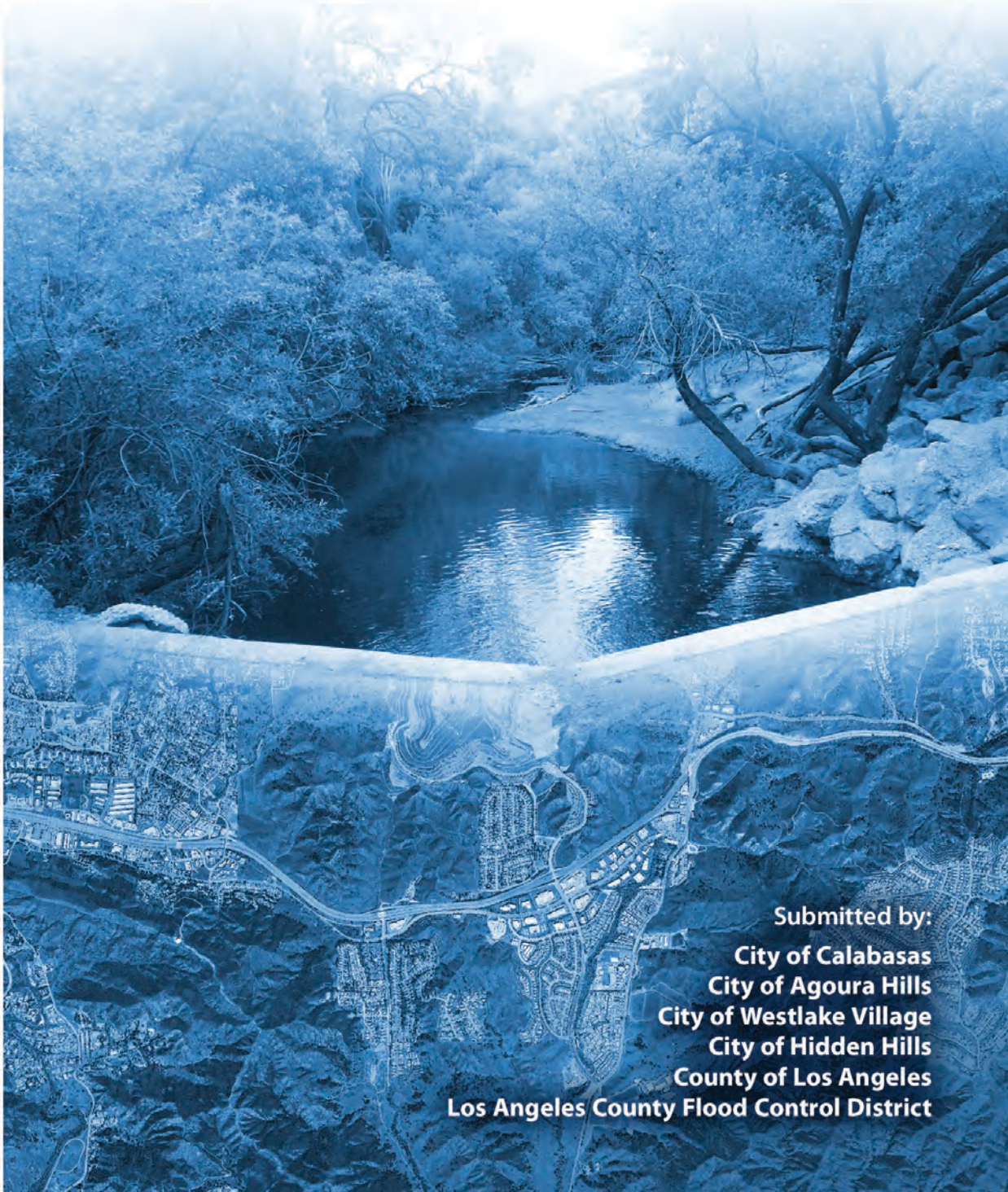
Malibu Creek Watershed
Enhanced Watershed Management Program Work Plan



Submitted by:

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Executive Summary

This Enhanced Watershed Management Program (EWMP) Work Plan (Work Plan) for the Malibu Creek Watershed (MCW) describes how the responsible agencies will develop the EWMP to meet the requirements of the 2012 Municipal Separate Storm Sewer System Permit (MS4 Permit) Order No. R4-2012-0175. The EWMP is being developed through a collaborative stakeholder process inclusive of the MS4 Co-permittees (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), watershed stakeholders (regulated under other MS4 Permits or other NPDES requirements), the Los Angeles Regional Water Quality Control Board (LARWQCB), U.S. Environmental Protection Agency (USEPA), environmental and community organizations, and the public. Specifically, the Work Plan:

- describes the existing water quality conditions;
- proposes water quality priorities for the watershed that are consistent with LARWQCB recommendations; and
- identifies existing and potential watershed control measures, including both institutional and structural controls. Structural projects developed through the EWMP will be designed to incorporate multiple benefits where feasible.

The Work Plan identifies the approach that will be used to evaluate watershed implementation strategies. This approach begins with identifying water quality priorities based on Total Maximum Daily Loads (TMDLs), 303(d) listings, and other potential pollutants of concern in the watershed. The identified water quality priorities will be used to develop a list of potential regional projects, select appropriate watershed control measures, and develop project cost estimates and schedules. The EWMP is a dynamic and evolving process, and it will include adaptive management principles to adapt to changes in the watershed.

A key component of the EWMP is evaluation of opportunities for collaboration among Permittees and other stakeholders on multi-benefit regional projects. Priority will be given to developing projects that retain all non-stormwater runoff and all stormwater runoff from the 85th percentile, 24-hour storm event for the drainage areas tributary to the projects while also achieving other benefits, such as flood protection, water supply, recreation, and habitat restoration.

A Reasonable Assurance Analysis (RAA) will be performed to demonstrate how the water quality based effluent limitations will be achieved in the Malibu Creek Watershed. Recommendations on best management practice (BMP) implementation will be made based on the model-recommended BMP scenario(s) obtained from the RAA. The recommendations will be based on watershed control measures that are existing, planned, or identified through the EWMP development process, known sources of pollutants within the Malibu Creek Watershed, and additional information gathered from scientifically reviewed studies.

The Work Plan contains a schedule for the development of the EWMP with key milestones and deliverables. The overall goal of the Work Plan is to explain in detail how the regulated agencies in the Malibu Creek Watershed will achieve the highest water quality benefit for receiving waters in the shortest period of time.

1 Background and Objectives

1.1 Watershed Background

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

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

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

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

About the NPDES MS4 Permit

The NPDES MS4 Permit Order No. R4-2012-0175 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 certain receiving water limitations (RWLs) and water quality based effluent limits (WQBELs) over time.

1.2 Purpose of the Enhanced Watershed Management Program

The Permittees within the Malibu Creek Watershed (MCW) consist of the Cities of Agoura Hills, Calabasas, Hidden Hills, Malibu, and Westlake Village; County of Los Angeles; and the Los Angeles County Flood Control District. To address the requirements of the MS4 Permit, the Permittees have chosen to implement an Enhanced Watershed Management Program (EWMP). The City of Malibu will be implementing an EWMP for the portion of MCW under its jurisdiction as part of the North Santa Monica Bay Coastal Watersheds EWMP Group.

The EWMP facilitates collaboration among participating Permittees and other partners and encourages them to evaluate opportunities for multi-benefit regional projects within their collective jurisdiction in the Malibu Creek Watershed 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 also encourages Permittees to achieve other benefits, including but not limited to flood protection and water supply. In EWMP 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 will:

- Be 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
- Incorporate applicable state agency input on priority setting and other key implementation issues
- Provide for meeting water quality standards and other Clean Water Act (CWA) obligations by using provisions in the CWA and its implementing regulations, policies and guidance
- Include 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, include 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.
- Maximize the effectiveness of 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
- Incorporate effective innovative technologies, approaches and practices, including green infrastructure
- Ensure that existing requirements to 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
- Coordinate project design and development with other agencies and stakeholders to maximize funding opportunities and provide project benefits in addition to water quality; and
- Ensure that a financial strategy is in place.

2 About the Stakeholder Process

The Malibu Creek Watershed EWMP is being developed through a collaborative stakeholder process inclusive of the MS4 Co-permittees , other watershed stakeholders regulated under other MS4 Permits (e.g., the Statewide Phase II MS4 Permit or Caltrans MS4 Permit) or 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;

- Encourage 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 ensures that:

- all stakeholders are included and input is heard
- information is provided in an open manner
- project stakeholder workshops and public outreach events are facilitated;
- multiple options for the watershed are presented
- decisions made are with due consideration of all input

2.1 Watershed Stakeholder Coordination and Outreach

Development of the EWMP includes coordination among the MS4 Permittees (Agoura Hills, Calabasas, Hidden Hills, Westlake Village, the County of Los Angeles and the Los Angeles County Flood Control District) in the Malibu Creek Watershed. It also includes ongoing coordination with other watershed stakeholders, including the Las Virgenes Municipal Water District (LVMWD), California State Parks, National Parks, Ventura County Watershed Protection District, and Caltrans. Coordination has occurred through the Malibu Creek Watershed Management Committee (MCWMC), as well as additional coordination on an individual basis with each of the entities. A meeting of the MCWMC was held on April 8, 2014 to present the Draft EWMP Work Plan and the Draft Coordinated Integrated Monitoring Plan (CIMP) documents, which provided the MCWMC an opportunity to receive information regarding the documents and ask questions.

Coordination with the North Santa Monica Bay Coastal Watersheds Group, located downstream of the MCW, has been ongoing as we develop the EWMP. This group consists of the City of Malibu, the County of Los Angeles, and the Los Angeles Flood Control District. Coordination is also ongoing with the regulatory agencies including the Los Angeles Regional Water Quality Control Board (LARWQCB) and as needed coordination with USEPA Region 9, the US Army Corp of Engineers (USACE), the California Department of Fish & Wildlife, and the US Fish and Wildlife Service. Additionally, stakeholder coordination includes presentations to the TAC and the LARWQCB at key milestones in the development of the EWMP as appropriate. The cities and county staff participating in the TAC also provide meaningful stakeholder input to EWMP development.

Watershed stakeholder coordination also includes public outreach, which is an important part of EWMP development. This outreach provides an opportunity to the public, as well as environmental and community groups (nongovernmental organizations), to provide input. Outreach includes posting draft documents on the stakeholder's websites to solicit public written comment regarding the plans, as well as public outreach workshops to receive feedback on the EWMP documents. For example, a public outreach workshop coordinated with the North Santa Monica Bay EWMP was held at King Gillette Ranch on May 22, 2014. The workshop provided presentations regarding both the MCW EWMP and the NSMB EWMP, as well as an interactive question and answer (Q&A) session with the public, and an opportunity to interact with the Co-permittees and consultant teams after the Q&A session. This workshop will be followed up with another public workshop when the draft EWMP is completed in 2015.

2.2 Purpose of the EWMP Work Plan

The EWMP Work Plan (this document) is a roadmap for the development of the MCW EWMP that will meet the requirements of the MS4 Permit. The EWMP Work Plan includes the following:

- MCW background information.
- A description of the stakeholder process for development of the MCW EWMP.
- A description of the existing water quality conditions, including Total Maximum Daily Loads (TMDLs), CWA Section 303(d) listings, and other water quality issues.
- The proposed water quality priorities for the MCW that are consistent with MS4 Permit.
- The existing and potential watershed control measures for implementation in the MCW.
- An approach to evaluate EWMP implementation strategies.
- An approach for performing the Reasonable Assurance Analysis (RAA)
- Interim Milestones and Deliverables for the MCW EWMP and the MCW CIMP.

3 Existing Water Quality Conditions

3.1 Total Maximum Daily Loads

The LARWQCB has developed two TMDLs for Malibu Creek, the Malibu Creek and Lagoon Bacteria TMDL and the Malibu Creek Watershed Trash TMDL. Both of the TMDLs were adopted by the LARWQCB and approved by the State Water Resources Control Board (State Board), Office of Administrative Law, and the U.S. Environmental Protection Agency (USEPA). The Malibu Creek and Lagoon Bacteria TMDL went into effect on January 24, 2006, and the Malibu Creek Trash TMDL went into effect on July 7, 2009[1].

The USEPA has developed three TMDLs to address impairments in the Malibu Creek Watershed. The first TMDL developed by the USEPA for this watershed is for nutrients, approved on March 21, 2003. In addition, the USEPA developed TMDLs for Los Angeles Area Lakes, including a TMDL for mercury at Lake Sherwood, a lake within the Malibu Creek Watershed. Lake Sherwood is located in Ventura County and will not be included in the CIMP or the EWMP. No other lakes located within the Malibu Creek Watershed are included in the TMDLs for Los Angeles Area Lakes. The TMDLs were approved on March 26, 2012. The third USEPA TMDL is the Malibu Creek and Lagoon TMDL for Sedimentation and Nutrients to address Benthic Community Impairments. The draft TMDL was released in December 2012 and was approved on July 2, 2013. Additional information on these TMDLs is provided below.

3.1.1 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. Table 1 includes the TMDL target concentrations for bacterial indicators. The TMDL also includes waste load allocations (WLAs) for point sources of discharge, including the MS4. Compliance with the TMDL is based on the number of allowable exceedances of single sample objectives and by meeting the geometric mean targets. The TMDL establishes requirements for compliance for three conditions: summer dry-weather, winter dry-weather, and wet-weather. Table 2 shows the allowable numbers of exceedances for the defined conditions.

