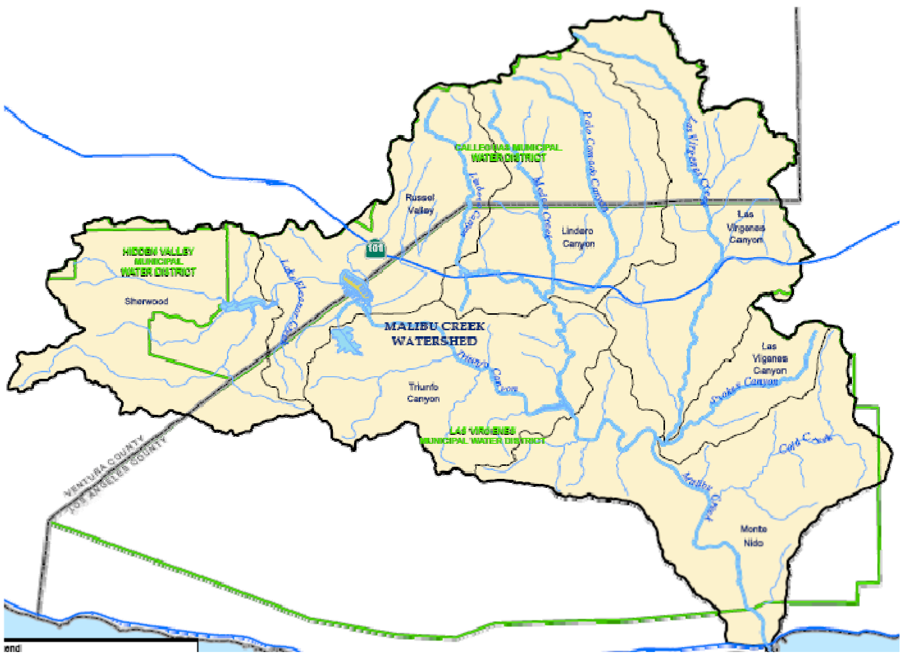
Integrated Total Maximum Daily Load Implementation Plan for the Malibu Creek Watershed

February 27, 2007



Prepared for:

Los Angeles County Department of Public Works

Prepared by:

CDM
18581 Teller Avenue, Suite 200
Irvine, California 92612

Prepared with support from: Geosyntec Consultants, Integrated Water Resources, Inc., E2 Inc., Bonterra, and Map Vision Technologies Inc.

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Executive Summary

ES.1 Introduction

This Integrated Total Maximum Daily Load Implementation Plan (TMDLIP) for the Malibu Creek Watershed (MCW) has been prepared in response to Resolution No. 2004-019R of the California Regional Water Quality Control Board—Los Angeles Region (Regional Board) amending the Water Quality Control Plan for the Los Angeles Region (Basin Plan) to incorporate Implementation Provisions for the Region's Bacteria Objectives and to incorporate a Total Maximum Daily Load (TMDL) for Bacteria for Malibu Creek and Lagoon.

For the areas lying within the Malibu Creek Watershed, Los Angeles and Ventura Counties, Caltrans, and the Cities of Agoura Hills, Calabasas, Hidden Hills, Malibu, Thousand Oaks, and Westlake Village have jointly developed this Implementation Plan to meet the requirements of the TMDL. An integrated approach to target activities with multi-pollutant benefits was used during the development of this Implementation Plan in anticipation of future TMDLs for additional pollutants. This document will be the primary guiding reference for the implementation of activities necessary to meet this and future TMDL objectives.

ES.2 TMDL Summary

The Clean Water Act of 1972 (CWA), enacted into the U.S. Code, required States to develop a list, named the 303(d) List after the relevant section of the CWA, of impaired waters and name the pollutants for which they are impaired. For each impaired waterbody, States must then establish a watershed based, pollutant-specific TMDL for each pollutant on the list that is determined to be necessary to bring each impaired waterbody into compliance with the water quality standards necessary for achieving designated beneficial uses of the waterbody.

In 2003, EPA adopted a Bacteria TMDL for Malibu Creek to meet the deadline from a Consent Decree based on the impairments identified in prior 303(d) lists (2002, 1998). The impairments continue to be included in the recently adopted (October, 2006) updated 303(d) list. Since that time, the Regional Board has developed a revised version, which the Board adopted in December 2004 through Resolution 2004-019R. This resolution detailed an amendment to the Los Angeles Regional Water Quality Control Plan to incorporate the TMDL for Bacteria in Malibu Creek. The amendment presents a brief background on the history of the bacteria issues in Malibu Creek, sets target limits, and addresses an implementation plan. The Staff Report and appendices detail the TMDL development activities. The TMDL was subsequently approved by the State Water Resources Control Board (SWRCB) and EPA Region 9 and became effective January 2006, thereby superseding the 2003 EPA TMDL. Both Los Angeles and Ventura Counties along with the other affected cities have developed this Implementation Plan for this TMDL.

The TMDL addresses water quality impairments for bacteria in the Malibu Creek Watershed. The TMDL is consistent with the Santa Monica Bay Beaches Bacteria TMDL, which was approved by the United States Environmental Protection Agency (EPA) in June 2003. The Santa Monica Bay Beaches TMDL expressed the Waste Load Allocation for bacteria at Santa Monica Bay Beaches in terms of the number of days that the single sample bacteria water quality objectives in the Basin Plan may be exceeded. The Santa Monica Bay Beaches TMDL applies to Surfrider Beach, which is located at the mouth of the Malibu Creek Watershed. In terms of the number of days that the single sample bacteria limit has historically been exceeded, Surfrider ranks among the most impaired beaches in the Bay. This TMDL addresses the bacteria sources from Malibu Creek and Lagoon, but does not address other coastal sources that may impact the impairment at Surfrider Beach.

ES.2.1 General Approach

First and foremost, the objective is to develop an integrated plan that results in the improvement of water quality to a level such that the waters in Malibu Creek and the Lagoon meet or are below the established water quality objectives and Resolution No. 2004-019R. In addition, recognizing that bacteria is not the sole pollutant of concern, this Implementation Plan addresses multiple pollutants for the Malibu Creek Watershed. An integrated water resources approach has been applied in the development of this TMDLIP, providing a range of multi-beneficial use programs and solutions. An outcome of this integrated approach is a plan that will assist in meeting the requirements of future TMDLs issued by the Regional Board for the Malibu Creek Watershed.

The final objective of the Implementation Plan is to provide an adaptive and iterative framework for implementation. Because source prioritization efforts have not yielded conclusive source tracking results, and because technologies, particularly for bacteria treatment are developing, it is recognized that both the objectives of the TMDL and mitigation strategies may require revision and re-examination. This recognition is incorporated in the scheduling and phasing of activities within the Implementation Plan.

Much of the policies, procedures, and recommendations contained in this Implementation Plan are based on assertions, use designations, and objectives set forth in the June 13, 1994, Water Quality Control Plan, Los Angeles Region: Basin Plan for the Coastal Watershed of Los Angeles and Ventura County ("Basin Plan"). A number of the assertions, use designations and objectives contained in the Basin Plan may not accurately reflect current information regarding water quality in the Los Angeles Basin. Attempts to modify and update the Basin Plan so as to reflect current conditions may necessarily result in changes to this Implementation Plan and the TMDL as a whole.

ES.2.2 TMDL Compliance Monitoring

For purposes of measuring and monitoring compliance, responsible jurisdictions and agencies jointly submitted the Malibu Creek and Lagoon Bacteria TMDL Compliance Monitoring Plan to the Regional Board, on May 24, 2006. The compliance monitoring plan specifies agreed upon sampling stations including: those identified in the TMDL staff report, one sample from each of the 18 subwatersheds, and additional samples in any areas where REC-1 uses are known to occur. These stations will serve as compliance points for the TMDL. The sampling plan also lists the sampling parameters, methods of measuring flow, and sampling frequency. Responsible agencies must conduct daily or systematic weekly sampling at each compliance point. As weekly sampling is selected for all sampling locations, the days of allowable exceedance for single sample limits will be scaled accordingly.

- Summer Dry-weather (Apr 1 - Oct 31) – 0 daily exceedance days, 0 weekly exceedance days
- Winter Dry-weather (Nov 1 – Mar 31) – 3 daily exceedance days, 1 weekly exceedance days
- Wet-Weather (All Year) - 17 daily exceedance days, 3 weekly exceedance days

The weekly sampling results will be assigned to the remaining days of the week in order to calculate the daily rolling 30-day geometric mean.

ES.2.3 TMDL Compliance Schedule

The TMDL document identifies a number of critical dates for TMDL compliance, as shown in Table ES-1. The TMDL identifies dates for summer dry-weather compliance (3 years from the TMDL effective date), and winter dry- and wet-weather compliance (6 and 10 years, respectively, from the effective TMDL date). The TMDL allows for an extension of the dry-weather and wet-weather compliance dates if certain criteria are met:

- The TMDLIP must include a description of local ordinances necessary to implement the dry-weather plan to be eligible for an extension of the dry-weather compliance date.
- The TMDLIP must follow and include a description of the integrated water resources approach to be implemented to be eligible for an extension of the wet-weather compliance date.

