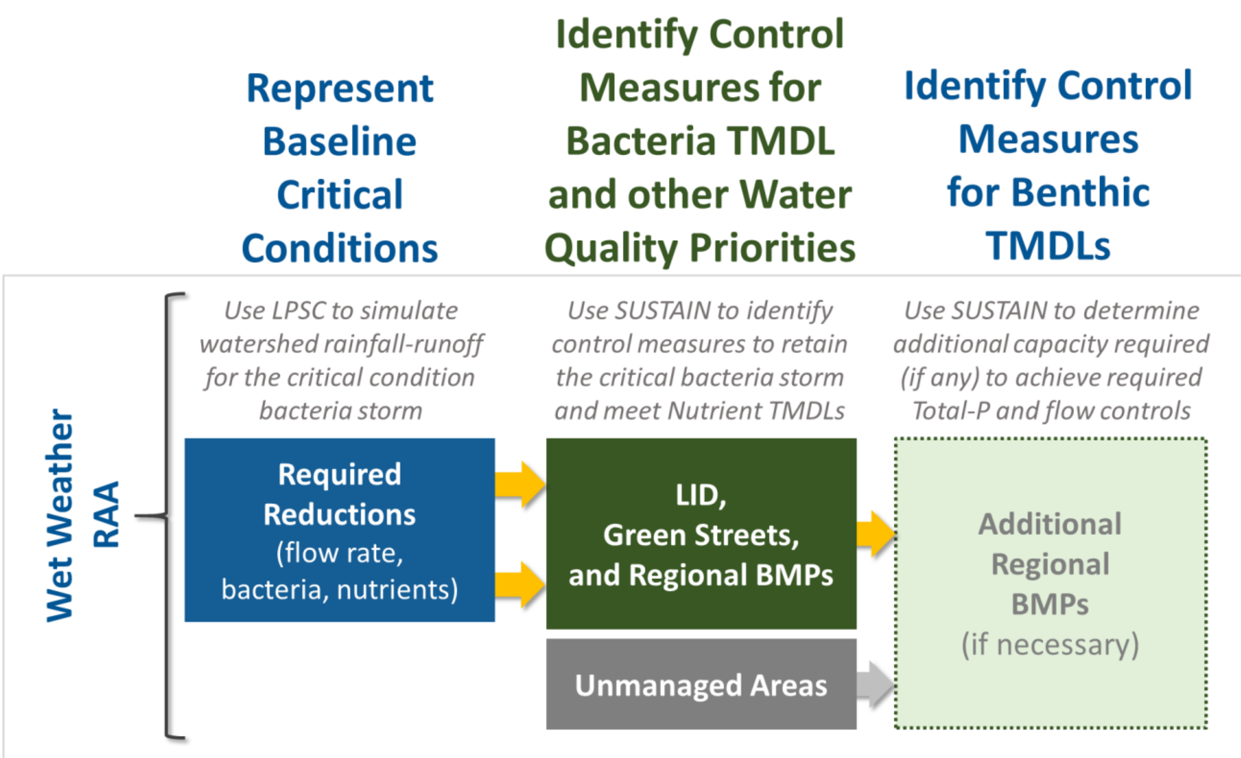

Figure 28: RAA Process for Establishing Critical Conditions and Addressing Water Quality Priorities in MCW

6.2.5 Required Interim and Final Pollutant Reductions

The RAA Guidelines specify that required pollutant reductions should be determined by comparing baseline/current pollutant loading to the allowable pollutant loading. With a set of defined critical conditions and identified limiting pollutants for MCW (as described in the previous two subsections), the required pollutant reductions for MCW can be determined, as shown in Table 39. The control measures to be implemented by the EWMP are designed to achieve these reductions, and the RAA provides assurance that the required reductions will be achieved by the selected control measures. Within those assessment areas where the Cities and County have jurisdictional area, each is held to achieving the equitable reductions for the receiving waters/assessment areas to which they discharge. The required reductions shown in Table 39 determine the control measures ultimately selected for EWMP implementation (as described in Section 6.4).

Table 39: Required Pollutant Reductions for MCW RAA

Condition and Pollutant Addressed	Reduction Metric	RAA Assessment Area					
		Malibu Creek	Cold Creek	Stokes & Las Virgenes Creeks	Lindero Creek	Medea Creek	Triunfo Canyon Creek
Final Compliance with Nutrients	Required Load Reduction [1]	5%	5%	23%	21%	25%	0%
Final Compliance with E. coli	Runoff volume to be retained	Runoff from critical bacteria storm is retained prior to discharge to receiving water (excluding open space subwatersheds)					
Final Compliance with Benthic Community Impacts	Required Load Reduction [2]	34%	67%	35%	--	--	--

[1] Based on control of total nitrogen to meet WQBEL for the MCW Nutrient TMDL (USEPA 2003) during storm that generates the 90th percentile total nitrogen Exceedance Volume

[2] Based on control of total phosphorus to meet the waste load allocation for the Malibu Creek & Lagoon TMDL for Sedimentation a nd Nutrients to Address Benthic Community Impairments (USEPA 2011) during storm that generates the 90th percentile total phosphorus Exceedance Volume

6.3 Representation of EWMP Control Measures

Once the model is set up to accurately simulate baseline hydrology and water quality conditions, the targets have been calculated, and the required reductions estimated, the next stage of the RAA determines the optimal combination of BMP types to achieve applicable RWLs and WQBELs. This step requires a robust set of assumptions to define the watershed-wide extent and configuration of each of the types of control measures described in Section 5.

The representation of control measures in the model is an important element of the RAA, as it provides the link between future watershed activities, model-predicted water quality improvement, and, ultimately, compliance. Since the BMP modeling parameters will greatly influence the outcome of the RAA, it is imperative that the suite of BMP assumptions are based on the best available data and represent the opportunity and limitations that will be faced by designers, contractors, and maintenance crews in the field as these BMPs are implemented over time. Further, the technical rigor of the analysis must be appropriately balanced with the resolution of the modeling system and the accuracy of the key datasets.

This section will present and review the three primary elements for representing BMPs in the RAA model, as follows:

- ***Opportunity –*** Where can these BMPs be located and how many can be accommodated?

- ***System Configuration –*** How is the runoff routed to and through the BMP, and what is the maximum BMP size?
- ***Cost Functions –*** What is the relationship between BMP volume/footprint/design elements and costs?

The following sections provide an overview of methods, summarize key assumptions, and highlight potential data limitations.

6.3.1 BMP Opportunities

Opportunities to implement BMPs in the MCW are detailed in Section 5.3 including institutional and source control BMPs in Section 5.3.2, regional BMPs in section 5.2.3, and distributed BMPs on public parcels in Section 5.3.4. Identification of BMPs opportunities took into consideration many factors including land availability, available BMP footprint, topography, hydrology, existing stormwater infrastructure including proximity to storm drains, land ownership, maintenance access, other physical constraints, and environmental impacts. To ensure that the BMP opportunities were accurately accounted for in the model, a BMP opportunity assessment was developed for each BMP category. A comprehensive GIS desktop survey was performed to identify structural BMP opportunities in the MCW including regional BMPs and distributed BMPs on public parcels. A summary of these opportunities is provided in Table 40 and detailed methods for identification of opportunities are provided in Section 5.3.

Table 40: Summary of BMPs for Final Compliance

BMP Category	Type	Description
Institutional	Institutional	Institutional and source controls proposed by the MCW EWMP Groups were assumed to achieve 5% reduction
Green Streets	Green Streets	Available opportunities for integration of green streets were approximated for each subwatershed.
Regional BMPs	Tier A projects on Public Parcels	Top ranked parcels from regional BMP selection process.
	Tier B projects on Public Parcels	Parcels identified as secondary opportunities by the MCW EWMP Group.
	Tier C projects on Private Parcels	BMP projects to be located on private land.

6.3.2 BMP Configuration

BMP configuration is determined by a combination of physical constraints for each BMP location and the BMP design assumptions. The following are the elements considered that identify the configuration of BMPs at each site.

- Infiltration Rate – Determined by the soil types in the area, infiltration rate defines the rate at which water exits the BMP into the soil.

- Drainage Area – Determined by the physical setup of the watershed and the placement of the BMP, drainage area ultimately defines how much water and pollutant load could possibly arrive at the site.

- Site Constraints – Site constraints include physical elements at the proposed BMP location that affect the configuration. These include the land available for the BMP footprint, presence of trees or woody vegetation, available hydraulic head, slope, geotechnical stability, compatibility with adjacent land uses, utilities, proximity to storm drains, and environmental impact constraints.

- BMP Design – Determined by the physical space available at the site and the standard profile assumed, BMP design defines the spatial footprint, depth, and internal hydraulic routing of runoff through the BMP.

Each of the regional BMP opportunity sites were evaluated according the elements identified above to determine the most appropriate BMP for the identified location. A constructability analysis was performed for each of the regional BMP opportunity sites using the constraints identified for each site to determine the feasibility of implementation of the proposed BMP. Additionally, a preliminary environmental assessment was performed for the sites. Geotechnical investigations were also performed for the following regional BMP opportunity sites: LC-02, LVC-14, MEC-09, MEC-12, TC-02, TC-29, TC-35, and TC-37. Based on the constructability analysis, the preliminary environmental assessment, and the geotechnical investigations some BMP configurations were modified for the proposed locations.

6.3.3 Cost Functions

To support BMP optimization, cost functions were developed for each type of structural BMP. For EWMP development efforts throughout Los Angeles County, BMP cost functions within WMMS were modified for improved cost predictions. A summary of the BMP cost functions, expressed as a function of BMP geometry is presented in Table 41. It is important to note the cost functions are based on 20-year life cycle costs including operations and maintenance (O&M).

Table 41: Summary of BMP Cost Functions for Final Compliance RAA (20-year, including O&M)

BMP Category	BMP types	Functions for Estimating Total Costs [1]
LID and Green Streets	Bioretention with Underdrain (Biofiltration)	*Cost = 64.908 (A) + 2.165 (Vt) + 2.64 (Vm) + 3.3 (Vu)*
	Bioretention without Underdrain	*Cost = 56.658 (A) + 2.165 (Vt) + 2.64 (Vm)*
Regional BMPs	Regional Project on Public Parcel	*Cost = 45.42 (A) + 2.296 (Vt) + 2.8 (Vm)*
	Regional Project on Private Parcel	*Cost = 45.42 (A) + 2.296 (Vt) + 2.8 (Vm) + 129 (A)*

[1] Functions describe 20-year life cycle costs including O&M using the following variables: (A) is the area of the BMP footprint in square feet. (Vt) is the total volume of the BMP in cubic feet. (Vm) is the volume of the BMP soil media in cubic feet. (Vu) is the volume of the BMP underdrain in cubic feet.

6.4 Selection of Control Measures for EWMP Implementation

The RAA process is an important tool for assisting EWMP agencies with selection of control measures for EWMP implementation. A major challenge associated with stormwater planning is the multitude of potential types and locations of control measures and the varying performance and cost of each scenario. This subsection describes the process for selecting the control measures for the EWMP Implementation Strategy by each jurisdiction.

6.4.1 Selection of Control Measures for Final Wet Weather Compliance

The SUSTAIN model within WMMS provides a powerful tool for considering millions of scenarios of control measures and recommending a solution based on cost-effectiveness. The cost functions described in the previous subsection are used to weigh the cost of different BMP scenarios with benefits in terms of pollutant load reduction. As shown in Figure 28, the RAA process for the MCW EWMP first determines the control measures to retain the critical bacteria storm and then determines the additional capacity (if any) to achieve total phosphorus WQBELs under critical conditions. The optimization modeling is conducted stepwise to determine the control measures for final compliance that are selected for the EWMP implementation strategy, as follows:

1. **Determine the cost-effective BMP solutions for each subwatershed in the EWMP area:** an example set of "BMP solutions" is shown in Figure 29, which shows thousands of scenarios considered for an individual subwatershed in the EWMP area. The scenarios are based on the available opportunity (e.g., the available footprints for regional BMPs and length of right of way for green streets) and predicted performance for controlling bacteria and total phosphorus (depending on applicable assessment areas) if BMPs were implemented at those opportunities with varying sizes. The most cost-effective BMP solutions for each of the 68 subwatersheds in the EWMP area provide the basis for cost optimization.

2. **Determine the cost-effective scenarios for each Group member:** by rolling up the BMP solutions at the subwatershed level, the most cost-effective scenarios for each jurisdiction can be determined for a wide range of requirements for controlling bacteria or total phosphorus. These "cost optimization curves" provide a potential EWMP Implementation Strategy for a range of required reductions. Figure 30 shows example cost optimization curves for the jurisdictions that drain to Stokes & Las Virgenes Creeks. Each scenario is a "recipe for compliance" for all the subwatersheds in the jurisdictional area (for a given percent reduction). The complete set of cost optimization curves for the ULAR EWMP is presented in Appendix 6.C.

3. **Extract the cost-effective scenarios for the required reduction:** the required bacteria or total phosphorus reductions specified in Table 39 determine the specific scenario that is selected from the cost optimization curves. All Group members within the assessment areas are held to the same percent reduction. The selected scenarios become the EWMP Implementation Plan. Figure 31 illustrates the process for extracting the control measures to achieve total phosphorus WQBELs from the cost optimization curve. The extracted control measures comprise a detailed recipe for retaining the critical bacteria storm and compliance with RWLs/WQBELs for other Water Quality Priorities for each subwatershed in the jurisdictional area.

4. **Route the storms through the control measures in the extracted scenario to assess the sediment target:** the effectiveness of the selected control measures for achieving reductions in "work",

using peak flow as a surrogate, as required by the benthic sediment TMDL. The benthic TMDL compared pre-development and post-development conditions in the Malibu Creek watershed for several return interval events (USEPA 2013). The TMDL recognized that most of the sediment transport in the Malibu Creek system occurs between the 1-year and 10-year event. Analysis suggested that peak flow increased 43% for the 2-year storm event from pre-development conditions. For the Malibu Creek RAA, modeled peak flow was compared using a flow duration curve for the existing condition and managed condition (with the RAA BMPs) covering the spatial domain of the EWMP area. This analysis was performed to (1) validate that implementation of the RAA BMPs provides enough reduction in peak flow to achieve requirements of the benthic sediment TMDL, and (2) if the necessary peak flow reduction was not achieved then this analysis would be used to quantify any additional measures to comply with the benthic sediment TMDL. Control measure could include additional BMPs in upstream subwatersheds similar to those plans developed for E. coli and TP.

The resulting EWMP Implementation Plan for final compliance is presented in Section 7.

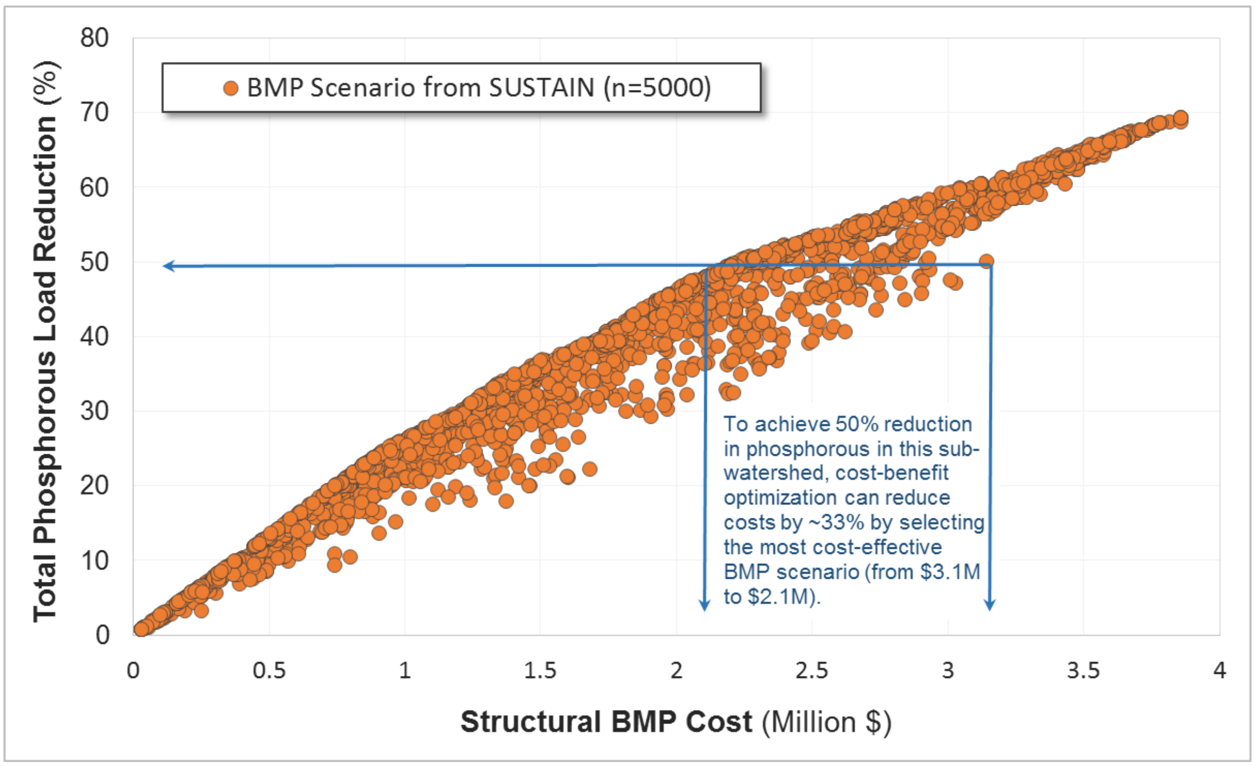

Figure 29: Example BMP Solutions for a Selected Subwatershed and Advantage of Cost-Benefit Optimization[19]

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[19] This figure shows an optimization output for a single subwatershed. A similar curve was generated for each of the 68 subwatersheds in the MCW EWMP area. The EWMP Implementation Strategy is based on an optimization routine that searches through those curves and selects the combination of solutions in each assessment area / watershed that provides the greatest cost-benefit for the required pollutant reduction.

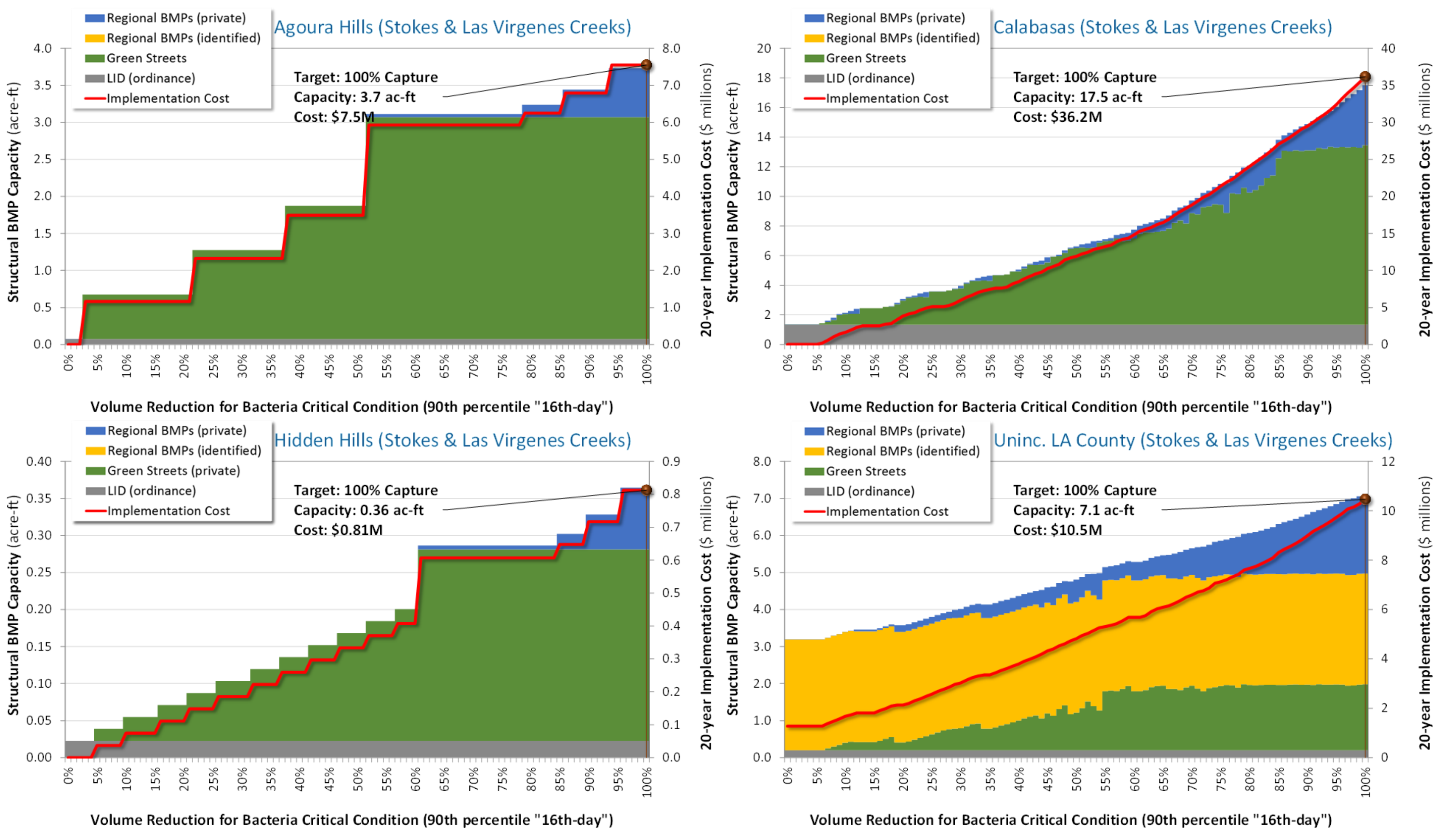
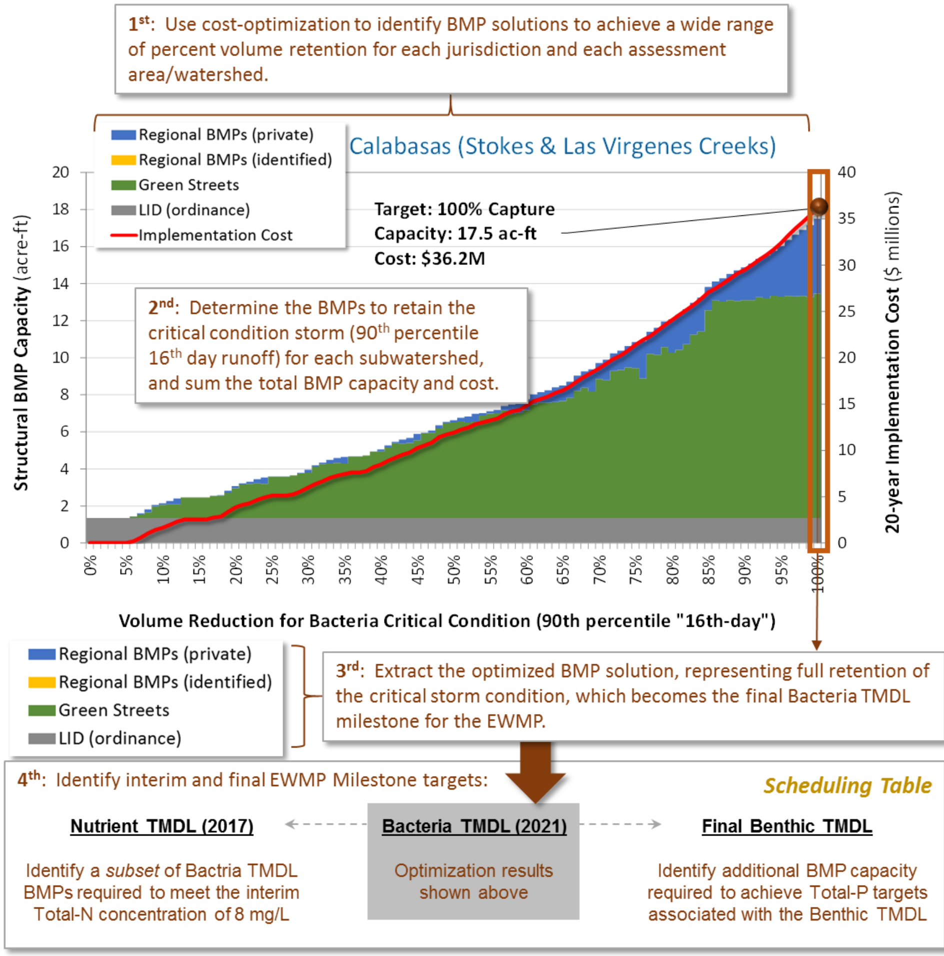


Figure 30: Example Cost Optimization Curves for a Watershed: Stokes & Las Virgenes Creeks[20]

[20] This example shows the set of optimized BMP solutions for MCW EWMP jurisdictions that drain to Stokes & Las Virgenes Creeks. The optimization curves represent over 1 million BMP scenarios that were evaluated for cost-effectiveness. All jurisdictions are held to the same equitable target (100% capture of critical-condition bacteria runoff). Curves differ by jurisdictions because land cover/BMP opportunities differ; but critical condition definition is consistent. See Appendix 6C for the complete set of cost optimization curves.



Calabasas Scheduling Table

Assessment Area	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)				
			LID	Streets	Regional BMPs		
	EWMP Milestone	24-hour Volume Managed (acre-ft)	Ordinance	Green Streets	Regional BMPs (identified)	Regional BMPs (private)	Cumulative BMP Capacity (acre-ft)
Cold Creek	Nutrient TMDL (2017)	0.00	0.0	---	---	---	**0.00**
	Bacteria TMDL (2021)	0.09	0.0	0.2	---	0.0	**0.18**
	Final Benthic TMDL	0.32	0.0	0.2	---	0.0	**0.18**
Medea Creek	Nutrient TMDL (2017)	--	--	--	--	--	--
	Bacteria TMDL (2021)	--	--	--	--	--	--
	Final Benthic TMDL	--	--	--	--	--	--
Stokes & Las Virgenes Creeks	Nutrient TMDL (2017)	2.98	0.4	2.0	---	---	**2.34**
	Bacteria TMDL (2021)	15.80	1.3	12.1	---	4.2	**17.62**
	Final Benthic TMDL	21.25	1.3	12.1	---	4.2	**17.62**
Total	**---**	**21.57**	**1.35**	**12.28**	**0.00**	**4.17**	**17.80**

Detailed Recipe

Subwatershed ID	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)						
	Bacteria	Benthic	For Bacteria TMDLs					For Benthic TMDL	
			LID	Streets	Regional BMPs				
	24-hour Volume Managed (acre-ft)	Additional 24-hour Volume Managed (acre-ft)	Ordinance	Green Streets	Regional BMPs (identified)	Regional BMPs (private)	Total BMP Capacity (acre-ft)	Regional BMPs (private)	Cumulative BMP Capacity for both Bacteria and Benthic (acre-ft)
301214	0.45	---	0.01	0.11	---	0.29	**0.41**	---	---
301314	0.00	---	---	0.01	---	0.00	**0.01**	---	---
301414	0.00	---	0.00	---	---	0.00	**0.00**	---	---
301514	9.77	---	0.94	5.53	---	1.99	**8.46**	---	---
301614	1.51	---	0.20	0.63	---	1.06	**1.88**	---	---
301714	0.25	---	0.06	0.43	---	0.02	**0.51**	---	---
301814	3.82	---	0.14	5.41	---	0.79	**6.35**	---	---
Total	**15.80**	---	**1.35**	**12.11**	**0.00**	**4.15**	**17.62**	---	---

RED = Subwatersheds with highest required runoff management volumes
BLUE = Subwatersheds with highest BMP capacities within a BMP category
GRAY = Areas with no required reductions

Figure 31: Illustration of how the EWMP Implementation Strategy is extracted from a Cost Optimization Curve.[21]

[21] This illustration uses the Calabasas jurisdiction in the Stokes & Las Virgenes Creeks watershed as an example. Four steps are shown for RAA development: cost-optimized BMP solutions are developed for a wide range of % volume reductions (1st text box), followed by determination of the BMP solution that would completely retain the critical storm condition (2nd text box). The corresponding BMP solution becomes the required bacteria TMDL milestone (3rd text box), followed by determination of interim Nutrient and Final Benthic TMDL control measures (4th text box). The detailed recipes and schedules for the RAA are presented in Appendices 7A and 7C. The EWMP Implementation Plan for all jurisdictions and assessment areas is presented in Section 7.

To evaluate the effect of this EWMP implementation plan on the sediment TMDL, the final extracted BMP plan for each subwatershed was validated using LSPC model runoff time series for the 10-year period from October 1, 2001 through September 30, 2011. The results of the baseline condition (no BMPs) and managed runoff condition (with BMPs to address critical pollutants) were plotted as a flow duration curve presented in Figure 32. The percent reduction in peak flow between the baseline and managed condition is shown for comparison against the reduction targets described earlier.

Note that this plot represents runoff from the Malibu Creek EWMP Group area and excludes areas outside of Los Angeles County, State Park land, and other areas not considered part of the Group's jurisdiction (Figure 34). To correlate EWMP RAA runoff to instream flow events, the storms associated with the 1-year, 2-year, and 10-year event were identified [22] and the corresponding flow from the EWMP RAA model was identified.

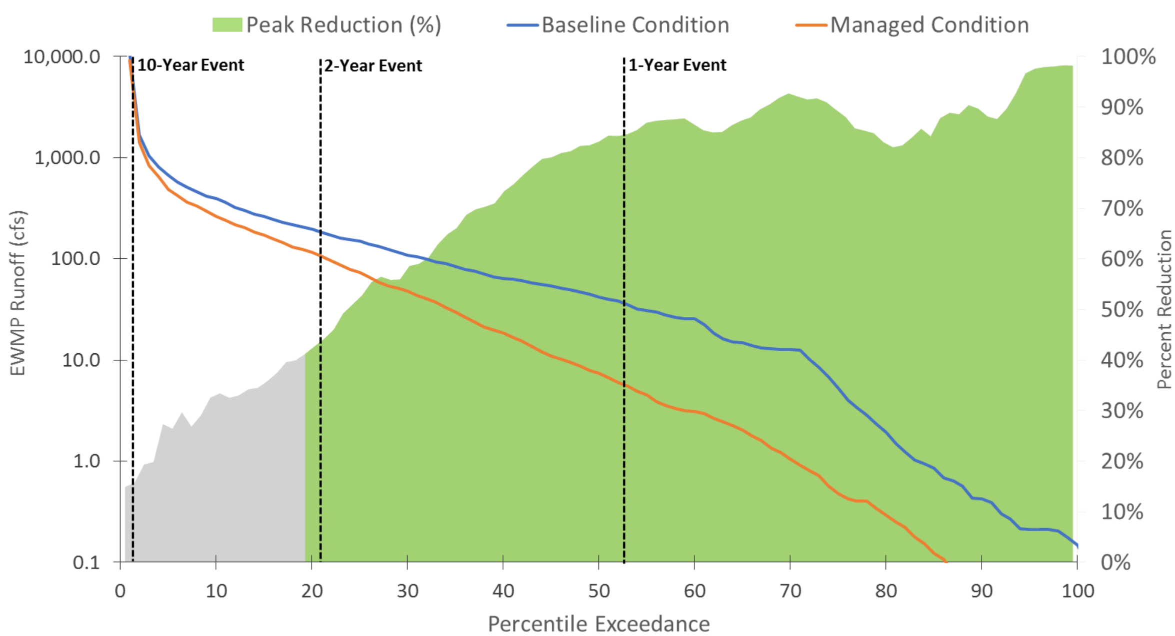


Figure 32: Malibu Creek EWMP area runoff duration curves for baseline and managed conditions.

The analysis in Figure 32 shows the effect of the RAA BMPs on reducing peak flows in the Malibu Creek watershed by plotting runoff duration curves for the baseline (unmanaged) and BMP (managed) scenarios. The difference in flow between the two scenarios was calculated for each percentile and rendered behind the curves for reference. The selected BMPs provide a 43% reduction in peak flows from the EWMP area for storms at or below the 2-year return interval. This exceeds the 38% reduction of

[22] Return intervals were identified based on streamflow data at LACFCD station F-130 on Malibu Creek below Cold Creek. Per the RAA guidelines, the period assessed was the last 10 years of record.

channel sediment transport reported in the Benthic TMDL[23]. The RAA BMPs also continue to provide measurable reductions in peak flow for storms larger than the 1-year and 2-year events.

Additionally, the BMPs recommended in the EWMP Implementation Plan provide capture and reduce sediment from stormwater generated at upland sources. Over the evaluation period of October 1, 2001 through September 30, 2011, the BMPs provided 12% reduction in the annual average sediment load from upland urban stormwater sources, with the actual loads and percent reductions varying by year based on hydrologic conditions.

6.4.2 Selection of Control Measures for Interim Wet Weather Compliance

With the EWMP Implementation Strategy for final compliance determined, the remaining step for the wet weather RAA is scheduling of control measures over time to achieve interim milestones. The following interim wet weather milestones were used for development of the MCW EWMP, primarily based on the milestones of the MCW WQBELs for nutrients and bacteria (LARWQCB 2012). Additional reductions of nutrients and sediment required by the Malibu Creek and Lagoon TMDL for Sedimentation and Nutrients to Address Benthic Community Impairments (USEPA 2011) represent the final milestone to be met by the EWMP Implementation Strategy.

- Achieve 100% of the reduction for total nitrogen (December 2017)
- Achieve 100% of the reduction for bacteria (July 2021)
- Achieve 100% of the reduction of total phosphorus and meet sediment target (March 2032)

The scenario of control measures that corresponds to each of the EWMP / TMDL milestones was extracted and used for scheduling of the EWMP Implementation Strategy, as presented in the next section.

6.4.3 Selection of Control Measures for Dry Weather Compliance

Based on the initial non-stormwater outfall screening performed for all of the primary outfalls in the MCW most outfalls were observed not to have significant dry-weather discharges. The outfall screening process identified in Section 6.3.1 of the MCW CIMP was used for the screening. Screening included field checks of all major outfalls as defined in the permit[24]. During the initial field screening, outfalls were observed during dry weather, and at least 72 hours after a rain event of 0.1 inches or greater. During the initial field screening, the following information was gathered:

- Date, Time, Weather
- Photos of outfall and receiving water using a GPS-enabled camera
- Coordinates of outfall
- Physical descriptions of outfall, site condition, and accessibility
- Discharge characteristics, such as odor and color

[23] The Benthic TMDL (USEPA 2013) used a calculation of "effective work" to measure the power of sediment transport for 2- and 10-year recurrence intervals. A 38% reduction of effective work is assumed in the TMDL to be equivalent to a 38% reduction in channel sediment transport. This 38% was applied in the TMDL as the target reduction applied to annual average sediment loads to calculate the loading capacity of the lagoon. The average annual sediment load was based on long-term flow records and TSS concentrations assumed constant for flows less than 80 cfs (125.9 mg/L TSS) or greater to or equal to 80 cfs (301.8 mg/L TSS), with flows representing the variable in the calculation. Based on an approach consistent with the TMDL, the 43% reduction of the 2-year stormflow is the equivalent of a 43% reduction in sediment load for that event, with even greater reductions for all storms smaller than the 2-year storm.

[24] 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.

- Presence of flow greater than trickle or no flow
- Receiving water characteristics

The results of the outfall screening identified that of the total 55 major outfalls in the MCW EWMP Group area, 26 outfalls were dry and had no discharge, 20 outfalls only had a trickle of water discharging, and 9 outfalls had a discharge approximating the flow from a garden hose. Based on the results of the initial non-stormwater outfall screening performed for all of the major outfalls in the MCW EWMP area; the MCW EWMP group has no significant non storm water discharges. Additionally, the MCW EWMP group has substantially eliminated dry weather discharges as monitoring results show that approximately half of the outfalls have no dry weather discharges. Initial screening of non-stormwater discharges from the MCW EWMP Group MS4 indicates they are not causing or contributing to exceedances of water quality based effluent limitations or receiving water limitations.

Upon completion of the major outfall screening, any outfall determined to have significant non-stormwater discharges will be subject to source identification consistent with Section 6.3.4 of the CIMP.

The MCW EWMP group is committed to implementing appropriate control measures to eliminate both significant and less-than-significant discharge from all outfalls. This approach will provide compliance with the dry weather requirements of the Nutrients TMDL and improve the quality of our receiving waters.

7 EWMP Implementation Plan and Milestones

The EWMP Implementation Strategy is the "recipe for compliance" of each jurisdiction to address Water Quality Priorities and comply with the provisions of the MS4 Permit. Through the RAA, a series of quantitative analyses were used to identify the capacities of LID, green streets and regional BMPs that comprise the EWMP Implementation Strategy and assure those control measures will address the Water Quality Priorities. The EWMP Implementation Strategy includes individual recipes for each of the six jurisdictions and each watershed/assessment area – Malibu Creek, Cold Creek, combined Stokes and Las Virgenes Creeks, Medea Creek, Lindero Creek, and Triunfo Canyon Creek, see Figure 21 for a map of these assessment areas). The EWMP Implementation Strategy provides a BMP-based compliance pathway for each jurisdiction under the MS4 Permit. This section describes the EWMP Implementation Strategy and the pace of its implementation to achieve applicable milestones, through the following subsections:

- Elements of the EWMP Implementation Plan (7.1)
- Stormwater control measures to be implemented by March 2032 for final compliance (7.2)
- Scheduling of stormwater control measures for EWMP milestones (7.3)
- Non-stormwater control measures to be implemented (7.4)
- Natural Sources of Pollutants Special Study (7.5)
- EWMP Implementation Schedule (7.6)

7.1 Elements of the EWMP Implementation Plan

The EWMP Implementation Plan is expressed in terms of [1] the volumes[25] of stormwater and non-stormwater to be managed by each jurisdiction to address Water Quality Priorities and [2] the control measures that will be implemented to achieve those volume reductions. The two primary elements of the Pollutant Reduction are as follows:

- Compliance Targets: for MS4 compliance determination, the ultimate metric for EWMP implementation is the volume of stormwater managed by implemented control measures. The stormwater volume to be managed[26] is anticipated to be the metric that will be used by the Regional Board to assess BMP-based compliance. To support future compliance determination and adaptive management, the EWMP Implementation Plan reports volume of stormwater to be managed along with the capacities of control measures to be implemented by each jurisdiction.
- EWMP Implementation Plan: the network of control measures that has reasonable assurance of achieving the Compliance Targets[27]. In the development of the EWMP, regional multi-benefit projects are prioritized, as emphasized in the Permit. The identified BMPs (and BMP preferences) will likely evolve over the course of adaptive management in response to "lessons learned" and CIMP monitoring data. As such, it is anticipated the BMP capacities within the various

[25] Volume is used rather than pollutant loading because volume reduction is more readily tracked and reported by MS4 agencies. As described in Section 6.2.3, the volume reductions are actually a *water quality* improvement metric based on required pollutant reductions.

[26] The reported volume is determined by tracking the amount of water that is be retained (infiltrated) by BMPs over the course of a 24-hour period under the critical 90th percentile storm condition. Additional volume would be *treated* by these BMPs, but that additional treatment is implicit to the reported Compliance Targets. For compliance, the volume in the Compliance Target can either be retained and/or treated to concentrations below WQBELs/RWLs. Both would result in compliance.

[27] While the EWMP Implementation Plan reports the *total* BMP capacity to be implemented, that capacity is not a compliance target because some BMP capacities are sized to reflect anticipated opportunities rather than sized to achieve the required reduction. For example, should some streets be determined later to be inappropriate for green streets, those BMPs could be replaced by a different type of BMP (e.g., regional BMP) that is equally effective.

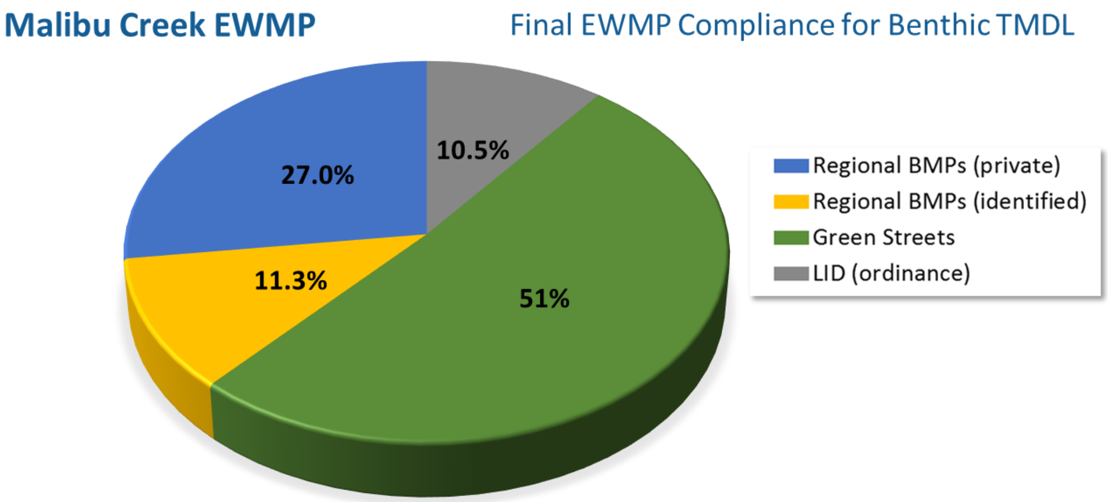
subcategories will be reported to the Regional Board but not tracked explicitly by the Regional Board for compliance determination. As BMPs are substituted over the course of EWMP implementation (e.g., replace green street capacity in a subwatershed with additional regional BMP capacity), the Group will show equivalency for achieving the corresponding Compliance Target.

7.2 Stormwater Control Measures to be Implemented by March 2032 for Final Compliance

The EWMP will guide stormwater management in the MCW for the coming decades, and the control measures to be implemented by the EWMP have the potential to transform communities through widespread multi-benefit projects and green infrastructure. The EWMP Implementation Strategy identifies the location and type of control measures to be implemented by each jurisdiction for final compliance by March 2032, which includes addressing all Water Quality Priorities including the limiting pollutants total phosphorus and E. coli (as described in Section 6.2.5). The EWMP Implementation Plan for final compliance is as follows:

- **Summary of total capacity of control measures to be implemented by each jurisdiction across the entire EWMP area:** bar graphs are used to summarize the control measure capacities that comprise the EWMP Implementation Strategy. Shown in Figure 33 are the various subcategories of LID, green streets and regional BMPs to be implemented across the entire EWMP area by March 2032.
- **Summary of total capacity of control measures to be implemented in each assessment area:** the control measures to be implemented within each watershed/assessment area reported in Section 7.3, organized by jurisdiction.
- **Detailed recipe for compliance, including volumes of stormwater to be managed, and control measure capacities:** the EWMP Implementation Plan is detailed for each subwatershed in the EWMP area (generally 1 to 2 square mile drainages). Shown in Figure 34 is a map of the “density” of control measure capacities to be implemented to address E. coli and other Water Quality Priorities (through controlling E. coli) and Figure 35 shows the additional capacity to address total phosphorus. The same results are shown as detailed tables in Section 7.4 and Appendix 7A, which present for each jurisdiction the volumes of stormwater to be managed in each subwatershed (Compliance Targets) and the control measures to achieve those volume reductions (EWMP Implementation Plan). Note that separate Compliance Targets and EWMP Implementation Plans are provided for the Bacteria TMDL (E. coli and other Water Quality Priorities) and the Benthic TMDL (total phosphorus).

The network of control measures in the EWMP Implementation Plan is extensive and its implementation represents a major change in how stormwater is managed in the MCW. The next subsection describes the timeline/sequencing for EWMP Plan Implementation.



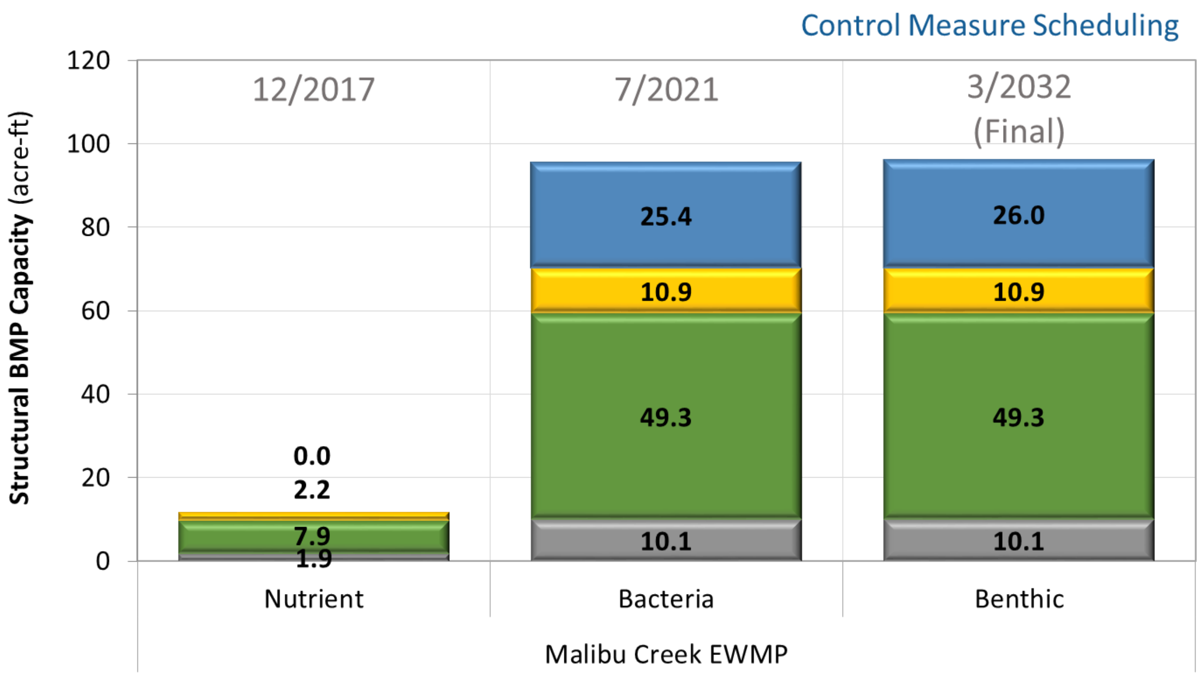


Figure 33: MCW EWMP Implementation Plan for Final Compliance by March 2032

The top pie chart depicts the relative amount of green streets, identified regional BMPs, and other regional BMPs needed for the entire MCW EWMP area to meet the final milestone. The bottom chart depicts the increasing total structural BMP capacity for the entire MCW EWMP area to meet interim and final milestones.

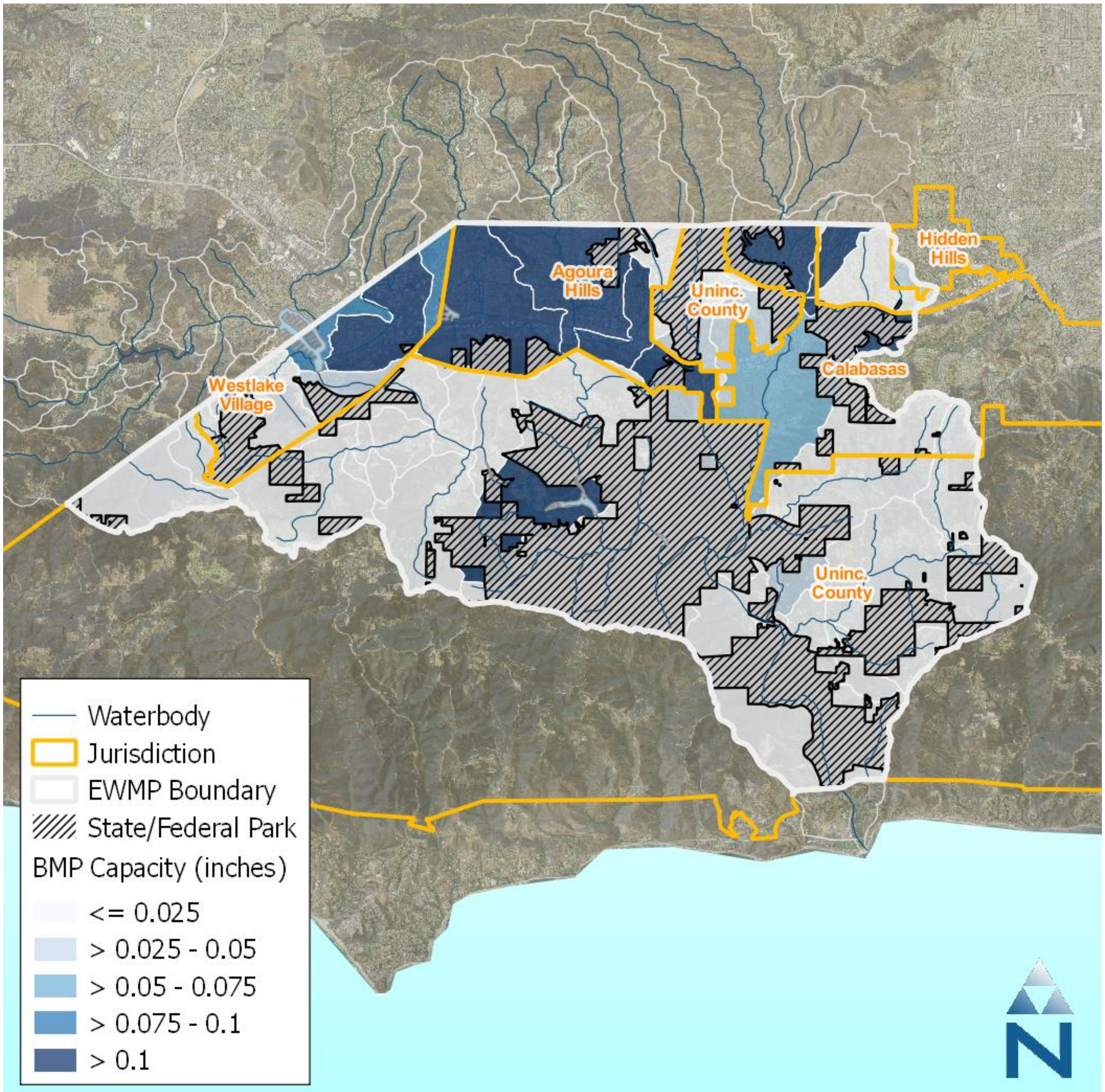


Figure 34: EWMP Implementation Plan by Subwatershed for Addressing E. coli

This map presents the EWMP Implementation Strategy for E. coli and Other Water Quality Priorities as control measure "density" by subwatershed. The BMP density is higher in some areas (dark blue) because either 1) relatively high load reductions are required, or 2) BMPs in those areas were relatively cost-effective (e.g., due to high soil infiltration rates). The BMP capacities are normalized by area. For example, the BMP capacity for each subwatershed (in units of acre-feet) was divided by the subwatershed area (in units of acres) to express the BMP capacity in units of depth (feet or inches). Note that, while all jurisdictions in an assessment area/watershed are held to an equivalent % reduction, subwatersheds within a jurisdiction may have variable reductions based on cost-benefit optimization (another reason why some subwatersheds within a jurisdiction are dark blue while others are light blue). The tabular version of this map is presented as a series of tables in in Appendix 7A, and subwatershed index maps for each jurisdiction are presented in Appendix 7B.

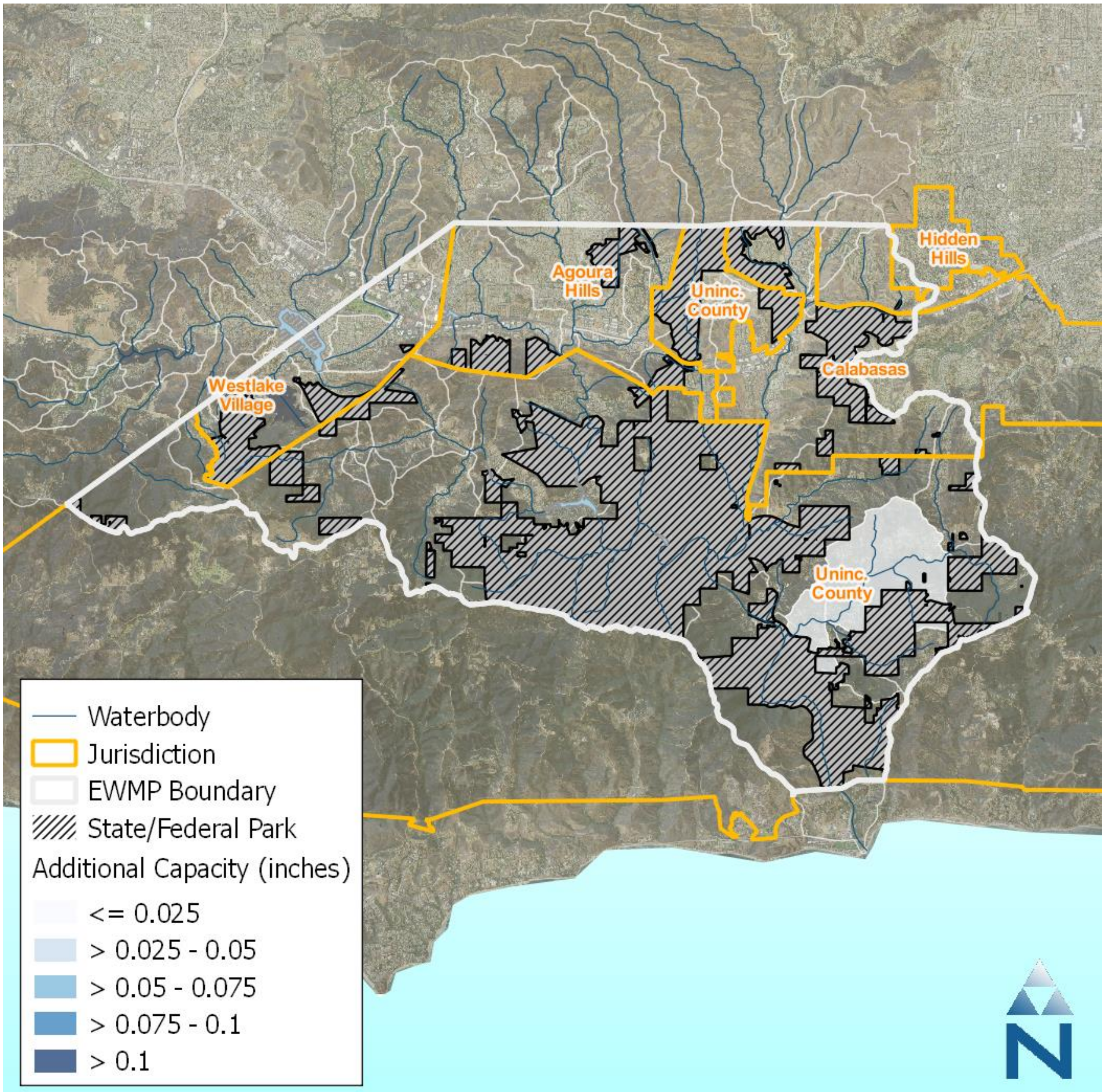


Figure 35: Additional Control Measures in EWMP Implementation Plan to Address Total Phosphorus

Figure 35 uses the same approach as Figure 34 to present the additional capacity in the EWMP Implementation Plan to address total phosphorus (beyond the control measures to address E. coli). Only subwatersheds within Malibu Creek, Cold Creek, and Stokes & Las Virgenes Creeks assessment areas require additional capacity beyond what was presented in the previous figure. The tabular version of this map is presented as a series of tables in in Appendix 7.A, and subwatershed index maps for each jurisdiction are presented in Appendix 7B.

7.2.1 Institutional and Source Controls

Institutional and source controls will complement the implementation of structural BMPs in the MCW. All of the institutional and source control BMPs identified in Table 42 will be implemented in the MCW by each jurisdiction no later than December 2017 except for those that are blank, which are not applicable to that jurisdiction. Implementation milestones as to when each jurisdiction will implement each of the institutional/source controls is provided in Table 42.

Table 42: MCW EWMP Institutional and Source Controls

Institutional/Source Control	Implementation Milestones				
	County of Los Angeles	Agoura Hills	Calabasas	Hidden Hills	Westlake Village
Pet Waste					
Outreach to Pet Owners Linking Waste to Bacterial Loading		12/2017	12/2017	12/2017	12/2017
Pet Waste Bag Dispensers		2012	2014	2012	2012
Pet Store/Vet/Shelter POS Campaign		12/2017	2014		12/2017
Trash Receptacles					
Signs On or Near Trash Receptacles to Keep Lids Closed		2012	12/2017	2012	2012
Letters and Outreach Materials to Trash Haulers and Businesses		2012	12/2016	2012	2012
Properly Design Trash Storage Areas		2012	2012	2012	2012
Industrial Commercial					
Increase Frequency of Trash Collection at Restaurants		2012	12/2017		2012
Equestrian/Livestock Facilities					
Update the Inventory of Areas with Confined Animals and Educate Property Owners on Bacteria	Completed	12/2017	12/2017	12/2017	12/2017
Create Updated Equestrian BMP Outreach Materials and Equestrian/Livestock Facility Education	Completed	12/2017	12/2017	12/2017	12/2017
Outreach for Equestrian Users Emphasizing Cleaning up After Horses & Post Signs at City and County-owned Trailheads	12/2017	12/2017	12/2017	12/2017	12/2017
Exclusion Fences		2012	12/2017	2012	2012
Manure Management	Completed	12/2017	12/2017	12/2017	12/2017
Education Materials and Workshops on Water Efficient Landscaping & Fertilizer Reduction	Completed	2012	12/2016	2012	2012
Trash					
Advanced Street Sweeping	12/2017	2012	12/2017	2012	2012
Storm Drain Marking	Completed	2012	2015	2012	2012
Trash Receptacles		2012	2014	2012	2012
Creek Clean-Ups		2012	12/ 2017	12/2017	12/2017

7.3 Scheduling of Stormwater Control measures to Achieve EWMP Milestones

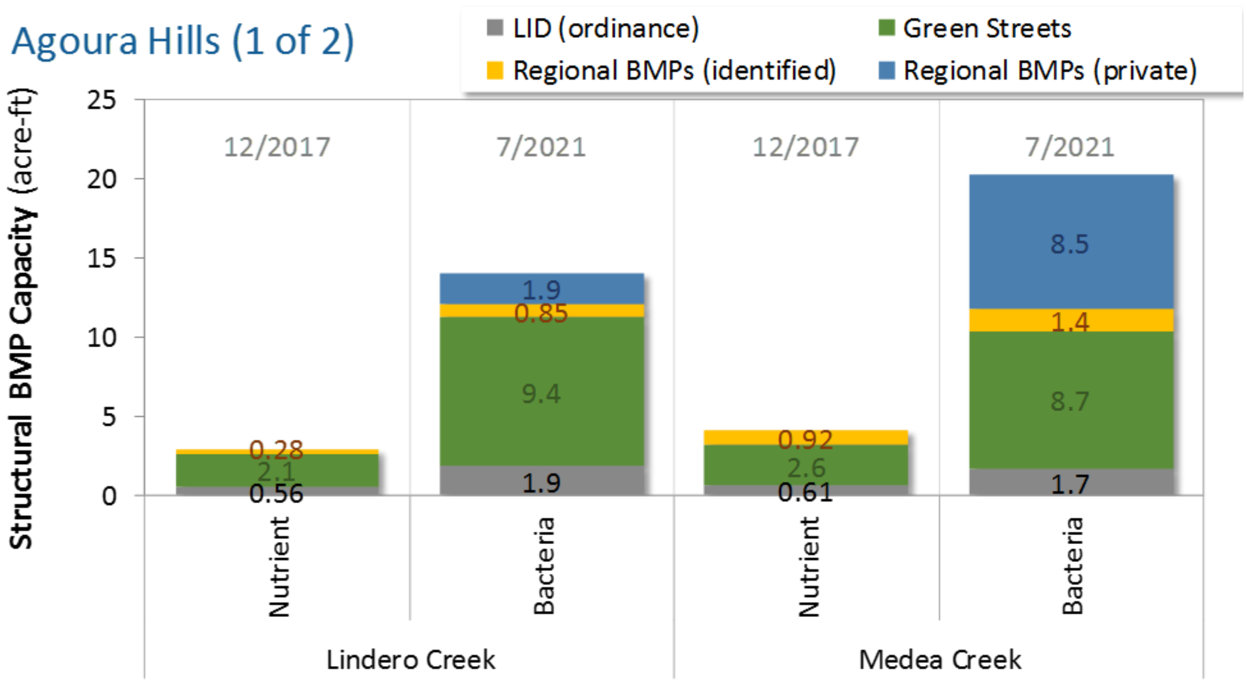
As described in Section 6.4.2, the scheduling of LID, green streets and regional BMP implementation for the EWMP is based on the milestones of the applicable nutrient, bacteria and benthic impairment TMDLs, as follows:

- Achieve final compliance for the MCW Nutrient TMDL by December 2017;
- Achieve final compliance for the MCW Bacteria TMDL by July 2021; and
- Achieve final compliance for the TMDLs Addressing Benthic Impairments March 2032

The EWMP Implementation Plan to meet final compliance with the Bacteria TMDL and TMDLs addressing Benthic Impairments was presented in Section 7.2. This section provides more detailed scheduling of the EWMP Implementation Plan to address the Nutrient TMDL by December 2017. The scheduling of the EWMP Implementation Plan is presented as follows:

- Summary of control measure capacities to be implemented by each jurisdiction by assessment area/watershed: the green streets and regional BMP capacities that will be implemented over time to achieve milestones are shown in Figure 36 through Figure 40. Separate panels are shown for each jurisdiction, organized by MCW assessment areas.
- Detailed scheduling for each jurisdiction, including volumes of stormwater to be managed, and control measure capacities, and detailed tables that present the scheduling by assessment area for each jurisdiction including volumes of stormwater (Compliance Targets) to be managed are presented in Appendix 7.C. Each jurisdiction has a standalone Implementation Plan for the MCW reaches and tributaries to which it contributes runoff.

The pace of implementation for the EWMP Implementation Plan is rapid due to the compliance dates specified in the nutrient and bacteria TMDLs. Because the pace of implementation is directly proportional to available internal and financial resources, acquiring the additional resources to implement the EWMP will be challenging.



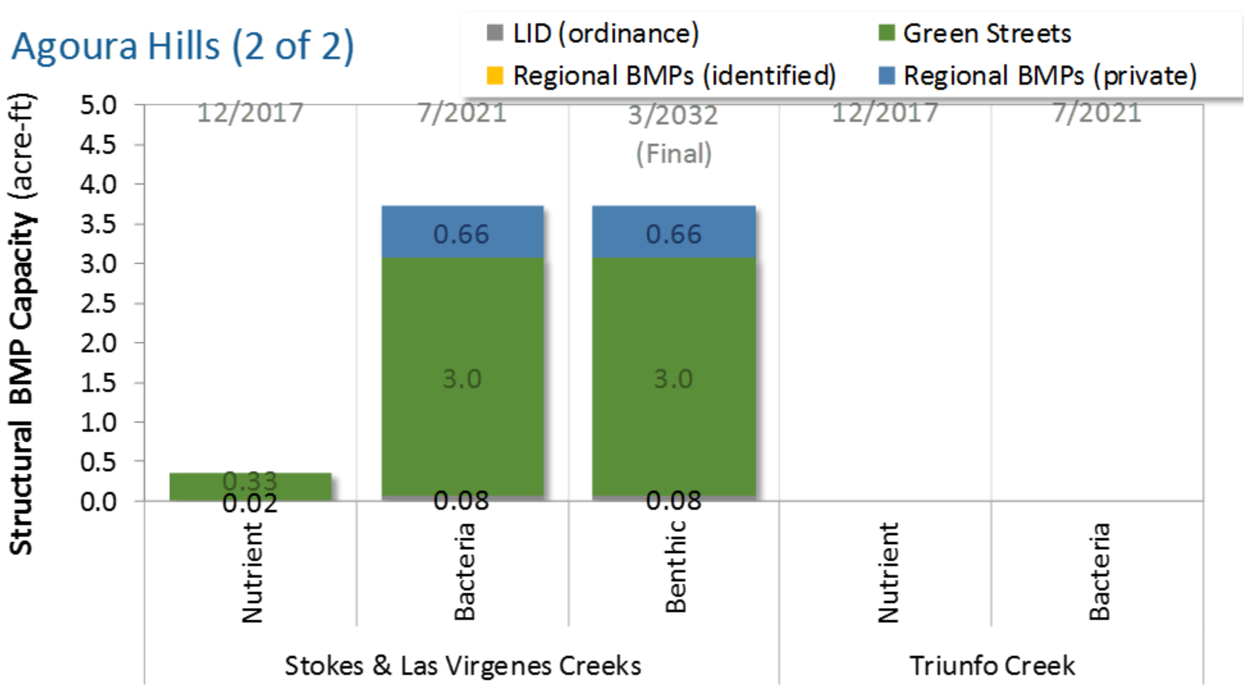
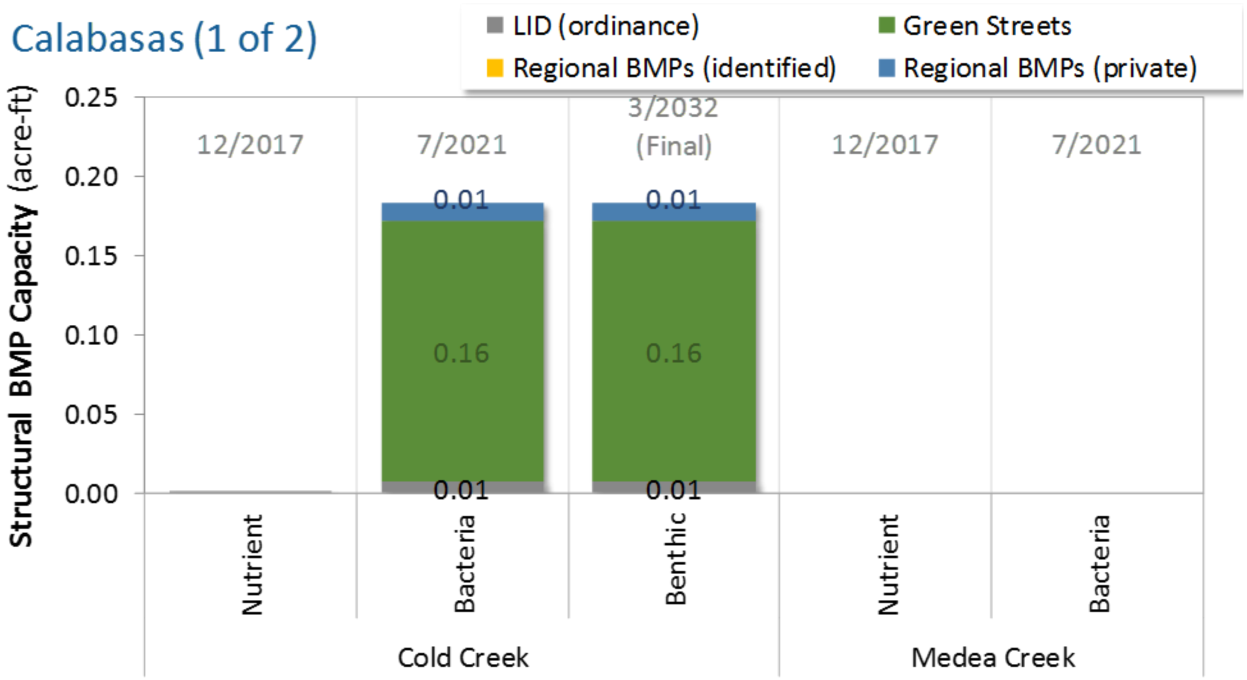


Figure 36: EWMP Implementation Plan for Agoura Hills within each Assessment Area



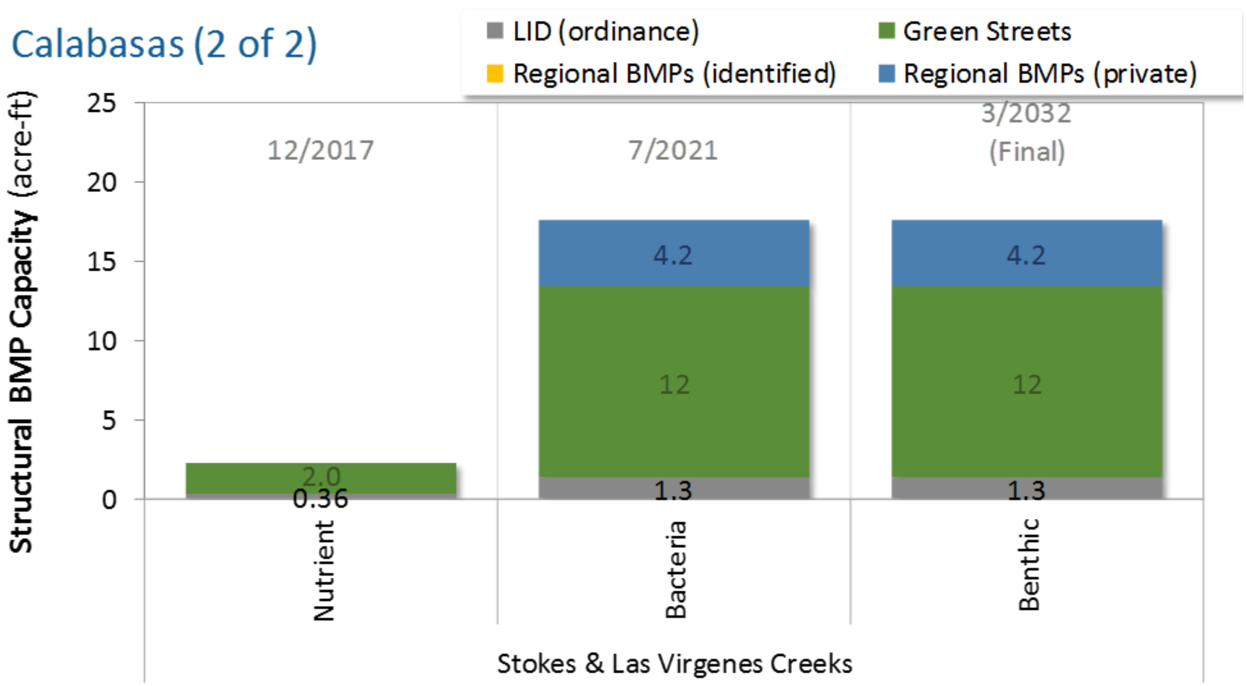


Figure 37: EWMP Implementation Plan for Calabasas within each Assessment Area

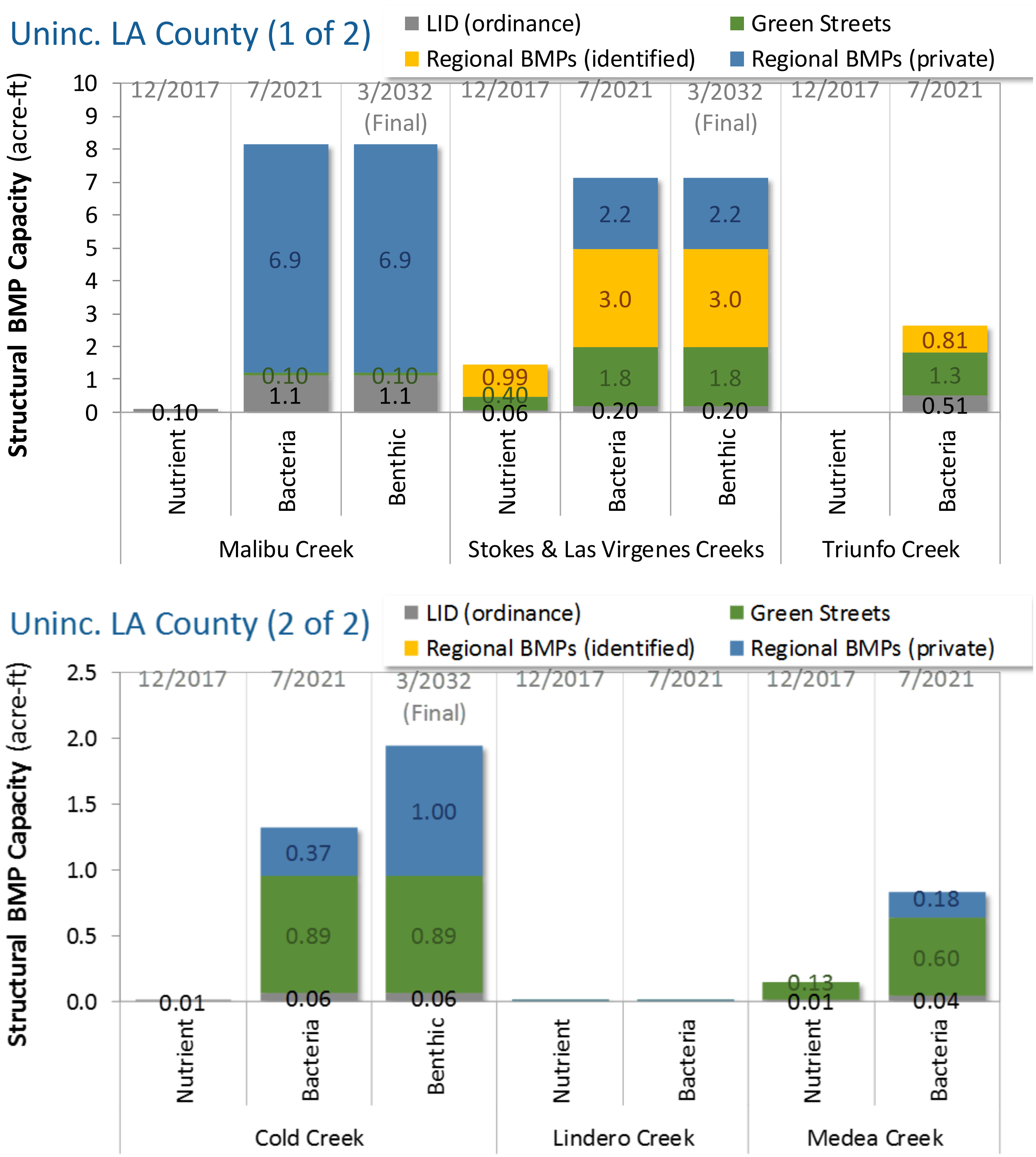


Figure 38: EWMP Implementation Plan for Unincorporated County within each Assessment Area

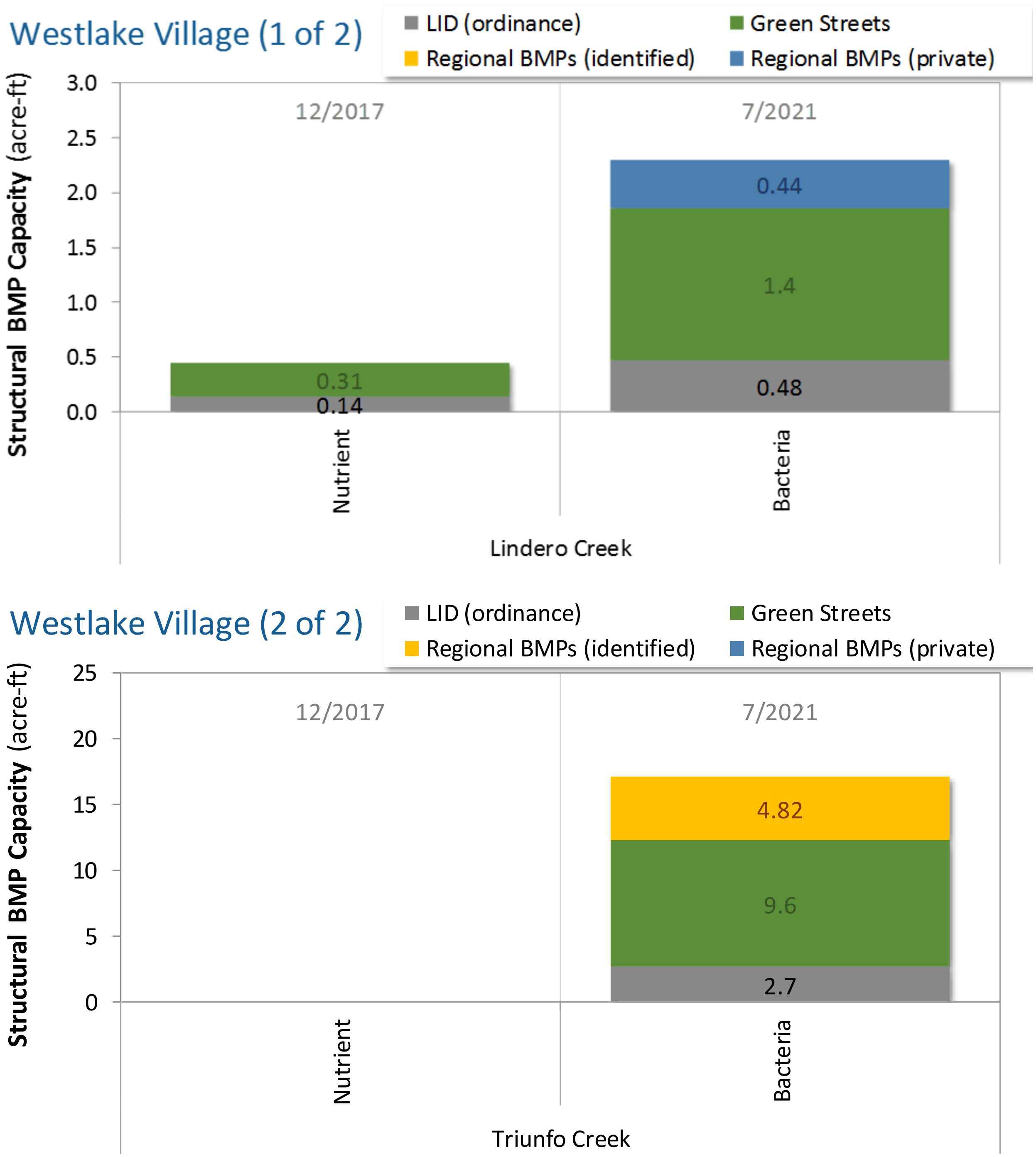


Figure 39: EWMP Implementation Plan for Westlake Village within each Assessment Area

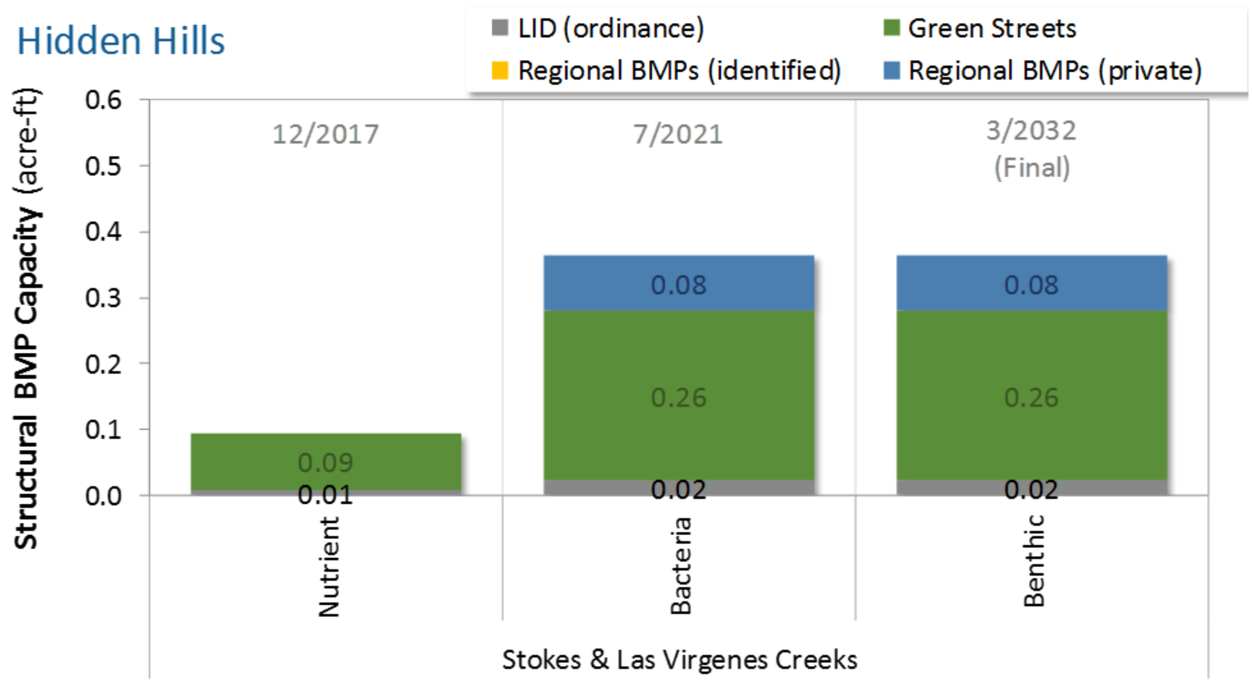


Figure 40: EWMP Implementation Plan for Hidden Hills within its Assessment Area

7.4 Non-Stormwater Control Measures

Non-stormwater outfall screening, source identification, and elimination of dry weather discharges, as identified in Section 6.3 of the MCW CIMP, will serve as the basis for the Groups approach to dry weather compliance in the MCW. Through this program the MCW Group will eliminate all non-conditionally exempt, non-stormwater discharges by the nutrient TMDL deadline of December 2017.