[1] LARWQCB – http://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/tmdl_list.shtml

Table 1 – Bacterial Indicator Concentration Targets

Constituent	Target Limits	
	Geometric Mean Limits	Single Sample Objectives
E. coli[a]	Shall not exceed 126 MPN[d] per 100 mL	Shall not exceed 235 MPN per 100 mL
Enterococcus[b]	Shall not exceed 35 MPN per 100 mL	Shall not exceed 104 MPN per 100 mL
Fecal Coliform[a,b]	Shall not exceed 200 MPN per 100 mL	Shall not exceed 400 MPN per 100 mL
Total Coliform[b]	Shall not exceed 1000 MPN per 100 mL	Shall not exceed 10,000 MPN per 100 mL[c]

[a] Targets apply to fresh waters.

[b] Targets apply to marine waters.

[c] In addition, no single sample shall exceed 1,000 MPN of Total Coliform/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1

[d] MPN – Most Probable Number

Table 2 – Bacterial Compliance Targets

Conditions	Allowable Number of Exceedance Days			
	Weekly Sampling Limit*		Daily Sampling Limit	
	Single Sample	Geometric Mean	Single Sample	Geometric Mean
Summer Dry-Weather	0	0	0	0
Winter Dry-Weather	1	0	3	0
Wet-Weather	3	0	17	0

* The weekly limits are the allowable exceedances for Malibu Creek Watershed per sampling location in accordance with the current monitoring program frequency.

The Bacteria TMDL was updated in an amendment that was adopted June 7, 2012 by the Regional Water Quality Control Board (Resolution No. R12-009). The amendment revised a few of the TMDL requirements, including the following changes that are relevant to the this EWMP:

- Resolution No. R12-009 indicates that fecal coliform is no longer a numeric target in fresh waters.
- Rolling geometric means should be calculated weekly using five or more samples for rolling six-week periods. All calculations should be started on the same day for consistency. Sunday has been used for previous analyses, and it will continue to be used under the CIMP.

Table 3 shows the compliance milestone deadlines for the TMDL. The TMDL allows for an extended compliance date if the stakeholder develops and implements an integrated compliance strategy, which is a strategy that addresses multiple pollutants. The EWMP qualifies as an integrated compliance

strategy due to the nature of the EWMP addressing multiple pollutants. The compliance dates with and without the extension are included in the table.

Table 3 – Bacterial Compliance Requirement Deadlines

Compliance Requirement	Date (no extension)	Date (with extension)
TMDL Effective Date	January 24, 2006	
Summer Dry-Weather	January 24, 2009	January 24, 2012
Winter Dry-Weather	January 24, 2012	
Wet-Weather	January 24, 2016	July 15, 2021

3.1.2 Malibu Creek Watershed Trash TMDL

The Malibu Creek Trash TMDL went into effect on July 7, 2009[2]. The trash TMDL sets a goal of zero trash to be attained in the listed water bodies and shorelines. For point sources of trash, the TMDL recommends that the zero trash waste load allocation goal be met through the implementation of BMPs that are approved by the LARWQCB as full capture systems. The TMDL outlines a minimum frequency of assessment and collection (MFAC) program to meet the nonpoint source load allocation target. In addition to requirements to meet trash load reduction compliance milestones, the TMDL requires the stakeholders to develop and submit a trash monitoring and reporting plan (TMRP), which was submitted but has yet to be approved.

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

The USEPA approved the TMDLs for nutrients in the Malibu Creek Watershed on March 21, 2003. The TMDL does not include an implementation plan with monitoring requirements or a compliance schedule. The LARWQCB staff recommended that the USEPA's nutrient targets be applied for both summer and winter periods. These targets are 1.0 milligram (mg) per liter (L) of total nitrogen and 0.1 mg/L of total phosphorus.

The TMDL includes recommendations for compliance actions and establishes targets for the following constituents:

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

The most prominent sources of nutrients listed in the TMDL include:

- Tapia Water Reclamation Facility (WRF);
- Malibu and other onsite wastewater treatment systems (OWTS);

[2] LARWQCB – http://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/tmdl_list.shtml

- Rancho Las Virgenes;
- historic sludge injection and associated contaminated groundwater;
- runoff from golf courses and other landscaped areas; and
- runoff from livestock holding areas.

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

On July 2, 2013, the USEPA approved the Malibu Creek and Lagoon TMDL for Sedimentation and Nutrients to address Benthic Community Impairments. This is a USEPA developed TMDL that includes WLAs for sediment and nutrients. The TMDL does not include an implementation plan, monitoring requirements, or a compliance schedule. The TMDL includes numeric targets to achieve the WLAs. The numeric targets that apply to Malibu Creek and its tributaries (Las Virgenes Creek, Stokes Creek, and Cold Creek) are for:

- Southern California Index of Biological Integrity (SC-IBI);
- Southern California O/E Ratio (SC-O/E), where O is the number of taxa observed in a sample and E is the expected number of taxa;
- Benthic Community Diversity;
- Benthic Algal Coverage;
- Dissolved Oxygen;
- Natural Sedimentation Rate (Total Suspended Solids or TSS, Turbidity); and
- Nutrient Concentrations (TN, TP).

The numeric targets for the TMDL for Malibu Lagoon are:

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

3.2 303(d) Listings

The watershed also includes reaches listed on the CWA Section 303(d) list. The latest approved 303(d) list is the 2010 list. The State Board is reviewing data submitted for an update to the 303(d) list, but the assessment is not expected to be available for public review until 2016.

Table 4 – 2010 303(d) Listings in the Malibu Creek Watershed

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

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

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

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

Notes:

1 TMDL developed by the USEPA

2 TMDL developed by the LARWQCB

3.3 Other Potential Water Quality Issues

In some of the watersheds, natural sources likely cause or contribute to these stressors (LARWQCB, 2012). According to an assessment conducted by the Las Virgenes Municipal Water District (LVMWD) in 2012, the Monterey/Modelo formation outcrops in the watershed are known to have elevated levels of sulfate, phosphate, metals, and selenium. LVMWD found that the high background levels of biostimulatory substances associated with the formation likely have a negative impact on benthic communities downstream. The Reasonable Assurance Analysis (RAA) will integrate this information.

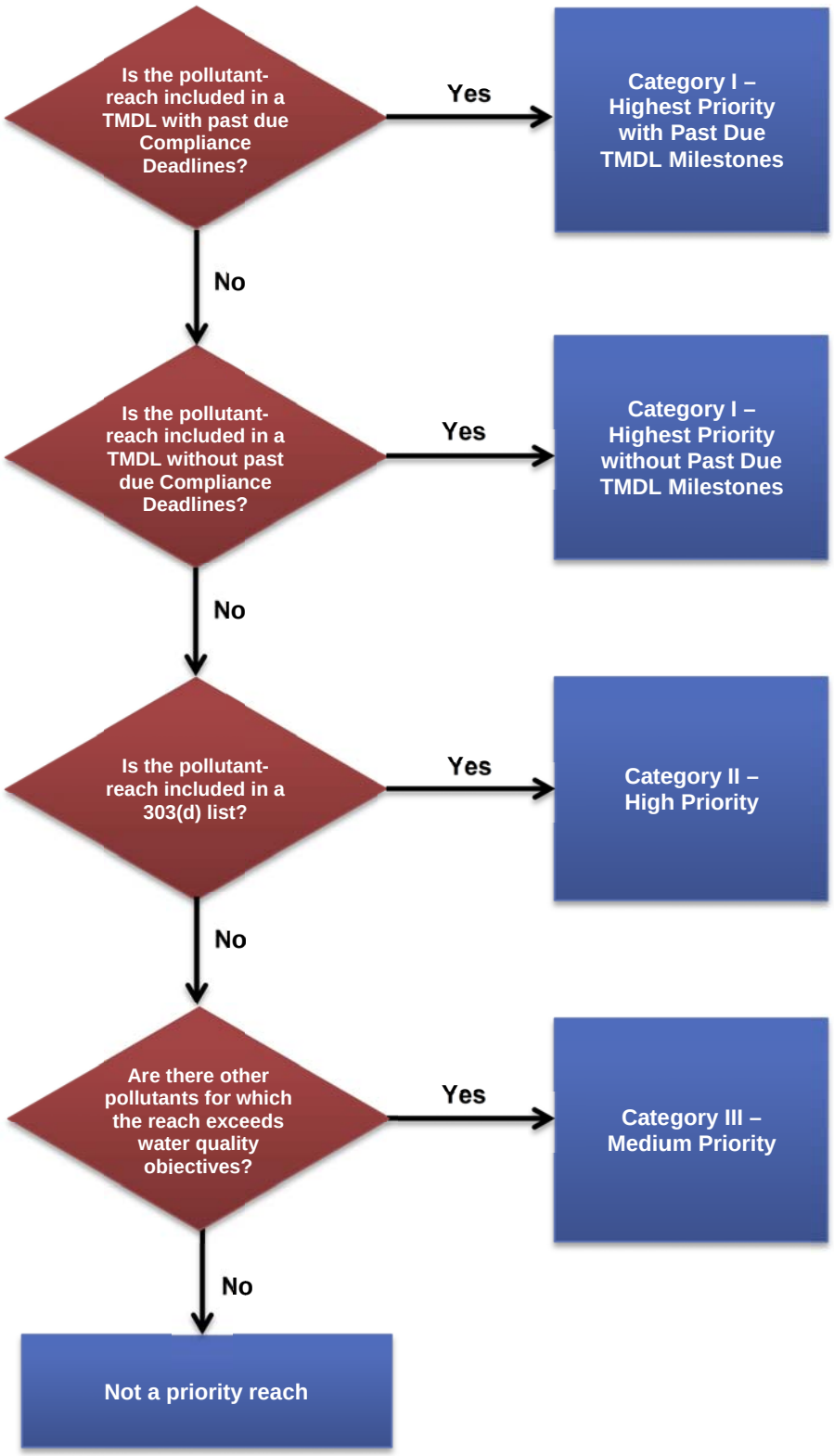
4 Water Quality Priorities

The purpose of this section is to present the approach used to prioritize reaches within the Malibu Creek Watershed. Reaches are identified based on pollutant listings and are prioritized consistent with the prioritization requirements of the MS4 permit. All reaches that are named in TMDLs, or on the 2010 303(d) list, were included in the prioritization. In addition, per the MS4 Permit water quality data was reviewed for reaches in the MCW and those pollutants for reaches in the MCW that had exceedances of applicable receiving water limitations, but there was insufficient data to indicate water quality impairment in the receiving water according to the State's Listing Policy were also included in the prioritization. , a source assessment evaluation was performed to identify the "pollutants" from the 303(d) list where the MS4 is not a source (Table 4).

The Permit includes three broad categories for water body-pollutant classification. The proposed prioritization approach is consistent with the permit and expands the methodology to include additional combinations of impairment categories and levels of impairment. The level of impairment for bacterial indicators was based on *Escherichia coli* (*E. coli*) concentrations. This is consistent with the most current requirements for the Bacteria TMDL as updated during the TMDL re-opener. The Bacteria TMDL is a key component for the water quality prioritization due to the past due TMDL milestones in the TMDL compliance schedule and the number of exceedances for Bacteria in the watershed.

The first category defined in the permit is the "Highest Priority" water bodies and includes reaches with TMDLs. In the MCW, this category includes those reaches with a TMDL for bacterial indicators and trash due to the past due TMDL milestones in compliance schedule of the TMDL. This category also includes other TMDLs without past due TMDL milestones. The second category defined in the permit is the "High Priority" water bodies, which have 303(d) impairments but no TMDLs. The third category defined in the permit is "Medium Priority" water bodies and includes those with no TMDLs and no 303(d) listed impairments, but with other exceedances of water quality objectives and for which MS4 discharges may be causing or contributing to the exceedance. This is also consistent with the permit. Figure 1 shows a flowchart of the proposed approach.

Figure 1 – Pollutant-Reach Prioritization Methodology Flow Chart



4.1 Watershed Monitoring

Table 5 identifies monitoring programs that have been conducted in the Malibu Creek Watershed. 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. A map with the locations of the monitoring sites is presented in Figure 2.