Given the proposed integrated, multi-benefit, multi-pollutant approach of this TMDLIP and given description of local ordinances necessary to implement the TMDLIP, all which are already in place, the extended compliance dates are the targeted deadlines for this TMDLIP.

This TMDL presently includes one reopener, scheduled for January 2009. At that time, only very limited, short-term information and data will be available to assess the efficacy of the current numeric targets, load allocations, and pathogen indicators. In order to ensure that this TMDL adequately reflects and incorporates the information gained from ongoing studies, the Regional Board should consider preparing and implementing a number of additional and subsequent re-openers into this TMDL.

Table ES-1
TMDL Compliance Dates

Milestone	Date without extensions	Extended Date*
TMDL Effective Date	January 24, 2006	
Comply with Summer Dry-Weather Exceedance Days	January 24, 2009	January 24, 2012
Comply with Winter Dry-Weather Exceedance Days	January 24, 2012	
Comply with Wet-Weather Exceedance Days	January 24, 2016	July 15, 2021

*Extended dates apply if the integrated planning approach is approved and the dry-weather extension is approved.

ES.3 Summary of Technical Analysis

Technical analyses were performed to assess conditions in the MCW to support identification of BMPs to address water quality impairments. Existing watershed conditions, such as topography, drainage, geology, and aquifer characteristics were assessed in order to design optimal watershed-wide BMPs to achieve compliance with TMDL as well as NPDES and AB 885 requirements. Memorandums describing the technical analysis performed as part of this TMDLIP development can be found in Appendix B. Since the development of the initial analysis presented in these Technical Memorandums, additional refinements have been made. The final results and conclusion of the technical analysis are provided below.

Opportunities for beneficial reuse of water requires an understanding of water supply, water use, water reuse, and the integration of water quality improvement strategies associated with land use such as recreational and open space uses. The following conclusions were developed based on existing watershed characteristics, coupled with knowledge of beneficial water re-use opportunities in the region:

- Several recreational sites with potential multi-beneficial use were identified in the MCW and further assessed for appropriateness of various types of BMPs such as natural treatment systems, infiltration areas, or other structural BMPs that may be combined with enhanced recreational or education opportunities.

- Opportunities exist for on-site infiltration, particularly in the neighborhoods of the upper watershed where local on-site infiltration BMPs could be effective for capturing runoff from small or low intensity intermediate sized storms.

- Local (on-site) reuse opportunities for the MCW include irrigation use of roof runoff captured via cisterns and on-site runoff infiltration.

- Although local capture systems such as a cistern option will not manage a large enough quantity of runoff to eliminate the need for other runoff management options, it is included in the plan due to its positive effect from a water conservation standpoint, and its ability to eliminate low flow runoff from very small storm events.

- Larger capture systems from multifamily, commercial/industrial and/or public properties can offer more substantial benefits.
- The largest single area for reuse of stormwater runoff is irrigation. Landscape irrigation is prevalent at golf courses, schools, parks and transportation or highway corridors. Reuse of stormwater for this purpose requires capture, storage, treatment and distribution.
- Limitations on regional reuse scenarios emphasize the importance of distributed, watershed wide, local small-scale stormwater reuse and infiltration projects as the most suitable management tool for reducing storm runoff.

Existing Monitoring and Water Quality Information

Water quality monitoring in the MCW is conducted by several municipalities and by volunteers through non-profit organizations. Several MCW agencies have monitoring programs which analyze for bacteria indicators, the primary constituents of concern for the MCW Bacteria TMDL Implementation Plan. Data sets analyzed in this TMDLIP were from available water quality monitoring programs through 2006, which encompass waterbodies including lower Malibu Creek, its tributaries, and inland lakes. Most of these programs are ongoing and will continue to provide expanded information in the future.

Water quality data and studies have been reviewed to identify specific areas and pollutants of concern; this information was then used in the identification of appropriate non-structural and structural BMPs within the watershed.

To address water quality impairments and concerns within the MCW, BMPs are identified within this TMDLIP for incorporation into existing water quality control programs to achieve pollution reduction goals.

The MCW area is broken into 18 subwatersheds. To determine where BMPs will provide the greatest benefits and to assist in developing a schedule for BMP implementation, water quality areas of concern (AOCs) have been identified and prioritized. The prioritization method addresses AOCs for these 18 subwatersheds as a whole. It should be noted that while this is a TMDLIP for bacteria, in following an integrated water resources approach, numerous pollutants were evaluated and included in the prioritization. The resulting prioritization by subwatershed is provided in Figure ES-1.

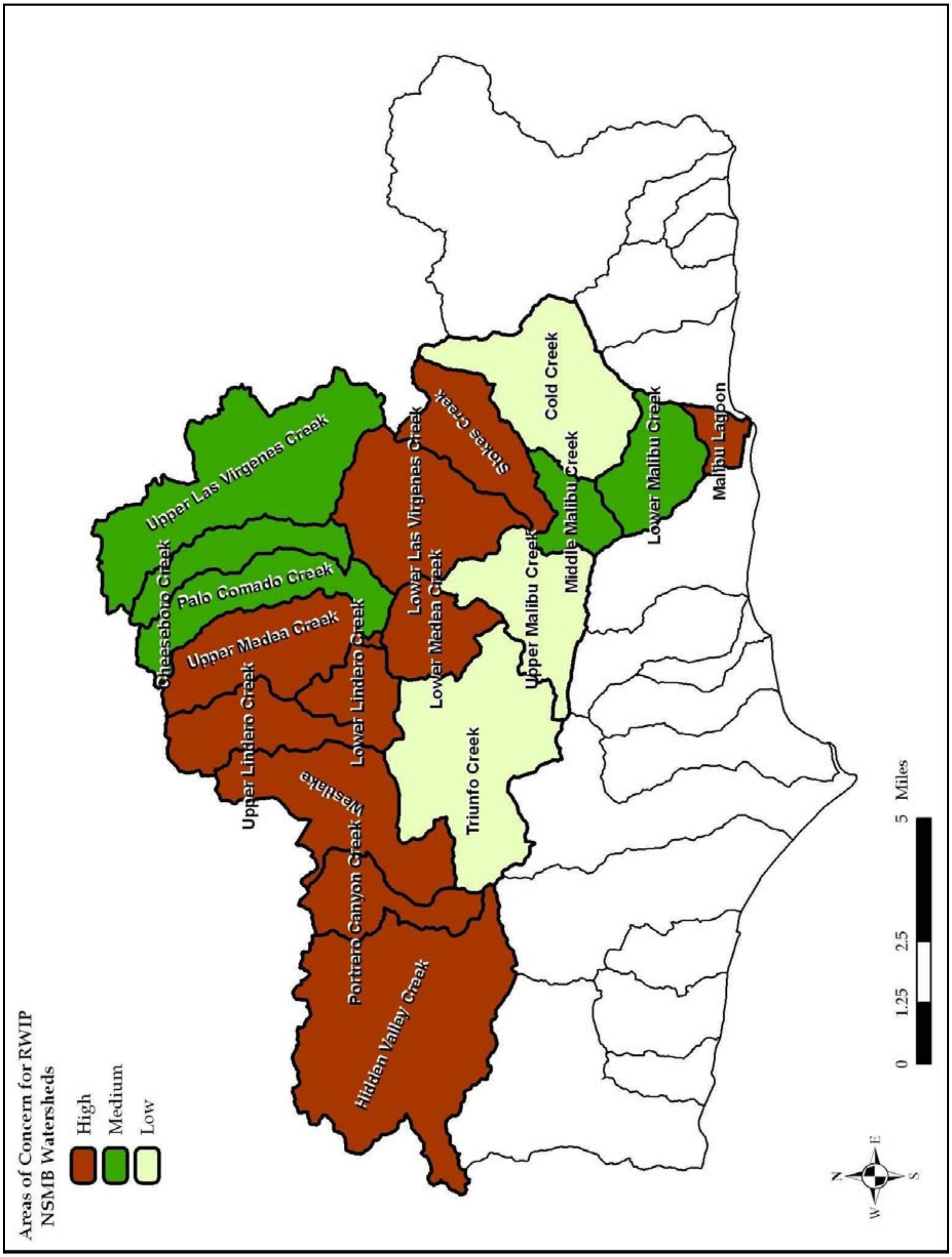

Figure ES-1
Prioritization of Water Quality AOCs for Malibu Creek Subwatersheds

ES.4 Plan Development

Subwatershed suites of recommended BMPs have been developed using the watershed priorities, structural and non-structural BMPs developed and evaluated and feedback from the MCW stakeholders regarding priorities for BMP implementation. Stakeholders helped identify the relative priority (or weightings) of evaluation criteria. Structural and non-structural BMPs were ranked by using these weightings and the previously developed subwatershed prioritizations. Each BMP received a weighted score on a subwatershed basis allowing for the formation of BMP suites for each watershed prioritization type. A follow-on evaluation was performed to identify specific BMPs of the higher-ranked BMPs to commit to implementing, commit to piloting, or for future consideration.