The results of the Groups initial non-stormwater outfall screening identified that of the total 55 major outfalls in the MCW EWMP Group area, 26 outfalls were dry and had no discharge, 20 outfalls discharged a trickle of water, and 9 outfalls had a discharge approximating the flow from a garden hose. Based on the results of the initial non-stormwater outfall screening performed for all of the major outfalls in the MCW, the Group has substantially eliminated all non-stormwater discharges.

Upon completion of the major outfall screening, any outfall determined to have significant non-stormwater discharges will be subject to source identification consistent with Section 6.3.4 of the CIMP. Additionally, the MCW EWMP Group will continue to support water conservation through educational materials and workshops on water efficient landscaping and other institutional and source controls identified in Section 7.2.1.

Existing requirements to comply with technology based effluent limitations and core requirements (e.g., prohibiting non-stormwater discharges of pollutants through the MS4 and controls to reduce the discharge of pollutants in stormwater to the MEP) will not be delayed for implementation.

7.5 Natural Sources of Pollutants Special Study

Studies indicate that natural sources of pollutants exist in the MCW. The Monterey/Modelo formation outcrops in the watershed are natural sources of sulfate, phosphate, metals, and selenium. A study of these natural sources of pollutants in the MCW is proposed that would elucidate: 1) the sources of selected constituents, including nitrogen and phosphorous, and 2) the processes that control the transport, cycling, and concentrations of these pollutants in Malibu Creek and selected tributary streams.

The draft science plan for the study includes incorporating a step-wise, nested design in which:

1) initial analysis of readily available spatial and hydrologic data is used to guide selection of sites for field data collection,
2) field data are used to develop process oriented studies, and
3) results of process oriented studies are interpreted and analyzed in light of refined spatial data from earlier phases of the study to evaluate hydrologic responses to management options available to local stakeholders.

The data collection has been divided into seven tasks:

1) mineralogical assessment
2) streambed sediment collection
3) stormflow hydrograph sample collection
4) synoptic wet-season sample collection
5) synoptic dry season sample collection
6) stream seepage data collection
7) nutrient cycling (spiraling) studies

Interpretation of these data will include:

1) examination of relations between chemical, isotopic, and microbiological data,
2) GIS statistical analysis to identify spatial relations in data,
3) numerical analysis of seepage data using the computer program VS2DT, and
4) numerical analysis of nutrient spiraling data using the computer program HSPF. (Izbicki, 2012)

It is anticipated that the proposed study will be completed by December 2019. Data from the study will be integrated with CIMP data and taken into consideration for updates to the EWMP. The results of the study may have a significant impact on the quantity of BMPs and volume of water to be treated or retained under the EWMP. Currently, the EWMP has identified the volumes that need to be treated or retained to achieve compliance as determined by the current land use based assignment of pollutant loads. However, it is expected that a better understanding of the natural sources of pollutants in the watershed will affect the pollutant load reduction allocated to the MS4 Permittees, and reduce the total volume of BMPs required to be implemented by the EWMP.

7.6 Implementation Schedule

The proposed compliance schedule for USEPA TMDLs, 303(d) listed impairments, and other exceedances of receiving water limitations defines the pace of implementation of structural and non-structural BMPs. The schedule for implementation of BMPs was developed based on the findings of the RAA.

Table 43 provides the compliance schedule for TMDLs; 303(d) listed waterbodies, and waterbodies with non-listed exceedances of water quality objectives. As discussed previously, BMPs implemented to meet the Nutrients, Bacteria, and Benthics TMDLs will also achieve the necessary reductions in Category 2 and Category 3 pollutants. The BMP implementation schedule will begin September 2015 or following final approval of the EWMP as determined by the results of the RAA and stakeholder considerations. The EWMP is evaluated every two years as part of the EWMP adaptive management framework identified in Section 9.

The final compliance deadline for the Nutrient TMDL, based on the MS4 permit, is, December 28, 2017. The final compliance deadline for the Bacterial Indicator TMDL (July 2021) is based on the compliance schedule established in the TMDL for Bacterial Indicators. The final compliance deadline of March 2032 for the Malibu Creek and Lagoon TMDL for Sedimentation and Nutrients to address Benthic Community Impairments was established to be consistent with the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL (Harbors TMDL). The Harbors TMDL addresses sediment toxicity and associated benthic community impairments. With a final compliance milestone of March 23, 2032, implementation efforts are focused on the control of pollutants associated with sediment loading to the harbors. There are similarities with the Malibu Creek Benthic TMDL as both are designed to address benthic community effects with a focus on the management of sediment loads and associated pollutants (nutrients for the Malibu Creek Benthic TMDL). Although not in the Los Angeles Region, the sediment TMDL for the Los Peñasquitos Lagoon in the San Diego Region shares similar characteristics of the Benthic TMDL in that it addresses sedimentation of a coastal lagoon. The Los Peñasquitos Lagoon sediment TMDL includes a 20-year implementation schedule for final compliance with waste load allocations assigned to the Phase I MS4 permit. This 20-year TMDL compliance schedule for a coastal lagoon is consistent with the 20-year schedule for the Harbors TMDL. Therefore, the final milestone for the MCW EWMP is set to be consistent with the Harbors TMDL at 2032.

Table 43: Proposed MCW EWMP Compliance Schedule

Compliance Element	Date
Begin Implementation of EWMP	April 2016
Begin Private Regional BMP Outreach Program	April 2016
Achieve Compliance with Trash TMDL Deadline of 80% Reduction	July 7, 2016
Interim Milestone 1 – EWMP Evaluation - Assess Progress toward Compliance with TMDL Requirements and Evaluation of Data and any Pertinent Information	July 2017
Achieve Compliance with Trash TMDL Deadline of 100% Reduction	July 7, 2017
EWMP Modifications and Adjust Schedule and BMP Implementation Schedule Based on Evaluation	August 2017
Eliminate Significant Non-Stormwater Discharges in the MCW	December 2017
Complete Implementation of all Proposed Institutional and Source Control BMPs	December 2017
Complete Implementation of Regional BMP Sites LVC-14, LC-02, MEC-09 and the Green Streets for the December 2017 Compliance Date	December 2017
Achieve Compliance with Nutrient TMDL Targets established in the Nutrient TMDL and MS4 Permit	December 28, 2017
Completion of Special Studies to Understand and Quantify Natural Sources of Pollutants in the MCW	June 2019
Interim Milestone 2 – EWMP Evaluation - Assess Progress toward Compliance with TMDL Requirements and Evaluation of Data and any Pertinent Information	July 2019
EWMP Modifications and Adjust Schedule and BMP Implementation Schedule Based on Evaluation	August 2019
Complete Natural Sources of Pollutants Special Study	December 2019
Complete Design of all Regional BMPs (Public and Private) and the Green Streets for the July 2021 Compliance Date	December 2019
Complete Implementation of all Regional BMPs (Public and Private) and the Green Streets for the July 2021 Compliance Date	July 2021
Achieve Compliance with Bacterial Indicator TMDL for Wet Weather Conditions and with Bacteria TMDL Geometric Mean Deadline	July 15, 2021[1]

Compliance Element	Date
Interim Milestone 3 – EWMP Evaluation - Assess Progress toward Compliance with Benthic TMDL Requirements and Evaluation of Data and any Pertinent Information	July 2021
EWMP Modifications and Adjust Schedule and BMP Implementation Schedule Based on Evaluation	August 2021
Interim Milestone 4 – EWMP Evaluation - Assess Progress toward Compliance with Benthic TMDL Requirements and status of Non-TMDL Impaired Waterbodies [303(d) Listed and WQO Exceedances]	July 2023
EWMP Modifications and Adjust Schedule and BMP Implementation Schedule Based on Evaluation	August 2023
Interim Milestone 5 – EWMP Evaluation - Assess Progress toward Compliance with Benthic TMDL Requirements and status of Non-TMDL Impaired Waterbodies [303(d) Listed and WQO Exceedances]	July 2025
EWMP Modifications and Adjust Schedule and BMP Implementation Schedule Based on Evaluation	August 2025
Interim Milestone 6 – EWMP Evaluation - Assess Progress toward Compliance with Benthic TMDL Requirements and status of Non-TMDL Impaired Waterbodies [303(d) Listed and WQO Exceedances]	July 2027
EWMP Modifications and Adjust Schedule and BMP Implementation Schedule Based on Evaluation	August 2027
Interim Milestone 7 – EWMP Evaluation - Assess Progress toward Compliance with Benthic TMDL Requirements and status of Non-TMDL Impaired Waterbodies [303(d) Listed and WQO Exceedances]	July 2029
EWMP Modifications and Adjust Schedule and BMP Implementation Schedule Based on Evaluation	August 2029
Interim Milestone 8 – EWMP Evaluation - Assess Progress toward Compliance with Benthic TMDL Requirements and status of Non-TMDL Impaired Waterbodies [303(d) Listed and WQO Exceedances]	July 2031
EWMP Modifications and Adjust Schedule and BMP Implementation Schedule Based on Evaluation	August 2031
Complete Implementation of all Regional BMPs and Green Streets	March 2032
Achieve Compliance with Sediment / Sedimentation and Nutrient Targets for Benthic Community Impairments TMDL & Non-TMDL Impaired Waterbodies [303(d) Listed and WQO Exceedances]	March 2032

Note: 1 – Based on the TMDL established deadline.

8 Structural Control Measures Cost Estimate

Estimated costs for structural watershed control measures include consideration of planning, design, permits, construction, operation and maintenance, and other factors as appropriate. BMP implementation (and associated cost) is primarily based on TMDL compliance schedules, with key milestones in December 2017 (nutrient TMDL), July 2021 (bacteria TMDL) and the final program compliance in March 2032.

This section also describes potential funding sources and outlines a financial strategy to implement the EWMP. Each of the stakeholders in the MCW currently supports their stormwater program through the general fund. At this point in time it appears that this method of funding will not be able to fully support implementation of the EWMP, even at the first key milestone in December 2017. Accordingly, a significant effort will be required to assemble a package of funding from a variety of sources to meet the program objectives.

8.1 Regional BMP Cost Summary

Unit cost detail for each BMP can be found in Appendix D. Regional BMPs capital and life cycle costs were priced by using conceptual designs as discussed in Appendix D. Factors that influence the whole life cycle cost include project scale and unit costs, retrofit verses new construction (or construction associated with other improvements), regulatory requirements, site suitability, state of the economy, land cost, and soil type. Whole life cost includes the cost for operation and maintenance, which may exceed the initial capital investment.

The tributary area to each BMP, BMP type, and the BMP volume or size served as the basis for the project construction cost estimates. The Whole Life Cost estimate assumed a level of maintenance consistent with local practices and includes annual maintenance inspections, intermittent corrective maintenance, and an allowance for periodic major maintenance. The cost of annual maintenance is estimated to be 2% of the estimated capital cost. Permitting and utility relocation were each estimated at 3% of the capital cost while Planning and Design were estimated at 20%. Construction management was estimated as 15% of the construction cost.

Table 44 outlines the proposed cost for each regional BMP. For more details of the 20-year whole life cycle cost of each BMP refer to Appendix D: Regional BMP Cost Details.

Table 44: Regional BMP Cost Summary

BMP	Footprint (ac)	BMP Type	Estimated Capital Cost	Estimated Annual O&M
LVC-14	0.49	Regional EWMP Project - Infiltration/Harvest and Use	$4,150,000	$50,000
TC-35	0.55	Harvest and Use	$2,379,786	$28,331
MEC-12	0.21	Infiltration/Harvest and Use	$4,448,577	$52,959
LC-02	0.43	Infiltration/Harvest and Use	$2,623,361	$31,230
TC-29	0.27	Infiltration	$1,216,370	$14,481
TC-37	1.59	Infiltration	$2,286,810	$27,224
TC-02	0.19	Bioretention	$1,992,000	$24,000
MEC-09	0.48	Harvest and Use	$1,961,478	$23,351
Total Regional BMP Cost			**$21,058,382**	**$251,576**

8.2 Green Street Cost Summary

Green streets are a major component of the compliance strategy for the EWMP. The cost for green street implementation has been estimated using the cost equations from SUSTAIN. The SUSTAIN cost function for bioretention with underdrains and without can be found in Section 6.3.3 Cost Functions. The costs in this tool are based on retrofitting a stormwater BMP into existing infrastructure. This cost basis should provide a conservative estimate since future green street implementation will be incorporated into road improvement projects.

Table 45 shows a summary estimate for green streets with bioretention to be implemented in the MCW. The location of green street implementation is conceptual, and will be determined in each subwatershed during implementation based on site feasibility, which includes right of way availability, traffic constraints and opportunities, and local soil conditions. Green streets are defined as street segments with either bioretention or biofiltration treating the tributary area. Underdrains are needed in areas where soil permeability is low. Locations requiring underdrains were estimated through a review of soil mapping for the watershed.

Table 45: Green Street Capital Cost Estimate

BMP Scenario	BMP Surface Area (ac)	BMP Unit Cost ($/ft^2)	Cost Estimate
Bioretention-No Underdrain	29.47	$68	$86,686,151
Bioretention-With Underdrain	6.00	$84	$21,957,453
Green Streets Total	**35.47**		**$108,643,604**

8.3 Cost Summary for Private BMPs

Public Regional and green street (distributed) BMPs are not sufficient by themselves to achieve compliance with receiving water standards. A conceptual BMP cost model was developed for application on private property, with the objective of closing the identified compliance gap. The concept BMP cost model assumes that infiltration, extended detention, and bioretention will be used on private parcels with the specific BMP type to be determined according to local site conditions. To estimate capital and whole life costs for the conceptualized BMP, per cubic foot of treatment volume for each of the three selected treatment BMPs were averaged to arrive at a single unit price estimate. Since the BMPs will be constructed on private land, a land cost of $5M per acre was also included[28].

The implementation of the Private BMPs will be more complex since easements will need to be acquired from private parties, or cost and maintenance agreements will need to be developed with local property owners. Accordingly, these BMPs are slated to be constructed in the later portions of the EWMP implementation schedule.

The RAA model indicates that an additional 26 acre-feet of treatment volume is needed after implementation of green streets and regional BMPs in the watershed, to achieve compliance with receiving water standards. The estimated cost to treat this additional volume of water can be found in Table 46.

Table 46: Private BMP Cost Estimate

BMP Scenario	BMP Land Area (Ac)	Estimated Cost
Private Regional	8.66	$68,386,190

8.4 Cost Summary for EWMP Implementation

The total capital cost of the EWMP is the sum of the regional BMPs, green streets and BMPs on private land. The combined cost of these three compliance elements will be expended by the final compliance date of this plan, March 2032. The capital cost and average annual cost (operations and maintenance) for each element is provided in Table 47.

Table 47: EWMP Compliance Cost Summary

BMP Scenario	Capital Cost ($)	Annual O&M Cost ($)
Regional	21,058,000	251,000
Green Streets	108,643,000	2,173,000
Private Regional	68,386,190	1,368,000
Total	**198,087,190**	**3,792,000**

The program capital costs are broken down by jurisdiction and by compliance milestone year and are provided in Table 48. The table identifies the costs to be expended under each BMP category for each jurisdiction by each of the compliance dates identified and a total cost by jurisdiction and by BMP category.

[28] Based on the regional privately owned cost function from the SUSTAIN model.

Table 48: EWMP Capital Compliance Cost Summary by Jurisdiction

Agency	Year/ Milestone	Regional BMPs ($M)	Green Streets ($M)	Private Regional BMPs ($M)	Total Per Jurisdiction ($M)
Agoura Hills	2017	4.59	11.221	0.000	15.811
	2021	4.45	35.849	29.12	69.42
	2035	0.000	0.000	0.000	0.000
Calabasas	2017	0.000	4.258	0.000	4.258
	2021	0.000	21.632	10.97	32.602
	2035	0.000	0.000	0.000	0.000
Hidden Hills	2017	0.000	0.201	0.000	0.201
	2021	0.000	0.379	0.22	0.599
	2035	0.000	0.000	0.000	0.000
Unincorporated Los Angeles County	2017	4.15	1.156	0.00	2.548
	2021	1.99	9.074	25.28	36.34
	2035	0.000	0.000	1.653	1.653
Westlake Village	2017	0.000	0.707	0.000	0.707
	2021	5.88	24.163	1.15	31.19
	2035	0.000	0.000	0.000	0.000
EWMP Total		**21.06**	**108.64**	**68.39**	**198.09**

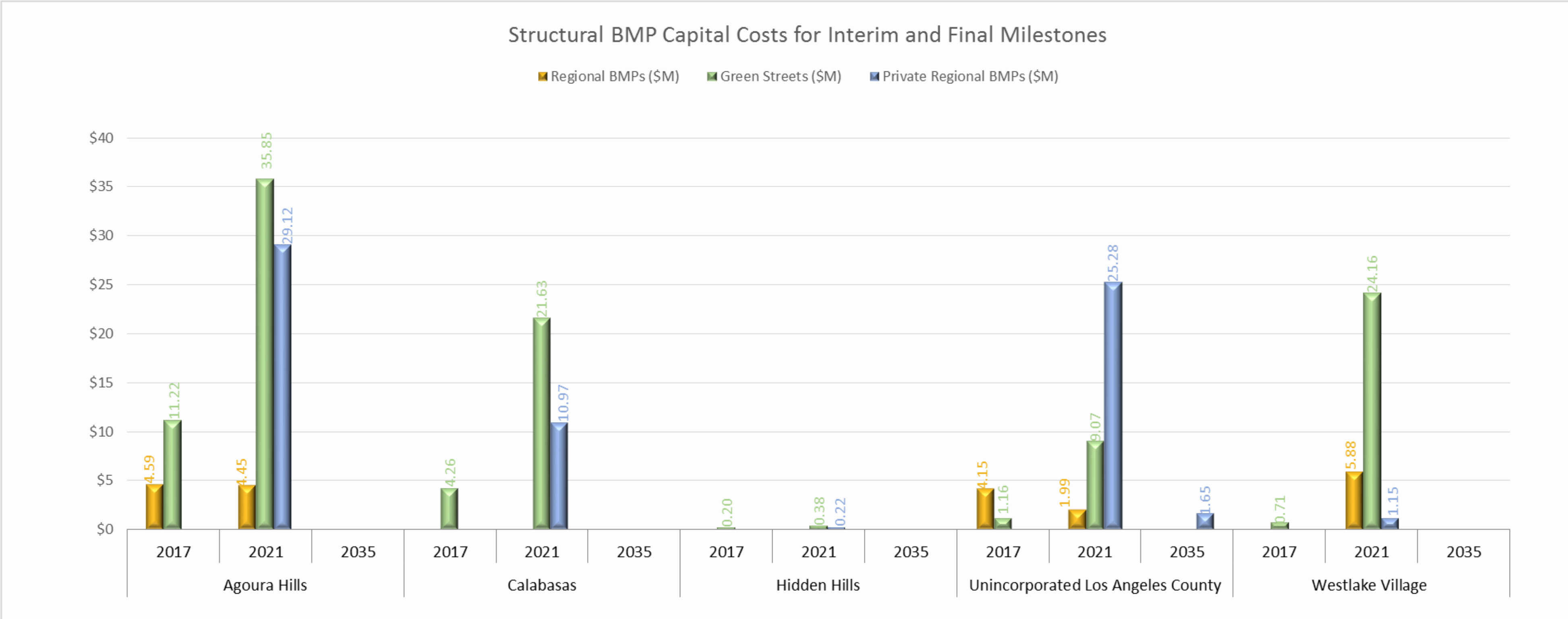


Figure 41: Capital Costs for Structural BMPs by Each Milestone per Jurisdiction

8.5 Funding Options and Strategy

The purpose of this section is to present the financial strategy for addressing the additional costs of compliance with the 2012 MS4 permit to implement the extensive set of BMPs or "recipe for compliance", identified in Section 6.

The financial strategy for implementing the EWMP consists of the identification of existing funding sources and a process for identifying future funding sources for the estimated costs that are not covered by existing funding sources.

8.5.1 Existing Funding Sources

The agencies within this group historically utilized general funds to support their stormwater programs and will continue to do so. However, the cost estimates exceed expected available general fund revenue for stormwater programs. Therefore, the cities will be pursuing funds from multiple, additional sources.

The County has an ongoing collective budget of $10.1 million for 140 unincorporated areas. Additional funds for projects are allocated on an annual basis from the General Fund and other sources. In Fiscal Year 2015-16, the total allocation from the General Fund for stormwater management was $23 million. Additional funds from other sources, including the Gasoline Tax, Solid Waste Fund, Prop C, Prop A Local Return Funds, and Measure R, provide for ongoing MCM compliance activities.

The LACFCD allocated a budget of $33 million from the Flood Fund for all LACFCD territories within Los Angeles County MS4 in Fiscal Year 2015-16.

8.5.2 Potential Funding Sources

Several potential funding sources could be used alone, or in combination, to fund the EWMP. Some of these sources are temporary in nature (such as grants), and do not require repayment but may require in-kind or matching funds. Other sources require repayment of principle and interest on the amount borrowed (bonds). The identified funding options and constraints are shown in Table 49. Some of the funding options reviewed here reference the study, "Stormwater Funding Options, Providing Sustainable Water Quality Funding in Los Angeles County," dated October 14, 2014.

Table 49: Potential Funding Strategies

Type	Background	Potential	Process	Conditions	Challenges
Local Fee Programs	In place in some Cities in the County	Unknown. Fees historically receive significant scrutiny by the voters	Requires a Proposition 218 process and approval by 2/3rds margin in a popular vote	May consider amendments to refuse contracts and street sweeping contracts for some pollutants.	Achieving voter approval
Enhanced Infrastructure Financing Districts (EIFD)s	Government entity created by City or County to construct or improve infrastructure, governed by a public financing authority (PFA) to use a portion of property taxes from the participating jurisdictions or other fees or investments to fund regional infrastructure projects	Signed into law in Fall 2014, will allow cross jurisdictional projects to collaboratively fund improvements affecting water problems which don't follow jurisdictional boundaries	• Determine if the prerequisites are met, • ID projects, stakeholders, district members • Establish PFA • Formalize EIFD • Develop Infrastructure Financing Plan (IFP) • Review with public • Adopt IFP and begin work	• Receive Finding of Completion (FOC) • Certify no SA assets under litigation will benefit • Comply with State Controller's asset transfer review	New concept which will need time to become standard practice will require educating local decision makers of the benefits of EIFDs
State Revolving Fund (SRF) Loans	Funding source for any city county or district to fund projects including stormwater treatment, water reclamation and wastewater treatment systems	Continuously available for application	Application available online on SWRCB site,	Limitations apply to types of projects eligible	Limited supply of funds
Bonds	Traditional infrastructure bonds	Vary by project funding needs and jurisdiction	Traditional bond development and approval processes	Vary by type of bond and details	Lack of public support from lack of knowledge of infrastructure funding shortcomings. Timelines of bond issuance process don't always match project timelines

Type	Background	Potential	Process	Conditions	Challenges
Prop 1. Grants	The bond measure approved by voters in fall of 2014 will enact the Water Quality, Supply, and Infrastructure Improvement Act of 2014	$7.5 billion law to be enacted, funds generated by the act will become available under a variety of programs and through various agencies and timelines	Prop 1 Water Bond contained: • $520 million to improve water quality for "beneficial use," for reducing and preventing drinking water contaminants • $1.495 billion for competitive grants for multi-benefit ecosystem and watershed protection and restoration projects • $810 million for expenditures on, and competitive grants and loans to, integrated regional water management projects • $2.7 billion for water storage projects, dams and reservoirs • $725 million for water recycling and advanced water treatment technology • $900 million for competitive grants and loans for groundwater contamination cleanup • $395 million for flood management projects	Will vary by program, information about availability will be arriving from different agencies administering funds in 2015. Governor's budget calls for spending $532 million in 2015 of Prop 1 funds	Will vary by program

Type	Background	Potential	Process	Conditions	Challenges
IRWM Grants	Grant funding program for projects related to all aspects of water resources, including multi-jurisdiction projects	Stormwater management projects are eligible for funding	• Application process overseen by DWR. • Applications for the current round of Prop 84 funding will be due in fall of 2015, draft program guidelines to be released in spring 2015 • $1.1 billion in spending from the 2006 flood bond Prop 1E proposed in Governor's 2015 budget	To be outlined in guidelines	Limited supply of funds
Climate Change/Greenhouse Gas Emission Funding	AB32 established a comprehensive emission reduction program, including a "cap and trade" program that will auction emission credits creating up to $3billion annually, investment of these funds will be potential funding source	Emission trading funds investment plan does include "water use and supply" projects that reduce GHG as eligible	Emission trading market still developing	Still to be determined	Role of stormwater projects in the cap and trade program and quantification of associated emission reduction is still to be determined
Special Assessment Districts	Developed by watershed or sub-watershed to pay for EWMP improvements and maintenance	Tailored to local watershed and community needs.	Resolution of Intention. Financing mechanism formed under The California Streets and Highways Code, Division 10 and 12	Requires approval of a majority of the landowners based on the stated financial obligations, to finance the improvements constructed or acquired by the District.	Proposition 218 ballots must be mailed to each property owner within the district. The majority must vote in favor for formation.
Collaborative opportunities with Other Agencies	Mutually beneficial program partnerships to share resources and meet regulatory requirements	Will be well suited to be developed via the EIFD process above	Varies on type of jurisdictions or entities included	Varies on type of jurisdictions or entities included	Case by case management can be resource intensive
Public/Private Partnerships	Synergistic partnerships to develop funding opportunities	Vary by jurisdictions, smaller scale projects may be more attainable or allow proof of concept	Vary by project type and scale	Vary by project	May not be repeatable or of sufficient scale to justify public resource expenditure

8.5.3 MCW Funding Strategy

The MCW EWMP Group members will utilize the following process to maximize opportunities to obtain the necessary funding. As noted in Table 49, constraints and challenges exist for all of the potential funding strategies. As a result, while the MCW EWMP Group will implement the following process to attempt to gather the needed funding resources. Additionally, to the extent additional funding is obtained earlier in the implementation schedule, those resources will be utilized to implement additional actions.

Step 1: Implement procedures to maximize water quality benefits from existing maintenance and public agency processes. Examples of this include incorporating green streets into all major new roads projects and incorporating consideration of water quality benefits into all new flood control projects.

Step 2: Pursue multi-benefit projects. Stakeholders will work closely with each other, within their internal departments, and with local water agencies to identify projects that can be jointly funded or supported to enhance local water supplies, and increase public support through aesthetic enhancement, transit, active transportation and other community benefits.

Step 3: Pursue grant funding opportunities. The MCW EWMP Group will incorporate identified EWMP projects into the Integrated Regional Water Management Plan and any other planning documents necessary to make them eligible for state grant funding. Additionally, the agencies will evaluate opportunities to obtain other types of grants for funding projects.

Step 4: When funds are needed, the stakeholders can pursue bond financing or obtaining a loan.

Step 5: If additional funds are needed, the County and Flood Control District may pursue initiating a stormwater fee and/or developing an Enhanced Infrastructure Financing District (EIFD).

9 Adaptive Management and Assessment

Adaptive management is a critical component of the EWMP implementation process, and EWMP updates are required at two-year cycles by the Permit. The CIMP will gather additional data on receiving water conditions and stormwater/non-stormwater quality. These data will support adaptive management at multiple levels, including (1) generating data not previously available to support model updates and (2) tracking improvements in water quality over the course of EWMP implementation. Furthermore, over time the experience gained through intensive BMP implementation will provide lessons learned to support modifications to the control measures identified in the EWMP.

The adaptive management process also includes a schedule for developing and reporting on the EWMP updates, the approach to conducting the updates, and the process for implementing any modifications to the RAA and EWMP to reflect the updates.

The adaptive management approach for MCW is designed to address the EWMP planning process and the relationship between monitoring, scheduling, and BMP planning. The adaptive management process outlines how the EWMP will be modified in response to monitoring results, updated modeling results, and lessons learned from BMP implementation. The adaptive management process for MCW is designed to accomplish three goals:

1. Clarify the short-term and long-term commitments of the MCW EWMP Group agencies within the EWMP.
2. Provide a structured decision-making process for modifications to the EWMP based on the results of monitoring data.
3. Propose a structure for evaluating compliance with water-quality based permit requirements within an adaptive structure.

The adaptive management framework identifies the process for updates to the EWMP based on relevant monitoring data, other new information for the watershed, such as special studies, watershed control measure implementation, regulatory updates, and updated results of the RAA water quality model.

The MCW adaptive management framework was developed to:

1. Evaluate relevant information for the MCW so that the EWMP can be modified to most effectively and efficiently achieve RWLs and WQBELs in the MCW.
2. Emphasize the initial MCW EWMP implementation actions and how initial implementation results and information will likely affect long-term EWMP implementation actions.
3. Identify the type of information that will be used to evaluate implementation and modify the MCW EWMP and the steps in the MCW EWMP adaptive management process.
4. Identify how the results of evaluation and adaptive management of the MCW EWMP will be reported to the Regional Board.

As outlined in Section 7.3, the schedule and milestones for the EWMP have been designed around meeting the interim and final TMDL requirements. The EWMP milestones are structured around Permit terms and describe the actions to be taken by the Group. While the EWMP is a long-term planning document that identifies a pathway to compliance with the final TMDL targets and receiving water limitations, the long timeframe of the document (through March 2032) prevents the identification of specific actions to be taken for the entire implementation period. Additionally, it is likely that special studies and monitoring data collected under the CIMP will provide information that will modify the assumptions and analysis used to develop the EWMP. As a result, the proposed process for developing commitments and implementation of the EWMP is as follows:

1. The MCW EWMP includes specific actions to be completed in the first five years (by 2020) of implementation including elimination of dry weather discharges by December 2017, implementation of all proposed institutional and source control BMPs by December 2017, and completion of special studies to understand and quantify natural sources of pollutants by December 2019. Additionally, a significant number of the proposed public regional BMPs, green streets, and private regional BMPs are planned to be implemented by July 2021 to achieve compliance with the Bacteria TMDL. For actions after 2020 the MCW EWMP includes specific implementation actions that could be modified based on relevant information obtained in the first five years of EWMP implementation, including results of the CIMP, results of special studies, results of institutional and source control implementation, regulatory changes, and other pertinent information. All modifications will be proposed for Regional Water Board Executive Officer approval.

2. Every two years, the MCW EWMP Group will evaluate data and information and propose revised schedules, milestones, and control measures for the EWMP if needed. The revised control measures, milestones and schedule will be clearly defined. Implementation of the updated control measures and milestones will be the mechanism by which compliance with the permit will be determined for the EWMP implementation compliance pathway.

3. The adaptive management process will also include consideration of any applicable regulatory changes that could influence the interim and final milestones and schedule. For example, because of concerns of natural sources of pollutants in the watershed, the results of the study to evaluate, understand, and quantify natural sources of pollutants is planned for completion in December 2019. Upon completion, and/or if other relevant information regarding natural sources of pollutants becomes available, this information will be evaluated and, if needed, revisions will be made to the MCW EWMP and submitted to the Regional Board for approval. As part of the adaptive management process, any new regulatory requirements will be considered and if warranted, the evaluation of progress towards achieving RWLs and WQBELs will be based on the revised values.

4. Monitoring data will be utilized to measure progress towards achieving RWLs and WQBELs. The evaluation of the monitoring data will be done on an annual basis in accordance with Figure 42 to determine if modifications to the EWMP are necessary. Modifications that are warranted because final milestones are achieved *more quickly* than anticipated can be done at any time (i.e. no more actions are needed if fewer control measures result in meeting RWLs and/or WQBELs). Modifications that are warranted because insufficient progress is being made will be noted every two years and a schedule for implementation will be provided. Full updates to the EWMP and the RAA and a consolidation of the proposed modifications into future milestones and schedules will only occur during the ROWD development for the next permit term to allow for resource planning.

The process outlined in Figure 42 applies during the implementation period for the Bacteria and Nutrient TMDLs and for all non-TMDL constituents. At the end of the implementation period for the Bacteria and Nutrient TMDLs, if the final RWL and/or WQBELs are not being met, either the TMDL must be modified to adjust the schedule or the permittees will need to apply for a Time Schedule Order or other mechanism to get an extension of the implementation period.

During EWMP implementation, revisions to the EWMP and RAA may be needed to ensure that the long term EWMP achieves relevant water quality goals. However, updating the EWMP and RAA is a significant and costly undertaking that should only be required if conditions have changed significantly such that they would alter the model results. For example, if water quality monitoring data demonstrates that progress towards meeting the water quality goals is being achieved at a rate equal to or faster than predicted by the initial analysis, the monitoring data should be sufficient evidence that sufficient progress towards meeting water quality goals is occurring. Refining the RAA would be appropriate in cases where progress is not being achieved as anticipated, significant changes to the proposed control measures have been identified as part of the adaptive management process, or monitoring has revealed that initial assumptions were incorrect. With the implementation of BMP projects, constraints may arise that make an identified project not feasible to construct and a replacement project would therefore be needed or a more beneficial projects than a currently identified EWMP project may be identified in the future. If there is a need to substitute a currently identified project in the MCW EWMP with a project with equal or greater benefit from the originally proposed project, the MCW EWMP Group will submit justification of the substitution of projects to the Regional Board for approval. The MCW EWMP Group will implement any proposed modifications of the EWMP upon approval by the Los Angeles Water Board or its Executive Officer, or within 60 days of submittal of modifications if the Los Angeles Water Board or its Executive Officer expresses no objections.

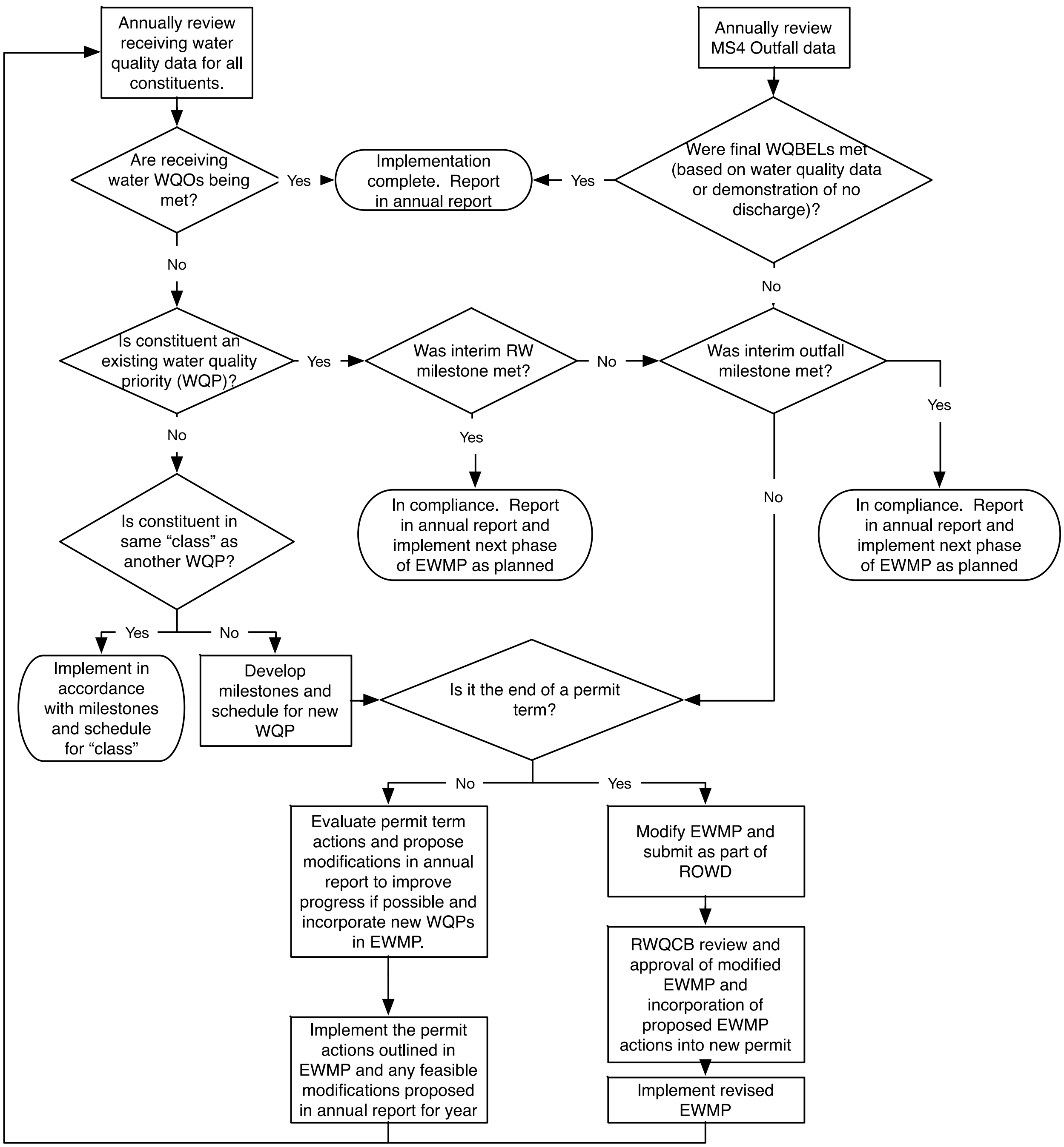


Figure 42: Adaptive Management Approach

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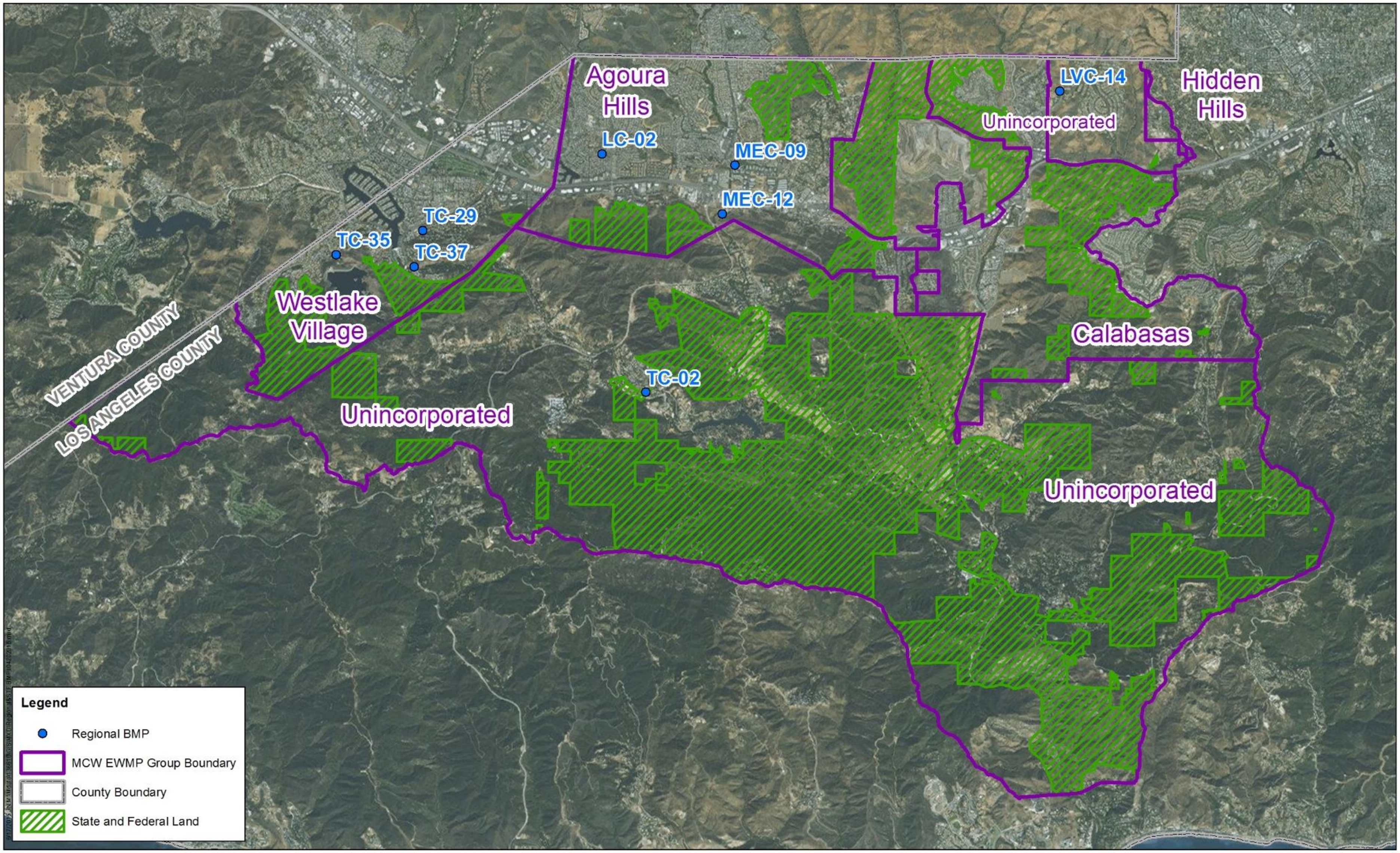
Appendix A: Proposed Regional Projects Detail Maps

BMP Location Index Map



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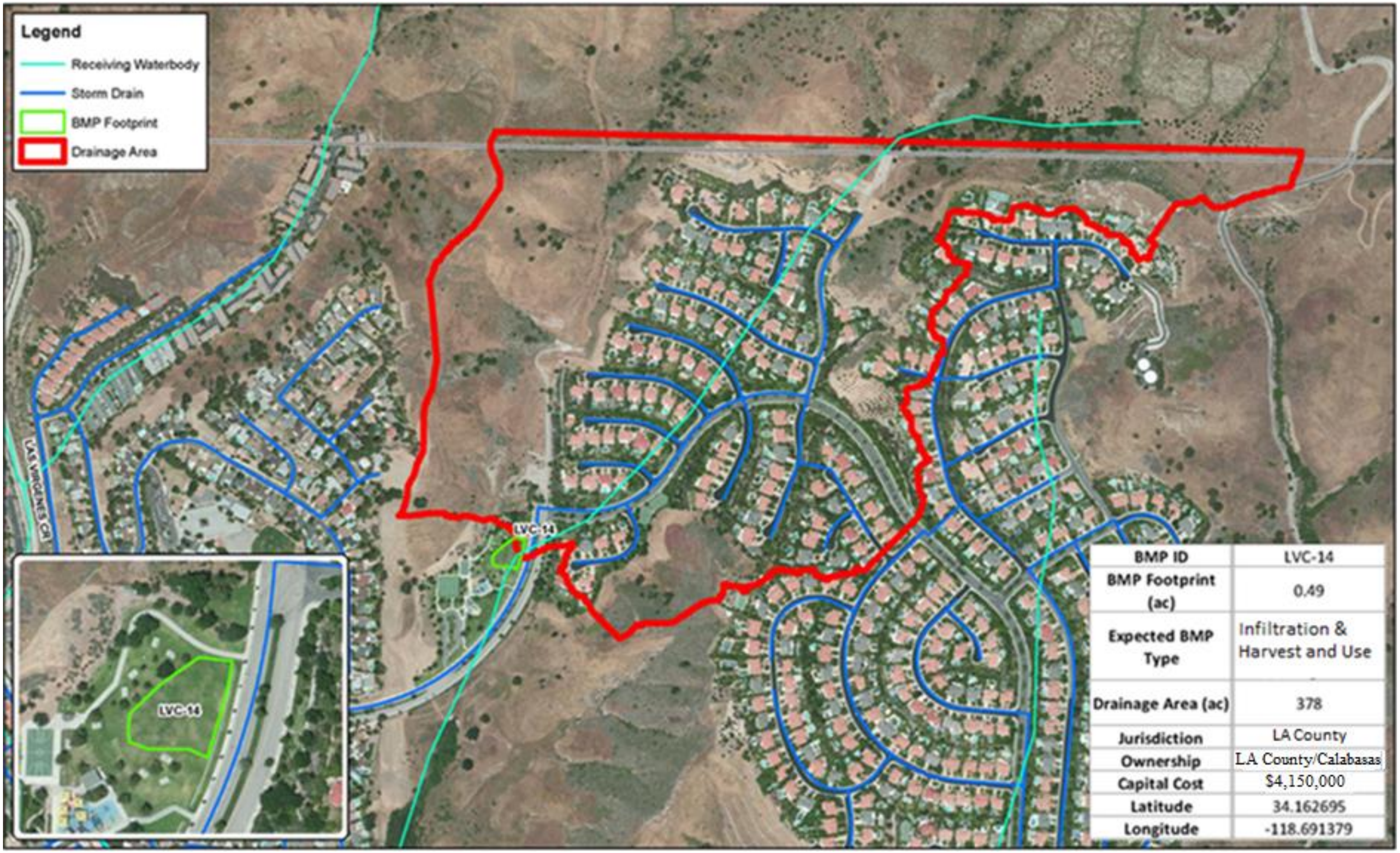
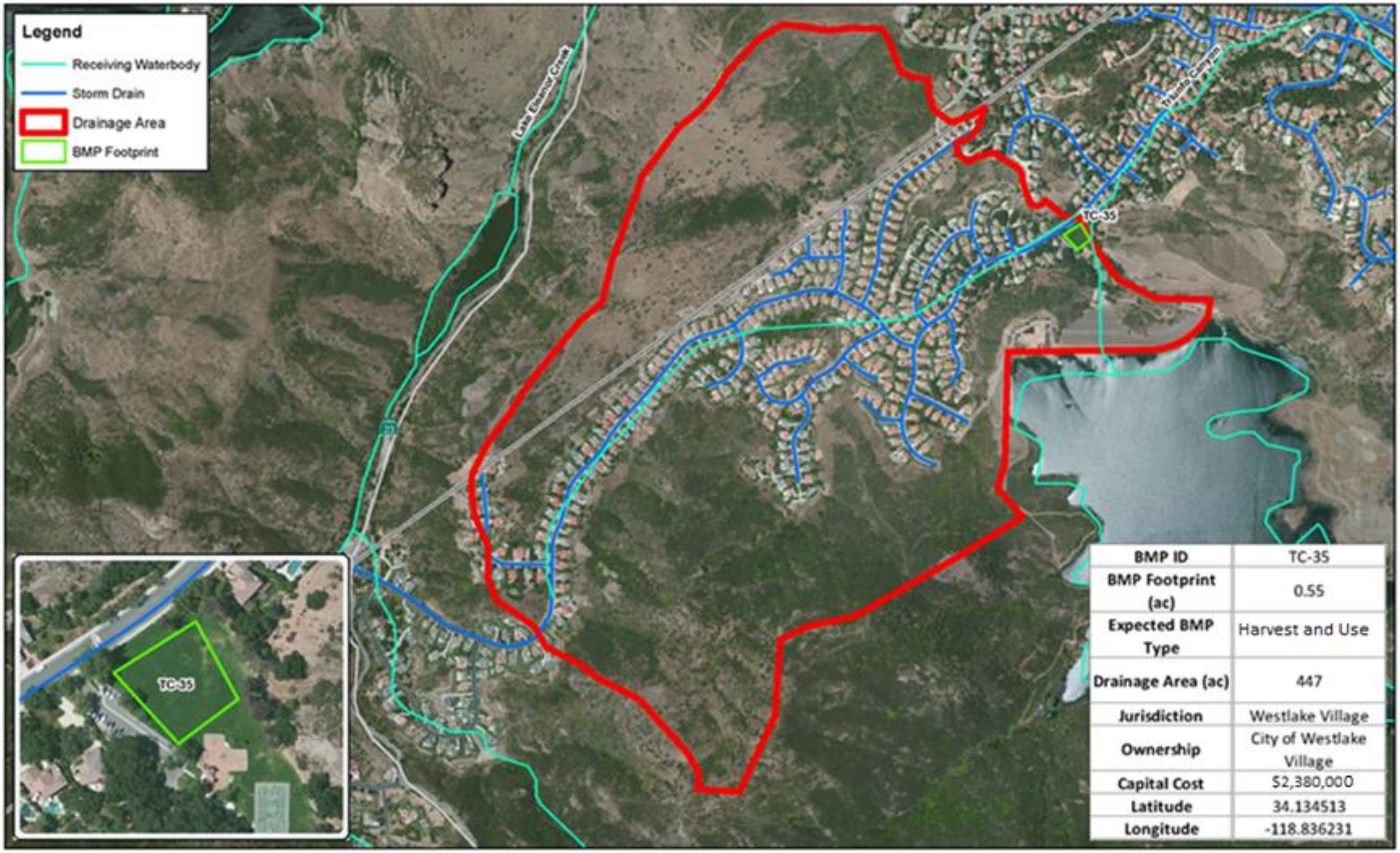


BMP ID	LVC-14
BMP Footprint (ac)	0.49
Expected BMP Type	Infiltration & Harvest and Use
Drainage Area (ac)	378
Jurisdiction	LA County
Ownership	LA County/Calabasas
Capital Cost	$4,150,000
Latitude	34.162695
Longitude	-118.691379

SITE: TC-35


Legend
Receiving Waterbody
Storm Drain
Drainage Area
BMP Footprint
TC-35
TC-35
BMP ID: TC-35
BMP Footprint (ac): 0.55
Expected BMP Type: Harvest and Use
Drainage Area (ac): 447
Jurisdiction: Westlake Village
Ownership: City of Westlake Village
Capital Cost: $2,380,000
Latitude: 34.134513
Longitude: -118.836231

SITE: MEC-12

BMP ID	MEC-12
BMP Footprint (ac)	0.21
Expected BMP Type	Infiltration & Harvest and Use
Drainage Area (ac)	1,619
Jurisdiction	Agoura Hills
Ownership	LACFCD
Capital Cost	$4,449,000
Latitude	34.083241
Longitude	-118.452858

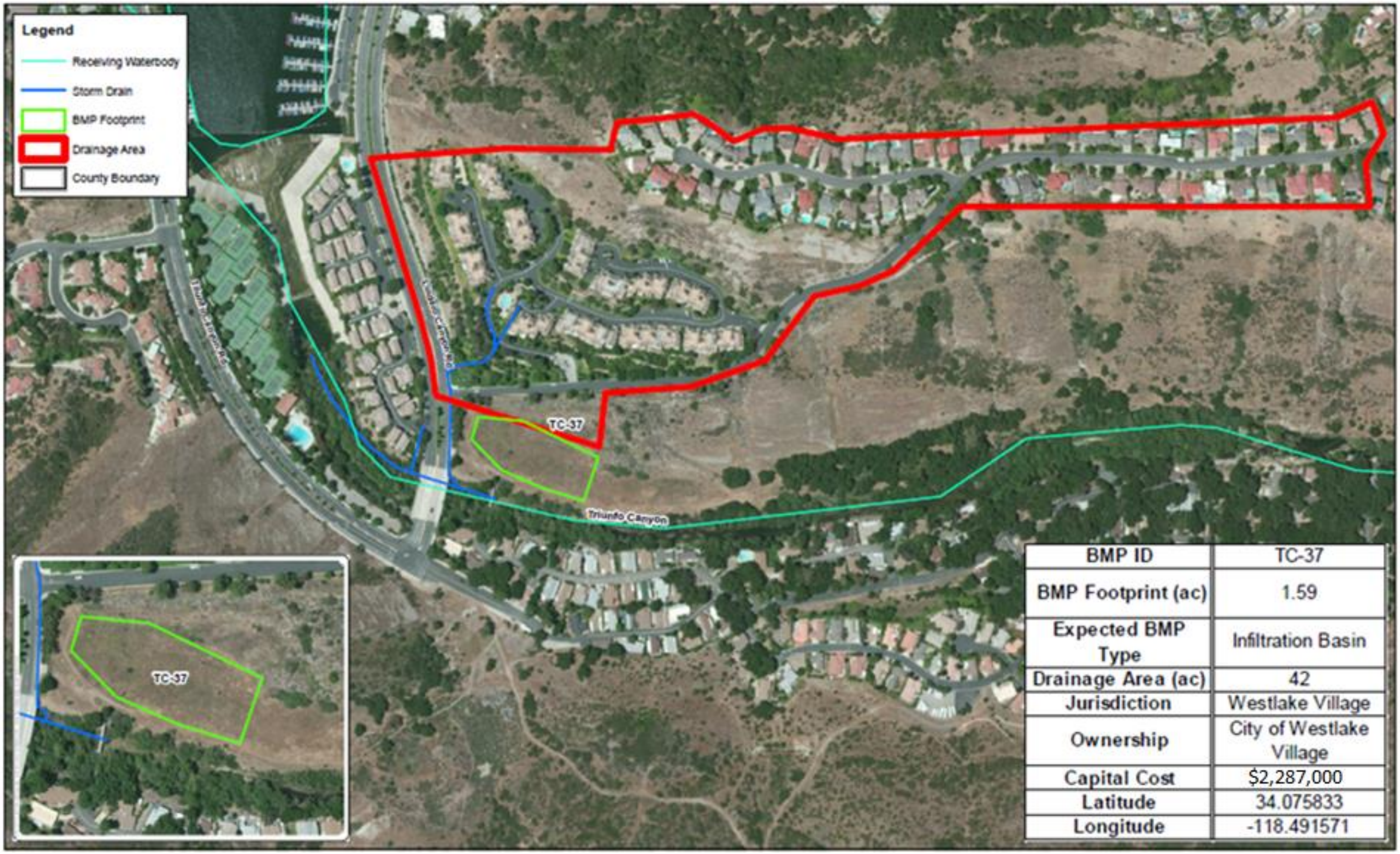
SITE: LC-02

BMP ID	LC-02
BMP Footprint (ac)	0.43
Expected BMP Type	Infiltration & Harvest and Use
Drainage Area (ac)	31
Jurisdiction	Agoura Hills
Ownership	City of Agoura Hills
Capital Cost	$2,623,000
Latitude	34.151652
Longitude	-118.783018

SITE: TC-29

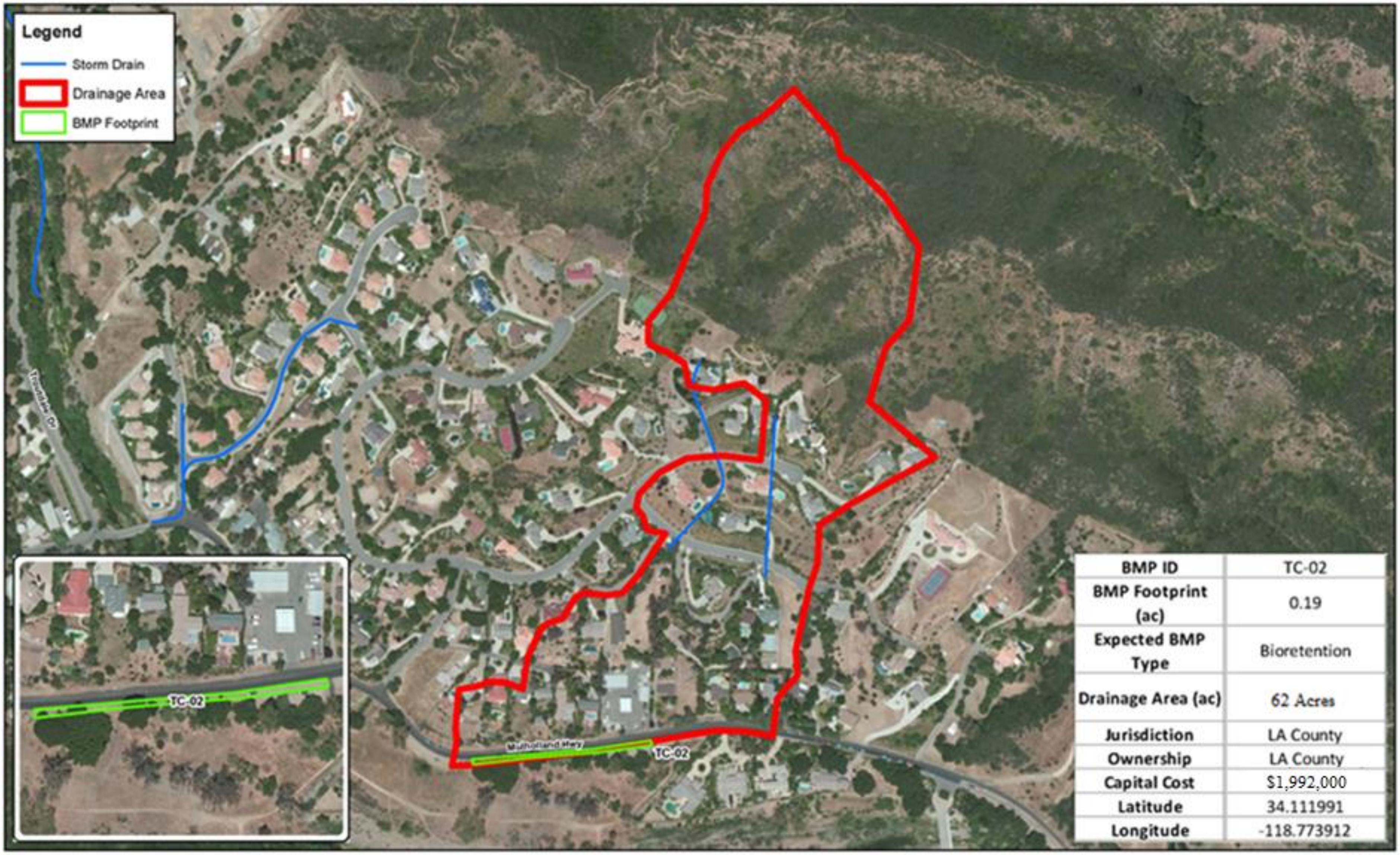
BMP ID	TC-29
BMP Footprint (ac)	0.27
Expected BMP Type	Infiltration Chamber
Drainage Area (ac)	95
Jurisdiction	Westlake Village
Ownership	City of Westlake Village
Capital Cost	$1,216,000
Latitude	34.138637
Longitude	-118.818853

SITE: TC-37



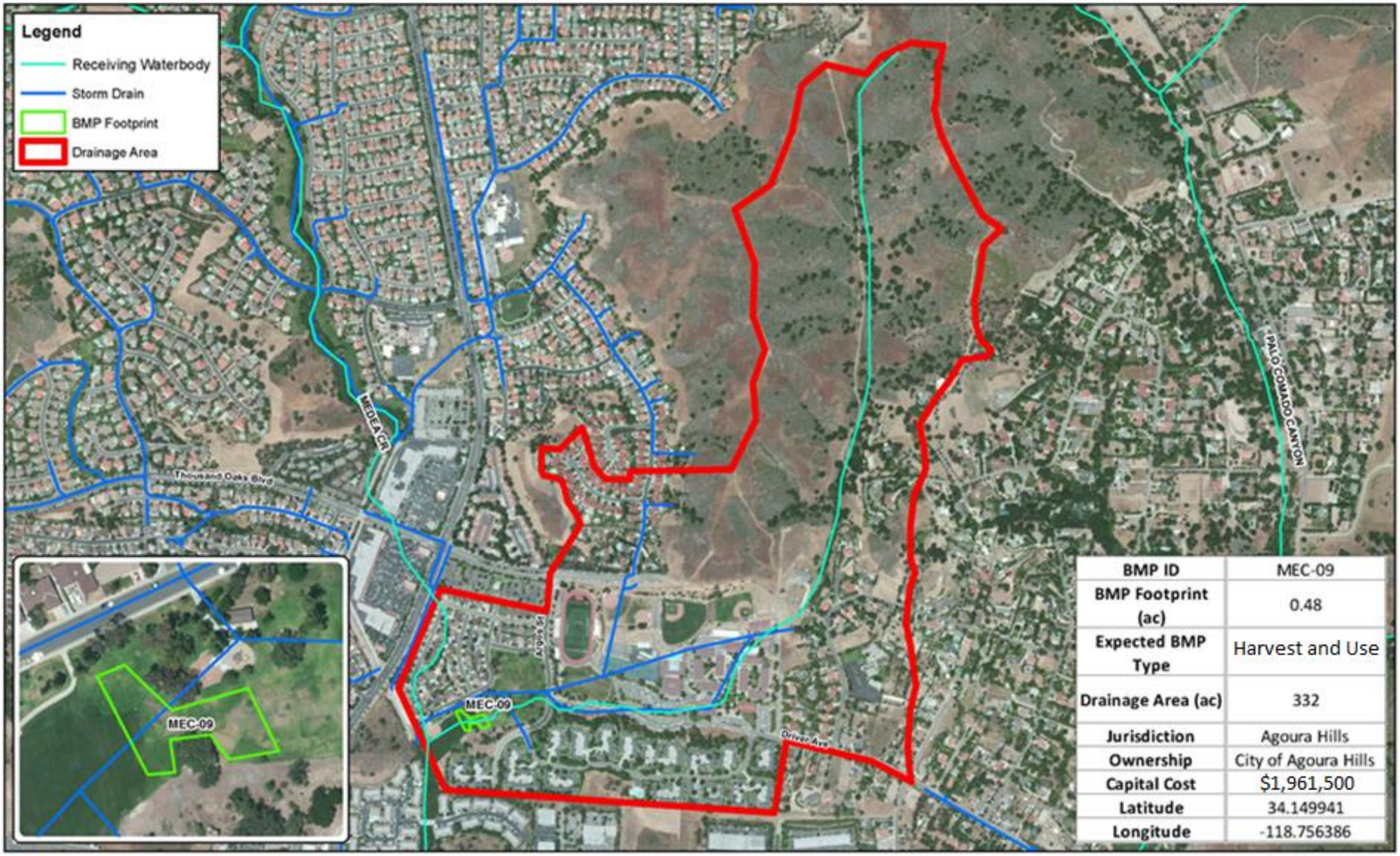
BMP ID	TC-37
BMP Footprint (ac)	1.59
Expected BMP Type	Infiltration Basin
Drainage Area (ac)	42
Jurisdiction	Westlake Village
Ownership	City of Westlake Village
Capital Cost	$2,287,000
Latitude	34.075833
Longitude	-118.491571

SITE: TC-02



BMP ID	TC-02
BMP Footprint (ac)	0.19
Expected BMP Type	Bioretention
Drainage Area (ac)	62 Acres
Jurisdiction	LA County
Ownership	LA County
Capital Cost	$1,992,000
Latitude	34.111991
Longitude	-118.773912

SITE: MEC-09



BMP ID	MEC-09
BMP Footprint (ac)	0.48
Expected BMP Type	Harvest and Use
Drainage Area (ac)	332
Jurisdiction	Agoura Hills
Ownership	City of Agoura Hills
Capital Cost	$1,961,500
Latitude	34.149941
Longitude	-118.756386

Appendix B: Preliminary Environmental Analysis Report

Michael Baker INTERNATIONAL

PRELIMINARY ENVIRONMENTAL ANALYSIS OF PROPOSED BMP SITES WITHIN THE MALIBU CREEK WATERSHED

Los Angeles County, California

Prepared For:

City of Calabasas
City of Agoura Hills
City of Westlake Village
City of Hidden Hills
County of Los Angeles
Los Angeles County Flood Control District

Prepared By:

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14725 Alton Parkway
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Contact: Chris Johnson, PWS
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June 2015

JN 136610

Table of Contents

Section 1 Introduction and Purpose

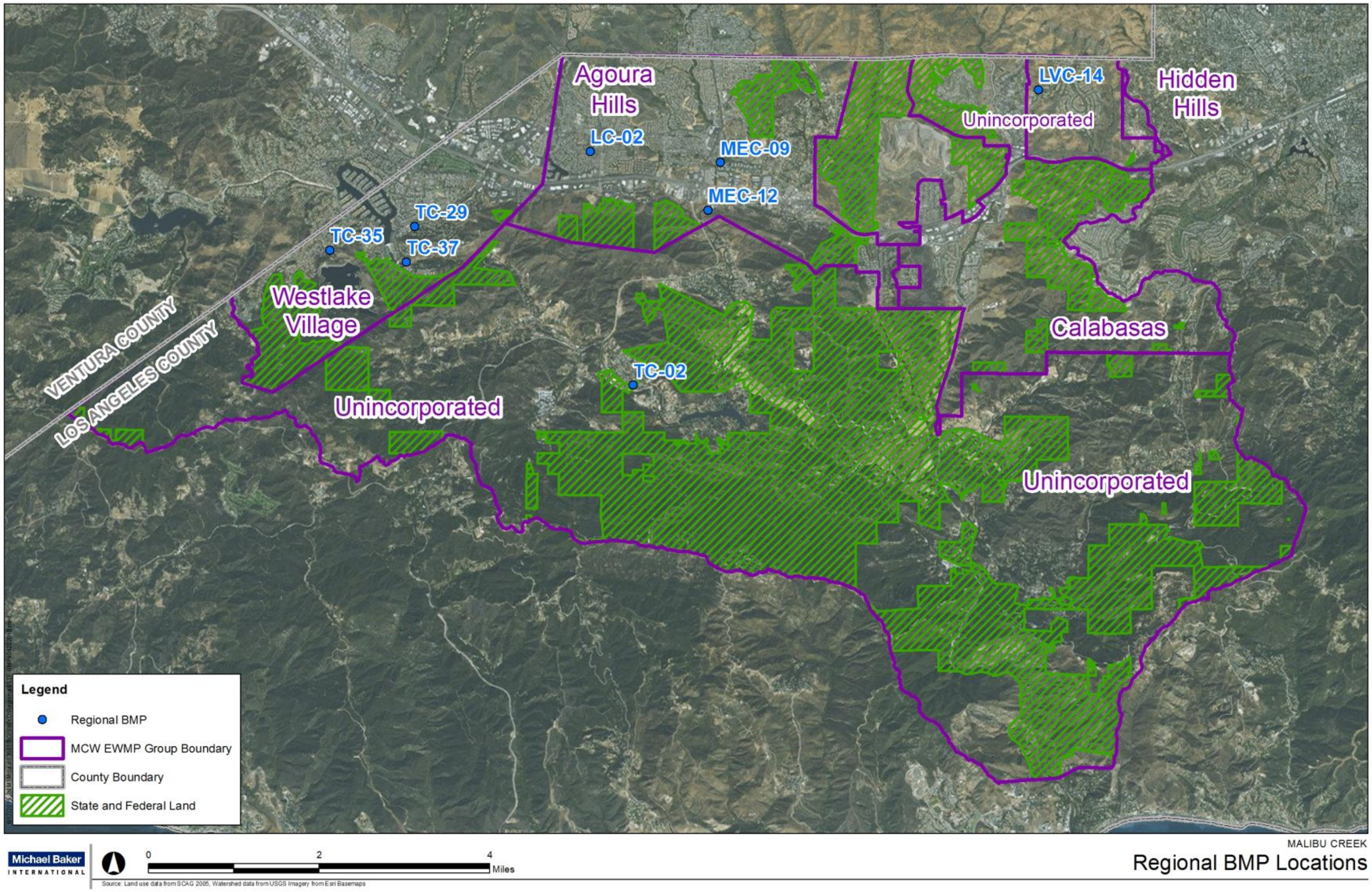
The Cities of Calabasas, Agoura Hills, Hidden Hills, and Westlake Village in cooperation with the County of Los Angeles and the Los Angeles County Flood Control District, also known as the Malibu Creek Watershed (MCW) Enhanced Water Management Program (EWMP) Group have developed an EWMP for the Malibu Creek Watershed. This EWMP uses integrated planning to evaluate opportunities to implement regional multi-beneficial water quality projects.

The Malibu Creek Watershed is a predominantly rural watershed with some agricultural and urban areas located approximately 35 miles west of Los Angeles. Malibu Creek and its tributaries have been identified as having various water quality impairments. To address these impairments the MS4 Permit includes provisions that allow permittees the flexibility to implement an EWMP. The EWMP encourages permittees to evaluate and, where feasible, implement regional projects that retain all non-stormwater runoff and all stormwater runoff from the 85th percentile, 24-hour storm event for the drainage area tributary to those projects. These projects may also achieve other benefits such as flood protection, water supply enhancement, recreational opportunities, and wildlife habitat enhancement.

This preliminary Environmental Analysis (Analysis) provides a preliminary review of applicable environmental and regulatory permitting regulations for the proposed structural Best Management Practice (BMP) construction throughout the Malibu Creek Watershed (refer to Exhibit 1, *BMP Site Index Map*). BMP locations identified within this Analysis were selected in consultation with the permittees following a watershed screening tour conducted on March 16, 2015. The following discussion identifies potential environmental constraints associated with the siting of the selected BMP's. The proposed improvements have been separated by site and evaluated on an individual basis. A brief description of the BMP site proposed and an associated table of the environmental setting has been prepared for each of the selected sites. The tables may be modified as more details become available (e.g. updated/revised project footprint). Ultimately, a formal environmental analysis will be prepared as required by the California Environmental Quality Act (CEQA) and/or National Environmental Policy Act (NEPA) through the lead agency's discretionary review process.

While general environmental topical areas were reviewed, special focus was given to whether sites exhibited the potential to require regulatory permits pursuant to the U.S. Army Corps of Engineers' (Corps), Los Angeles Regional Water Quality Control Board's (Regional Board), and California Department of Fish and Wildlife's (CDFW) jurisdictional authority. The fieldwork for this environmental Analysis was conducted on April 8th and 9th of 2015.

Exhibit 1: BMP Location Index Map



Section 2 Summary of Regulations

The following Analysis was prepared to preliminarily review potential environmental and regulatory constraints.

2.1 CALIFORNIA ENVIRONMENTAL QUALITY ACT

In accordance with the California Environmental Quality Act (CEQA) (Public Resources Code Sections 21000-21177) and pursuant to Section 15063 of Title 14 of the California Code of Regulations (CCR), the City of Calabasas, as the Lead Agency, is required to undertake the preparation of an Initial Study to determine whether the proposed project would have a significant environmental impact. If the Lead Agency finds that there is no evidence that the project, either as proposed or as modified to include the mitigation measures identified in the Initial Study, may cause a significant effect on the environment, the Lead Agency shall find that the proposed project would not have a significant effect on the environment and shall prepare a Negative Declaration (or Mitigated Negative Declaration) for that project. Such determination can be made only if "there is no substantial evidence in light of the whole record before the Lead Agency" that such impacts may occur (Section 21080(c), Public Resources Code).

The environmental documentation, which is ultimately approved and/or certified by the City of Calabasas in accordance with CEQA, is intended as an informational document undertaken to provide an environmental basis for subsequent discretionary actions upon the project. However, the resulting documentation is not a policy document, and its approval and/or certification neither presupposes nor mandates any actions on the part of those agencies from whom permits and other discretionary approvals would be required.

The environmental documentation and supporting analysis is subject to a public review period. During this review, public agency comments on the document relative to environmental issues should be addressed to the Lead Agency. Following review of any comments received, the Lead Agency will consider these comments as a part of the project's environmental review and include them with the Initial Study documentation for consideration.

Section 15063(c) of the State CEQA Guidelines identifies that the purposes of an Initial Study are to: (1) provide the Lead Agency with information to use as the basis for deciding whether to prepare an EIR or Negative Declaration; (2) enable an applicant or Lead Agency to modify a project, mitigating adverse impacts before an environmental document is prepared thereby enabling the project to qualify for a Negative Declaration; (3) assist in the preparation of an EIR, if required, by focusing the EIR on the effects determined to be significant, identifying the effects determined not to be significant, and explaining the reasons for determining that potentially significant effects would not be significant; and identifying whether a program EIR, tiering, or another appropriate process can be used for analysis of the project's environmental impacts (4) facilitate environmental assessment early in the design of the project; (5) provide documentation of the factual basis for the finding in a Negative Declaration that a project would not have a significant environment effect; (6) eliminate unnecessary Environmental Impact Reports (EIRs); and (7) determine whether a previously prepared environmental document could be used for the project.

Section 15063(d) of the State CEQA Guidelines identifies specific disclosure requirements for inclusion in an Initial Study. Pursuant to those requirements, an Initial Study shall include: (1) a description of the project, including the location of the project; (2) an identification of the environmental setting; (3) an identification of environmental effects by use of a checklist, matrix or other method, provided that entries on a checklist or other form are briefly explained to indicate that there is some evidence to support the entries; (4) a discussion of ways to mitigate the significant effects identified, if any; (5) an examination of whether the project would be consistent with existing zoning, plans, and other applicable land use controls; and (6) the name of the person or persons who prepared or participated in the preparation of the Initial Study.

2.2 NATIONAL ENVIRONMENTAL POLICY ACT

Established in 1969, the National Environmental Policy Act (NEPA) process consists of an evaluation of the environmental effects of a federal undertaking including its alternatives. There are three levels of analysis depending on whether or not an undertaking could significantly affect the environment. These three levels include: categorical exclusion determination; preparation of an environmental assessment/finding of no significant impact (EA/FONSI); and preparation of an environmental impact statement (EIS).