Table 5 – Monitoring Programs in Malibu Watershed

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
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- to date
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	2013
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

Monitoring Program	Collection Agency	Location of Samples	Year(s) Data Collected
Microbial Source Tracking	Los Angeles County Flood Control/ Los Angeles County Public Works	Malibu Creek Watershed	2013-2015
National Park Service (NPS) MEDN Monitoring Program	Santa Monica Mountains National Recreation Area (SMM-NRA)	Malibu Creek Watershed	2006-2011
Tributary Monitoring	Los Angeles County Flood Control District	Malibu Creek Watershed	2011-2013
Malibu Lagoon Bacteria and Nutrient Study	United States Geological Survey	Malibu Creek, Malibu Lagoon, wells, and ocean	2009-2010
Ventura Co Bacteria TMDL Monitoring Program	Ventura County	Ventura County	2008-2013

Notes:

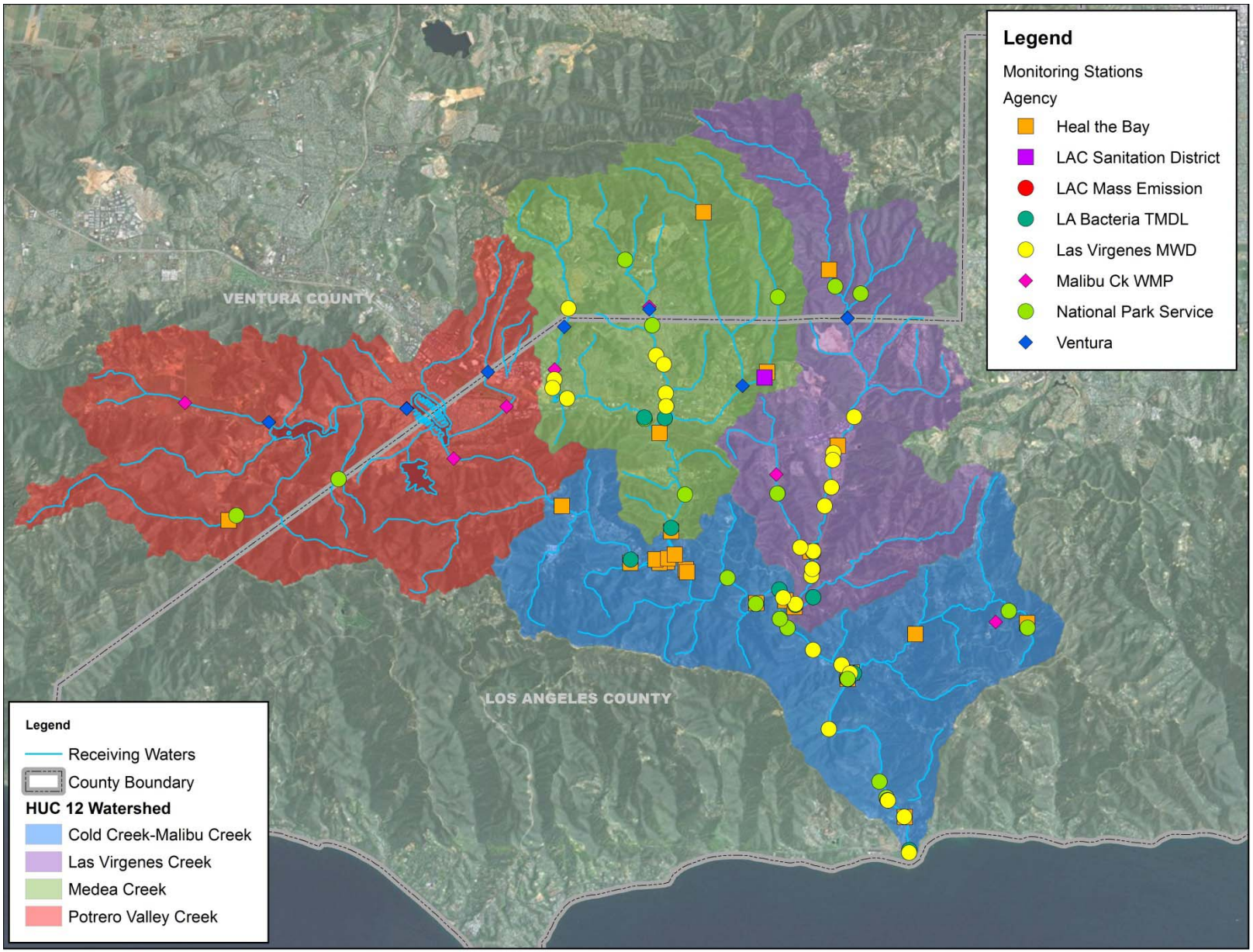
* One mass emission site is located in Malibu Creek Watershed.

DO – Dissolved Oxygen

JPA – Joint Powers Authority of the Las Virgenes Municipal Water District/Triunfo Sanitation District

LVMWD – Las Virgenes Municipal Water District

Figure 2 – Monitoring Sites in Malibu Creek Watershed



4.2 Prioritized Sources

The prioritization requirements set forth by the MS4permit were applied to the reaches in the Malibu Creek watershed, and the results are presented graphically in Figure 3 and in Table 6. The table lists the identified reaches, the water quality impairments, and the prioritization results.

Figure 3 is a map of the reaches within the project area and the prioritization category for each reach. The map shows the county boundary and that of the City of Malibu. As discussed previously, the EWMP includes the portions of Malibu Creek and its tributaries within the County of Los Angeles and upstream of the City of Malibu. The map also shows the subwatersheds that drain to the reaches. These subwatersheds will be considered during the identification of priority BMP locations for the EWMP.

The reaches identified as Category 1 Highest Priority will be considered for priority implementation in the EWMP. The EWMP will also consider BMP load reduction and implementation feasibility to develop recommendations for BMP implementation.

Figure 3 – Malibu Creek Watershed Receiving Water Reaches Priority

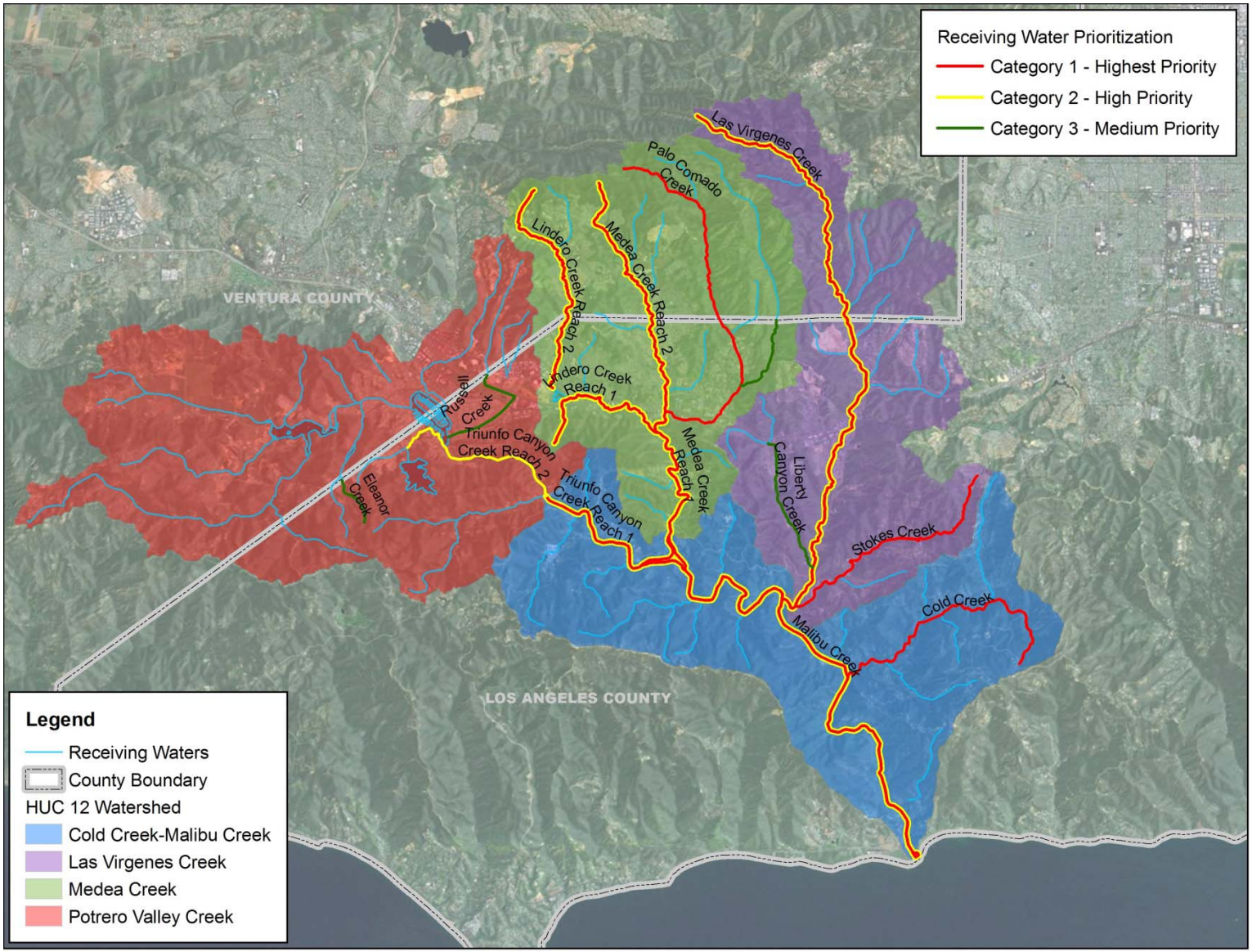


Table 6 – Water Body Prioritization from the Malibu Creek Watershed EWMP

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

Notes:

[1] 303(d) listed impairment not based on pollutant

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

5 Watershed Control Measures

The MS4 Permit requires the identification of a suite of best management practices (BMPs) and implementation measures that could be implemented in the watershed to achieve compliance with the WQBELs and Receiving Water Limitations (RWLs). These BMPs and implementation measures are referred to in the MS4 Permit as watershed control measures.

The watershed control measures include existing and planned measures in the watershed, as well as potential control measures that could be implemented to achieve compliance. The suite of the watershed control measures includes institutional BMPs (non-structural measures), structural BMPs, and multi-benefit projects. The emphasis will be on identifying watershed control measures that can retain the volume of stormwater runoff associated with the 85th percentile, 24-hour storm (design storm) as the MS4 Permit identifies that compliance with the final RWLs and WQBELs is achieved for the drainage area to the watershed control measures that achieve this amount of retention. The MS4 Permit also recommends that the Permittees develop an EWMP to implement multi-benefit projects. The emphasis in the MCW EWMP is therefore to implement multi-benefit projects that achieve retention of the volume of stormwater runoff associated with the 85th percentile, 24-hour storm (design storm).

The following sections identify the existing and planned controls measures in the watershed, the suite of potential controls measures that could be implemented, and the approach and prioritization of watershed controls measures for implementation in the MCW.

5.1 Existing Structural and Institution BMPs

The Permittees have been implementing the Countywide Storm Water Quality Management Plan (SQMP) to manage municipal stormwater and urban runoff discharges since adoption of the 2001 NPDES MS4 Permit (Order No. 01-182). The 2002 SQMP includes 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 (IC/ID) Elimination Program.

This section identifies the existing and planned institutional and structural BMPs in the watershed.

5.1.1 Existing Minimum Control Measures

Participating agencies are continuing to implement the MCMs required under the 2001 MS4 Permit. Applicable new MCMs will be implemented by the time the EWMP is approved by the Regional Board. An inventory of the existing minimum control measures in the MCW is provided in the following tables.

Table 7 – Public Information and Participation Program

Permittee	Residential Outreach Program	Public reporting (e.g., 888-CLEAN-LA)	Community pollution prevention and clean up (e.g., clean ups 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, Clean LA (http://dpw.lacounty.gov/epd/cleanla). The website offers environmentally responsible programs that are available for residents, businesses, governmental agencies, and includes a public reporting program 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. Table 8 lists the video titles and includes website links.

Table 8 – Public Education Activities

Permittee	Public Education Video Title	Advertisement Category
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 Malibu Creek Watershed 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)	Pet Waste Bus Shelter Advertisement

Table 9 – 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]	X
City of Westlake Village	X	X	X
County of Los Angeles	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.

Table 10 – 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	Catch Basin Cleaning	Trash Receptacles Maintained as Necessary	Catch Basin Labels and Open Channel Signage[1]	Street Sweeping	Site Design and Landscape Planning	Efficient Irrigation	Fueling Areas
City of Agoura Hills	X	X	X	X	X	X	X	X	X	X
City of Calabasas	X	X	X	X	X	X	X	X	X	X
City of Hidden Hills	N/A	X	N/A	X	X	X	X	X	X	N/A
City of Westlake Village	X	X	X	X	X	X	X	X	X	X
County of Los Angeles		X		X	X	X	X	X	X	X
Los Angeles County Flood Control District		N/A	N/A	X	X	X	N/A	X	N/A	X

ESA – Endangered Species Act

LID – Low Impact Development

1 Catch basin labels only.

Table 11 – 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

Table 12 – Public Agency Activities Program

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

Table 13 – Illicit Connections and Illicit Discharge Elimination Program

Permittee	Illicit Connections and Illicit Discharge Elimination 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, the Las Virgenes Municipal Water District (LVMWD) service area depends entirely upon imported supplies for its drinking water. The LVMWD Board has adopted several policies to enforce water conservation measures, including 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.

5.1.2 Existing Source Controls

The Permittees currently employ source control BMPs in order to prevent the generation and spread of pollutants such as bacteria , trash, and sediment. An identification of source control BMPs currently implemented by the Permittees was performed and the results are presented in Table 14.

Table 14 – Existing Source Control BMPs Implemented

BMP Type[1]	Permittee					
	Agoura Hills	Calabasas	Hidden Hills	Westlake Village	County of Los Angeles	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	-	-	-	-	1	-

BMP Type[1]	Permittee					
	Agoura Hills	Calabasas	Hidden Hills	Westlake Village	County of Los Angeles	Los Angeles County Flood Control District
Traps						
Bird Deterrent Spikes	-	-	-	-	1	-
Erosion Control	-	-	-	-	1	-
Fiber Rolls	-	-	-	-	50	-
Recycle Bins	-	-	-	-	27	-
Sandbag Barriers	-	-	-	-	2	-
Slope Stabilization	-	-	-	-	1	-
Total	**17**	**1**	**-**	**53**	**934**	**0**

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

5.1.3 Existing Structural BMPs

A review of the existing BMPs identified several existing regional and distributed BMPs that are operated and maintained within the watershed. Existing regional and distributed BMPs within the watershed are summarized in Tables 15 and 16 respectively.