ES.4.1 Evaluation Criteria and Methodology

Structural BMP

Four structural criteria were used to assist in developing a weighted score for each BMP on a subwatershed basis. These criteria were established to be consistent with the *Los Angeles County-Wide Structural BMP Prioritization Methodology* developed jointly by Heal the Bay, the County of Los Angeles, the City of Los Angeles, and GeoSyntec Consultants:

- Cost
- Effectiveness
- Implementability (Ease of Implementation)
- Risk of implementation, risk of not implementing

Non-structural BMP

Three non-structural criteria were used to assist in developing a weighted score for each BMP on a subwatershed basis. These criteria are consistent with other Santa Monica Bay TMDL Implementation Plans and reflect a desire to balance competing criteria, while meeting required objectives:

- Cost
- Multi-pollutant effectiveness/capabilities
- Risk of implementation, risk of not implementing

Evaluation Methodology

Stakeholders evaluated each structural or non-structural BMP, using both the aforementioned criteria, and the relative importance of cost, risk, and effectiveness/implementation. The evaluation methodology for developing a “short list” of BMPs for further consideration of inclusion in the implementation plan was as follows:

- Evaluate the BMPs performance relative to each criterion
- Apply the appropriate weighting to the criterion
- Select the BMPs

This evaluation provided a "first-cut" of proposed BMPs and an initial point of discussion in developing the final listing of BMPs included in this TMDLIP. A number of local factors were also considered for final ranking of Regional BMPs for pilot studies.

ES.4.2 Commit-Pilot-Consider Model

A commit-pilot-consider model was developed to assist with further defining the BMPs for implementation. Three levels of implementation are proposed in this Implementation Plan:

- **Commit**: Agencies commit to engaging in the activities so designated within the indicated time frame.
- **Pilot**: Agencies commit to limited scale implementation to establish the overall effectiveness (including factors such as cost) of the measure (structural and non-structural) and to help identify the severity of the potentially targeted source.
- **Consider**: If the perceived need for this BMP, based on preliminary studies and early implementation, is not apparent, or if the subject technology is potentially costly or unproven, these activities will be considered in future phases of implementation.

The commit-pilot-consider model varied for each subwatershed priority to account for different needs and focuses within the different prioritized subwatersheds. This approach of subwatershed focusing and using a commit-pilot-consider model was generally used to identify the projects and programs for inclusion in the Implementation Plan discussed. In some cases other factors were considered in identifying a BMP for commitment piloting or consideration.

- Dry-Weather BMPs– Subwatersheds were evaluated separately for dry-weather BMPs. BMPs that had higher scores for dry-weather flow sources were identified as commit or pilot and included in the overall dry- and wet-weather recommendations.
- Watershed-Wide BMPs – A number of BMPs have been identified to support overall improvement in watershed BMP implementation. These BMPs were also evaluated and the top ranking BMPs identified for implementation at a commit or pilot scale in all jurisdictions.

ES.5 Plan Implementation

This Implementation Plan assumes an iterative and phased approach to implementation, considering the TMDL dates for dry-weather and wet-weather compliance, the required elements and time frames for implementing a program or project. Given the TMDL milestone dates identified for the extended compliance time frames for dry- and wet-weather a conceptual schedule and detailed schedule for each BMP has been developed. The schedule addresses dry and wet-weather implementation schedules, the time required for implementing major project/program phases, and a phased implementation of BMPs by subwatershed priority. Implementation has been broken into four phases, with a different emphasis in each phase:

- Phase I – Planning (starting in January 2007)
- Phase II – Dry and Wet-Weather BMP Implementation (starting in January 2009)
- Phase III – Wet-Weather BMP Implementation (starting in January 2012)
- Phase IV – Refinement and Regional BMP Implementation (starting in January 2017)

It should be noted that the phases overlap and do not end at the start of the next phase.

The Implementation Plan consists of combinations of non-structural activities, institutional, distributed structural measures and regional structural measures selected for each subwatershed. The elements contained in the plan for each subwatershed include those that are committed either for implementation or pilot programs/projects. Other measures may be considered at some point in the future depending upon the effectiveness of the committed and piloted programs or in response to specific opportunities that may be presented but are not part of the initial commitments.

Subwatershed-specific BMP listings were developed based on the BMP evaluations, subwatershed prioritization and subwatershed land-use characteristics. Each subwatershed plan includes a mixture of institutional and distributed structural BMPs and non-structural BMP solutions. Several subwatersheds also include regional BMPs to be evaluated and implemented on a pilot basis.

As stated previously, for committed BMPs, agencies commit to engaging in the activities so designated within the indicated time frame. Effectiveness of any BMP program or project will be periodically evaluated and reassessed for maximum cost and water quality benefit. Other factors may be considered as well in this re-evaluation. Though not the intent, it is recognized that commitment to an item may go only as far as a feasibility analysis if the results of that analysis are unfavorable toward cost effectively removing impairments. Through the iterative-adaptive process some commitments may prove to be unnecessary and therefore not carried out. Agencies reserve their legal rights, pursuant to state and federal law, to carry out this Implementation Plan in the manner they deem most effective in consideration of the goals and factors set forth herein. For purposes of this Implementation Plan and the predicted effectiveness of implementation, it is assumed that "Commit"-designated projects will be implemented.

Nonstructural and institutional/distributed structural options will be implemented initially and the results of these efforts monitored to determine the subsequent course of action. In parallel, the Malibu Creek Watershed and Lagoon Bacteria TMDL Compliance Monitoring Plan will provide additional water quality information and feedback regarding BMP effectiveness. Implementation will follow the following methodologies and plan elements:

- An integrated water resources approach has been applied in the development of this TMDLIP, providing a range of multi-beneficial use programs and solutions. BMPs included in the subwatershed specific plans include a variety of BMPs that can provide water quality improvements and other multiple benefits.

- Based on a review of City and County Ordinances and the proposed BMPs selected for implementation, the responsible agencies and jurisdictions all have ordinances in place that cover BMP implementation for protection of water quality, and no new ordinances are presently considered necessary to support implementation of BMPs for the dry- or wet-weather TMDL Implementation Plan.

- The Malibu Creek and Lagoon Bacteria TMDL Compliance Monitoring Plan was submitted to the Regional Board on May 24, 2006. The plan as submitted provides the sampling program design and methodology. Once compliance monitoring begins, the monitoring data will provide additional detail regarding the overall effectiveness of implemented BMPs on a watershed, or subwatershed basis. Monitoring the effectiveness of specific structural BMPs will be dependent on plans and criteria determined during the planning and design phases of each individual BMP.

Section 1
Introduction

1.1 TMDL Summary

This Integrated Total Maximum Daily Load Implementation Plan (TMDLIP) for the Malibu Creek Watershed (MCW) has been prepared in response to Resolution No. 2004-019R of the California Regional Water Quality Control Board—Los Angeles Region (Regional Board) amending the Water Quality Control Plan for the Los Angeles Region (Basin Plan) to incorporate Implementation Provisions for the Region's Bacteria Objectives and to incorporate a Total Daily Maximum Daily Load (TMDL) for Bacteria for Malibu Creek and Lagoon (see Appendix A).

1.1.1 TMDL Development

The Clean Water Act of 1972 (CWA), enacted into the U.S. Code, required States to develop a list, named the 303(d) List after the relevant section of the CWA, of impaired waters and name the pollutants for which they are impaired. For each impaired waterbody, States must then establish a watershed based, pollutant-specific TMDL for each pollutant on the list that is determined to be necessary to bring each impaired waterbody into compliance with the water quality standards necessary for achieving designated beneficial uses of the waterbody.

In 2003, EPA adopted a Bacteria TMDL for Malibu Creek to meet the deadline from a Consent Decree based on the impairments identified in prior 303(d) lists (2002, 1998). The impairments continue to be included in the recently adopted (October, 2006) updated 303(d) list. Since that time, the Regional Board has developed a revised version, which the Board adopted in December 2004 through Resolution 2004-019R. This resolution detailed an amendment to the Los Angeles Regional Water Quality Control Plan to incorporate the TMDL for Bacteria in Malibu Creek. The amendment presents a brief background on the history of the bacteria issues in Malibu Creek, sets target limits, and addresses an implementation plan. The Staff Report and appendices detail the TMDL development activities. The TMDL was subsequently approved by the State Water Resources Control Board (SWRCB) and EPA Region 9 and became effective January 2006, thereby superseding the 2003 EPA TMDL. Both Los Angeles and Ventura Counties along with the other affected cities have developed this Implementation Plan for this TMDL.

For the areas lying within the Malibu Creek Watershed, Los Angeles and Ventura Counties, the affected cities and California Department of Transportation (Caltrans) have jointly developed this Implementation Plan to meet the requirements of the TMDL. An integrated approach to target activities with multi-pollutant benefits was used during the development of this Implementation Plan in anticipation of future TMDLs for additional pollutants. This document will be the primary guiding reference for the implementation of activities necessary to meet this and future TMDL objectives.