At the first level, an undertaking may be categorically excluded from a detailed environmental analysis if it meets certain criteria which a federal agency has previously determined as having no significant environmental impact. A number of agencies have developed lists of actions which are normally categorically excluded from environmental evaluation under their NEPA regulations.

At the second level of analysis, a federal agency prepares a written environmental assessment (EA) to determine whether or not a federal undertaking would significantly affect the environment. If the answer is no, the agency issues a finding of no significant impact (FONSI). The FONSI may address measures which an agency will take to reduce (mitigate) potentially significant impacts.

If the EA determines that the environmental consequences of a proposed federal undertaking may be significant, an EIS is prepared. An EIS is a more detailed evaluation of the proposed action and alternatives. The public, other federal agencies and outside parties may provide input into the preparation of an EIS and then comment on the draft EIS when it is completed.

If a federal agency anticipates that an undertaking may significantly impact the environment, or if a project is environmentally controversial, a federal agency may choose to prepare an EIS without having to first prepare an EA. After a final EIS is prepared and at the time of its decision, a federal agency will prepare a public record of its decision addressing how the findings of the EIS, including consideration of alternatives, were incorporated into the agency's decision-making process.

2.3 REGULATORY PERMITTING REVIEW

There are four (4) key agencies that regulate activities within streams, wetlands, and riparian areas in California. The U.S. Army Corps of Engineers Regulatory Branch regulates activities pursuant to Section 404 of the Federal Clean Water Act (CWA), and Section 10 of the Rivers and Harbors Act. Of the State agencies, the California Department of Fish & Wildlife regulates activities under the Fish and Game Code Section 1600-1616; the Regional Water Quality Control Board regulates activities pursuant to Section 401 of the CWA and the California Porter-Cologne Water Quality Control Act; and the California Coastal Commission pursuant to the California Coastal Act for projects located within the Coastal Zone.

2.4 U.S. ARMY CORPS OF ENGINEERS

Since 1972, the Corps and U.S. Environmental Protection Agency (EPA) have jointly regulated the filling of “waters of the U.S.” (WoUS), including wetlands, pursuant to Section 404 of the CWA. The Corps has regulatory authority over the discharge of dredged or fill material into the WoUS under Section 404 of the CWA. The Corps and EPA define “fill material” to include any “material placed in waters of the United States where the material has the effect of: (i) replacing any portion of a water of the United States with dry land; or (ii) changing the bottom elevation of any portion of the waters of the United States.” Examples include, but are not limited to, sand, rock, clay, construction debris, wood chips, and “materials used to create any structure or infrastructure in the waters of the United States.”

The term WoUS is defined under CWA regulations 33 CFR §328.3(a). Wetlands, a subset of jurisdictional waters, are jointly defined by the Corps and EPA under CWA regulations 33 CFR §328.3(b). The process in which jurisdictional areas are identified is further discussed in Section 3.0, Methodology.

2.5 REGIONAL WATER QUALITY CONTROL BOARD

Applicants for a federal license or permit for activities which may discharge to WoUS must seek Water Quality Certification from the state or Indian tribe with jurisdiction.1 Such Certification is based on a finding that the discharge will meet water quality standards and other applicable requirements. In California, there are nine Regional Boards that issue or deny Certification for discharges within their geographical jurisdiction. Water Quality Certification must be based on a finding that the proposed discharge will comply with water quality standards, which are defined as numeric and narrative objectives in each Regional Board’s Basin Plan. Where applicable, the State Water Resources Control Board has this responsibility for projects

[1] Title 33, United States Code, Section 1341; Clean Water Act Section.

affecting waters within multiple Regional Boards. The Regional Board's jurisdiction extends to all waters of the State and to all WoUS, including wetlands.

Additionally, the California Porter-Cologne Water Quality Control Act gives the State very broad authority to regulate waters of the State, which are defined as any surface water or groundwater, including saline waters. The Porter-Cologne Act has become an important tool post Solid Waste Agency of Northern Cook County v. United States Corps of Engineers[2] (SWANCC) and Rapanos v. United States[3] (Rapanos) court cases regulatory environment, with respect to the state's authority over isolated and insignificant waters. Generally, any person proposing to discharge waste into a water body that could affect its water quality must file a Report of Waste Discharge in the event that there is no Section 404/401 nexus. Although "waste" is partially defined as any waste substance associated with human habitation, the Regional Board also interprets this to include fill discharged into water bodies.

2.6 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

California Fish and Game Code Sections 1600-1616 establishes a fee-based process to ensure that projects conducted in and around lakes, rivers, or streams do not adversely impact fish and wildlife resources, or, when adverse impacts cannot be avoided, ensures that adequate mitigation and/or compensation is provided.

Fish and Game Code Section 1602 requires any person, state, or local governmental agency or public utility to notify the CDFW before beginning any activity that will do one or more of the following:

(1) substantially obstruct or divert the natural flow of a river, stream, or lake;

(2) substantially change or use any material from the bed, channel, or bank of a river, stream, or lake; or

(3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into a river, stream, or lake.

Fish and Game Code Section 1602 applies to all perennial, intermittent, and ephemeral rivers, streams, and lakes in the state. It should be noted that the State agencies (Regional Board and Fish & Game) do not have regulatory authority on Tribal Lands. For Tribal Lands, only the Corps regulates jurisdictional waters.

2.7 CALIFORNIA COASTAL COMMISSION

Some of BMP sites evaluated are located within the Coastal Zone and thereby regulated by the California Coastal Commission (CCC). The CCC was established by voter initiative in 1972 (Proposition 20) and later made permanent by the Legislature through adoption of the California

[2] Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers, 531 U.S. 159 (2001)
[3] Rapanos v. United States, 547 U.S. 715 (2006)

Coastal Act of 1976. The CCC, in partnership with coastal cities and counties, plans and regulates the use of land and water in the coastal zone. Development activities, which are broadly defined by the Coastal Act to include (among others) construction of buildings, divisions of land, and activities that change the intensity of use of land or public access to coastal waters, generally require a coastal permit from either the CCC or the local government.

The Coastal Act includes specific policies that address issues such as shoreline public access and recreation, lower cost visitor accommodations, terrestrial and marine habitat protection, visual resources, landform alteration, agricultural lands, commercial fisheries, industrial uses, water quality, offshore oil and gas development, transportation, development design, power plants, ports, and public works. The policies of the Coastal Act constitute the statutory standards applied to planning and regulatory decisions made by the CCC and by local governments, pursuant to the Coastal Act.

<u>Jurisdictional Wetlands within the Coastal Zone:</u>

A comprehensive classification system of wetlands and deepwater habitats (also referred to as the "Cowardin Wetland Classification System") was developed for the U.S. Fish and Wildlife Service (USFWS) in order to create the National Inventory of Wetlands. Under this hierarchical system, classification is based on hydrologic regime, vegetative community, and to a lesser extent on water chemistry and soils. The classification includes both wetlands and deepwater habitats. The Cowardin system includes several layers of detail for wetland classification including: a subsystem of water flow, classes of substrate types, subclasses of vegetation types and dominant species, as well as flooding regimes and salinity levels within the system. Overall, the Cowardin system and the Corps Section 404 regulations define wetlands differently. The most significant difference is that the Cowardin system defines wetlands to include mudflats and other wet areas that lack vegetation.

According to the classification, the USFWS defines wetlands as follows: "Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominately hydrophytes; (2) the substrate is predominately undrained hydric soil; and (3) the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year."

At the State and regional levels, the CDFG and the CCC, accept the USFWS definition and use it as a guide in identifying wetlands and in implementing their wetland policies. The Coastal Act (PRC Section 30121) defines "wetlands" as "lands within the Coastal Zone which may be covered periodically or permanently with shallow water and include saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, and fens." In addition, the Coastal Act (PRC Section 30107.5) defines environmentally sensitive areas in a manner that would include rivers, streams or other aquatic habitat. The Coastal Act defines wetland fill (Section 30233(a)) as the following:

The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:

(1) New or expanded port, energy, and coastal-dependent industrial facilities, including commercial fishing facilities.

(2) Maintaining existing or restoring previously dredged depths in existing navigational channels, turning basins, vessel berthing and mooring areas, and boat launching ramps.

(3) In wetland areas only, entrance channels for new or expanded boating facilities; and in a degraded wetland, identified by the Department of Fish and Game pursuant to subdivision (b) of Section 30411, for boating facilities if, in conjunction with such boating facilities, a substantial portion of the degraded wetland is restored and maintained as a biologically productive wetland, provided, however, that in no event shall the size of the wetland area used for such boating facilities, including berthing space, turning basins, necessary navigation channels, and any necessary support service facilities, be greater than 25 percent of the total wetland area to be restored.

(4) In open coastal waters, other than wetlands, including streams, estuaries, and lakes, new or expanded boating facilities and the placement of structural pilings for public recreational piers that provide public access and recreational opportunities.

(5) Incidental public service purposes, including but not limited to, burying cables and pipes or inspection of piers and maintenance of existing intake and outfall lines.

(6) Mineral extraction, including sand for restoring beaches, except in environmentally sensitive areas.

(7) Restoration purposes.

(8) Nature study, aquaculture, or similar resource-dependent activities.

Section 3 Methodology

Potential environmental and regulatory boundaries were evaluated based on above-ground observations within the proposed approximate BMP footprints. This Analysis represents a best effort at inventorying potential environmental constraints and jurisdictional boundaries via a desktop aerial map review and field visits. RBF Baker has utilized the most up-to-date regulations, written policy, and guidance from the regulatory agencies; however, only the lead or regulatory agencies can make a final determination regarding environmental impacts and jurisdictional boundaries.

This Analysis includes relevant environmental issue areas pursuant to CEQA and NEPA. RBF Baker conducted a preliminary review of the issue areas and has provided a precursory evaluation in order to support the eventual decision making by a Lead Agency with regard to the preparation of an environmental document. The environmental review identified in this Analysis is patterned after the Initial Study Checklist recommended by the CEQA Guidelines for the environmental review process. While not a formal CEQA document, this Analysis aims to preliminarily review the general topical areas discussed under CEQA for future analysis.

While in the field, environmental constraints, jurisdictional areas and potentially sensitive habitat (e.g., oak trees and vegetation) were recorded. Photo documentation was inventoried for each individual site. RBF Baker environmental and regulatory specialists visited the proposed BMP locations between approximately 7:00 a.m. to 4:00 p.m. on April 8 and 9, 2015 to evaluate existing conditions. All sites were walked as access permitted. For areas with limited access, visual observations were made from public rights-of-way. Few locations exhibited limitations, such as physical obstructions (e.g. fencing, steep terrain); however, the vast majority of the proposed BMP locations were accessible during the course of the site visits. No significant rain events had occurred within seven (7) days of the site visits. RBF observed on-site and immediately adjoining off-site resources and documented conditions where applicable.

Section 4 Site Conditions/Environmental Analysis

Preliminary environmental and regulatory analysis was conducted on all subject BMP sites identified in this section. It should be noted that potential impacts may be avoided, minimized, or increased upon refinement of the BMP footprints. The following information is a preliminary environmental assessment and does not intend to replace any formal environmental or regulatory process.

4.1 BMP LVC-14

BMP LVC-14 is a proposed underground infiltration harvest/ reuse system located within Gates Canyon Park and is within the jurisdiction of Unincorporated LA County. Adjacent land uses include open space to the north, west, and south, with residential uses to the east along Thousand Oaks Blvd. Vegetation consists of turf grass and landscaped trees, including several mature sycamore trees. Vegetation adjacent to the site includes coastal sage scrub (CSS), mulefat, and willow. No drainage courses or riparian vegetation were noted on-site. Based on the current siting of the proposed footprint there is a low potential for regulatory permits to be required.

TABLE 4.1
BMP Site LVC-14

	Potential Impact	No Anticipated Impact	Comments
Aesthetics		x	The proposed project would not result in significant short-term or long-term operational aesthetic impacts.
Agriculture and Forestry Resources		x	No impacts to agriculture and forestry resources are anticipated.
Air Quality	x		The proposed project would result in short-term/temporary impacts to air quality associated with construction activities. No long-term impacts to air quality are anticipated.
Biological Resources	x		Pre-construction nesting bird surveys would be required prior to the commencement of construction activities.
Cultural Resources	x		A cultural resources assessment would be required prior to the commencement of construction activities.
Geology/Soils	x		A geotechnical report would be required in order to determine potential impacts to soil erosion, site suitability, and risk assessment.
Greenhouse Gas Emissions	x		Greenhouse gas emissions would be associated with construction activities. Post-construction greenhouse gas emissions are not anticipated.
Hazards and Hazardous		x	No impacts are anticipated.

Materials			
Hydrology and Water Quality		x	No impacts are anticipated.
Land Use/Planning		x	No impacts are anticipated.
Mineral Resources		x	No impacts are anticipated.
Noise	x		Noise impacts would be associated with construction activities. Post-construction noise impacts are not anticipated.
Population/Housing		x	No impacts are anticipated.
Public Services		x	No impacts are anticipated.
Recreation	x		The project site is located within a public park. Construction activities would temporarily limit public access. Post-construction impacts are not anticipated.
Transportation/Traffic	x		Short-term impacts to transportation would be associated with access and staging during construction activities. Post-construction impacts are not anticipated.
Utilities/Service Systems		x	No impacts are anticipated.

4.2 BMP TC-02

BMP TC-02 is a proposed super greenstreet bioretention/ infiltration system located along Mulholland Highway and is within the jurisdiction of Unincorporated Los Angeles County. Adjacent land uses include open space to the south and west, with residential uses to the immediate north and east. Vegetation consists of non-native grassland and interspersed mature sycamore and oak trees. An ephemeral creek corridor is present south of the project site. The proposed footprint remains within the road right of way, away from the adjacent creek and associated riparian vegetation.

TABLE 4.2
BMP Site TC-02

	Potential Impact	No Anticipated Impact	Comments
Aesthetics		x	The proposed project would not result in significant short-term or long-term operational aesthetic impacts.
Agriculture and Forestry Resources		x	No impacts to agriculture and forestry resources are anticipated.
Air Quality	x		The proposed project would result in short-term/temporary impacts to air quality associated with construction activities. No long-term impacts to air quality are anticipated.
Biological Resources	x		Pre-construction nesting bird surveys would be required prior to the commencement of construction activities. Establish work limits in order to avoid disturbance to the streambed and associated riparian vegetation.
Cultural Resources	x		A cultural resources assessment would be required

			prior to the commencement of construction activities.
Geology/Soils	x		A geotechnical report would be required in order to determine potential impacts to soil erosion, site suitability, and risk assessment.
Greenhouse Gas Emissions	x		Greenhouse gas emissions would be associated with construction activities. Post-construction greenhouse gas emissions are not anticipated.
Hazards and Hazardous Materials		x	No impacts are anticipated.
Hydrology and Water Quality		x	No impacts are anticipated.
Land Use/Planning		x	No impacts are anticipated.
Mineral Resources		x	No impacts are anticipated.
Noise	x		Noise impacts would be associated with construction activities. Post-construction noise impacts are not anticipated.
Population/Housing		x	No impacts are anticipated.
Public Services		x	No impacts are anticipated.
Recreation		x	No impacts are anticipated.
Transportation/Traffic	x		Short-term impacts to transportation would be associated with access and staging during construction activities. Post-construction impacts are not anticipated.
Utilities/Service Systems		x	No impacts are anticipated.

4.3 BMP TC-37

BMP TC-37 is located southwest of the intersection of Lindero Canyon Road and Ridgeford Drive within Triunfo Canyon. Adjacent land uses include open space to the east and residential development to the north, west, and south. Vegetation in the area includes non-native grasses and other ruderal annuals. Triunfo Creek is located immediately to the south and contains a mature willow riparian forest. The proposed footprint appears to remain within the upland meadow, away from the adjacent creek and associated riparian vegetation. Regulatory permits would be required if the proposed project extended into the riparian corridor.

TABLE 4.3
BMP Site TC-37

	Potential Impact	No Anticipated Impact	Comments
Aesthetics		x	The proposed project would not result in significant short-term or long-term operational aesthetic impacts.
Agriculture and Forestry Resources		x	No impacts to agriculture and forestry resources are anticipated.
Air Quality	x		The proposed project would result in short-term/temporary impacts to air quality associated with construction activities. No long-term impacts to air quality are anticipated.
Biological Resources	x		Pre-construction nesting bird surveys would be required prior to the commencement of construction activities. Establish work limits in order to avoid disturbance to the streambed and associated riparian vegetation.
Cultural Resources	x		A cultural resources assessment would be required prior to the commencement of construction activities.
Geology/Soils	x		A geotechnical report would be required in order to determine potential impacts to soil erosion, site suitability, and risk assessment.
Greenhouse Gas Emissions	x		Greenhouse gas emissions would be associated with construction activities. Post-construction greenhouse gas emissions are not anticipated.
Hazards and Hazardous Materials		x	No impacts are anticipated.
Hydrology and Water Quality		x	No impacts are anticipated.
Land Use/Planning		x	No impacts are anticipated.
Mineral Resources		x	No impacts are anticipated.
Noise	x		Noise impacts would be associated with construction activities. Post-construction noise impacts are not anticipated.
Population/Housing		x	No impacts are anticipated.
Public Services		x	No impacts are anticipated.
Recreation		x	No impacts are anticipated.
Transportation/Traffic	x		Short-term impacts to transportation would be associated with access and staging during construction activities. Post-construction impacts are not anticipated.
Utilities/Service Systems		x	No impacts are anticipated.

4.4 BMP MEC-12

BMP location MEC-12 is located west of Cornell Road, between Agoura Road and Kanan Road, immediately south of Medea Creek. Adjacent land use includes a storage yard to the northeast and open space surrounding the remaining area. Due to the presence of riparian vegetation associated with the streambed, biological resources may be present and warrant further environmental analysis. Based on the current siting of the proposed footprint there is a high potential for regulatory permits to be required.

TABLE 4.4
BMP Site MEC-12

	Potential Impact	No Anticipated Impact	Comments
Aesthetics		x	The proposed project would not result in significant short-term or long-term operational aesthetic impacts.
Agriculture and Forestry Resources		x	No impacts to agriculture and forestry resources are anticipated.
Air Quality	x		The proposed project would result in short-term/temporary impacts to air quality associated with construction activities. No long-term impacts to air quality are anticipated.
Biological Resources	x		Pre-construction nesting bird surveys would be required prior to the commencement of construction activities. Impacts to the adjacent stream system would trigger regulatory permits. An evaluation of riparian habitat downstream of the site should also be evaluated if a water diversion from Medea Creek is proposed.
Cultural Resources	x		A cultural resources assessment would be required prior to the commencement of construction activities.
Geology/Soils	x		A geotechnical report would be required in order to determine potential impacts to soil erosion, site suitability, and risk assessment.
Greenhouse Gas Emissions	x		Greenhouse gas emissions would be associated with construction activities. Post-construction greenhouse gas emissions are not anticipated.
Hazards and Hazardous Materials		x	No impacts are anticipated.
Hydrology and Water Quality		x	No impacts are anticipated.
Land Use/Planning		x	No impacts are anticipated.
Mineral Resources		x	No impacts are anticipated.
Noise	x		Noise impacts would be associated with construction activities. Post-construction noise impacts are not anticipated.
Population/Housing		x	No impacts are anticipated.
Public Services		x	No impacts are anticipated.
Recreation		x	No impacts are anticipated.
Transportation/Traffic	x		Short-term impacts to transportation would be associated with access and staging during construction activities. Post-construction impacts are not anticipated.
Utilities/Service Systems		x	No impacts are anticipated.

4.5 BMP TC-29

BMP TC-29 is a proposed infiltration chamber system located within Foxfield Park and is within the jurisdiction of Westlake Village. Adjacent land use is residential and commercial development. Vegetation consists of turf grass and landscaped trees, including several mature sycamore trees. No native vegetation or open space exists within or adjacent to the project site. No drainage courses or riparian vegetation were noted on-site. Based on the current siting of the proposed footprint there is a low potential for regulatory permits to be required.

TABLE 4.5

BMP Site TC-29

	Potential Impact	No Anticipated Impact	Comments
Aesthetics		x	The proposed project would not result in significant short-term or long-term operational aesthetic impacts.
Agriculture and Forestry Resources		x	No impacts to agriculture and forestry resources are anticipated.
Air Quality	x		The proposed project would result in short-term/temporary impacts to air quality associated with construction activities. No long-term impacts to air quality are anticipated.
Biological Resources	x		Pre-construction nesting bird surveys would be required prior to the commencement of construction activities. Establish work limits in order to avoid disturbance to the streambed and associated riparian vegetation.
Cultural Resources	x		A cultural resources assessment would be required prior to the commencement of construction activities.
Geology/Soils	x		A geotechnical report would be required in order to determine potential impacts to soil erosion, site suitability, and risk assessment.
Greenhouse Gas Emissions	x		Greenhouse gas emissions would be associated with construction activities. Post-construction greenhouse gas emissions are not anticipated.
Hazards and Hazardous Materials		x	No impacts are anticipated.
Hydrology and Water Quality		x	No impacts are anticipated.
Land Use/Planning		x	No impacts are anticipated.
Mineral Resources		x	No impacts are anticipated.
Noise	x		Noise impacts would be associated with construction activities. Post-construction noise impacts are not anticipated. Site is located immediately adjacent to residential uses to the east.
Population/Housing		x	No impacts are anticipated.
Public Services		x	No impacts are anticipated.
Recreation	x		The project site is located within a public park. Construction activities would temporarily limit public access. Post-construction impacts are not

	Potential Impact	No Anticipated Impact	Comments
			anticipated.
Transportation/Traffic	x		Short-term impacts to transportation would be associated with access and staging during construction activities. Post-construction impacts are not anticipated.
Utilities/Service Systems		x	No impacts are anticipated.

4.6 BMP TC-35

BMP TC-35 is a proposed infiltration basin located within Three Springs Park and is within the jurisdiction of Westlake Village. Adjacent land use is primarily residential development. Triunfo Creek Park open space adjoins the eastern boundary of the project site. Vegetation within Three Springs Park consists of turf grass and landscaped trees, including several mature sycamore trees. No native vegetation or open space exists within the project site, though the adjacent Triunfo Creek Park contains CSS habitat. No drainage courses or riparian vegetation were noted on-site. A concrete culvert is situated at the northernmost limits of Three Springs Park.

TABLE 4.6
BMP Site TC-35

	Potential Impact	No Anticipated Impact	Comments
Aesthetics		x	The proposed project would not result in significant short-term or long-term operational aesthetic impacts.
Agriculture and Forestry Resources		x	No impacts to agriculture and forestry resources are anticipated.
Air Quality	x		The proposed project would result in short-term/temporary impacts to air quality associated with construction activities. No long-term impacts to air quality are anticipated.
Biological Resources	x		Pre-construction nesting bird surveys would be required prior to the commencement of construction activities. Establish work limits in order to avoid disturbance to the streambed and associated riparian vegetation.
Cultural Resources	x		A cultural resources assessment would be required prior to the commencement of construction activities.
Geology/Soils	x		A geotechnical report would be required in order to determine potential impacts to soil erosion, site suitability, and risk assessment.
Greenhouse Gas Emissions	x		Greenhouse gas emissions would be associated with construction activities. Post-construction greenhouse gas emissions are not anticipated.
Hazards and Hazardous Materials		x	No impacts are anticipated.

	Potential Impact	No Anticipated Impact	Comments
Hydrology and Water Quality		x	No impacts are anticipated.
Land Use/Planning		x	No impacts are anticipated.
Mineral Resources		x	No impacts are anticipated.
Noise	x		Noise impacts would be associated with construction activities. Post-construction noise impacts are not anticipated.
Population/Housing		x	No impacts are anticipated.
Public Services		x	No impacts are anticipated.
Recreation	x		The project site is located within a public park. Construction activities would temporarily limit public access. Post-construction impacts are not anticipated.
Transportation/Traffic	x		Short-term impacts to transportation would be associated with access and staging during construction activities. Post-construction impacts are not anticipated.
Utilities/Service Systems		x	No impacts are anticipated.

4.7 BMP LC-02

BMP LC-02 is a proposed infiltration basin located within Reyes Adobe Park and is within the jurisdiction of Agoura Hills. Adjacent land use is residential development with no open space within or adjacent to the project site. Vegetation within Reyes Adobe Park consists of turf grass and landscaped trees, including several mature sycamore, oak and cottonwood trees. No native vegetation or open space exists within the project site. No drainage courses or riparian vegetation were noted on-site.

TABLE 4.7
BMP Site LC-02

	Potential Impact	No Anticipated Impact	Comments
Aesthetics		x	The proposed project would not result in significant short-term or long-term operational aesthetic impacts.
Agriculture and Forestry Resources		x	No impacts to agriculture and forestry resources are anticipated.
Air Quality	x		The proposed project would result in short-term/temporary impacts to air quality associated with construction activities. No long-term impacts to air quality are anticipated.
Biological Resources	x		Pre-construction nesting bird surveys would be required prior to the commencement of construction activities. Establish work limits in order to avoid disturbance to the streambed and associated riparian vegetation.
Cultural Resources	x		A cultural resources assessment would be

	Potential Impact	No Anticipated Impact	Comments
			required prior to the commencement of construction activities.
Geology/Soils	x		A geotechnical report would be required in order to determine potential impacts to soil erosion, site suitability, and risk assessment.
Greenhouse Gas Emissions	x		Greenhouse gas emissions would be associated with construction activities. Post-construction greenhouse gas emissions are not anticipated.
Hazards and Hazardous Materials		x	No impacts are anticipated.
Hydrology and Water Quality		x	No impacts are anticipated.
Land Use/Planning		x	No impacts are anticipated.
Mineral Resources		x	No impacts are anticipated.
Noise	x		Noise impacts would be associated with construction activities. Post-construction noise impacts are not anticipated.
Population/Housing		x	No impacts are anticipated.
Public Services		x	No impacts are anticipated.
Recreation	x		The project site is located within a public park. Construction activities would temporarily limit public access. Post-construction impacts are not anticipated.
Transportation/Traffic	x		Short-term impacts to transportation would be associated with access and staging during construction activities. Post-construction impacts are not anticipated.
Utilities/Service Systems		x	No impacts are anticipated.

4.8 BMP MEC-09

BMP MEC-09 is a proposed infiltration chamber system located within Chumash Park and falls within the jurisdiction of Agoura Hills. Adjacent land use is residential development with no open space within or adjacent to the project site. Vegetation within Chumash Park consists of turf grass and landscaped trees, including several mature sycamore trees. No native vegetation or open space exists within the project site. No drainage courses or riparian vegetation were noted on-site. Medea Creek is located adjacent to the western boundary of Chumash Park.

TABLE 4.8
BMP Site MEC-09

	Potential Impact	No Anticipated Impact	Comments
Aesthetics		x	The proposed project would not result in significant short-term or long-term operational aesthetic impacts.
Agriculture and Forestry Resources		x	No impacts to agriculture and forestry resources are anticipated.
Air Quality	x		The proposed project would result in short-term/temporary impacts to air quality associated with construction activities. No long-term impacts to air quality are anticipated.
Biological Resources	x		Pre-construction nesting bird surveys would be required prior to the commencement of construction activities. Establish work limits in order to avoid disturbance to the streambed and associated riparian vegetation.
Cultural Resources	x		A cultural resources assessment would be required prior to the commencement of construction activities.
Geology/Soils	x		A geotechnical report would be required in order to determine potential impacts to soil erosion, site suitability, and risk assessment.
Greenhouse Gas Emissions	x		Greenhouse gas emissions would be associated with construction activities. Post-construction greenhouse gas emissions are not anticipated.
Hazards and Hazardous Materials		x	No impacts are anticipated.
Hydrology and Water Quality		x	No impacts are anticipated.
Land Use/Planning		x	No impacts are anticipated.
Mineral Resources		x	No impacts are anticipated.
Noise	x		Noise impacts would be associated with construction activities. Post-construction noise impacts are not anticipated.
Population/Housing		x	No impacts are anticipated.
Public Services		x	No impacts are anticipated.
Recreation	x		The project site is located within a public park. Construction activities would temporarily limit public access. Post-construction impacts are not anticipated.
Transportation/Traffic	x		Short-term impacts to transportation would be associated with access and staging during construction activities. Post-construction impacts are not anticipated.
Utilities/Service Systems		x	No impacts are anticipated.

Section 5 Environmental & Regulatory Approval Process

The following is a summary of the various environmental and regulatory approvals required before construction activities take place.

5.1 CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

In accordance with the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000-21177) and pursuant to Section 15063 of Title 14 of the California Code of Regulations (CCR), the City of Calabasas or other agency, acting in the capacity of Lead Agency, is required to undertake the preparation of an Initial Study to determine if the proposed project would have a significant environmental impact. If, as a result of the Initial Study, the Lead Agency finds that there is evidence that any aspect of the project may cause a significant environmental effect, the Lead Agency shall further find that an Environmental Impact Report (EIR) is warranted to analyze project-related and cumulative environmental impacts. Alternatively, if the Lead Agency finds that there is no evidence that the project, either as proposed or as modified to include the mitigation measures identified in the Initial Study, may cause a significant effect on the environment, the Lead Agency shall find that the proposed project would not have a significant effect on the environment and shall prepare a Negative Declaration for that project. Such determination can be made only if “there is no substantial evidence in light of the whole record before the Lead Agency” that such impacts may occur (Section 21080(c), Public Resources Code). Due to the nature of the proposed improvements, the Lead Agency may also make a determination that a Categorical Exemption may be applicable.

5.2 U.S. ARMY CORPS OF ENGINEERS

The Corps regulates discharges of dredged or fill materials into WoUS and wetlands pursuant to Section 404 of the CWA. Permits will be required from the Corps Regulatory Branch – Los Angeles District Office, for construction activities that occur within Corps’ jurisdiction. Both temporary and permanent impacts are regulated.

5.3 REGIONAL WATER QUALITY CONTROL BOARD

The Regional Board regulates discharges to surface waters under the Federal CWA and the California Porter-Cologne Water Quality Control Act. The Regional Board’s jurisdiction extends to all waters of the State (including isolated conditions) and to all WoUS (including wetlands). Certification is required for construction activities that occur within Corps’ and Regional Board’s jurisdiction.

For a Corps 404 permit to be approved, a 401 Water Quality Certification from the Los Angeles Regional Board will be required. The Regional Board also requires that CEQA compliance be obtained prior to obtaining the 401 Certification.

Once an application has been deemed complete, the Regional Board has between 60 days and 1 year in which to make a decision. According to regulations of the Corps, the State has 60 days from the date of receipt of a valid request for water quality standards certification (33 CFR Section 325.2 (b) (1) (ii)). The Corps district engineer may specify a longer (up to one year) or shorter time, if he or she determines that a longer or shorter time is reasonable (33 CFR Section 325.2 (b) (1) (ii)). If processing and review of the 401 application will take more than 60 days, the Regional Board will request additional time from the Corps. Please note that even when an application has been deemed complete, the Regional Board has the option of denial without prejudice. This is not a reflection on the project, but a means to stop the clock until the required information has been received.

As required by Title 23 California Code of Regulations (CCR) § 3858 (a), the Regional Board is required to have a minimum 21-day public comment period before any action is taken on a 401 application. The period closes when the Regional Board acts on the 401 application. The public comment period does not close after a certain number of days because proposed projects tend to change through the 401 process and the public is allowed to review and comment on the changed project. The public comment period starts as soon as an application has been received. Additionally, the Regional Board requires that water quality concerns related to urban storm water runoff be addressed. Any 401 Certification application submitted to the Regional Board should incorporate the use of Best Management Practices (BMPs) for the treatment of pollutants carried by storm water runoff in order to be considered a complete application. The Regional Board also requires a 401 Certification Application Fee, which is dependent on the amount and type of impacts.

5.4 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

On-site drainages (streambeds) for many of the sites would be considered jurisdictional by the CDFW; a 1602 Stream Alteration Agreement (SAA) must be obtained prior to any jurisdictional impact (if proposed). Upon a formal notification, CDFW will determine whether the notification package (application) is complete. CDFW will make this determination within 30 calendar days of receiving the notification package if the application is for a regular agreement (i.e., an agreement for a term of five years or less). However, the 30-day time period does not apply to notifications for long-term agreements (i.e., agreements for a term greater than five years). Once the notification package is deemed complete, CDFW will process a Draft Agreement as described below.

If a SAA is required, CDFW may require an on-site inspection and a draft agreement. The draft agreement will include measures to protect fish and wildlife resources while conducting the project. For regular agreements, CDFW will submit a draft agreement to the applicant within

60 calendar days after the notification is deemed complete. Again, the 60-day time period does not apply to notifications for long-term agreements, since these are often large or complex projects.

The applicant then has 30 calendar days to notify CDFW whether the measures in the draft agreement are acceptable. After CDFW receives the signed draft agreement, it will make it final by signing it. The CDFW Application fee associated with the notification package varies and is dependent upon the total cost of the project and type of agreement (i.e., Regular or Long-Term).

5.5 CALIFORNIA COASTAL COMMISSION

Several of the proposed BMP locations would be subject to review and approval by the California Coastal Commission (CCC) and/or the Local Agency pursuant to an approved Local Coastal Program. Due to the proximity of the BMPs to potential environmental sensitive habitat areas (ESHA) a Coastal Development Permit (CDP) will likely be required from the CCC or Local Agency prior to approval of projects located within the Coastal Zone. The purpose of the CDP is to ensure consistency with the Local Coastal Program. Issuance of a CDP requires compliance with Chapter 3 of the Coastal Act, Coastal Resources Planning and Management Policies, which outlines the policies/standards by which the permissibility of proposed development are determined.

5.6 GLOBAL RECOMMENDATIONS

Once the sites are further defined, (e.g. processing individually or grouping of sites) it is highly recommended that a formal environmental review be conducted in order to more fully determine whether any significant impacts would occur as part of the proposed BMP siting and related construction activities. Additionally, it is recommended that a formal delineation be prepared for those BMP locations which intend to either permanently or temporarily impact, cross, or place pipes within jurisdictional boundaries. An environmental and regulatory strategy can be prepared once additional BMP design is completed that may reduce or eliminate impacts to jurisdictional areas.

Section 6 References

The following resources were utilized during preparation of this environmental assessment:

Eagle Aerial, Aerial Photographs, 2014.

Environmental Protection Agency, MyWaters Mapper, http://watersgeo.epa.gov/mwm/

Google Earth Pro, accessed March-April 2015.

Attachment A BMP Site Photo Inventory

BMP LVC-14 – Facing west from Thousand Oaks Boulevard.

BMP LVC-14 – Facing southwest from Thousand Oaks Boulevard.

BMP TC-02 – Facing southeast on Mulholland Highway.

BMP TC-02 – Facing northwest on Mulholland Highway.

BMP TC-37 – Facing east from Lindero Canyon Road.

BMP TC-37 – Facing northeast from Lindero Canyon Road.

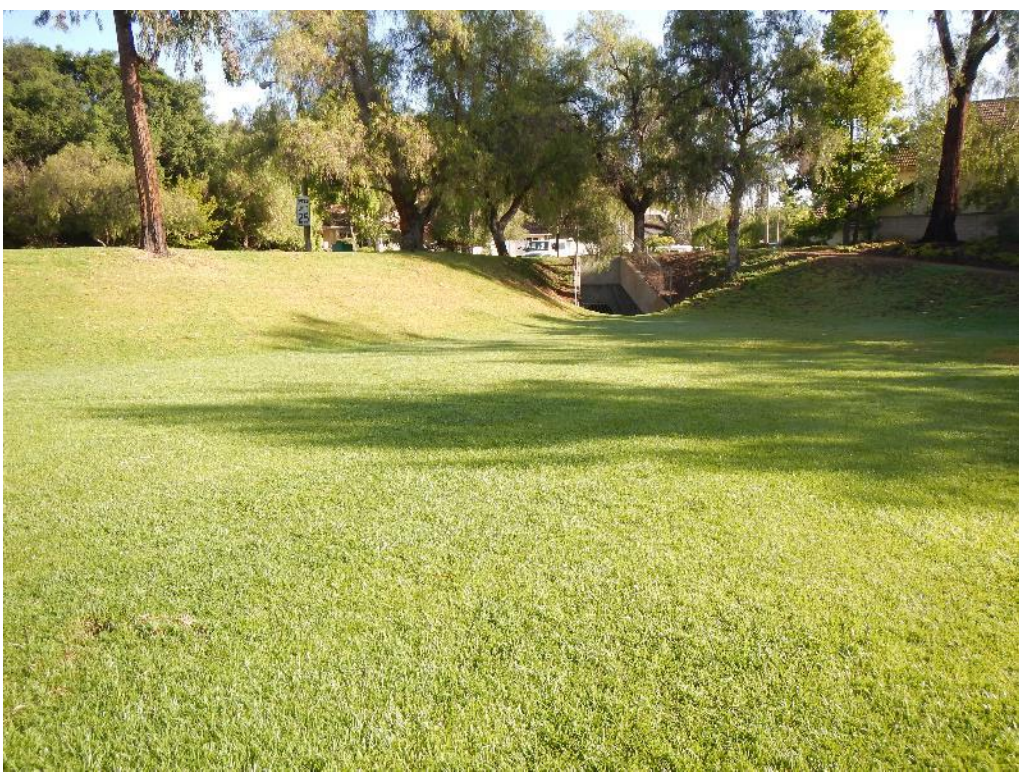
BMP MEC-12 – Aerial view of BMP site.

BMP MEC-12 – Aerial view of BMP site.

BMP TC-29 – Facing north from within park.

BMP TC-29 – Facing south from within park.

BMP TC-35 – Facing southeast from Three Springs Drive.



BMP TC-35 – Facing north from within park.

BMP LC-02 – Facing south from northern border of park, along N Rainbow Crest Drive.

BMP LC-02 – Facing north from within park.

BMP MEC-09 – Facing southeast.

Appendix C: Regional BMP Sites Geotechnical Report

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June 12, 2015
Project No. 04.62150019

RBF Consulting
14725 Alton Parkway
Irvine, California 92618-4117

Attention: Mr. Daniel Apt, Vice President

Subject: Geotechnical Data Report, Site Exploration and Percolation Testing Results, Enhanced Watershed Management Program (EWMP), Malibu Creek Watershed, Los Angeles County, California

Dear Mr. Apt:

Fugro Consultants, Inc. (Fugro) is pleased to present this letter-report summarizing our percolation testing program for the Malibu Creek Enhanced Watershed Management Program (EWMP) in Los Angeles County, California. This report summarizes our findings for the eight proposed Best Management Practice (BMP) site locations assessed during this study, referred to herein as TC-29, TC-35, TC-37, LC-02 and LVC-14, MEC-09, MEC-12 and TC-02. This letter-report was prepared in fulfillment of Fugro's contract to perform services under our Professional Services Agreement with RBF Consulting (RBF) dated April 8, 2015, and completes our work for the project.

PROJECT DESCRIPTION

Our understanding of the proposed project is based upon a review of the Request for Proposals (RFP) issued by the City of Calabasas, a field tour of all of the subject sites on March 16, 2015, and assumptions summarized herein. The City of Calabasas is serving as the lead agency for this project, which will serve all of the Malibu Creek Watershed Permitees (Cities of Agoura Hills, Calabasas, Hidden Hills, Malibu, Westlake Village, County of Los Angeles, Los Angeles County Flood Control District, and Caltrans).

The EWMP will attempt to address requirements established by the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System Permit (MS4 Permit) Order No. R-4-2012-0175. We understand that the EWMP will involve enhancements to the existing drainage infrastructure by employing Best Management Practices (BMPs) designed to infiltrate surface water runoff into the alluvial soils present at the proposed sites. Based on information provided by RBF Consulting (RBF), we expect that the BMPs will consist of basins for extended detention and infiltration, infiltration chambers, and green streets. Fugro was tasked to review existing data, perform project-specific field and laboratory programs, and prepare this data report. Information gathered from this work will aid in the feasibility assessment and design of infiltration-related BMPs at the proposed improvement sites. A list of the proposed BMP site locations for the project is provided below in Table 1.

Table 1. Summary of Proposed BMP Locations

Site Name	Site Location	Proposed BMP
TC-35	Three Springs Park, Three Springs Drive between Shell Creek Place and Bowman Knoll	Infiltration Basin
TC-37	Open space owned by City of Westlake Village, near intersection of Lindero Canyon Road and Ridgeford Drive	TBD
LC-02	Reyes Adobe Park, near intersection of Rainbow Crest Drive and Fair Grange Drive	Infiltration Basin
LVC-14	Gates Canyon Park, near intersection of Thousand Oaks Boulevard and Mountain View Drive	Extended Detention Basin
TC-29	Foxfield Park, near intersection of Foxfield Drive and River Farm Drive	Infiltration Chambers
MEC-12	County of Los Angeles Flood Control Maintenance Yard, near intersection of Agoura Road and Cornell Road	TBD
MEC-09	Chumash Park, near intersection of Medea Valley Drive and Agoura Glen Drive	Infiltration Chambers
TC-02	Mulholland Highway between Careful Avenue and Outlet Trail	Super Green Street

The general site locations that were explored and completed as part of this letter-report are shown on Plate 1 - Vicinity Map. The locations are shown in more detail on Plates 2a through 2h - Exploration Location Map.

WORK PERFORMED

Our work scope included planning and coordination, data review, site exploration, in-situ percolation testing, laboratory testing, and reporting as described in our proposal dated April 2, 2015. The following sections summarize our site assessment and reporting efforts for the project.

Planning and Coordination

After receiving authorization to begin work our staff began coordinating with our drilling subcontractor to initiate field work. Our personnel visited each site to perform a preliminary site reconnaissance, during which we noted site access constraints, visible utilities and general geomorphology. We also delineated the proposed drilling areas with stakes and white paint and contacted Underground Services Alert (USA) to request that local member agencies identify and mark the locations of their facilities.

Two proposed sites (MEC-12 and TC-02) lie within the Los Angeles County Department of Public Works (LA County) public Right-of-Way (ROW). Our staff coordinated with LA County personnel to obtain access and encroachment permits to work within the ROW.

Before mobilizing equipment and staff for field work we prepared a project-specific health and safety plan for the use of all on-site personnel and subcontractors.

Data Review

Our staff reviewed pertinent existing geotechnical exploration data, historical groundwater data, and geologic maps to gain a preliminary understanding of the subsurface conditions at the proposed BMP locations. That data aided us in interpreting the conditions encountered during drilling and provided additional reference for the historical groundwater levels and potential fluctuations that may be experienced at the proposed sites.

Subsurface Exploration

As discussed in our proposal, our exploration and field testing scope included a program of drilling two exploratory drill holes to a maximum of 30 feet of depth and constructing three temporary percolation test wells to a maximum of 15 feet of depth at each site. The exploration drill holes were terminated at depths of less than 30 feet if groundwater was encountered or the drilling met refusal due to hard bedrock/boulder conditions. Drilling was terminated at 20 feet or shallower at sites MEC-12 and TC-02 in compliance with Los Angeles County encroachment permit conditions. After completing the two exploration drill holes, Fugro personnel coordinated with RBF staff to determine preferred depth intervals for the percolation tests and constructed the temporary test wells accordingly as described later in this report.

Fugro performed a total of 29 drill hole explorations and three (3) test pit explorations at the proposed BMP sites between April 14 and June 2, 2015. The test pits were excavated at site TC-29 (Foxfield Park) in lieu of mechanical drill holes due to site access constraints. Appendix A provides the details of our exploration means and methods as well as logs of the conditions encountered.

Percolation Testing

We performed the percolation tests using falling head borehole and shallow excavation percolation test procedures as described in the Los Angeles County Low Impact Development Best Management Practices Guideline for Design, Investigation, and Reporting [LA County LIDBMPG] (2014). The following subsections detail our means and methods.

Drill Hole Percolation Test Well Construction. Drilling work for the three percolation wells planned at each site was completed after determining the required percolation test depth intervals. Upon drilling to the required test depth interval, we placed several inches of drain rock at the bottom of each hole, set a 2-inch diameter perforated polyvinyl-chloride (PVC) casing, and backfilled the annular space within the test interval with drain rock to prevent the sidewalls from caving during the test. The test wells constructed in drilled holes were installed through the hollow-stem-augers as recommended by the testing procedure. The augers were extracted as annular backfill was placed.

The percolation test wells at site TC-29 (where exploration was limited to hand dug test pits) were constructed in the bottom the hand-dug excavations. At those locations, we excavated a 1-foot by 1-foot test hole to a depth of 1-foot and placed approximately 2 to 3 inches of drain rock at the bottom of the excavated hole. Temporary well casing was not installed at those locations.

Pre-Soak. After constructing the temporary percolation test wells/holes, water was added through the casing or directly to the excavation to saturate the anticipated test intervals and allowed to percolate into the test holes before initiating testing. If necessary, our field staff refilled the test holes with water to the top of the test intervals and maintained the water level for at least 4 hours to re-saturate the soils prior to initiating the test.

Percolation Measurements. After the pre-soak period, we refilled the test well/hole with water to the top of the test interval and began the percolation testing period. Once the initial water level was set, our field staff took readings of the water surface level inside the casing (or in the shallow test hole) using a water level sounder or engineering tape at regular time intervals of approximately 30 minutes (the actual time intervals were recorded with each reading). The measurement intervals were determined in accordance with the LA County LIDBMPG (2014) and the water column was restored to the original level after each reading, if necessary. Our personnel collected a minimum of 8 readings at each test well/hole or until the measured rate stabilized over at least 3 consecutive readings (less than 10 percent difference between minimum and maximum measurements).

Abandonment. After testing was complete, we removed perforated PVC casing and left the drain rock in the holes. We backfilled the drilled holes and test pits to the ground surface with cuttings generated during excavation and hand tamped the soil backfill. The grass in disturbed turf areas was replaced after backfilling. Holes within the LA County ROW were backfilled with 1-1/2 sack sand-cement slurry in compliance with the permit standard conditions.

Laboratory Testing

Laboratory tests were performed on selected driven split spoon Standard Penetration Test (SPT) and California-type samples to estimate engineering characteristics of the various earth materials encountered. The methods used are described in Appendix B accompanying the test results.

FINDINGS

The following subsections describe the earth materials and groundwater conditions encountered during exploration at each site location. Our findings are also summarized in Table 2, presented later in this section.

Site TC-35

Earth Materials. During exploration at site TC-35, our on-site personnel noted approximately 4 to 5 feet of lean clay and clayey sand with gravel that we interpret as artificial fill materials that was likely placed during site development for the park. Drilling encountered colluvial deposits generally consisting of lean clay to clayey sand with gravel underlying the artificial fill materials. The colluvial materials extended to the ultimate depth explored of 16 feet bgs.

Groundwater Conditions. Groundwater was encountered at both deep drill hole explorations excavated at site TC-35. After allowing the water level within each hole to rise for a few hours after drilling, our personnel measured water levels at 13 feet and 9.4 feet bgs at drill holes TC-35-DH-01 and TC-35-DH-02, respectively. Based upon the encountered water level, we understand that RBF has concluded that the proposed infiltration basin at this site will not be feasible.

Site TC-37

Earth Materials. The earth materials encountered at site TC-37 generally consisted of approximately 4 feet of artificial fill materials likely placed during grading for the nearby roads, residences, and lake. The fill materials appeared to have been derived from onsite alluvial soils and consisted of clayey sand with gravel. Alluvial soils were encountered below the artificial fill and extended to depths of approximately 17 to 18 feet bgs. The alluvial soils generally consist of lean clay and silt with varying quantities of sand and gravel. Drilling met refusal on-site at depths of 19-1/2 feet and 21 feet bgs in gray shale bedrock material. The bedrock appears consistent with Upper Topanga Formation as described and mapped nearby by Dibblee (1993).

Groundwater Conditions. Groundwater was encountered in the two deep drill hole explorations at site TC-37. After allowing the water level within each hole to rise during the 2 to 3 hours spent constructing percolation test wells, our personnel measured water levels at 15.5 feet and 13 feet bgs at drill holes TC-37-DH-01 and TC-37-DH-02, respectively. We interpret groundwater conditions encountered in the drill holes to be representative of a perched condition within the alluvium and resting on the underlying bedrock formation a few feet below.

Site LC-02

Earth Materials. The subsurface materials encountered at site LC-02 generally consist of approximately 19 to 25 feet of alluvium overlying siltstone bedrock. The alluvium generally consists of sandy clay with gravel to clayey gravel with sand. However, we note that the alluvium encountered at drill hole DH-01 consisted largely of silty sand and sandy silt, indicating variable conditions across the site. The gravel observed in the alluvial soils appears to consist of volcanic rock and was likely derived from Conejo Volcanic geologic units mapped in the area and outcrop nearby. We interpret the siltstone bedrock materials encountered underlying the alluvium to be consistent with Upper Topanga Formation as described by Dibblee (1993).

Groundwater Conditions. Groundwater was encountered in drill holes LC-02-DH-02 and LC-02-Perc-03 but not encountered in drill hole LC-02-DH-01. Free water was initially encountered in LC-02-DH-02 at approximately 26 feet at LC-02-DH-02, and rose over 3 to 4 hours to about 15.7 feet bgs. Upon returning to the site the following day to perform infiltration testing, groundwater was encountered at a depth of 9 feet bgs at LC-02-Perc-03. In our opinion, groundwater at this site location exists in a perched condition with groundwater perched on the underlying bedrock. We note that it is possible that groundwater was not encountered in drill hole LC-02-DH-01 due to the low permeability of the alluvial materials and the limited time (between drilling and abandonment) for groundwater to seep into the bore hole. We also note that Dibblee (1993) maps a fault trace near the proposed site and subsurface structure related to faulting may also have contributed to the variable groundwater conditions encountered at the site.

Site LVC-14

Earth Materials. At proposed site location LVC-14, our personnel observed approximately 4 to 5 feet of artificial fill materials overlying alluvial deposits. The alluvial materials extend down to the ultimate depths explored of 31 feet bgs. The artificial fill materials generally consist of clay to sandy lean clay that was likely derived from the underlying alluvium. We anticipate the fill materials were probably placed during development of the park facilities and

Thousand Oaks Boulevard. The underlying alluvium generally consists of lean clay to sandy lean clay with lenses of sandy silt and clayey sand present at depth.

Groundwater Conditions. Groundwater was encountered in both drill hole explorations at site LVC-14. We initially encountered wet conditions during drilling at depths of approximately 28 feet bgs. We left the holes open for 2 to 3 hours while constructing percolation test wells to allow for water to continue to seep into the bore holes. After that time, water levels were measured at depths of approximately 22.1 and 19 feet bgs at locations LVC-14-DH-01 and LVC-14-DH-02, respectively.

Site TC-29

Earth Materials. We interpret the subsurface materials encountered at site TC-29 to be in-place alluvial soils. The soils generally consist of clayey sand with gravel, cobbles and boulders. The oversize rock in the alluvium appears consistent with the nearby Conejo Volcanics as mapped by Dibblee (1993) and that outcrop near the site. The alluvial soils extend to the ultimate depth explored of 6 feet bgs. The subsurface conditions at this site were explored using hand dug test pits and exploration below a depth of 6 feet was not possible due to the presence of cobbles and boulders.

Groundwater Conditions. Water was not encountered in the test pit explorations excavated at site TC-29. However, based upon local geologic conditions and site observations, bedrock is likely close to the ground surface at this site location and will act as a relatively impervious surface. Therefore, we expect that the water table likely lies relatively shallow near the site and in the absence of a site-specific measurement we recommend that the groundwater level at this site location be assumed consistent with the historical data (CGS, 2000).

Site MEC-12

Earth Materials. At site MEC-12 our personnel observed a surficial veneer of artificial fill materials approximately 2 feet thick overlying alluvium to the ultimate depths explored of approximately 21 feet bgs. The artificial fill materials generally consist of sandy lean clay to clayey sand containing some gravel and appear to have been placed during previous site development. Our explorations indicate that the alluvium present below the artificial fill materials generally consists of clayey sand to sandy lean to fat clay. A layer of poorly graded sand with silt was encountered at dill hole MEC-12-DH-2 at a depth of approximately 14 feet bgs and appears to represent a localized lense of primarily coarse-grained material.

Groundwater Conditions. Water was encountered in drill hole MEC-12-DH-02 at approximately 12.3 feet bgs. We interpret the water encountered at that location to be representative of a perched condition within the permeable sand lense encountered at approximately 14 feet bgs. The other exploration locations did not encounter that saturated sand seam and showed no indication of free water during or after drilling.

Site MEC-09

Earth Materials. Our personnel observed a few feet of artificial fill materials overlying in-place alluvium and Topanga Formation bedrock at site MEC-09. The artificial fill encountered on-site consists of fat clay to fat clay with sand, similar to the underlying alluvial soils present at the site. Those fill materials are likely derived from underlying alluvium that was disturbed during previous residential and park development. The Topanga Formation bedrock underlying the alluvial soils appears to consist of soft, moderately to intensely weathered claystone and was encountered at approximately 13 feet bgs and extending to the ultimate depth explored at the site of approximately 21 feet bgs.

Groundwater Conditions. Water was encountered as shallow as about 7 feet bgs within the alluvium encountered at drill hole location MEC-09-DH-01. The hole was left open overnight to allow the water level to fully stabilize and measured the following day at approximately 6.9 feet. That water level likely represents a perched condition within the alluvial soils overlying the Topanga Formation claystone bedrock. Based upon the encountered water level, we understand that RBF has concluded that the proposed infiltration basin at this site will not be feasible.

Site TC-02

Earth Materials. Site TC-02 appears to lie in an area of roadway fill placed during the construction of Mulholland Highway. Based on observations during drilling, we anticipate that the encountered artificial fill directly overlies Conejo Volcanic bedrock materials present below about 9 to 14 feet bgs and extending to the ultimate depth explored of about 21 feet bgs. The fill materials generally consist of a few feet of clayey sand overlying a mixture of sand, silt and gravel. The Conejo volcanic bedrock materials encountered within the drill holes appear to consist of moderately weathered to decomposed coarse ash tuff ranging from soft to locally hard. Observed outcrop on adjacent cut slopes indicates that the material is intensely fractured and appears massive. Our staff also noted the presence of basalt and volcanic breccia outcrop along the nearby cut slope. Those materials are likely also locally present underlying the site.

Groundwater Conditions. Water was not encountered in the drill hole explorations excavated at site TC-02. We anticipate that water may periodically exist in a perched condition the encountered bedrock at approximately 8 to 10 feet bgs; however, we note that those bedrock materials appear to be somewhat permeable in nature due to intense weathering and fracturing.

Table 2. Generalized Summary of Encountered Subsurface Conditions

Site ID	Artificial Fill (af)	Alluvium/Colluvium (Qal/Qc)	Bedrock Formation	Groundwater
TC-35	Approx. 0 to 4 ft bgs (Lean CLAY to Clayey SAND with gravel)	Below approx. 4 ft bgs (Lean CLAY to Clayey SAND with gravel)	Not Encountered	Approx. 9 to 13 ft bgs
TC-37	Approx. 0 to 4 ft bgs (Clayey SAND with gravel)	Approx. 4 to 18 ft bgs (Sandy CLAY to Clayey SAND with gravel)	Below approx. 17 ft bgs (Topanga Formation Shale)	Approx. 13 to 15 ft bgs
LC-02	Not Encountered	Approx. 0 to 24 ft bgs (Silty SAND, Sandy SILT and Sandy CLAY)	Below approx. 19 to 24 ft bgs (Topanga Formation Siltstone)	Approx. 9 to 16 ft bgs
LVC-14	Approx. 0 to 5 ft bgs (Lean CLAY to Sandy Lean CLAY)	Below approx. 5 ft bgs (Sandy Lean CLAY with lenses of Clayey Sand and Sandy SILT)	Not Encountered	Approx. 19 to 22 ft bgs
TC-29	Not Encountered	(Clayey SAND with gravel)	Not Encountered	Not Encountered
MEC-12	Approx. 0 to 2 ft bgs (Clayey SAND to Sandy Lean CLAY)	Below approx. 2 ft bgs (Clayey SAND to Sandy Lean to Fat CLAY)	Not Encountered	Approx. 12 to 13 ft bgs
MEC-09	Approx. 0 to 2 ft bgs (Fat CLAY to Fat CLAY with Sand)	Approx. 2 to 13 ft bgs (Fat CLAY to Fat CLAY with Sand)	Below approx. 13 ft bgs (Topanga Formation Claystone)	Approx. 7 ft bgs
TC-02	Approx. 8 to 14 ft bgs (Clayey sand to Well-graded GRAVEL with Silt and Sand)	Not Encountered	Below approx. 8 to 14 ft bgs (Conejo Volcanic Formation Coarse Ash Tuff)	Not Encountered

Historical High Water

Plates 3a through 3c - Historic High Groundwater Map indicate the proposed site locations with respect to historically high groundwater levels assessed by the California Geological Survey (CGS) and provided in relevant Seismic Hazard Evaluation Open-File Reports (1997, 2000, 2001). Those data indicate that sites TC-35, TC-37, TC-29, and MEC-12 all lie within alluviated valley areas where groundwater has been historically measured to as shallow as about 10 feet bgs. Site TC-02 appears to lie at the boundary of the alluvial valley as shown on Plate 3c. The other sites lie outside of the interpreted groundwater depth contour areas.

We also attempted to access well data available from the California Department of Water Resources but did not find groundwater level measurements in the vicinity of the proposed sites.

Although water was measured deeper than indicated on Plate 3 at sites TC-35, TC-37, MEC-12 and TC-02, we note that the region has recently experienced a significant drought period and the current water levels may not represent the future groundwater levels at the sites. We suggest that the design team anticipate water levels (at least on a periodic basis) as shallow as the historic highs shown on Plate 3.

Percolation Results

Table 3 summarizes the corrected and uncorrected results of the percolation testing program for this project. The corrected values are adjusted as recommended by the LA County LIDBMPG for lateral flow associated with the borehole percolation test method only. Other factors for test redundancy, siltation and plugging are not included. Our measurements are considered accurate to about 1/10-inch. At RBF's direction, percolation testing was not conducted at sites TC-35 and MEC-09 due to shallow groundwater conditions.

Table 3. Field Percolation Testing Results

Site ID	Test Well ID	Test Depth Interval (feet bgs)	Testing Date	Test Interval Soil Classification	Percolation Rate (in/hr)[1]	
					Uncorrected (Field Data)	Corrected[2] (Infiltration Rate)
TC-37	TC-37-Perc-01	3 to 4-1/2	04/15/2015	(SC) with gravel	1.1	0.2
	TC-37-Perc-02	2-1/2 to 4		(GC) with sand	3.8	0.7
	TC-37-Perc-03	3 to 4-1/2		(SC) with gravel	0.5	0.1
LC-02	LC-02-Perc-01	6 to 7-12	04/16/2015	(GC) with sand	0.2	<0.1
	LC-02-Perc-02	6 to 7-12		(GC) with sand	0.2	<0.1
	LC-02-Perc-03[3]	13-1/2 to 15		Siltstone	<0.1[3]	<0.1
LVC-14	LVC-14-Perc-01	5 to 6-1/2	04/23/2015	Sandy (CL)	<0.1	<0.1
	LVC-14-Perc-02	6-1/2 to 8		Sandy (CL)	0.2	<0.1
	LVC-14-Perc-03	13-1/2 to 15		(SC)	<0.1	<0.1
TC-29	TC-29-Perc-01	3 to 4	04/24/2015	(SC) with gravel	0.3	0.1
	TC-29-Perc-02	5 to 6		(SC) with gravel	2.3	0.8
	TC-29-Perc-03	4 to 5		(SC) with gravel	0.2	<0.1
MEC-12	MEC-12-Perc-01	3.5 to 5	06/02/2015	(SC)	0.2	<0.1
	MEC-12-Perc-02	1-1/2 to 3		(SC)	0.2	<0.1
	MEC-12-Perc-03	2-1/2 to 4		(CL) with sand	0.2	<0.1
TC-02	TC-02-Perc-01	2-1/2 to 4	06/03/2015	(SC)	14.2	2.8
	TC-02-Perc-02	8-1/2 to 10		Coarse Ash Tuff	2.9	0.5
	TC-02-Perc-03	2-1/2 to 4		(SC) with gravel	6.0	1.2

1) Taken as the average of the final three test measurements.
2) Reported "corrected" values include lateral flow reduction factor only.
3) Test interval likely below water table or seeping perched water, rising water conditions during testing.

The measured percolation and corrected infiltration rates obtained from in-situ testing suggest that the soils at the explored sites (except site TC-02) generally exhibit a low propensity to infiltrate surface water. With the exception of test wells TC-37-Perc-02 and TC-29-Perc-02, the corrected infiltration rates fall below the minimum threshold of 0.3 in/hr recommended by the LA County LIDBMPG (2014) for the design of BMPs that rely on infiltration. The higher rates measured from test wells TC-37-Perc-02 and TC-29-Perc-02 suggest that lenses of material are present that may infiltrate water at a higher rate than measured at the other wells. The soils at site TC-02 generally appear more permeable than the other proposed BMP locations. The corrected infiltration rates suggest that infiltration BMPs are more feasible at that site location due to the permeable fill materials present below the ground surface.

Laboratory measured fines contents ranged from 12 percent (TC-02) to 92 percent (MEC-09). Although upon initial inspection the corrected infiltration rates appear low with respect to the gravel classifications at some locations, we note that the corrected infiltration rates are in general agreement with soil classification ranges as provided by Terzaghi and Peck (1996). Some potential explanations for the low in-situ testing rates may include the following:

- Laboratory tested soil samples may not be representative of the field percolation test interval. In addition, gravel was present in many of the collected samples and the gravel can artificially reduce the fines content and suggest the soil is more coarse grained that it actually is;
- The HSA drilling used for field percolation testing may have disturbed or smeared the excavation sidewalls impacting the percolation test rates; however, the drilling was performed in accordance with the test method and a similar disturbance would likely occur during BMP construction.

We also performed laboratory permeability testing on selected samples from sites TC-02 and MEC-12 for general comparison with the infiltration rates obtained from in-situ testing. Those results are provided in Appendix B on Plates B-4a through B-4d - Hydraulic conductivity.

Infiltration BMPs relying upon some infiltration component to manage storm water flow should be set back from any structural foundation for buildings or other site structures (e.g., retaining walls) by 10 feet to reduce the potential for moisture intrusion. In addition, measures to maintain subgrade stability in pavement or hardscape areas (such as geogrid reinforcement or increased aggregate base thickness) will be required if infiltration is incorporated into the design of those elements.

LIMITATIONS

This report has been prepared for the exclusive use of RBF Consulting and its agents for the specific application to the proposed Malibu Creek Enhanced Watershed Management Program (EWMP) in Los Angeles County, California. The findings presented herein were prepared in accordance with generally accepted geotechnical engineering practices of the project region. No other warranty, express or implied, is made.

Soil and rock deposits will vary in type, strength, and other geotechnical properties between discreet sample intervals, and points of observation and exploration. Additionally, groundwater and soil moisture conditions can also vary seasonally or for other reasons. Therefore, we do not and cannot have complete knowledge of the subsurface conditions underlying the site. The data presented in this report are based upon the findings at the points of exploration, and interpolation or extrapolation of information between and beyond the locations of observation, and are subject to confirmation during construction.

The scope of our services presented in this report did not include any environmental site assessment for the presence or absence of hazardous/toxic/biological materials in the soil, groundwater, surface water, or the presence of wetlands or the presence of environmentally sensitive areas, endangered or candidate wildlife or vegetation, or culturally significant zones within the project area. Any statements or absence of statements in this report or data presented herein regarding odors, unusual or suspicious items, or conditions observed are strictly for descriptive purposes and are not intended to convey engineering judgment regarding potential hazardous/toxic assessment.

CLOSURE

We appreciate the opportunity to provide geotechnical services to RBF Consulting on this regionally important project. If you have any questions regarding the contents of this letter or require additional information, please contact us.

Sincerely,

FUGRO CONSULTANTS, INC.

Justin R. Martos, P.E.
Senior Staff Engineer

Reviewed By:

Keith P. Askew, G.E.
Principal Geotechnical Engineer

Attachments: Plate 1 - Vicinity Map
Plates 2a through 2h - Exploration Location Maps
Plates 3a and 3c - Historic High Groundwater Maps
Appendix A - Subsurface Exploration
- Plates A-1 through A-17 - Logs of Drill Holes
- Plates A-18 and A-19 - Logs of Test Pits
- Plates A-20 through A-31 - Logs of Drill Holes
- Plate A-32 - Key to Terms & Symbols Used on Logs

Appendix B - Laboratory Testing
- Plates B-1a through B-1c - Summary of Laboratory Test Results
- Plates B-2a through B-2d - Grain Size Curves
- Plate B-3 - Plasticity Chart
- Plates B-4a through B-4d - Hydraulic Conductivity

Copies Submitted: (PDF) Addressee

REFERENCES

California Department of Conservation, Division of Mines and Geology [CGS] (1997), Seismic Hazard Zone Report for the Calabasas 7.5-minute Quadrangle, Los Angeles and Ventura Counties, California, Seismic Hazard Zone Report 06.

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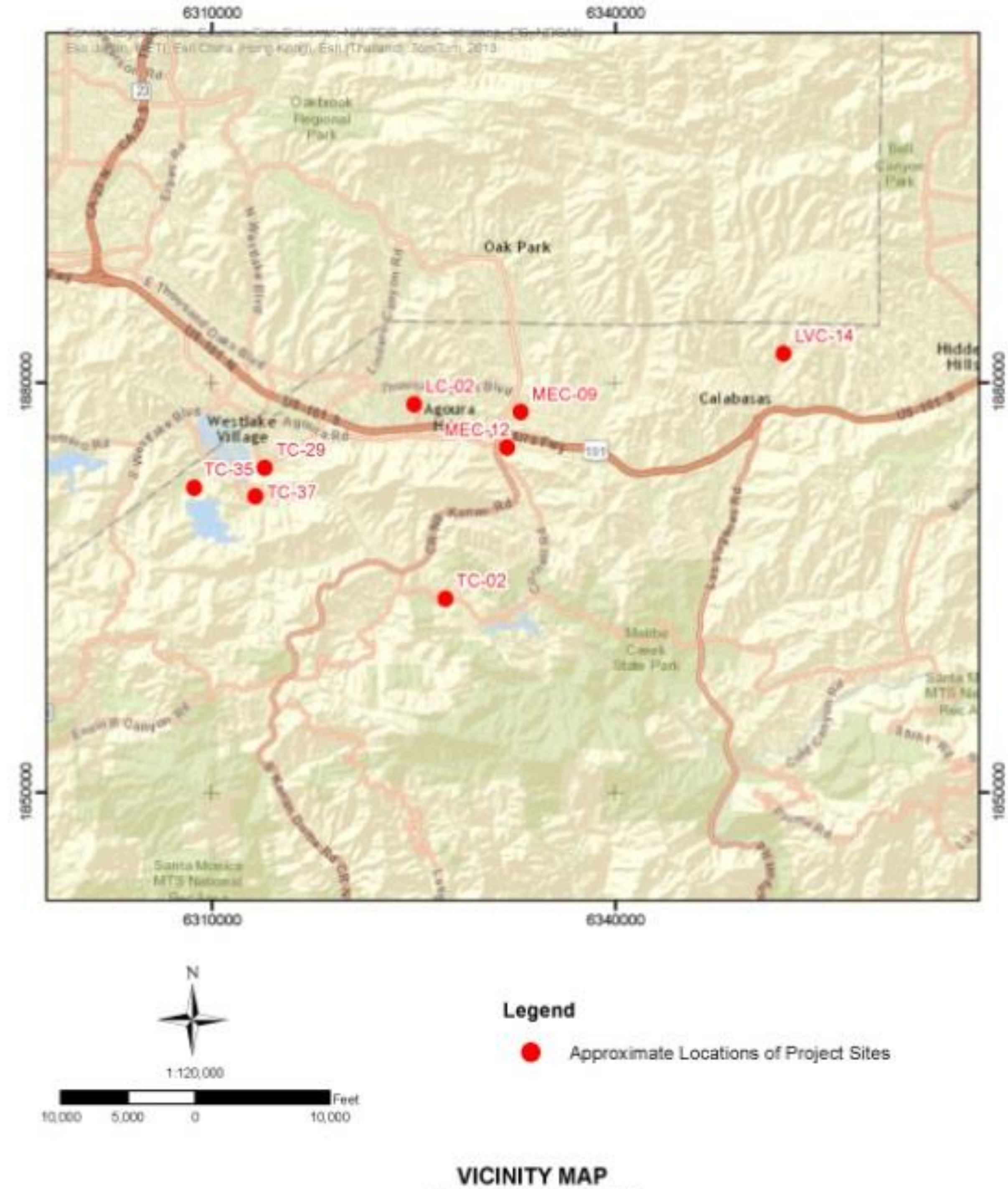
County of Los Angeles (2014), Low Impact Development Best Management Practice Guideline for Design, Investigation, and Reporting, Administrative Manual, County of Los Angeles Department of Public Works, Geotechnical and Materials Engineering Division, Document No. GS200.1, December 31.

Dibblee, T.W., Helmut, E.E. (1993). Geologic Map of the Thousand Oaks Quadrangle, Ventura and Los Angeles Counties, California, Dibblee Geological Foundation, Map #DF-49, 1:24,000 scale, December.

Terzaghi, K., Peck, R. B., and Mesri, G., (1996), Soil Mechanics in Engineering Practice, Third Edition, 1996.

PLATES



VICINITY MAP
Malibu Creek EWMP
Los Angeles County, California

PLATE 1

RBF Consulting
Project No. 04.62150019

Legend

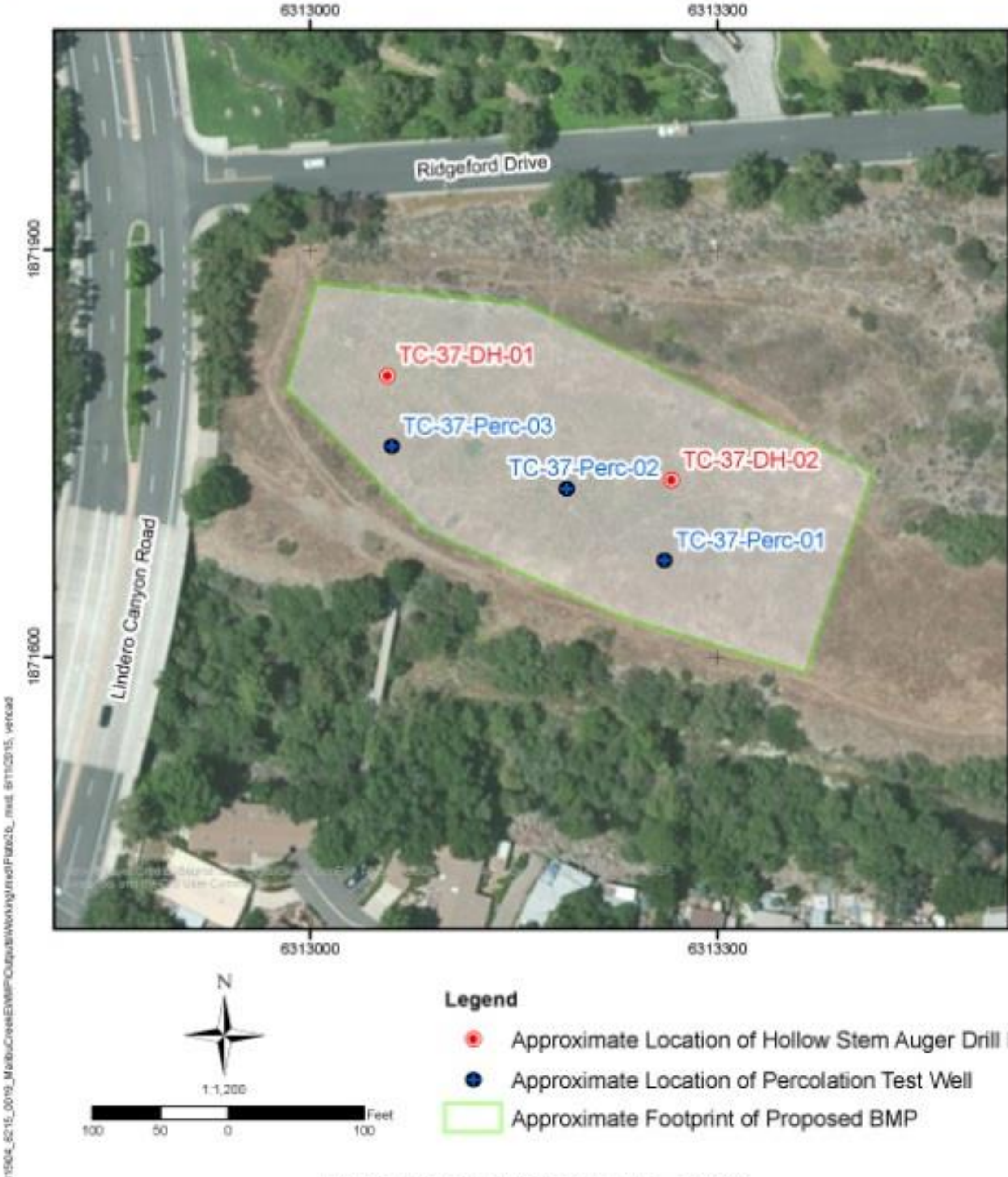
Approximate Location of Hollow Stem Auger Drill Hole

Approximate Footprint of Proposed BMP

EXPLORATION LOCATION MAP - TC-35
Malibu Creek EWMP
Los Angeles County, California

PLATE 2a

RBF Consulting
Project No. 04.62150019



Legend

- Approximate Location of Hollow Stem Auger Drill Hole
- Approximate Location of Percolation Test Well
- Approximate Footprint of Proposed BMP

EXPLORATION LOCATION MAP - TC-37
Malibu Creek EWMP
Los Angeles County, California

PLATE 2b

EXPLORATION LOCATION MAP - LC-02
Malibu Creek EWMP
Los Angeles County, California

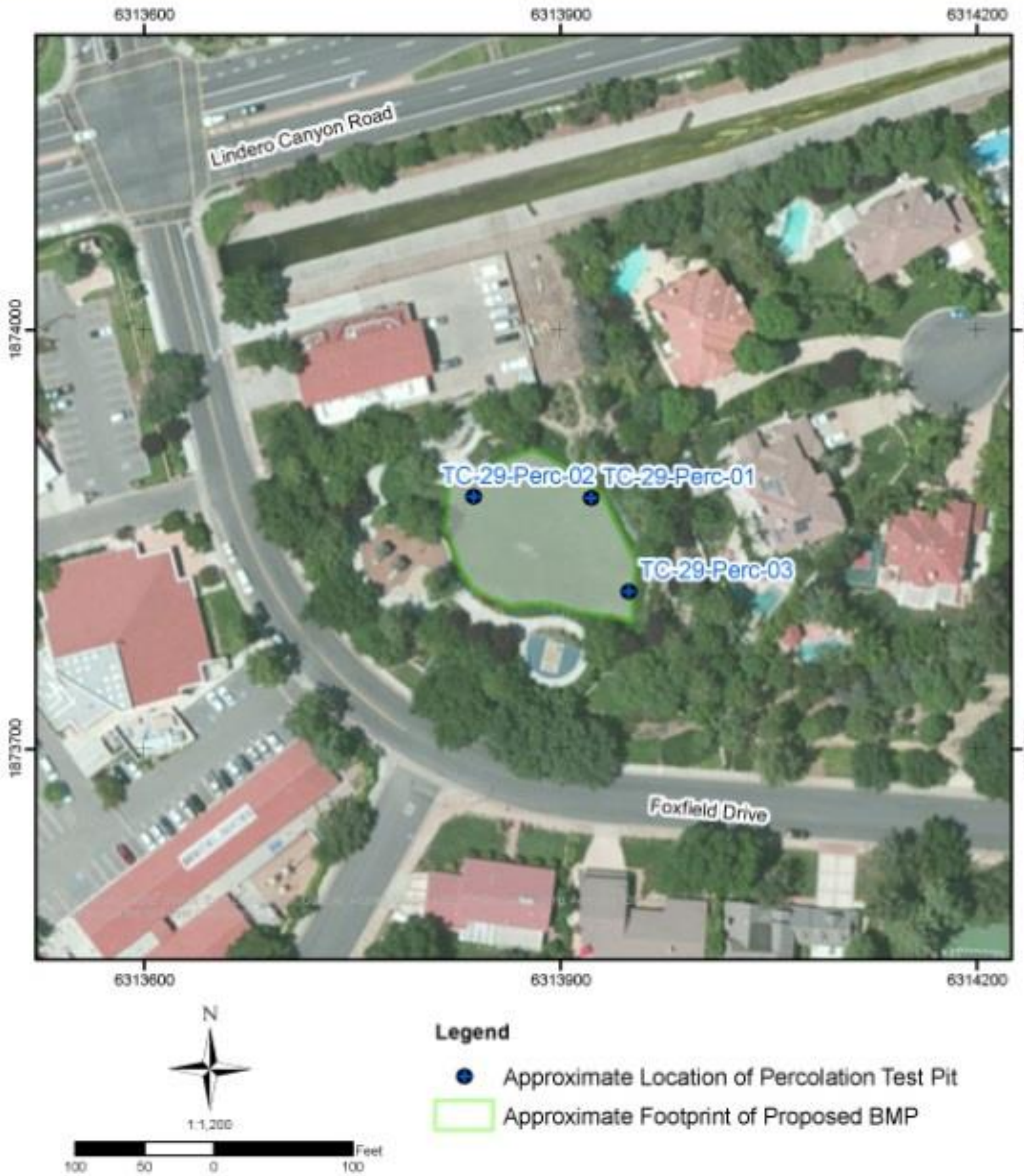
PLATE 2c

Legend

- Approximate Location of Hollow Stem Auger Drill Hole
- Approximate Location of Percolation Test Well
- Approximate Footprint of Proposed BMP

EXPLORATION LOCATION MAP - LVC-14
Malibu Creek EWMP
Los Angeles County, California

PLATE 2d



EXPLORATION LOCATION MAP - TC-29
Malibu Creek EWMP
Los Angeles County, California

PLATE 2e

RBF Consulting
Project No. 04.62150019

Legend

- Approximate Location of Hollow Stem Auger Drill Hole
- Approximate Location of Percolation Test Well
- Approximate Footprint of Proposed BMP

EXPLORATION LOCATION MAP - MEC-12
Malibu Creek EWMP
Los Angeles County, California

PLATE 2f

RBF Consulting
Project No. 04.62150019

EXPLORATION LOCATION MAP - MEC-09
Malibu Creek EWMP
Los Angeles County, California

PLATE 2g

Legend

- Approximate Location of Hollow Stem Auger Drill Hole
- Approximate Location of Percolation Test Well
- Approximate Footprint of Proposed BMP

EXPLORATION LOCATION MAP - TC-02

Malibu Creek EWMP

Los Angeles County, California

PLATE 2h

APPENDIX A
SUBSURFACE EXPLORATION

APPENDIX A
SUBSURFACE EXPLORATION

INTRODUCTION

The contents of this appendix shall be integrated with the geotechnical engineering study of which it is a part. The data contained in this appendix shall not be used in whole or in part as a sole source for information or recommendations regarding the subject site.