Table 15 – Existing Regional BMPs

ID	Permittee	Regional BMP Name	Subwatershed	Regional BMP Type
1	City of Agoura Hills	Chumash Park	Upper Medea Creek	Infiltration Basin
2	City of Agoura Hills	Lake Lindero Country Club	Upper Lindero Creek	Infiltration Basin
3	City of Calabasas	Las Virgenes near De Anza	Lower Las Virgenes Creek	Infiltration Basin
4	City of Calabasas	Liberty Canyon Creek	Lower Las Virgenes Creek	Subsurface Flow Wetland
5	City of Agoura Hills	Reyes Adobe Park	Lower Lindero Creek	Subsurface Flow Wetland
6	City of Agoura Hills	Sumac Park	Upper Medea Creek	Infiltration Basin
7	City of Westlake Village	Three Springs Park	Westlake	Subsurface Flow Wetland
8	City of Westlake Village	Triunfo Creek Riparian Enhancement	Westlake	Free surface Flow Wetland

ID	Permittee	Regional BMP Name	Subwatershed	Regional BMP Type
9	City of Agoura Hills	Upper Lindero Creek Subwatershed	Upper Lindero Creek	Infiltration Basin
10	City of Agoura Hills	Agoura Road Subsurface Wetland	Lindero Creek Watershed	Subsurface Flow Wetland
11	City of Agoura Hills	Agoura Road Extended Detention Basin Project	Lower Lindero Creek	Detention Basin
12	City of Agoura Hills	Chumash Park Runoff Reuse Project	Upper Medea Creek	Retention/ Reuse Chambers/ Infiltration Gallery

Table 16 – Existing Distributed BMPs Installed and Maintained on Public Land

Treatment BMP Type[1]	Permittee					
	Agoura Hills	Calabasas	Hidden Hills	Westlake Village	County of Los Angeles	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	**-**
Total	126	436	-	13	498	**1**
Estimated Area Treated[2] (ac)	79	141	0	9	158	1
Percentage Jurisdiction Treated (%)[2]	**1.6%**	**1.7%**	**0.0%**	**0.3%**	**0.5%**	**<0.1%**

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

[2] Estimates based on treated area of 1-acre for each distributed BMP (bioretention, biofiltration, bioswale, infiltration trench, low flow diversion, permeable pavement), and 0.5-acre for other structural BMPs (hydrodynamic separators, inserts and screens). Trash and debris BMPs are not included in the estimates.

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:

- 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. Below are some photos of the project.



- The Malibu Creek Watershed 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.

5.2 Potential Control Measures

5.2.1 EWMP BMP Approach

The objective of the EWMP is to address the existing impairments from the MS4 related pollutants of concern while providing multiple benefits to the watershed, in the most cost-effective manner.

The EWMP will develop an optimized BMP implementation strategy based on water quality improvement, constructability, multiple benefits, and cost. Cost efficiencies are driven by the:

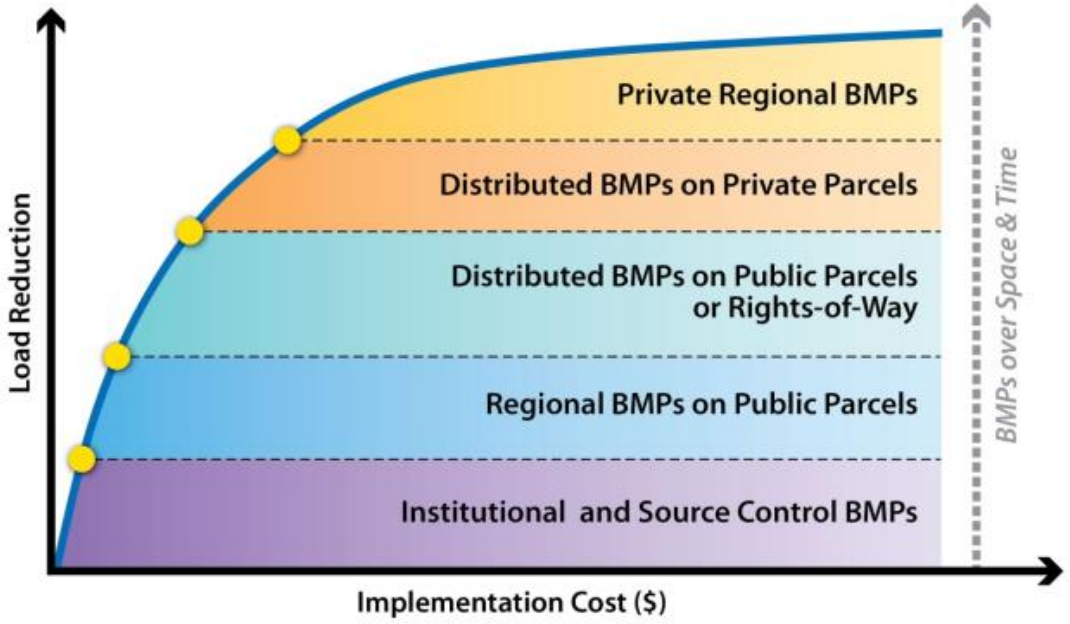
- Ability of the Permittees to manage identified sources of the pollutants of concern through the implementation of source control BMPs and institutional BMPs
- Potential to centralize treatment systems at regional facilities instead of distributed facilities
- Availability of public parcels for implementation of structural BMPs
- Potential for collaboration with non-MS4 Permittees for achieving multiple benefits

Load reductions for each of the pollutants of concern will be achieved through the evaluation and integration of the following BMPs:

- Institutional and Source Control BMPs
- Regional BMPs on Public Parcels
- Distributed BMPs on Public Parcels or Rights-of-Way
- Distributed BMPs on Private Parcels
- Private Regional BMPs

The EWMP will prioritize structural BMPs that 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 BMPs, while also achieving multiple benefits. Structural BMPs that are capable of retaining both (i) and (ii) are based on inherent infiltration capacity or the feasibility of capturing and reusing dry-weather flow and stormwater runoff. Figure 4 identifies the hierarchy of BMPs for evaluation in the EWMP, which is based on effectiveness of pollutant reduction and cost. This hierarchy provides guidance for implementation; however, the RAA will ultimately identify what BMPs are needed in the watershed. For further discussion on identification of potential BMP's see Section 6.3.

Figure 4 – EWMP BMP Hierarchy



5.2.2 Multiple Benefits and Potential Multi-Benefit Regional Projects

While identifying potential EWMP projects, those capable of providing benefits in addition to water quality improvement will be preferred. Potential benefits are identified in this section and will be used in evaluating watershed control measures. Some potential multi-benefit projects have been identified as well. For each potential watershed control measure, the following benefits will be evaluated:

- Water Supply/Water Conservation – Given the current drought situation, augmentation of water supply and water conservation are becoming increasingly important. There may be opportunities in the Malibu Creek Watershed to capture, treat and use stormwater and non-stormwater runoff. Initial collaboration with the Las Virgenes Municipal Water District has identified challenges with augmentation of water supply through capture and use in the MCW but also potential opportunities to divert non-stormwater runoff and stormwater runoff into the sewer system, where it can be stored for use as part of the recycled water system. There may also be opportunities to augment water supply on a subregional basis. This would achieve a multi-benefit and help to achieve compliance with WQBELs and RWLs if retention of (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 capture and use project can be achieved. Additionally, initial collaboration with the LVMWD has identified collaborative opportunities for water conservation in the MCW, which could significantly improve surface water quality. Coordination

with LVMWD will be ongoing during EWMP development to identify specific projects to augment water supply and collaborate on water conservation.

- Groundwater recharge – According to Technical Memorandum: Hydrogeology and Aquifer Characteristics (CDM, 2006), the potential for regional groundwater recharge projects is very limited in the watershed given the lack of a suitable alluvial aquifer, seasonality and need for storage, treatment needs, and poor aquifer water quality. Of particular concern, a higher water table induced by regional recharge projects may potentially impact onsite septic systems. The technical memorandum notes that localized infiltration projects may be beneficial. Such localized projects will be evaluated. Alternatively, if the investigation identifies potential regional projects that are of sufficient size to manage stormwater timing, quantities, and treatment, the feasibility to recharge the bedrock aquifer through injection will be evaluated.
- Stream rehabilitation/habitat enhancements – Stream rehabilitation is a set of activities that help improve the environmental health of a river or stream and restore the beneficial uses of the water body. These activities aim to restore the natural state and function of the river system to support the water quality, biodiversity, recreation, flood management and landscape development. Potential regional projects may consist of in-stream rehabilitation projects that contain aquatic pools. Aquatic pools may be sized to retain both dry-weather runoff from urbanized areas and the 85th percentile, 24-hour storm volume. The investigation evaluates the opportunities of potential stream rehabilitation projects to maintain a dynamic geomorphic equilibrium of the stream segment, provide an optimal habitat for riparian communities, preserve and restore stream corridors and wetlands in coastal subwatersheds, and the feasibility to retain stormwater before infiltration through the native alluvial soils. As a part of restoration of beneficial uses, habitat enhancements can also be achieved.
- Recreational activities – The watershed is home to several public and private community parks that play a significant role in local communities by providing ecological features and entertainment or sport fields in urban environments. It may be possible to retrofit some of these parks to incorporate a structural BMP while preserving the primary recreational role of the sites. Examples of dual-use parks include grassed extended detention basins (provided that the field can be excavated or bermed in a cost-effective way while preserving its primary function), bioretention areas for landscape purposes, or underground media filters. The investigation evaluates the feasibility to retrofit each identified public or private park into a dual-use regional facility.
- Public education and outreach – Multi-benefit projects may be highlighted by the Permittees to promote behavioral changes of local communities towards pollution prevention, water conservation, and wildlife protection. The investigation evaluates the potential to raise public awareness, especially if opportunities are sought in public parks or recreational areas.
- Flood control – The watershed is home to several flood control facilities, debris basins, and reservoirs. Retrofitting these flood control facilities for water quality may represent a cost-effective measure that serves both flood control and water quality purposes. Retrofitting flood control facilities may include the implementation of a water quality riser, the evaluation of potential infiltration for the 85th percentile, 24-hour storm volume, and the transformation of the lower geomorphology of the basin for water quality (low-flow channel, multistage basins, and riparian vegetation if needed). The investigation evaluates all publicly owned flood control basins for potential retrofit opportunities.
- Conjunctive urban land use – As discussed in Section 5.2.4, the identification of potential regional facilities will include urban land uses, notably parking lots where underground infiltration chambers may be feasible. The investigation will estimate impacts on traffic loads for incorporation into the cost-effectiveness of parking lot retrofits.

- Aesthetics – Aesthetics play an important role in acceptance of a water quality feature by the local community, notably by maintaining the rural character of the watershed. Open water is generally considered much more attractive than the dense vegetative growth that occurs in constructed wetlands. Consequently, wet basins are preferred for potential BMP sites that are clearly visible from adjacent neighborhoods, parks, or other public places.

5.2.3 Potential Institutional BMPs

Institutional BMPs include all minimum control measures and source control BMPs that may be considered for implementation to address the water quality priorities of the watershed. All proposed customization of the minimum control measures and source control BMPs should evaluate the potential for addressing multiple benefits.

5.2.3.1 Minimum Control Measures

Permit Item VI.C.5.b provides the Permittees with an opportunity to identify specific control measures for customization or elimination if MCMs do not address or only partially address the known impairments or if MCMs are not deemed efficient based on implementation experience.

The EWMP will include an evaluation of the MCMs including any proposed changes or customization to the MCMs. The evaluation will consider how effective the MCMs are at controlling the pollutants of concern and assess the effectiveness assessments of each program element. Based on the evaluation, proposed changes to or customization of ineffective MCMs will be included in the EWMP.

5.2.3.2 Source Control BMPs

Where feasible, the implementation of source control BMPs will be favored over structural BMPs in two cases:

- Where generic source control BMPs are included in the existing SQMP and address the impairments in pollutants of concern generated from urbanized land uses of the watershed;
- Where specific source control BMPs are designed to manage the sources of pollutants of concern that are specific to the watershed. Potential sources may include the effects of Malibou Lake and other retention systems, discharges from the Tapia Water Reclamation Facility (WRF), discharges from horse ranch facilities, discharges caused by migratory birds of the Pacific Flyway, and other significant sources identified during the development of the Coordinated Integrated Monitoring Plan (CIMP) and the EWMP.