The TMDL addresses bacteria water quality impairments in the Malibu Creek Watershed. The TMDL is consistent with the Santa Monica Bay Beaches Bacteria TMDL, which was approved by the United States Environmental Protection Agency (EPA) in June 2003. The Santa Monica Bay Beaches TMDL expressed the Waste Load Allocation for bacteria at Santa Monica Bay Beaches in terms of the number of days that the single sample bacteria water quality objectives in the Basin Plan may be exceeded. The Santa Monica Bay Beaches TMDL applies to Surfrider Beach, which is located at the mouth of the Malibu Creek Watershed. In terms of the number of days that the single sample bacteria limit has historically been exceeded, Surfrider ranks among the most impaired beaches in the Bay. This TMDL addresses the bacteria sources from Malibu Creek and Lagoon, but does not address other coastal sources that may impact the impairment at Surfrider Beach.

The responsible jurisdictions and responsible agencies, primarily the incorporated cities, Los Angeles County, Ventura County, and Caltrans are responsible for meeting the final pollutant allocations. The TMDL provides an estimated reduction in bacteria loading necessary to meet the allocations. Based upon the output from Hydrologic Simulation Program – Fortran (HSPF) Modeling conducted for the USEPA (TetraTech, 2002), stormwater from commercial/industrial and high-density development generate the highest annual bacteria loading. However, these loads are a result of episodic storm events. Bacteria loads from failing or short-circuited onsite wastewater treatment systems (OWTS) may contribute bacteria loading year round and potentially have an impact on impairments during dry-weather. Historical concerns in the Malibu Civic Center area led to a 2004 study (Stone, 2004) which evaluated this potential and identified strategies to manage OWTS in this area and minimize the potential bacteria loading. Another significant finding is that based on the model output, loading reductions designed to meet the allowable days of exceedance of the single sample limits were not sufficient to meet the 30-day geometric mean. In addition, the model indicates that it may not be possible to achieve the 30-day geometric mean in the Lagoon due to fecal contamination from birds. Under the TMDL, the California Department of Parks and Recreation is responsible for a report to quantify bacteria loading from natural sources to the lagoon.

The TMDL provides an implementation schedule allowing the responsible jurisdictions and responsible agencies time to gather additional monitoring data to validate the model and to better quantify the loading from birds in the Lagoon. The Regional Board may reconsider the TMDL in three years from the effective date to consider the impact of birds in the Lagoon and to refine the days of allowable exceedance based on additional studies. At that time, the Regional Board may revise the TMDL to allow for a Natural Source Exclusion, as provided for in the Basin Plan. The Natural Source Exclusion can only be applied after all anthropogenic sources of bacteria have been controlled. The schedule would allow six years from the effective date to meet both summer and winter dry-weather Waste Load Allocations.

1.1.2 Malibu Creek Watershed Background

The MCW is a major watershed in western Los Angeles County and southeastern Ventura County. At 109 square miles, it is the second largest watershed draining to the Santa Monica Bay. The MCW includes portions of unincorporated Los Angeles and Ventura Counties, as well as seven cities in the two counties. Much of the watershed is open space under the jurisdiction of the State and the Santa Monica Mountains Conservancy. Jointly responsible for meeting the MCW Bacteria TMDL requirements are the two counties; the Cities of Calabasas, Malibu, Westlake Village, Agoura Hills, Hidden Hills, Simi Valley and Thousand Oaks; the California Department of Parks and Recreation; the National Park Service, the Santa Monica Mountains Conservancy; and Caltrans. The Malibu Creek Watershed and its subwatersheds are shown in Figure 1-1.

Creeks and lakes located in the upper portions of the watershed drain into Malibu Creek which then continues into the downstream portion of the watershed draining into Malibu Lagoon and ultimately into Santa Monica Bay when the Lagoon is breached. Historically, there is little flow in the summer months; much of the natural flow that does occur in the summer in the upper tributaries comes from springs and seepage areas. During this period, Malibu Lagoon is disconnected from the ocean by a sand bar. During the first rain storms of the wet season, runoff from the watershed increases flow in Malibu Creek dramatically, resulting in the Lagoon breaching the sand bar and runoff flowing out to the Bay. The natural hydrology of the watershed has been modified by the creation of several dams and man-made lakes, the importation of water to the system for human use to support the region for urban growth and subsequent dry-weather urban runoff from developed areas, and the presence of the Tapia Wastewater Reclamation Facility (WRF), which provides significant dry-weather flow to the system in the winter months.

The land use distribution in the Malibu Creek Watershed is about 80% undeveloped. The developed land is a mixture of residential (13%), commercial/industrial (4%) and agricultural (3%) land uses.

Certain reaches of Malibu Creek and its tributary waterbodies have shown past and present impairment of ambient water quality for coliform bacteria that exceeds the objectives established to protect the recreational uses of these receiving waterbodies. A number of waterbodies in the Malibu Creek Watershed are hydrologically connected to the waterbodies listed as impaired. These waterbodies include Hidden Valley Creek, Potrero Canyon Creek, Triunfo Creek, Cheseboro Creek, and Cold Creek and four lakes (Lake Sherwood, Westlake Lake, Lake Lindero and Malibou Lake). These waterbodies are considered within the analytical framework of the MCW Bacteria TMDL because they have the potential to contribute significant bacterial indicator loading to the downstream impaired waterbodies.

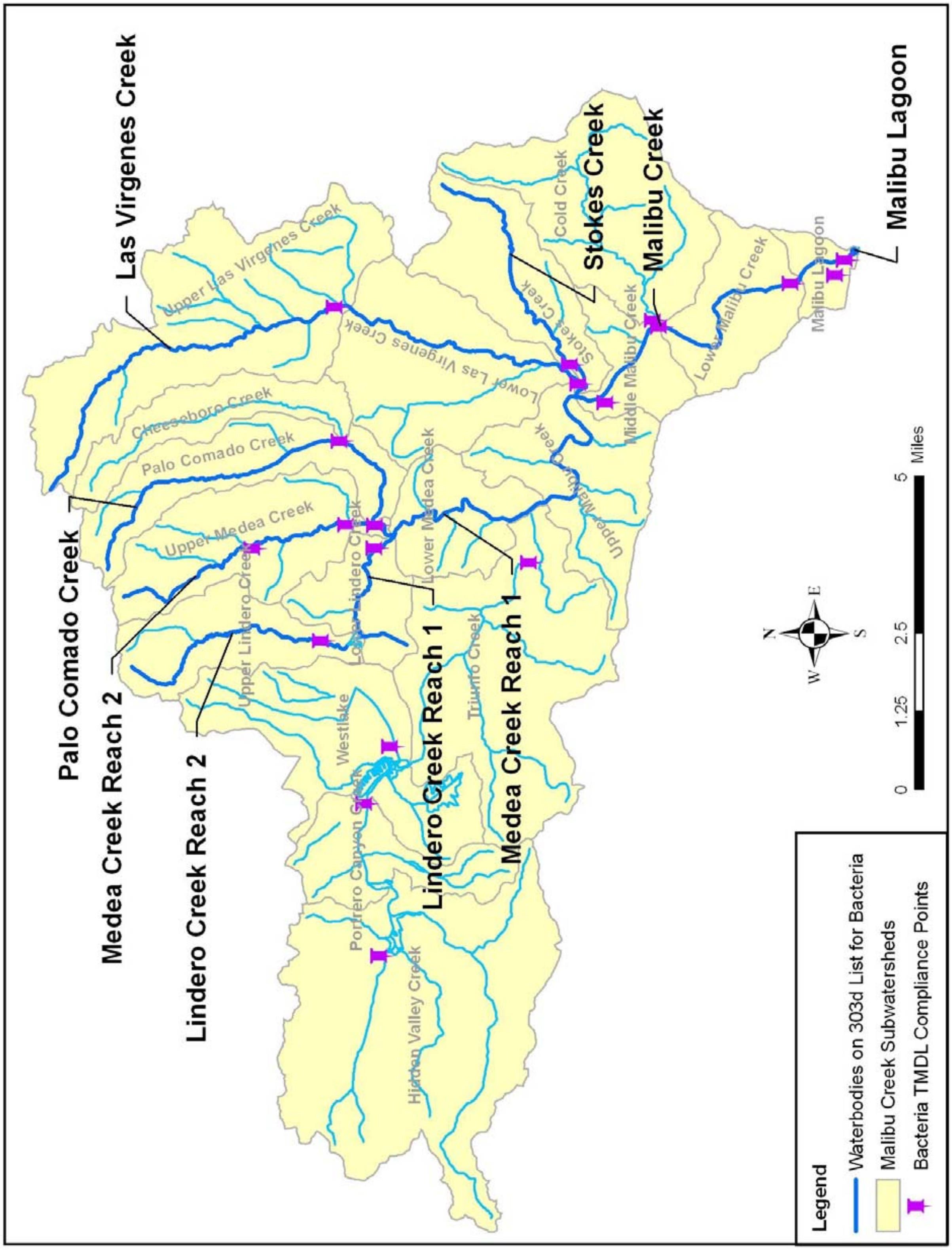

Figure 1-1
Subwatersheds, Bacteria 303d Listed Waterbodies, and Current Bacteria TMDL Compliance Points in the Malibu Creek Watershed

The western part of the watershed drains the areas around Hidden Valley, Potrero Creek, Westlake and Triunfo Creek (total area about 25,210 acres). These areas are largely undeveloped. There is limited agricultural land use, located mostly in the Hidden Valley subwatershed. Most of the residential and commercial/industrial land use is in the area around Westlake Village. Nearly all the runoff from this large watershed area is funneled to Triunfo Creek and ultimately to Malibou Lake. None of the waterbodies in this western-most portion of the watershed have been listed for fecal coliform bacterial impairments. However, it is important to note that the waterbodies in these areas were largely unassessed by the Regional Board due to a lack of data. Nonetheless, the TMDL states that "it is highly probable that the runoff from these areas contributes fecal coliform loading to the listed segments downstream of Malibou Lake and need to be considered in TMDL development".