The subsurface exploration program for the proposed project consisted of the excavation of 29 hollow-stem-auger drill holes and 3 hand-dug test pits within the limits of the proposed BMP sites. The approximate locations of the excavations are shown on Plate 2 – Exploration Location Map.

Drill Holes. We excavated a total of 29 hollow-stem-auger (HSA) drill holes at the seven sites explored using mechanical drilling methods between April 14 and June 2, 2015. Those holes were excavated to depths ranging from about 4 to 31 feet below the existing ground surface (bgs). The drilling work was performed by S/G Drilling Company of Lompoc, California (S/G). S/G used a truck-mounted CME-85 drill rig equipped with 8-inch-diameter hollow-stem-augers to excavate the drill holes at the locations shown on Plate 2

Test Pits. Due to access constraints at project site TC-29 (Foxfield Park) we were not able to use the truck-mounted HSA drilling rig to excavate the planned drill holes. Geotechnical exploration at this site was performed using hand excavation methods. Mike's Excavating Service of Temecula, California provided hand digging services to excavate 3 shallow test pits to depths of 4 to 6 feet bgs on April 23, 2015. The test pits were excavated at the locations indicated on Plate 2e - Exploration Location Map. Due to the presence of cobbles and boulders, excavation deeper than 4 to 6 feet using hand tools was not possible.

Sampling. The drill holes were sampled at regular intervals using 2-inch-outside-diameter (OD) Standard Penetration Test (SPT) and 3.25-OD California type split-spoon samplers. The samplers were driven by a 140-pound automatic-trip hammer with a 30-inch drop. Field blow counts shown on the drill hole logs indicate the number of blows from the hammer that were needed to drive the sampler 1-foot after the initial 6-inches seating into the material at the bottom of the hole.

During excavation, the materials at the bottom of the test pit explorations were sampled at regular intervals using a 3.25-inch OD split-spoon hand sampler driven by a slide hammer. The hand sampler was fitted with 1-inch-tall brass ring liners to obtain relatively undisturbed samples of the subsurface materials for subsequent laboratory testing.

The soil samples collected during drilling and test pit exploration were labeled and packaged for transport back to our laboratory for further testing.

Logging. The holes were logged by a Fugro engineer in general conformance with ASTM D2488 for visual-manual soil classification. Logs indicating the subsurface conditions encountered during exploration are included in Appendix A as Plates A-1 through A-17 and A-20 through A-31 - Log of Drill Hole and Plates A-18 and A-19 - Log of Test Pits. The boundaries between soil types shown on the logs are approximate because the transition between different soil layers may be gradual and may change with time. The legend for interpretation of the exploration logs is presented on Plate A-32 - Key to Terms & Symbols Used on Logs.

Abandonment. After completing the logging and sampling, the HSA drill holes were typically backfilled with cuttings generated during drilling. Drill hole locations within the LA County Right-of-Way were backfilled with 1-1/2 sack sand-cement slurry in compliance with the encroachment permit standard conditions. Excess cuttings generated during drilling were spread on-site.

LOCATION: See Plate 2a - Exploration Location Map
N 1,872,296 E 6,308,630
California State Plane Zone V, NAD83, ft

SURFACE EL: 901 ft +/- (rel. Google Earth datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						ARTIFICIAL FILL (af) Lean CLAY with sand and gravel (CL): dark brown, moist, some coarse sand, angular gravel to about 2"							
900													
	2												
898													
	4												
896			1		20	**COLLUVIUM (Qcol)** Sandy lean CLAY with gravel (CL): very stiff, dark brown, moist, some fine to medium sand, pulverized angular gravel							
	6												
894													
	8												
892													
	10		2		26								
890													
	12												
888													
	14												
886			3		53	- moist to wet							
	16												
884													
	18												
882													
	20												
880													
	22												
878													
	24												
876													
	26												
874													
	28												
872													
	30												
870													
	32												
868													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 15.5 ft
DEPTH TO WATER: 13.0 ft
BACKFILLED WITH: Cuttings
DRILLING DATE: April 14, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. TC-35-DH-01

Malibu Creek EWMP
Los Angeles County, California

LOCATION: See Plate 2a - Exploration Location Map
N 1,872,463 E 6,308,647
California State Plane Zone V, NAD83, ft

SURFACE EL: 898 ft +/- (rel. Google Earth datum)

ELEVATION, ft	DEPTH, ft	SAMPLE NO.	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
				ARTIFICIAL FILL (af) Clayey SAND with gravel (SC): dark brown, moist, fine to medium sand, angular gravel to 2"							
896	2										
894	4										
		1	16	**COLLUVIUM (Qcol)** Lean CLAY with sand (CL): very stiff, dark gray, moist							
892	6										
890	8										
888	10	2	11	- stiff, dark brown at approximately 9.5'							
886	12			- possible gravel lense at approximately 12.5'							
884	14										
		3	53	Clayey SAND with gravel (SC): very dense, yellowish red, moist, subangular gravel							
882	16										
880	18										
878	20										
876	22										
874	24										
872	26										
870	28										
868	30										
866	32										

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 16.0 ft
DEPTH TO WATER: 9.4 ft
BACKFILLED WITH: Cuttings
DRILLING DATE: April 14, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. TC-35-DH-02

Malibu Creek EWMP
Los Angeles County, California

LOCATION: See Plate 2b - Exploration Location Map
N 1,871,807 E 6,313,057
California State Plane Zone V, NAD83, ft

SURFACE EL: 856 ft +/- (rel. Google Earth datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						ARTIFICIAL FILL (af) Clayey SAND with gravel (SC): dark brown, dry to moist, rootlets							
854	2												
852	4												
			1		30	**ALLUVIUM (Qal)** Clayey SAND with gravel (SC): medium dense, dark brown, moist			9				
850	6												
848	8												
846	10		2		50/5"	- increased gravel at approximately 9.5'			8				
844	12												
842	14												
			3		8	Lean CLAY with sand and gravel (CL): medium stiff, dark gray, moist, subangular gravel to 1"			13				
840	16												
838	18					**UPPER TOPANGA FORMATION (Ttuc)** SEDIMENTARY ROCK (SHALE): slightly weathered, soft, gray, moist							
836	20		4		Ref/1"								
						Drilling met refusal at approximately 21'							
834	22												
832	24												
830	26												
828	28												
826	30												
824	32												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 31.0 ft
DEPTH TO WATER: 15.5 ft
BACKFILLED WITH: Cuttings
DRILLING DATE: April 14, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. TC-37-DH-01

Malibu Creek EWMP
Los Angeles County, California

LOCATION: See Plate 2b - Exploration Location Map
N 1,871,730 E 6,313,266
California State Plane Zone V, NAD83, ft

SURFACE EL: 853 ft +/- (rel. Google Earth datum)

SAMPLE NO.	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
		ARTIFICIAL FILL (af) Clayey SAND with gravel (SC): medium dense, dark brown, dry to moist, rootlets							
1	14	**ALLUVIUM (Qal)** Sandy lean CLAY (CL): stiff, brown, moist, fine to medium-grained sand, trace subangular gravel to 1"			11		37	17	
2	16	SILT with sand (ML): very stiff, dark gray, moist, fine to medium-grained sand			16				
3	60/10"	Clayey SAND (SC): very dense, gray, moist			12				
		UPPER TOPANGA FORMATION (Ttuc) SEDIMENTARY ROCK (SHALE): slightly weathered, soft to moderately soft, gray, moist							
4	Ref/1"	Drilling met refusal at approximately 19.5'							

ELEVATION, ft: 852, 850, 848, 846, 844, 842, 840, 838, 836, 834, 832, 830, 828, 826, 824, 822, 820

DEPTH, ft: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 31.0 ft
DEPTH TO WATER: 13.0 ft
BACKFILLED WITH: Cuttings
DRILLING DATE: April 14, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. TC-37-DH-02

Malibu Creek EWMP
Los Angeles County, California

LOCATION: See Plate 2b - Exploration Location Map
N 1,871,671 E 6,313,261
California State Plane Zone V, NAD83, ft
SURFACE EL: 651.0 ft +/- (rel. Google Earth datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf	WELL DIAGRAM
						Clayey SAND with gravel (SC): medium dense, brown, dry to moist, subangular gravel to 1"								
650														
	2													2-inch perforated PVC with gravel backfill
648			1		(35)		112	100	11	29				
	4													
						Percolation test interval 3-4.5 feet								
646														
	6													
644														
	8													
642														
	10													
640														
	12													
638														
	14													
636														
	16													
634														

COMPLETION DEPTH: 4.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Cuttings
DRILLING DATE: April 14, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. TC-37-Perc-01
Malibu Creek EWMP
Los Angeles County, California

LOCATION: See Plate 2b - Exploration Location Map
N 1,871,724 E 6,313,189
California State Plane Zone V, NAD83, ft
SURFACE EL: 853.0 ft +/- (rel. Google Earth datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf	WELL DIAGRAM
852						Clayey GRAVEL with sand (GC): medium dense, brown, moist, fine to coarse sand, gravel to 3/4"								
	2													2-inch perforated PVC with gravel backfill
850			1		(47)		113	103	9	16				
	4					Percolation test interval 2.5-4 feet								
848														
	6													
846														
	8													
844														
	10													
842														
	12													
840														
	14													
838														
	16													
836														

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 4.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Cuttings
DRILLING DATE: April 14, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. TC-37-Perc-02

Malibu Creek EWMP
Los Angeles County, California

PLATE A-6

RBF Consulting
Project No. 04.62150019

LOCATION: See Plate 2b - Exploration Location Map
N 1,871,755 E 6,313,060
California State Plane Zone V, NAD83, ft
SURFACE EL: 856.0 ft +/- (rel. Google Earth datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf	WELL DIAGRAM
						Clayey SAND with gravel (SC): very stiff, brown, dry to moist, subangular gravel to 1"								
854	2													2-inch perforated PVC with gravel backfill
			1		(38)		122	103	18	31				
852	4													
						Percolation test interval 3-4.5 feet								
850	6													
848	8													
846	10													
844	12													
842	14													
840	16													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 4.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Cuttings
DRILLING DATE: April 14, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. TC-37-Perc-03
Malibu Creek EWMP
Los Angeles County, California

PLATE A-7

ELEVATION, ft	DEPTH, ft	SAMPLE NO.	SAMPLER BLOW COUNT	LOCATION: See Plate 2c - Exploration Location Map N 1,878,528 E 6,324,873 California State Plane Zone V, NAD83, ft SURFACE EL: 951 ft +/- (rel. Google Earth datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
950				**ALLUVIUM (Qal)** Silty SAND with gravel (SM): medium dense, brown, moist, angular gravel to 1"							
	2										
948											
	4										
946		1	50/5"				12				
	6			- possible boulder encountered from approximately 6 to 8 feet							
944											
	8										
942											
	10	2	34	Sandy SILT (ML): hard, brown, moist, fine sand, trace gravel			16		36	12	
940											
	12										
938											
	14										
936		3	57				13				
	16										
934											
	18										
932											
	20	4	88	**UPPER TOPANGA FORMATION (Ttuc)** SEDIMENTARY ROCK (SILTSTONE): slightly weathered, soft, gray, moist			14				
930											
	22										
928											
	24										
926		5	50/5"				16				
	26										
924											
	28										
922											
	30	6	50/2"				16				
920											
	32										
918											

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 31.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Cuttings
DRILLING DATE: April 15, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. LC-02-DH-01

Malibu Creek EWMP
Los Angeles County, California

LOCATION: See Plate 2c - Exploration Location Map
N 1,878,552 E 6,324,962
California State Plane Zone V, NAD83, ft

SURFACE EL: 951 ft +/- (rel. Google Earth datum)

SAMPLE NO.	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
		ALLUVIUM (Qal) Sandy lean CLAY (CL): very stiff, brown, moist, fine sand, trace gravel to 1"							
1	16				18		44	25	
2	18	- brown to dark brown with olive grey			19				
3	11	- stiff, dark brown			19				
4	53	Clayey GRAVEL with sand (GC): very dense, brownish yellow to olive grey, moist			19				
5	75	**UPPER TOPANGA FORMATION (Ttuc)** SEDIMENTARY ROCK (SANDY SILTSTONE): moderately weathered, soft, dark brown, moist			23				
6	50/3"				16				

ELEVATION, ft: 950, 948, 946, 944, 942, 940, 938, 936, 934, 932, 930, 928, 926, 924, 922, 920, 918

DEPTH, ft: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 31.0 ft
DEPTH TO WATER: 15.7 ft
BACKFILLED WITH: Cuttings
DRILLING DATE: April 15, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. LC-02-DH-02

Malibu Creek EWMP
Los Angeles County, California

LOCATION: See Plate 2c - Exploration Location Map
N 1,878,583 E 6,324,960
California State Plane Zone V, NAD83, ft
SURFACE EL: 951.0 ft +/- (rel. Google Earth datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf	WELL DIAGRAM
						Sandy lean CLAY (CL): stiff to very stiff, dark brown, moist, some gravel to 1"								
950														
	2													
948						- Boulder encountered from 3' to 5.5'								
	4													2-inch perforated PVC with gravel backfill
946														
	6		1		(30)	Clayey GRAVEL with sand (GC): medium dense, dark brown, moist, gravel to 1"	112	96	17	17				
944														
						Percolation test interval 6-7.5 feet								
	8													
942														
	10													
940														
	12													
938														
	14													
936														
	16													
934														

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 7.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Cuttings
DRILLING DATE: April 15, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. LC-02-Perc-01
Malibu Creek EWMP
Los Angeles County, California

RBF Consulting
Project No. 04.62150019

LOCATION: See Plate 2c - Exploration Location Map
N 1,878,483 E 6,324,864
California State Plane Zone V, NAD83, ft
SURFACE EL: 951.0 ft +/- (rel. Google Earth datum)

ELEVATION, ft	DEPTH, ft	SAMPLE NO.	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf	WELL DIAGRAM
	0			**Sandy lean CLAY (CL): stiff, dark brown, moist, with some fine gravel**								
950												
	2											
948												
	4											
946												2-inch perforated PVC with gravel backfill
	6	1	(31)	**Clayey GRAVEL with sand (GC): medium dense, olive gray, moist**	127	106	20	18				
944												
	7.5			**Percolation test interval 6-7.5 feet**								
	8											
942												
	10											
940												
	12											
938												
	14											
936												
	16											
934												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 7.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Cuttings
DRILLING DATE: April 15, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. LC-02-Perc-02
Malibu Creek EWMP
Los Angeles County, California

LOCATION: See Plate 2c - Exploration Location Map
N 1,878,586 E 6,324,864
California State Plane Zone V, NAD83, ft
SURFACE EL: 952.0 ft +/- (rel. Google Earth datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u ksf	WELL DIAGRAM
						Sandy lean CLAY with gravel (CL): very stiff, dark brown, moist								
950	2													
948	4													
946	6													
944	8													
942	10													
						SEDIMENTARY ROCK (SILTSTONE): moderately weathered, soft to moderately soft, gray, moist								
940	12													2-inch perforated PVC with gravel backfill
			1		(Ref)									
938	14													
						Percolation test interval 13.5-15 feet								
936	16													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 15.0 ft
DEPTH TO WATER: 9.0 ft
BACKFILLED WITH: Cuttings
DRILLING DATE: April 15, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. LC-02-Perc-03
Malibu Creek EWMP
Los Angeles County, California

LOCATION: See Plate 2d - Exploration Location Map
N 1,882,094 E 6,352,541
California State Plane Zone V, NAD83, ft

SURFACE EL: 943 ft +/- (rel. Google Earth datum)

Interval	SAMPLE NO.	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
			ARTIFICIAL FILL (af) Lean CLAY with sand (CL): very soft, dark brown, moist, trace subangular gravel to 1", rootlets							
	1	21	**ALLUVIUM (Qal)** Sandy lean CLAY (CL): very stiff, dark brown, moist, fine-grained sand, with lenses of clayey sand and sandy silt			29		40	17	
	2	31	- increased silt content, very stiff to hard at approximately 9.5'			23				
	3	16	- decreased silt content, very stiff at approximately 14.5'			31				
	4	19				25				
	5	18	- sand content, trace gravel at approixmately 24.5'			27				
	6	30	- increased sand and silt content at approximately 29.5'			33				

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 31.0 ft
DEPTH TO WATER: 22.1 ft
BACKFILLED WITH: Cuttings
DRILLING DATE: April 16, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. LVC-14-DH-01

Malibu Creek EWMP
Los Angeles County, California

LOCATION: See Plate 2d - Exploration Location Map
N 1,881,978 E 6,352,477
California State Plane Zone V, NAD83, ft

SURFACE EL: 938 ft +/- (rel. Google Earth datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						ARTIFICIAL FILL (af) Sandy lean CLAY (CL): very soft to soft, dark brown, moist, fine-grained sand							
936	2												
934	4												
			1		33	**ALLUVIUM (Qal)** Sandy lean CLAY (CL): stiff to very stiff, dark brown, moist, fine-grained sand, some subangular gravel to about 1", with lenses of clayey sand and sandy silt			25				
932	6												
930	8												
928	10		2		18				28				
926	12												
924	14												
			3		22	- dark brown to brown at approximately 9.5'			28				
922	16												
920	18												
918	20		4		14	- dark brown at approximately 14.5'			30				
916	22												
914	24												
			5		20	- moist to wet at approximately 24.5'			28				
912	26												
910	28												
908	30		6		29	- moist at approximately 29.5'			23				
906	32												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 31.0 ft
DEPTH TO WATER: 19.0 ft
BACKFILLED WITH: Cuttings
DRILLING DATE: April 16, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. LVC-14-DH-02

Malibu Creek EWMP
Los Angeles County, California

ELEVATION, ft / DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO	SAMPLERS	SAMPLER BLOW COUNT	LOCATION: See Plate 2d - Exploration Location Map N 1,862,009 E 6,352,445 California State Plane Zone V, NAD83, ft SURFACE EL: 939.0 ft +/- (rel. Google Earth datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf	WELL DIAGRAM
					Sandy lean CLAY (CL): very stiff, brown, moist, fine-grained sand								
938													
2													
936													2-inch perforated PVC with gravel backfill
4													
934		1		(45)		114	85	34	50				
6													
					Percolation test interval 5-6.5 feet								
932													
8													
930													
10													
928													
12													
926													
14													
924													
16													
922													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 6.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Cuttings
DRILLING DATE: April 16, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. LVC-14-Perc-01

Malibu Creek EWMP
Los Angeles County, California

LOCATION: See Plate 2d - Exploration Location Map
N 1,862,020 E 6,352,530
California State Plane Zone V, NAD83, ft
SURFACE EL: 939.0 ft +/- (rel. Google Earth datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf	WELL DIAGRAM
						Sandy lean CLAY (CL): stiff, dark brown, moist, fine-grained sand								
938														
	2													
936														
	4													2-inch perforated PVC with gravel backfill
934														
	6													
			1		(23)		111	83	34	55				
932														
	8					Percolation test interval 6.5-8 feet								
930														
	10													
928														
	12													
926														
	14													
924														
	16													
922														

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 8.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Cuttings
DRILLING DATE: April 16, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. LVC-14-Perc-02

Malibu Creek EWMP
Los Angeles County, California

ELEVATION, ft / DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	LOCATION: See Plate 2d - Exploration Location Map N 1,862,072 E 6,352,471 California State Plane Zone V, NAD83, ft SURFACE EL: 942.0 ft +/- (rel. Google Earth datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf	WELL DIAGRAM
					Sandy lean CLAY (CL): stiff to very stiff, dark brown, moist, fine-grained sand								
940 2													
938 4													
936 6													
934 8													
932 10													
930 12													2-inch perforated PVC with gravel backfill
					Clayey SAND (SC): medium dense, dark brown, moist, fine-grained sand								
		1		(45)		121	95	27	39				
928 14													
					Percolation test interval 13.5-15 feet								
926 16													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 15.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Cuttings
DRILLING DATE: April 16, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. LVC-14-Perc-03
Malibu Creek EWMP
Los Angeles County, California

LOG OF NO. TC-29-Perc-01

LOCATION: See Plate 2e - Exploration Location Map
N 1,873,880 E 6,313,922
California State Plane Zone V, NAD83, ft

SURFACE EL: 886 ft +/- (rel. Google Earth datum)

ELEV, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO	SAMPLES	SAMPLER BLOWCOUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
						ALLUVIUM (Qal) Clayey SAND with gravel (SC): stiff to very stiff, dark brown, moist, subangular gravel, with some cobbles to approximately 12"							
884			1				110.6	96.2	15.0				
882						**Percolation test interval 3-4 feet**							
	5												
880													
878													
876	10												
874													
872													

COMPLETION DEPTH: 4 ft
DEPTH TO WATER: Not Encountered
EXCAVATION DATE: April 23, 2015
The log and data presented are a simplification of actual conditions encountered at the time of exploring at the explored location. Subsurface conditions may differ at other locations and with the passage of time.

LOGGED BY: J. Hogendorn
EXCAVATION METHOD: Hand Digging
CONTRACTOR: Mike's Excavating Service
BACKFILLED WITH: Cuttings
CHECKED BY: J Martos

LOG OF NO. TC-29-Perc-02

LOCATION: See Plate 2e - Exploration Location Map
N 1,873,881 E 6,313,837
California State Plane Zone V, NAD83, ft

SURFACE EL: 886 ft +/- (rel. Google Earth datum)

ELEV, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO	SAMPLES	SAMPLER BLOWCOUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
						ALLUVIUM (Qal) Clayey SAND with gravel (SC): very stiff, dark brown, moist, subangular gravel, with some cobbles and boulders to approximately 15"							
884			1				127.3	102.7	24.0				
882			2				118.5	104.7	13.1	23			
	5		3		Ref								
880						**Percolation test interval 5-6 feet**							
878													
876	10												
874													
872													

COMPLETION DEPTH: 6 ft
DEPTH TO WATER: Not Encountered
EXCAVATION DATE: April 23, 2015
The log and data presented are a simplification of actual conditions encountered at the time of exploring at the explored location. Subsurface conditions may differ at other locations and with the passage of time.

LOGGED BY: J. Hogendorn
EXCAVATION METHOD: Hand Digging
CONTRACTOR: Mike's Excavating Service
BACKFILLED WITH: Cuttings
CHECKED BY: J Martos

LOG OF TEST PITS
Malibu Creek EWMP
Los Angeles County, California

LOG OF NO. TC-29-Perc-03

ELEV, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO	SAMPLES	SAMPLER BLOWCOUNT	LOCATION: See Plate 2e - Exploration Location Map N 1,873,813 E 6,313,949 California State Plane Zone V, NAD83, ft SURFACE EL: 887 ft +/- (rel. Google Earth datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
886 884						**ALLUVIUM (Qal)** Clayey SAND with gravel (SC): medium dense, dark brown, moist, subangular gravel, with some cobbles to approximately 12"							
882 880 878 876 874	5 10					**Percolation test interval 4-5 feet**							

COMPLETION DEPTH: 5 ft
DEPTH TO WATER: Not Encountered
EXCAVATION DATE: April 23, 2015
The log and data presented are a simplification of actual conditions encountered at the time of exploring at the explored location. Subsurface conditions may differ at other locations and with the passage of time.

LOGGED BY: J. Hogendorn
EXCAVATION METHOD: Hand Digging
CONTRACTOR: Mike's Excavating Service
BACKFILLED WITH: Cuttings
CHECKED BY: J Martos

LOG OF TEST PITS
Malibu Creek EWMP
Los Angeles County, California

PLATE A-19

LOCATION: See Plate 2f - Exploration Location Map
N 1,875,140 E 6,332,346
California State Plane Zone V, NAD83, ft

SURFACE EL: 844 ft +/- (rel. Google Earth datum)

ELEVATION, ft	DEPTH, ft	SAMPLE NO.	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
				ARTIFICIAL FILL (af) Sandy lean CLAY with gravel (CL): stiff, grey to brown, dry to moist, some subangular gravel to 1"							
842	2			**ALLUVIUM (Qal)** Sandy lean CLAY (CL): medium stiff, brown, moist, fine sand							
840	4										
		1	7				18		39	22	
838	6										
836	8										
834	10	2	27	- some subangular gravel to 1"			16				
832	12										
830	14										
		3	41	Sandy fat CLAY (CH): very stiff, dark brown, moist, fine sand			15		50	31	
828	16										
826	18										
824	20	4	43	- dark yellowish brown, some subangular gravel to 1"			18				
822	22										
820	24										
818	26										
816	28										
814	30										
812	32										

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 21.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: 1.5 Sack Sand Cement Slurry
DRILLING DATE: June 1, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. MEC-12-DH-01

Malibu Creek EWMP
Los Angeles County, California

LOCATION: See Plate 2f - Exploration Location Map
N 1,874,958 E 6,332,295
California State Plane Zone V, NAD83, ft

SURFACE EL: 842 ft +/- (rel. Google Earth datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						ARTIFICIAL FILL (af) Clayey SAND (SC): loose, gray to brown, dry to moist							
840	2					**ALLUVIUM (Qal)** Lean CLAY with sand (CL): stiff, dark brown, moist							
838	4												
			1		(20)		122	102	20				
836	6												
834	8												
832	10		2		(14)	Clayey SAND (SC): loose	121	101	21		30	10	
830	12												
828	14												
			3		(14)	Poorly graded SAND with silt (SP-SM): loose, brown, wet			20				
826	16												
824	18												
822	20												
820	22												
818	24												
816	26												
814	28												
812	30												
810	32												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 21.0 ft
DEPTH TO WATER: 12.3 ft
BACKFILLED WITH: 1.5 Sack Sand Cement Slurry
DRILLING DATE: June 1, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. MEC-12-DH-02

Malibu Creek EWMP
Los Angeles County, California

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	LOCATION: See Plate 2f - Exploration Location Map N 1,874,896 E 6,332,229 California State Plane Zone V, NAD83, ft SURFACE EL: 840.0 ft +/- (rel. Google Earth datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf	WELL DIAGRAM
						Clayey SAND (SC): loose, dark brown to brown, moist, fine sand, some gravel to 1"								
838	2													2-inch perforated PVC with gravel backfill
			1		(14)		122	105	17	38				
836	4													
						Percolation test interval 3.5-5 feet								
834	6													
832	8													
830	10													
828	12													
826	14													
824	16													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 4.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: 1.5 Sack Sand Cement Slurry
DRILLING DATE: June 1, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. MEC-12-Perc-01

Malibu Creek EWMP
Los Angeles County, California

ELEVATION, ft / DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO	SAMPLERS	SAMPLER BLOW COUNT	LOCATION: See Plate 2f - Exploration Location Map N 1,875,107 E 6,332,295 California State Plane Zone V, NAD83, ft SURFACE EL: 843.0 ft +/- (rel. Google Earth datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf	WELL DIAGRAM
842 / 2		1		(24)	Clayey SAND (SC): medium dense, dark brown to brown, moist, fine sand	122	100	22	48				2-inch perforated PVC with gravel backfill
840 / 4					Percolation test interval 1.5-3 feet								
838 / 6													
836 / 8													
834 / 10													
832 / 12													
830 / 14													
828 / 16													
826													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 3.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: 1.5 Sack Sand Cement Slurry
DRILLING DATE: June 1, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. MEC-12-Perc-02

Malibu Creek EWMP
Los Angeles County, California

RBF Consulting
Project No. 04.62150019

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO	SAMPLERS	SAMPLER BLOW COUNT	LOCATION: See Plate 2f - Exploration Location Map N 1,875,048 E 6,332,415 California State Plane Zone V, NAD83, ft SURFACE EL: 845.0 ft +/- (rel. Google Earth datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf	WELL DIAGRAM
						Lean CLAY with sand (CL): medium dense, brown, moist, fine sand								
844														
	2													2-inch perforated PVC with gravel backfill
842			1		(25)		122	95	28	83				
	4					Percolation test interval 2.5-4 feet								
840														
	6													
838														
	8													
836														
	10													
834														
	12													
832														
	14													
830														
	16													
828														

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 4.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: 1.5 Sack Sand Cement Slurry
DRILLING DATE: June 1, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. MEC-12-Perc-03

Malibu Creek EWMP
Los Angeles County, California

PLATE A-24

LOCATION: See Plate 2g - Exploration Location Map
N 1,877,899 E 6,332,752
California State Plane Zone V, NAD83, ft

SURFACE EL: 870 ft +/- (rel. Google Earth datum)

ELEVATION, ft	DEPTH, ft	SAMPLE NO.	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
				ARTIFICIAL FILL (af) Fat CLAY with sand (CH): stiff, dark brown, moist							
868	2			**ALLUVIUM (Qal)** Fat CLAY with sand (CH): stiff, dark brown, moist, some fine sand, trace rootlets							
866	4	1	(16)		119	96	24				
864	6										
862	8										
860	10	2	(26)	Fat CLAY (CH): very stiff, gray with red-brown inclusions, wet, little fine sand	120	91	32				
858	12										
856	14										
854	16										
852	18										
850	20										
848	22										
846	24										
844	26										
842	28										
840	30										
838	32										

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 21.0 ft
DEPTH TO WATER: 7.0 ft
BACKFILLED WITH: Cuttings
DRILLING DATE: June 1, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. MEC-09-DH-01

Malibu Creek EWMP
Los Angeles County, California

LOCATION: See Plate 2g - Exploration Location Map
N 1,877,826 E 6,332,924
California State Plane Zone V, NAD83, ft

SURFACE EL: 868 ft +/- (rel. Google Earth datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
						ARTIFICIAL FILL (af) Fat CLAY (CH): stiff, dark brown, moist, trace fine sand							
866	2					**ALLUVIUM (Qal)** Fat CLAY (CH): stiff, dark brown, moist, trace fine sand							
864	4												
			1		(20)		121	96	26	92			
862	6												
860	8												
			2		(48)		119	91	31		62	31	
858	10												
856	12												
						TOPANGA FORMATION (Ttlc) SEDIMENTARY ROCK (CLAYSTONE): Intensely to moderately weathered, very soft, reddish brown with grey inclusions and white weathering, moist							
854	14												
			3		(62)		126	102	23				
852	16												
850	18												
			4		(50/4")		124	100	25				
848	20					- gray							
846	22												
844	24												
842	26												
840	28												
838	30												
836	32												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 11.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Cuttings
DRILLING DATE: June 1, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. MEC-09-DH-02

Malibu Creek EWMP
Los Angeles County, California

LOCATION: See Plate 2h - Exploration Location Map
N 1,864,131 E 6,326,824
California State Plane Zone V, NAD83, ft

SURFACE EL: 765 ft +/- (rel. Google Earth datum)

DEPTH, ft	SAMPLE NO.	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
0–4			**ARTIFICIAL FILL (af)** Clayey SAND with gravel (SC): medium dense, brown, dry to moist, gravel to 1"							
4–9.5	1	(34)	Silty GRAVEL with sand (GM): medium dense, brown, dry to moist, gravel to 2"	105	97	8	19			
9.5–14.5	2	(17)	Poorly graded GRAVEL with silt and sand (GP-GM): medium dense, brown, moist, gravel to 1", reduced silt content at approximately 9.5'			5	12			
14.5–21	3	(Ref.)	**CONEJO VOLCANICS (Tcvb)** IGNEOUS ROCK (COARSE ASH TUFF): up to medium-grained clasts, slightly to moderately weathered, soft to hard, intensely fractured, massive, light yellowish brown with dark reddish brown discoloration, dry to moist			9				
	4	(50/6")		130	115	13				

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 21.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: 1.5 Sack Sand Cement Slurry
DRILLING DATE: June 2, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. TC-02-DH-01

Malibu Creek EWMP
Los Angeles County, California

LOCATION: See Plate 2h - Exploration Location Map
N 1,864,167 E 6,327,467
California State Plane Zone V, NAD83, ft

SURFACE EL: 768 ft +/- (rel. Google Earth datum)

ELEVATION, ft	DEPTH, ft	SAMPLE NO.	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
				ARTIFICIAL FILL (af) Clayey SAND with gravel (SC): medium dense, brown, dry to moist, gravel to 1"							
766	2										
764	4			Well-graded GRAVEL with silt and sand (GW-GM): medium dense, brown, moist, gravel to 1.5"							
		1	(30)		105	97	8	12			
762	6										
760	8										
		2	(43)	**CONEJO VOLCANICS (Tcvb)** IGNEOUS ROCK (COARSE ASH TUFF): up to medium-grained clasts, decomposed to intensely weathered, soft to hard, intensely fractured, massive, light yellowish brown with dark reddish brown discoloration, dry to moist	124	104	19	53			
758	10										
756	12										
754	14										
		3	(Ref.)	- slightly to moderately weathered			6				
752	16										
750	18										
748	20										
746	22										
744	24										
742	26										
740	28										
738	30										
736	32										

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 21.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: 1.5 Sack Sand Cement Slurry
DRILLING DATE: June 2, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. TC-02-DH-02

Malibu Creek EWMP
Los Angeles County, California

ELEVATION, ft / DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	LOCATION: See Plate 2h - Exploration Location Map N 1,864,131 E 6,326,875 California State Plane Zone V, NAD83, ft SURFACE EL: 765.0 ft +/- (rel. Google Earth datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf	WELL DIAGRAM
764 / 2 / 762 / 4		1		(27)	Clayey SAND (SC): medium dense, brown, dry to moist, some gravel to 1"				40				2-inch perforated PVC with gravel backfill
760 / 6 / 758 / 8 / 756 / 10 / 754 / 12 / 752 / 14 / 750 / 16 / 748					Percolation test interval 2.5-4 feet								

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 4.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: 1.5 Sack Sand Cement Slurry
DRILLING DATE: June 2, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. TC-02-Perc-01

Malibu Creek EWMP
Los Angeles County, California

RBF Consulting
Project No. 04.62150019

LOCATION: See Plate 2h - Exploration Location Map
N 1,864,161 E 6,327,403
California State Plane Zone V, NAD83, ft
SURFACE EL: 767.0 ft +/- (rel. Google Earth datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf	WELL DIAGRAM
766						**ARTIFICIAL FILL (af)** Clayey SAND with gravel (SC): medium dense, brown, dry to moist, gravel to 1"								
	2													
764														
	4					Poorly graded GRAVEL with silt and sand (GP-GM): medium dense, brown, dry to moist, gravel to 2"								
762														
	6													
760														2-inch perforated PVC with gravel backfill
	8													
758			1		85/11"	**CONEJO VOLCANICS (Tcvb)** IGNEOUS ROCK (COARSE ASH TUFF): up to medium-grained clasts, slightly to moderately weathered, soft to hard, intensely fractured, massive, light yellowish brown with dark reddish brown discoloration, dry to moist	125	102	22	67				
	10					**Percolation test interval 8.5-10 feet**								
756														
	12													
754														
	14													
752														
	16													
750														

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 10.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: 1.5 Sack Sand Cement Slurry
DRILLING DATE: June 2, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. TC-02-Perc-02
Malibu Creek EWMP
Los Angeles County, California

PLATE A-30

LOCATION: See Plate 2h - Exploration Location Map
N 1,864,178 E 6,327,536
California State Plane Zone V, NAD83, ft
SURFACE EL: 768.0 ft +/- (rel. Google Earth datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf	WELL DIAGRAM
						ARTIFICIAL FILL (af) Clayey SAND with gravel (SC): medium dense, brown, moist, gravel to 1.5"								
766	2													2-inch perforated PVC with gravel backfill
			1		(23)		116	100	16	26				
764	4					**Percolation test interval 2.5-4 feet**								
762	6													
760	8													
758	10													
756	12													
754	14													
752	16													

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 4.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: 1.5 Sack Sand Cement Slurry
DRILLING DATE: June 2, 2015

DRILLING METHOD: 8-inch-dia. Hollow Stem Auger
HAMMER TYPE: 140-lb Automatic Trip
DRILLED BY: S/G Drilling Company
LOGGED BY: J. Hogendorn
CHECKED BY: J Martos
RIG TYPE: CME-85

LOG OF DRILL HOLE NO. TC-02-Perc-03

Malibu Creek EWMP
Los Angeles County, California

LOCATION: The drill hole location referencing local landmarks or coordinates

SURFACE EL: Using local, MSL, MLLW or other datum

ELEVATION, ft	DEPTH, ft
-12	2
-14	4
-16	6
-18	8
-20	10
-22	12
-24	14
-26	16
-28	18
-30	20
-32	22
-34	24
-36	26
-38	28
-40	30
-42	32
-44	34
-46	36
-48	38

SAMPLE NO.	BLOW COUNT / REC/DRIVE
1	25
2	(25)
3	(25)
4	(25)
5	18"/ 30"
6	
7	
8	20"/ 24"
9	(25)
10	30"/ 30"
11	20"/ 24"
12	
13	

MATERIAL DESCRIPTION	
Well graded GRAVEL (GW)	COARSE GRAINED
Poorly graded GRAVEL (GP)	COARSE GRAINED
Well graded SAND (SW)	COARSE GRAINED
Poorly graded SAND (SP)	COARSE GRAINED
Silty SAND (SM)	COARSE GRAINED
Clayey SAND (SC)	COARSE GRAINED
Silty, Clayey SAND (SC-SM)	COARSE GRAINED
Elastic SILT (MH)	FINE GRAINED
SILT (ML)	FINE GRAINED
Silty CLAY (CL-ML)	FINE GRAINED
Fat CLAY (CH)	FINE GRAINED
Lean CLAY (CL)	FINE GRAINED
CONGLOMERATE	ROCK
SANDSTONE	ROCK
SILTSTONE	ROCK
MUDSTONE	ROCK
CLAYSTONE	ROCK
BASALT	ROCK
ANDESITE BRECCIA	ROCK
Paving and/or Base Materials	

General Notes

Soil Texture Symbol

Sloped line in symbol column indicates transitional boundary

Samplers and sampler dimensions
(unless otherwise noted in report text) are as follows:

Symbol for:

1. SPT Sampler, driven 1-3/8" ID, 2" OD
2. CA Liner Sampler, driven 2-3/8" ID, 3" OD
3. CA Liner Sampler, disturbed 2-3/8" ID, 3" OD
4. Thin-walled Tube, pushed 2-7/8" ID, 3" OD
5. Bulk Bag Sample (from cuttings)
6. CA Liner Sampler, Bagged
7. Hand Auger Sample
8. CME Core Sample
9. Pitcher Sample
10. Lexan Sample
11. Vibracore Sample
12. No Sample Recovered
13. Sonic Soil Core Sample

Sampler Driving Resistance

Number of blows with 140 lb. hammer, falling 30" to drive sampler 1 ft. after seating sampler 6", for example,

Blows/ft	Description
25	25 blows drove sampler 12" after initial 6" of seating
86/11"	After driving sampler the initial 6" of seating, 36 blows drove sampler through the second 6" interval, and 50 blows drove the sampler 5" into the third interval
50/6"	50 blows drove sampler 6" after initial 6" of seating
Ref/3"	50 blows drove sampler 3" during initial 6" seating interval

Blow counts for California Liner Sampler shown in ( )

Length of sample symbol approximates recovery length

Classification of Soils per ASTM D2487 or D2488

Geologic Formation noted in bold font at the top of interpreted interval

Strength Legend

Q = Unconfined Compression
u = Unconsolidated Undrained Triaxial
t = Torvane
p = Pocket Penetrometer
m = Miniature Vane

Water Level Symbols

Initial or perched water level
Final ground water level
Seepages encountered

Rock Quality Designation (RQD) is the sum of recovered core pieces greater than 4 inches divided by the length of the cored interval.

KEY TO TERMS & SYMBOLS USED ON LOGS

PLATE A-32

APPENDIX B
LABORATORY TESTING

APPENDIX B
LABORATORY TESTING

INTRODUCTION

The contents of this appendix shall be integrated with the geotechnical engineering study of which it is a part. The data contained in this appendix shall not be used in whole or in part as a sole source for information or recommendations regarding the subject site.

LABORATORY ANALYSIS

Laboratory tests were performed on selected driven ring (Modified California) and Standard Penetration Test (SPT) samples to estimate engineering characteristics of the various earth materials encountered. Testing was performed in general accordance with ASTM Standards for Soil Testing, latest revision. The results of the laboratory analyses are summarized on Plates B-1a through B-1c - Summary of Laboratory Test Results.

Laboratory Moisture/Density Determinations. Moisture content and dry density determinations were performed on selected driven ring samples collected to evaluate the natural water content and dry density of the various soils encountered in accordance with ASTM D2937. In addition, moisture contents were determined on selected SPT samples in accordance with ASTM D2216. The results are presented on Plate B-1 and on the respective exploration logs (Appendix A).

Grain Size Distribution. Grain size distribution was determined for selected soil samples in accordance with standard test method ASTM D422. The grain size analysis results are plotted on Plates B-2a through B-2d - Grain Size Curves and the results of percent passing No. 200 Sieve are summarized on Plate B-1 and on the respective exploration logs in Appendix A.

Atterberg Limits. Atterberg limits testing was performed on selected samples of predominantly fine grained soils. Liquid and plastic limits were determined in accordance with standard test method ASTM D4318. The test results are shown on Plate B-1, Plate B-3 - Plasticity Chart, and on the respective exploration logs (Appendix A).

Permeability. Four permeability tests were performed on selected samples of soils collected from within percolation testing intervals to estimate the saturated hydraulic conductivity of the subsurface materials. Flexible wall, falling head permeability tests were performed in accordance with ASTM D5084. The results are presented on Plates A-4a through A-4d - Hydraulic Conductivity.

DRILL HOLE	DEPTH, ft	SAMPLE NUMBER	MATERIAL DESCRIPTION	UWW pcf	UDW pcf	MC %	FINES %	ATTERBERG LIMITS LL	PI	COMPACTION TEST MAX DD pcf	OPT MC %	DIRECT SHEAR C ksf	PHI deg	COMPRESSIVE STRENGTH TESTS Qu ksf	S (Cell Prs.) ksf	CORROSIVITY TESTS R	pH	Cl	SO_4 (%)	R-VALUE	EXPANSION INDEX	SAND EQUIVALENT (SE)	Specific Gravity
TC-37-DH-01	4.5	1	Clayey SAND with gravel (SC)			9																	
TC-37-DH-01	9.5	2	Clayey SAND with gravel (SC)			8																	
TC-37-DH-01	14.5	3	Lean CLAY with sand and gravel (CL)			13																	
TC-37-DH-02	4.5	1	Sandy lean CLAY (CL)			11		37	17														
TC-37-DH-02	9.5	2	SILT with sand (ML)			16																	
TC-37-DH-02	14.5	3	Clayey SAND (SC)			12																	
TC-37-Perc-01	3.0	1	Clayey SAND with gravel (SC)	112	100	11	29																
TC-37-Perc-02	2.5	1	Clayey GRAVEL with sand (GC)	113	103	9	18																
TC-37-Perc-03	3.0	1	Clayey SAND with gravel (SC)	122	103	18	31																
LC-02-DH-01	4.5	1	Silty SAND with gravel (SM)			12																	
LC-02-DH-01	9.5	2	Sandy SILT (ML)			16		36	12														
LC-02-DH-01	14.5	3	Sandy SILT (ML)			13																	
LC-02-DH-01	19.5	4	SILTSTONE (Rx)			14																	
LC-02-DH-01	24.5	5	SILTSTONE (Rx)			16																	
LC-02-DH-01	29.5	6	SILTSTONE (Rx)			16																	
LC-02-DH-02	4.5	1	Sandy lean CLAY (CL)			18		44	25														
LC-02-DH-02	9.5	2	Sandy lean CLAY (CL)			19																	
LC-02-DH-02	14.5	3	Sandy lean CLAY (CL)			19																	
LC-02-DH-02	19.5	4	Clayey GRAVEL with sand (GC)			19																	
LC-02-DH-02	24.5	5	Sandy SILTSTONE (Rx)			23																	
LC-02-DH-02	29.5	6	Sandy SILTSTONE (Rx)			16																	
LC-02-Perc-01	6.0	1	Clayey GRAVEL with sand (GC)	112	96	17	17																
LC-02-Perc-02	6.0	1	Clayey GRAVEL with sand (GC)	127	106	20	18																
LVC-14-DH-01	4.5	1	Sandy lean CLAY (CL)			29		40	17														
LVC-14-DH-01	9.5	2	Sandy lean CLAY (CL)			23																	
LVC-14-DH-01	14.5	3	Sandy lean CLAY (CL)			31																	
LVC-14-DH-01	19.5	4	Sandy lean CLAY (CL)			25																	
LVC-14-DH-01	24.5	5	Sandy lean CLAY (CL)			27																	
LVC-14-DH-01	29.5	6	Sandy lean CLAY (CL)			33																	
LVC-14-DH-02	4.5	1	Sandy lean CLAY (CL)			25																	

SUMMARY OF LABORATORY TEST RESULTS

Malibu Creek EWMP

Los Angeles County, California

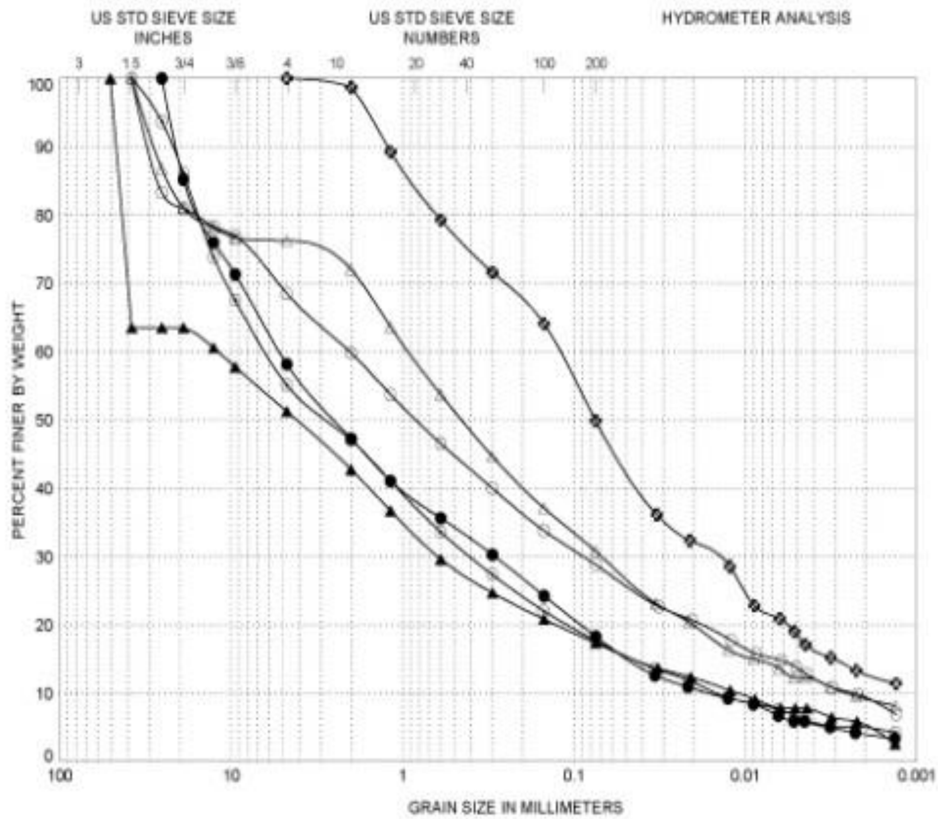
DRILL HOLE	DEPTH, ft	SAMPLE NUMBER	MATERIAL DESCRIPTION	UWW pcf	UDW pcf	MC %	FINES %	ATTERBERG LIMITS		COMPACTION TEST		DIRECT SHEAR		COMPRESSIVE STRENGTH TESTS		CORROSIVITY TESTS				R-VALUE	EXPANSION INDEX	SAND EQUIVALENT (SE)	Specific Gravity
								LL	PI	MAX DD pcf	OPT MC %	C ksf	PHI deg	Qu ksf	S (Cell Prs.) ksf	R	pH	Cl	SO_4 (%)				
LVC-14-DH-02	9.5	2	Sandy lean CLAY (CL)			28																	
LVC-14-DH-02	14.5	3	Sandy lean CLAY (CL)			28																	
LVC-14-DH-02	19.5	4	Sandy lean CLAY (CL)			30																	
LVC-14-DH-02	24.5	5	Sandy lean CLAY (CL)			28																	
LVC-14-DH-02	29.5	6	Sandy lean CLAY (CL)			23																	
LVC-14-Perc-01	5.0	1	Sandy lean CLAY (CL)	114	85	34	50																
LVC-14-Perc-02	6.5	1	Sandy lean CLAY (CL)	111	83	34	55																
LVC-14-Perc-03	13.5	1	Clayey SAND (SC)	121	95	27	39																
TC-29-Perc-01	2.0	1	Clayey SAND with gravel (SC)	111	96	15																	
TC-29-Perc-02	2.5	1	Clayey SAND with gravel (SC)	127	103	24																	
TC-29-Perc-02	3.5	2	Clayey SAND with gravel (SC)	119	105	13	23																
MEC-12-DH-01	4.5	1	Sandy lean CLAY (CL)			18		39	22														
MEC-12-DH-01	9.5	2	Sandy lean CLAY (CL)			16																	
MEC-12-DH-01	14.5	3	Sandy fat CLAY (CH)			15		50	31														
MEC-12-DH-01	19.5	4	Sandy fat CLAY (CH)			16																	
MEC-12-DH-02	4.5	1	Lean CLAY with sand (CL)	122	102	20																	
MEC-12-DH-02	9.5	2	Clayey SAND (SC)	121	101	21		30	10														
MEC-12-DH-02	14.5	3	Poorly graded SAND with silt (SP-SM)			20																	
MEC-12-Perc-01	3.5	1	Clayey SAND (SC)	122	105	17	38																
MEC-12-Perc-02	1.5	1	Clayey SAND (SC)	122	100	22	48																
MEC-12-Perc-03	2.5	1	Lean CLAY with sand (CL)	122	95	28	83																
MEC-09-DH-01	4.5	1	Fat CLAY with sand (CH)	119	96	24																	
MEC-09-DH-01	9.5	2	Fat CLAY (CH)	120	91	32																	
MEC-09-DH-02	4.5	1	Fat CLAY (CH)	121	96	26	92																
MEC-09-DH-02	9.5	2	Fat CLAY (CH)	119	91	31		62	31														
MEC-09-DH-02	14.5	3	CLAYSTONE (Rx)	126	102	23																	
MEC-09-DH-02	19.5	4	CLAYSTONE (Rx)	124	100	25																	
TC-02-DH-01	4.5	1	Silty GRAVEL with sand (GM)	105	97	8	19																
TC-02-DH-01	9.5	2	Poorly graded GRAVEL with silt and sand (GP-GM)			5	12																
TC-02-DH-01	14.5	3	COARSE ASH TUFF (Rx)			9																	

SUMMARY OF LABORATORY TEST RESULTS
Malibu Creek EWMP
Los Angeles County, California

PLATE B-1b

DRILL HOLE	DEPTH, ft	SAMPLE NUMBER	MATERIAL DESCRIPTION	UWW pcf	UDW pcf	MC %	FINES %	ATTERBERG LIMITS LL	PI	COMPACTION TEST MAX DD pcf	OPT MC %	DIRECT SHEAR C ksf	PHI deg	COMPRESSIVE STRENGTH TESTS Qu ksf	S_u (Cell Pre.) ksf	CORROSIVITY TESTS R	pH	Cl	SO_4 (%)	R-VALUE	EXPANSION INDEX	SAND EQUIVALENT (SE)	Specific Gravity
TC-02-DH-01	19.5	4	COARSE ASH TUFF (Rx)	130	115	13																	
TC-02-DH-02	4.5	1	Well-graded GRAVEL with silt and sand (GW-GM)	106	97	8	12																
TC-02-DH-02	9.5	2	COARSE ASH TUFF (Rx)	124	104	19	53																
TC-02-DH-02	14.5	3	COARSE ASH TUFF (Rx)			6																	
TC-02-Perc-01	2.5	1	Clayey SAND (SC)				40																
TC-02-Perc-02	8.5	1	COARSE ASH TUFF (Rx)	126	102	22	67																
TC-02-Perc-03	2.5	1	Clayey SAND with gravel (SC)	118	100	18	28																

SUMMARY OF LABORATORY TEST RESULTS
Malibu Creek EWMP
Los Angeles County, California

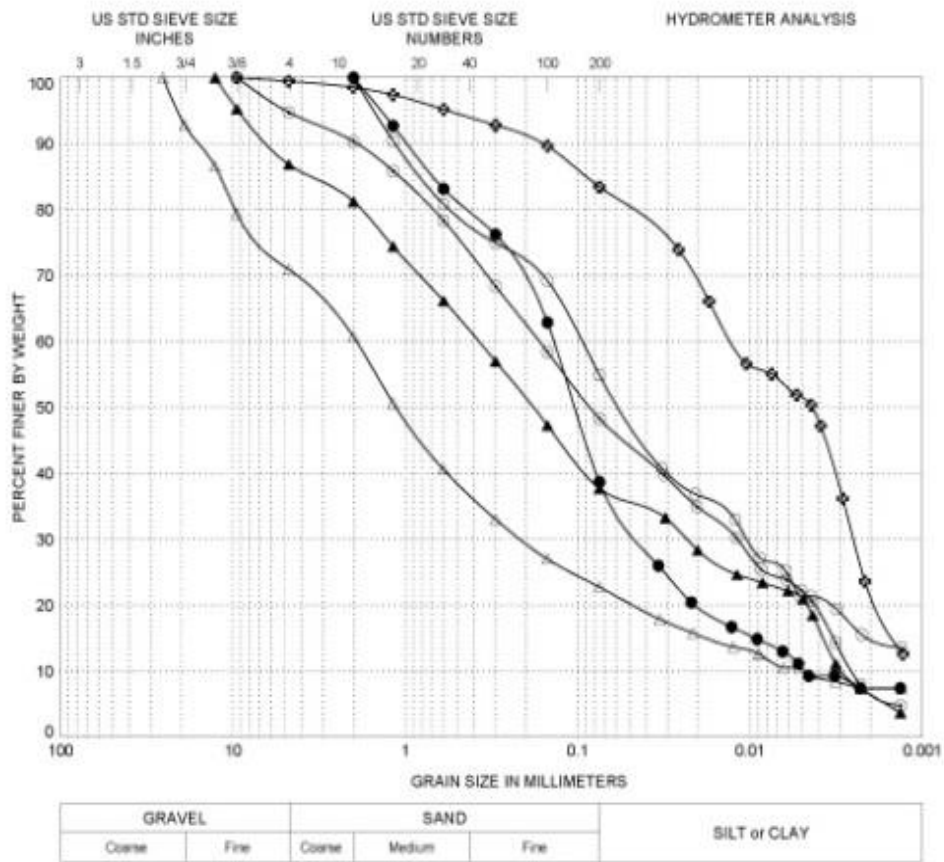


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

LEGEND (location)	(depth,ft)	CLASSIFICATION	Cc	Cu
○ TC-37-Perc-01	3.0	Clayey SAND with gravel (SC)	1.6	873.3
● TC-37-Perc-02	2.5	Clayey GRAVEL with sand (GC)	1.0	324.5
△ TC-37-Perc-03	3.0	Clayey SAND with gravel (SC)	2.0	361.0
▲ LC-02-Perc-01	6.0	Clayey GRAVEL with sand (GC)	2.9	1078.4
⊙ LC-02-Perc-02	6.0	Clayey GRAVEL with sand (GC)	1.8	428.1
◆ LVC-14-Perc-01	5.0	Sandy lean CLAY (CL)		

GRAIN SIZE CURVES
Malibu Creek EWMP
Los Angeles County, California

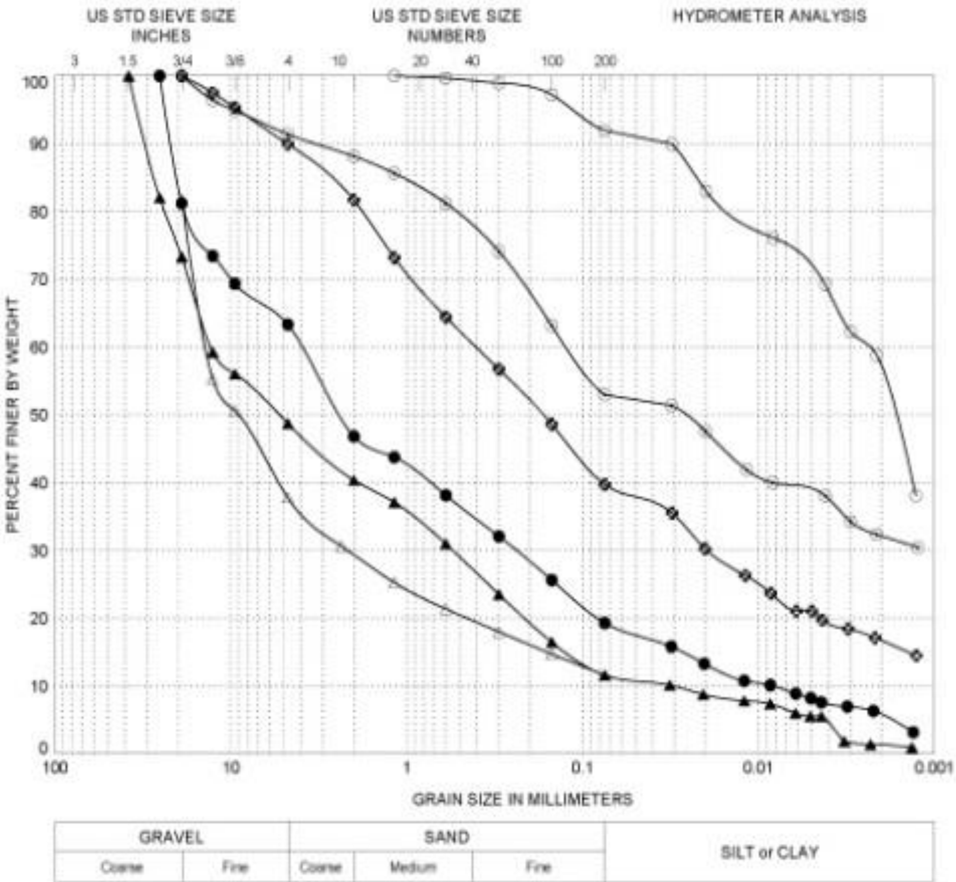
PLATE B-2a



LEGEND (location)	(depth, ft)	CLASSIFICATION	Cc	Cu
○ LVC-14-Perc-02	6.5	Sandy lean CLAY (CL)		
● LVC-14-Perc-03	13.5	Clayey SAND (SC)	2.9	28.6
△ TC-29-Perc-02	3.5	Clayey SAND with gravel (SC)	4.8	397.5
▲ MEC-12-Perc-01	3.5	Clayey SAND (SC)	0.5	130.3
⊛ MEC-12-Perc-02	1.5	Clayey SAND (SC)	0.3	65.4
◈ MEC-12-Perc-03	2.5	Lean CLAY with sand (CL)		

GRAIN SIZE CURVES
Malibu Creek EWMP
Los Angeles County, California

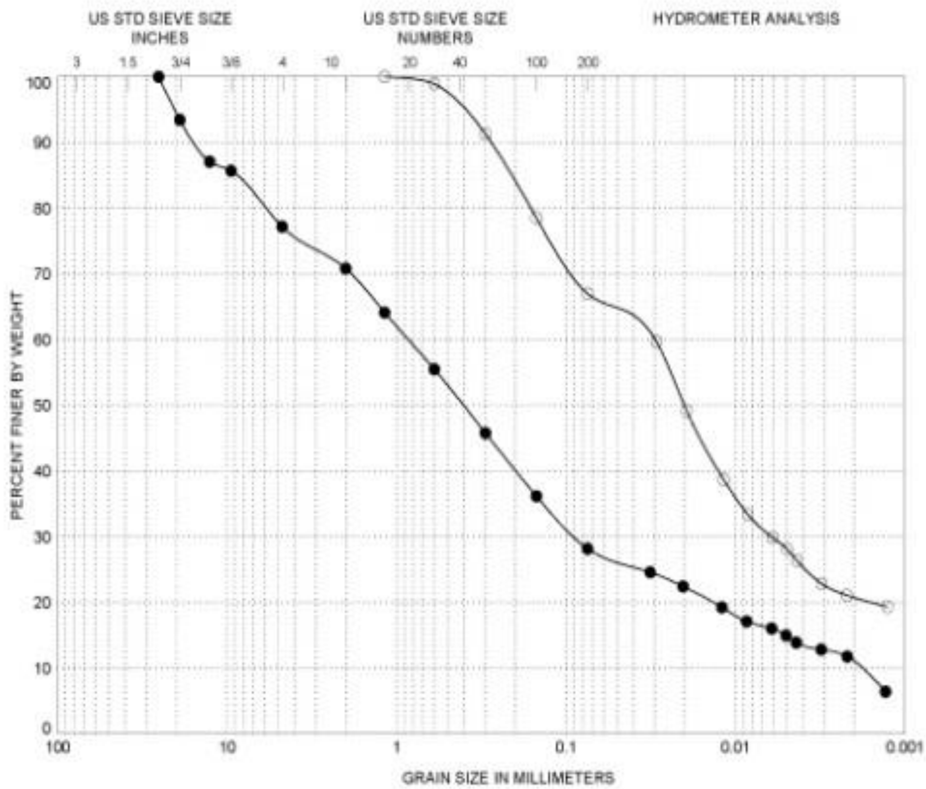
PLATE B-2b



LEGEND (location)	(depth,ft)	CLASSIFICATION	Cc	Cu
○ MEC-09-DH-02	4.5	Fat CLAY (CH)		
● TC-02-DH-01	4.5	Silty GRAVEL with sand (GM)	1.7	478.5
△ TC-02-DH-01	9.5	Poorly graded GRAVEL with silt and sand (GP-GM)	6.6	261.0
▲ TC-02-DH-02	4.5	Well-graded GRAVEL with silt and sand (GW-GM)	0.8	421.7
⊛ TC-02-DH-02	9.5	COARSE ASH TUFF (Rx)		
◈ TC-02-Perc-01	2.5	Clayey SAND (SC)		

GRAIN SIZE CURVES
Malibu Creek EWMP
Los Angeles County, California

PLATE B-2c

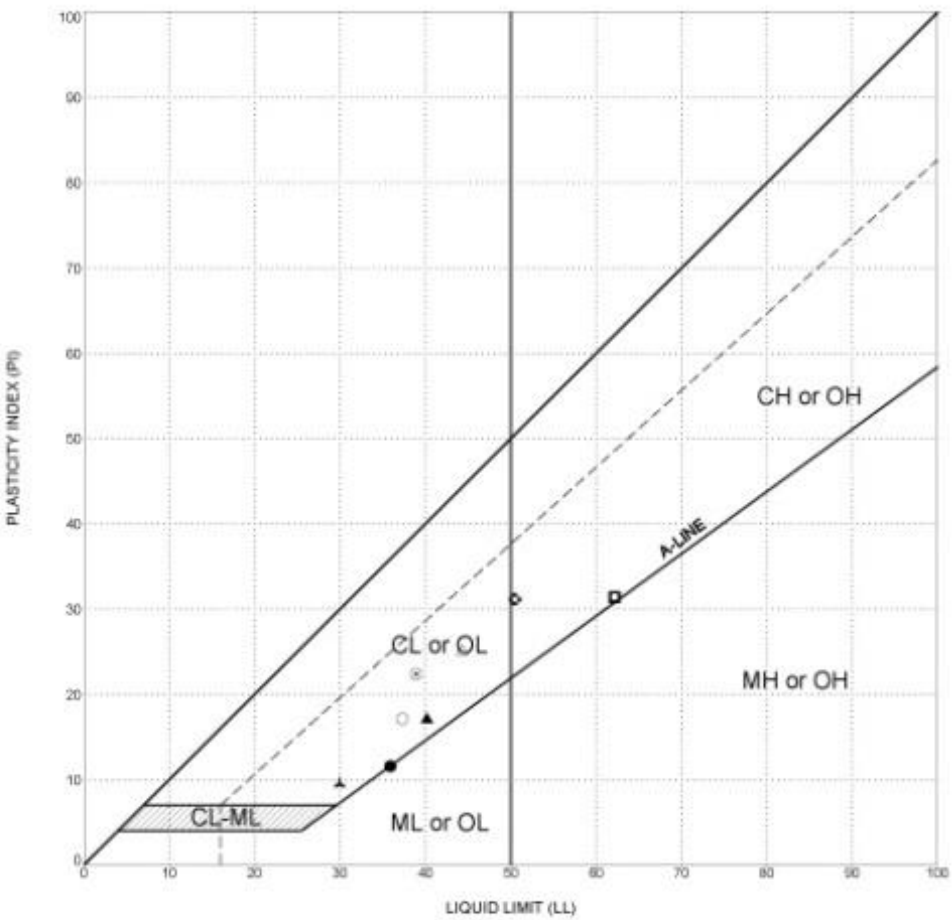


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

LEGEND			CLASSIFICATION	Cc	Cu
	(location)	(depth,ft)			
○	TC-02-Perc-02	8.5	COARSE ASH TUFF (Rx)		
●	TC-02-Perc-03	2.5	Clayey SAND with gravel (SC)	4.9	460.2

GRAIN SIZE CURVES
Malibu Creek EWMP
Los Angeles County, California

PLATE B-2d



LEGEND location	depth, ft	CLASSIFICATION	LIQUID LIMIT(LL)	PLASTIC LIMIT(PL)	PLASTICITY INDEX (PI)
○ TC-37-DH-02	4.5	Sandy lean CLAY (CL)	37	20	17
● LC-02-DH-01	9.5	Sandy SILT (ML)	36	24	12
△ LC-02-DH-02	4.5	Sandy lean CLAY (CL)	44	19	25
▲ LVC-14-DH-01	4.5	Sandy lean CLAY (CL)	40	23	17
⊛ MEC-12-DH-01	4.5	Sandy lean CLAY (CL)	39	17	22
✪ MEC-12-DH-01	14.5	Sandy fat CLAY (CH)	50	19	31
▲ MEC-12-DH-02	9.5	Clayey SAND (SC)	30	20	10
◘ MEC-09-DH-02	9.5	Fat CLAY (CH)	62	31	31

ATTERBERG LIMITS TEST RESULTS

PLASTICITY CHART
Malibu Creek EWMP
Los Angeles County, California

PLATE B-3

SAMPLE ID		
Boring Number	MEC-12-Perc-01	
Sample Number	1	
Sample Depth, ft	3.5	
Classification	Clayey SAND (SC)	

SAMPLE PROPERTIES	Initial	Final
Mass, g	304.31	318.10
Water Content, %	16.6%	21.9%
Dry Unit Weight, pcf	104.8	104.8
Saturation, %	76%	100%
Void Ratio	0.58	0.58
Diameter, in	2.42	2.42
Height, in	2.07	2.07
Area, in^2	4.60	4.60
Volume, in^3	9.49	9.49

CLASSIFICATION: Sieve Size	% Passing	Other Parameters	
3/8-in. (9.5mm)	---	Liquid Limit	---
#4 (4.75mm)	---	Plastic Limit	---
#16 (1.18mm)	---	Plasticity Index	---
#30 (0.6mm)	---	Estimated Gs	2.65
#100 (0.150mm)	---		
#200 (0.075mm)	---		

TEST SUMMARY	
k_{avg} 20ºC, cm/s	7.3E-08
Sample Type	MCA
Permeant	Deaired Tap-Water
Pipette Area, cm^2	0.0314
Annulus Area, cm^2	0.7671
Tested By	AB

REMARKS

Test Method: ASTM D5084 (Method F)

Estimated Gs provides final saturation of 100%.

PERMEATION DATA

Trial	Date	Time, sec	$Temp_{Avg}$, ºC	σ', ksf	μ, ksf	i_o	i_f	k_t, cm/s
1	6/10/15	230	22.8	0.4	11.5	59.9	57.4	7.9E-08
2	6/10/15	236	22.8	0.4	11.5	59.9	57.4	7.7E-08
3	6/10/15	234	22.8	0.4	11.5	59.9	57.4	7.7E-08
4	6/10/15	232	22.8	0.4	11.5	59.9	57.4	7.8E-08

SAMPLE IMAGES

HYDRAULIC CONDUCTIVITY
Malibu Creek EWMP
Los Angeles County, California

SAMPLE ID

Boring Number	MEC-12-Perc-02
Sample Number	1
Sample Depth, ft	1.5
Classification	Clayey SAND (SC)

CLASSIFICATION

Sieve Size	% Passing	Other Parameters	
3/8-in. (9.5mm)	---	Liquid Limit	---
#4 (4.75mm)	---	Plastic Limit	---
#16 (1.18mm)	---	Plasticity Index	---
#30 (0.6mm)	---	Estimated Gs	2.67
#100 (0.150mm)	---		
#200 (0.075mm)	---		

SAMPLE PROPERTIES

	Intial	Final
Mass, g	150.93	154.40
Water Content, %	21.9%	24.7%
Dry Unit Weight, pcf	100.3	100.3
Saturation, %	88%	100%
Void Ratio	0.66	0.66
Diameter, in	2.43	2.43
Height, in	1.01	1.01
Area, in^2	4.64	4.64
Volume, in^3	4.70	4.70

TEST SUMMARY

k_{avg} 20ºC, cm/s	3.4E-06
Sample Type	MCA
Permeant	Deaired Tap-Water
Pipette Area, cm^2	0.0314
Annulus Area, cm^2	0.7671
Tested By	AB

REMARKS

Test Method: ASTM D5084 (Method F)
Estimated Gs provides final saturation of 100%.

PERMEATION DATA

Trial	Date	Time, sec	$Temp_{Avg}$, °C	σ', ksf	μ, ksf	i_o	i_f	k_t, cm/s
1	6/10/15	72	23.0	0.2	10.1	40.6	10.2	3.7E-06
2	6/10/15	72	23.0	0.2	10.1	40.6	10.2	3.7E-06
3	6/10/15	73	23.0	0.2	10.1	40.6	10.2	3.7E-06
4	6/10/15	72	23.0	0.2	10.1	40.6	10.2	3.7E-06

SAMPLE IMAGES

HYDRAULIC CONDUCTIVITY
Malibu Creek EWMP
Los Angeles County, California

SAMPLE ID		
Boring Number	TC-02-Perc-02	
Sample Number	2	
Sample Depth, ft	8.5	
Classification	COARSE ASH TUFF (Rx)	

CLASSIFICATION	Sieve Size	% Passing	Other Parameters	
	3/8-in. (9.5mm)	---	Liquid Limit	---
	#4 (4.75mm)	---	Plastic Limit	---
	#16 (1.18mm)	---	Plasticity Index	---
	#30 (0.6mm)	---	Estimated Gs	2.7
	#100 (0.150mm)	---		
	#200 (0.075mm)	---		

SAMPLE PROPERTIES	Intial	Final
Mass, g	307.24	312.17
Water Content, %	22.3%	24.2%
Dry Unit Weight, pcf	102.0	102.0
Saturation, %	92%	100%
Void Ratio	0.65	0.65
Diameter, in	2.42	2.42
Height, in	2.04	2.04
Area, in^2	4.59	4.59
Volume, in^3	9.38	9.38

TEST SUMMARY	
k_{avg} 20°C, cm/s	5.1E-06
Sample Type	MCA
Permeant	Deaired Tap-Water
Pipette Area, cm^2	0.0314
Annulus Area, cm^2	0.7671
Tested By	AB

REMARKS

Test Method: ASTM D5084 (Method F)
Estimated Gs provides final saturation of 100%.

PERMEATION DATA

Trial	Date	Time, sec	$Temp_{Avg}$, °C	σ', ksf	μ, ksf	i_o	i_f	k_t, cm/s
1	6/10/15	98	23.8	1.0	10.1	20.2	5.0	5.6E-06
2	6/10/15	100	23.8	1.0	10.1	20.2	5.0	5.4E-06
3	6/10/15	98	23.8	1.0	10.1	20.2	5.0	5.6E-06
4	6/10/15	97	23.8	1.0	10.1	20.2	5.0	5.6E-06

SAMPLE IMAGES

HYDRAULIC CONDUCTIVITY
Malibu Creek EWMP
Los Angeles County, California

PLATE B-4c

SAMPLE ID		
Boring Number	TC-02-Perc-03	
Sample Number	3	
Sample Depth, ft	2.5	
Classification	Clayey SAND w/ Gravel (SC)	

CLASSIFICATION: Sieve Size	% Passing
3/8-in. (9.5mm)	---
#4 (4.75mm)	---
#16 (1.18mm)	---
#30 (0.6mm)	---
#100 (0.150mm)	---
#200 (0.075mm)	---

Other Parameters	
Liquid Limit	---
Plastic Limit	---
Plasticity Index	---
Estimated Gs	2.67

SAMPLE PROPERTIES	Intial	Final
Mass, g	147.92	156.22
Water Content, %	18.0%	24.6%
Dry Unit Weight, pcf	100.4	100.4
Saturation, %	73%	100%
Void Ratio	0.66	0.66
Diameter, in	2.42	2.42
Height, in	1.03	1.03
Area, in^2	4.60	4.60
Volume, in^3	4.76	4.76

TEST SUMMARY	
k_{avg} 20°C, cm/s	2.9E-06
Sample Type	MCA
Permeant	Deaired Tap-Water
Pipette Area, cm^2	0.0314
Annulus Area, cm^2	0.7671
Tested By	AB

REMARKS

Test Method: ASTM D5084 (Method F)

Estimated Gs provides final saturation of 100%.

PERMEATION DATA

Trial	Date	Time, sec	$Temp_{Avg}$, °C	σ', ksf	μ, ksf	i_o	i_f	k_t, cm/s
1	6/10/15	88	23.8	0.3	10.1	39.9	10.0	3.1E-06
2	6/10/15	88	23.8	0.3	10.1	39.9	10.0	3.1E-06
3	6/10/15	87	23.8	0.3	10.1	39.9	10.0	3.2E-06
4	6/10/15	88	23.8	0.3	10.1	39.9	10.0	3.1E-06

SAMPLE IMAGES

HYDRAULIC CONDUCTIVITY
Malibu Creek EWMP
Los Angeles County, California

Appendix D: Regional BMP Cost Details

APPENDIX D: REGIONAL BMP COST DETAILS

The whole life cycle costs for the eight proposed regional BMPs can be found below. All projects are in preliminary design phase and their estimated costs are based on each projects current design concept. As each project advances through the design process it is anticipated that estimated project cost will change. The following construction costs were estimated through professional experience and reference to previous design and build projects in Los Angeles County. Other categories within the tables are a percentage of the construction cost estimate and are based on typical project costs. A breakdown of the design, planning, and permitting costs can be found below:

Table D 1: Capital Cost Breakdown

Activity	Percent of Construction Cost
Utility Relocation	3%
Contingency	20%
Mobilization and Demobilization	5%
Permitting	5%
Construction Management	15%
Engineering and Planning	20%
Annual O&M	2%

The Geotechnical Data Report from Fugro Consultants, Inc. was used to evaluate what BMP options can be implemented at each location. The work performed included data review, site exploration, in-situ percolation testing, laboratory testing, and reporting. The fieldwork included a program of drilling two exploratory drill holes to a maximum of 30 feet of depth and constructing three temporary percolation test wells to a maximum of 15 feet of depth at each site. The test results showed various sites infeasible for infiltration because either the percolation was below the required 0.3 in/hr. standard or high groundwater occurred less than 10 feet below the anticipated invert of the BMP.