Both the contribution and magnitude of each potential source of pollutants of concern will be determined as a part of the RAA development. A comprehensive approach will then identify to what extent these sources can be managed with specific cost-effective source control BMPs. For each of the following potential pollutant sources, potential source control BMPs may include:

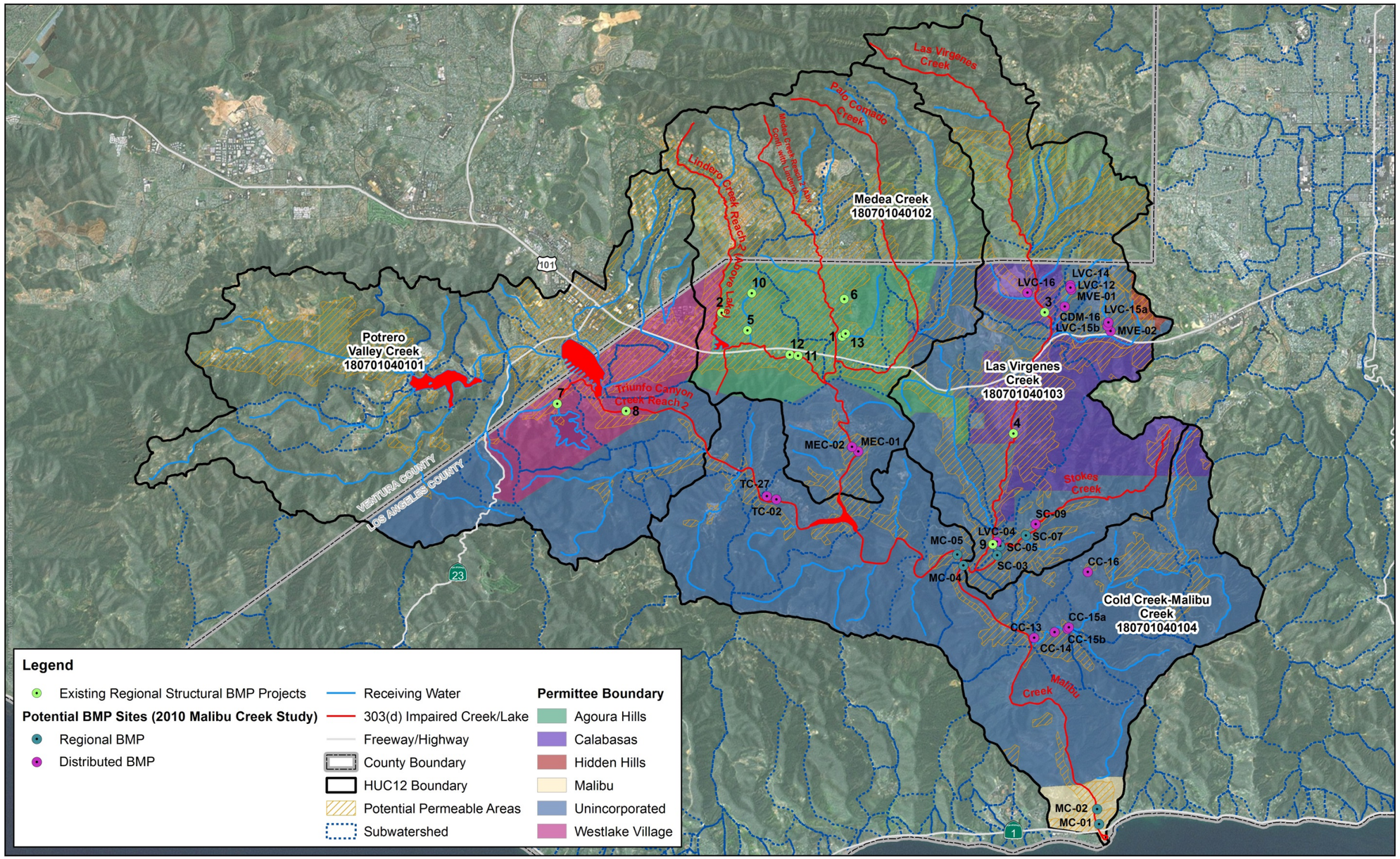
- Lake impairments and discharges from detention facilities:
    - Homeless encampment management
    - Lake discharge schedules that are compatible with objectives of groundwater recharge flood protection, and habitat conservation
- Discharges from the Tapia Water Reclamation Facility (Tapia WRF):
    - Quantitative and qualitative restrictions on discharges following monitoring observations
    - Coordination with Las Virgenes Municipal Water District for technology-based enhanced treatment of effluent discharge based on monitoring

  - Enhanced treatment of recycled water used for irrigation
  - Site design and landscape planning
  - Efficient irrigation
- Horse ranches and facilities:
  - Equestrian facilities management and litter management
  - Equestrian facilities inventory and inspections
  - Litter management education of owners, employees, and riders
  - Litter management ordinances, inspections, and enforcement actions
- Migratory birds from the Pacific Flyway:
  - Coordination with California State Parks to establish an educational program for visitors and the local community on ways to reduce anthropogenic populations of birds within the watershed
- Onsite wastewater disposal systems:
  - Onsite wastewater disposal systems management
  - Onsite wastewater disposal systems inventory and inspections
  - Onsite wastewater disposal systems management education of owners
  - Onsite wastewater disposal systems management ordinances, inspections, and enforcement actions

5.2.4 Potential Structural BMPs

Structural BMPs encompass a suite of BMPs that can be implemented at various sites throughout the watershed. Structural BMPs include regional BMPs on public parcels, distributed BMPs on public parcels or rights-of-way, distributed BMPs on private parcels, and private regional BMPs. Structural BMPs that achieve multiple benefits will be prioritized over other structural BMPs. Structural BMPs that 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 BMPs will be prioritized over all other structural BMPs. Figure 15 identifies opportunities for infiltration in the Malibu Creek Watershed, where meeting the retention standard of the permit may be feasible.

Figure 5 – MCW Potential Infiltration Map



5.2.4.1 Regional BMPs on Public Parcels

Regional BMPs on Public Parcels represent the most cost effective structural BMP for implementation in the watershed. Regional structural BMPs include both retention BMPs and treatment BMPs as identified below.

Regional Retention BMPs

- **Infiltration basins and/or underground infiltration galleries** 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.
- **Low-Flow diversion projects** consist of diverting dry-weather runoff and/or stormwater runoff to the sanitary sewer system. Pollutants are removed at the downstream wastewater treatment plant. Diverted runoff will be used to: (1) flush primary and secondary treatment systems of the wastewater treatment plants (water for flushing lines is currently either pumped from local aquifers or supplied from the existing potable water line); and (2) provide additional water for supply to the service area.
- **Regional stormwater capture and use projects** include water storage infrastructure, water treatment systems, and water distribution systems for different types of water demands. Depending on the water demand, different levels of treatment are necessary for use of captured stormwater. Irrigation is the primary perceived use of captured stormwater; however, other uses may be possible in the watershed. Regional stormwater capture and use may substitute the multiple extraction wells that are currently used by LVMWD throughout the watershed to supply irrigation water to larger residential communities and agricultural landowners.

Regional Treatment BMPs

- **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.
- **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.

5.2.4.2 Distributed BMPs on Public Parcels

Distributed BMPs on public parcels and public right-of-way represent the next level of structural BMP in the BMP hierarchy.

Distributed Retention BMPs

Distributed retention BMPs, also known as Low Impact Development (LID), help to mimic natural hydrology by retaining a portion of the stormwater onsite, which is what occurs in the natural environment. Some of these BMPs retain water through and evapotranspiration, as some are vegetated systems, while other systems retain stormwater by using it as a resource for water demands. In addition to reducing the volume of stormwater runoff, helping to mimic natural hydrology, an additional benefit of retention is that pollutants associated with the stormwater are retained onsite.

- **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. The 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.
- **Infiltration trenches** are rock-filled trenches with no outlet; runoff is stored in the void space between the stones and infiltrates through the bottom and into the soil matrix.
- **Small-scale low flow diversions** divert low flows that occur during the dry season to the sanitary sewer on a distributed basis.
- **Residential stormwater capture and use** include stormwater storage devices (e.g., rain barrel, cistern) and use of stormwater for residential demands (e.g., irrigation, toilet flushing).
- **Biofiltration devices** are LID BMPs that reduce stormwater pollutant discharges by intercepting rainfall on a vegetative canopy, through incidental infiltration 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.
- **Bioswales** are open, shallow channels with vegetation covering the side slopes and bottom that collect and slowly convey runoff flow to downstream discharge points. They treat runoff through straining the vegetation in the channel, filtering through a subsoil matrix, and/or by infiltration into the underlying soils.
- **Permeable pavement** is a system comprising a load-bearing, durable surface together with an underlying layered structure that temporarily stores water prior to infiltration into the subgrade or drainage to a controlled outlet.
- **Stormwater quality vaults** contain a permanent water pool that may also have a constricted outlet that causes a temporary rise of the water level during each storm.
    - **Catch basin clean inserts and screens** are filters/screens placed in a catch basin with absorbent pillows to capture debris and trash before they can enter the MS4.
    - **Debris boom/nets** are just like the floating trash boom, but a net is attached to allow smaller fish and particles to pass through the barrier while still containing larger debris or aquatic life.
    - **End of pipe nets** are placed at the end of MS4 pipes to capture trash and debris from entering receiving waters.
    - **Floating trash booms** are a permanent or temporary measure installed for pollution control, containment and recovery of flowing trash, debris, urban waste, or aquatic plants.
    - **Hydrodynamic separators** are cast-in-place devices that separate gross solids from stormwater runoff through a continuous deflective separation process.
    - **Water clarifiers** are designed for installation below grade to allow stormwater to flow via gravity and to reduce heavy solids, oil, and grease.

Additional distributed BMPs will be built as new development and significant redevelopment occurs in the watershed. As warranted by the implementation of the Planning and Land Development Program, LID BMPs will ensure that the runoff volume produced by the 85th percentile, 24-hour storm is retained onsite, where feasible, or biotreated.

The RAA will determine the extent to which distributed BMPs will be needed to meet receiving water objectives.

5.2.4.3 Distributed BMPs on Private Parcels

Distributed BMPs on private parcels are the next level of structural BMPs in the BMP hierarchy. The RAA will determine the extent to which distributed BMPs on private parcels will be needed to meet receiving water objectives.

5.2.4.4 Private Regional BMPs

Regional BMPs on private parcels are the next level of BMPs in the BMP hierarchy. The RAA will determine the extent to which regional BMPs on private parcels will be needed to meet receiving water objectives.

6 Evaluation of Watershed Implementation Strategies

6.1 Finalize Approach to Addressing USEPA TMDLs, 303(d) Listings, and Other Exceedances of Receiving Water Limitations

Existing numeric milestones and compliance schedules for the current Malibu Creek Watershed TMDLs are reviewed, and numeric milestones and compliance schedules for the USEPA Promulgated TMDL for nutrients are developed to help devise a coordinated, achievable strategy for TMDLs. Interim numeric milestones and compliance schedules for receiving water limitations exceedances not addressed by a TMDL will also be developed. These milestones and schedules will be coordinated with TMDL milestones and schedules.

6.2 Develop List of Regional Projects and Initial Screening

Regional projects play an essential role in the Malibu Creek EWMP for their ability to provide a centralized option and address multiple objectives for the Permittees. Regional projects offer economies of scale on investments and facilitate the resources required for long-term operation and maintenance when compared to a series of small-scale distributed systems of equivalent capacity. This section identifies a list of potential regional projects that retain or treat the pollutants of concern:

- all non-stormwater for the drainage area tributary to the project; and
- all stormwater runoff of the volume equivalent to the 85th percentile, 24-hour storm event for the drainage area tributary to the project.

Section 6.2.1 identifies the evaluation elements for potential regional projects in the watershed including 1) feasibility to retain the 85th percentile, 24-hour storm event, and 2) evaluation of treatment for those sites where retention is infeasible. Section 6.2.2 describes the steps to identify and evaluate potential regional projects in the watershed.

6.2.1 Evaluation of Regional Projects

<u>Feasibility to Retain the 85th Percentile, 24-hour Storm Event</u>

The MS4 Permit identifies that performing a RAA is not necessary in drainage areas where the retention of (i) all non-stormwater runoff and (ii) all stormwater runoff from the 85th percentile, 24-hour storm event is achieved. Retention is feasible at potential regional projects if onsite infiltration or low-flow diversions are available.

Onsite infiltration

Onsite infiltration is deemed feasible if soil conditions and geotechnical conditions are favorable to the retention of dry-weather runoff and/or stormwater runoff. The desktop evaluation assesses:

- Local soil data provided by the Natural Resources Conservation Service (NRCS) or available in the Los Angeles County Hydrology Manual (LACDPW, 2006) to establish the hydrologic soil group (HSG) of the soils at the potential regional locations. HSGs type A and/or type B are considered suitable to infiltration-based facilities.
- Groundwater data from the Groundwater Ambient Monitoring & Assessment Program (GAMA) to evaluate the presence of contaminated groundwater, or high groundwater table in proximity to the potential regional locations. Infiltration is deemed feasible if there are neither contaminated plumes nor injection wells within 250 feet, and if the high groundwater table is more than 10 feet below the invert of a potential infiltration facility.
- Local LACDPW and NRCS soil data to evaluate potential geotechnical conditions (collapsible soil, expansive soil, slopes, liquefaction, etc.) that would preclude the retention of water onsite.

Runoff diversion or Storage

As part of the EMWP, the feasibility of dry-weather and/or stormwater runoff diversion to the sewer, as well as the implementation of stormwater capture and use projects, will be established upon coordinating with LVMWD. Coordination efforts determine whether LVMWD has adopted water conservation objectives and recycled water policies that would support low flow diversion projects and capture and use projects.

The extent of implementation of low flow diversion projects remains limited by the treatment capacity of the receiving wastewater reclamation facilities, as well as the restrictions related to both quantity and quality of runoff allowed for diversion. The criteria for the selection of feasible low flow diversions are the:

- Proximity of storm drain and sewer lines in an urbanized environment.
- Estimated discharge of dry-weather runoff and the volume of runoff produced by the 85th percentile, 24-hour storm event at the evaluated location.
- Full discharge capacity of the adjacent sewer line. In some cases, low flow diversion projects may require the construction of a detention structure upstream of the diversion structure to retain the runoff produced from the 85th percentile, 24-hour storm event, or as appropriate. Stormwater runoff may be pumped or diverted into the sewer line outside of the hours of peak potable water usage.
- Reduction in stormwater runoff to the downstream would not negatively impact beneficial uses in the receiving waters.