The eastern portion of the Malibou Lake drainage area is 15,900 acres and includes the subwatersheds associated with the 303(d) listed Lindero, Medea and Palo Camodo Creeks as well as the subwatershed draining the unlisted Cheseboro Creek. The land use in these areas, while still largely undeveloped, has a relatively higher percentage of residential and commercial land uses especially in the Lindero Creek and Medea Creek subwatersheds.

Malibou Lake discharges to Malibu Creek, which is listed as impaired for its entire 10-mile length to the Lagoon. Malibu Creek also receives flow from Las Virgenes Creek and Stokes Creek, both of which are listed as impaired. Land use at the bottom of the watershed near the Lagoon has significantly more residential and commercial area.

The water quality in Malibu Creek, its five tributaries (Stokes Creek, Las Virgenes Creek, Palo Comado Creek, Medea Creek, and Lindero Creek) and Malibu Lagoon, which receives runoff from Malibu Creek, exceeds the water quality objectives (WQOs) for indicator bacteria, including fecal coliform, total coliform, E. coli, and enterococcus. The analysis conducted under the TDML report suggested that runoff from urban areas is the most significant source of bacteria in the MCW based on the bacteria densities assumed for different land use types and the land use distribution in the watershed. This is generally consistent with monitoring data discussed further in Section 3. Many developments in the Malibu Lagoon subwatershed and in unincorporated areas in the northern part of the MCW are not connected to a public sewer and rely upon OWTS, which may be a bacteria source when OWTS are short-circuited or failing. Portions of the watershed are also home to a large population of horses, which could contribute to the fecal bacteria presence in the creeks and tributaries. However, impacts from OWTS and horses have not yet clearly been demonstrated.

In order for MCW to comply with the Bacteria TMDL allocations, non-structural and structural Best Management Practices (BMPs) must be implemented throughout the watershed. Enforceable programs under which the practices will be implemented include National Pollutant Discharge Elimination System (NPDES) municipal stormwater permits, local ordinances, and California Assembly Bill 885 (AB 885) which regulates on-site wastewater treatment systems.

1.1.3 Compliance Requirements

For purposes of compliance monitoring, responsible jurisdictions and agencies jointly submitted the Malibu Creek and Lagoon Bacteria TMDL Compliance Monitoring Plan to the Regional Board, on May 24, 2006, within 120 days of the effective date of the TMDL, that specifies agreed upon sampling stations that will serve as compliance points.

Table 1-1
Allowable Exceedance Days for Single Sample Bacteria Objectives at Malibu Creek Watershed Compliance Monitoring Locations

(from LA Resolution No. 2004-019R, Amendment to the Water Quality Control Plan of the Los Angeles Region to Incorporate a TMDL for Bacteria in the Malibu Creek Watershed)

Compliance Deadline		3 Years After Effective Date		6 Years After Effective Date		10 Years After Effective Date	
		Summer Dry-weather (Apr 1 - Oct 31)		Winter Dry-weather (Nov 1 – Mar 31)		Wet-Weather (All Year)	
Station ID	Location Name	Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling	Daily Sampling	Weekly Sampling
LA RWQCB	Triunfo Creek	0	0	3	1	17	3
LA RWQCB	Lower Las Virgenes Creek	0	0	3	1	17	3
LA RWQCB	Lower Medea Creek	0	0	3	1	17	3
LVMWD (R-9)	Upper Malibu Creek, above Las Virgenes Creek	0	0	3	1	17	3
LVMWD (R-2)	Middle Malibu Creek, below Tapia discharge	0	0	3	1	17	3
LVMWD (R-3)	Lower Malibu Creek, 3 mi below Tapia	0	0	3	1	17	3
LVMWD (R-4)	Malibu Lagoon, above PCH	0	0	3	1	17	3
LVMWD (R-11)	Malibu Lagoon, below PCH	0	0	3	1	17	3

1.1.4 Compliance Water Quality Objectives

The compliance monitoring includes the stations shown in Table 1-1, one sample from each of the 18 subwatersheds, and additional samples in any areas where REC-1 uses are known to occur. The sampling plan also lists the sampling parameters, methods of measuring flow, and sampling frequency. Responsible agencies must conduct daily or systematic weekly sampling at each compliance point. As weekly sampling is selected for all sampling locations, the days of allowable exceedance for single sample limits will be scaled accordingly. The weekly sampling results will be assigned to the remaining days of the week in order to calculate the daily rolling 30-day geometric mean.

If the number of exceedance days is greater than the allowable number of exceedance days or the 30-day geometric mean is exceeded, then the responsible jurisdictions and agencies within the contributing subwatershed will be considered out-of-compliance with the TMDL. Responsible jurisdictions or agencies will not be deemed out of compliance with the TMDL if the investigation described in the paragraph below demonstrates that bacterial sources originating within the jurisdiction of the responsible agency have not caused or contributed to the exceedance.

As stated in the TMDL, if a single sample shows the discharge or contributing area to be out of compliance, the Regional Board may require, through permit requirements or the authority contained in Water Code section 13267, daily sampling at the downstream compliance point or at the existing downstream monitoring location (if it is not already) until all single sample events meet bacteria water quality objectives. Furthermore, if a creek location is out-of-compliance as determined in the previous paragraph, the Regional Board will require responsible agencies to initiate an investigation, which at a minimum must include daily sampling in the target receiving waterbody reach or at the existing monitoring location until all single sample events meet bacteria water quality objectives.

1.1.5 Compliance Schedule

The TMDL document identifies a number of critical dates for TMDL compliance, as shown in Table 1-2. The MCW TMDL became effective January 24, 2006. Milestone dates identified by the Regional Board are based upon this effective date. The TMDL identifies dates for summer dry-weather compliance (3 years from the effective TMDL date), and winter dry- and wet-weather compliance (6 and 10 years, respectively, from the effective TMDL date). These are the time periods when water quality monitoring is expected to show compliance with the TMDL bacteria targets. The TMDL allows for an extension of the dry-weather and wet-weather compliance dates if certain criteria are met. This TMDLIP must include a description of local ordinances necessary to implement the dry-weather plan to be eligible for an extension of dry-weather compliance date. This TMDLIP must also follow and include a description of the integrated water resources approach to be implemented to be eligible for an extension of the wet-weather compliance date.

Table 1-2
TMDL Compliance Dates

Milestone	Date without extensions	Extended Date*
TMDL Effective Date	January 24, 2006	
Comply with Summer Dry-Weather Exceedance Days	January 24, 2009	January 24, 2012

Table 1-2 TMDL Compliance Dates		
Comply with Winter Dry-Weather Exceedance Days	January 24, 2012	
Comply with Wet-Weather Exceedance Days	January 24, 2016	July 15, 2021

* Extended dates apply if the integrated planning approach is approved and the dry-weather extension is approved.

1.2 Implementation Plan Participants, Roles, and Responsibilities

1.2.1 Responsible Agencies

For the purposes of Implementation Plan development, the County of Los Angeles has taken the lead for the entire Malibu Creek Watershed. Other agencies involved and contributing to this TMDLIP include Caltrans, and the County of Ventura, and the Cities of Agoura Hills, Calabasas, Malibu, Thousand Oaks, and Westlake Village.

1.2.2 Stakeholders

Stakeholder participation was accomplished through the MCW TMDL Working Group. In addition to the Regional Board staff, environmental groups actively engaged in the process of developing this TMDLIP include the Santa Monica Mountains Conservancy, Heal the Bay, the Santa Monica BayKeepers, and others. Stakeholders were invited to attend and participate in the Implementation Plan Milestone Meetings.