In the event infiltration is deemed infeasible, the alternative option for retaining the volume that was modeled in the RAA is a harvest and use BMP. In some cases incidental infiltration and harvest and use will take place at one site. A list of what type of BMP is proposed for each regional BMP can be found below:

Table D 2: Regional BMP Types

BMP ID	BMP Type
LVC-14	Infiltration/Harvest and Use
TC-35	Harvest and Use
MEC-12	Infiltration/Harvest and Use
LC-02	Infiltration/Harvest and Use
TC-29	Infiltration
TC-37	Infiltration
TC-02	Bioretention
MEC-09	Harvest and Use

Table D 3: Whole Life Cycle (20 year) Costs

Phase	Project LVC-14 Cost	Project TC-02 Cost	Project TC-35 Cost	Project MEC-12 Cost	Project LC-02 Cost	Project TC-29 Cost	Project TC-37 Cost	Project MEC-09 Cost
Permitting	$75,000	$36,000	$70,827	$132,398	$78,076	$36,202	$68,060	$58,377
Design and Planning	$500,000	$240,000	$283,308	$529,592	$312,305	$144,806	$272,239	$233,509
Mobilization and Demobilization	$125,000	$60,000	$70,827	$132,398	$78,076	$36,202	$68,060	$58,377
Utility Relocation	$75,000	$36,000	$42,496	$79,439	$46,846	$21,721	$40,836	$35,026
Construction Management	$375,000	$180,000	$212,481	$397,194	$234,229	$108,605	$204,179	$175,132
Contingency	$500,000	$240,000	$283,308	$529,592	$312,305	$144,806	$272,239	$233,509
Construction Cost	$2,500,000	$1,200,000	$1,416,539	$2,647,964	$1,561,524	$724,028	$1,361,197	$1,167,548
Capital Cost	$4,150,000	$1,992,000	$2,379,786	$4,448,577	$2,623,361	$1,216,370	$2,286,810	$1,961,478
Annual O&M	$50,000	$24,000	$28,331	$52,959	$31,230	$14,481	$27,224	$23,351
Whole Life (20-year) Cost	$5,150,000	$2,472,000	$2,946,402	$5,507,763	$3,247,971	$1,505,981	$2,831,289	$2,428,497

Reference

Dpw.lacounty.gov, 'Bid Price History'. N.p., 2015. Web. 8 June 2015.

Appendix E: Legal Authorities

This appendix covers legal authority information, such as documentation and references/links to water quality ordinances for each permittee, demonstrating adequate legal authority to implement and enforce Watershed Control Measures (WCMs) identified in this plan and as required in Section VI.C.5.b.iv.(6) of the MS4 Permit. The goal of these WCMs is to create an efficient program that focuses on the watershed priorities and achieves the following objectives:

- Prevent or eliminate non-storm water discharges to the MS4 that are a source of pollutants from the MS4 to receiving waters.
- Implement pollutant controls necessary to achieve all applicable interim and final water quality-based effluent limitations and/or receiving water limitations pursuant to corresponding compliance schedules.
- Ensure that discharges from the MS4 do not cause or contribute to exceedances of receiving water limitations.

The WCMs include structural and non-structural controls to address water quality objectives. As the requirement to incorporate these WCMs is an element of the MS4 Permits, the legal authority to implement them is based on each agency’s legal authority to implement the NPDES MS4 Permit.

A copy of each participating agency's ordinances related to water quality program elements and watershed control measures identified in the EWMP can be found this appendix.

City of Agoura Hills
Legal Authority

RICHARDS | WATSON | GERSHON
ATTORNEYS AT LAW – A PROFESSIONAL CORPORATION

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Telephone 213.626.8484 Facsimile 213.626.0078

December 1, 2014

VIA ELECTRONIC TRANSMISSION

Mr. Samuel Unger
Executive Officer
Los Angeles Regional Quality Control Board
320 W. 4th Street, Suite 200
Los Angeles, CA 90013
sunger@waterboards.ca.gov

Re: Legal Authority of the City of Agoura Hills to Implement and Enforce the Requirements of 40 C.F.R. § 122.26(d)(2)(i)(A-F) and RWQCB Order R4-2012-0175, NPDES Permit CAS004001

Dear Mr. Unger:

The City of Agoura Hills (the "City"), by and through its City Attorney, hereby submits the following certification ("Statement"), pursuant to Section VI.A.2.b of Order R4-2012-0175 (NPDES Permit CAS004001), issued by the California Regional Water Quality Control Board, Los Angeles Region ("RWQCB") on November 8, 2012 and entitled "Waste Discharge Requirements for Municipal Separate Storm Sewer System ("MS4") Discharges within the Coastal Watersheds of Los Angeles County, Except Those Discharges Originating from the City of Long Beach MS4" (the "Permit").

The City is one of the co-permittees under the Permit. Section VI.A.2.b of the Permit requires the City to provide the RWQCB with a statement by its chief legal counsel, certifying that the City has the legal authority to implement and enforce each of the current requirements set forth in 40 C.F.R. § 122.26(d)(2)(i)(A-F) and the Permit. The purpose of this Statement is to describe the City's compliance with Section VI.A.2.b of the Permit. As discussed in further detail herein, it is our opinion that the City has the necessary legal authority to implement the Permit and to control and prohibit discharges of pollutants into the Municipal Separate Storm Sewer System ("MS4"). However, this Statement is not, nor should it be construed as, a waiver of any rights that the City may have relating to the Permit.

1. Legal Authority Statement

In our opinion, the City has the necessary legal authority to comply with the legal requirements imposed upon it under the Permit, consistent with the requirements set forth in the U.S. Environmental Protection Agency's regulations promulgated under the Clean Water Act, and, specifically, 40 C.F.R. § 122.26(d)(2)(i)(A-F), and to the extent permitted by state and federal law and subject to the limitations on municipal action under the California and United States Constitutions, except as noted herein.

The City, as a general law city, has broad general police powers under the California Constitution to enact legislation for health and public welfare of the community to the extent not preempted by federal or state law. In addition, the City adopted ordinances for the purpose of ensuring that it has adequate legal authority to implement and enforce its storm water control program. The City has the authority under the California Constitution and state statutes to enact and enforce these ordinances, and these ordinances were duly enacted.

2. Ordinances

The City has adopted ordinances related to the regulation of urban runoff to control and prohibit discharges of pollutants into the MS4 and to comply with the requirements of the Permit applicable to it, as well as, to the extent applicable, 40 C.F.R. § 122.26(d)(2)(i)(A)-(F). The City's Storm Water Ordinance (Chapter 5 of Article V of the Agoura Hills Municipal Code ("AHMC")) is the principal City ordinance addressing the control of urban runoff. In addition, we cite, below, the AHMC sections that implement and enforce the following requirements of 40 C.F.R. § 122.26(d)(2)(i)(A)-(F) and the Permit:

i. 40 C.F.R. § 122.26(d)(2)(i)(A); Permit Section VI.A.2.a.i: Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit (AHMC §§ 5505 – Prohibited Activities; and 5508 – Requirements for Industrial/Commercial and Construction Activities);

ii. 40 C.F.R. § 122.26(d)(2)(i)(C); Permit Section VI.A.2.a.ii: Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A (AHMC § 5505(d) – Prohibited Activities);

iii. 40 C.F.R. § 122.26(d)(2)(i)(B); Permit Section VI.A.2.a.iii: Prohibit and eliminate illicit discharges and illicit connections to the MS4 (AHMC § 5505(a) – Prohibited Activities);

iv. 40 C.F.R. § 122.26(d)(2)(i)(C); Permit Section VI.A.2.a.iv: Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4 (AHMC § 5505 – Prohibited Activities);

v. 40 C.F.R. § 122.26(d)(2)(i)(E); Permit Section VI.A.2.a.v: Require compliance with conditions in its ordinances, permits, contracts or orders (*i.e.*, hold dischargers to its MS4 accountable for their contributions of pollutants and flows) (AHMC §§ 5505(e) – Prohibited Activities; and 5510 – Enforcement);

vi. 40 C.F.R. § 122.26(d)(2)(i)(E)-(F); Permit Section VI.A.2.a.vi: Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders (AHMC § 5510 – Enforcement);

vii. 40 C.F.R. § 122.26(d)(2)(i)(D); Permit Section VI.A.2.a.vii: Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among copermittees (AHMC §§ 5505(e) – Prohibited Activities; and 5506 – Exempted Discharges, Conditionally Exempted Discharges, or Designated Discharges);

viii. 40 C.F.R. § 122.26 (d)(2)(i)(D); Permit Section VI.A.2.a.viii: Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation (AHMC §§ 5505(e) – Prohibited Activities; and 5506 – Exempted Discharges, Conditionally Exempted Discharges, or Designated Discharges);

ix. 40 C.F.R. § 122.26(d)(2)(i)(F); Permit Section VI.A.2.a.ix: Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the City has the authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4 (AHMC §§ 5509 – Standard Urban Storm Water Mitigation Plan (SUSMP) for New Development and Redevelopment Projects; 5510 – Enforcement; Chapter 6 of Article V of the AHMC – Nuisance Abatement);

x. 40 C.F.R. § 122.26(d)(2)(i)(E); Permit Section VI.A.2.a.x: Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations (AHMC §§ 5509 – Standard Urban Storm Water Mitigation Plan (SUSMP) for New Development and Redevelopment Projects; 5510 – Enforcement; Chapter 6 of Article V of the AHMC –Nuisance Abatement);

xi. 40 C.F.R. § 122.26(d)(2)(i)(E); Permit Section VI.A.2.a.xi: Require that structural BMPs are properly operated and maintained (AHMC §§ 5509 – Standard Urban Storm Water Mitigation Plan (SUSMP) for New Development and Redevelopment Projects; 5510 – Enforcement); and

xii. 40 C.F.R. § 122.26(d)(2)(i)(E); Permit Section VI.A.2.a.xii: Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4 (AHMC §§ 5509 – Standard Urban Storm Water Mitigation Plan (SUSMP) for New Development and Redevelopment Projects; 5510 – Enforcement).

3. Implementation

Some of the City's ordinances are implemented through permit programs and others are implemented as regulatory programs. Under each ordinance, one or more City departments or department directors are authorized and directed in each ordinance to take the actions contemplated by the ordinance (*e.g.*, to consider evidence and make findings, to issue or deny permits, to impose conditions on projects, to inspect, to take enforcement action, etc.).

The City's Storm Water Ordinance (Chapter 5 of Article V of the AHMC) is the principal City ordinance addressing the control of urban runoff. This ordinance is regulatory, and applies to specified new and existing residential and business communities and associated facilities and activities, as well as new development and redevelopment, and all other specified new and existing facilities and activities that threaten to discharge pollutants within the boundaries of the City and within its regulatory jurisdiction, whether or not a City permit or approval is required. The City's Storm Water Ordinance also contains discharge prohibitions and requirements for the implementation of BMPs and other requirements necessary to implement the Permit.

Other City departments require compliance with the City's Storm Water Ordinance as a condition for issuance of relevant City permits. City departments may also impose specific conditions of approval consistent with the City's Storm Water Ordinance. All City environmental ordinances are also implemented, in part, through the application of the CEQA process to proposed projects.

4. Administrative and Judicial/Legal Procedures

In addition to the above authority, the City has in place various legal and administrative procedures to assist in enforcing the various urban runoff related Ordinances, including the following:

A. Administrative Remedies

- General Penalties (Chapter 2 of Article I of the AHMC; and AHMC § 5510)
- Administrative Penalties and Citations (Chapter 2 of Article I of the AHMC; and AHMC § 5510)

B. Nuisance Remedies

- Public nuisance under State law
- City nuisance abatement (Chapter 6 of Article V of the AHMC and AHMC § 5510(a))

C. Criminal Remedies

- Misdemeanor citations/prosecution (AHMC §§ 1200(a) and 5510(e))

D. Equitable Remedies

- Injunctive relief under State law and the Agoura Hills Municipal Code
- Declaratory relief under State law

E. Other Civil Remedies

- Federal law claims (*e.g.*, Clean Water Act and Resource Conservation and Recovery Act Citizen Suits)

- Remedies under the California Government Code

Violations of the City's Storm Water Ordinance are deemed a "public nuisance", in which case enforcement actions can be completed administratively or judicially when necessary.

RICHARDS | WATSON | GERSHON
ATTORNEYS AT LAW – A PROFESSIONAL CORPORATION

Please contact me if you have any questions or if you need any additional information regarding the City's legal authority to enforce the Permit.

Very truly yours,

Candice K. Lee
City Attorney
City of Agoura Hills

cc: Ramiro Adeva, City Engineer
Kelly Fisher, Public Works Project Manager
Joe Bellomo, Willdan
Norman A. Dupont, Esq.

City of Calabasas
Legal Authority

STATEMENT OF LEGAL AUTHORITY TO ENFORCE PROVISIONS OF 40 CFR Sec. 1.22.26(d)

Pursuant to Part VI.A.2b. of Order No. R4-2012-0175, the City of Calabasas has all the necessary legal authority to implement and enforce the requirements contained in 40 CFR Sec. 1.22.26(d)(2)(i)(A-F) and this Order during the reporting period of July 1, 2012 and June 30, 2013 pursuant to citation to the relevant Municipal Code provisions as set forth below:

1. Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity, and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.

Chapter 8.28, Article II "Discharge Prohibitions and Requirements", sections 8.28.050-8.28.125.

2. Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part M.A.

Chapter 8.28, Articles I through III.

8. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation.

Chapter 8.28, Articles I through III.

9. Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4.

Chapter 8.28, Article III, Section 8.28.130 A-D.

10. Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standard/receiving water limitations.

Chapter 8.28, sections 8.28.070 and 8.28.125.

11. Require that structural BMP's are properly operated and maintained.

Chapter 8.28, section 8.28.125K

12. Require documentation on the operation and maintenance of structural BMP's and their effectiveness in reducing the discharge of pollutants to the MS4.

Chapter 8.28, section 8.28.125K and 8.28.130A.

The City of Calabasas legal processes and procedures available to mandate compliance with applicable municipal ordinances identified above, and therefore with the conditions of the Order, can be found in **Chapter 8.28, Article III, "Inspection and Enforcement".**

Violations are deemed a public nuisance subject to abatement through various alternatives including, but not limited to, administrative orders to cease and desist; administrative citation; permit revocation; civil action; and criminal prosecution (misdemeanor).

Dated ______ / 3

Scott H. Howard
City Attorney

County of Los Angeles Legal Authority

COUNTY OF LOS ANGELES
OFFICE OF THE COUNTY COUNSEL
648 KENNETH HAHN HALL OF ADMINISTRATION
500 WEST TEMPLE STREET
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December 16, 2013

Mr. Samuel Unger, P.E., Executive Officer
California Regional Water Quality Control Board – Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013-2343

Attention: Mr. Ivar Ridgeway

Re: Certification By Legal Counsel For County of Los Angeles' Annual Report

Dear Mr. Unger:

Pursuant to the requirements of Part VI(A)(2)(b) of Order No. R4-2012-0175 (the "Order"), the Office of the County Counsel of the County of Los Angeles makes the following certification in support of the Annual Report of the County of Los Angeles ("County"):

Certification Pursuant To Order Part VI(A)(2)(b)

"*Each Permittee must submit a statement certified by its chief legal counsel that the Permittee has the legal authority within its jurisdiction to implement and enforce the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and this Order.*"

The County has the legal authority within its jurisdiction to implement and enforce each of the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and the Order.

Order Part VI(A)(2)(b)(i)

"*Citation of applicable municipal ordinances or other appropriate legal authorities and their relationship to the requirements of 40 CFR §122.26(d)(2)(i)(A-F) and this Order*"

Citations Of Applicable Ordinances Or Other Legal Authorities

Although many portions of State law, the Charter of the County of Los Angeles and the Los Angeles County Code are potentially applicable to the implementation and enforcement of these requirements, the primary applicable laws and ordinances are as follows:

Los Angeles County Code, Title 12, Chapter 12.80 STORMWATER AND RUNOFF POLLUTION CONTROL, including:

§12.80.010 - §12.80.360 Definitions

§12.80.370 Short title.

§12.80.380 Purpose and intent.

§12.80.390 Applicability of this chapter.

§12.80.400 Standards, guidelines and criteria.

§12.80.410 Illicit discharges prohibited.

§12.80.420 Installation or use of illicit connections prohibited.

§12.80.430 Removal of illicit connection from the storm drain system.

§12.80.440 Littering and other discharge of polluting or damaging substances prohibited.

§12.80.450 Stormwater and runoff pollution mitigation for construction activity.

§12.80.460 Prohibited discharges from industrial or commercial activity.

§12.80.470 Industrial/commercial facility sources required to obtain a NPDES permit.

§12.80.480 Public facility sources required to obtain a NPDES permit.

§12.80.490 Notification of uncontrolled discharges required.

§12.80.500 Good housekeeping provisions.

§12.80.510 Best management practices for construction activity.

§12.80.520 Best management practices for industrial and commercial facilities.

§12.80.530 Installation of structural BMPs.

§12.80.540 BMPs to be consistent with environmental goals.

§12.80.550 Enforcement—Director's powers and duties.

§12.80.560 Identification for inspectors and maintenance personnel.

§12.80.570 Obstructing access to facilities prohibited.

§12.80.580 Inspection to ascertain compliance—Access required.

§12.80.590 Interference with inspector prohibited.

§12.80.600 Notice to correct violations—Director may take action.

§12.80.610 Violation a public nuisance.

§12.80.620 Nuisance abatement—Director to perform work when—Costs.

§12.80.630 Violation—Penalty.

§12.80.635 Administrative fines.

§12.80.640 Penalties not exclusive.

§12.80.650 Conflicts with other code sections.

§12.80.660 Severability.

§12.80.700 Purpose.

§12.80.710 Applicability.

§12.80.720 Registration required.

§12.80.730 Exempt facilities.

§12.80.740 Certificate of inspection—Issuance by the director.

§12.80.750 Certificate of inspection—Suspension or revocation.

§12.80.760 Certificate of inspection—Termination.

§12.80.770 Service fees.

§12.80.780 Fee schedule.

§12.80.790 Credit for overlapping inspection programs.

§12.80.800 Annual review of fees.

Los Angeles County Code, Title 12, Chapter 12.84 LOW IMPACT DEVELOPMENT STANDARDS, including:

§12.84.410 Purpose.

§12.84.420 Definitions.

§12.84.430 Applicability.

§12.84.440 Low Impact Development Standards.

§12.84.445 Hydromodification Control.

§12.84.450 LID Plan Review.

§12.84.460 Additional Requirements.

Los Angeles County Code, Title 22 PLANNING AND ZONING, Part 6 ENFORCEMENT PROCEDURES, including:

§22.60.330 General prohibitions.

§22.60.340 Violations.

§22.60.350 Public nuisance.

§22.60.360 Infractions.

§22.60.370 Injunction.

§22.60.380 Enforcement.

§22.60.390 Zoning enforcement order and noncompliance fee.

Los Angeles County Code, Title 26 BUILDING CODE, including:

§26.103 Violations And Penalties

§26.104 Organization And Enforcement

§26.105 Appeals Boards

§26.106 Permits

§26.107 Fees

§26.108 Inspections

California Government Code §6502

California Government Code §23004

Relationship Of Applicable Ordinances Or Other Legal Authorities To The Requirements of 40 CFR §122.26(d)(2)(i)(A-F) And The Order

Although, depending upon the particular issue, there may be multiple ways in which particular sections of the County's ordinances and State law relate to the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and the Order, the table below indicates the basic relationship with Part VI(A)(2)(a) of the Order:

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
i. Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.	§12.80.410 [illicit discharge prohibited]; §12.80.450 [construction] §12.80.460 [industrial and commercial] §12.80.470 and .480 [industrial and commercial NPDES requirements] §12.84.440 [LID standards] §12.84.445 [hydromodification control] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions]

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Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§22.60.340 [violations] §22.60.350 [public nuisance] §22.60.360 [infractions] §22.60.370 [injunction] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.103 [violations and penalties] §26.104 [enforcement] §26.106 [permits] §26.108 [inspections]
ii. Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.	§12.80.410 [illicit discharge prohibited]
iii. Prohibit and eliminate illicit discharges and illicit connections to the MS4.	§12.80.410 [illicit discharge prohibited]; §12.80.420 [illicit connections prohibited]
iv. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.	§12.80.410 [illicit discharge prohibited]; §12.80.440 [littering and other polluting prohibited]

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Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
v. Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows).	§12.80.490 [notification of uncontrolled discharge] §12.80.570 [obstructing access to facilities] §12.80.580 [compliance inspection] §12.80.610 [violation a nuisance] §12.620 [nuisance abatement] §12.80.635 [violation penalty] §12.80.640 [penalties not exclusive] §12.84.440 [LID standards] §12.84.445 [hydromodification control] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.340 [violations] §22.60.350 [public nuisance] §22.60.360 [infractions] §22.60.370 [injunction] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.103 [violations and penalties] §26.104 [enforcement] §26.106 [permits] §26.108 [inspections]
vi. Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.	Same as item v., above

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Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
vii. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees.	California Government Code §6502 and §23004
viii. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation.	California Government Code §6502 and §23004
ix. Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4.	§12.80.490 [notification of uncontrolled discharge] §12.80.570 [obstructing access to facilities] §12.80.580 [compliance inspection] §12.80.610 [violation a nuisance] §12.80.620 [nuisance abatement] §12.80.635 [violation penalty] §12.80.640 [penalties not exclusive] §22.60.380 [enforcement.] §26.106 [permits] §26.108 [inspections]

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Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
x. Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations.	§12.80.450 [construction mitigation] §12.80.500 [good housekeeping practices] §12.80.510 [construction BMPs] §12.80.520 [industrial/commercial BMPs] §12.84.440 [LID standards] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections]
xi. Require that structural BMPs are properly operated and maintained.	§12.80.530 [installation of structural BMPs] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections]
xii. Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.	§12.80.530 [installation of structural BMPs] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections]

Order Part VI(A)(2)(b)(ii)

"*Identification of the local administrative and legal procedures available to mandate compliance with applicable municipal ordinances identified in subsection (i) above and therefore with the conditions of this Order, and a statement as to whether enforcement actions can be completed administratively or whether they must be commenced and completed in the judicial system.*"

The local administrative and legal procedures available to mandate compliance with the above ordinances are specified in those ordinances, particularly in:

§12.80.550 Enforcement—Director's powers and duties.

§12.80.600 Notice to correct violations—Director may take action.

§12.80.610 Violation a public nuisance.

§12.80.620 Nuisance abatement—Director to perform work when—Costs.

§12.80.630 Violation—Penalty.

§12.80.635 Administrative fines.

§12.80.640 Penalties not exclusive.

§12.84.450 LID Plan Review.

§12.84.460 Additional Requirements.

Title 26, §103 Violations And Penalties

Title 26, §104 Organization And Enforcement

Title 26, §105 Appeals Boards

Title 26, §106 Permits

Title 22 PLANNING AND ZONING, Part 6 ENFORCEMENT PROCEDURES, including:

§22.60.330 General prohibitions.

§22.60.340 Violations.

§22.60.350 Public nuisance.

§22.60.360 Infractions.

§22.60.370 Injunction.

§22.60.380 Enforcement.

§22.60.390 Zoning enforcement order and noncompliance fee.

The County attempts to first resolve each enforcement action administratively. However, the above cited ordinances also provide the County with the authority to pursue such actions in the judicial system as necessary.

Very truly yours,

JOHN F. KRATTLI
County Counsel

By Judith A. Fries
JUDITH A. FRIES
Principal Deputy County Counsel
Public Works Division

JAF:jyj

Los Angeles County Flood Control District Legal Authority

COUNTY OF LOS ANGELES
OFFICE OF THE COUNTY COUNSEL
648 KENNETH HAHN HALL OF ADMINISTRATION
500 WEST TEMPLE STREET
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December 16, 2013

Mr. Samuel Unger, P.E., Executive Officer
California Regional Water Quality Control Board – Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013-2343

Attention: Mr. Ivar Ridgeway

Re: Certification By Legal Counsel For Los Angeles County Flood Control District's Annual Report

Dear Mr. Unger:

Pursuant to the requirements of Part VI(A)(2)(b) of Order No. R4-2012-0175 (the "Order"), the Office of the County Counsel of the County of Los Angeles makes the following certification in support of the Annual Report of the Los Angeles County Flood Control District ("LACFCD"):

<u>Certification Pursuant To Order Part VI(A)(2)(b)</u>

"*Each Permittee must submit a statement certified by its chief legal counsel that the Permittee has the legal authority within its jurisdiction to implement and enforce the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and this Order.*"

LACFCD has the legal authority within its jurisdiction to implement and enforce each of the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and the Order.

<u>Order Part VI(A)(2)(b)(i)</u>

"*Citation of applicable municipal ordinances or other appropriate legal authorities and their relationship to the requirements of 40 CFR §122.26(d)(2)(i)(A-F) and this Order*"

Citations Of Applicable Ordinances Or Other Legal Authorities

Although many portions of State law, the Charter of the County of Los Angeles, the Los Angeles County Code and LACFCD's Flood Control District Code ("Code") are potentially applicable to the implementation and enforcement of these requirements, the primary applicable laws and ordinances are as follows:

Los Angeles County Code, Title 12, Chapter 12.80 STORMWATER AND RUNOFF POLLUTION CONTROL, including:

§12.80.010 - §12.80.360 Definitions

§12.80.370 Short title.

§12.80.380 Purpose and intent.

§12.80.390 Applicability of this chapter.

§12.80.400 Standards, guidelines and criteria.

§12.80.410 Illicit discharges prohibited.

§12.80.420 Installation or use of illicit connections prohibited.

§12.80.430 Removal of illicit connection from the storm drain system.

§12.80.440 Littering and other discharge of polluting or damaging substances prohibited.

§12.80.450 Stormwater and runoff pollution mitigation for construction activity.

§12.80.460 Prohibited discharges from industrial or commercial activity.

§12.80.470 Industrial/commercial facility sources required to obtain a NPDES permit.

§12.80.480 Public facility sources required to obtain a NPDES permit.

§12.80.490 Notification of uncontrolled discharges required.

§12.80.500 Good housekeeping provisions.

§12.80.510 Best management practices for construction activity.

§12.80.520 Best management practices for industrial and commercial facilities.

§12.80.530 Installation of structural BMPs.

§12.80.540 BMPs to be consistent with environmental goals.

§12.80.550 Enforcement—Director's powers and duties.

§12.80.560 Identification for inspectors and maintenance personnel.

§12.80.570 Obstructing access to facilities prohibited.

§12.80.580 Inspection to ascertain compliance—Access required.

§12.80.590 Interference with inspector prohibited.

§12.80.600 Notice to correct violations—Director may take action.

§12.80.610 Violation a public nuisance.

§12.80.620 Nuisance abatement—Director to perform work when—Costs.

§12.80.630 Violation—Penalty.

§12.80.635 Administrative fines.

§12.80.640 Penalties not exclusive.

§12.80.650 Conflicts with other code sections.

§12.80.660 Severability.

§12.80.700 Purpose.

§12.80.710 Applicability.

§12.80.720 Registration required.

§12.80.730 Exempt facilities.

§12.80.740 Certificate of inspection—Issuance by the director.

§12.80.750 Certificate of inspection—Suspension or revocation.

§12.80.760 Certificate of inspection—Termination.

§12.80.770 Service fees.

§12.80.780 Fee schedule.

§12.80.790 Credit for overlapping inspection programs.

§12.80.800 Annual review of fees.

Los Angeles County Code, Title 12, Chapter 12.84 LOW IMPACT DEVELOPMENT STANDARDS, including:

§12.84.410 Purpose.

§12.84.420 Definitions.

§12.84.430 Applicability.

§12.84.440 Low Impact Development Standards.

§12.84.445 Hydromodification Control.

§12.84.450 LID Plan Review.

§12.84.460 Additional Requirements.

Los Angeles County Code, Title 22 PLANNING AND ZONING, Part 6 ENFORCEMENT PROCEDURES, including:

§22.60.330 General prohibitions.

§22.60.340 Violations.

§22.60.350 Public nuisance.

§22.60.360 Infractions.

§22.60.370 Injunction.

§22.60.380 Enforcement.

§22.60.390 Zoning enforcement order and noncompliance fee.

Los Angeles County Code, Title 26 BUILDING CODE, including:

§26.103 Violations And Penalties

§26.104 Organization And Enforcement

§26.105 Appeals Boards

§26.106 Permits

§26.107 Fees

§26.108 Inspections

LACFCD Code Chapter 21 - STORMWATER AND RUNOFF POLLUTION CONTROL including:

§21.01 Purpose and Intent

§21.03 Definitions

§21.05 Standards, Guidelines, and Criteria

§21.07 Prohibited Discharges

§21.09 Installation or Use of Illicit Connections Prohibited

§21.11 Littering Prohibited

§21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity

§21.15 Notification of Uncontrolled Discharges Required

§21.17 Requirement to Monitor and Analyze

§21.19 Conflicts With Other Code Sections

§21.21 Severability

§21.23 Violation a Public Nuisance

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California Government Code §6502

California Government Code §23004

California Water Code §8100 *et. seq.*

Relationship Of Applicable Ordinances Or Other Legal Authorities To The Requirements of 40 CFR §122.26(d)(2)(i)(A-F) And The Order

Although, depending upon the particular issue, there may be multiple ways in which particular sections of the County of Los Angeles' ordinances, LACFCD's ordinances, and statutes relate to the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and the Order, the table below indicates the basic relationship with Part VI(A)(2)(a) of the Order:

Order Part VI(A)(2)(a) Items	**Primary Applicable Ordinance/Statute**
i. Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited]; §12.80.450 [construction] §12.80.460 [industrial and commercial] §12.80.470 and .480 [industrial and commercial NPDES requirements] §12.84.440 [LID standards] §12.84.445 [hydromodification control] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.340 [violations] §22.60.350 [public nuisance] §22.60.360 [infractions] §22.60.370 [injunction] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.103 [violations and penalties]

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§26.104 [enforcement] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
ii. Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited] LACFCD Code: §21.07 Prohibited Discharges
iii. Prohibit and eliminate illicit discharges and illicit connections to the MS4.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited]; §12.80.420 [illicit connections prohibited] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.23 Violation a Public Nuisance

California Regional Water Quality Control Board, Los Angeles Region
December 16, 2013
Page 8

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
iv. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited]; §12.80.440 [littering and other polluting prohibited] LACFCD Code: §19.07 Interference With or Placing Obstructions, Refuse, Contaminating Substances, or Invasive Species in Facilities Prohibited §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
v. Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows).	Los Angeles County Code: §12.80.490 [notification of uncontrolled discharge] §12.80.570 [obstructing access to facilities] §12.80.580 [compliance inspection] §12.80.610 [violation a nuisance] §12.620 [nuisance abatement] §12.80.635 [violation penalty]

California Regional Water Quality Control Board, Los Angeles Region
December 16, 2013
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Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§12.80.640 [penalties not exclusive] §12.84.440 [LID standards] §12.84.445 [hydromodification control] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.340 [violations] §22.60.350 [public nuisance] §22.60.360 [infractions] §22.60.370 [injunction] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.103 [violations and penalties] §26.104 [enforcement] §26.106 [permits] §26.108 [inspections] LACFCD Code: §19.11 Violation a Public Nuisance §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze

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Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§21.19 Conflicts With Other Code Sections §21.23 Violation a Public Nuisance
vi. Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.	Same as item v., above
vii. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees.	California Government Code §6502 California Government Code §23004
viii. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation.	California Government Code §6502 California Government Code §23004
ix. Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4.	Los Angeles County Code: §12.80.490 [notification of uncontrolled discharge] §12.80.570 [obstructing access to facilities] §12.80.580 [compliance inspection] §12.80.610 [violation a nuisance] §12.80.620 [nuisance abatement] §12.80.635 [violation penalty] §12.80.640 [penalties not exclusive] §22.60.380 [enforcement.] §26.106 [permits] §26.108 [inspections]

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Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
x. Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations.	Los Angeles County Code: §12.80.450 [construction mitigation] §12.80.500 [good housekeeping practices] §12.80.510 [construction BMPs] §12.80.520 [industrial/commercial BMPs] §12.84.440 [LID standards] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
xi. Require that structural BMPs are properly operated and maintained.	Los Angeles County Code: §12.80.530 [installation of structural BMPs] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§21.23 Violation a Public Nuisance
xii. Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.	Los Angeles County Code: §12.80.530 [installation of structural BMPs] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance

Order Part VI(A)(2)(b)(ii)

"*Identification of the local administrative and legal procedures available to mandate compliance with applicable municipal ordinances identified in subsection (i) above and therefore with the conditions of this Order, and a statement as to whether enforcement actions can be completed administratively or whether they must be commenced and completed in the judicial system.*"

The local administrative and legal procedures available to mandate compliance with the above ordinances are specified in those ordinances, particularly in:

Los Angeles County Code:

§12.80.550 Enforcement—Director's powers and duties.

§12.80.600 Notice to correct violations—Director may take action.

§12.80.610 Violation a public nuisance.

§12.80.620 Nuisance abatement—Director to perform work when—Costs.

§12.80.630 Violation—Penalty.

§12.80.635 Administrative fines.

§12.80.640 Penalties not exclusive.

§12.84.450 LID Plan Review.

§12.84.460 Additional Requirements.

Title 26, §103 Violations And Penalties

Title 26, §104 Organization And Enforcement

Title 26, §105 Appeals Boards

Title 26, §106 Permits

§22.60.330 General prohibitions.

§22.60.340 Violations.

§22.60.350 Public nuisance.

§22.60.360 Infractions.

§22.60.370 Injunction.

§22.60.380 Enforcement.

§22.60.390 Zoning enforcement order and noncompliance fee.

LACFCD Code:

§21.05 Standards, Guidelines, and Criteria

§21.07 Prohibited Discharges

§21.09 Installation or Use of Illicit Connections Prohibited

§21.11 Littering Prohibited

§21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity

§21.15 Notification of Uncontrolled Discharges Required

§21.17 Requirement to Monitor and Analyze

§21.23 Violation a Public Nuisance

LACFCD attempts to first resolve each enforcement action administratively. However, the above cited ordinances also provide LACFCD with the authority to pursue such actions in the judicial system as necessary.

Very truly yours,

JOHN F. KRATTLI
County Counsel

By Judith A. Fries
JUDITH A. FRIES
Principal Deputy County Counsel
Public Works Division

JAF:jyj

City of Hidden Hills Legal Authority

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355 South Grand Avenue, 40th Floor, Los Angeles, California 90071-3101
Telephone 213.626.8484 Facsimile 213.626.0078

December 3, 2014

VIA ELECTRONIC TRANSMISSION

Mr. Samuel Unger
Executive Officer
Los Angeles Regional Quality Control Board
320 W. 4th Street, Suite 200
Los Angeles, CA 90013
sunger@waterboards.ca.gov

Re: Legal Authority of the City of Hidden Hills to Implement and Enforce the Requirements of 40 C.F.R. § 122.26(d)(2)(i)(A-F) and RWQCB Order R4-2012-0175, NPDES Permit CAS004001

Dear Mr. Unger:

The City of Hidden Hills (the "City"), by and through its City Attorney, hereby submits the following certification ("Statement"), pursuant to Section VI.A.2.b of Order R4-2012-0175 (NPDES Permit CAS004001), issued by the California Regional Water Quality Control Board, Los Angeles Region ("RWQCB") on November 8, 2012 and entitled "Waste Discharge Requirements for Municipal Separate Storm Sewer System ("MS4") Discharges within the Coastal Watersheds of Los Angeles County, Except Those Discharges Originating from the City of Long Beach MS4" (the "Permit").

The City is one of the co-permittees under the Permit. Section VI.A.2.b of the Permit requires the City to provide the RWQCB with a statement by its chief legal counsel, certifying that the City has the legal authority to implement and enforce each of the current requirements set forth in 40 C.F.R. § 122.26(d)(2)(i)(A-F) and the Permit. The purpose of this Statement is to describe the City's compliance with Section VI.A.2.b of the Permit. As discussed in further detail herein, it is our opinion that the City has the necessary legal authority to implement the Permit and to control and prohibit discharges of pollutants into the Municipal Separate Storm Sewer System ("MS4"). However, this Statement is not, nor should it be construed as, a waiver of any rights that the City may have relating to the Permit.

1. Legal Authority Statement

In our opinion, the City has the necessary legal authority to comply with the legal requirements imposed upon it under the Permit, consistent with the requirements set forth in the U.S. Environmental Protection Agency's regulations promulgated under the Clean Water Act, and, specifically, 40 C.F.R. § 122.26(d)(2)(i)(A-F), and to the extent permitted by state and federal law and subject to the limitations on municipal action under the California and United States Constitutions, except as noted herein.

The City, as a general law city, has broad general police powers under the California Constitution to enact legislation for health and public welfare of the community to the extent not preempted by federal or state law. In addition, the City adopted ordinances for the purpose of ensuring that it has adequate legal authority to implement and enforce its storm water control program. The City has the authority under the California Constitution and state statutes to enact and enforce these ordinances, and these ordinances were duly enacted.

2. Ordinances

The City has adopted ordinances related to the regulation of urban runoff to control and prohibit discharges of pollutants into the MS4 and to comply with the requirements of the Permit applicable to it, as well as, to the extent applicable, 40 C.F.R. § 122.26(d)(2)(i)(A)-(F). The City's Storm Water Ordinance (Chapter 11 of Title 3 of the Hidden Hills Municipal Code ("HHMC")) is the principal City ordinance addressing the control of urban runoff. In addition, we cite, below, the HHMC sections that implement and enforce the following requirements of 40 C.F.R. § 122.26(d)(2)(i)(A)-(F) and the Permit:

i. 40 C.F.R. § 122.26(d)(2)(i)(A); Permit Section VI.A.2.a.i: Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit (HHMC §§ 3-11-6 — Prohibited Activities; and 3-11-9 — Requirements for Construction Activities);

ii. 40 C.F.R. § 122.26(d)(2)(i)(C); Permit Section VI.A.2.a.ii: Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A (HHMC § 3-11-9.D — Prohibited Activities);

iii. 40 C.F.R. § 122.26(d)(2)(i)(B); Permit Section VI.A.2.a.iii: Prohibit and eliminate illicit discharges and illicit connections to the MS4 (HHMC § 3-11-6.A — Prohibited Activities);

iv. 40 C.F.R. § 122.26(d)(2)(i)(C); Permit Section VI.A.2.a.iv: Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4 (HHMC § 3-11-6 — Prohibited Activities);

v. 40 C.F.R. § 122.26(d)(2)(i)(E); Permit Section VI.A.2.a.v: Require compliance with conditions in its ordinances, permits, contracts or orders *(i.e.,* hold dischargers to its MS4 accountable for their contributions of pollutants and flows) (HHMC §§ 3-11-6.E — Prohibited Activities; and 3-11-10.F - Enforcement);

vi. 40 C.F.R. § 122.26(d)(2)(i)(E)-(F); Permit Section VI.A.2.a.vi: Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders (HHMC § 3-11-10 — Enforcement);

vii. 40 C.F.R. § 122.26(d)(2)(i)(D); Permit Section VI.A.2.a.vii: Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among copermittees (HHMC §§ 3-11-6 — Prohibited Activities; and 3-11-7 — Exempted Discharges, Conditionally Exempted Discharges, or Designated Discharges);

viii. 40 C.F.R. § 122.26 (d)(2)(i)(D); Permit Section VI.A.2.a.viii: Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation (HHMC §§ 3-11-6 — Prohibited Activities; and 3-11-7 — Exempted Discharges, Conditionally Exempted Discharges, or Designated Discharges);

ix. 40 C.F.R. § 122.26(d)(2)(i)(F); Permit Section VI.A.2.a.ix: Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the City has the authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4 (HHMC §§ 3-11-10 — Enforcement; Chapter 7 of Title 3 — Nuisances; and Chapter 5 of Title 1 — General Penalty);

x. 40 C.F.R. § 122.26(d)(2)(i)(E); Permit Section VI.A.2.a.x: Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations (HHMC §§ 3-11-10 - Enforcement; Chapter 7 of Title 3 — Nuisances; and Chapter 5 of Title 1 — General Penalty);

xi. 40 C.F.R. § 122.26(d)(2)(i)(E); Permit Section VI.A.2.a.xi: Require that structural BMPs are properly operated and maintained (HHMC §§ 3-11-8.F - Good Housekeeping Provisions; and 3-11-10 — Enforcement; Chapter 7 of Title 3 — Nuisances; and Chapter 5 of Title 1 — General Penalty); and

xii. 40 C.F.R. § 122.26(d)(2)(i)(E); Permit Section VI.A.2.a.xii: Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4 (HHMC §§ 3-11 -8.F — Good Housekeeping Provisions; and 3-11-10 — Enforcement).

3. Implementation

Some of the City's ordinances are implemented through permit programs and others are implemented as regulatory programs. Under each ordinance, the City is authorized and directed in each ordinance to take the actions contemplated by the ordinance *(e.g.,* to consider evidence and make findings, to issue or deny permits, to impose conditions on projects, to inspect, to take enforcement action, etc.).

The City's Storm Water Ordinance (Chapter 11 of Title 3 of the HHMC) is the principal City ordinance addressing the control of urban runoff. This ordinance is regulatory, and applies to specified new and existing residential and business uses and associated facilities and activities, as well as new development and redevelopment, and all other specified new and existing facilities and activities that threaten to discharge pollutants within the boundaries of the City and within its regulatory jurisdiction, whether or not a City permit or approval is required. The City's Storm Water Ordinance also contains discharge prohibitions and requirements for the implementation of BMPs and other requirements necessary to implement the Permit.

The City requires compliance with the City's Storm Water Ordinance as a condition for issuance of relevant City permits. The City may also impose specific conditions of approval consistent with the City's Storm Water Ordinance. All City environmental ordinances are also implemented, in part, through the application of the CEQA process to proposed projects.

4. Administrative and Judicial/Legal Procedures

In addition to the above authority, the City has in place various legal and administrative procedures to assist in enforcing the various urban runoff related Ordinances, including the following:

A. Administrative Remedies

- General Penalties (Chapter 5 of Title 1 of the HHMC; and HHMC § 3-11-10)
- Administrative Penalties and Citations (Chapter 5 of Title 1 of the HHMC; and HHMC § 3-11-10)

RICHARDS WATSON GERSHON
ATTORNEYS AT LAW -A PROFESSIONAL CORPORATION

B. Nuisance Remedies

- Public nuisance under State law
- City nuisance abatement (HHMC §§ 1-5-2 and 3-11-10; and Chapter 7 of Title 3 of HHMC)

C. Criminal Remedies

- Misdemeanor citations/prosecution (HHMC § 1-5-1.A and 3-11-10)

D. Equitable Remedies

- Injunctive relief under State law and the Hidden Hills Municipal Code
- Declaratory relief under State law

E. Other Civil Remedies

- Federal law claims *(e.g.,* Clean Water Act and Resource Conservation and Recovery Act Citizen Suits)
- Remedies under the California Government Code

Violations of the City's Storm Water Ordinance are deemed a "public nuisance", in which case enforcement actions can be completed administratively, or judicially when necessary.

Please contact me if you have any questions or if you need any additional information regarding the City's legal authority to enforce the Permit.

Very truly yours,

Roxanne M. Diaz
City Attorney
City of Hidden Hills

cc: Cherie Paglia, City Manager
Dirk Lovett, City Engineer
Joe Bellomo, Willdan
Candice K. Lee, Esq.

City of Westlake Village Legal Authority

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December 1, 2014

VIA ELECTRONIC TRANSMISSION

Mr. Samuel Unger
Executive Officer
Los Angeles Regional Quality Control Board
320 W. 4th Street, Suite 200
Los Angeles, CA 90013
sunger@waterboards.ca.gov

Re: Legal Authority of the City of Westlake Village to Implement and Enforce the Requirements of 40 C.F.R. § 122.26(d)(2)(i)(A-F) and RWQCB Order R4-2012-0175, NPDES Permit CAS004001

Dear Mr. Unger:

The City of Westlake Village (the "City"), by and through its City Attorney, hereby submits the following certification ("Statement"), pursuant to Section VI.A.2.b of Order R4-2012-0175 (NPDES Permit CAS004001), issued by the California Regional Water Quality Control Board, Los Angeles Region ("RWQCB") on November 8, 2012 and entitled "Waste Discharge Requirements for Municipal Separate Storm Sewer System ("MS4") Discharges within the Coastal Watersheds of Los Angeles County, Except Those Discharges Originating from the City of Long Beach MS4" (the "Permit").

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1. Legal Authority Statement

In our opinion, the City has the necessary legal authority to comply with the legal requirements imposed upon it under the Permit, consistent with the requirements set forth in the U.S. Environmental Protection Agency's regulations promulgated under the Clean Water Act, and, specifically, 40 C.F.R. § 122.26(d)(2)(i)(A-F), and to the extent permitted by state and federal law and subject to the limitations on municipal action under the California and United States Constitutions, except as noted herein.

The City, as a general law city, has broad general police powers under the California Constitution to enact legislation for health and public welfare of the community to the extent not preempted by federal or state law. In addition, the City adopted ordinances for the purpose of ensuring that it has adequate legal authority to implement and enforce its storm water control program. The City has the authority under the California Constitution and state statutes to enact and enforce these ordinances, and these ordinances were duly enacted.

2. Ordinances

The City has adopted ordinances related to the regulation of urban runoff to control and prohibit discharges of pollutants into the MS4 and to comply with the requirements of the Permit applicable to it, as well as, to the extent applicable, 40 C.F.R. § 122.26(d)(2)(i)(A)-(F). The City's Storm Water Ordinance (Westlake Village Municipal Code ("WVMC") Chapter 5.5) is the principal City ordinance addressing the control of urban runoff. In addition, we cite, below, the WVMC sections that implement and enforce the following requirements of 40 C.F.R. § 122.26(d)(2)(i)(A)-(F) and the Permit:

i. 40 C.F.R. § 122.26(d)(2)(i)(A); Permit Section VI.A.2.a.i: Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit (WVMC §§ 5.5.025 — Prohibited Activities; and 5.5.040. - Requirements for Industrial, Commercial and Construction Activities);

ii. 40 C.F.R. § 122.26(d)(2)(i)(C); Permit Section VI.A.2.a.ii: Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A (WVMC § 5.5.025.D — Prohibited Activities);

iii. 40 C.F.R. § 122.26(d)(2)(i)(B); Permit Section VI.A.2.a.iii: Prohibit and eliminate illicit discharges and illicit connections to the MS4 (WVMC § 5.5.025.A — Prohibited Activities);

iv. 40 C.F.R. § 122.26(d)(2)(i)(C); Permit Section VI.A.2.a.iv: Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4 (WVMC § 5.5.025 – Prohibited Activities);

v. 40 C.F.R. § 122.26(d)(2)(i)(E); Permit Section VI.A.2.a.v: Require compliance with conditions in its ordinances, permits, contracts or orders *(i.e.*, hold dischargers to its MS4 accountable for their contributions of pollutants and flows) (WVMC §§ 5.5.025.E – Prohibited Activities; and 5.5.045 - Enforcement);

vi. 40 C.F.R. § 122.26(d)(2)(i)(E)-(F); Permit Section VI.A.2.a.vi: Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders (WVMC § 5.5.045. – Enforcement);

vii. 40 C.F.R. § 122.26(d)(2)(i)(D); Permit Section VI.A.2.a.vii: Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among copermittees (WVMC §§ 5.5.025.E – Prohibited Activities; and 5.5.030 – Exempted Discharges, Conditionally Exempted Discharges, or Designated Discharges);

viii. 40 C.F.R. § 122.26 (d)(2)(i)(D); Permit Section VI.A.2.a.viii: Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation (WVMC §§ 5.5.025.E – Prohibited Activities; and 5.5.030 – Exempted Discharges, Conditionally Exempted Discharges, or Designated Discharges);

ix. 40 C.F.R. § 122.26(d)(2)(i)(F); Permit Section VI.A.2.a.ix: Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the City has the authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4 (WVMC §§ 5.5.041 – Standard Urban Storm Water Mitigation Plan (SUSMP) Requirements for New Development and Redevelopment Projects; 5.5.045 – Enforcement; 4.8.010 – Nuisances Prohibited—Abatement; and 4.8.090 – Abatement by City);

x. 40 C.F.R. § 122.26(d)(2)(i)(E); Permit Section VI.A.2.a.x: Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations (WVMC §§ 5.5.041 - Standard Urban Storm Water Mitigation Plan (SUSMP) Requirements for New Development and Redevelopment Projects; 5.5.045. — Enforcement; and 4.8.010 — Nuisances Prohibited — Abatement);

xi. 40 C.F.R. § 122.26(d)(2)(i)(E); Permit Section VI.A.2.a.xi: Require that structural BMPs are properly operated and maintained (WVMC §§ 5.5.041 - Standard Urban Storm Water Mitigation Plan (SUSMP) Requirements for New Development and Redevelopment Projects; and 5.5.045 — Enforcement); and

xii. 40 C.F.R. § 122.26(d)(2)(i)(E); Permit Section VI.A.2.a.xii: Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4 (WVMC §§ 5.5.041 — Standard Urban Storm Water Mitigation Plan (SUSMP) Requirements for New Development and Redevelopment Projects; and 5.5.045 — Enforcement).

3. Implementation

Some of the City's ordinances are implemented through permit programs and others are implemented as regulatory programs. Under each ordinance, one or more City departments or department directors are authorized and directed in each ordinance to take the actions contemplated by the ordinance *(e.g.,* to consider evidence and make findings, to issue or deny permits, to impose conditions on projects, to inspect, to take enforcement action, etc.).

The City's Storm Water Ordinance (WVMC Chapter 5.5) is the principal City ordinance addressing the control of urban runoff. This ordinance is regulatory, and applies to specified new and existing residential and business communities and associated facilities and activities, as well as new development and redevelopment, and all other specified new and existing facilities and activities that threaten to discharge pollutants within the boundaries of the City and within its regulatory jurisdiction, whether or not a City permit or approval is required. The City's Storm Water Ordinance also contains discharge prohibitions and requirements for the implementation of BMPs and other requirements necessary to implement the Permit.

Other City departments require compliance with the City's Storm Water Ordinance as a condition for issuance of relevant City permits. City departments may also impose specific conditions of approval consistent with the City's Storm Water Ordinance.

All City environmental ordinances are also implemented, in part, through the application of the CEQA process to proposed projects.

4. Administrative and Judicial/Legal Procedures

In addition to the above authority, the City has in place various legal and administrative procedures to assist in enforcing the various urban runoff related Ordinances, including the following:

A. Administrative Remedies

- General Penalties (WVMC Chapter 1.2; and Section 5.5.045,)
- Administrative Penalties and Citations (WVMC Chapter 1.2; and Section 5.5.045)

B. Nuisance Remedies

- Public nuisance under State law
- City nuisance abatement procedures (WVMC Section 5.5.045; Chapter 4.7; and Chapter 4.8)

C. Criminal Remedies

- Misdemeanor citations/prosecution (WVMC Section 5.5.045; and Chapter 1.2)

D. Equitable Remedies

- Injunctive relief under State law and the Westlake Village Municipal Code
- Declaratory relief under State law

E. Other Civil Remedies

- Federal law claims *(e.g.,* Clean Water Act and Resource Conservation and Recovery Act Citizen Suits)

- Remedies under the California Government Code

Violations of the City's Storm Water Ordinance are deemed a "public nuisance", in which case enforcement actions can be completed administratively, or judicially when necessary.

Please contact me if you have any questions or if you need any additional information regarding the City's legal authority to enforce the Permit.

Very truly yours,

Terence Boga
City Attorney
City of Westlake Village

cc: Ray Taylor, City Manager
John Knipe, City Engineer
Joe Bellomo, Assistant City Engineer
Candice K. Lee, Esq.
Norman A. Dupont, Esq.

Appendix 6A: Model Calibration and Parameters

APPENDIX 6A: MODEL CALIBRATION AND PARAMETERS

This document provides additional details on baseline model calibration to support the MCW RAA.

Table 6A-1. Regional Board model parameter ranges

Parameter	Units	Initial Values	Model Values
Hydrology Parameters			
Infiltration capacity of the soil	in./hr.	Soil Type	0.1-0.2
Interception storage capacity	in.	0.01-0.40	0.05-0.2
Manning's n for overland flow	--	0.01-0.15	0.011-0.2
Upper zone nominal soil moisture storage	in.	0.05-2.0	0.5
Fraction of GW inflow to deep recharge	--	0.0-0.50	0.0-0.5
Fraction of remaining ET from baseflow	--	0.0-0.20	0.0
Fraction of remaining ET from active GW	--	0.0-0.20	0.0
Lower zone nominal soil moisture storage	in.	2.0-15.0	7.0
Interflow inflow parameter	--	1.0-10.0	2.0
Interflow recession parameter	--	0.3-0.85	0.6
Lower zone ET parameter	--	0.1-0.9	0.7
Water Quality Parameters			
Initial storage of water quality constituent on land surface	lbs	NA	0.0
Wash-off potency factor for Total Phosphorous	lbs/ton	NA	0.005-1.1
Event Mean Concentrations for *E. coli*	#/100mL	NA	218-79,050
Accumulation rate of Total Nitrogen on land surface	lbs/ac/day	0.0-0.0005	0.0026-0.51
Maximum storage of Total Nitrogen on land surface	lbs/ac/day	0.0-0.0005	0.26-2.6
Accumulation rate of Total Phosphorous on land surface	lbs/ac/day	0.0-0.0005	0.0003-0.15
Maximum storage of Total Phosphorous on land surface	lbs/ac/day	0.0-0.0005	0.0013-0.76
Rate of surface runoff that removes 90% of stored mass	in/hr.	0.0-0.5	1.0
Groundwater Concentrations for Total Phosphorous	mg/L	NA	0.0045-0.3
Groundwater Concentrations for Total Nitrogen	mg/L	NA	0.45-6.0
General first order in-stream loss rate of constituent	1/day	0.2-0.2	0.2-1.0
Sediment Parameters			
Coefficient in the soil detachment equation	--	0.05-0.75	0.1-0.26
Exponent in the soil detachment equation	--	1.0-3.0	1.23
Coefficient in the sediment wash-off equation	--	0.1-10.0	0.01-4.0
Exponent in the sediment wash-off equation	--	1.0-3.0	1.23-2.0
Coefficient in the sediment scour equation	--	0.0-10.0	4.00

Parameter	Units	Initial Values	Model Values
Exponent in the sediment scour equation	--	1.0-5.0	1.23-2.0
Solids accumulation rate on the land surface	lbs/ac/day	0.0-30.0	0.001-0.01
Fraction of solids removed from land surface per day	--	0.01-1.0	0.1
Coefficient in the soil detachment equation	--	0.05-0.75	0.1-0.35

Hydrology Calibration

The evaluation period for hydrology is October 1, 2000 to September 30, 2010. An hourly time step was used to simulate streamflow at each of the subwatershed outlets for comparison with observed data. Key model components influencing hydrology, hydraulics, and the overall water balance evaluated as part of model configuration included: (1) precipitation data quantity and quality, (2) evaporation and evapotranspiration rates, (3) lakes/reservoirs/impoundments, and other hydromodifications.

Precipitation and evapotranspiration data were provided by Los Angeles County Flood Control District (LACDPW) through the WMMS model. The data was quality controlled; therefore, no updates were made to meteorological boundary conditions. There were 9 lakes or impoundments in the watershed. Five of them were explicitly modeled into the LSPC model as highlighted in Figure 6A-1. F-Tables for each of these impoundments were generated using geometric information gathered from operations management.

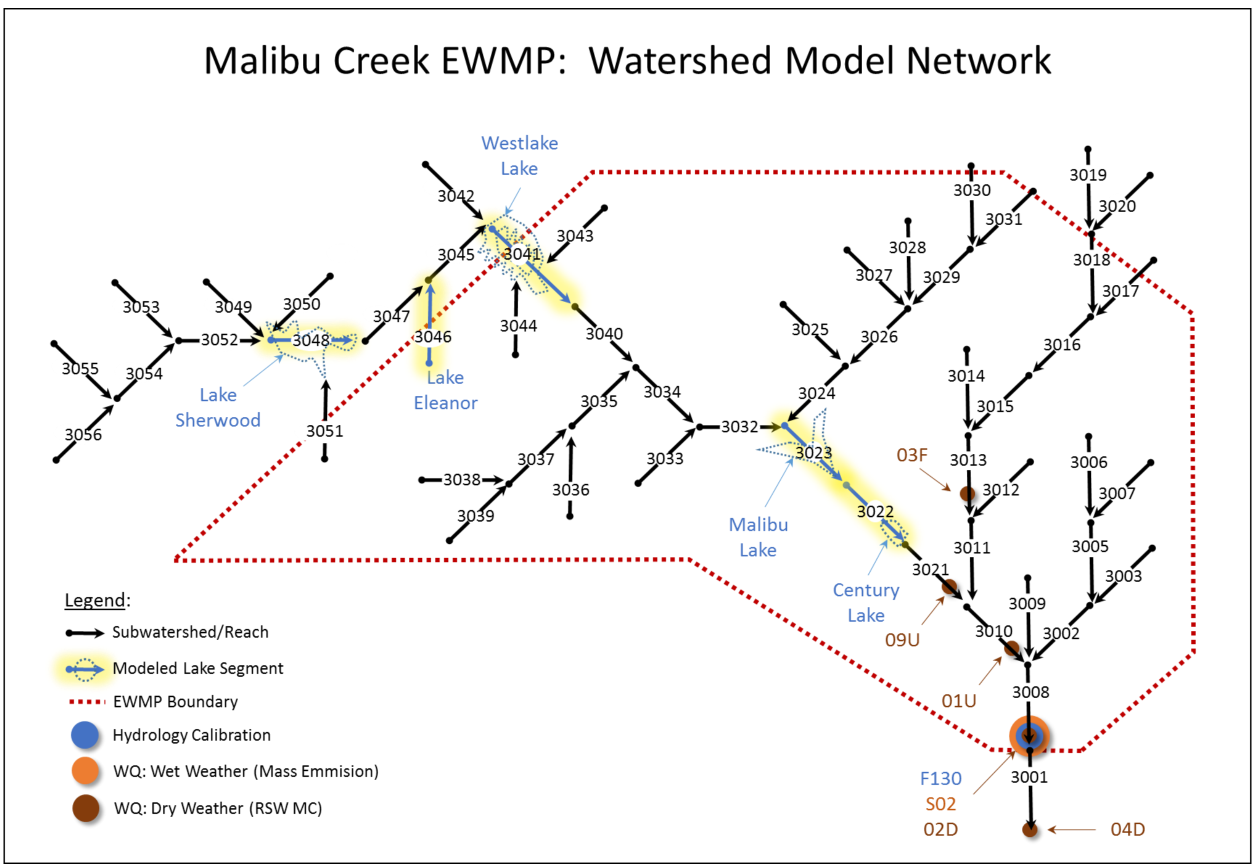

Figure 6A-1. Reach network schematic for Malibu Creek Schematic.

Because the Malibu Creek watershed has a relatively warm and dry climate (average rainfall is 19 inches per year), evaporation accounts for a large part of the water balance. Operations management at Westlake Lake reported average surface evaporation of 1,037 acre-ft, with peak rates above 900 gpm. A minor adjustment of the calibrated PEVT:EVAP ratio of 1.1 yielded a close match to observed long-term evaporation rates at Westlake Lake, as illustrated in Figure 6A-2 below. That ratio was then applied to derive site-specific EVAP time series for all other waterbodies in the Malibu Creek watershed.

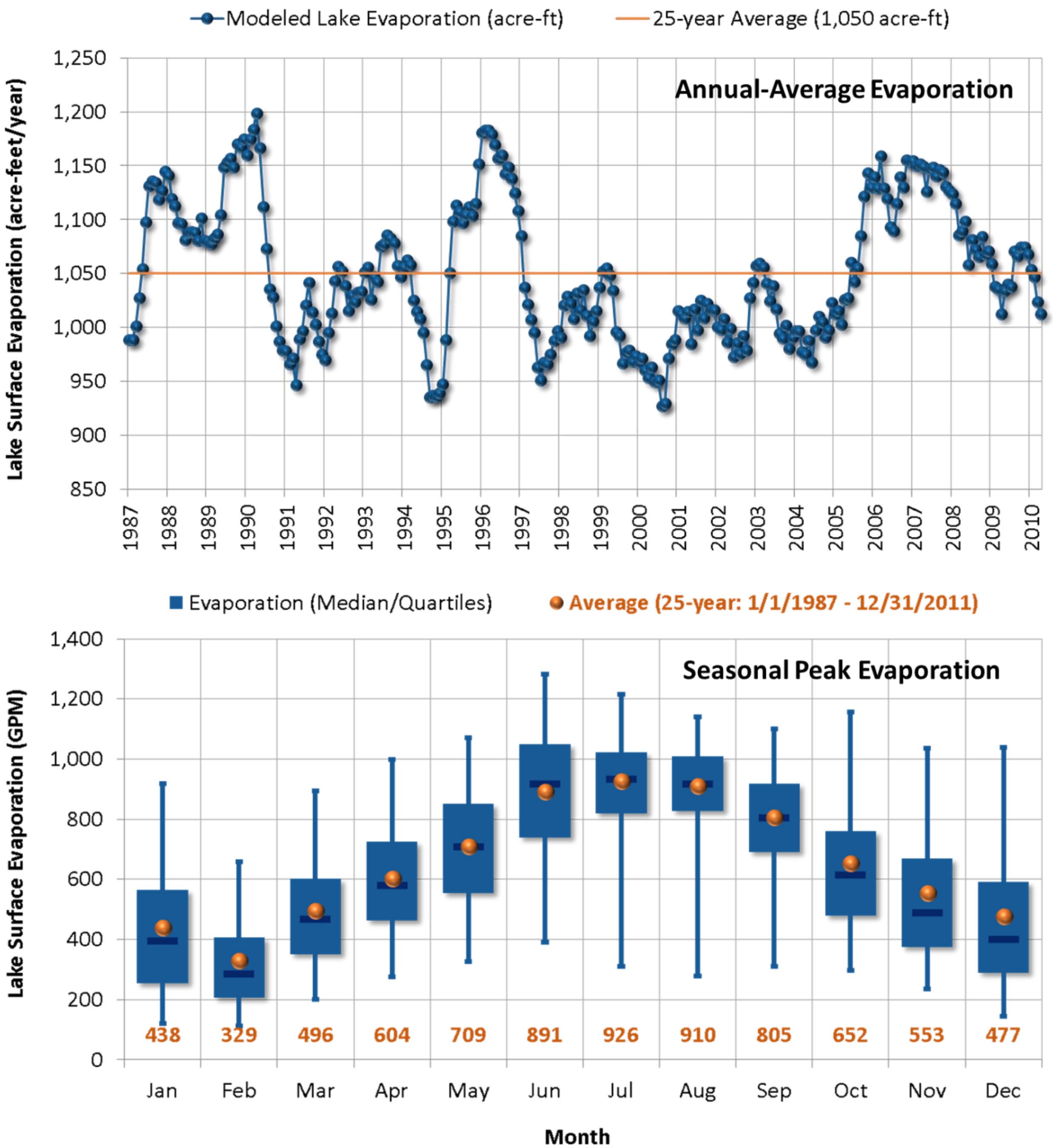

Figure 6A-2. Calibrated annual-average and seasonal peak evaporation rates at Westlake Lake.

Modeled versus observed streamflow were compared at the LACFCD streamflow monitoring gage on Malibu Creek below Cold Creek (F130). Figure 6A-3 summarizes the long-term calibrated water balance for the watershed. Table 6A-2 shows modeled versus observed calibration statistics and recommended Regional Board Guidelines metrics. Figure 6A-4 shows calibrated surface runoff and evapotranspiration summaries by land use category. Detailed plots of modeled versus observed streamflow time series are also shown in Figure 6A-5 through Figure 6A-8.

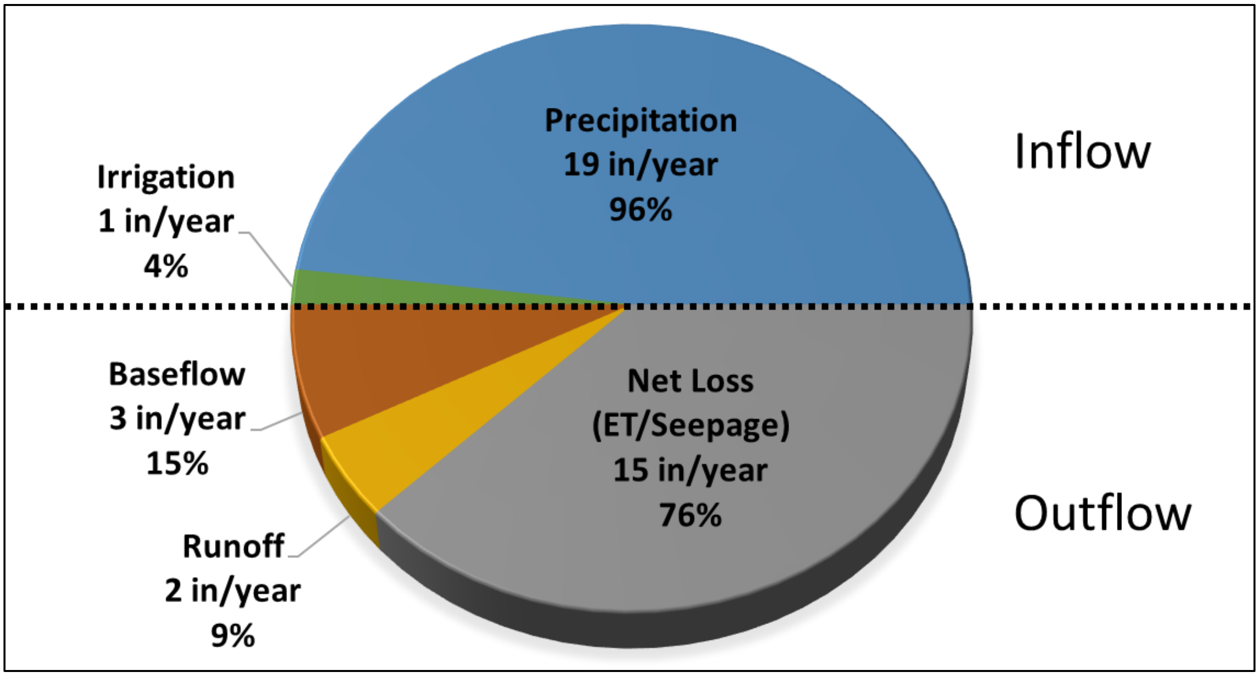

Figure 6A-3. Calibrated water balance for the Malibu Creek Watershed

Table 6A-2. Summary of Hydrology Calibration Performance by Baseline Model

Location	Model Period	Hydrology Parameter	Modeled vs. Observed	RAA Guidelines Performance Assessment
Malibu Creek Below Cold Creek (LA DPW F130)	10/1/2000 – 9/30/2010	Total Annual Volume	-4.5%	Very Good
		Highest 10% of Flows	-8.3%	Very Good
		Annual Storm Volume	-13.8%	Good

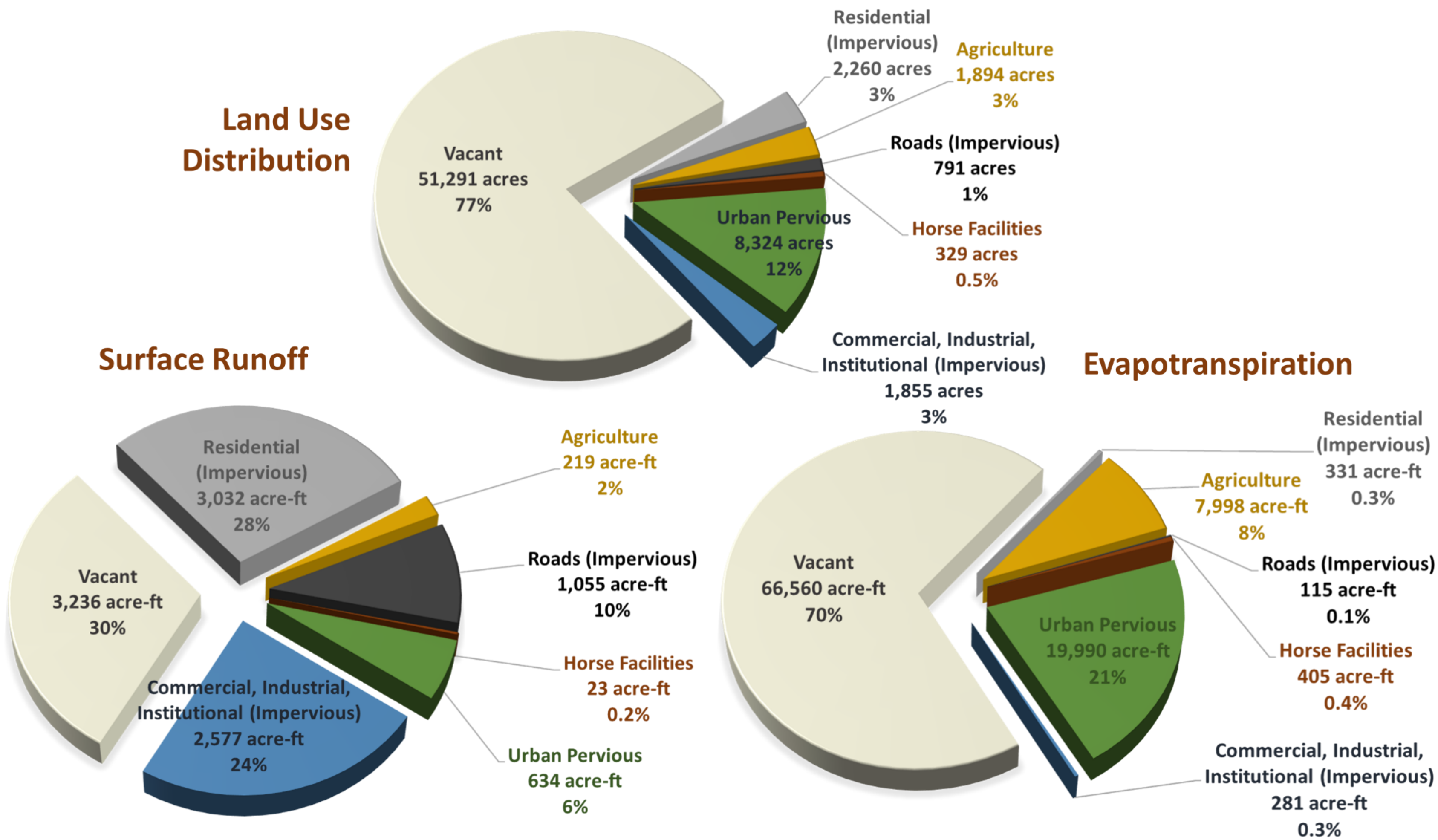

Figure 6A-4. Calibrated surface runoff and evapotranspiration summaries by land use category.

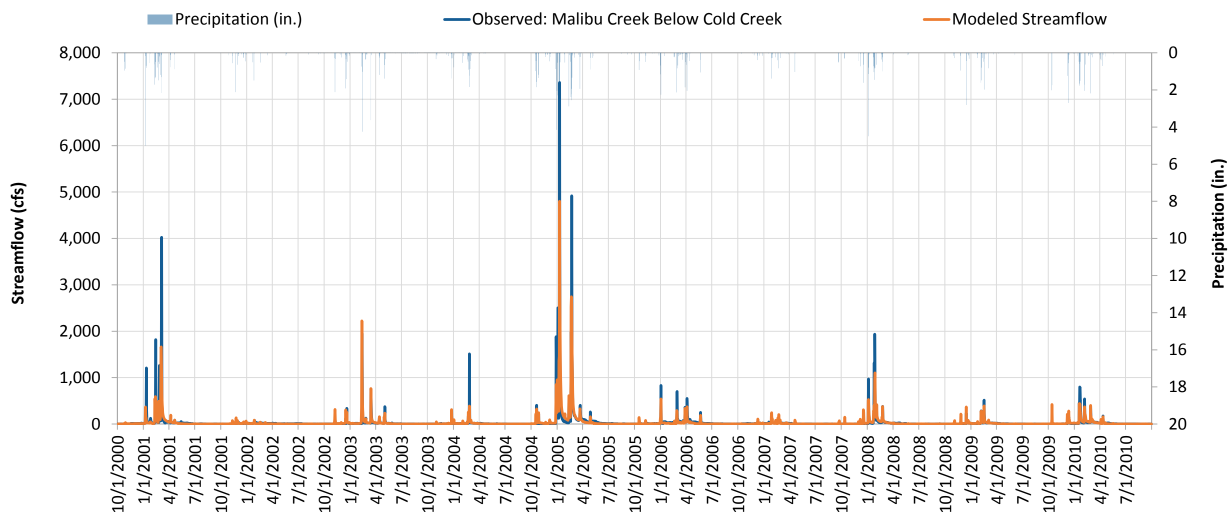

Figure 6A-5. Daily modeled versus observed streamflow at Malibu Creek below Cold Creek (F130).

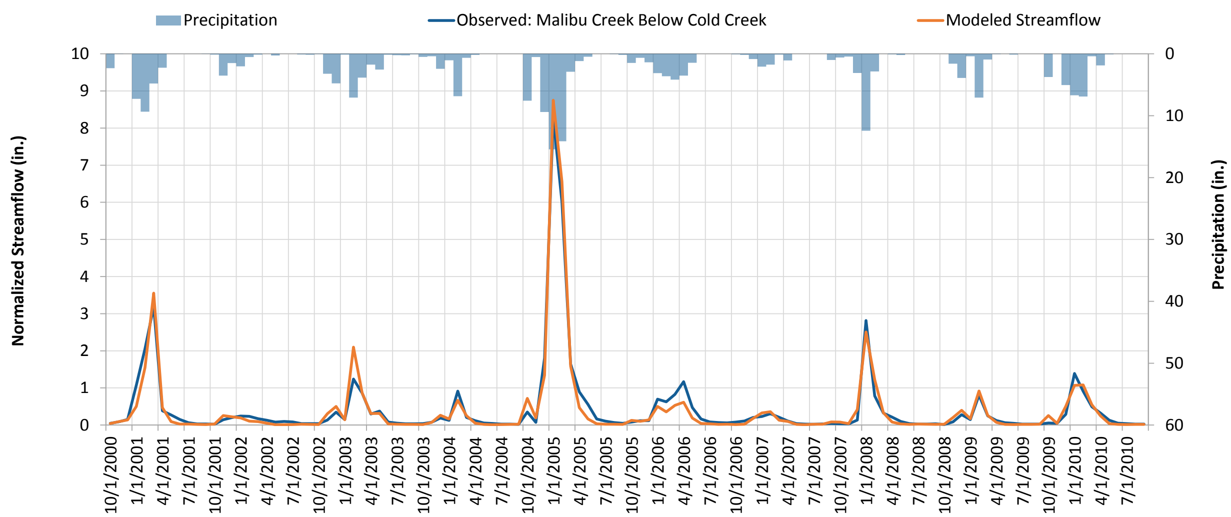

Figure 6A-6. Monthly modeled versus observed streamflow at Malibu Creek below Cold Creek (F130).