Similarly, the extent of implementation of stormwater capture and use projects remains limited by the availability of land, the proximity of water demands, and the restrictions related to both quantity and quality of runoff allowed for diversion. The criteria for the selection of feasible stormwater capture and use projects are:

- Availability of land for the construction of a detention structure to retain the runoff produced from the 85th percentile, 24-hour storm event, or as appropriate;
- Estimated discharge of dry-weather runoff and the volume of runoff produced by the 85th percentile, 24-hour storm event at the evaluated location;
- Proximity of identified water demands to the identified site, including the distance of water demands from the detention structure (pump and conveyance infrastructure);

- Treatment requirements per the provisions of California Health and Safety Code Title 22;
- Reduction in stormwater runoff to the downstream that would not negatively impact beneficial uses in the receiving waters.

Quantification of retention

For each potential regional project where infiltration or low flow diversion is deemed feasible, the EWMP quantifies the volume that can be, respectively, infiltrated or diverted within the available site footprint. Typical BMP specifications for infiltration devices and storage features before diversion to sewer are assumed for the volumetric estimates. The investigation further quantifies the percentage of tributary drainage area that is mitigated by the potential regional project based on:

- Imperviousness of the tributary drainage area that is estimated using land use information from the Southern California Association of Governments (SCAG) and imperviousness information from the Multi-Resolution Land Characteristics Consortium (MRLC).
- Estimated runoff volume from the 85th percentile, 24-hour storm, as computed using the Tc calculator or other appropriate computational methods.
- The ratio of the volumetric retention capacity of the potential regional project over the estimated runoff volume from the 85th percentile, 24-hour storm, which quantifies how much tributary drainage area should be evaluated in the RAA.

Treatment Evaluation

For each potential regional project where infiltration or low flow diversion was deemed infeasible, the EWMP quantifies the volume/flowrate that can be biofiltrated or treated from pollutants of concern using industry-standard structural BMPs within its delineated footprint. Typical BMP specifications of biofiltration devices and structural BMPs are assumed for the volumetric/flowrate estimates. The investigation further quantifies the percentage of tributary drainage area that is treated by the regional project based on:

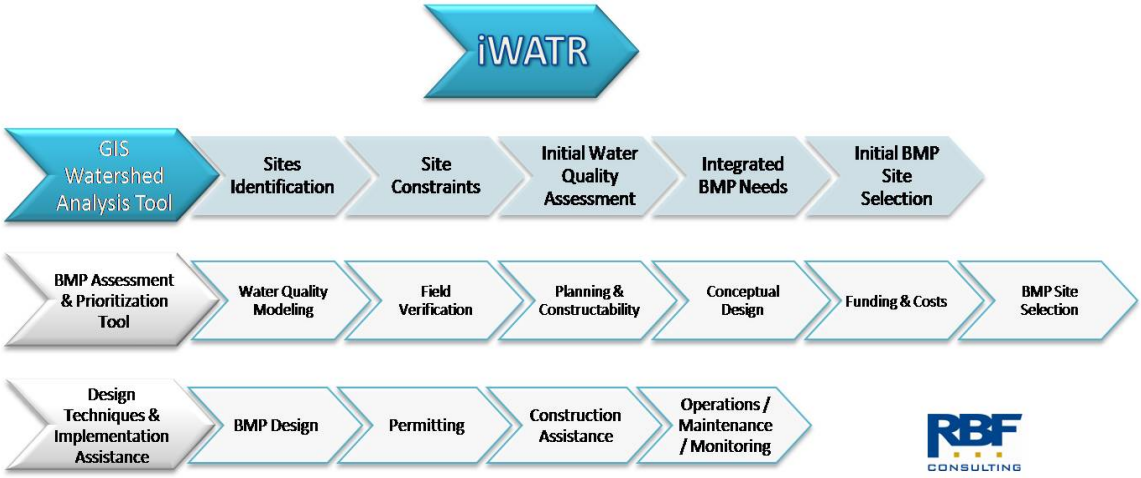
- Imperviousness of the tributary drainage area that is estimated using land use information from the Southern California Association of Governments (SCAG) and imperviousness information from the Multi-Resolution Land Characteristics Consortium (MRLC).
- Estimated runoff volume and flowrate from the 85th percentile, 24-hour storm, as computed using the Tc calculator or other appropriate computational methods.

Treatment capacities of the different potential regional facilities are used for inclusion in the RAA to determine the cost-effectiveness and priority of each.

6.2.2 Identification of Regional Projects and Initial Screening

The approach for identifying potential structural BMP site locations will be through a desktop survey and will include the development of site selection criteria using iWATR™ (Integrated Watershed Assessment Tool for Restoration) and the Watershed Management Modeling System (WMMS). iWATR™ has been developed as an approach to watershed restoration and water quality improvement that integrates identification of optimal BMP retrofit locations that are the most cost effective, constructible, maintainable, and have the highest water quality benefits addressing existing receiving water impairments. iWATR™ includes a GIS watershed analysis tool for to identify potential BMP retrofit locations; a BMP prioritization and assessment tool, which integrates water quality modeling; a constructability analysis tool; and a tool to aid in the development of BMP conceptual designs and cost estimates. The iWATR™ process is identified in Figure 6 below.

Figure 6 – iWATR™ Process



The iWATR™ tool surveys the Watershed 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 will be 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 will be particularly scrutinized 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 helps 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 focuses on sites adjacent to or near significant named streams, improved channels, and storm drains. Potential sites not directly adjacent to receiving waters or drainage facilities are deemed "close" if there appears to be sufficient existing right-of-way to hydraulically connect the site to the nearby drainage facility or receiving water with a modest capital expense. Passive regional opportunities are favored in an effort to minimize high operation and maintenance costs associated with the implementation of lift stations.
- Topography – The 2-foot contours from the 2006 07 LAR IAC dataset help evaluate whether reasonable hydraulic modifications and infrastructures are necessary, or if stormwater can gravity drain to and from the regional facility.

The steps for identification and initial screening of regional projects include:

1. **Identification of the boundary of the watershed using GIS software** – This step also includes identification of the Significant Ecological Areas (SEAs) within the watershed. It allows the search to be focused on the watershed area and on whether an identified site is within an SEA.
2. **Use of aerial imagery to identify vacant parcels –**- It also includes topographical information, which can be reviewed for identification of areas where contours showed flat to slight slopes for potential BMP placement. The topographical information also allows for a hydrology analysis, including:
    a. confirmation of watershed drainage areas and identification of drainage areas to each potential site;
    b. evaluation of gravity drainage to a potential BMP site from either the site drainage area for local sites or an adjacent receiving water for extraction or diversion of water for regional sites; and
    c. an evaluation to determine whether reasonable hydraulic modifications and infrastructure will be needed.
3. **Identification of vacant parcels that are owned by public agencies.**
4. **Selection of potential BMPs for the identified potential sites** – A list of potential BMPs for the sites will be developed based on the results from WMMS to identify optimized BMP types for each site. For each potential BMP site, specific site information will be identified and reviewed. This information will encompass:
    a. geotechnical information, including hydrologic soil group and depth to groundwater;
    b. area available for the BMP footprint;
    c. existence of a perennial source of water;
    d. existence of woody or dense vegetation;
    e. available hydraulic head; and
    f. Maintenance access.

6.2.3 Proposed Project Sites

The result of the identification of potential project sites will be used to develop a preliminary list of regional projects. This preliminary list will be prioritized based on those sites capable of retention of the (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 potential BMP location. Each of the potential regional projects will also be evaluated for multiple benefits. From this preliminary list, a list of proposed project sites is developed through analysis using the iWATR^{TM} .

6.2.4 Soils Analysis and Testing

Infiltration BMPs, when feasible, have the greatest potential for pollutant load reduction. The hydrologic soil groups identified at each site will be used to determine whether an infiltration BMP is feasible. Available depth to groundwater information will also be used to screen for possible infiltration BMPs. Soils analysis and infiltration testing will be conducted for the regional project sites that pass the feasibility analysis. The testing will be conducted based on the following approach:

- Field exploration will include drilling two temporary borings and three temporary wells to a maximum target borehole depth of 30 feet or less if groundwater or refusal is encountered, and 15 feet for wells or less if refusal is encountered. In a well test hole, one approximately 5-foot depth test interval will be isolated between the proposed BMP device invert and the groundwater table if encountered using medium grade gravel or other suitable filter material.

The team will conduct three constant- or falling-head permeability tests in each hole, and monitor the groundwater level.
- Laboratory testing will be conducted by taking undisturbed ring samples.
- The team will conduct permeability (vertical flow rate) tests if the soil is pervious.
- The team will conduct geotechnical engineering analyses and will verify the 10- foot minimum vertical separation requirement below the proposed BMP invert.

6.2.5 Environmental Study

A preliminary environmental assessment will be conducted to analyze the potential project sites relative to applicable environmental and regulatory permitting regulations. The environmental assessment will conceptually identify potential environmental constraints associated with the siting of potential BMP locations.

6.2.6 Construction Feasibility Evaluation

The feasibility of constructing the identified regional project will then be evaluated. Evaluation of the constructability of the potential BMP sites will be performed using the specific constraints of a potential BMP site, including environmental issues, traffic impacts, structural constructability, availability of hydraulic head, utility interference, vector concerns, and compatibility with adjacent land uses.

6.3 Identify Selected Watershed Control Measures

The selection of the watershed control measures will integrate the institutional controls with proposed structural project sites to formulate the initial plan for implementation and achieving compliance with the WQBELs and the RWLs in the Malibu Creek Watershed. Institutional measures will be evaluated as the first level in the BMP hierarchy as identified in Section 5.2.1. The methodology for evaluation of the institutional controls is provided below.

6.3.1 Institutional BMPs

Minimum Control Measures

The MS4 Permit provided the option for Permittees to make modification to the MCMs. MCMs will be evaluated as part of the EWMP development. MCMs may be modified or new MCMs may be developed as a part of this analysis. The following are the steps for potential modification, customization, or development of new MCMs:

- A survey identifying candidate MCMs for customization based on the Permittees' knowledge and experience will be conducted. The survey results will be used to identify MCMs that have presented challenges or have not provided useful information. It is likely that stormwater implementation staff can determine whether each MCM constitute an effective use of program resources or provides little return for the investment.
- An estimate of potential load reductions associated with each MCM. This is accomplished by determining a participation rate for the target audience and a loading factor. The participation and loading factors are multiplied to estimate effectiveness with respect to reduction in loading of a pollutant that is released to the environment.
- A comparison of investment costs versus returns in effectiveness for each MCM. The comparison may help understand an inefficient use of program resources. The overall cost should take into account the time requirements of staff and the direct costs of any materials needed over the life of implementation of the MCM.

If the effectiveness evaluation shows that a MCM is not effective, or if the costs are high compared to other MCMs that address the same water quality priorities, the implementation strategy should determine whether the measure could be modified, or if an alternative MCM may be more effective. Justification for proposing modified or alternative MCMs will be documented.

Source Controls

The potential source controls identified in Section 5.2.3.2 will be evaluated for potential pollutant load reduction and cost of implementation. If cost-effective, feasible for implementation, and a potential for significant water quality benefits, the source control will be identified for implementation as a selected watershed control measure.

6.3.2 Structural Measures

Once the institutional BMPs are identified for implementation, an initial plan for implementation and achieving compliance with the WQBELs and the RWLs in the Malibu Creek Watershed will be prepared. The measures will be integrated into the model and the RAA will be performed.

6.3.3 Identification of Additional Regional Projects

Results from the RAA will indicate whether additional control measures should be sought to meet the milestones set forth in the MS4 Permit. If deemed necessary, additional regional projects will be identified by focusing on publicly owned properties with opportunities to retrofit the current land use in multi-use features, as well as private properties with opportunities to implement a regional facility (open space, parking lot, etc.).

6.4 Project Schedules & Cost Estimates

Once the RAA has identified that compliance will be achieved with the identified watershed control measures, schedules and sequencing for each of the proposed watershed control measures will be developed that will fit into the compliance timeframes. These schedules will be based on previous experience in design and implementation of BMPs in Southern California and include sequencing and potential unforeseen circumstances that can impact schedules.

Whole life cost estimates will also be developed for each of the watershed control measures to be implemented. These costs will be developed using WERF BMP Whole Life Cost Models and the cost of implementation of similar BMPs in Southern California.

6.5 Adaptive Management

The EWMP is a dynamic and evolving process that embraces the principles of adaptive management. The MS4 Permit requires that the EWMP be updated every two years. Monitoring data obtained through implementation of the CIMP will be used to identify the effectiveness of implementation of the EWMP. The EWMP will incorporate an adaptive management process that will include:

- incorporation of changes in regulations, including WQBELs, RWLs, and TMDL requirements;
- updates of water quality priorities based on monitoring data provided by the CIMP and potentially changes in regulations;
- modification of watershed control measures;
- modification of the implementation schedule; and
- modifications based on regulatory agency input.