1.3 Objectives of the TMDL Implementation Plan

There are numerous objectives for this Implementation Plan. First and foremost, the objective is to develop an integrated plan that results in the improvement of water quality to a level such that the waters in Malibu Creek and the Lagoon meet or are below the established water quality objectives and Resolution No. 2004-019R. In addition, a significant objective of the Implementation Plan is to commit to strategic cost-effective solutions that address multiple pollutants. It is recognized that cost-effective implementation of TMDL requirements in conjunction with other water resources demands and opportunities, will result in a greater overall benefit than solely focusing on treatment of bacteria in urban runoff. Therefore, this Implementation Plan represents an integrated water resources approach that takes a holistic view of regional water resources management by integrating planning for future wastewater, stormwater, recycled water, and potable water needs and systems, and focuses on beneficial re-use of stormwater, including groundwater infiltration at multiple points throughout a watershed. In addition, recognizing that bacteria is not the sole pollutant of concern, this Implementation Plan addresses multiple pollutants for the Malibu Creek Watershed. An outcome of this integrated approach is a plan that will assist in meeting the requirements of future TMDLs issued by the Regional Board for the Malibu Creek Watershed.

Because the Regional Board recognizes that an integrated water resources approach not only provides water quality benefits to the people of the Malibu Creek region, but also potentially serves a variety of public purposes, a longer timeframe is reasonable for an integrated water resources approach. An integrated water resources approach requires more complicated planning and implementation such as identifying markets for water reuse and efficiently siting storage and transmission infrastructure within the watershed(s) to realize the multiple benefits of such an approach.

Another objective of the Implementation Plan is, therefore, to include methods for identifying, developing, designing, implementing, purchasing, installing, monitoring, evaluating, and maintaining the most appropriate "source control" and "treatment control" solutions. Given the additional complexity of an integrated water resources approach, the Implementation Plan will be presented to the Regional Board to justify a timeframe of 15 years to comply with the TMDL requirements. Given the additional complexity of an integrated water resources approach, the Implementation Plan will be presented to the Regional Board to justify a timeframe of at least 15 years to comply with the TMDL requirements.

The last critical objective of the Implementation Plan is to provide an adaptive and iterative framework for implementation. Because source prioritization efforts have not yielded conclusive source tracking results, and because technologies, particularly for bacteria treatment are developing, it is recognized that both the objectives of the TMDL and mitigation strategies may require revision and re-examination. This recognition is incorporated in the scheduling and phasing of activities within the Implementation Plan.

Section 2
Summary of Technical Analysis

This section presents a summary of technical analysis performed to assess conditions in the MCW to support identification of BMPs to address water quality impairments. Discussed in this section are:

- MCW Topography, Drainage, and Geology
- Opportunities for Beneficial Water Reuse
- Opportunities for Recreational Benefits, and
- Non-Structural and Structural BMPs considered

Additional details of these analyses can be found in Appendix B, which contains the technical memorandums of the analyses.

2.1 Existing Conditions

2.1.1 Topography, Drainage and Geology

In order to design optimal watershed-wide BMPs to comply with TMDL as well as NPDES and AB 885 requirements, a thorough understanding is necessary of existing watershed conditions. In this section, the results of investigations of the physical environment of the watershed (topography, geology and hydrogeology) are provided.

General drainage patterns in the study area are from the Santa Monica Mountains on the north towards the Pacific Ocean on the south (Figure 2-1). The Santa Monica Mountains are an east-west trending range that widen with the curve of Santa Monica Bay, and reach their highest peaks on the ocean side of the range. The rugged, deeply dissected Santa Monica Mountains rise abruptly from a narrow coastal strip of rocky or sandy beaches. The elevation range in the study area is from sea level to 3,111 feet at Sandstone Peak in the northern portion of Arroyo Sequit sub-watershed, part of the neighboring North Santa Monica Bay Watersheds (USG, 1975).

Malibu Creek, however, stands out as the largest watershed of the North Santa Monica Bay watersheds that drains to Santa Monica Bay, with a short steep, rugged lower canyon, and a large relatively moderate relief upper watershed. There are two theories regarding the formation of MCW: 1) an ancestral, or antecedent drainage eroded through tectonically rising Santa Monica Mountains (Dibblee, T.W., Jr., 1992a); or 2) a more recent analysis suggests stream capture by a coastal stream eroding inland captured the inland portion of the MCW. Support for the second theory includes the change in topographic relief from the coastal watersheds to the inland portion of MCW, and the steep, bedrock-eroding nature of Malibu Canyon in the lower portion of Malibu Creek (Meigs, A., et. al., 1999).

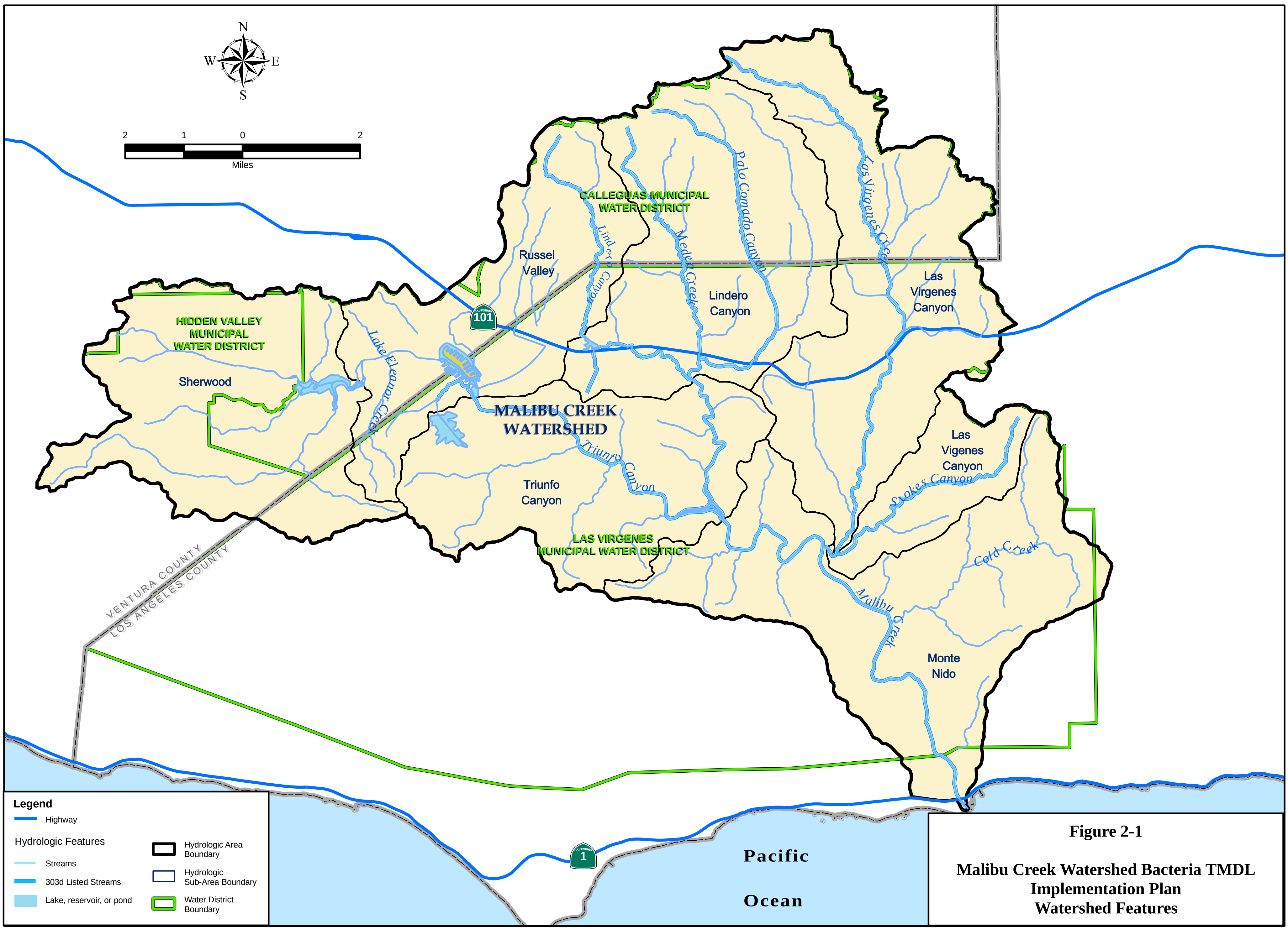

Figure 2-1

Malibu Creek Watershed Bacteria TMDL Implementation Plan Watershed Features

The geology of the Santa Monica Mountains is dominated by a sequence of Tertiary sedimentary and volcanic formations. For the purposes of this analysis, these formations have been grouped into three units: Tmt: - Tertiary Modelo and Upper Topanga Formations; Ts - Tertiary Sedimentary formations, other than Modelo and Upper Topanga Formations; and Tv/Ti - Tertiary volcanic and intrusive rocks of the Conego Formation (Figure 2-2). The oldest units within the Santa Monica Mountains are a series of Jurassic and Cretaceous Sedimentary Formations (K-J) that are beneath the Tertiary Formations of interest.