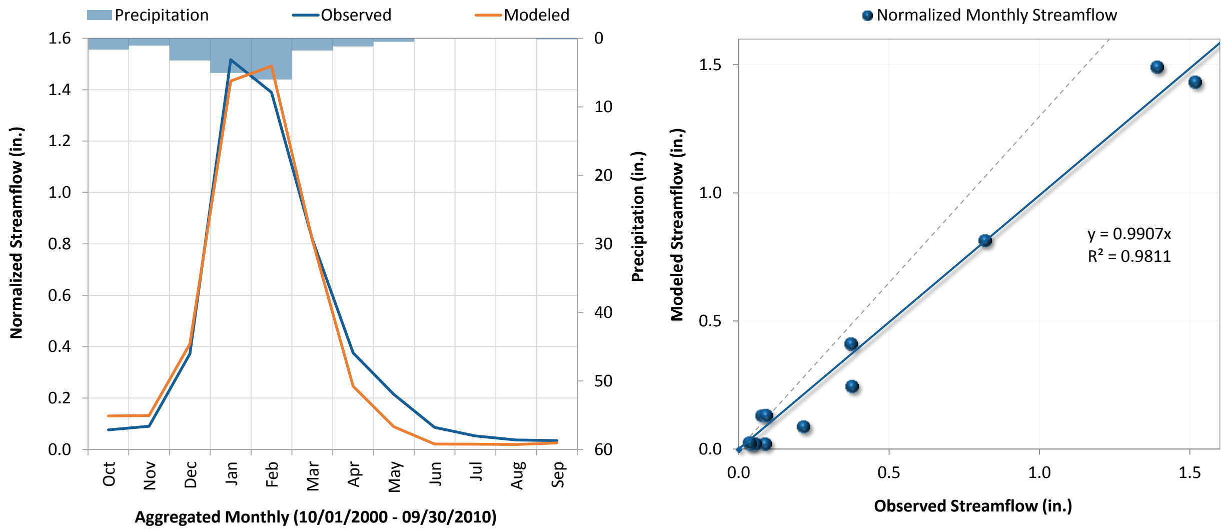

Figure 6A-7. Seasonal average modeled versus observed streamflow at Malibu Creek below Cold Creek (F130).

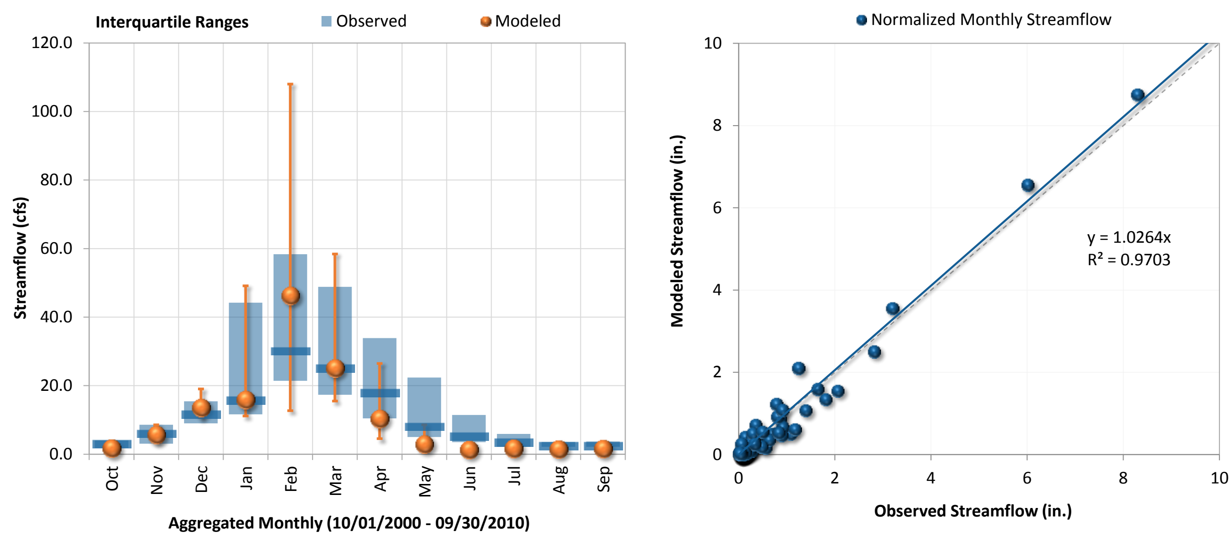

Figure 6A-8. Seasonal interquartile modeled versus observed streamflow at Malibu Creek below Cold Creek (F130).

Water Quality Data Analysis

Certain water quality data analytics were performed on available monitoring data to: (1) assess how representative of wet and/or dry weather conditions the data were, and (2) for source characterization to help quantify the relative impacts of contributing sources upstream of the monitoring sites.

<u>Wet Weather Assessment</u>

For wet-weather samples, water quality event-mean concentrations (EMC) from the LACFCD ME Station #S02 were first evaluated. Because the data were EMCs the first objective of the analysis was to verify that the samples were indeed representative of long-term wet-weather conditions in the watershed. Second, assuming that the data are representative, the analysis quantified the relative magnitude of different pollutant loads by storm size. This provided guidance for calibrating loads associated with surface runoff.

To assess if S02 data were representative of long-term wet-weather conditions, the entire historical rainfall record (area-weighted over the contributing drainage area) was summarized and ranked from smallest to largest. Figure 6A-9 shows a 25-year rainfall duration plot with 10-percentile intervals shown as blue dots. The orange bars are histograms of the 37 EMC samples that overlapped the model simulation period. The top 50 percent of rainfall events were >0.1 inches per day, and all of the wet-weather samples at S02 were on days with notable rainfall totals.

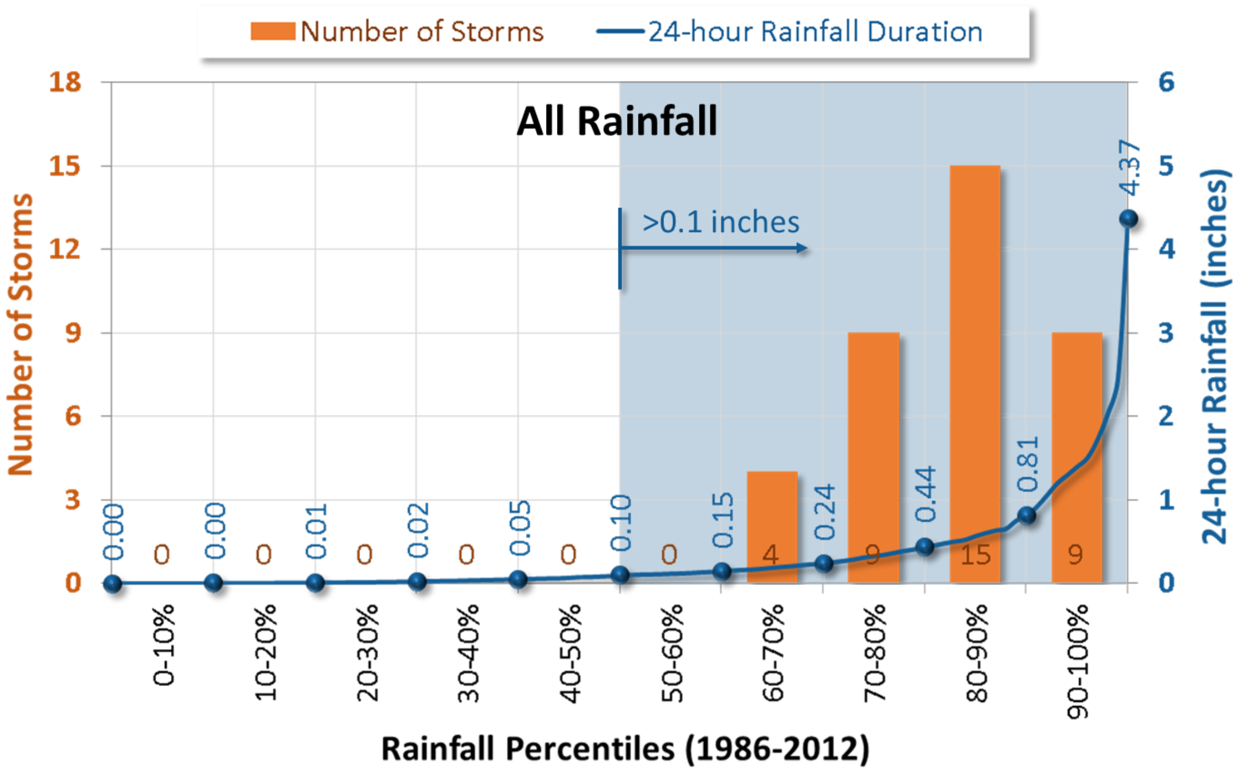

Figure 6A-9. Assessment of S02 wet-weather samples against long-term rainfall in the Malibu Creek Watershed.

To accommodate for time of travel influence, the same analysis was repeated on the data, except percentile bins were based on long-term streamflow at F130, which was collocated with S02 (Figure 6A-10). This further confirmed that most of the samples were taken on high-flow days. In fact, 63 percent of the samples were collected between December and February, which are historically the wettest months. For the same data, 75 percent of the samples were collected in the top 20 percentile ranges of streamflow, where concurrent streamflow measured between 26 and about just above 700 cfs—although 7,360 was the long-term peak flow rate, the highest flow rate among the EMC samples taken was about 730 cfs.

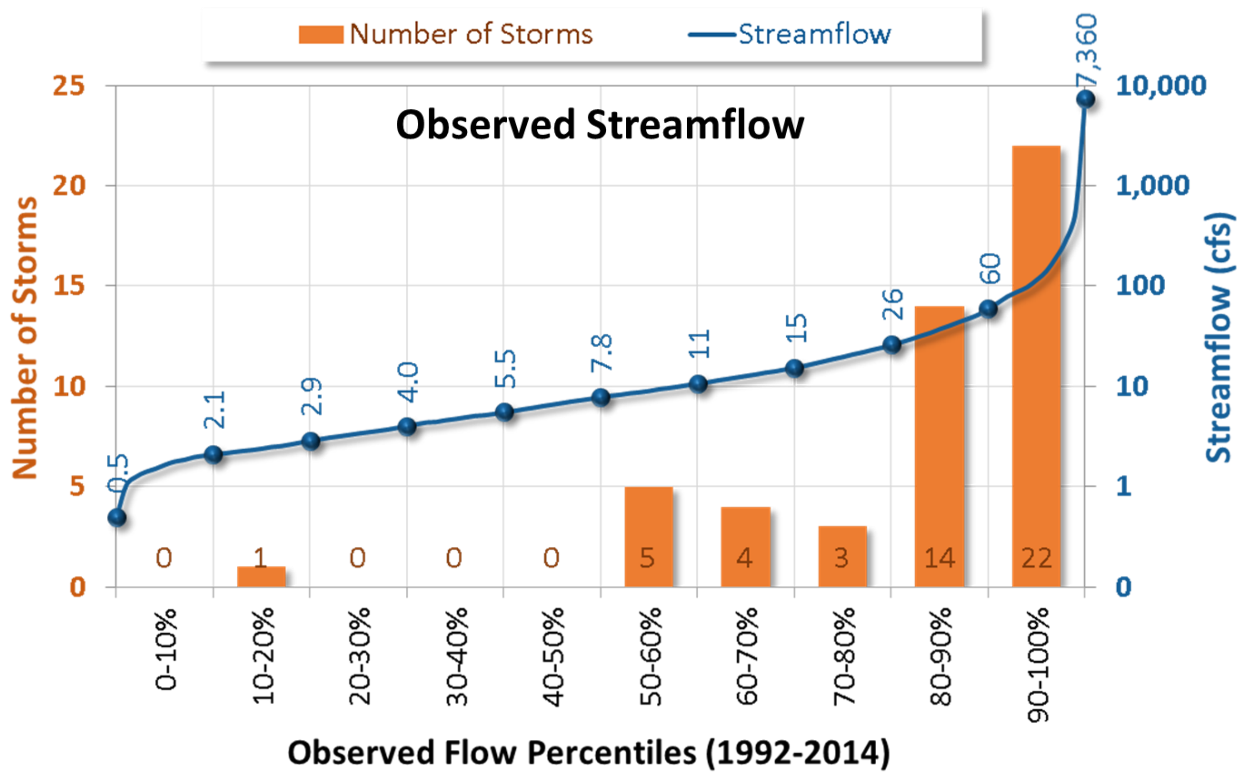

Figure 6A-10. Assessment of S02 wet-weather samples against long-term streamflow at F130.

Dry Weather Assessment

A unique aspect of the MCW is the presence of water reclamation activities managed by the Las Virgenes Water District at Rancho Las Virgenes. Reclaimed wastewater activities involve treating and infiltrating wastewater in a series of injection fields. Figure 6A-11 shows Rancho Las Virgenes water reclamation activities and well-monitoring nitrogen data. Well samples show low nitrogen levels up gradient of the injection fields, and higher levels down gradient. Among the down gradient wells, shallow wells have total nitrogen concentrations 2 to 5 times higher than the up gradient wells, while the deep wells show 5 to 10 times higher than the up gradient wells.

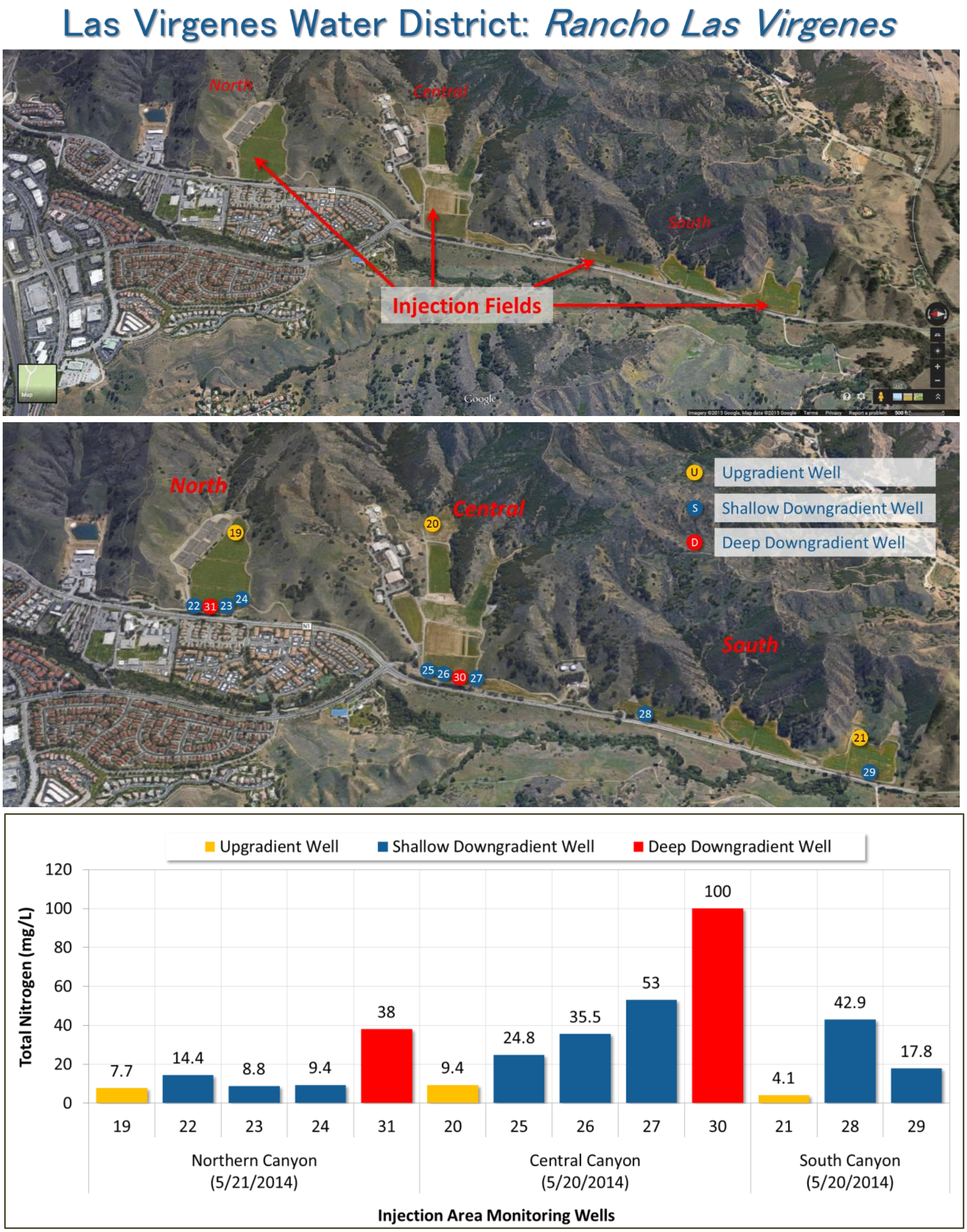

Figure 6A-11. Rancho Las Virgenes water reclamation activities and well monitoring data.

The LVMWD RSW MC Dataset provided a unique opportunity to assess the impacts of these activities on water quality in Malibu Creek. As shown in Figure 6A-12, the LVMWD RSW MC Dataset for MCW captured conditions in Las Virgenes Creek and Malibu Creek.

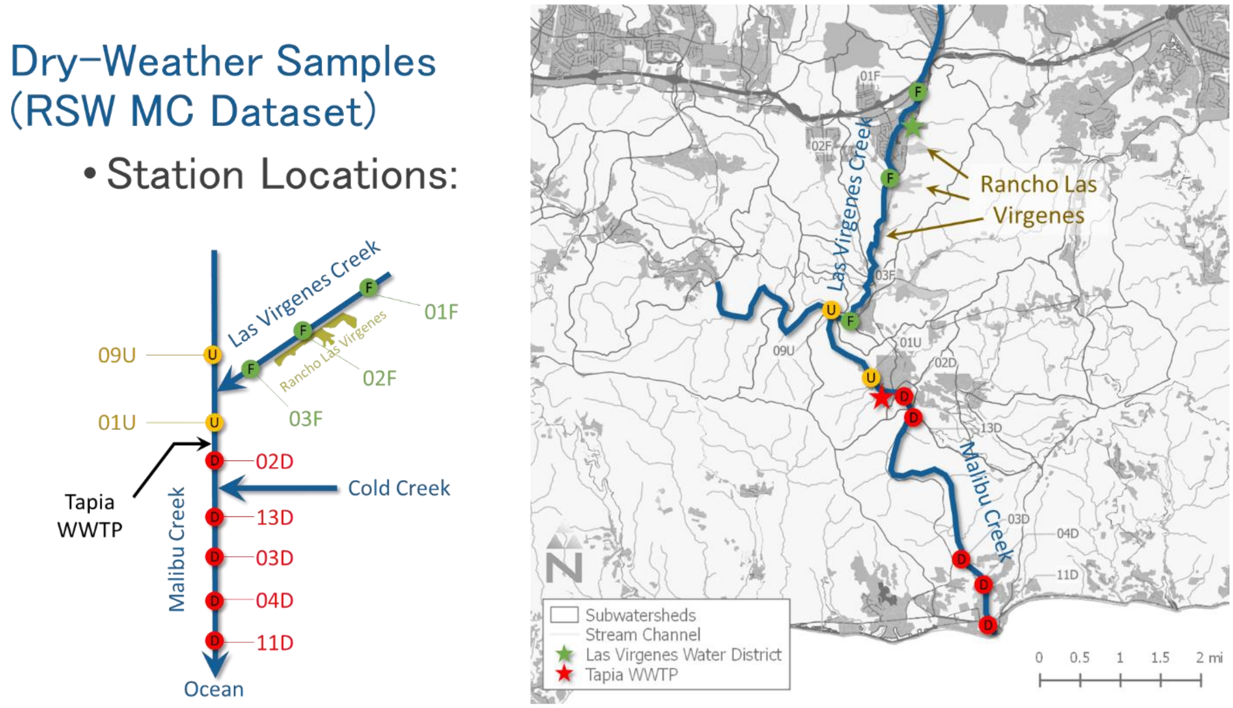

Figure 6A-12. Location of RSW MC monitoring stations relative to Ranchos Las Virgenes and Tapia WWTP.

There were 86 sampling dates that coincided with the model simulation period. Similar analytics as those performed on the S02 gage were performed on the dry weather LVMWD RSW MC Dataset to verify how representative the samples were of dry-weather conditions in Malibu Creek. For dry weather samples, the number of days after a rainfall event should be inversely correlated with streamflow, as confirmed in Figure 6A-14. Using all samples for all dates, the blue graph in Figure 6A-14 is a duration plot of the number of days after a rainfall event that a sample was taken. The orange histogram shows the average streamflow observed at the time that a total nitrogen sample was taken. Of the 86 sampling dates, total nitrogen was reported on 61 if those dates. On average, the LVMWD RSW MC Dataset shows that average streamflow is highest in the first 2 to 6 days following a rainfall event, but then drops steadily to about 1/3 of that value 7 weeks after a rainfall event.

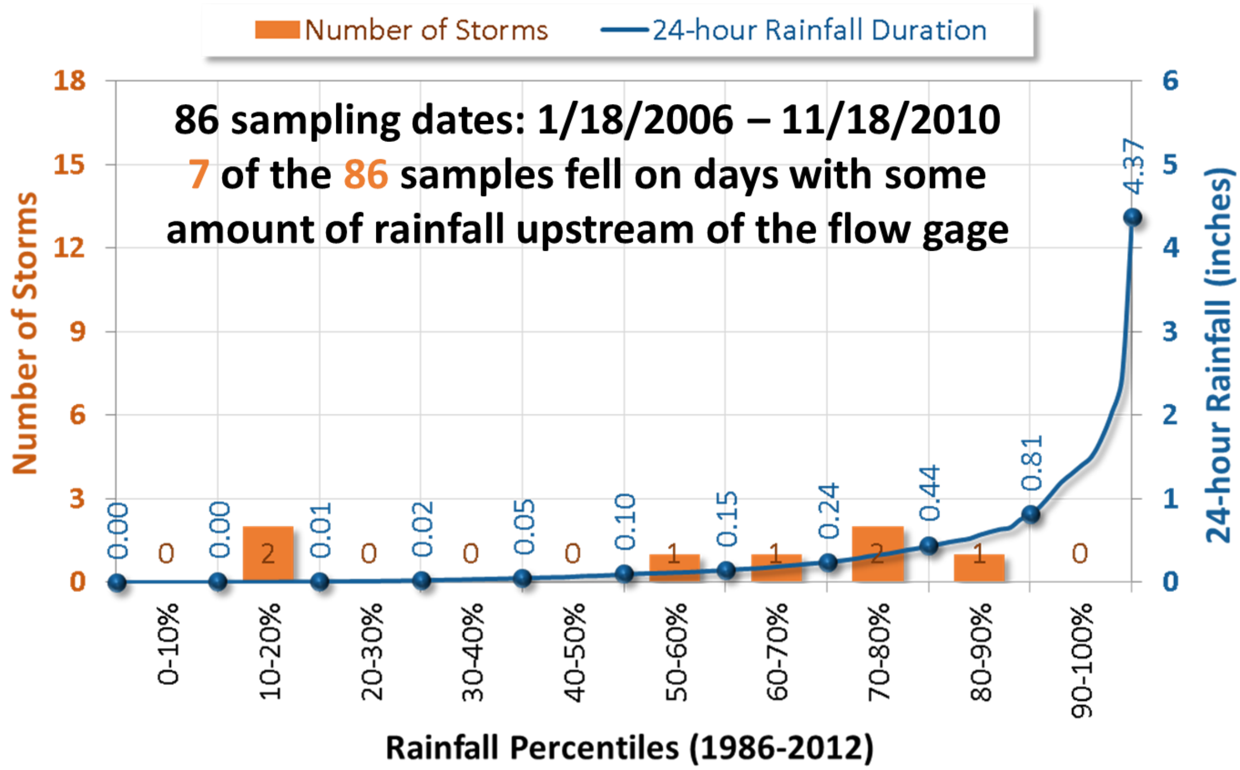

Figure 6A-13. Assessment of RSW MC dry-weather samples against long-term streamflow at F130.

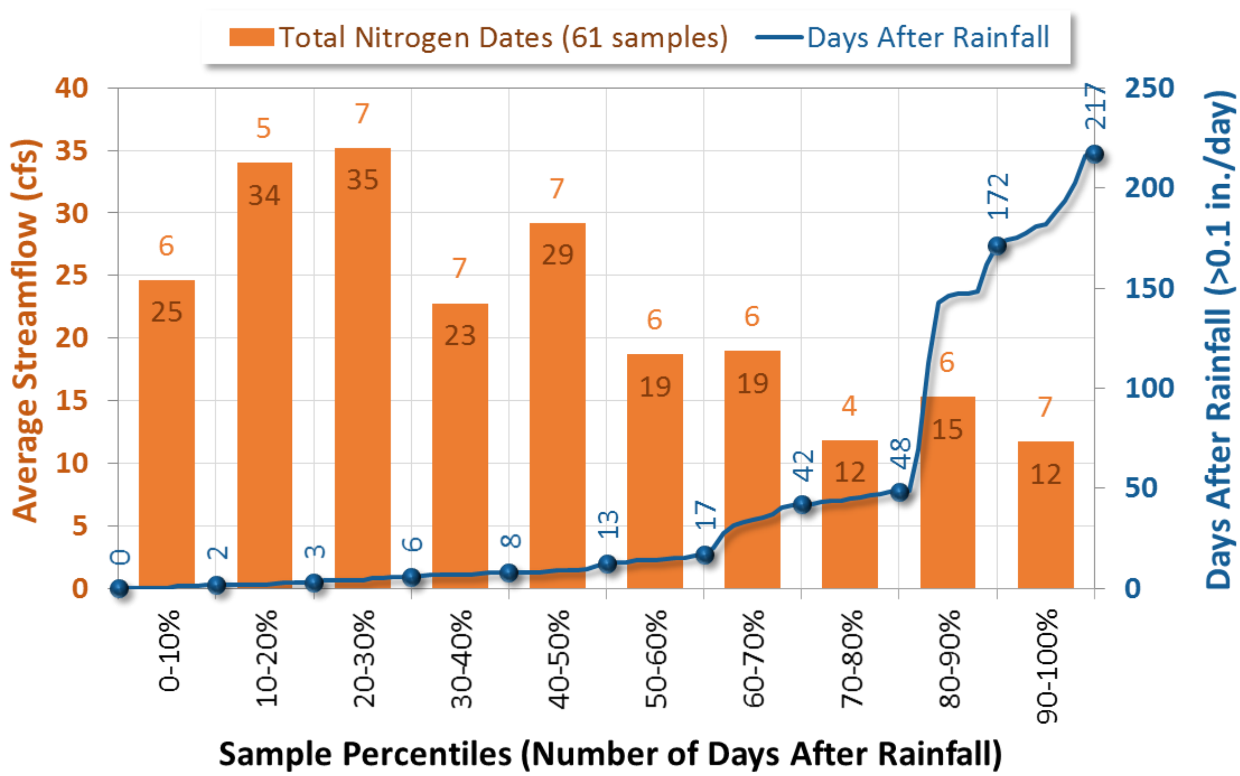

Figure 6A-14. Average streamflow observed on sampling dates versus number of days following a rainfall event that the RSW MC total nitrogen sample was taken.

Using the days after a rainfall event (>0.1 inches/day) as categories, the flow-weighted average nitrogen concentrations were evaluated at each of the 10 RSW MC monitoring stations. Two stations serve as "controls" for the analysis because the monitor conditions upstream of both Las Virgenes Creek and Tapia WWTP. Figure 6A-15 shows total nitrogen concentrations versus number of days after rainfall at those two stations (RSWMC-09U and -01U). Las Virgenes Creek discharges downstream of 09U, but upstream of 01U. The impacts of Las Virgenes Creek on main stem Malibu Creek dry-weather total nitrogen concentrations is illustrated as the difference between concentrations on these two panels. The impact of Rancho Las Virgenes on Las Virgenes Creek is shown in Figure 6A-16. The impact of Tapia WWTP on Malibu Creek dry-weather total nitrogen concentrations is shown in Figure 6A-17. Finally, dry-weather total nitrogen concentrations for stations along Malibu Creek from the Cold Creek confluence to Malibu Lagoon are shown in Figure 6A-18.

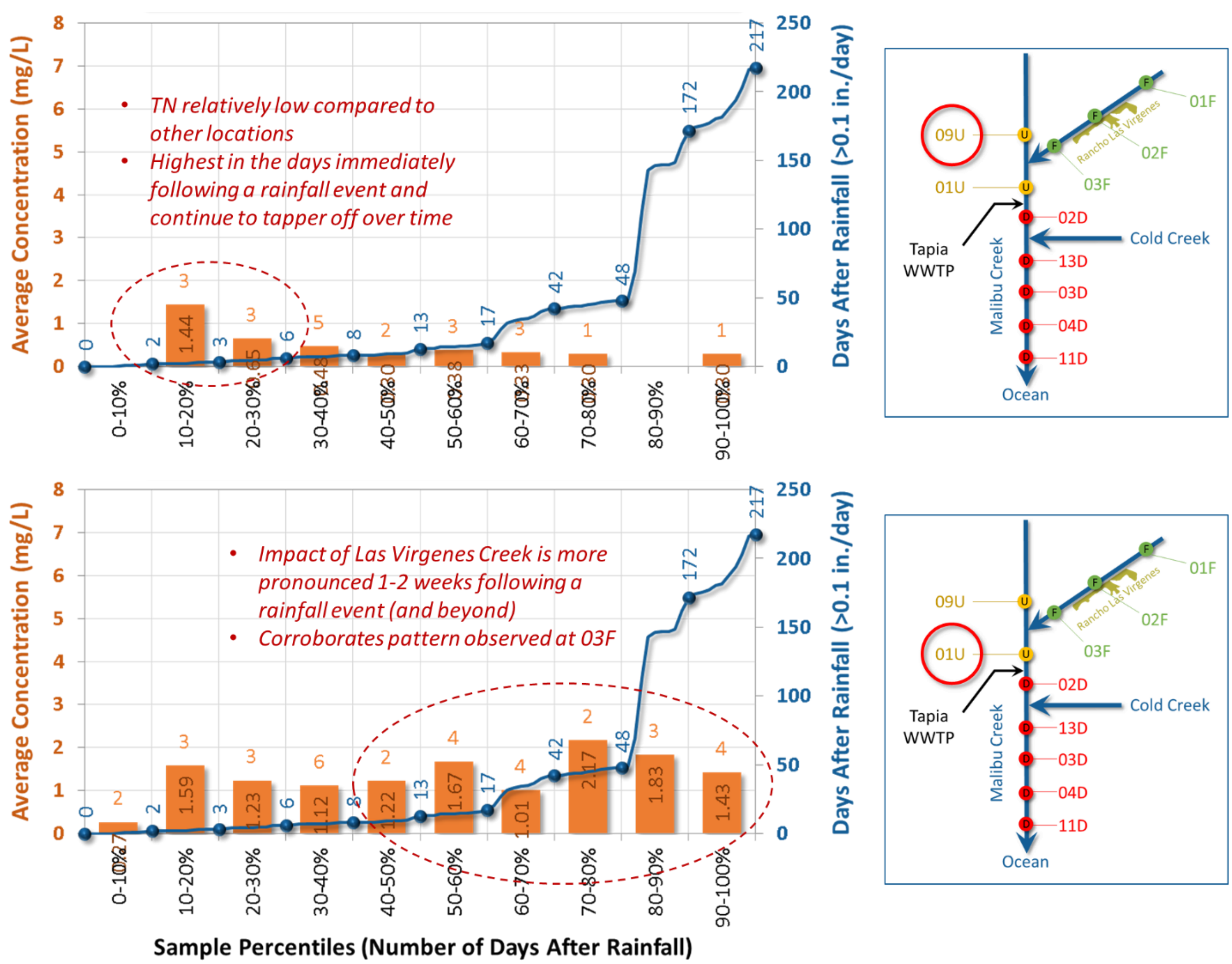

Figure 6A-15. Impact of Las Virgenes Creek on Malibu Creek dry-weather total nitrogen concentrations.

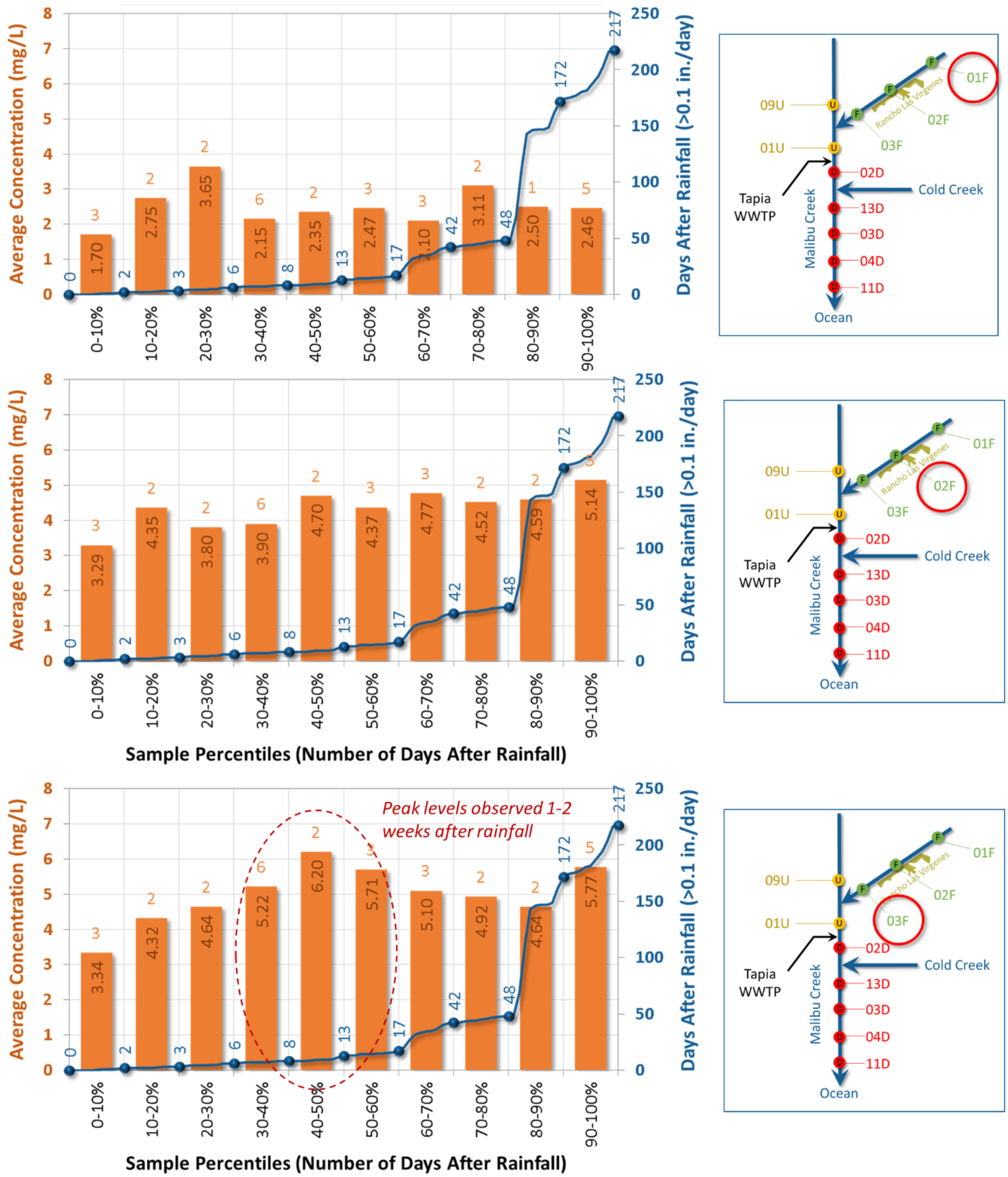

Figure 6A-16. Impact of Rancho Las Virgenes on Las Virgenes Creek dry-weather total nitrogen concentrations.

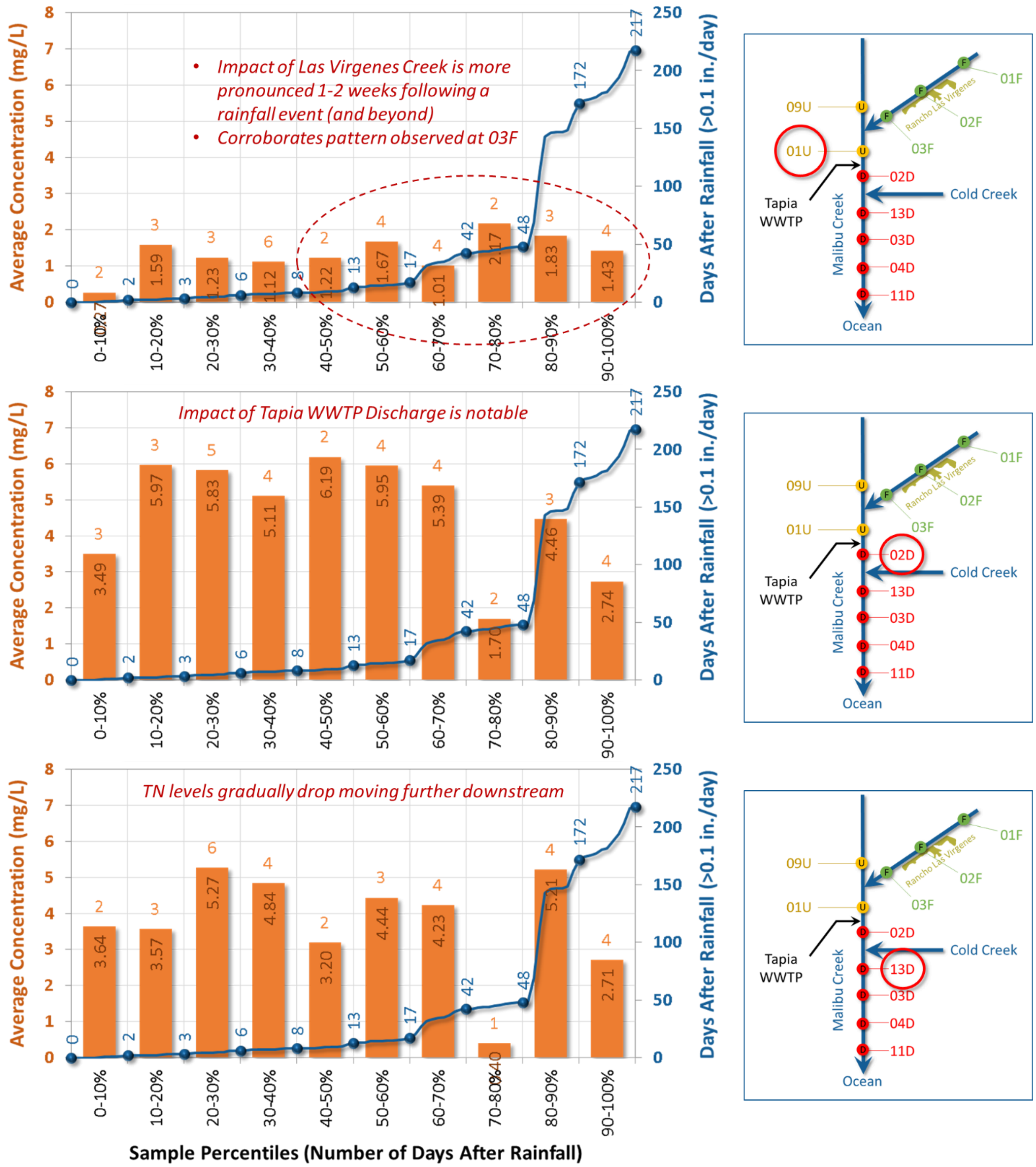

Figure 6A-17. Impact of Tapia WWTP discharge on Malibu Creek dry-weather total nitrogen concentrations.

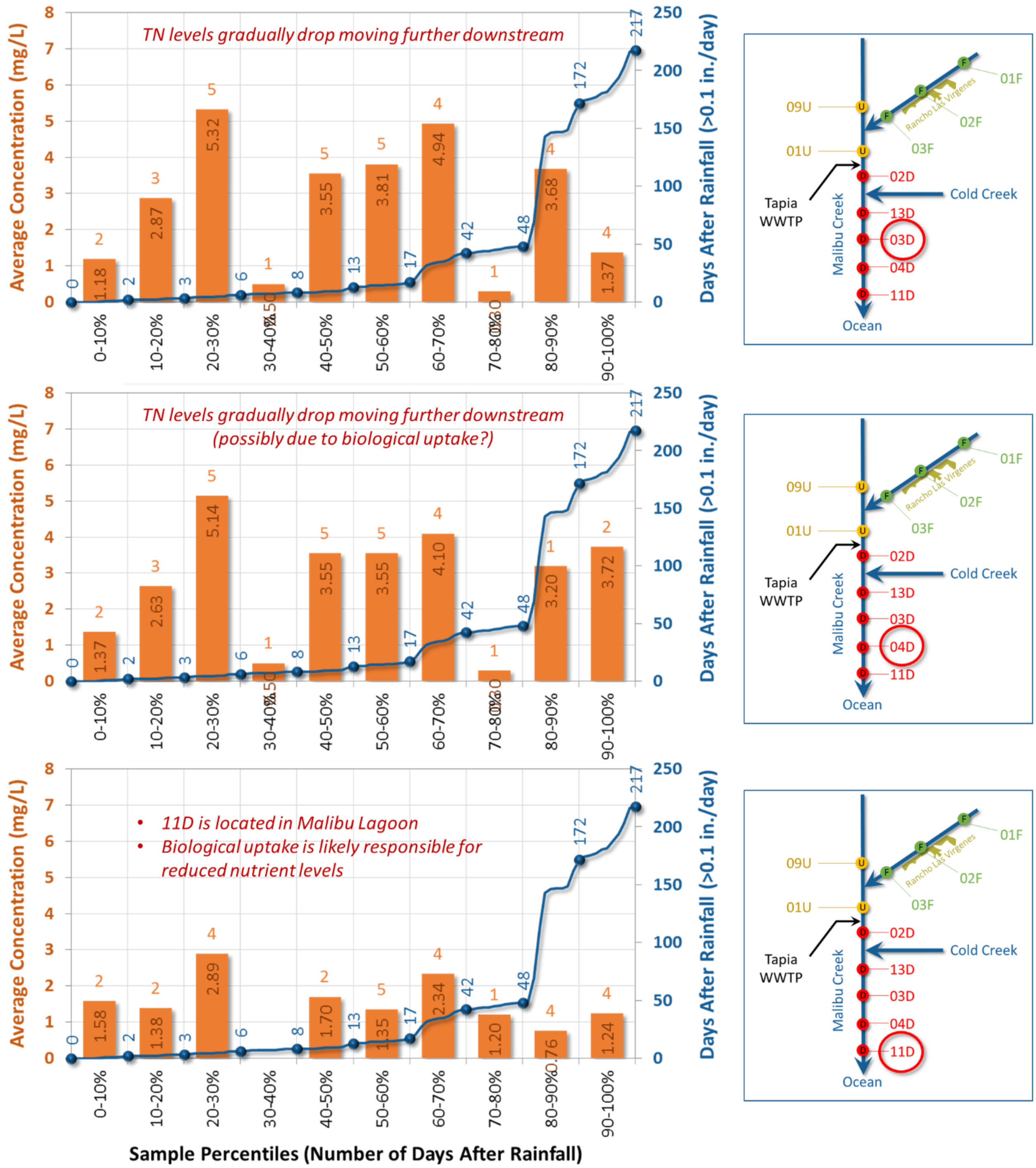

Figure 6A-18. Total nitrogen concentrations versus number of dry days after rainfall along Malibu Creek below Cold Creek.

Below is a summary of notable observations from the LVMWD RSW MC Data analysis:

1. The two upstream "control" gages had lower total nitrogen and total phosphorus levels than the downstream gages
    a. 09U (below Malibu Lake) has lowest nutrient levels

   b. 01U showed signs of impact from Las Virgenes Creek
2. The data show some impact of Rancho Las Virgenes on dry-weather total nitrogen and total phosphorus levels in Las Virgenes Creek and downstream Malibu Creek
   a. Most Elevated total nitrogen levels observed 1 to 2 weeks following a storm
   b. Elevated levels sustained at 01U (Malibu Creek), downstream of confluence
3. Tapia WWTP has notable impact on total nitrogen and total phosphorus levels in Malibu Creek
4. Total nitrogen levels gradually decreased below Tapia in Malibu Creek
   a. One of the gages (11D), located in Malibu Lagoon, had lower total nitrogen and total phosphorus levels, suggesting that impoundments are nutrient sinks, most likely due to biological activities.
   b. This behavior suggests that other impoundments throughout the stream network that have high levels of biological activity may be nutrient sinks

Unit-Area Loads by Land Use

Modeled runoff and pollutant loads were also summarized by land use. The model was validated against typical unit-area loading rates from literature to ensure that relative differences in loads were reasonable and representative of conditions in Malibu Creek. The following series of figures summarize the range of variation of unit-area runoff depth (Figure 6A-19), sediment yield (Figure 6A-20), total nitrogen (Figure 6A-21), total phosphorus (Figure 6A-22), and bacteria load (Figure 6A-23) throughout the Malibu Creek watershed. Factors affecting the spread include meteorological conditions, soil type, and land management activities (i.e. irrigation for “Urban Pervious” and “Agriculture”, and Rancho Las Virgenes water reclamation for “Agriculture”). Although sediment was not directly used as an EWMP management target, sediment yield from the land was still validated because a surface runoff component of total phosphorus was modeled as a function of land-based sediment yield.

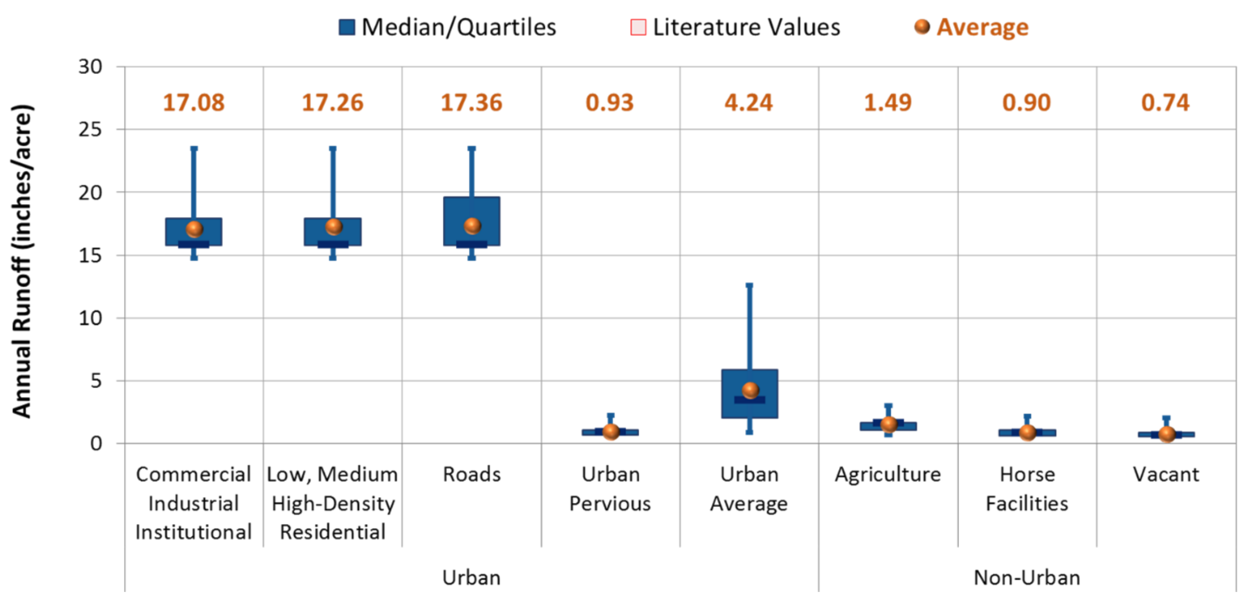

Figure 6A-19. Unit-area runoff volume by land use in the Malibu Creek Watershed.

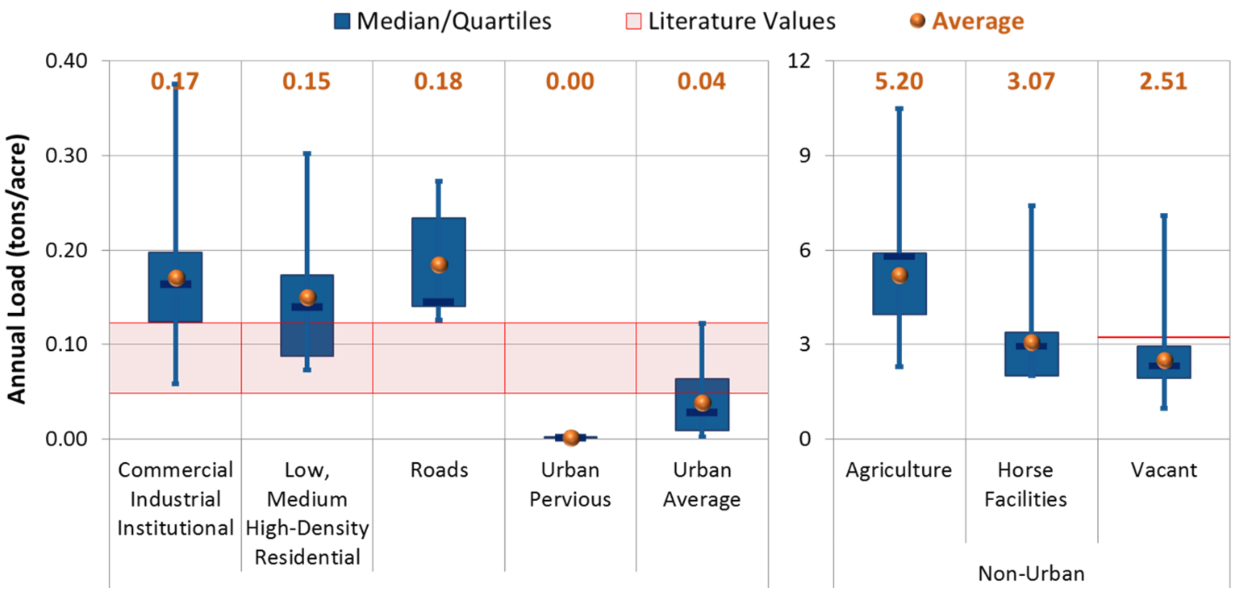

Figure 6A-20. Unit-area sediment yield by land use in the Malibu Creek Watershed.

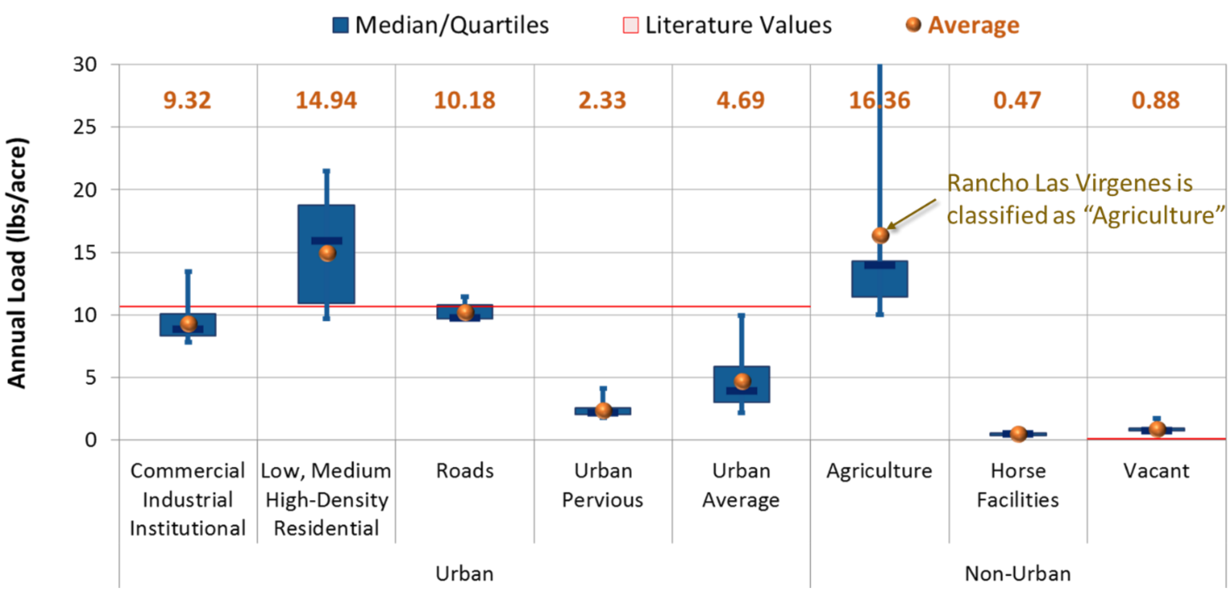

Figure 6A-21. Unit-area total nitrogen yield by land use in the Malibu Creek Watershed.

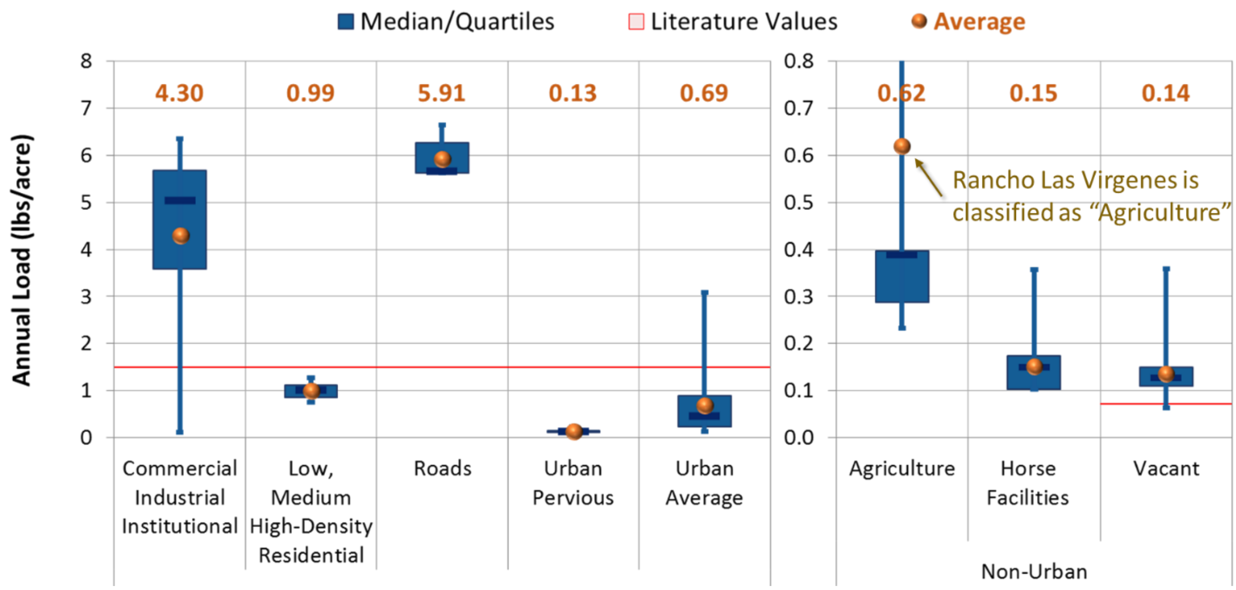

Figure 6A-22. Unit-area total phosphorus yield by land use in the Malibu Creek Watershed.

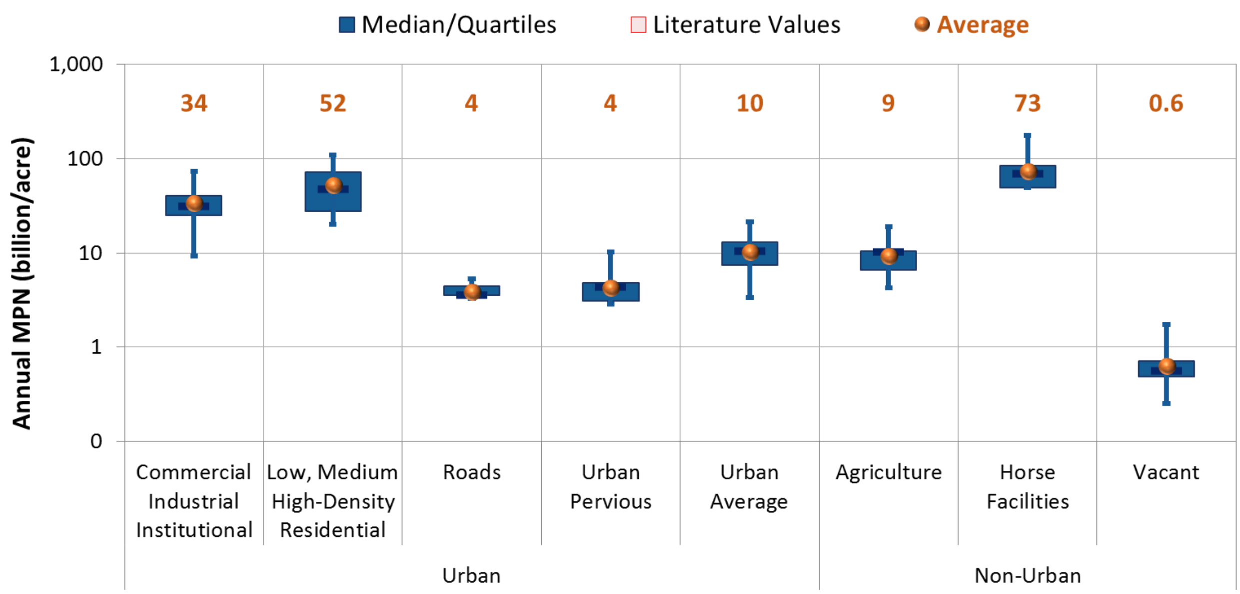

Figure 6A-23. Unit-area bacteria load by land use in the Malibu Creek Watershed.

Water Quality Model Calibration

Wet Weather Assessment

For wet-weather samples, paired water quality event-mean concentrations (EMC) from the LACFCD ME Station #S02 were compared for observed-and-modeled samples taken on the same dates. Because EMC samples at S02 were demonstrated to be representative of long-term wet-weather conditions, it was reasonable to assume that model calibration metrics computed on paired samples would be representative of average wet-weather water quality in Malibu Creek. Figure 6A-24 shows modeled versus observed wet-weather EMCs at S02. The average relative mean error was computed for each pollutant and compared against Table 3.0 in the Regional Board model calibration guidelines document. Metrics for bacteria, total nitrogen, and total phosphorus were all "Very Good." Sediment was under predicted and shown as "Fair" because bank erosion, a process known to be occurring in the watershed, was not modeled.

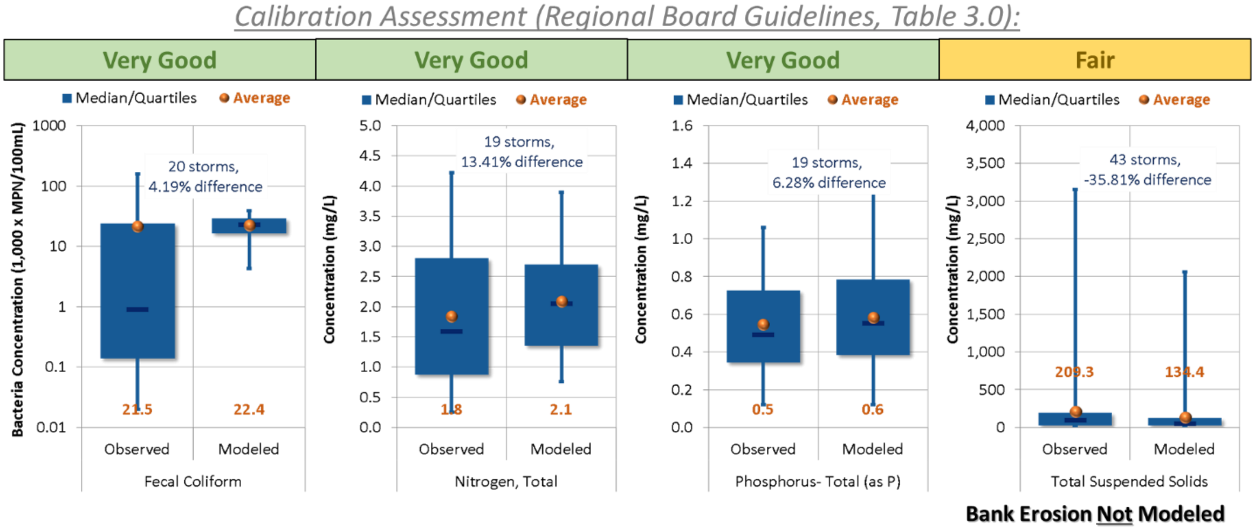

Figure 6A-24. Modeled versus observed wet-weather event-mean concentrations at S02.

Dry Weather Water Quality Calibration (LVMWD RSW MC Dataset)

Five out of the ten RSW MC stations coincided with reach outlets in LSPC. Modeled instream concentrations for the coincident sampling dates were compared at each of those five locations. Station 03F captured conditions at the outlet of Las Virgenes Creek (downstream of Rancho Las Virgenes). Two "control" stations, 09U and 01U, monitored conditions upstream of the confluence of Malibu Creek with Stokes/Las Virgenes Creek and upstream of Tapia WWTP, respectively. Station 02D captured conditions immediately downstream of Tapia WWTP before the confluence with Cold Creek, while 04D monitored conditions downstream of the Cold Creek confluence. Figure 6A-25 and Figure 6A-26 show the range of modeled total nitrogen and total phosphorus levels, respectively, at the five coincident gages for paired modeled-versus-observed samples. One synoptic sampling date is highlighted in Figure 6A-25 and Figure 6A-26 to show the variation in concentration throughout a specific day (December 5, 2006) in the monitoring record.

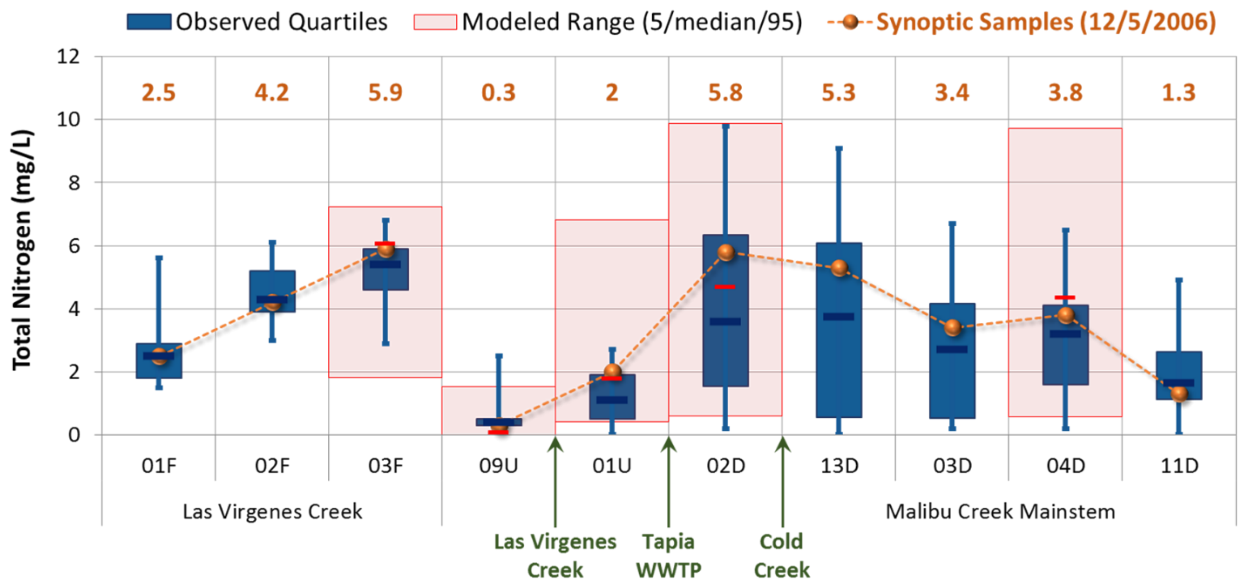

Figure 6A-25. Modeled versus observed dry-weather total nitrogen at selected RSW MC Stations.

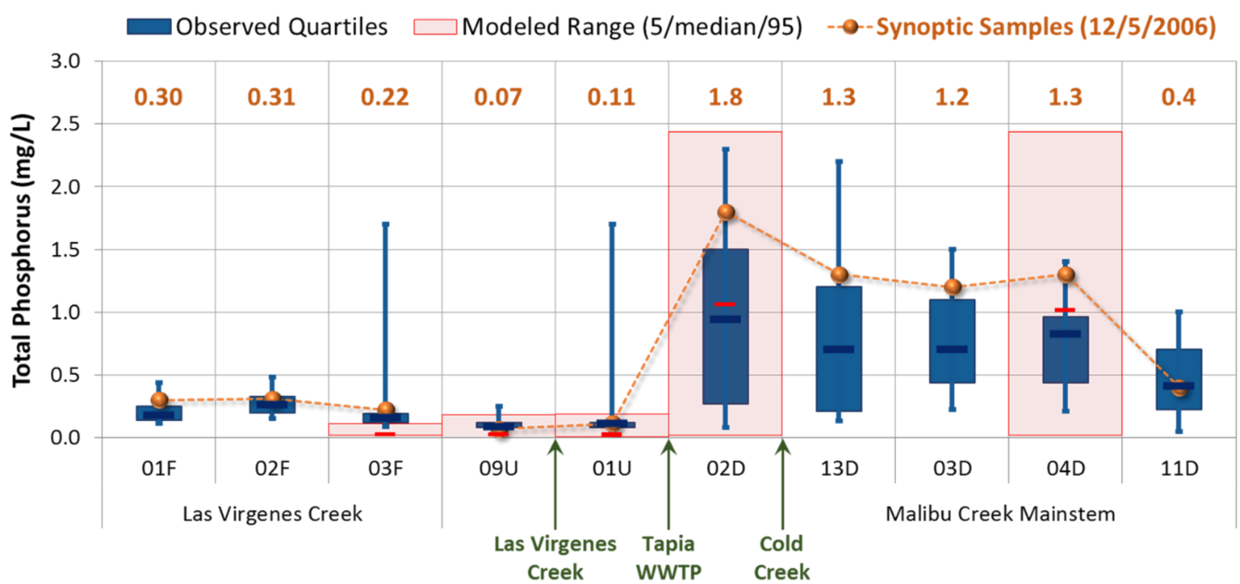

Figure 6A-26. Modeled versus observed dry-weather total phosphorus at selected RSW MC Stations.

In summary, the modeled wet-weather pollutants match very well with observed data at ME station S02. Modeled dry-weather levels also follow the trends observed in the LVMWD RSW MC Dataset. Instream nutrient transformations are not explicitly modeled in this configuration. First-order decay is used to approximate losses and transformations. The model captured the impacts of low-flow dominant sources, making it a reasonable candidate for sensitivity analysis of dry-weather source impacts.

Appendix 6B: Cost Optimization Curves

This appendix presents cost optimization curves for each jurisdiction and watershed, as follows:

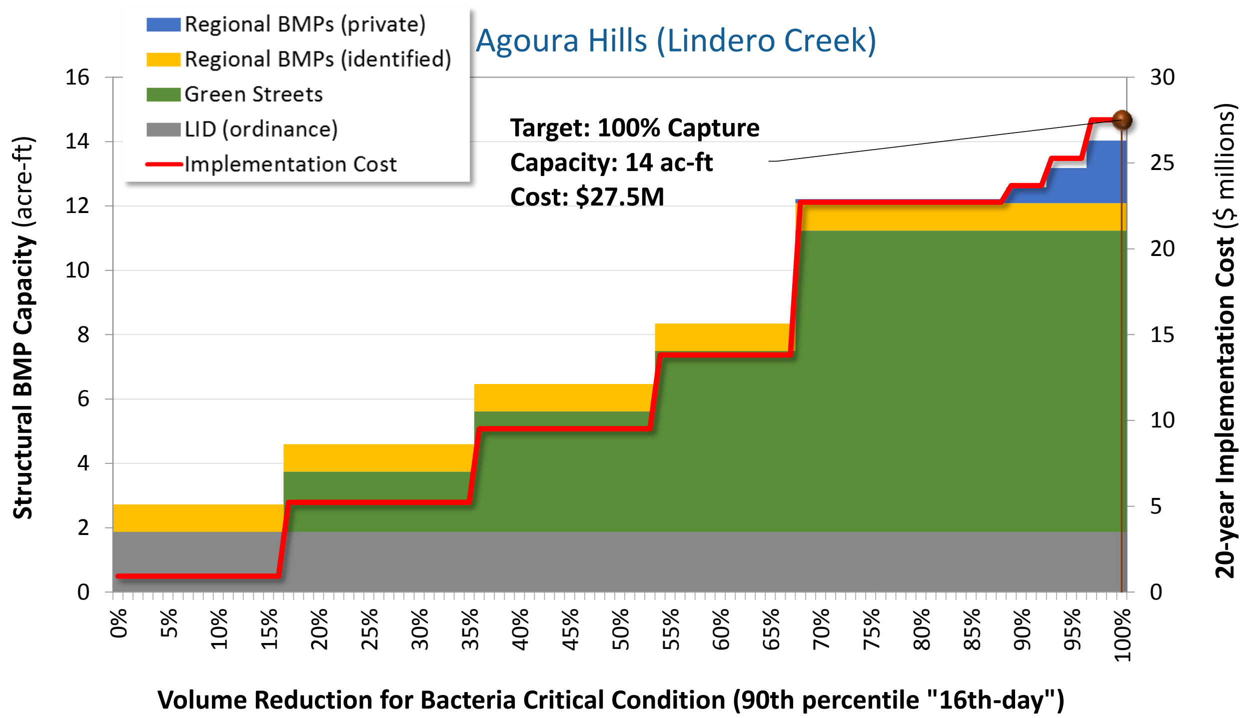

Figure 6B-1. BMP capacities: Agoura Hills (Lindero Creek).

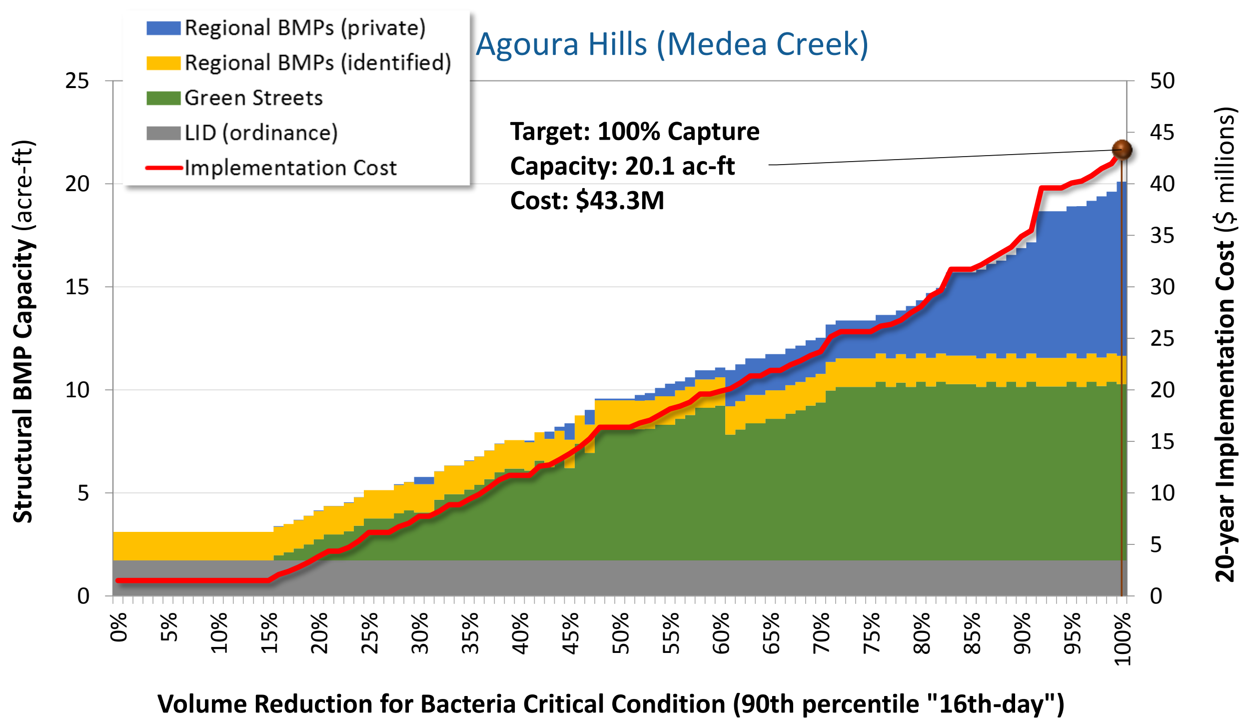

Figure 6B-2. BMP capacities: Agoura Hills (Medea Creek).

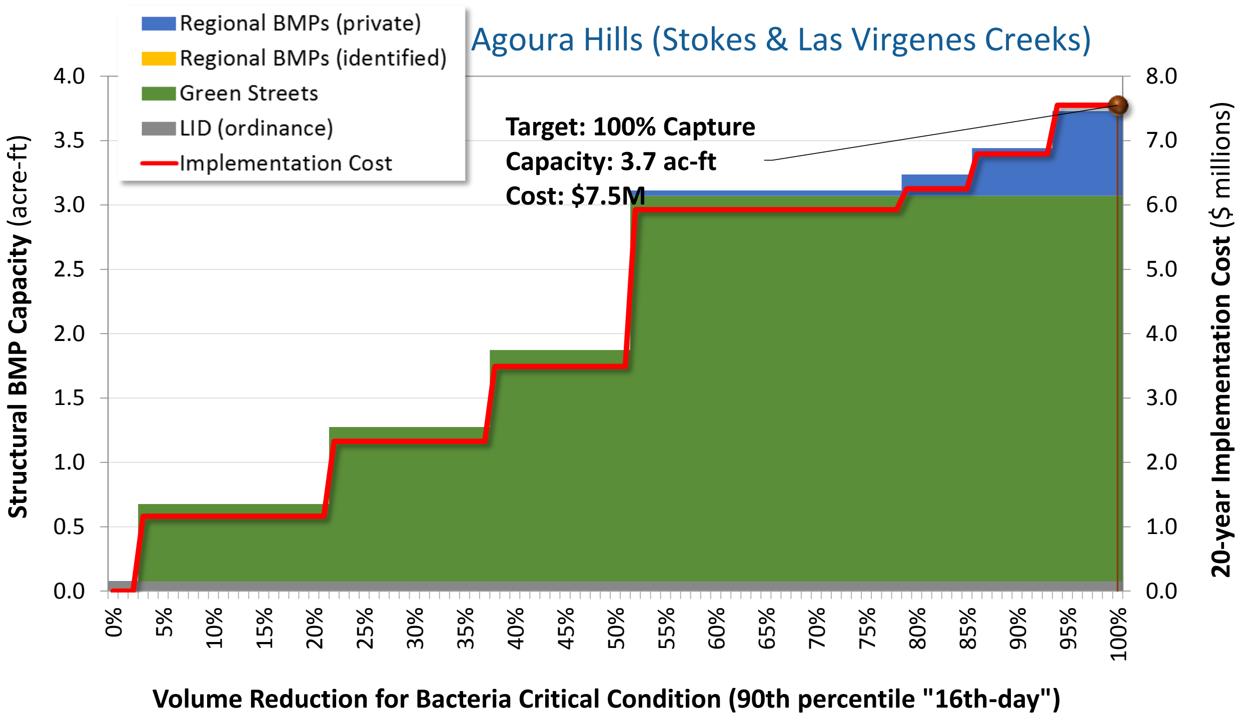

Figure 6B-3. BMP capacities: Agoura Hills (Stokes & Las Virgenes Creeks).

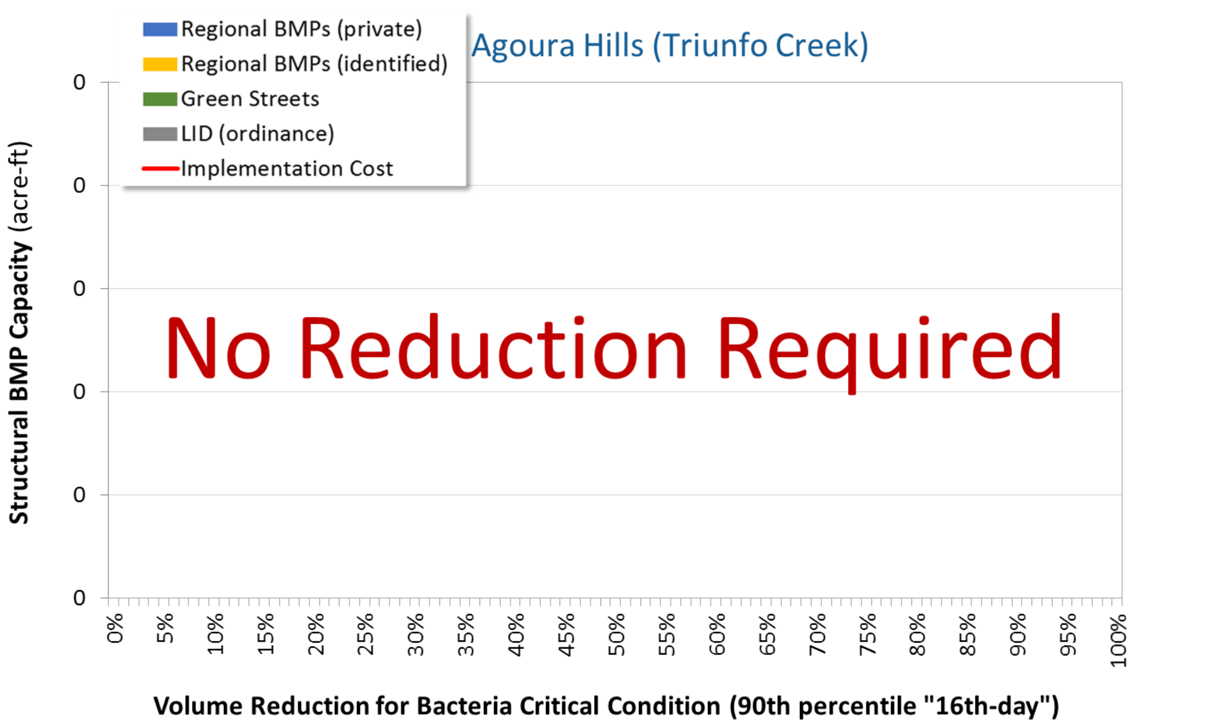

Figure 6B-4. BMP capacities: Agoura Hills (Triunfo Creek).