7 Reasonable Assurance Analysis

7.1 Objectives of the Reasonable Assurance Analysis

The RAA will demonstrate that the water quality requirements will be met in the Malibu Creek Watershed. The BMP implementation plan for the watershed will be based on the model-recommended BMP scenario(s) obtained from the RAA. The RAA will be conducted in a manner consistent with LARWQCB Final RAA Guidance (LARWQCB, 2014) and the approach described in Section 7.2, as well as the multiple efforts performed throughout the development and implementation of the EWMP. Recommendations will be based on existing and planned watershed control measures, known sources of pollutants within the Malibu Creek Watershed, and additional information gathered from scientifically reviewed studies.

7.2 Overview of the Selected Approach

The philosophy behind the RAA is to build upon existing information in the Malibu Creek Watershed and customize the existing pollutant loading modeling process to best represent the watershed characteristics. The model will simulate a critical storm year to demonstrate that the proposed BMPs will achieve compliance with the TMDLs and WQBELs. The approach encompasses formulation of an optimized BMP implementation plan identified in collaboration with the stakeholders.

The RAA will use WMMS, developed by the Los Angeles County Department of Public Works (LACDPW), as the basis for the pollutant-loading model. The pollutant loading model component, or Loading Simulation Program in C++ (LSPC) model, has been pre-calibrated for typical pollutants generated by identified land use categories. The RAA will customize the LSPC model for the Malibu Creek Watershed to generate a baseline for sediment, nutrients, and bacterial indicators (i.e., pollutants of concern). Trash is evaluated analytically outside of the LSPC model to allow the evaluation of compliance based on full capture devices and other approaches specific to trash. Customization of the LSPC model will consist of incorporating existing structural control BMPs, existing programmatic measures, existing major hydrologic features such as Malibou Lake, and sources of pollutants that are specific to the Malibu Creek Watershed. A calibration process for the pollutants of concern is performed to ensure that the modeling results are;

- consistent with the higher priority areas identified during the Water Quality Priorities evaluation; and
- linked to specific sources of pollutants identified in the several TMDL Source Assessment Reports, notably in the Malibu Creek & Lagoon Total Maximum Daily Load (TMDL) for Sedimentation and Nutrients to Address Benthic Community Impairments Source Assessment Report (LARWQCB, 2013) and other TMDL-related documents.

Upon validation of the baseline LSPC model for Malibu Creek, the cost-effectiveness of various BMP implementation scenarios are evaluated on a watershed-wide scale using both the Nonlinearity-Interval Mapping Scheme (NIMS) spreadsheet model developed as part of the WMMS package and iWATR™. The regional optimization process will identify the timely reductions that need to occur in each combined hydrologic catchment to achieve compliance with active TMDL milestones.

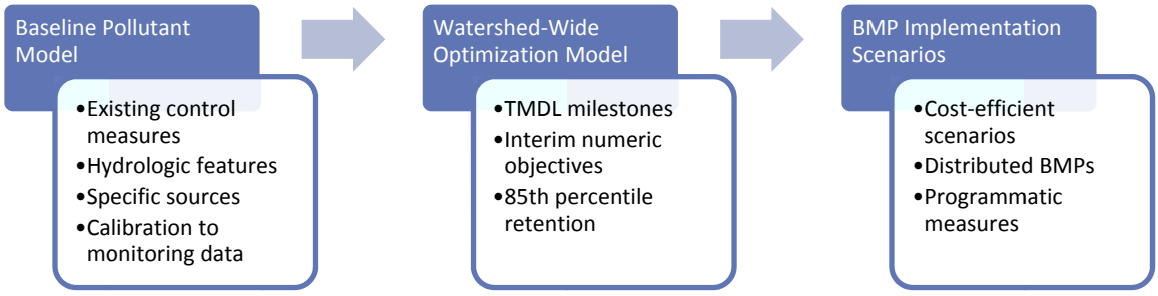
Using the results from the watershed-wide optimization process, iWATR™ will identify an optimal configuration of distributed BMPs within both urban and non-urban areas that fit each BMP implementation scenario. Preferred scenarios will be tailored based on the stakeholders' preferences. Distributed BMPs will include structural control BMPs, programmatic measures set forth in the TMDLs,

and additional source control BMPs to reduce pollutant loadings from identified contributors. The efficiency of the diverse control measures are referenced to peer-reviewed publications.

Finally, the framework of the RAA is developed based on the principles of adaptive management. Adaptive management principles identify that as additional relevant information is obtained a project or plan can be modified to reflect this new information so that the project or plan is optimized based on the most up to date information. The most accurate and up to date information is needed for the RAA to ensure compliance and so the framework for the RAA integrates adaptive management principles to ensure that the RAA is accurate and integrates the most up to date information. As monitoring data is collected or recommendations from peer-reviewed publications are gathered, each step of the RAA approach allows for refinement of the results.

The process of the RAA approach is conceptualized in Figure 7.

Figure 7 – Simplified process of the RAA Approach



7.3 Steps to Conduct Reasonable Assurance Analysis

7.3.1 Baseline Pollutant Model

The RAA establishes a baseline that is consistent with the findings of the TMDLs and relevant water quality studies and incorporates additional information obtained. The LSPC model is calibrated based on existing monitoring data and information on the sources of pollutants specific to the Malibu Creek Watershed. The existing LSPC model, as developed by LACDPW as part of WMMS, is pre-calibrated for the pollutants of concern that are typically discharged from specific land use types. During the implementation of the EWMP, the LSPC model may be updated as additional monitoring data becomes available.

7.3.1.1 Characteristics of specific sources in Malibu Creek Watershed

As a part of implementing the RAA, the LSPC model will be updated to include sources of pollutants that are specific to the Malibu Creek Watershed. These include the effects of Malibou Lake and other retention systems, discharges from the Tapia Water Reclamation Facility, horse ranch facilities, contributions by migratory birds of the Pacific Flyway, and other significant sources identified during the development of the Coordinated Integrated Monitoring Plan (CIMP) and the EWMP Work Plan.

- Several lakes, notably Malibou Lake and flood control facilities, impact the hydrology and the associated pollutant transport within the reaches of Malibu Creek Watershed. The information

of interest for lakes in the RAA will be the inflow and outflow loading. Where appropriate, to estimate the loading from the lake, the effects will be modeled in the LSPC model and calibrated, to the extent feasible, using the limited flow data from the seven flow gages within the watershed.

- The Tapia Water Reclamation Facility (Tapia WRF) recycles on average 9.5 million gallons per day (MGD) of wastewater and maintains a minimum discharge of 2.5 cubic-feet per second (cfs) in Malibu Creek. Sixty percent of the treated water is distributed for irrigation purposes, and 40 percent is discharged directly into Malibu Creek. The WMMS technical documentation identifies that potential contributions of bacteria and nutrients to the receiving waters may be associated with the discharges. The RAA will characterize this point source and include it in the model.
- Horse ranches and facilities are identified in the Malibu Creek & Lagoon TMDL for Sedimentation and Nutrients to Address Benthic Community Impairments Source Assessment Report (LARWQCB, 2013) as a potential source for impairments in bacterial indicators. The Draft Staff Report of the Malibu Creek & Lagoon TMDL for Bacteria Indicator Density does not identify horse ranches as a potential source for future investigation. However, the Southern California Coastal Water Research Project's (SCCWRP) monitoring data indicate that median fecal coliform concentrations located downstream of horse facilities are four to six times greater than the event mean concentrations associated with agricultural land uses used in the pre-calibrated LSPC model. As part of the RAA, a desktop survey of the watershed will be performed to identify those parcels that contain horse facilities. Where appropriate, horse facilities and associated contributions in pollutants will be integrated into the LSPC model.
- Migratory birds from the Pacific Flyway – As identified in the CIMP, the Bacteria TMDL requires that State Parks conduct a study of bacteria loadings from birds in the Malibu Lagoon. If available, the findings of the study, along with additional information from other studies, may help characterize the pollutant loadings from bird droppings in the watershed.
- Onsite wastewater disposal systems – The Malibu Lagoon Sediment TMDL Source Assessment Report (LARWQCB, 2013) identifies onsite wastewater disposal systems as one non-point source of nutrients to the lagoon. Based on data availability, the RAA will work with the stakeholders to inventory the onsite wastewater disposal systems and evaluate their contribution in nutrient loadings to the watershed using the LSPC model. The LSPC model is limited in its capabilities to simulate the dynamics and transport of pollutants in interflow and groundwater. As necessary, estimates of the loading from these sources will be calculated outside of the model.
- Other sources may be identified as the CIMP, the EWMP Work Plan, and technical studies on the Malibu Creek Watershed are developed and implemented. Where appropriate, these potential point or non-point sources will be evaluated and integrated into the LSPC model to the maximum extent possible.

7.3.2 Calibration process

The LSPC model will be calibrated and validated using available monitoring data to ensure that the sources of pollutants that are specific to Malibu Creek, as identified in Section 3.1, are well characterized by the model. The calibration/validation process will be applied to flow, sediment, nutrients, and bacterial indictor using both statistical and graphical methods. Because of the limited flow data available within the watershed, as constituted by the seven flow gages, the hydrologic calibration and validation for flow will be performed to the extent practicable.

The calibration and validation process for the water quality constituents of concern will be consistent with the model performance criteria defined by Donigian for HSPF-based pollutant loading models (2000). Statistical tests will be performed to ensure that modeled pollutant concentrations are within

the acceptable range of observed pollutant concentrations, on both a daily and monthly basis. In addition, based on the availability of water quality monitoring data, the process will compare the modeled pollutant concentrations to those monitored for a minimum of three well-represented storm events using graphical comparisons and/or statistical tests, as appropriate. The event-based calibration and validation will help the stakeholders accurately evaluate pollutant loadings and reductions during wet-weather conditions.

The Las Virgenes Municipal Water District (LVMWD) "Water Quality in the Malibu Creek Watershed, 1971 – 2010" Report (LVMWD, 2012) identifies that monitoring data was recorded for sediments, nutrients, and bacterial indicators at numerous monitoring stations throughout the Malibu Creek Watershed over the 2000-2010 period. Coordination with the LVMWD will take place to acquire the validated water quality monitoring data for the purposes of the calibration and validation process. The LSPC model will be calibrated and validated on both temporal and spatial bases at a minimum of three monitoring stations over the 2000 – 2010 period or longer based on data availability. The number of monitoring stations for inclusion may be increased if both the quality and definition of available monitoring data will improve the accuracy of the LSPC model.

7.3.3 Watershed-Wide Optimization Model & BMP Implementation Scenarios

An approach to addressing USEPA TMDLs and 303(d) listed impairments will be established. The efforts will identify interim numeric milestones to address TMDL and 303(d) listed impairments in a timely and cost-efficient manner. The interim numeric milestones will be translated into modeling terms to serve as the incremental goals that the modeling efforts will focus on achieving from a watershed-wide standpoint.

The watershed-wide optimization process will identify the reductions that need to occur in each combined hydrologic catchment to achieve compliance with the interim numeric milestones.

The watershed-wide optimization process will identify, for the entire watershed, the level of treatment that should be provided in each catchment of the LSPC model for a cost-effective solution. Using iWATR, BMP systems will be distributed throughout each catchment to achieve the desired level of treatment. The list of distributed BMP systems will be consistent with the recommendations of the EWMP Work Plan. Distributed BMP systems will be selected based on the impairments in receiving waters, the pollutants of concern from tributary land uses, the presence of a compliance monitoring station downstream, and the cost-effectiveness of a specific BMP type at reducing pollutant concentrations.

7.3.3.1 Prioritization of BMPs

The cost-effectiveness of each potential regional project and prioritization of the projects based on the results of the RAA will be identified in the EWMP. The prioritization process will be based on the results of iWATR. Because of the potential sources of impairments within the watershed, potential regional projects that retain the 85th percentile, 24-hour storm volume or that treat only a percentage of the volume will both be evaluated in the RAA. The RAA findings will help determine whether source control BMPs, or programmatic measures, are more efficient than regional projects at achieving the milestones set forth in the MS4 Permit.

Based on the results of the RAA, the EWMP will include rankings of potential regional projects. The ranking process is based on the applied methodology described in the Structural BMP Prioritization Methodology Manual (LACDPW, 2006). Ranking will include three comprehensive factors, including:

- Constructability of the potential regional projects based on specific site constraints, including environmental issues, traffic impacts, and structural constructability.

- Lifecycle cost of the potential regional projects based on capital costs, annual operation and maintenance costs, and, if the parcel of land is not publicly owned, land acquisition costs. The objective is to evaluate the long-term operation of implemented BMPs, and overall, the nominal duration of the TMDLs.
- Water quality benefits. All potential regional projects are integrated into the LSPC model to identify an optimal scenario that, if feasible, meets the milestones by the MS4 Permit and the TMDLs in the watershed. The water quality benefits of each regional project are estimated in terms of annual load reduction for the pollutant(s) of concern, and the potential of the project to have multiple benefits.