The Conejo Volcanic Formation (Tv/Ti) forms the core of the Santa Monica Mountains, and underlies much of Malibu Creek Watershed. The younger Tertiary sedimentary formations of the Modelo and Upper Topanga Formations flank the Conejo to the north and south. The south flank of the Santa Monica Mountains is structurally dominated by the Malibu Coast Fault that runs along the foot of the mountains at the coast. This fault, and associated structures, creates a considerably more complex geologic setting on the south flank of the Santa Monica Mountains compared to the north flank, where the Tertiary formations are gently folded. The active nature of the Malibu Coast fault and associated structures accounts for the steep and rugged coastal topography of the MCW.

Eroded from, and overlying, these bedrock formations are a series of recent alluvial units. For the purposes of this analysis, these alluvial units have been combined into two map units: Quaternary alluvium (Qal) - comprising alluvium, including stream deposits, alluvial fan and floodplain deposits, beach deposits, dissected and older alluvial deposits; and Quaternary land slides and colluvium (Qls/Qc) - comprising land slide deposits and colluvium deposits. The colluvium represents relatively thick continuous deposits of soil and rock fragments which are common on the steep slopes of the coastal canyons, and generally feed the many landslides, soil slips and debris flows.

2.1.2 Hydrogeology and Aquifer Characteristics

Hydrogeologic aquifers in the North Santa Monica Bay Watershed (NSMBW) can be divided between bedrock aquifers and alluvial aquifers. The bedrock aquifers consist of younger Tertiary sedimentary and volcanic formations (Tmt and Tv/Ti; Figures 2-2 and 2-3). The alluvial aquifers consist of alluvial stream deposits and alluvial fan and floodplain deposits (Qal; Figures 2-2 and 2-3). By definition the landslide deposits and colluvium deposits are on slopes that are too steep or unstable to be considered for further hydrogeologic analysis.

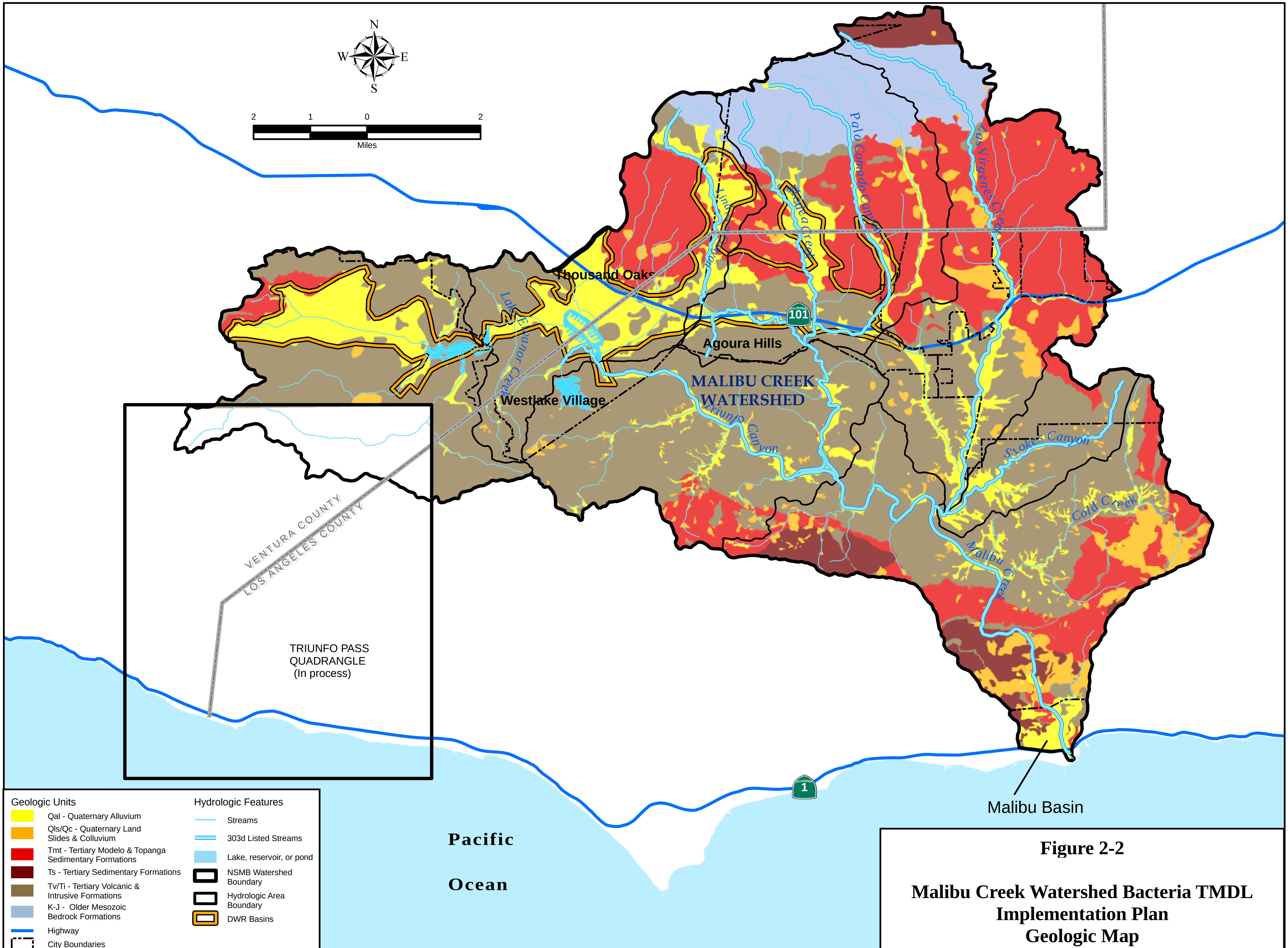

Figure 2-2

Malibu Creek Watershed Bacteria TMDL Implementation Plan Geologic Map

Part of what gives the MCW their individual and picturesque character is the steep topography. Caused by a complex interplay of tectonic uplift and erosion (Meigs, A., et. al., 1999), this active landscape has not produced large alluvial basins, such as the San Fernando basin, which are ideal alluvial aquifers. The MCW, as a whole, has only three very small alluvial groundwater basins identified by California Department of Water Resources (DWR): Hidden Valley and Russell Valley basins in Ventura County and Malibu Valley basin in Los Angeles County (Table 2-1). Russell Valley basin is presently used intermittently by Las Virgenes Municipal Water District (LVMWD) to augment recycled water during summer peak usage. The Malibu Valley groundwater basin is no longer pumped, and is considered, at least locally, contaminated with septic effluent and fuels from leaking underground storage tanks. The aquifer properties and water quality of these basins are summarized in Tables 2-1 and 2-2.

2.2 General Opportunities for Beneficial Reuse of Water

Opportunities for beneficial reuse of water requires an understanding of water supply, water use, water reuse, and the integration of water quality improvement strategies associated with land use such as recreational and open space uses. This section describes general opportunities for these multiple beneficial uses within the MCW.

2.2.1 Water Supply and Use

Water supply is provided to the MCW primarily by two water districts: Los Angeles County Waterworks District No. 29 (District No. 29), provides water to coastal watersheds; and LVMWD provides water to the upper Malibu Creek Watershed.

Water supply provided by these districts is imported to the area via the State Water Project. Calleguas Municipal Water District (CMWD) supplies a small portion of the upper MCW. LVMWD and CMWD provide recycled water supplies to their customers. According to the City of Malibu General Plan, there are some residences with private groundwater wells within the City, although the amount of water supplied by these wells is considered insignificant. Groundwater supply is used locally for irrigation purposes or to augment recycled water supply during peak usage (LVMWD, 2005). Presently there are no local, dependable surface water supplies and limited groundwater supplies. District No. 29's service area is the City of Malibu and Topanga Creek Waters. LVMWD's service area is entirely within the Malibu Creek Watershed. Only a portion of the CMWD service area is within the uppermost Malibu Creek Watershed. CMWD primary service area is southern Ventura County.