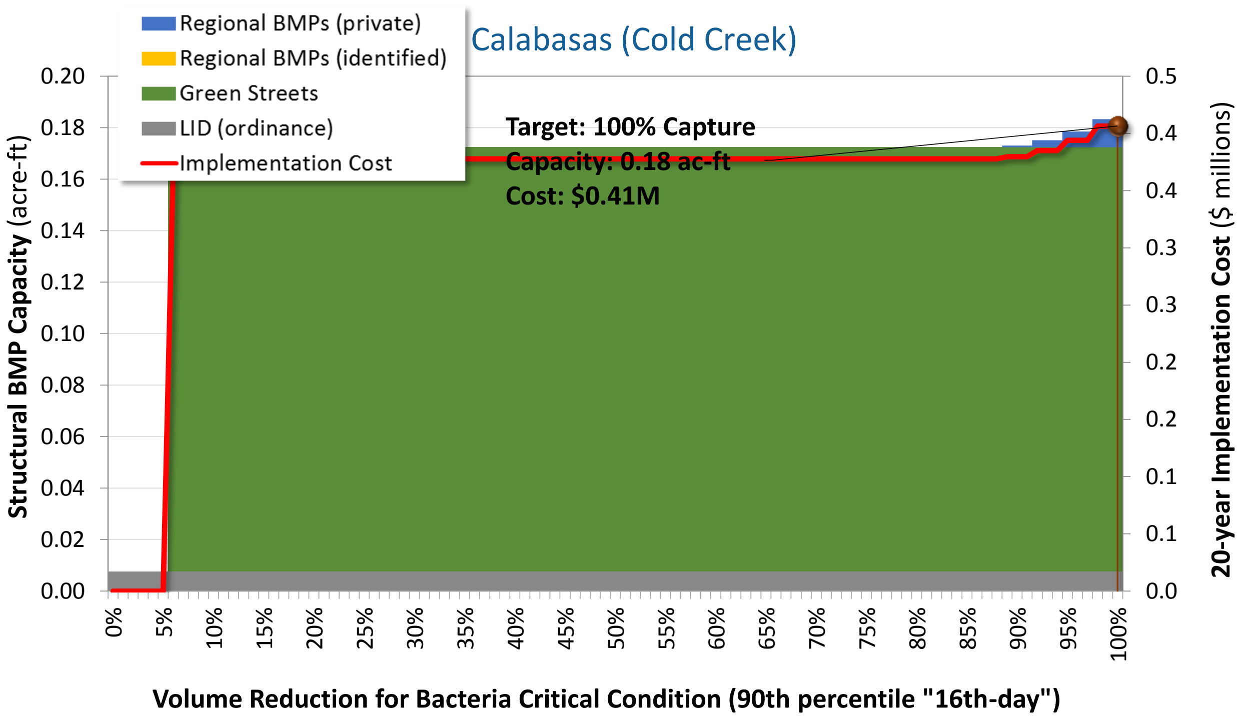

Figure 6B-5. BMP capacities: Calabasas (Cold Creek).

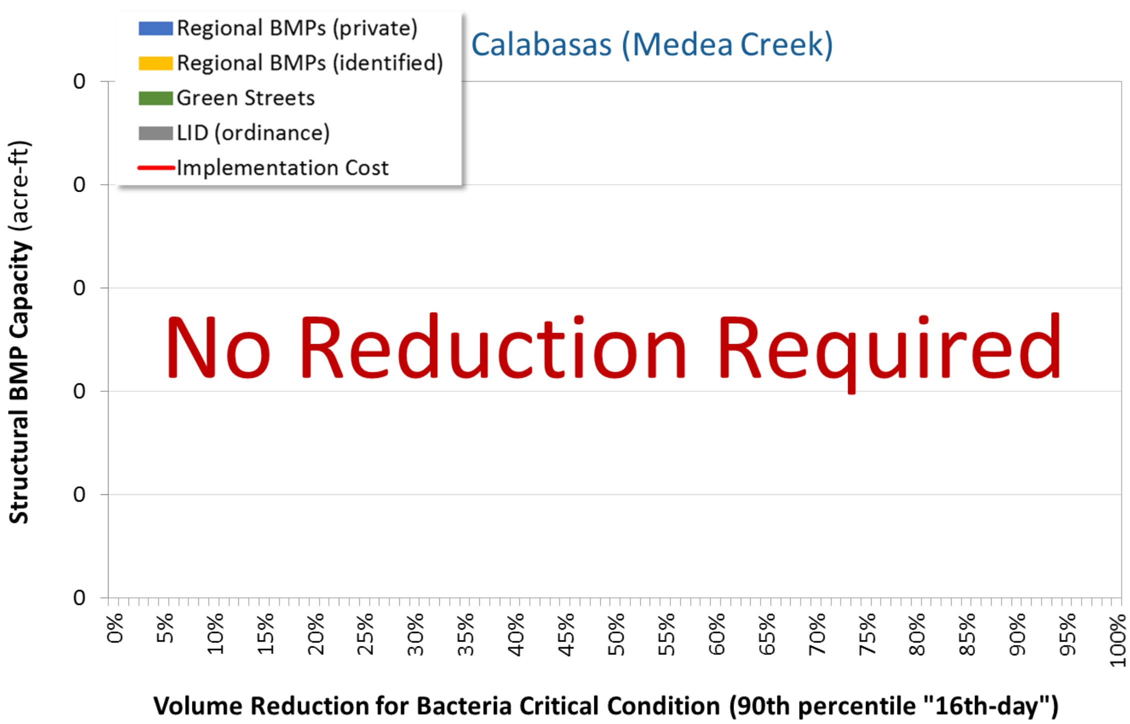

Figure 6B-6. BMP capacities: Calabasas (Medea Creek).

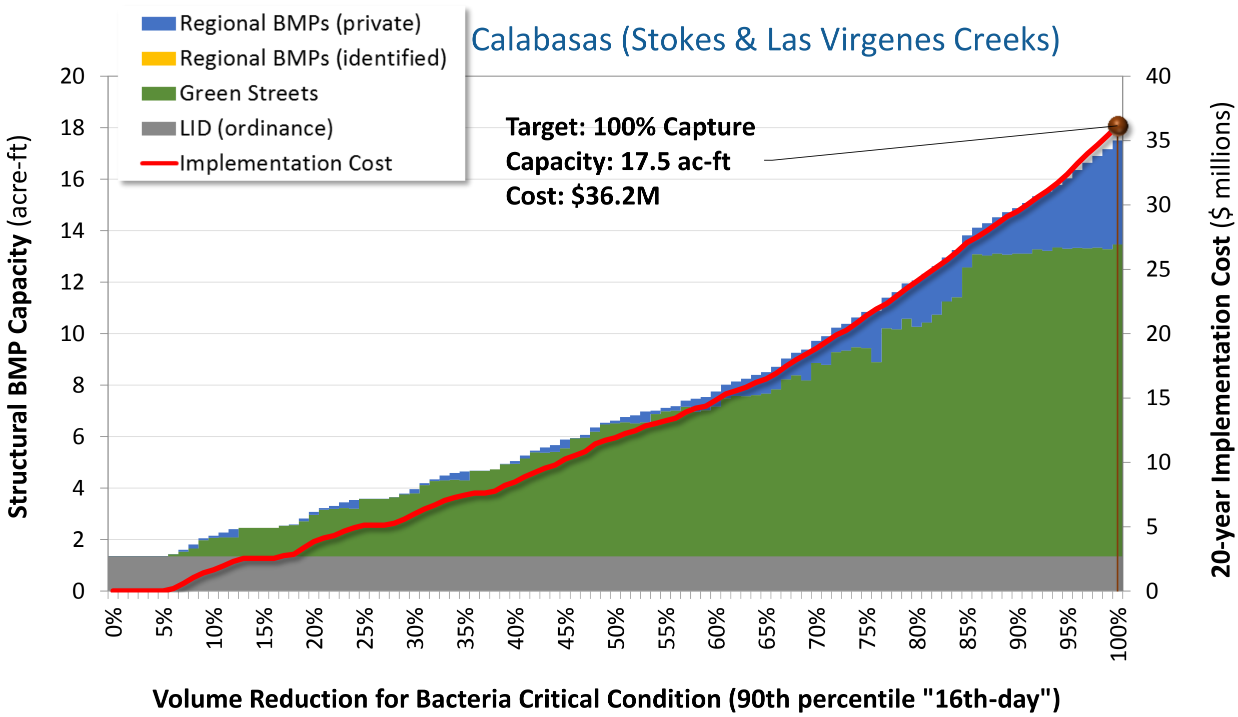

Figure 6B-7. BMP capacities: Calabasas (Stokes & Las Virgenes Creeks).

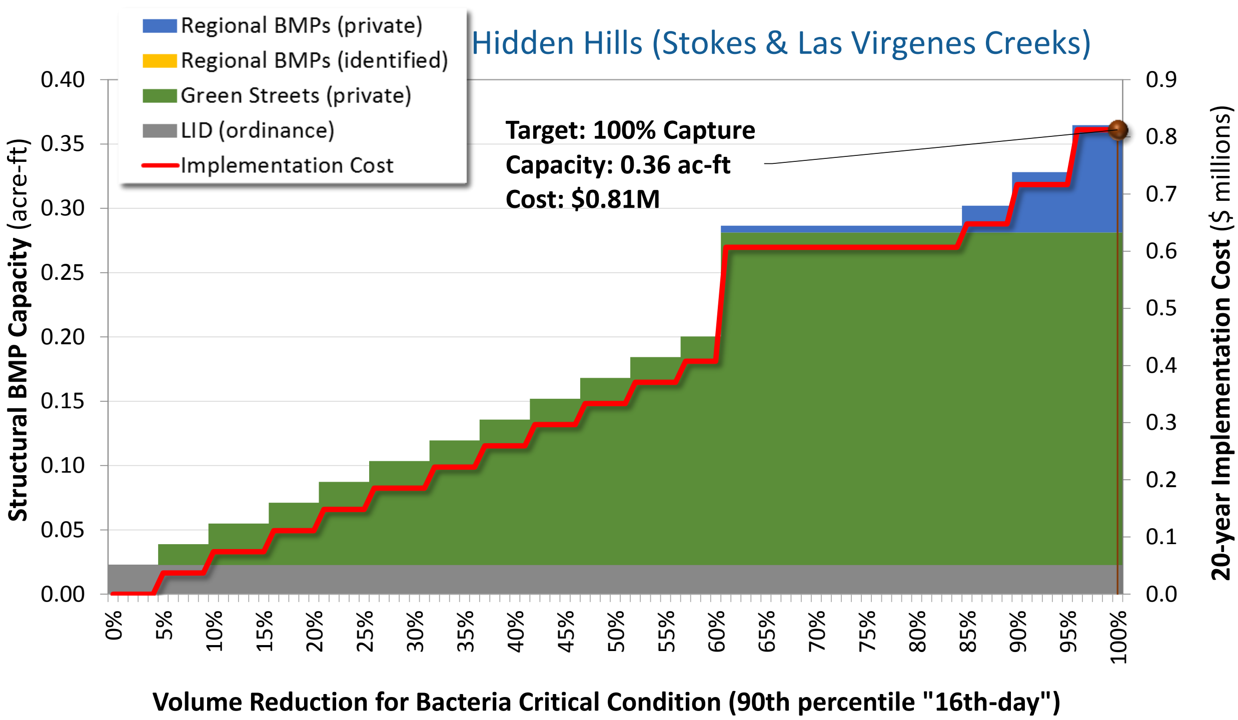

Figure 6B-8. BMP capacities: Hidden Hills (Stokes & Las Virgenes Creeks).

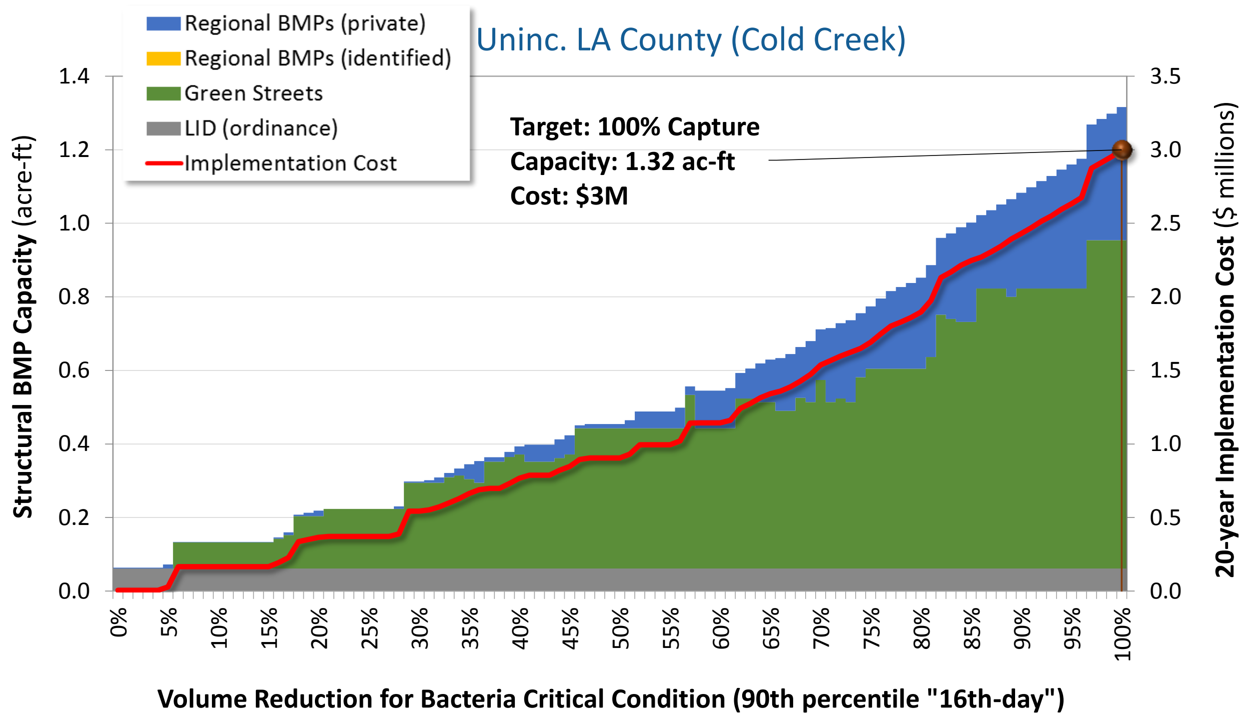

Figure 6B-9. BMP capacities: Uninc. LA County (Cold Creek).

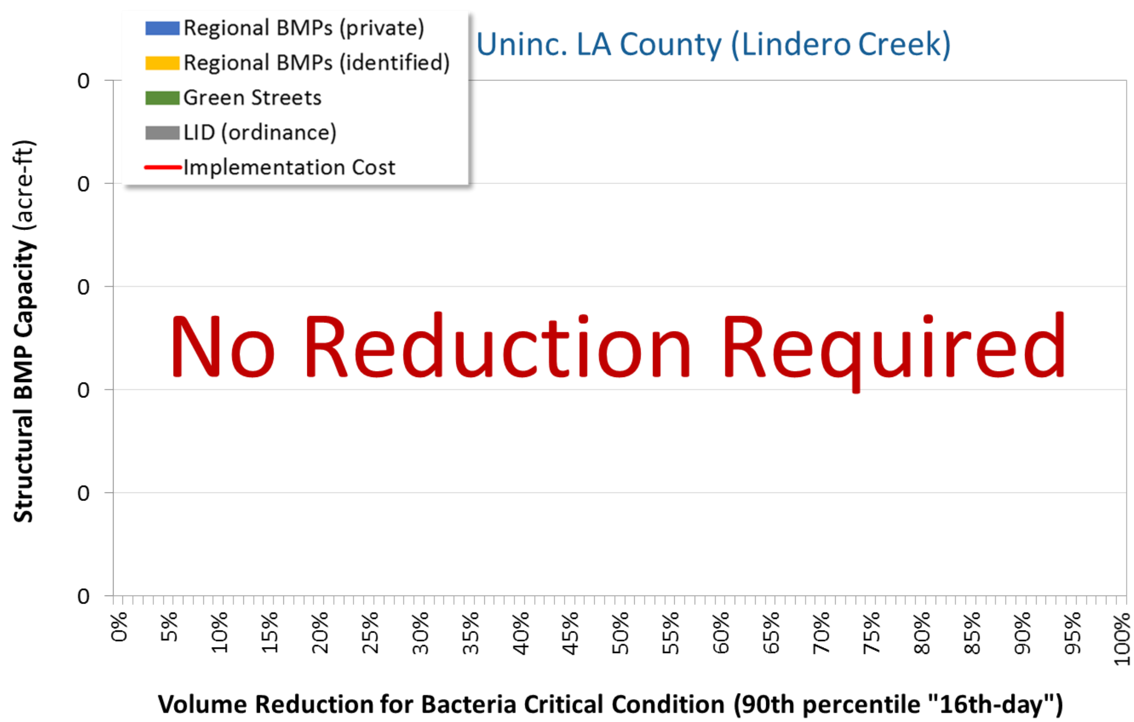

Figure 6B-10. BMP capacities: Uninc. LA County (Lindero Creek).

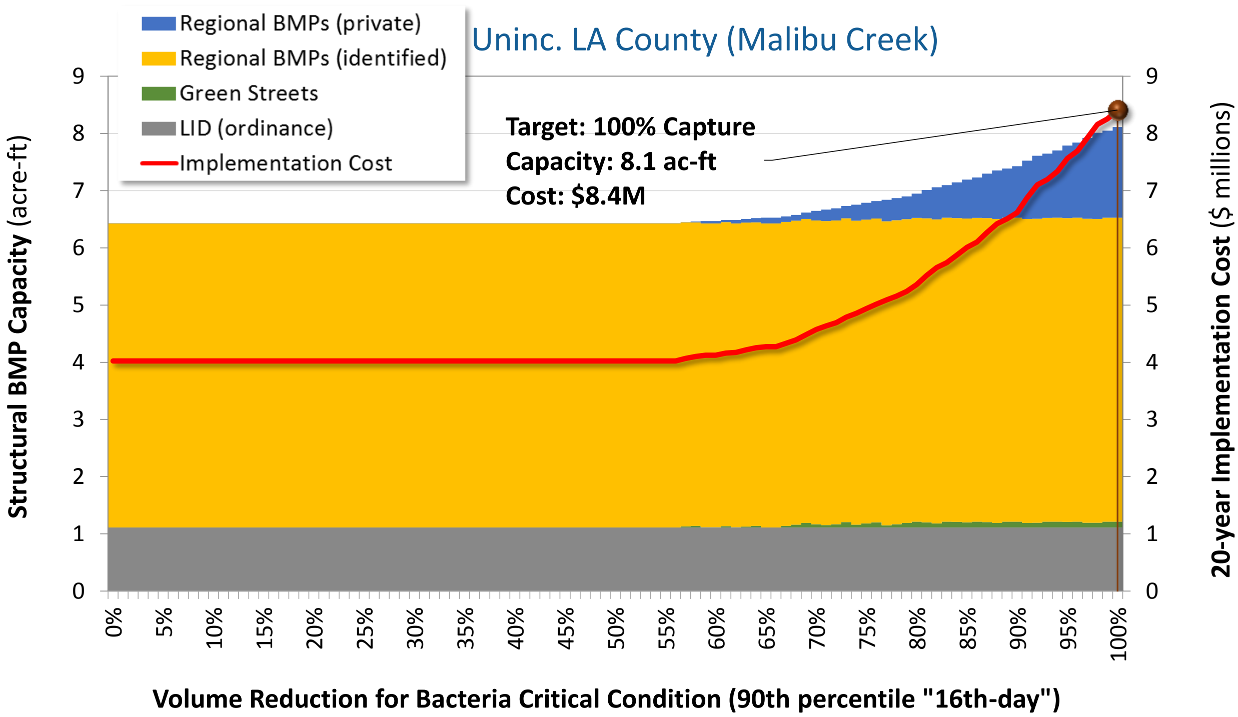

Figure 6B-11. BMP capacities: Uninc. LA County (Malibu Creek).

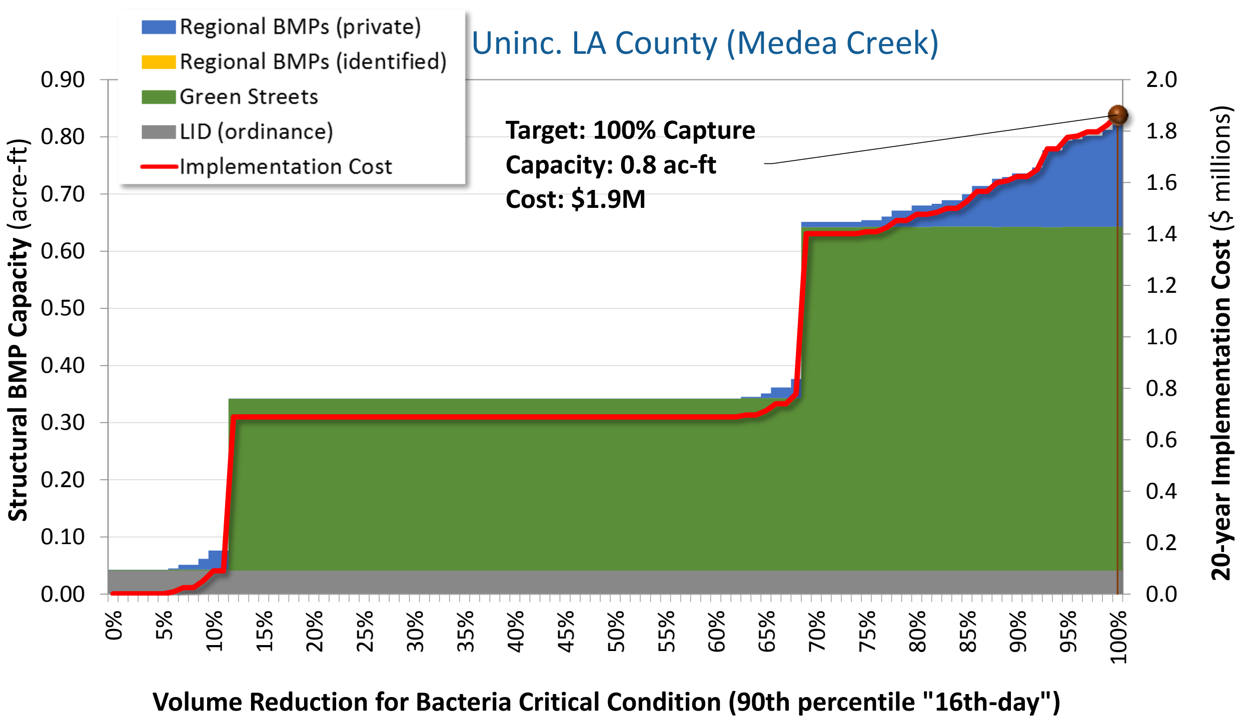

Figure 6B-12. BMP capacities: Uninc. LA County (Medea Creek).

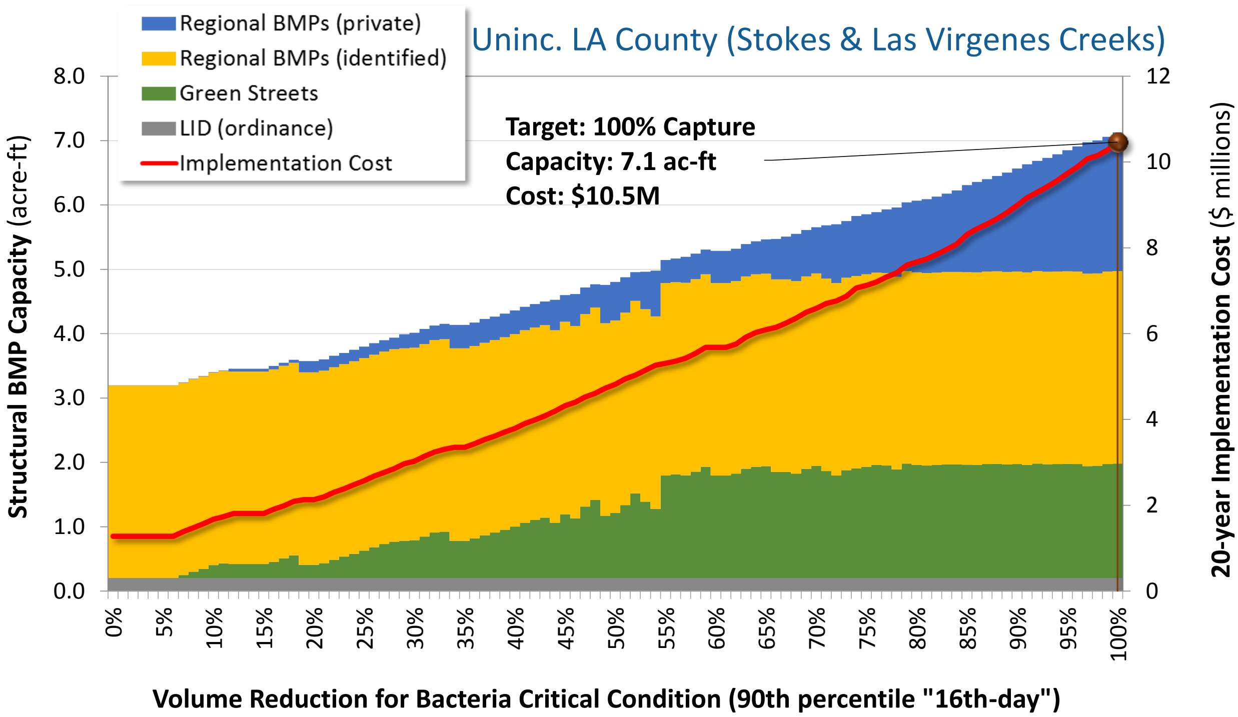

Figure 6B-13. BMP capacities: Uninc. LA County (Stokes & Las Virgenes Creeks).

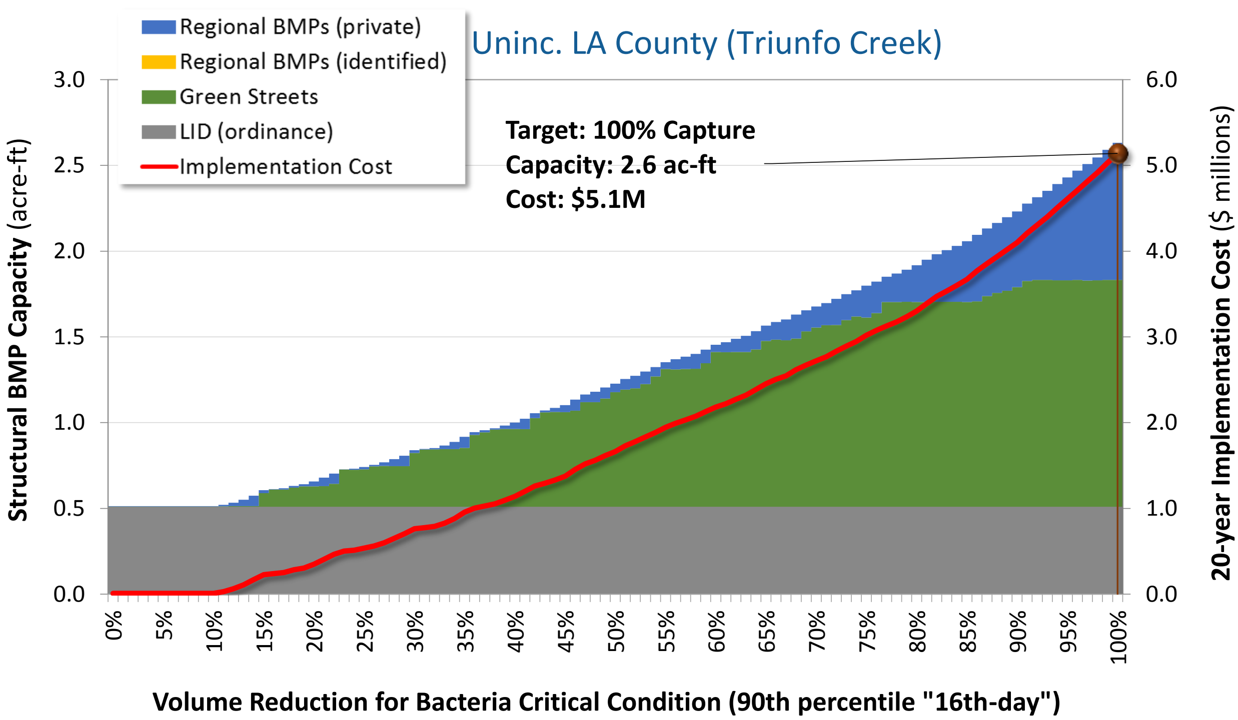

Figure 6B-14. BMP capacities: Uninc. LA County (Triunfo Creek).

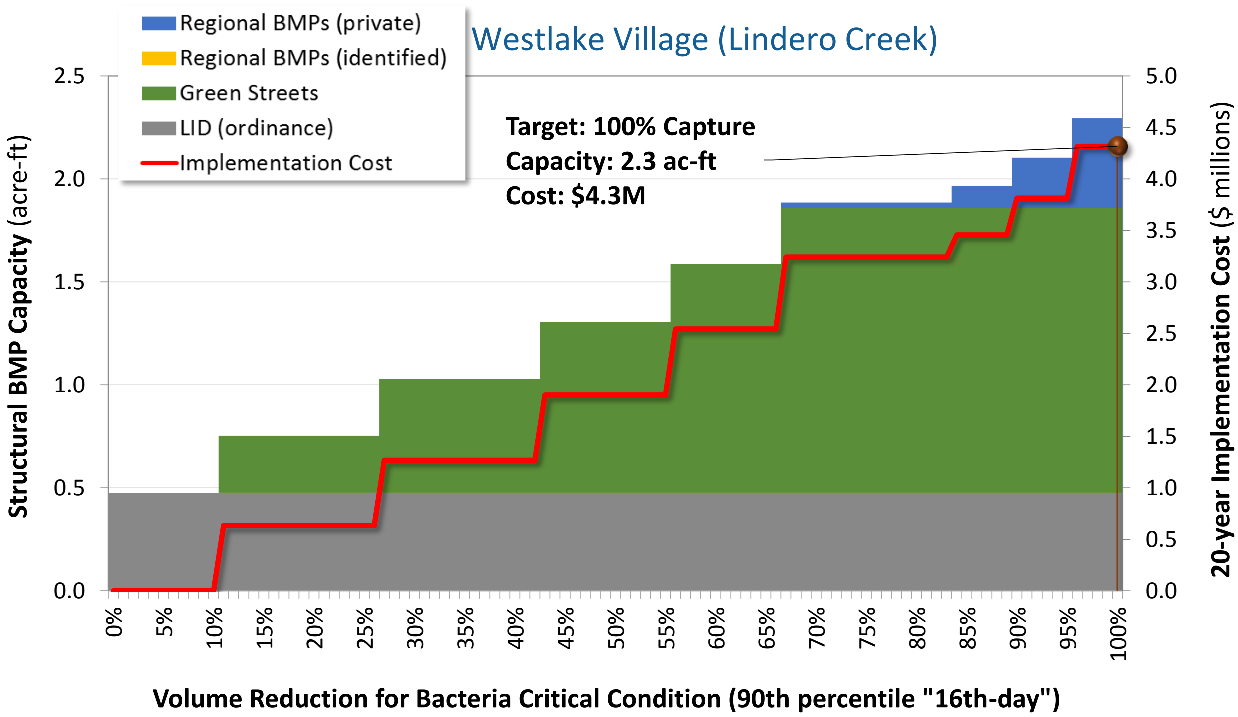

Figure 6B-15. BMP capacities: Westlake Village (Lindero Creek).

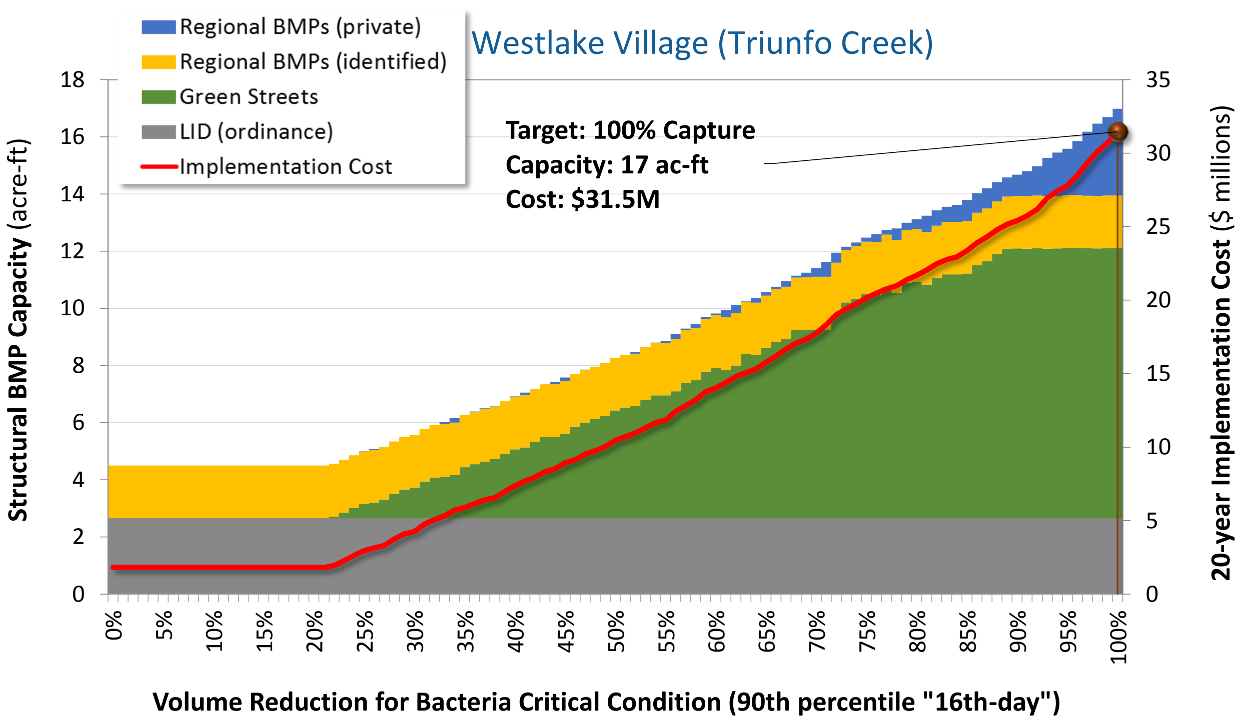

Figure 6B-16. BMP capacities: Westlake Village (Triunfo Creek).

Appendix 6C: Additional RAA Information

Appendix 6-C:
Additional RAA Information

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1 INTRODUCTION

As a component of the LARWQCB's review of the EWMP, additional information from the Reasonable Assurance Analysis (RAA) was requested regarding baseline calculations and predicted BMP performance. In response, this appendix contains additional information and RAA outputs, as follows:

- Section 2: Additional outputs regarding baseline condition and critical condition calculations
- Section 3: Additional outputs regarding predicted end-of-pipe best management practice (BMP) performance
- Section 4: Additional outputs through a regional validation example demonstrating attainment of instream receiving water limits (RWLs) by BMPs

2 BASELINE CONDITION: ADDITIONAL OUTPUTS

The LARWQCB requested a comparison be provided for the exceedance volume (EV) by assessment area and the 90th percentile of pollutant (phosphorous) load to account for conditions in which flow may be high but concentration may not exceed the RWL. Figure 2-1 presents a comparison of the total phosphorous load for three 24-hour 90th percentile critical conditions:

1. 90th percentile 24-hour Exceedance Volume
2. 90th percentile modeled daily flow times 90th percentile modeled concentration, and
3. 90th percentile modeled daily load.

The results show that phosphorous loading during the Exceedance Volume critical condition (#1, above) is higher than the other 90th percentile metrics (#1 and #2) and thus it is a conservative critical condition that is consistent with RAA Guidelines.

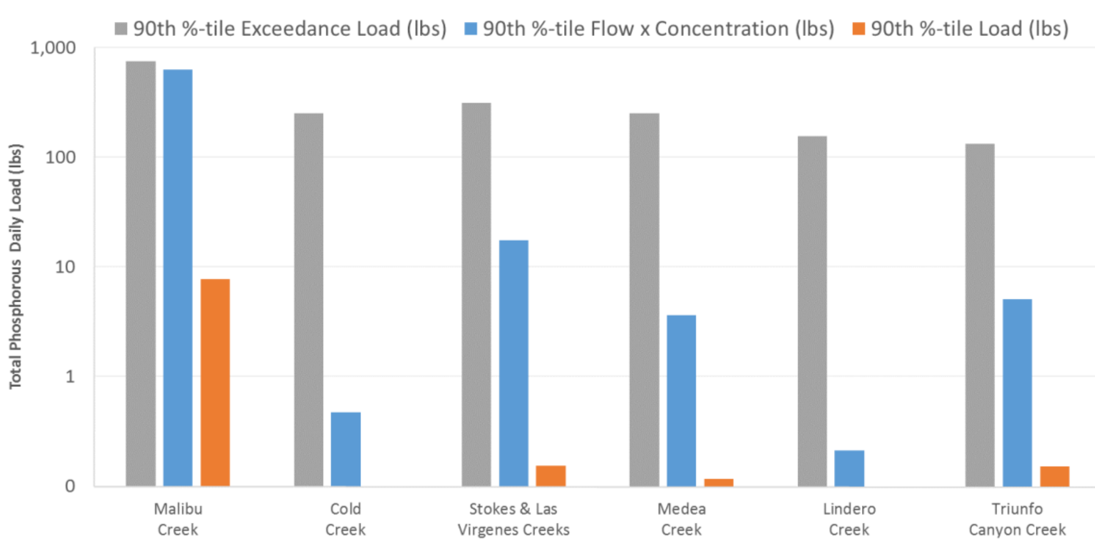


Figure 2-1. Demonstration of exceedance volume approach comparing the 90th percentile condition phosphorous loads by assessment area.

3 BMP PERFORMANCE: ADDITIONAL OUTPUTS

RAA Modeling Comment #3 of the RAA Comment Enclosure requested model results be presented for both the baseline condition and the post-EMP (managed) scenario with the proposed BMPs. The model results are summarized below by assessment area, as follows:

- Runoff under baseline and BMP scenarios for the 90th percentile, 16th wettest day bacteria critical condition (Table 3-1)
- Runoff and pollutant load under the baseline and BMP scenarios for the 90th percentile total phosphorous critical condition (Table 3-2)

Table 3-1. Baseline Runoff and BMP Retention for Assessment Areas during Bacteria Critical Condition

Assessment Area	Baseline Runoff during 90th percentile, 16th day (acre-feet)	Runoff with BMPs during 90th percentile, 16th day (acre-feet)
Cold Creek	1.0	0.0
Lindero Creek	14.0	0.0
Malibu Creek	3.9	0.0
Medea Creek	19.2	0.0
Stokes & Las Virgenes Creeks	21.5	0.0
Triunfo Canyon Creek	18.2	0.0

Table 3-2. Baseline and BMP Scenario for Runoff and Pollutant Loads during Total Phosphorous Critical Condition

Assessment Area	Scenario	Runoff Volume (ac-ft)	*E. coli* (MPN)	Total Phosphorous (lbs)	% Total Phosphorous Reduction
Cold Creek	Baseline	4.6	1.3E+11	8.4	67%
	with BMPs	1.6	4.7E+10	2.8	
Lindero Creek	Baseline	67.4	1.0E+12	265.6	30%
	with BMPs	47.1	6.2E+11	184.9	
Malibu Creek	Baseline	18.3	3.8E+11	65.7	43%
	with BMPs	11.2	2.1E+11	37.4	
Medea Creek	Baseline	65.9	1.2E+12	253.3	37%
	with BMPs	40.9	6.8E+11	159.9	
Stokes & Las Virgenes Creeks	Baseline	76.2	1.2E+12	264.0	40%
	with BMPs	47.0	6.1E+11	157.4	
Triunfo Canyon Creek	Baseline	88.1	1.5E+12	332.3	32%
	with BMPs	60.1	8.8E+11	224.9	

4 REGIONAL VALIDATION EXAMPLE

The LARWQCB requested a proof/validation/demonstration that managing the exceedance volume for the limiting pollutant using the recommended EWMP BMPs results in instream attainment of RWLs. It is important to note that volume-and-load-reduction targets are determined at the *beginning* of the Reasonable Assurance Analysis (RAA) process (and through the limiting pollutant analysis), and thus the extra step at the end of the RAA process to show validation results is optional. However, it is understood that a clear validation may be useful for engaging the public and LARWQCB staff during future discussion.

The RAA for the Malibu Creek EWMP employs a two-tiered optimization approach that manages stormwater runoff from EWMP areas according to critical conditions for associated water bodies (or assessment areas). For metals or nutrients, the management target becomes the load reduction that achieves receiving water limitations (RWLs) during the critical storm that produces the 90th percentile Exceedance Volume. The following EWMPs used this two-tiered optimization approach for selecting Best Management Practices (BMPs) for their implementation plans:

- Upper Santa Clara River (USCR),
- Upper Los Angeles River (ULAR),
- Ballona Creek (BC),
- Upper San Gabriel River (USGR),
- Malibu Creek (MC), and
- Carson and Lawndale portions of the Dominguez Channel (DC) EWMP

In order to support future discussions, this section provides an example regional validation for a representative example waterbody within Los Angeles County: Puente Creek, a tributary to San Jose Creek in the San Gabriel River Watershed. This regional validation example is attached to each of the six "selected EWMPs" listed above, and this sections presents several comparisons between the Puente Creek watershed and the selected EWMPs, based on averaged conditions *across all six* of those EWMP areas. The selected EWMP areas summarized in Table 4-1 represent the land use distribution within the 6 EWMP groups mapped in Figure 4-1. The areas in Table 4-1 represent the total MS4 areas for which the two-tiered optimization approach was used. Average rainfall within the selected EWMP areas was calculated by area-weighting 25 years of hourly rainfall from 111 unique rainfall gages from over 1,442 WMMS subwatersheds. Average rainfall for Puente Creek was calculated by area-weighting 25 years of rainfall from 2 rainfall gages over eight WMMS subwatersheds. Area-normalized rainfall depths were then plotted and compared (Figure 4-2 and Figure 4-3).

Puente Creek was selected for this demonstration because:

- Puente Creek has high required zinc reductions, providing a conservative demonstration of modeled BMP performance.
- Puente Creek is a watershed where 100% of the watershed area is contained within the EWMP boundary (Figure 4-1).

The land use distribution is Puente Creek is generally more urbanized than the land use distribution in the other selected EWMP areas mentioned above (see

- Table 4-1). Compared to the average distribution in the selected EWMP areas, the Puente Creek watershed has more urban area (93% vs. 55%). The distribution of Commercial, Institutional, Industrial, and Roads is similar; however, Puente Creek has nearly twice as much residential area (expressed as pervious and impervious residential land cover).
- Average rainfall in Puente Creek is very similar to average rainfall throughout the selected EWMP areas. Figure 4-2 shows annual average rainfall distribution for 25 years in Puente Creek watershed vs. selected EWMP areas. Figure 4-3 also confirms that seasonal variability in Puente follows the average seasonal trend in the selected EWMP areas. The percent difference in annual average and median rainfall in Puente Creek verses selected EWMP areas over 25 years of record is only 1.4% and 3.8%, respectively.
- The RAA for Puente Creek recommended a mix of LID, Green Streets, and Regional BMPs, which collectively treat 78% of the EWMP area.

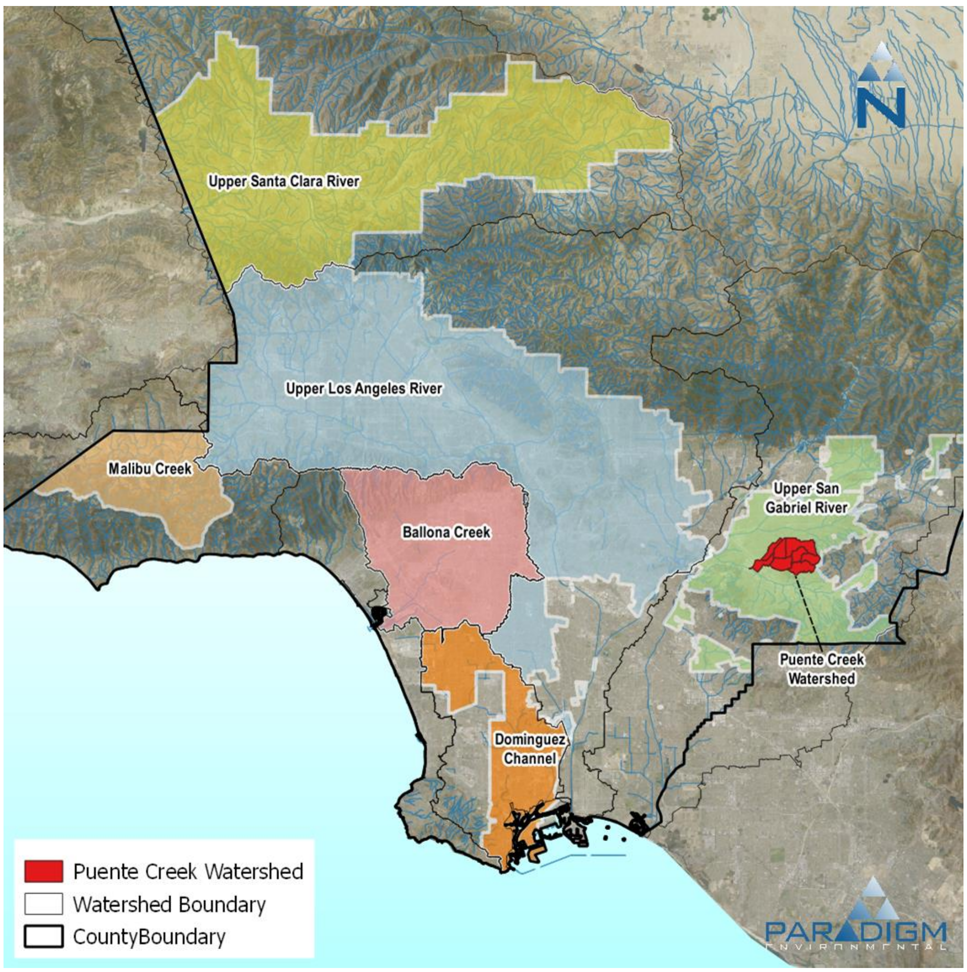


Figure 4-1. Location of Puente Creek watershed within the context of selected Los Angeles County EWMPs.

Table 4-1. Comparison of land use distribution in the Puente Creek EWMP area vs. selected EWMP areas

Land Use		Land Use Distribution[1] by Drainage Area			
		Selected EWMP Areas[2]		Puente Creek Watershed	
		Acres	Percent	Acres	Percent
Impervious	Residential	81,701	10%	1,044	19%
	Commercial	26,250	3%	226	4%
	Institutional	16,163	2%	231	4%
	Industrial	31,467	4%	277	5%
	Roads	60,793	7%	467	9%
Urban Pervious		236,137	29%	2,762	51%
Non-Urban Pervious		363,182	45%	398	7%
Total		**815,692**	**100%**	**5,405**	**100%**

1: Color gradient shows relative land use distribution from least (white) to greatest (red)
2: Selected EWMP areas include: USCR, USGR, ULAR, BC, Malibu, and portions of DC

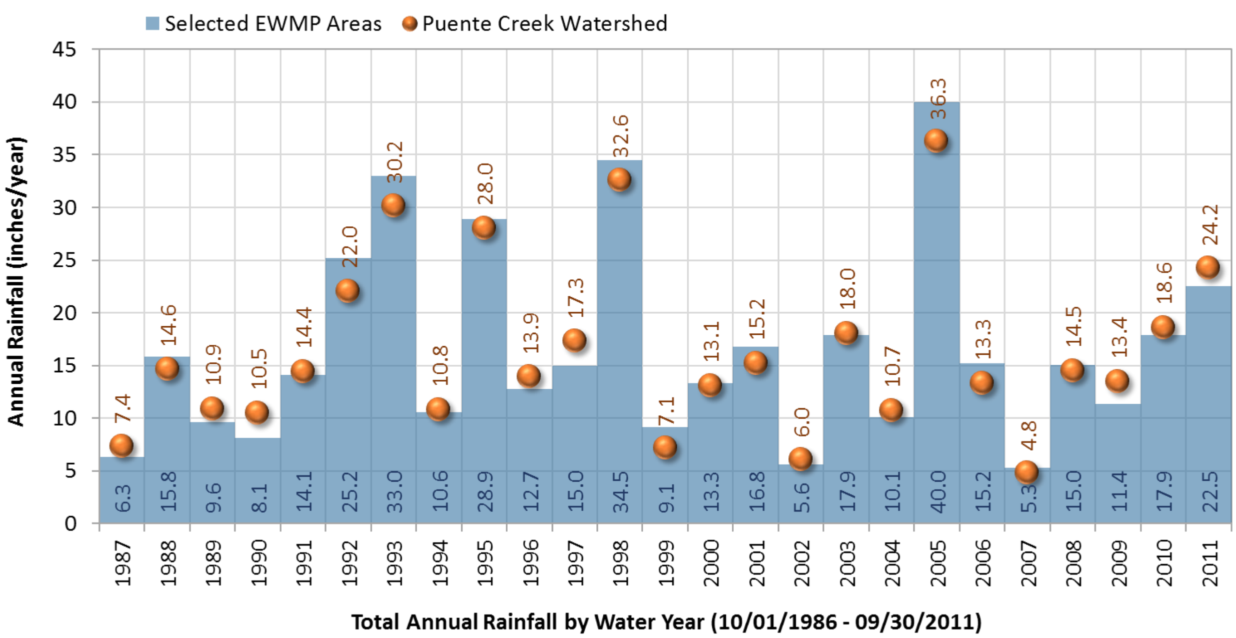


Figure 4-2. Annual rainfall distribution (25 years) in Puente Creek watershed vs. selected EWMP areas.

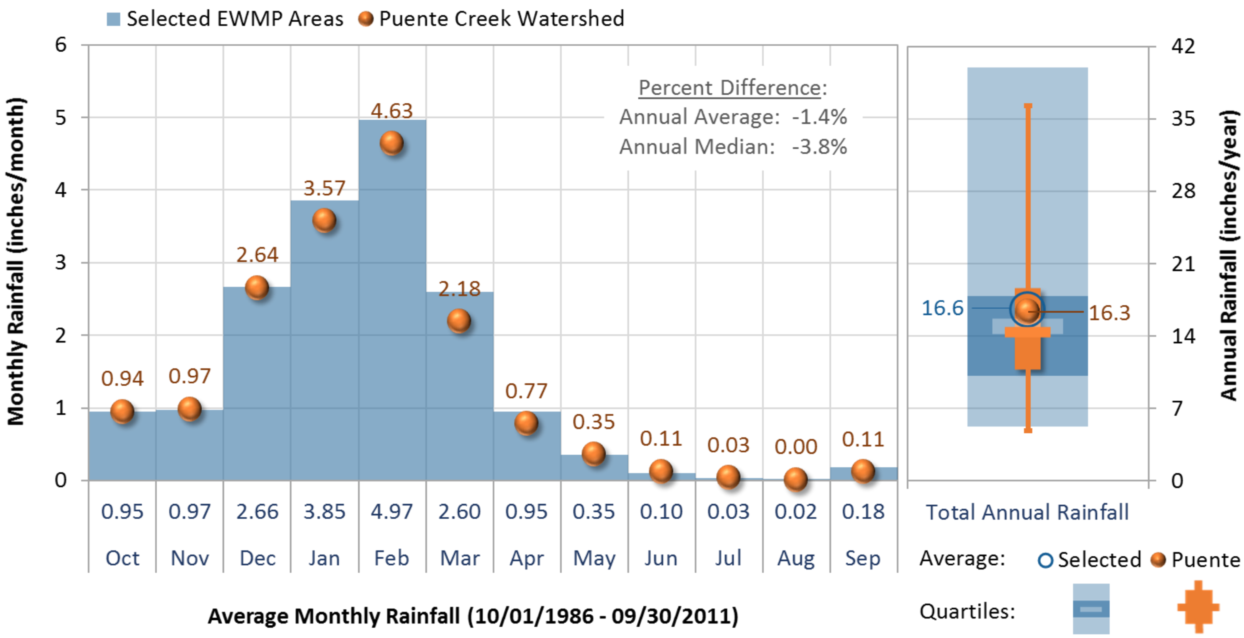


Figure 4-3. Monthly and annual rainfall variability in Puente Creek watershed vs. selected EWMP areas.

4.1 Validation Methodology

RAAs for the selected EWMPs were built on the two primary models within WMMS: the Loading Simulation Program in C++ (LSPC), which is used for watershed runoff and streamflow routing; and SUSTAIN, which is used for BMP selection and placement optimization modeling. As shown in Figure 4-4, to conduct the RAA and complete the validation, the modeling workflow includes (1) simulating watershed rainfall-runoff and pollutant loading; (2) predicting performance of BMPs with fixed assumptions and cost-optimize the cumulative network of BMPs given available BMP opportunities; and (3) validating the selected BMP network to provide reasonable assurance of attainment of RWLs.

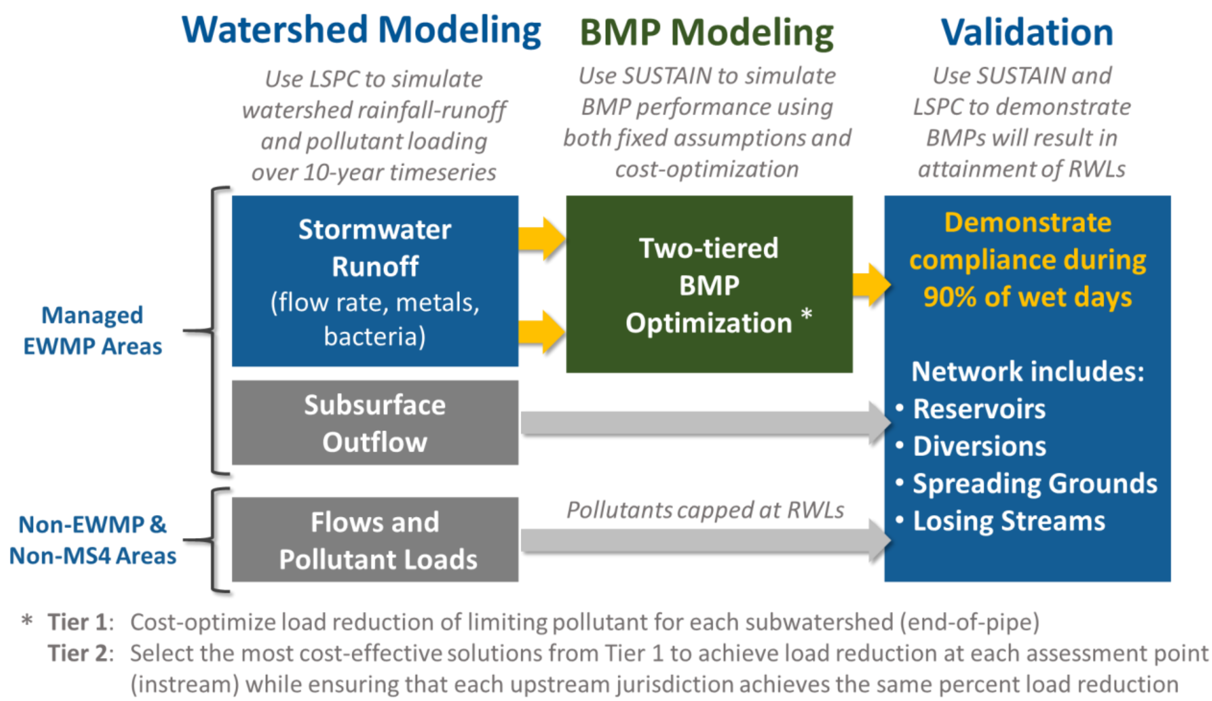
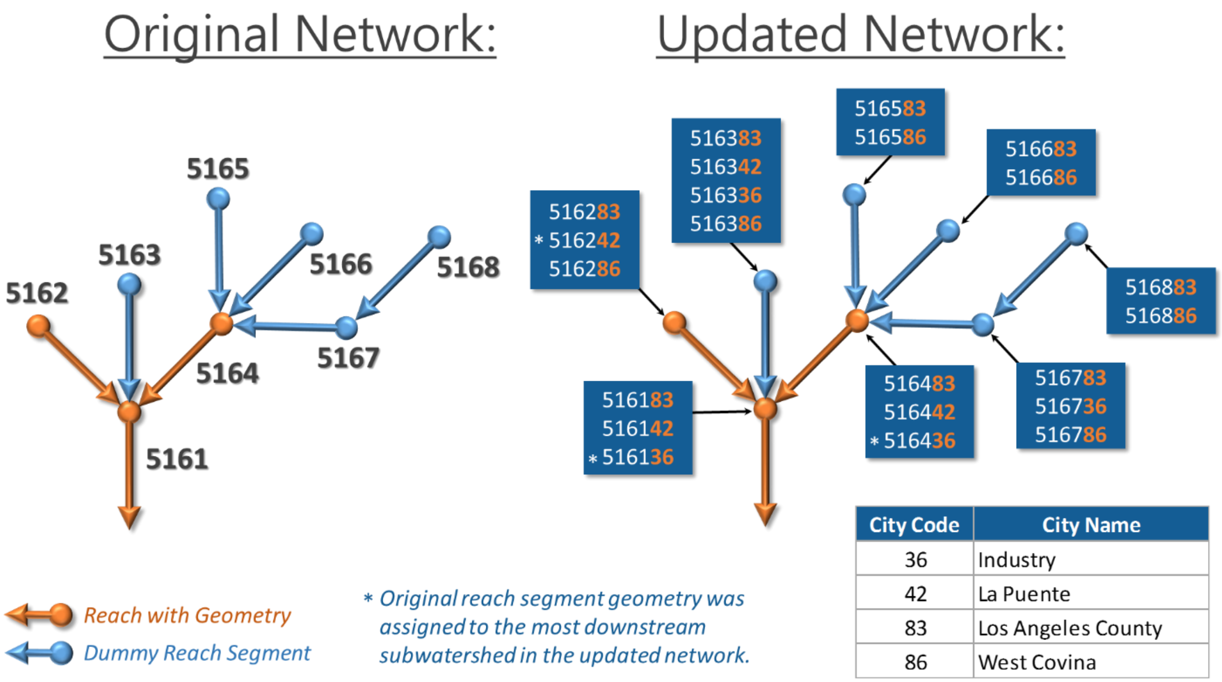


Figure 4-4. Components of the RAA Modeling Process.

4.2 Watershed Model Configuration

The watershed model simulates stormwater runoff and routing/transport for flow and pollutant loads. Subwatershed outflow includes surface and subsurface contributions. Stormwater BMPs manage the surface runoff portion of subwatershed outflow. As described in the RAA sections of the EWMPs, results from 10-years of continuous simulation were used to identify the limiting pollutant's critical condition (i.e. 90th percentile zinc Exceedance Volume) and the required load reduction associated with that critical condition. Although critical conditions are determined instream, associated runoff and loadings originate from multiple subwatersheds and jurisdictions.

An important aspect of the RAA is that load reductions within an assessment area are equitably distributed among jurisdictions contributing to the exceedance. For this reason, the original WMMS subwatersheds were further subdivided into jurisdictions. As described in the RAA sections of the selected EWMPs, all jurisdictions draining to a given assessment point were held to the same percent reduction. Figure 4-5 shows the original WMMS and updated RAA subwatershed routing networks for Puente Creek for the four contributing jurisdictions. The zinc critical condition in Puente Creek required a 76% instream load reduction—for equitability, all jurisdictions are required to each achieve a 76% load reduction collectively within their respective areas that drain to Puente Creek.



City Code	City Name
36	Industry
42	La Puente
83	Los Angeles County
86	West Covina

Figure 4-5. Original WMMS vs. RAA subwatershed modeling network for Puente Creek with contributing jurisdictions.

As previously shown in Figure 4-4, individual subwatershed contributions are separated into surface runoff and baseflow. Surface runoff from EWMP areas within Puente Creek were exported from the watershed model and used as boundary conditions for BMP modeling. Validation is performed by replacing baseline runoff in the watershed model with BMP effluent from the EWMP implementation plan. Subsurface flows and any other contributions from non-EWMP areas were also identified in the baseline model for accounting purposes. Non-EWMP areas were not managed by EWMP BMPs but it is important to account for impact of non-EWMP areas on the validation, as further described in Section 0.

4.3 BMP Model Configuration

SUTAIN was used to identify the most cost-effective combination of management practices in each subwatershed that collectively achieved a 76% zinc load reduction in each jurisdiction. Figure 4-6 shows the most cost-effective distribution of BMP capacity by BMP type (LID, green streets, and regional BMPs). Table 4-2 summarizes the detailed recipes for compliance for the four jurisdictions within the Puente Creek assessment area. For this exercise, the validation is focused on zinc RWL attainment and thus the BMPs associated with the 2026 metals attainment milestone were included in the model to validate RWL attainment for metals.

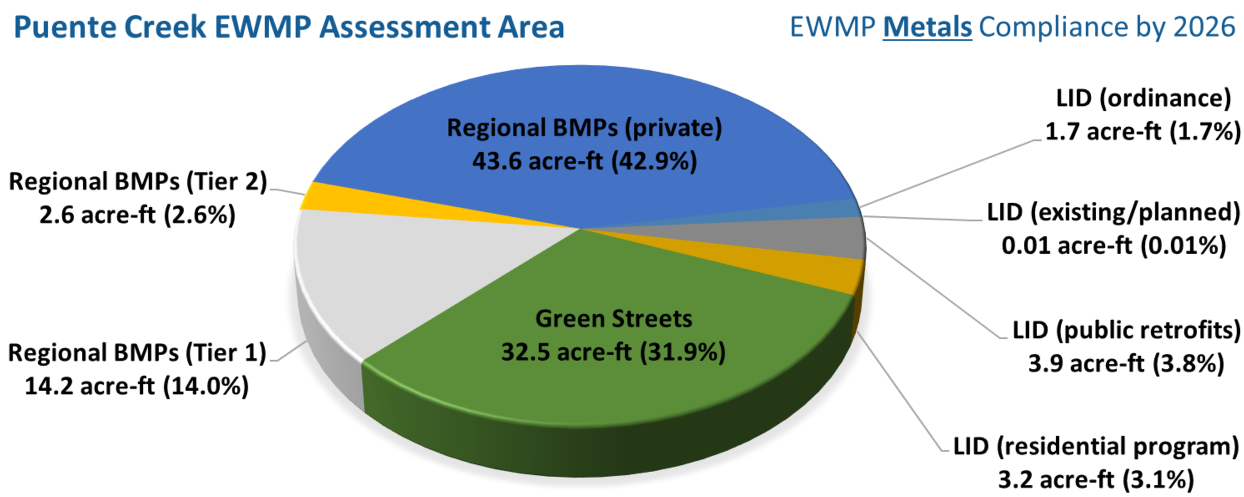


Figure 4-6. BMP capacities for metals compliance in the Puente Creek watershed.

Table 4-2. Detailed recipe for Metals TMDL compliance by jurisdiction for the Puente Creek Watershed

EWMP Implementation Plan Component			Optimized Capacity by Jurisdiction (acre-ft)			
			Industry	La Puente	Los Angeles County	West Covina
For Metals Attainment by 2026	24-hour Volume Managed		14.28	28.71	48.58	21.14
	LID	Ordinance	0.43	0.42	0.77	0.09
		Planned LID	---	---	0.01	---
		Public LID	0.14	0.42	3.27	0.05
		Residential LID	0.01	0.86	2.07	0.23
	Green Streets		0.98	9.00	17.62	4.85
	Regional	Tier 1 (public, owned)	---	10.92	3.31	---
		Tier 2 (public, owned)	0.81	0.03	---	1.78
		Tier 2 (public, non-owned)	---	---	0.00	---
		Private	6.82	10.52	15.42	10.8
	Total BMP Capacity		**9.19**	**32.18**	**42.48**	**17.8**

4.4 Routing Configuration between Watershed and BMP Models for Validation Example

The validation process involved deconstructing and reconstructing the watershed model within the Puente Creek assessment area. A step-by-step sequence of tests were performed to systematically layer the components, verifying for expected outcomes from test cases at each step in the process. The steps include:

1. **Establish baseline (original subwatershed network)**: run the baseline watershed model (with the original 8-subwatershed network), which serves as the primary reference point for validation.
2. **Confirm baseline (updated subwatershed network)**: run the updated baseline watershed (with the updated jurisdiction-based network with 22 subwatersheds) and verify that flow and water quality matches results from Step 1.
    a. **Establish EWMP baseline**: separate runoff into EWMP and non-MS4 timeseries. Non-MS4 areas are assumed to be managed by other means to achieve the RWL. This ensures that non-EWMP areas do not contribute to exceedances at the assessment point. Thus, the concentrations of zinc from non-MS4 areas are "capped" at the RWL to prevent the non-MS4 areas from causing or contributing to RWL exceedances.
3. **Confirm optimized BMP solution**: combine baseline LSPC and SUSTAIN BMP model runs
    a. Route 10 years of baseline continuous simulation runoff from LSPC through the selected EWMP BMPs to generate timeseries of treated runoff.
    b. Replace baseline timeseries in the watershed with treated BMP effluent from SUSTAIN. That is, the timeseries of concentration and flow rate in the effluent from the selected BMP solution for each assessment area was inserted back into the watershed model (LSPC) and routed through the reach network.
    c. Run the updated watershed model to generate 10-years of runoff and instream pollutant concentrations at the outlet of Puente Creek with BMPs implemented.
4. **Process Validate Output**: sort and plot 10-years of zinc *wet-weather* concentrations for each of the three model runs listed below.
    a. Baseline model for Puente Creek (output from Step 1)
    b. EWMP baseline model with non-MS4 area capped at RWL (output from Step 2)
    c. BMP solution model run (output from Step 3)
5. **Validate Results**: Present the three percentile plots from Step 4 on a graph, along with the RWL. Demonstrate that the BMP solution model run achieves the RWL at the 90th percentile threshold for the modeled 10-year period.

4.5 Results and Conclusions

Per Steps 4 and 5 of the validation process described above, the 10-year record was analyzed to validate that RWLs were attained on 90% of wet weather days. Figure 4-7 presents baseline timeseries verses EWMP-implemented (BMP solution model run) time series for flow and zinc concentration in Puente Creek. The successful validation outcome (for Puente Creek) is shown in Figure 4-8. The 90th percentile wet weather concentration of total zinc at the mouth of Puente Creek is compared to the RWL. Three different conditions are shown in Figure 4-8, as follows:

1. Baseline/existing condition ("Baseline", blue line)

2. Baseline condition with zinc concentrations capped at RWLs for runoff from non-MS4 and non-EWMP areas ("Baseline for EWMP MS4s", green line)
3. Condition after BMPs specified by the RAA are implemented ("EWMP implemented", orange line).

Validation is demonstrated by the outcome that the 90[th] percentile concentration at the mouth of Puente Creek is less than the zinc RWL. This validation is representative of each of the selected EWMPs including USCR.

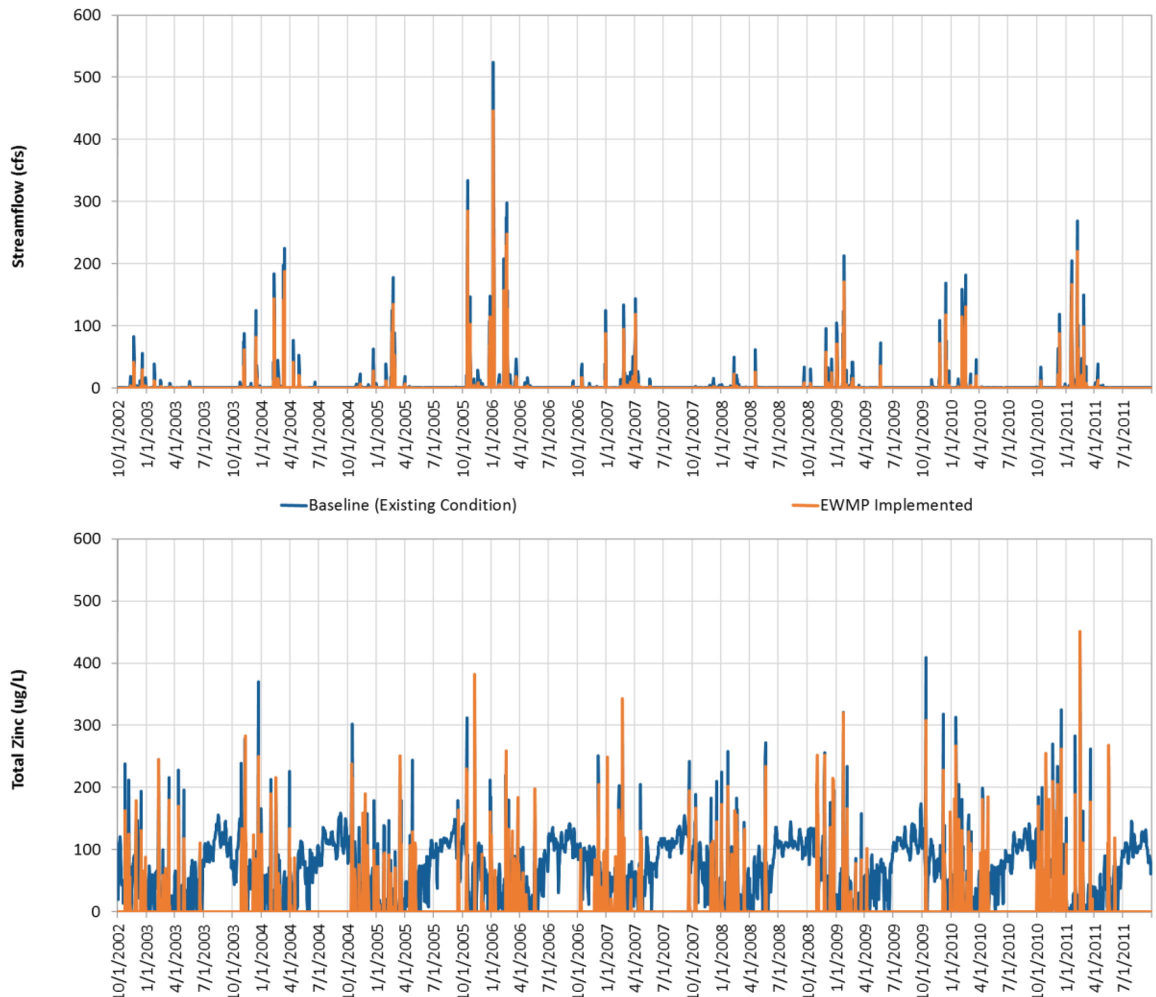


Figure 4-7. Instream validation 10-years timeseries plot demonstrating attainment of RWLs (Puente Creek).

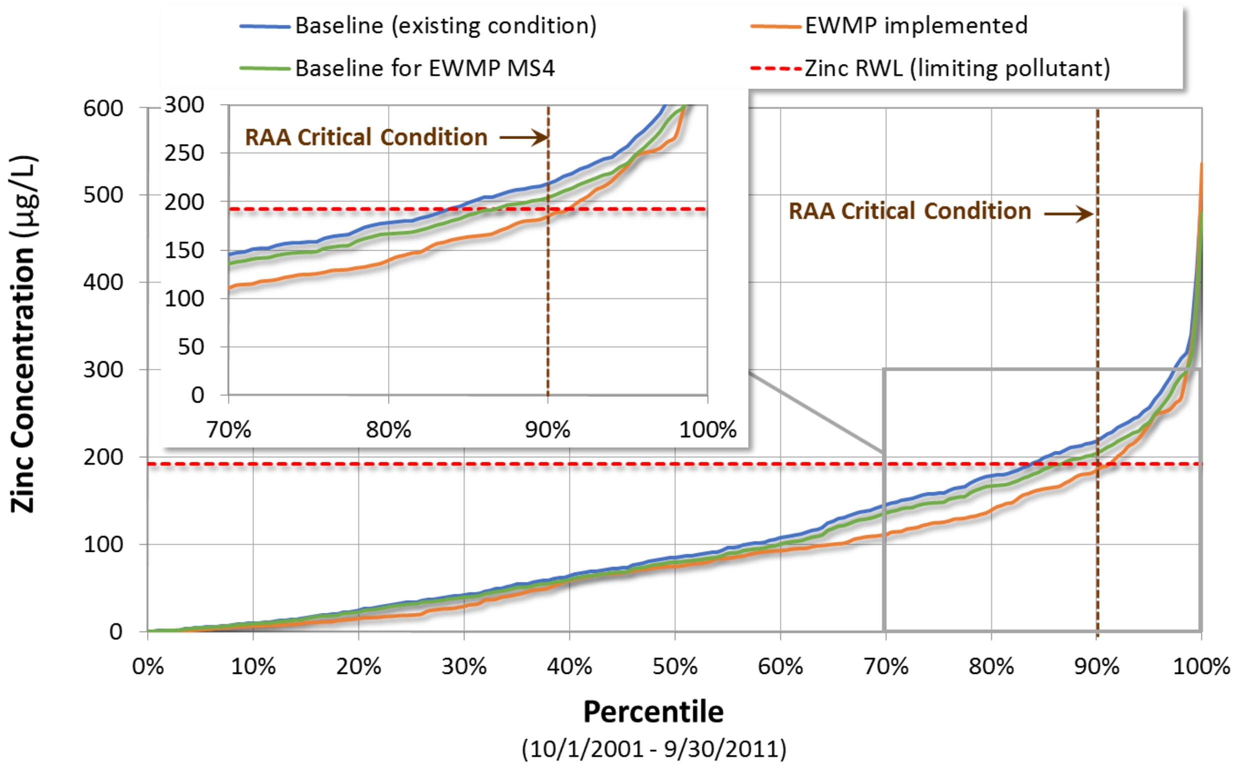


Figure 4-8. Instream validation plot demonstrating attainment of RWLs (Puente Creek).

Appendix 7A: Detailed Recipe for Final EWMP Compliance (Compliance Targets and EWMP Implementation Strategy)

This appendix presents the detailed Compliance Targets and EWMP Implementation Strategy. A series of tables are presented below, organized first by jurisdiction and then by watershed. Index maps of the subwatershed IDs are presented in Appendix 7.B.

The following color-gradients and symbol legend applies to all tables in Appendix 7A:

Red	=	Subwatersheds with highest required runoff management volumes
Blue	=	Subwatersheds with highest BMP capacities within a BMP category
Gray	=	Areas with no required reductions
—	=	BMP opportunity was either not available or not selected for the subwatershed (a value of 0.00 means that BMP capacity is non-zero but less than 0.004).