7.3.3.2 BMP Implementation Types

Reductions in pollutant loadings will be evaluated using the updated LSPC model through the implementation of structural control BMPs, programmatic measures, and non-traditional source control BMPs. The updated LSPC model will be used to predict the reductions in pollutant loadings based on existing historical meteorological data and the assumption that future meteorological and hydrologic patterns will be similar to historical observations. The pre-calibrated LSPC model includes hourly meteorological data spanning from October 1993 through September 2006 model. Based on meteorological data availability, the period may be extended for the RAA to 2010 or later. The types of BMPs that may be considered for implementation include:

- Structural control BMPs. Reductions expected from structural control BMPs will be established based on the most recent ASCE/WERF (Water Environmental Research Foundation) International BMP Database, BMP performance data from the Center for Watershed Protection (CWP), and additional scientifically reviewed data.
- As part of the TMDL Provisions and the EWMP requirements, the stakeholders are required to implement programmatic measures in the EWMP. The RAA will evaluate the efficiency of each programmatic measure (IC/ID program; public information and participation program; industrial/commercial facilities program; planning & development program; construction program) and integrate them into the LSPC model. The benefits from programmatic measures will be accounted for based on the availability of literature values, and they will be revised as specific monitoring data becomes available in the watershed.
- Non-traditional source control BMPs that specifically address the impairments caused by specific sources of impairments within the Malibu Creek Watershed.

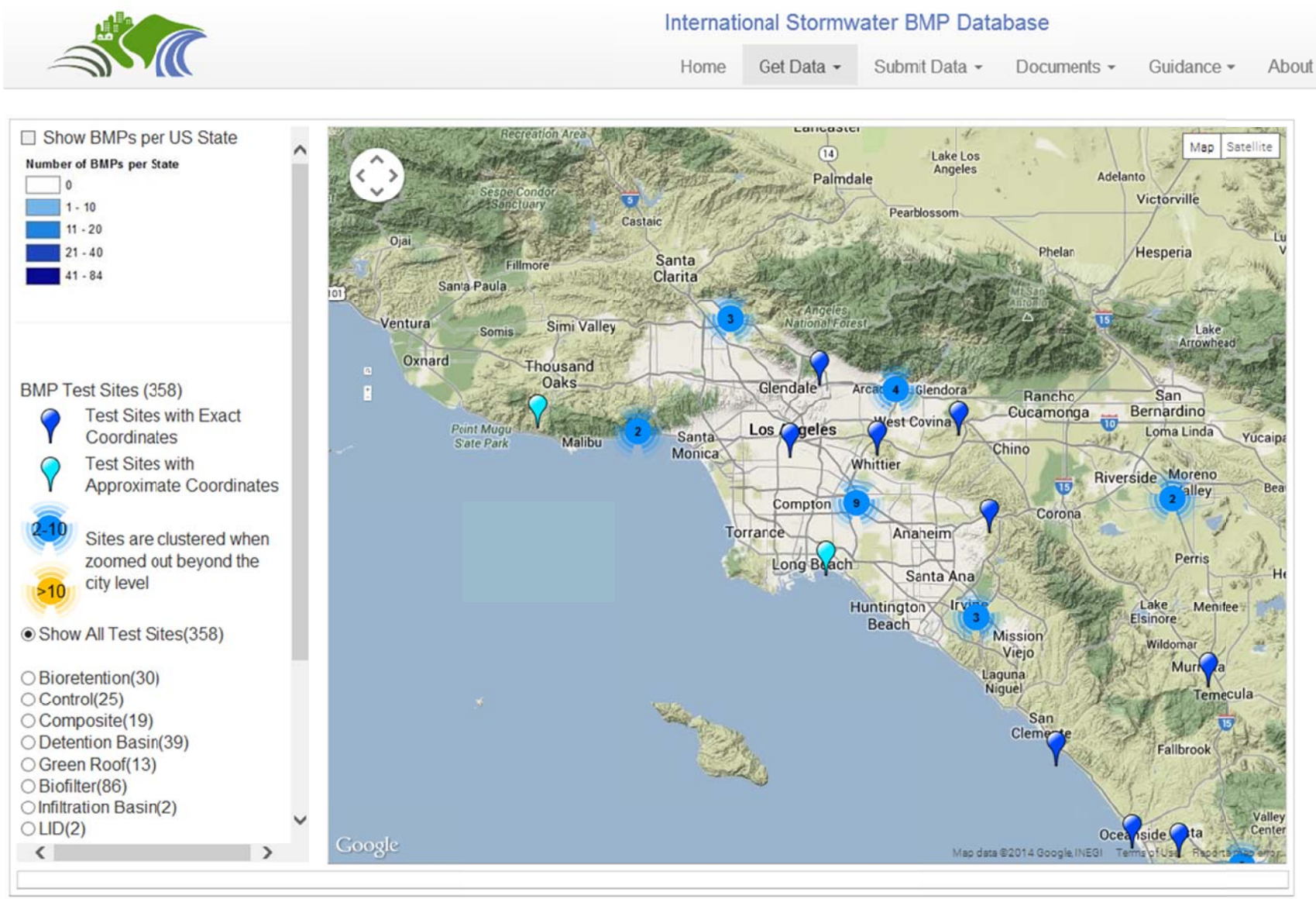
7.3.3.3 Performance of Structural and Nonstructural Measures

This section presents the results of a statistical analysis of available BMP performance data relevant to Southern California. The goal was to review and summarize BMP performance data for reducing constituents of concern from stormwater and non-stormwater flows

Data for the BMP performance analysis was derived from the International BMP Database, the most extensive collection of BMP performance data within the U.S. The International BMP Database is sponsored by the USEPA, WERF, the American Society of Civil Engineers (ASCE)/Environmental and Water Resources Institute (EWRI), the American Public Works Association (APWA), and the Federal Highway Administration (FHWA).

As of February 2014, the available sites with monitoring data in Southern California are displayed in Figure 7. Forty-three sites have data within the mapped area in Figure 8. Within the 43 sites, 57 BMPs were sampled. Many of the BMPs, particularly biofiltration swales, are owned and operated by Caltrans and therefore implemented on roadways, maintenance stations, and park and ride facilities.

Figure 8 – Available Monitoring Data in Southern California



Analysis of BMP data in the International BMP database provides data on a variety of structural BMP types, including vegetated strips, swales, wetlands, detention basins, media filters and manufactured proprietary BMP devices. The International BMP Database has monitoring data for hundreds of constituents. The data presented below in Table 17 is for the constituents of concern within the watershed, including bacteria, nutrients and sediment. The data is based on percent reduction in the concentrations from the influent to the effluent within the BMPs.

BMP performance for individual constituents varied among the sites. In general, all BMPs performed well for total suspended solids (TSS). Nitrate-nitrogen was reduced by most BMPs, except media filters, which convert TKN to NO3 during the treatment process. There is generally an overall reduction in nitrogen for a media filter. Table 12 shows influent and effluent concentrations for selected BMPs and does not account for infiltration occurring and the subsequent load reduction.

Table 17 – Expected Effluent Concentrations (Based on 30 Sites)

BMP Type	Total Suspended Solids, mg/L			Nitrogen, Nitrate (NO3) as N, mg/L			Total Kjeldahl Nitrogen (TKN), mg/L		
	Influent	Effluent	% Removal	Influent	Effluent	% Removal	Influent	Effluent	% Removal
MF – Media Filter	69.21	37.75	45.46%	0.69	0.92	-32.19%	2.11	1.94	7.99%
DB – Detention Basin	130.11	48.57	62.67%	1.14	0.98	14.01%	2.24	1.90	15.21%
GS – Bioswale	88.45	46.11	47.87%	1.30	1.24	4.62%	3.05	2.06	32.37%
GS – Biofilter	119.66	43.90	63.31%	1.88	0.68	63.59%	3.14	1.89	39.73%
MD – Manufactured Device	75.96	43.94	42.16%	1.44	1.13	21.82%	2.67	2.50	6.47%
RP – Retention Pond	202.92	11.06	94.55%	1.54	1.05	32.31%	2.93	2.19	25.18%

BMP Type	Fecal Coliform, MPD/100mL			Lead (dissolved), mg/L		
	Influent	Effluent	% Removal	Influent	Effluent	% Removal
MF – Media Filter	6637	1958	70.5%	1.0	1.0	0.0%
DB – Detention Basin	3312	5876	-77.4%	0.8	0.6	25.0%
GS – Bioswale	8662	10583	-22.2%	1.4	1.1	21.0%
GS – Biofilter	8304	1852	77.7%	0.6	0.3	50.0%
MD – Manufactured Device	9550	18496	-93.7%	1.5	1.2	20.0%
RP – Retention Pond	12060	76	99.47%	0.8	0.5	37.5%

7.3.3.4 Summary

Several cost-effective scenarios will be selected through the process and will be compared to budgeting and programmatic constraints that the stakeholders face. The Co-permittees and other watershed stakeholders will work together to identify and select appropriate BMPs.

The RAA will identify a preferred BMP implementation sequence/schedule/timeline based on the findings from the LSPC model and from the BMP scenario optimization process from the iWATR™ BMP Prioritization & Assessment Tool. The preferred scenario will be selected based on the effectiveness in load reduction, cost-effectiveness, as well as programmatic and legal constraints set forth by the stakeholders. The implementation plan will ensure that all EWMP plan objectives are incorporated.

7.3.4 Improvements of the Model Results

The framework of the RAA was designed based on adaptive management principles. It provides flexibility to allow the stakeholders to incorporate new information, refine pollutant loadings, apply reductions from the LSPC model, and revise the optimal mitigation scenario for the watershed as necessary. Revisions to the model scenarios may be triggered by:

- Additional monitoring data collected through the implementation of the CIMP. Stakeholders are currently in the process of developing and implementing the CIMP. Findings will help (1) evaluate the progress towards meeting the TMDL milestones; and (2) determine the effectiveness of specific control measures or programmatic measures.
- Additional recommendations from scientific studies and other peer-reviewed information. For example, scientific studies may provide additional guidance on how to evaluate specific sources of pollutants throughout the watershed.

8 EWMP Development

Using the information and approach identified in this document, a draft EWMP will be developed. Development of the EWMP will include collaboration among the Co-permittees, other watershed stakeholders, and the public to develop an EWMP that will include:

- Water quality priorities;
- Proposed implementation plan inclusive of the proposed watershed control measures and the reasonable assurance analysis that demonstrates the proposed measures will attain Numeric Goals (WQBELs and RWLs);
- Project schedules for implementing the watershed control measures;
- Costs estimates for implementing the watershed control measures; and
- Adaptive management process.

The implementation schedule for development of the EWMP includes interim milestones and deliverables that are presented in Table 18.

Table 18 – EWMP Interim Milestones and Deliverables

EWMP Milestone	Schedule
Draft CIMP Tech Memo: Outfall and Receiving Water Monitoring Approach	November 2013
Draft Tech Memo: Identification of Water Quality Priorities	December 2013
Draft Tech Memo: Summary of Existing Control Measures	December 2013
Draft Tech Memo: Reasonable Assurance Analysis Approach	January 2014
Draft CIMP Tech Memo: Monitoring Site Selection	February 2014
Draft CIMP Tech Memo: New Development/Re-Development Effectiveness Tracking	March 2014
Draft Tech Memo: Summary of Potential Control Measures	March 2014
Draft EWMP Work Plan	April 2014
Draft CIMP	April 2014
Public Workshop #1	May 2014
Final EWMP Work Plan	June 2014
Final CIMP	June 2014
Draft Tech Memo: Approach to addressing USEPA TMDLs, 303(d), and other RWL	August 2014
Draft Tech Memo: List of Regional Projects and Initial Screening	September 2014
Draft Tech Memo: ID Selected Control Measures and RAA (Inclusive of proposed interim pollutant load reduction milestones)	December 2014
Draft Tech Memo: Project Schedules and Cost Estimates	February 2015
Draft EWMP	April 2015
Public Workshop #2	May 2015
Draft Final EWMP	June 2015
Final EWMP based on LARWQCB Comments	3 months after receiving comments

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Attachment 1

Los Angeles County Flood Control District

Background Information

Los Angeles Flood Control District Background Information

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

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

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

(Permit, Part II.F**,** p. 18.)

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

In some instances, in recognition of the increased efficiency of implementing certain programs regionally, the LACFCD has committed to responsibilities above and beyond its obligations under the 2012 Permit. For example, although under the 2012 Permit the Public Information and Participation

Program is a responsibility of each Permittee, the LACFCD is committed to implementing certain regional elements of the PIPP on behalf of all Permittees at no cost to the Permittees. These regional elements include:

- Maintaining a countywide hotline (888-CLEAN-LA) and website (www.888cleanla.com) for public reporting and general stormwater management information at an estimated annual cost of $250,000. Each Permittee can utilize this hotline and website for public reporting within its jurisdiction.
- Broadcasting public service announcements and conducting regional advertising campaigns at an estimated annual cost of $750,000.
- Facilitating the dissemination of public education and activity specific-stormwater pollution prevention materials at an estimated annual cost of $100,000.
- Maintaining a stormwater website at an estimated annual cost of $10,000.

The LACFCD will implement these elements on behalf of all Permittees starting July 2015 and through the Permit term. With the LACFCD handling these elements regionally, Permittees can better focus on implementing local or watershed-specific programs, including student education and community events, to fully satisfy the PIPP requirements of the 2012 Permit.

Similarly, although water quality monitoring is a responsibility of each Permittee under the 2012 Permit, the LACFCD is committed to implement certain regional elements of the monitoring program. Specifically, the LACFCD will continue to conduct monitoring at the seven existing mass emissions stations required under the previous Permit. The LACFCD will also participate in the Southern California Stormwater Monitoring Coalition's Regional Bioassessment Program on behalf of all Permittees. By taking on these additional responsibilities, the LACFCD wishes to increase the efficiency and effectiveness of these programs.

Figure A-1 Los Angeles County Flood Control District Service Area

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