Table 1. Agoura Hills, Lindero Creek: RAA Output and EWMP Implementation Plan

Subwatershed ID	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)						
	Bacteria	Benthic	For Bacteria TMDLs					For Benthic TMDL	
	24-hour Volume Managed (acre-ft)	Additional 24-hour Volume Managed (acre-ft)	LID Ordinance	Streets Green Streets	Regional BMPs Regional BMPs (identified)	Regional BMPs Regional BMPs (private)	Total BMP Capacity (acre-ft)	Regional BMPs (additional)	Cumulative BMP Capacity for both Bacteria and Benthic (acre-ft)
302501	12.06	---	1.87	9.37	0.85	1.94	**14.03**	---	---
Total	**12.06**	---	**1.87**	**9.37**	**0.85**	**1.94**	**14.03**	---	---

Table 2. Agoura Hills, Medea Creek: RAA Output and EWMP Implementation Plan

Subwatershed ID	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)						
	Bacteria	Benthic	For Bacteria TMDLs					For Benthic TMDL	
	24-hour Volume Managed (acre-ft)	Additional 24-hour Volume Managed (acre-ft)	LID Ordinance	Streets Green Streets	Regional BMPs Regional BMPs (identified)	Regional BMPs Regional BMPs (private)	Total BMP Capacity (acre-ft)	Regional BMPs (additional)	Cumulative BMP Capacity for both Bacteria and Benthic (acre-ft)
302401	0.00	---	---	0.00	---	0.00	**0.00**	---	---
302601	14.44	---	0.93	6.10	1.38	7.04	**15.45**	---	---
302901	4.08	---	0.79	2.32	---	1.40	**4.50**	---	---
303101	0.17	---	0.01	0.25	---	0.03	**0.29**	---	---
Total	**18.69**	---	**1.73**	**8.66**	**1.38**	**8.47**	**20.24**	---	---

Table 3. Agoura Hills, Stokes & Las Virgenes Creeks: RAA Output and EWMP Implementation Plan

Subwatershed ID	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)						
	Bacteria	Benthic	For Bacteria TMDLs					For Benthic TMDL	
			LID	Streets	Regional BMPs				
	24-hour Volume Managed (acre-ft)	Additional 24-hour Volume Managed (acre-ft)	Ordinance	Green Streets	Regional BMPs (identified)	Regional BMPs (private)	Total BMP Capacity (acre-ft)	Regional BMPs (additional)	Cumulative BMP Capacity for both Bacteria and Benthic (acre-ft)
301401	2.18	---	0.08	2.99	---	0.66	**3.73**	---	**3.73**
301501	0.00	---	---	---	---	0.00	**0.00**	---	**0.00**
Total	**2.18**	---	**0.08**	**2.99**	**0.00**	**0.66**	**3.73**	---	**3.73**

Table 4. Agoura Hills, Triunfo Creek: RAA Output and EWMP Implementation Plan

Subwatershed ID	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)						
	Bacteria	Benthic	For Bacteria TMDLs					For Benthic TMDL	
			LID	Streets	Regional BMPs				
	24-hour Volume Managed (acre-ft)	Additional 24-hour Volume Managed (acre-ft)	Ordinance	Green Streets	Regional BMPs (identified)	Regional BMPs (private)	Total BMP Capacity (acre-ft)	Regional BMPs (additional)	Cumulative BMP Capacity for both Bacteria and Benthic (acre-ft)
303201	---	---	---	---	---	---	**0.00**	---	---
303401	---	---	---	---	---	---	**0.00**	---	---
304001	---	---	---	---	---	---	**0.00**	---	---
304301	---	---	---	---	---	---	**0.00**	---	---
Total	**0.00**	---	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	---	---

Table 5. Calabasas, Cold Creek: RAA Output and EWMP Implementation Plan

Subwatershed ID	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)						
	Bacteria	Benthic	For Bacteria TMDLs					For Benthic TMDL	
	24-hour Volume Managed (acre-ft)	Additional 24-hour Volume Managed (acre-ft)	LID Ordinance	Streets Green Streets	Regional BMPs (identified)	Regional BMPs (private)	Total BMP Capacity (acre-ft)	Regional BMPs (additional)	Cumulative BMP Capacity for both Bacteria and Benthic (acre-ft)
300614	0.09	---	0.01	0.16	---	0.01	**0.18**	---	**0.18**
Total	**0.09**	---	**0.01**	**0.16**	**0.00**	**0.01**	**0.18**	---	**0.18**

Table 6. Calabasas, Medea Creek: RAA Output and EWMP Implementation Plan

Subwatershed ID	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)						
	Bacteria	Benthic	For Bacteria TMDLs					For Benthic TMDL	
	24-hour Volume Managed (acre-ft)	Additional 24-hour Volume Managed (acre-ft)	LID Ordinance	Streets Green Streets	Regional BMPs (identified)	Regional BMPs (private)	Total BMP Capacity (acre-ft)	Regional BMPs (additional)	Cumulative BMP Capacity for both Bacteria and Benthic (acre-ft)
303014	---	---	---	---	---	---	**0.00**	---	---
Total	**0.00**	---	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	---	---

Table 7. Calabasas, Stokes & Las Virgenes Creeks: RAA Output and EWMP Implementation Plan

Subwatershed ID	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)						
	Bacteria	Benthic	For Bacteria TMDLs					For Benthic TMDL	
	24-hour Volume Managed (acre-ft)	Additional 24-hour Volume Managed (acre-ft)	LID Ordinance	Streets Green Streets	Regional BMPs Regional BMPs (identified)	Regional BMPs Regional BMPs (private)	Total BMP Capacity (acre-ft)	Regional BMPs (additional)	Cumulative BMP Capacity for both Bacteria and Benthic (acre-ft)
301214	0.45	---	0.01	0.11	---	0.29	**0.41**	---	**0.41**
301314	0.00	---	---	0.01	---	0.00	**0.01**	---	**0.01**
301414	0.00	---	0.00	---	---	0.00	**0.00**	---	**0.00**
301514	9.77	---	0.94	5.53	---	1.99	**8.46**	---	**8.46**
301614	1.51	---	0.20	0.63	---	1.06	**1.88**	---	**1.88**
301714	0.25	---	0.06	0.43	---	0.02	**0.51**	---	**0.51**
301814	3.82	---	0.14	5.41	---	0.79	**6.35**	---	**6.35**
Total	**15.80**	---	**1.35**	**12.11**	**0.00**	**4.15**	**17.62**	---	**17.62**

Table 8. Hidden Hills, Stokes & Las Virgenes Creeks: RAA Output and EWMP Implementation Plan

Subwatershed ID	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)						
	Bacteria	Benthic	For Bacteria TMDLs					For Benthic TMDL	
	24-hour Volume Managed (acre-ft)	Additional 24-hour Volume Managed (acre-ft)	LID Ordinance	Streets Green Streets	Regional BMPs Regional BMPs (identified)	Regional BMPs Regional BMPs (private)	Total BMP Capacity (acre-ft)	Regional BMPs (additional)	Cumulative BMP Capacity for both Bacteria and Benthic (acre-ft)
301634	0.37	---	0.02	0.26	---	0.08	**0.36**	---	**0.36**
Total	**0.37**	---	**0.02**	**0.26**	**0.00**	**0.08**	**0.36**	---	**0.36**

Table 9. Uninc. LA County, Cold Creek: RAA Output and EWMP Implementation Plan

Subwatershed ID	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)						
	Bacteria	Benthic	For Bacteria TMDLs					For Benthic TMDL	
	24-hour Volume Managed (acre-ft)	Additional 24-hour Volume Managed (acre-ft)	LID: Ordinance	Streets: Green Streets	Regional BMPs: Regional BMPs (identified)	Regional BMPs: Regional BMPs (private)	Total BMP Capacity (acre-ft)	Regional BMPs (additional)	Cumulative BMP Capacity for both Bacteria and Benthic (acre-ft)
300283	0.18	0.20	0.02	0.18	---	0.02	**0.22**	0.25	**0.47**
300383	0.04	0.11	0.00	0.13	---	0.01	**0.14**	---	**0.14**
300483	0.17	0.18	0.01	0.14	---	0.05	**0.20**	---	**0.20**
300583	0.35	0.51	0.02	0.22	---	0.18	**0.42**	0.38	**0.81**
300683	0.14	0.20	0.01	0.22	---	0.09	**0.32**	---	**0.32**
300783	0.01	0.01	0.00	---	---	0.01	**0.01**	---	**0.01**
Total	**0.89**	**1.21**	**0.06**	**0.89**	**0.00**	**0.37**	**1.32**	**0.63**	**1.95**

Table 10. Uninc. LA County, Lindero Creek: RAA Output and EWMP Implementation Plan

Subwatershed ID	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)						
	Bacteria	Benthic	For Bacteria TMDLs					For Benthic TMDL	
	24-hour Volume Managed (acre-ft)	Additional 24-hour Volume Managed (acre-ft)	LID: Ordinance	Streets: Green Streets	Regional BMPs: Regional BMPs (identified)	Regional BMPs: Regional BMPs (private)	Total BMP Capacity (acre-ft)	Regional BMPs (additional)	Cumulative BMP Capacity for both Bacteria and Benthic (acre-ft)
302583	---	---	---	---	---	---	**0.00**	---	---
Total	**0.00**	---	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	---	---

Table 11. Uninc. LA County, Malibu Creek: RAA Output and EWMP Implementation Plan

Subwatershed ID	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)						
	Bacteria	Benthic	For Bacteria TMDLs					For Benthic TMDL	
	24-hour Volume Managed (acre-ft)	Additional 24-hour Volume Managed (acre-ft)	LID Ordinance	Streets Green Streets	Regional BMPs Regional BMPs (identified)	Regional BMPs Regional BMPs (private)	Total BMP Capacity (acre-ft)	Regional BMPs (additional)	Cumulative BMP Capacity for both Bacteria and Benthic (acre-ft)
300183	0.07	---	0.01	0.01	---	0.06	**0.08**	---	**0.08**
300883	0.00	---	0.00	0.00	---	0.00	**0.00**	---	**0.00**
300983	0.94	---	0.03	---	---	0.93	**0.96**	---	**0.96**
301083	0.57	---	0.03	---	---	0.56	**0.58**	---	**0.58**
302183	0.00	---	---	---	---	0.00	**0.00**	---	**0.00**
302283	0.14	---	0.04	0.09	---	0.01	**0.14**	---	**0.14**
302383	2.14	---	1.02	---	0.00	5.35	**6.38**	---	**6.38**
Total	**3.86**	---	**1.11**	**0.10**	**0.00**	**6.92**	**8.13**	---	**8.13**

Table 12. Uninc. LA County, Medea Creek: RAA Output and EWMP Implementation Plan

Subwatershed ID	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)						
	Bacteria	Benthic	For Bacteria TMDLs					For Benthic TMDL	
	24-hour Volume Managed (acre-ft)	Additional 24-hour Volume Managed (acre-ft)	LID Ordinance	Streets Green Streets	Regional BMPs Regional BMPs (identified)	Regional BMPs Regional BMPs (private)	Total BMP Capacity (acre-ft)	Regional BMPs (additional)	Cumulative BMP Capacity for both Bacteria and Benthic (acre-ft)
302483	0.52	---	0.04	0.60	---	0.15	**0.79**	---	---
302683	0.00	---	---	---	---	0.00	**0.00**	---	---
302983	0.03	---	0.00	0.00	---	0.03	**0.03**	---	---
303083	0.00	---	---	---	---	0.00	**0.00**	---	---
303183	0.00	---	---	---	---	0.00	**0.00**	---	---
Total	**0.56**	---	**0.04**	**0.60**	**0.00**	**0.18**	**0.83**	---	---

Table 13. Uninc. LA County, Stokes & Las Virgenes Creeks: RAA Output and EWMP Implementation Plan

Subwatershed ID	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)						
	Bacteria	Benthic	For Bacteria TMDLs					For Benthic TMDL	
	24-hour Volume Managed (acre-ft)	Additional 24-hour Volume Managed (acre-ft)	LID: Ordinance	Streets: Green Streets	Regional BMPs: Regional BMPs (identified)	Regional BMPs: Regional BMPs (private)	Total BMP Capacity (acre-ft)	Regional BMPs (additional)	Cumulative BMP Capacity for both Bacteria and Benthic (acre-ft)
301183	0.00	---	---	---	---	0.00	**0.00**	---	**0.00**
301283	0.20	---	0.01	0.14	---	0.16	**0.30**	---	**0.30**
301383	0.05	---	0.02	0.05	---	0.01	**0.08**	---	**0.08**
301483	0.81	---	0.01	0.21	---	0.69	**0.91**	---	**0.91**
301583	1.19	---	0.15	1.02	---	0.55	**1.71**	---	**1.71**
301683	0.86	---	0.01	0.37	---	0.76	**1.14**	---	**1.14**
301783	0.07	---	0.01	---	2.99	0.00	**3.00**	---	**3.00**
301883	0.00	---	0.00	0.00	---	0.00	**0.00**	---	**0.00**
Total	**3.18**	---	**0.20**	**1.79**	**2.99**	**2.17**	**7.15**	---	**7.15**

Table 14. Uninc. LA County, Triunfo Creek: RAA Output and EWMP Implementation Plan

Subwatershed ID	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)						
	Bacteria	Benthic	For Bacteria TMDLs					For Benthic TMDL	
	24-hour Volume Managed (acre-ft)	Additional 24-hour Volume Managed (acre-ft)	LID Ordinance	Streets Green Streets	Regional BMPs Regional BMPs (identified)	Regional BMPs (private)	Total BMP Capacity (acre-ft)	Regional BMPs (additional)	Cumulative BMP Capacity for both Bacteria and Benthic (acre-ft)
303283	0.24	---	0.03	0.14	---	---	**0.17**	---	---
303383	1.00	---	0.05	0.70	---	---	**0.75**	---	---
303483	0.45	---	0.25	0.30	0.81	---	**1.36**	---	---
303583	0.08	---	0.01	0.07	---	---	**0.08**	---	---
303683	0.00	---	0.00	0.00	---	---	**0.00**	---	---
303783	0.02	---	0.00	0.02	---	---	**0.02**	---	---
303883	0.07	---	0.01	0.04	---	---	**0.05**	---	---
303983	0.03	---	0.00	---	---	---	**0.03**	---	---
304083	0.20	---	0.09	0.06	---	---	**0.30**	---	---
304383	0.00	---	---	---	---	---	**0.00**	---	---
304483	0.00	---	---	---	---	---	**0.00**	---	---
304683	0.07	---	0.03	0.00	---	---	**0.03**	---	---
305183	0.09	---	0.03	---	---	---	**0.03**	---	---
Total	**2.24**	---	**0.51**	**1.32**	**0.81**	**0.00**	**2.65**	---	---

Table 15. Westlake Village, Lindero Creek: RAA Output and EWMP Implementation Plan

Subwatershed ID	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)						
	Bacteria	Benthic	For Bacteria TMDLs					For Benthic TMDL	
	24-hour Volume Managed (acre-ft)	Additional 24-hour Volume Managed (acre-ft)	LID Ordinance	Streets Green Streets	Regional BMPs Regional BMPs (identified)	Regional BMPs Regional BMPs (private)	Total BMP Capacity (acre-ft)	Regional BMPs (additional)	Cumulative BMP Capacity for both Bacteria and Benthic (acre-ft)
302588	1.92	---	0.48	1.38	---	0.44	**2.29**	---	---
Total	**1.92**	---	**0.48**	**1.38**	**0.00**	**0.44**	**2.29**	---	---

Table 16. Westlake Village, Triunfo Creek: RAA Output and EWMP Implementation Plan

Subwatershed ID	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)						
	Bacteria	Benthic	For Bacteria TMDLs					For Benthic TMDL	
	24-hour Volume Managed (acre-ft)	Additional 24-hour Volume Managed (acre-ft)	LID Ordinance	Streets Green Streets	Regional BMPs Regional BMPs (identified)	Regional BMPs Regional BMPs (private)	Total BMP Capacity (acre-ft)	Regional BMPs (additional)	Cumulative BMP Capacity for both Bacteria and Benthic (acre-ft)
303888	0.00	---	---	---	---	---	**0.00**	---	---
304088	1.05	---	0.07	0.54	---	---	**.61**	---	---
304188	2.56	---	0.52	1.77	---	---	**2.29**	---	---
304388	10.94	---	2.03	7.10	3.18	---	**12.31**	---	---
304488	1.39	---	0.04	---	1.64	---	**1.68**	---	---
304688	0.06	---	0.00	0.05	---	---	**0.06**	---	---
Total	**16.00**	---	**2.66**	**9.46**	**4.82**	---	**16.94**	---	---

Appendix 7B: Subwatershed Maps with Control Measure Capacity

This appendix presents zoomed in maps of control measure capacity for each jurisdiction. Each subwatershed is identified by a six-digit number that can be cross-referenced with tables in other appendices.

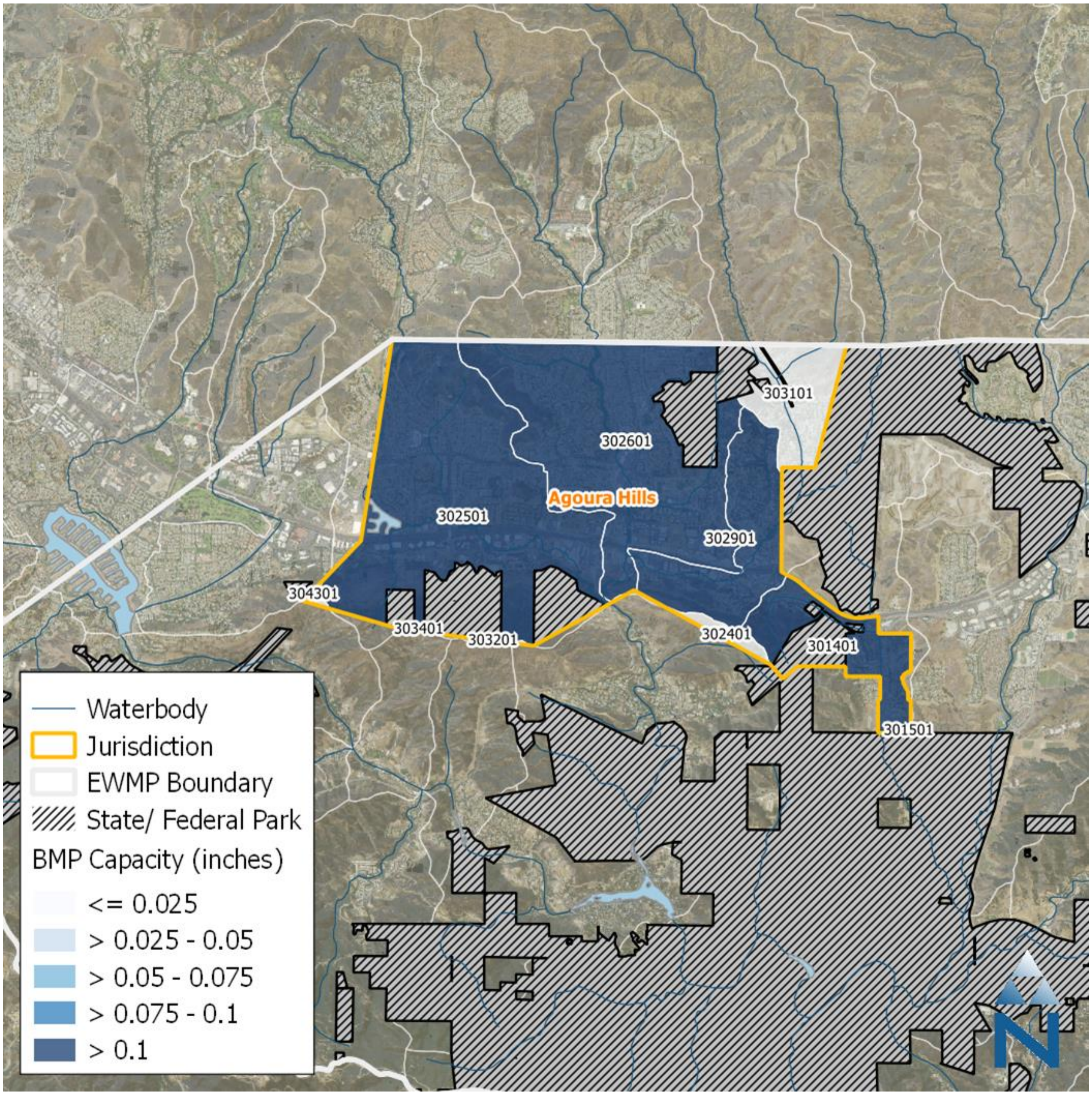


Figure 7B-1. Subwatershed index map for Agoura Hills.

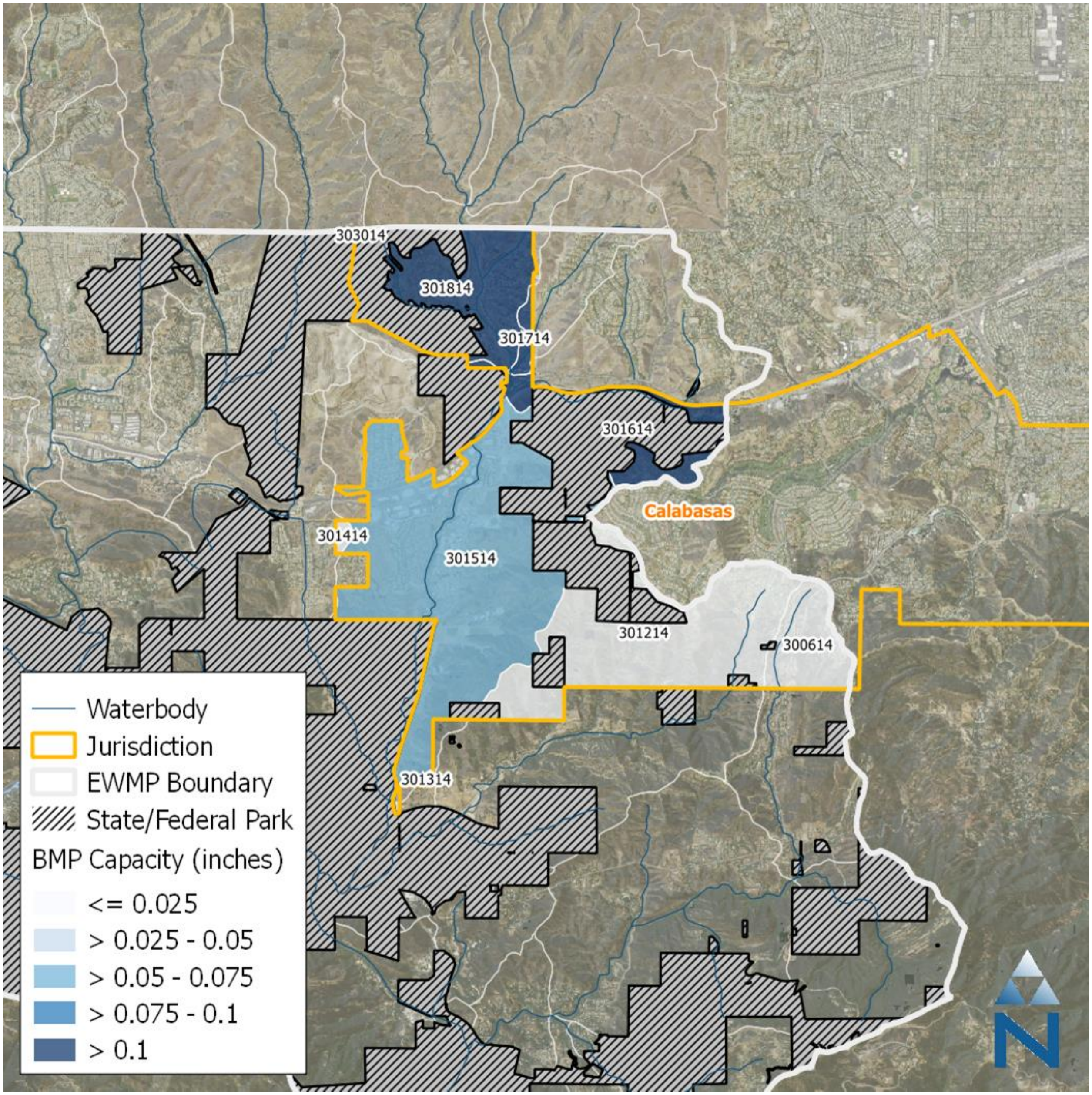


Figure 7B-2. Subwatershed index map for Calabasas.

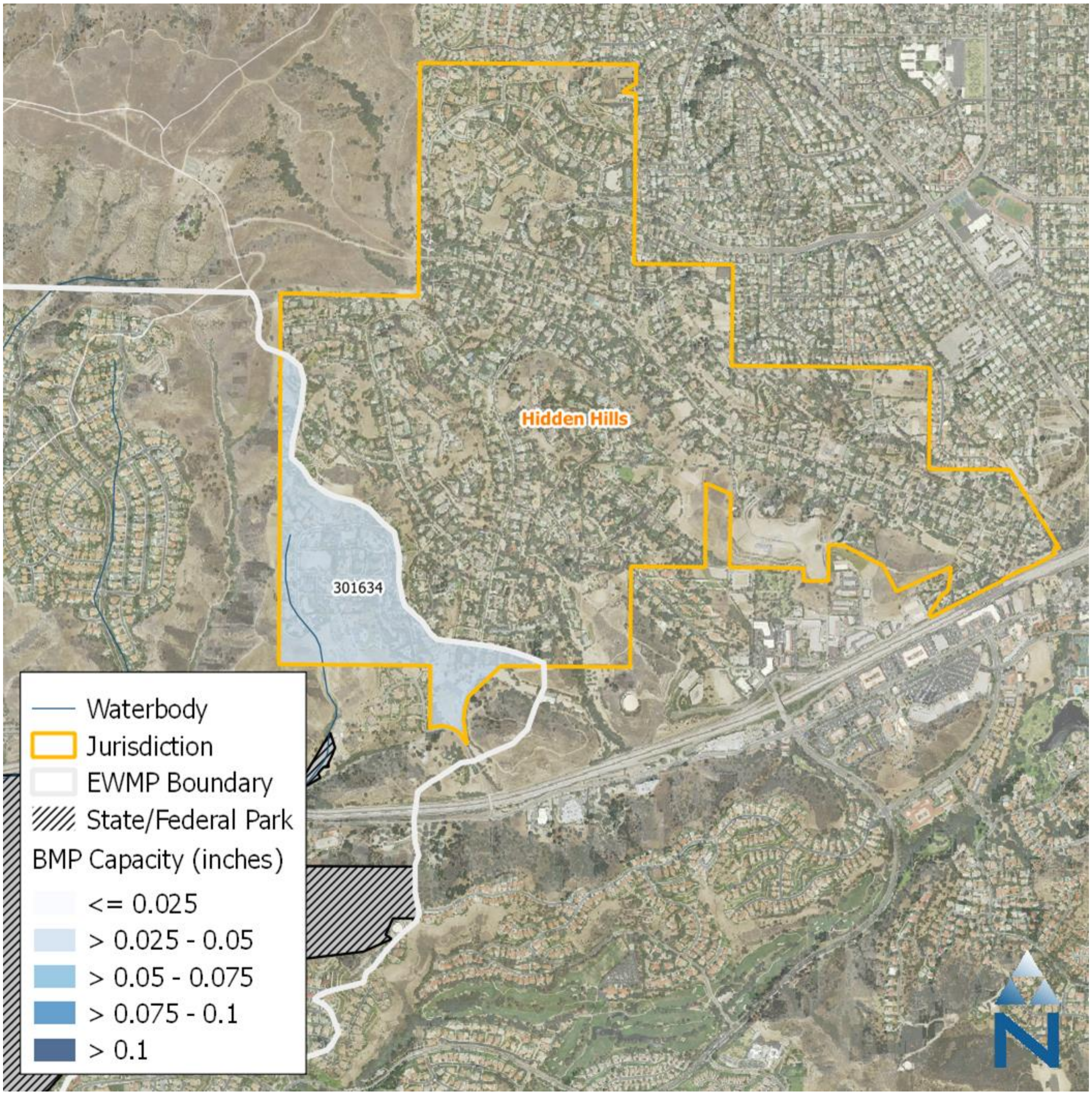


Figure 7B-3. Subwatershed index map for Hidden Hills.

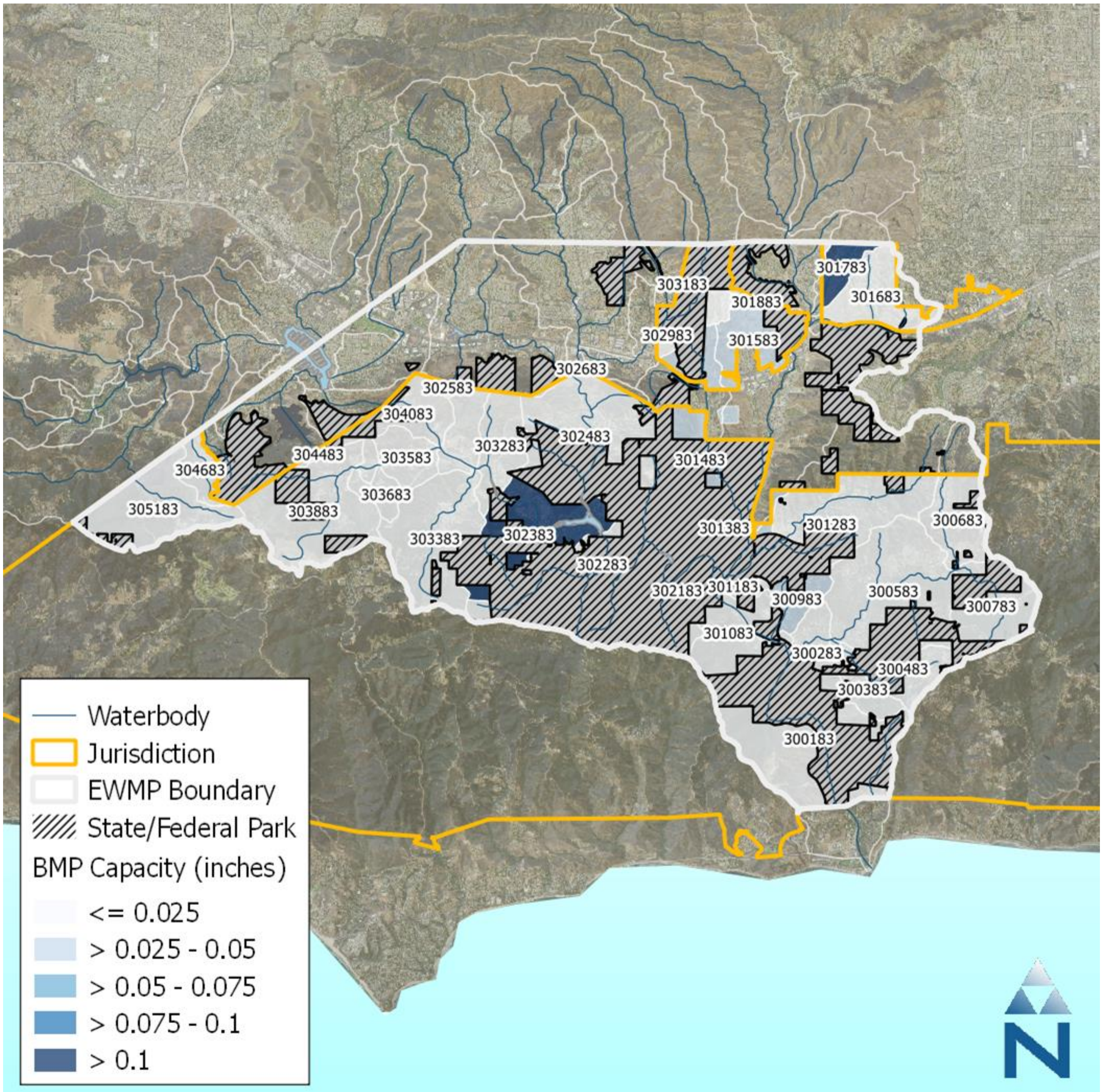


Figure 7B-4. Subwatershed index map for Unincorporated County.

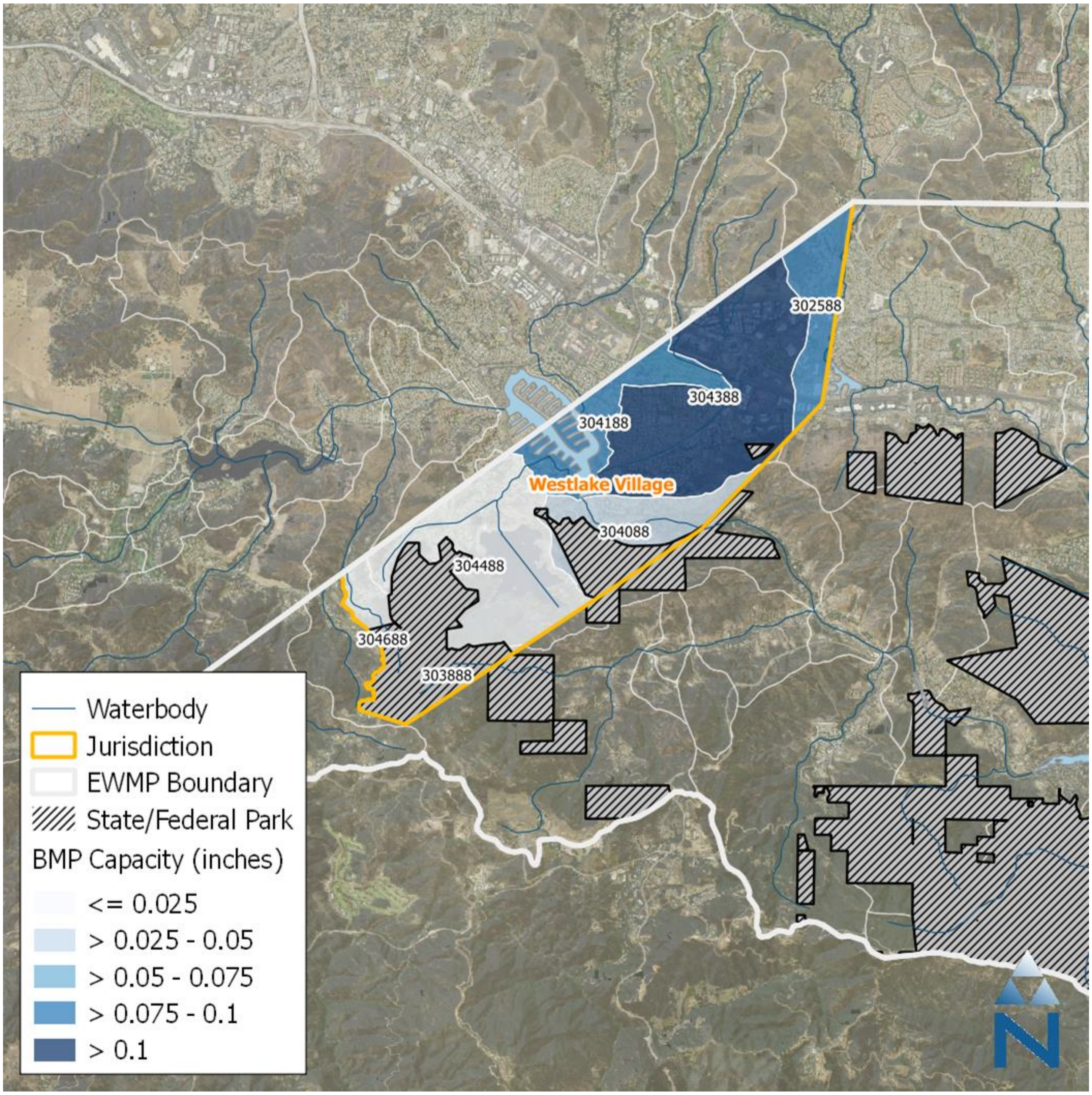


Figure 7B-5. Subwatershed index map for Westlake Village.

Appendix 7C: Scheduling of Control Measures for TMDL and EWMP Milestones

These tables present the scheduling of control measures to achieve applicable TMDL and EWMP Milestones. For each milestone, Compliance Targets and an EWMP Implementation Strategy are presented.

The following color-gradients and symbol legend applies to all tables in this appendix.

Red	=	Subwatersheds with highest required runoff management volumes
Blue	=	Subwatersheds with highest BMP capacities within a BMP category
Gray	=	Areas with no required reductions
—	=	BMP opportunity was either not available or not selected for the milestone (a value of 0.00 means that BMP capacity is non-zero but less than 0.004)

Table 1. Agoura Hills: RAA Output and EWMP for Interim and Final Compliance

Assessment Area	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)				
	EWMP Milestone	24-hour Volume Retained (acre-ft)	LID	Streets	Regional BMPs		Total BMP Capacity (acre-ft)
			Ordinance	Green Streets	Regional BMPs (identified)	Regional BMPs (private)	
Lindero Creek	Nutrient TMDL (12/2017)	3.54	0.6	2.1	0.3	---	**2.92**
	Bacteria TMDL (07/2021)	12.08	1.9	9.4	0.9	1.9	**14.03**
	Final Benthic TMDL (03/2032)	--	--	--	--	--	--
Medea Creek	Nutrient TMDL (12/2017)	4.68	0.6	2.6	0.9	---	**4.14**
	Bacteria TMDL (07/2021)	18.69	1.7	8.7	1.4	8.5	**20.24**
	Final Benthic TMDL (03/2032)	--	--	--	--	--	--
Stokes & Las Virgenes Creeks	Nutrient TMDL (12/2017)	0.24	0.0	0.3	---	---	**0.35**
	Bacteria TMDL (07/2021)	2.18	0.1	3.0	---	0.7	**3.73**
	Final Benthic TMDL (03/2032)	2.81	0.1	3.0	---	0.7	**3.73**
Triunfo Creek	Nutrient TMDL (12/2017)	--	--	--	--	--	--
	Bacteria TMDL (07/2021)	--	--	--	--	--	--

Assessment Area	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)				
	EWMP Milestone	24-hour Volume Retained (acre-ft)	LID	Streets	Regional BMPs		Total BMP Capacity (acre-ft)
			Ordinance	Green Streets	Regional BMPs (identified)	Regional BMPs (private)	
	Final Benthic TMDL (03/2032)	--	--	--	--	--	--
Total	**---**	**33.58**	**3.68**	**21.03**	**2.23**	**11.06**	**38.00**

Table 2. Calabasas: RAA Output and EWMP for Interim and Final Compliance

Assessment Area	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)				
	EWMP Milestone	24-hour Volume Retained (acre-ft)	LID	Streets	Regional BMPs		Total BMP Capacity (acre-ft)
			Ordinance	Green Streets	Regional BMPs (identified)	Regional BMPs (private)	
Cold Creek	Nutrient TMDL (12/2017)	0.00	0.0	---	---	---	**0.00**
	Bacteria TMDL (07/2021)	0.09	0.0	0.2	---	0.0	**0.18**
	Final Benthic TMDL (03/2032)	0.32	0.0	0.2	---	0.0	**0.18**
Medea Creek	Nutrient TMDL (12/2017)	--	--	--	--	--	--
	Bacteria TMDL (07/2021)	--	--	--	--	--	--
	Final Benthic TMDL (03/2032)	--	--	--	--	--	--
Stokes & Las Virgenes Creeks	Nutrient TMDL (12/2017)	2.98	0.4	2.0	---	---	**2.34**
	Bacteria TMDL (07/2021)	15.80	1.3	12.1	---	4.2	**17.62**
	Final Benthic TMDL (03/2032)	21.25	1.3	12.1	---	4.2	**17.62**
Total	**---**	**21.57**	**1.35**	**12.28**	**0.00**	**4.17**	**17.80**

Table 3. Hidden Hills: RAA Output and EWMP for Interim and Final Compliance

Assessment Area	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)				
	EWMP Milestone	24-hour Volume Retained (acre-ft)	LID	Streets	Regional BMPs		Total BMP Capacity (acre-ft)
			Ordinance	Green Streets (private)	Regional BMPs (identified)	Regional BMPs (private)	
Stokes & Las Virgenes Creeks	Nutrient TMDL (12/2017)	0.12	0.0	0.1	---	---	**0.10**
	Bacteria TMDL (07/2021)	0.37	0.0	0.3	---	0.1	**0.36**
	Final Benthic TMDL (03/2032)	0.46	0.0	0.3	---	0.1	**0.36**
Total	**---**	**0.46**	**0.02**	**0.26**	**0.00**	**0.08**	**0.36**

Table 4. Uninc. LA County: RAA Output and EWMP for Interim and Final Compliance

Assessment Area	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)				
	EWMP Milestone	24-hour Volume Retained (acre-ft)	LID	Streets	Regional BMPs		Total BMP Capacity (acre-ft)
			Ordinance	Green Streets	Regional BMPs (identified)	Regional BMPs (private)	
Cold Creek	Nutrient TMDL (12/2017)	0.01	0.0	---	---	---	**0.01**
	Bacteria TMDL (07/2021)	0.89	0.1	0.9	---	0.4	**1.32**
	Final Benthic TMDL (03/2032)	2.10	0.1	0.9	---	1.0	**1.95**
Lindero Creek	Nutrient TMDL (12/2017)	--	--	--	--	--	--
	Bacteria TMDL (07/2021)	--	--	--	--	--	--
	Final Benthic TMDL (03/2032)	--	--	--	--	--	--
Malibu Creek	Nutrient TMDL (12/2017)	0.14	0.1	---	---	---	**0.10**
	Bacteria TMDL (07/2021)	3.86	1.1	0.1	0.0	6.9	**8.13**

Assessment Area	COMPLIANCE TARGETS: BMP PERFORMANCE GOAL		EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT (BMP capacity expressed in units of acre-feet)				
	EWMP Milestone	24-hour Volume Retained (acre-ft)	LID	Streets	Regional BMPs		Total BMP Capacity (acre-ft)
			Ordinance	Green Streets	Regional BMPs (identified)	Regional BMPs (private)	
	Final Benthic TMDL (03/2032)	11.43	1.1	0.1	0.0	6.9	**8.13**
Medea Creek	Nutrient TMDL (12/2017)	0.18	0.0	0.1	---	---	**0.15**
	Bacteria TMDL (07/2021)	0.56	0.0	0.6	---	0.2	**0.83**
	Final Benthic TMDL (03/2032)	--	--	--	--	--	--
Stokes & Las Virgenes Creeks	Nutrient TMDL (12/2017)	0.39	0.1	0.4	1.0	---	**1.44**
	Bacteria TMDL (07/2021)	3.18	0.2	1.8	3.0	2.2	**7.15**
	Final Benthic TMDL (03/2032)	4.31	0.2	1.8	3.0	2.2	**7.15**
Triunfo Creek	Nutrient TMDL (12/2017)	---	---	---	---	---	**0.00**
	Bacteria TMDL (07/2021)	2.24	0.5	1.3	0.81	0.0	**2.65**
	Final Benthic TMDL (03/2032)	--	--	--	--	--	--
Total	**---**	**20.63**	**1.93**	**4.70**	**3.81**	**10.1**	**20.70**

Table 5. Westlake Village: RAA Output and EWMP for Interim and Final Compliance

Assessment Area	**COMPLIANCE TARGETS: BMP PERFORMANCE GOAL**		**EWMP IMPLEMENTATION PLAN: APPROACH TO ACHIEVE COMPLIANCE TARGETS, SUBJECT TO ADAPTIVE MANAGEMENT** (BMP capacity expressed in units of acre-feet)				
	EWMP Milestone	24-hour Volume Retained (acre-ft)	LID	Streets	Regional BMPs		Total BMP Capacity (acre-ft)
			Ordinance	Green Streets	Regional BMPs (identified)	Regional BMPs (private)	
Lindero Creek	Nutrient TMDL (12/2017)	0.48	0.1	0.3	---	---	**0.45**
	Bacteria TMDL (07/2021)	1.91	0.5	1.4	---	0.4	**2.29**
	Final Benthic TMDL (03/2032)	--	--	--	--	--	--
Triunfo Creek	Nutrient TMDL (12/2017)	0.00	---	---	---	---	**0.00**
	Bacteria TMDL (07/2021)	16.00	2.7	9.5	4.82	0.00	**17.02**
	Final Benthic TMDL (03/2032)	--	--	--	--	--	--
Total	**---**	**17.91**	**3.13**	**10.84**	**4.82**	**0.4**	**19.76**

Appendix 8: Analytical Method Requirements and Water Quality Objectives for Constituents

Analytical Method Requirements and Water Quality Objectives for Constituents

Table A8-1: 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[1] / 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[2] Malibu Creek WMA[3] 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

[1] "P" is 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.

[2] NSWAL: Non-Storm Water Action Level as defined by Los Angeles County Permit Order No. R4-2012-0175 Attachment G.

[3] WMA = Watershed Management Area

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[1] / 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[4]	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.	
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.	

[4] 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[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
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
GENERAL CONSTITUENTS								
Dissolved Phosphorus[5]	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[6] (summer)	0.1	mg/L

[5] All dissolved constituents must be filtered upon arrival at analysis laboratory as the official USEPA holding time is 15 minutes.
[6] WLA = Waste Load Allocation

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
						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.	
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 ≤6° 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

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
						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.	
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

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
						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
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	HNO_3 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

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
						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
METALS (TOTAL & DISSOLVED[7] 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[8] (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

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

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
						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
						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

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
						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
						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

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
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
						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

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
Total & Dissolved[9] Mercury	0.5	µg/L	EPA Method 245.7 or 1631E	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
						CTR Human Health Protection (30-d avg; fish consumption only)	0.051	µg/L
VOLATILE ORGANIC COMPOUNDS								
2-Chloroethyl vinyl ether[10]	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

[9] All dissolved constituents must be filtered upon arrival at analysis laboratory. The official USEPA holding time is 15 minutes.
[10] 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[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
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
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

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
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
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

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
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
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

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
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
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

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
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
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

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
Indeno(1,2,3-cd)pyrene	0.05	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking w ater)	0.0044	µg/L
Isophorone	1	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking w ater)	8.4	µg/L
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 w ater)	17	µg/L
N-Nitroso-dimethyl amine	5	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking w ater)	0.00069	µg/L
N-Nitroso-diphenyl amine	1	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking w ater)	5.0	µg/L
N-Nitroso-di-n-propyl amine	5	µg/L	--	--	--	CTR Human Health Protection (Sources of Drinking w ater)	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 w ater)	960	µg/L
1,2,4-Trichlorobenzene	1	µg/L	--	--	--	CA Dept. Public Health MCL (drinking w ater)	5	µg/L
						Basin Plan Federal MCL	70	µg/L

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
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
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

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
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
						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

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
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
POLYCHLORINATED BIPHENYLS								
Aqueous PCBs summation of a minimum of 40 (and preferably at least 50) congeners and Aroclors	0.2	ng/g	EPA Methods 1668C (as appropriate), and High Resolution Mass Spectrometry			SWAMP Quality Assurance Program Plan	0.2	ng/g
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
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

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
						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
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

Constituent	Minimum Level (Permit Table E-2)		Analytical Methods	Analysis Holding Time (Max)	Container Type[1] / Preservative	Water Quality Objective / Criterion		
	Value	Units				Source	Value	Units
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://w w w .w aterboards.ca.gov/w ater_issues/programs/w ater_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 9: Permitee MS4 Location Figures

Figure 8: Potrero Valley Creek Watershed Monitoring Map

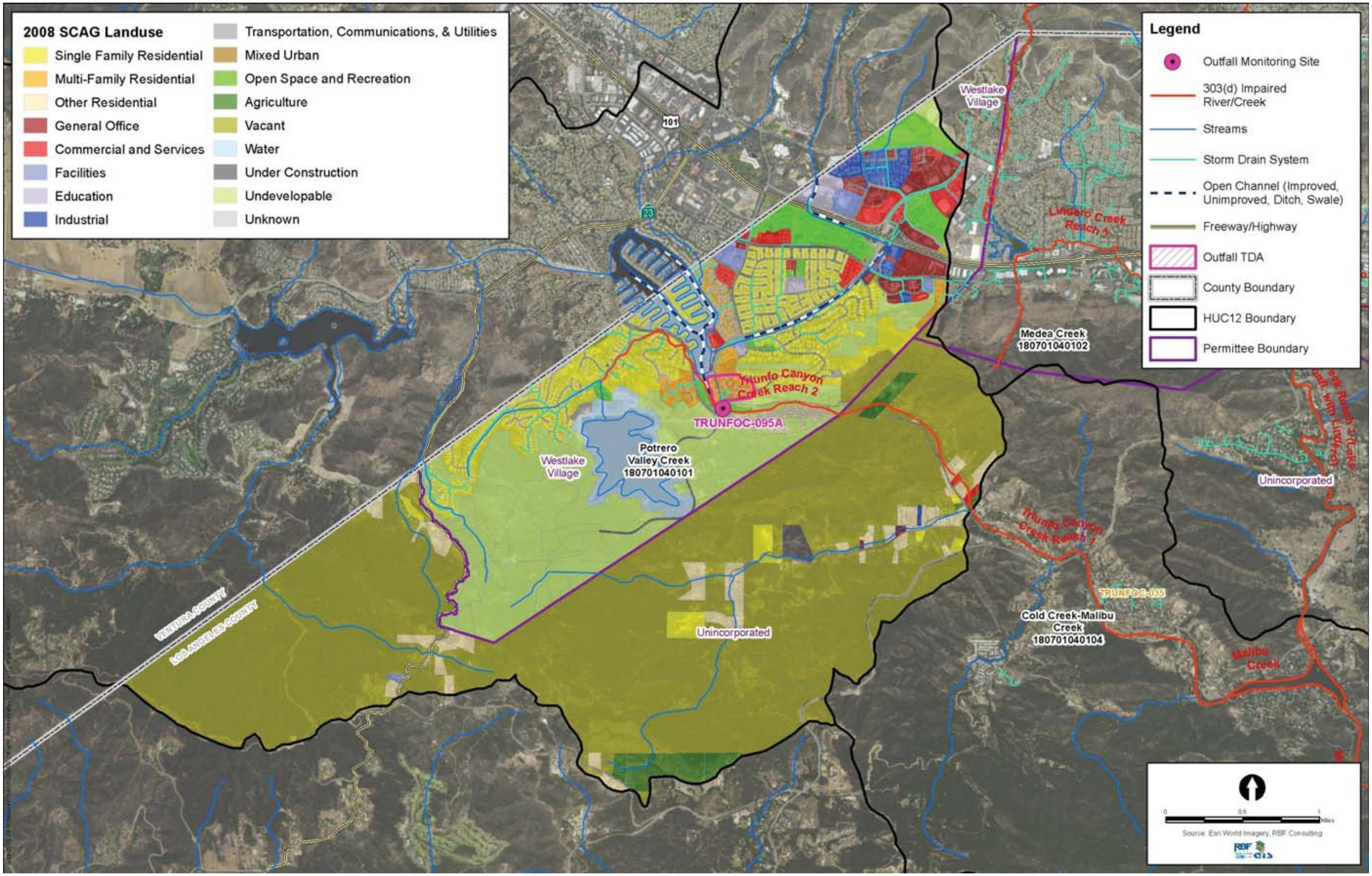


Figure 9: Madea Creek Watershed Monitoring Map

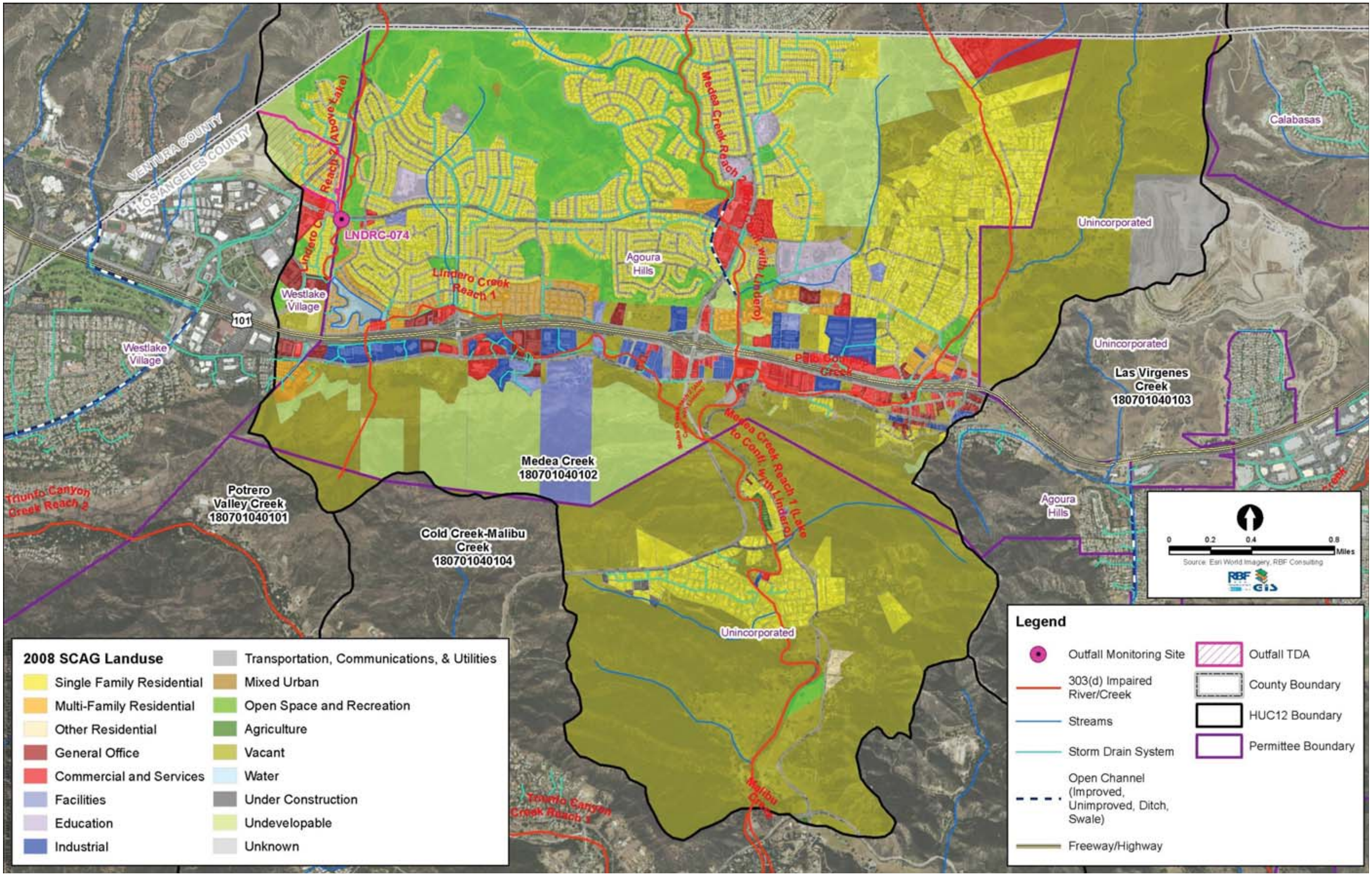


Figure 10: Las Virgenes Watershed Monitoring Map

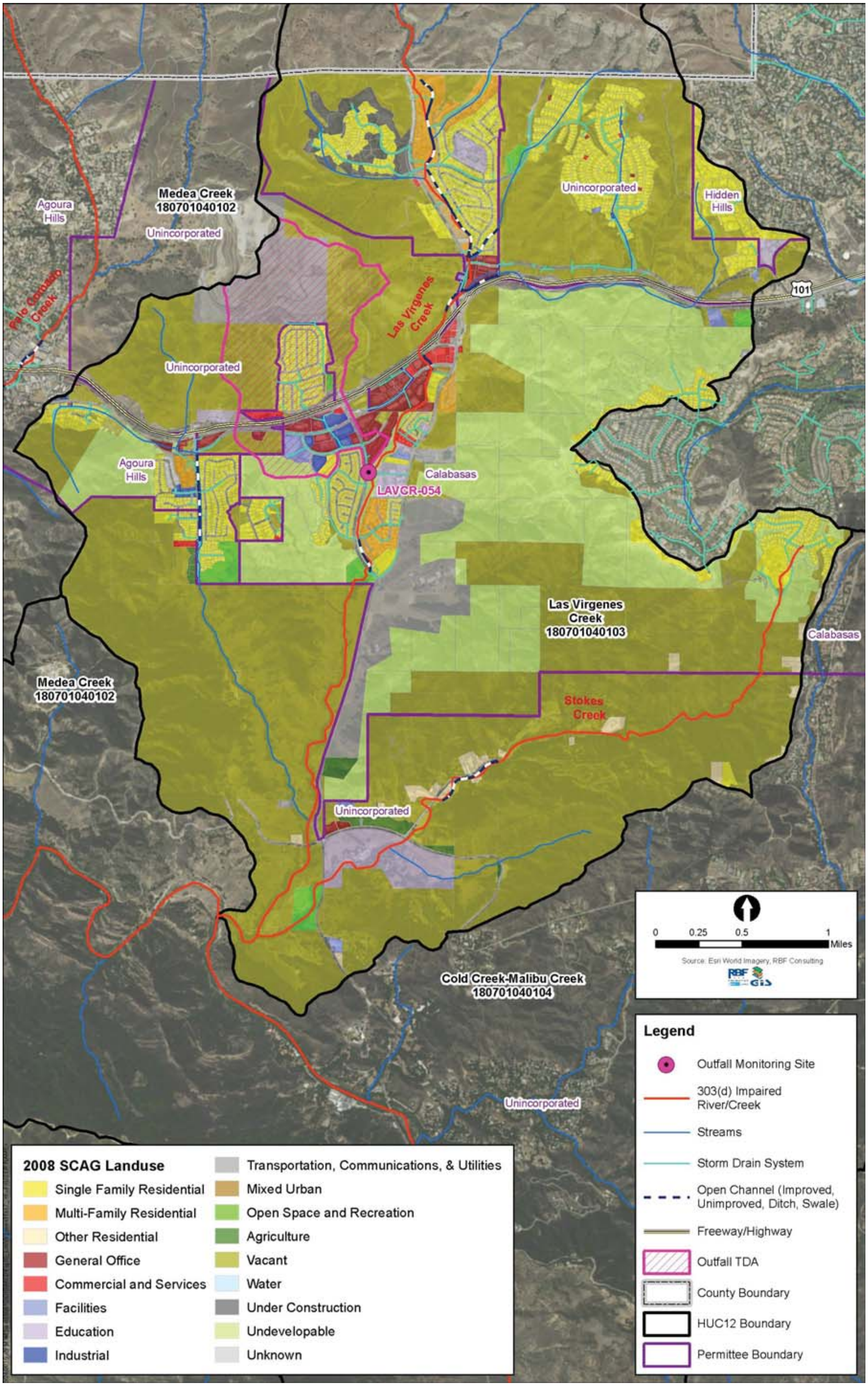


Figure 11: Cold Creek-Malibu Creek Watershed Monitoring Map

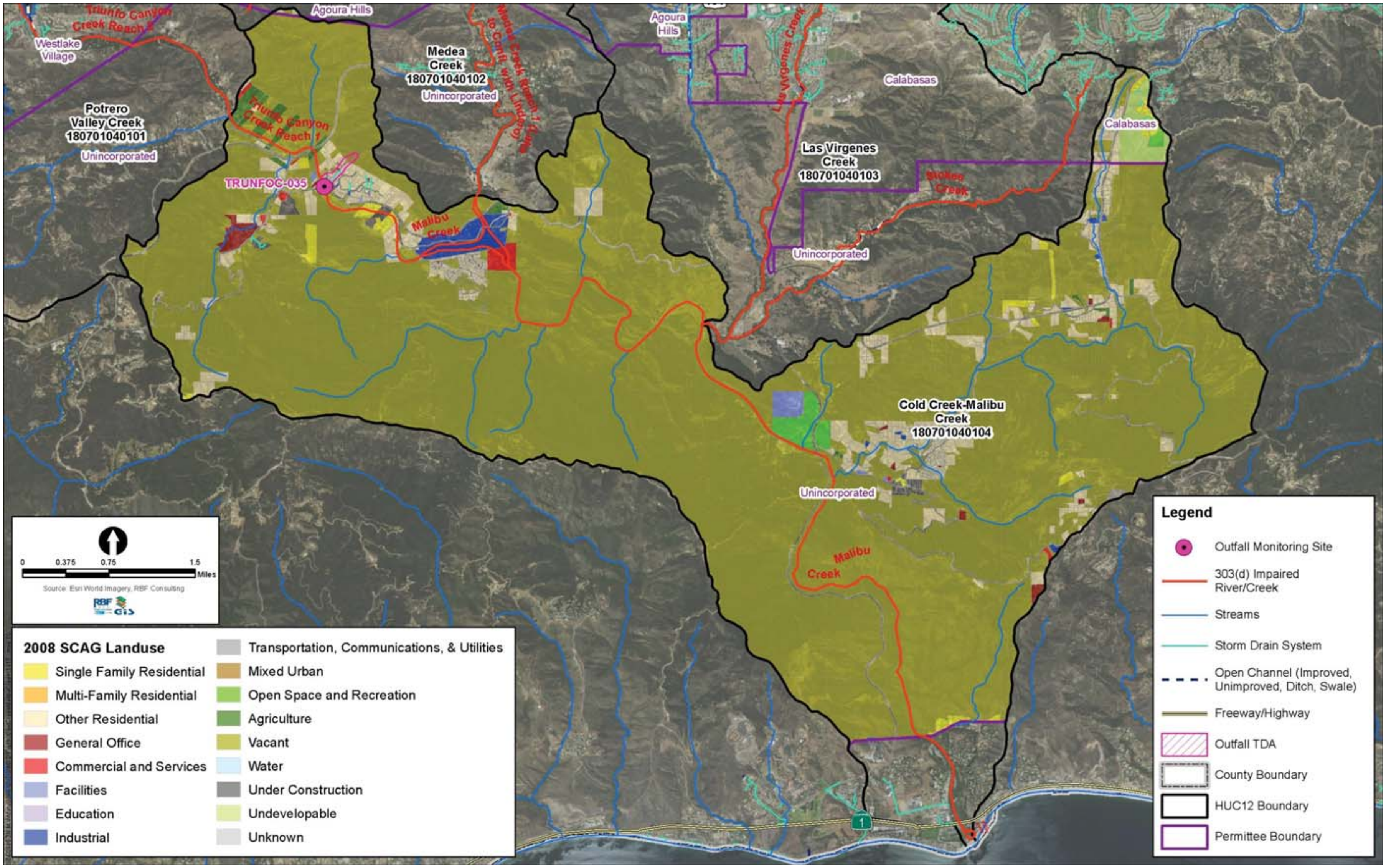


Figure J-1: CIMP Overall Map

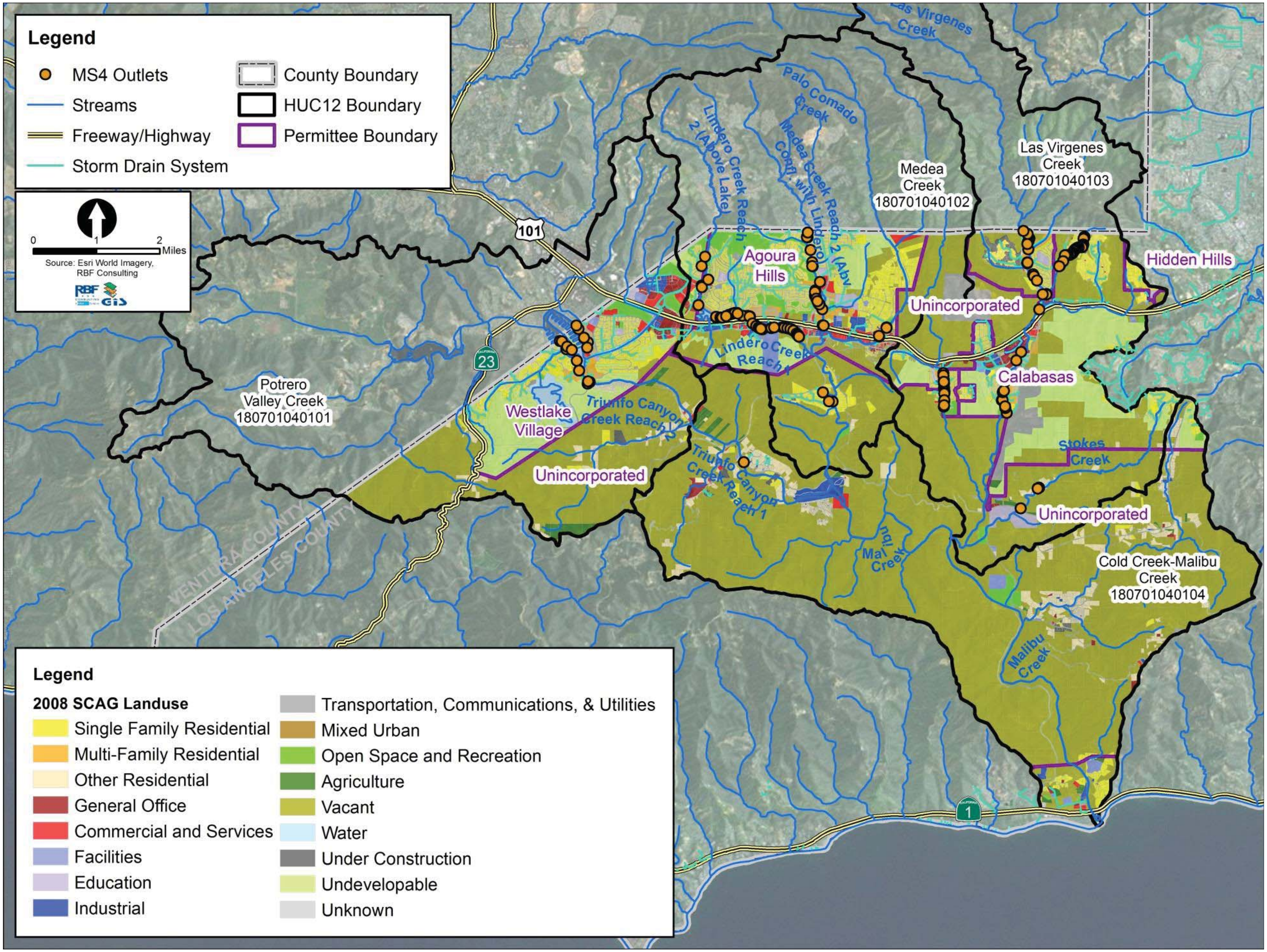


Figure J-2: Cold Creek

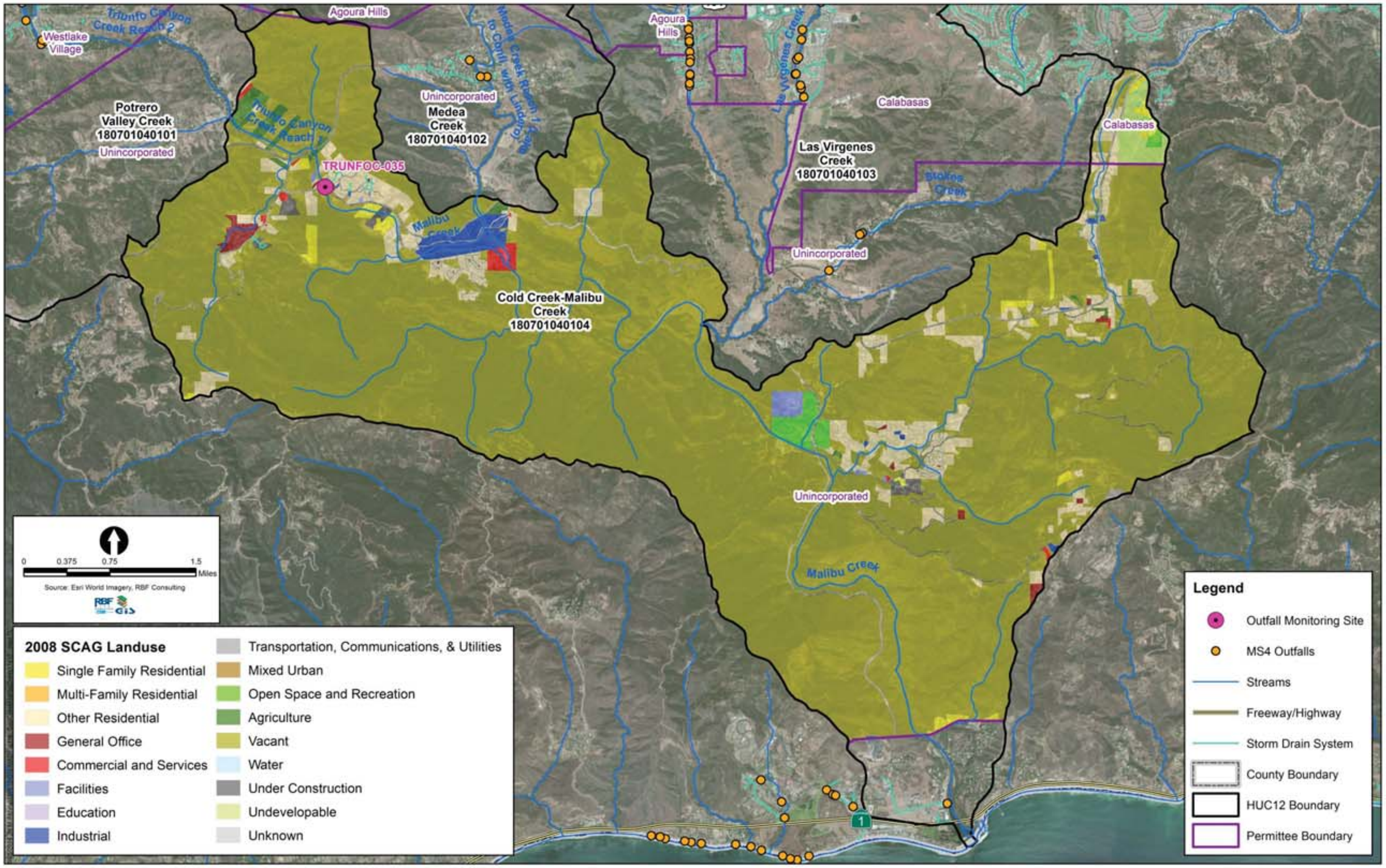


Figure J-3: Las Virgenes

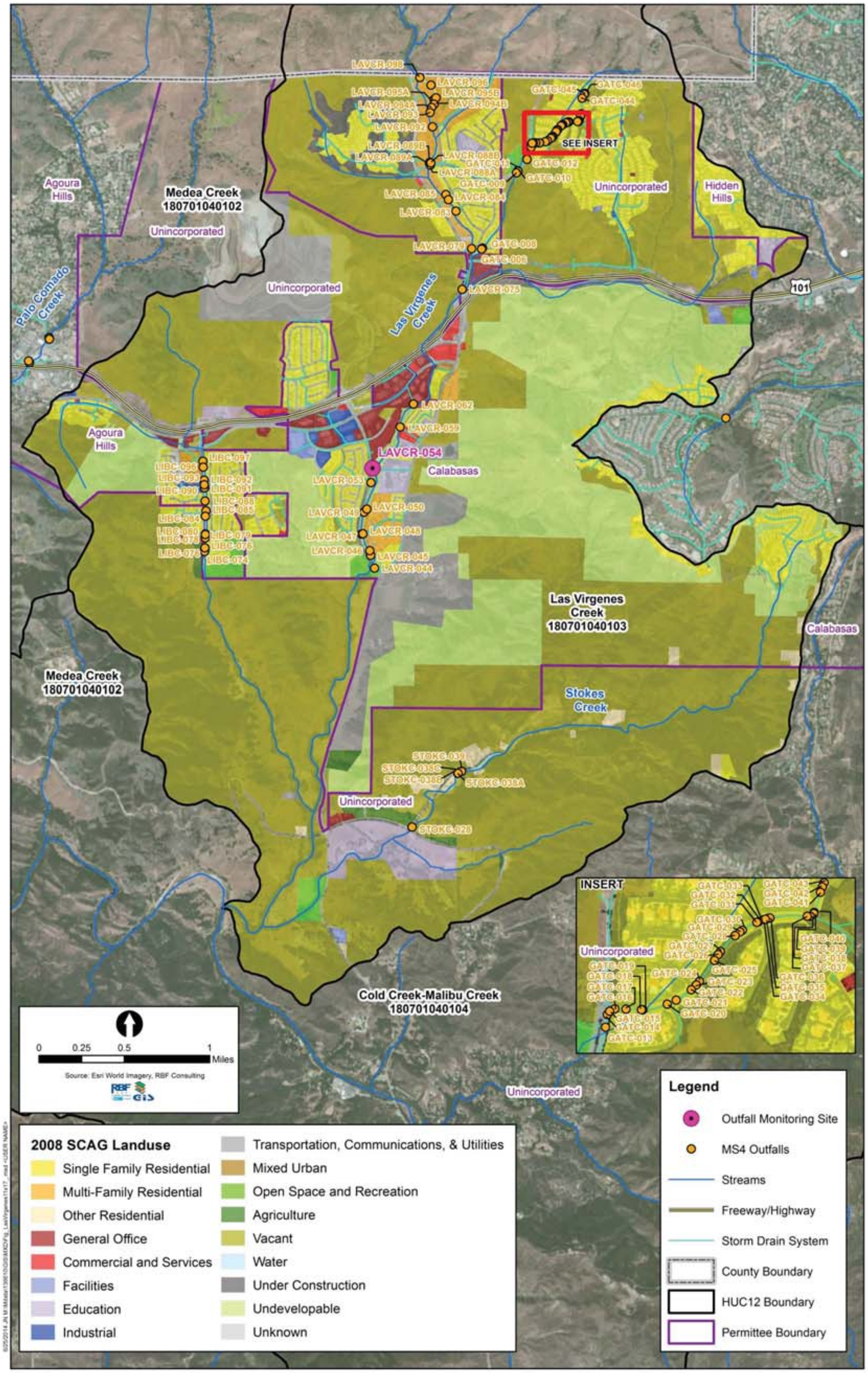


Figure J-4: Madea Creek

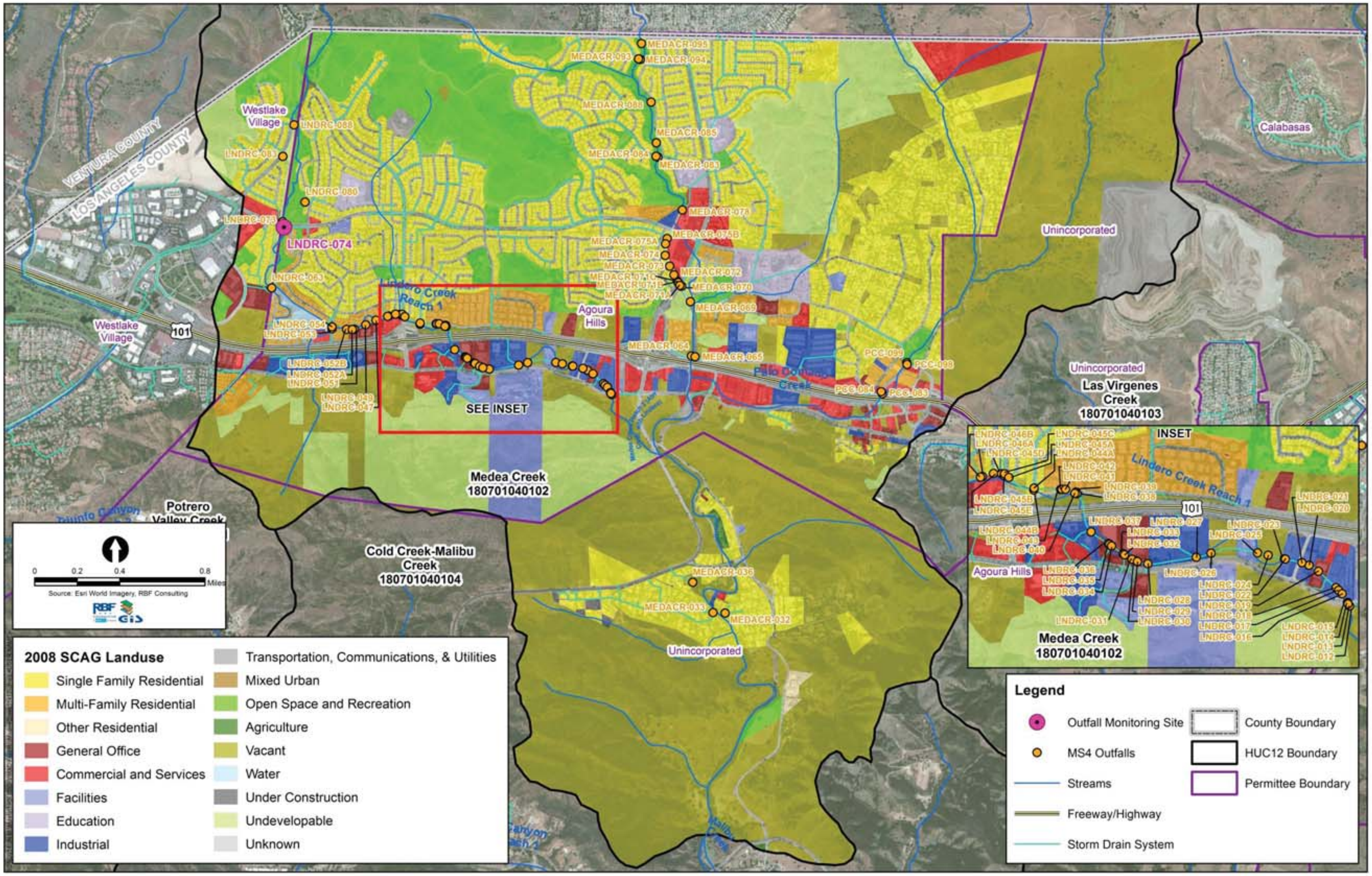


Figure J-5: Potrero Valley Creek