Table 2-1
MCW Aquifer Properties

Basin Name	Basin Area (acres)	Basin Boundaries	Hydrology	Hydrogeologic Formation	Recharge	Groundwater Levels	Groundwater Storage
Hidden Valley	2,210	Underlies Hidden Valley in southwest Ventura County.	Bounded by the semi-permeable rocks of the Santa Monica Mountains. The valley drains into Sherwood Lake.	Unconfined in the Conejo Formation volcanic deposits and overlying alluvium.	Recharges rapidly with seasonal rains, implying that recharge comes chiefly from percolation of precipitation to the valley and ephemeral streamflow.	Average - 75 feet. Water levels declined by as much as about 50 feet by 1988. During 1988 through 1992, the rate of decline of water levels increased, with water levels in 1992 reaching as much as 180 feet below high water levels of the previous decade. Water levels recovered again in 1993 and experienced seasonal fluctuations of as much as 60 feet through 2000. Groundwater moves southeastward through the basin toward Lake Sherwood.	4,000 acre feet (af) estimated. Recoverable storage estimated between 250-400 af.
Malibu Valley	610	Small alluvial basin located along the Los Angeles County coastline; bounded by the Pacific Ocean on the south and by non water-bearing Tertiary age rocks on all remaining sides.	The valley is drained by Malibu Creek to the Pacific Ocean.	Primarily in unconfined Quaternary alluvium which consists of clays, silts, sands, and gravels. Thickness of the alluvium ranges from 90 feet at the upper end to more than 140 feet at the lower end. The Malibu Coast fault crosses the valley but is not considered groundwater barrier.	Recharge of the basin is from percolation of precipitation, runoff, and effluent from domestic septic systems.	Groundwater levels generally shallow - 10-50 feet. Groundwater moves south towards the Pacific Ocean.	Unknown

Table 2-1 (Continued)
MCW Aquifer Properties

Basin Name	Basin Area (acres)	Basin Boundaries	Hydrology	Hydrogeologic Formation	Recharge	Groundwater Levels	Groundwater Storage
Russell Valley	3,100	Relatively small alluvial basin bounded by semi-permeable rocks of the Santa Monica Mountains. The basin is bordered on the west by the Thousand Oaks Groundwater Basin.	Triunfo Creek drains the valley into Malibu Creek.	The unconfined groundwater primarily pumped from Quaternary alluvium, although some groundwater is extracted from underlying Tertiary volcanic and sedimentary rocks. Alluvium consists of unconsolidated, poorly bedded, poorly sorted to sorted sand, gravel, silt, and clay with some cobbles and boulders that averages about 35 to 55 feet thick.	Recharge is dominantly from percolation of rainfall.	Depth to groundwater - 35 feet	The total storage capacity is estimated at 10,570 acre-feet (af). Recharge from underflow is estimated to be 300 to 500 afy and about 50 to 150 afy more from irrigation return. Extraction is estimated to be about 600 afy.

Sources: CA DWR Bulletin 118 (2/27/04); Ventura County Public Works Agency

Table 2-2
MCW Aquifer Water Quality

Basin Name	Basin Area (acres)	Total Dissolved Solids	Groundwater Quality	Well Characteristics		
				Yields	**Depths**	**Basin Management**
Hidden Valley	2,210	Below 800 mg/L	Varies from calcium bicarbonate to calcium-magnesium bicarbonate.	Average: 30 gal/min.	Unknown	
Malibu Valley	610	Single analysis resulted in total dissolved solids (TDS) content of 1,310 mg/L.	Seawater intrusion occurred in 1950, and again in 1960. Chloride concentrations exceeding 100 mg/L were found in groundwater in the coastal part of the basin. Basin known to have leaking underground storage tanks of fuel, and is suspected to be locally impacted by septic system effluent. However, impacts from OWTS have not yet been demonstrated.	1,000 gal/min.	Range: 100-550 ft	Los Angeles County Department of Public Works; Malibu Water Company
Russell Valley	3,100	Ranges from 800 to 2,800 mg/L.	Generally sodium bicarbonate or calcium bicarbonate water, but also may be sodium bicarbonate or calcium-magnesium sulfate. Sulfate averages 300 mg/L in most wells due to the volcanic basalt that constitutes the basement rock. TDS and sulfate both exceed their maximum allowable contaminant levels (MCL) for some wells in the basin.	Average: 25 gal/min.	Unknown	Calleguas Municipal Water District, Ventura County Public Works Agency

Sources: CA DWR Bulletin 118 (2/27/04); Ventura County Public Works Agency

2.2.1.1 Los Angeles County Waterworks District No. 29

District No. 29 currently supplies approximately 10,000 acre-feet per year (afy) of potable water supply to the City of Malibu, Pepperdine University, and unincorporated portions of the County including Topanga Canyon and portions of Marina Del Rey. District No. 29 has a water supply that is completely imported and acquires its water from the West Basin Municipal Water District (WBMWD), which in turn obtains water from either its underlying groundwater basin (West Basin) or from Metropolitan Water District (District). The District maintains emergency connections to the City of Los Angeles Department of Water and Power (LADWP) and LVMWD (District No. 29, 2005). Production and use of recycled water is limited in District No. 29 because the community served is predominately on individual septic systems; there is minimal recycled water available locally. District No. 29 is within the service area of WBMWD's Recycle Program. Under this program, WBMWD produces recycled water for 13 southern California cities in its service area. The program does not service District No. 29 with recycled water because of its remote location (District No. 29, 2005). A portion of the wastewater generated in District No. 29 is collected and treated by small private and publicly owned package wastewater treatment plants serving individual developments. The LACoDPW operates and maintains the collection and treatment systems of the three publicly-owned treatment plants (Malibu Mesa Water Reclamation Plant, Malibu Wastewater Treatment Plant and Trancas Wastewater Treatment Plant) serving the area. The total treatment capacity of the publicly-owned facilities is approximately 312,500 gallons per day (gpd). Of these plants, only the Malibu Mesa Plant generates recycled water for irrigation use (District No. 29, 2005).

The Malibu Mesa Plant serves an estimated population of 3,360 persons at Pepperdine University, and the Malibu Country Estates, a residential subdivision in the City of Malibu. The wastewater is treated to filtered, disinfected standards to meet the requirements of California Department of Health Services Regulations Title 22 of the Water Code for unrestricted irrigation, and is then used by Pepperdine University for landscape irrigation. The plant has a design capacity of 200,000 gpd and provides approximately 140 acre feet per year (afy) of recycled water for landscape irrigation to Pepperdine University (District No. 29, 2005). The low volume of wastewater and the treatment plant capacity limit recycled water use.

2.2.1.2 Las Virgenes Municipal Water District (LVMWD)

LVMWD provides potable water, recycled water, and wastewater services to the cities of Agoura Hills, Calabasas, Hidden Hills, Westlake Village and neighboring unincorporated areas of Los Angeles County. The area served by LVMWD has no local source of drinking water supply, and its approximately 22,000 afy of potable water is imported and provided by Tapia MWD. LVWMD, through its Tapia Water Reclamation Facility (TWRF), provides 4,500 acre-feet/year of recycled water within the service area (LVMWD, 2005). This is approximately 20 percent of total water supply, and represents 60 percent of TWRF production. LVWMD has aggressively pursued the goal of complete beneficial use of recycled water. Through several extensive studies, the district has attempted to identify projects that will fulfill this goal, but has been consistently hampered by the need for, and lack of, seasonal storage for use in summer high-demand months (LVWMD, 2005).

LVMWD operates the 9,600 acre feet (af) Las Virgenes reservoir for storage of imported water supply. It does capture a small amount of surface water, particularly in wet years (LVMWD, 2005). In addition, LVMWD operates two groundwater wells in Russell Valley, near Westlake Village, to augment recycled water supply during peak summer usage (LVMWD, 2005). The poor quality of this groundwater precludes using it for drinking water supply. Total production from these wells is approximately 200-300 afy, pumped generally between June and September.

2.2.2 Local (on-site) Reuse Opportunities

Local (on-site) reuse opportunities for the MCW include:

- Irrigation use of roof runoff captured via cisterns, and
- On-site infiltration of runoff.

2.2.2.1 Local Capture Systems

On-site stormwater reuse options can provide an important role in managing wet-weather runoff. This includes individual rain barrels or cisterns that can be installed at single family residences, and larger cisterns or holding tanks that can be incorporated in multifamily, commercial, industrial or public properties. These are typically lower-cost water conservation devices that can be used to reduce runoff volume and, for smaller storm events, delay and reduce the peak runoff flow rates. Local capture systems divert and store runoff from impervious roof areas that can provide a source of chemically untreated "soft water" for gardens and compost, free of most sediment and dissolved salts. Because irrigation can account for up to 40 percent of municipal water consumption, water conservation measures such as local capture systems can also reduce the demand on the municipal water system.

Although this cistern option will not manage a large quantity of runoff to eliminate the need for other runoff management options, it is included in the plan due to its positive effect from a water conservation standpoint, and its ability to eliminate low flow runoff from very small storm events. In particular, larger capture systems from multifamily, commercial/industrial and/or public properties can offer more substantial benefits.

For example, the Malibu Creek Watershed has approximately 13 percent residential land use, or 9,100 acres. With average precipitation of 16 inches per year, and assuming 90 percent capture of precipitation and 40 percent efficient storage, results in maximum potential of up to 1,000 afy reuse of stormwater from residential land uses although the actual amount that could be achieved might be less. As part of a distributed watershed wide implementation of BMPs, local capture installation can assist in reducing total runoff of stormwater and associated urban pollution.

The estimates for stormwater reuse for cisterns assume variable efficiency of installation and water usage. The effectiveness of residential use of rain barrels can be assumed to be similar to the success of residential compost bin programs.

Infiltration associated with cistern use is not expected to interfere with onsite wastewater treatment systems for several reasons. First, the cisterns will be collecting stormwater that would have, in part, otherwise infiltrated, thereby reducing local infiltration for a given storm event; and second, cistern water usage is designed to replace potable water use for irrigation, and therefore the overall result will be a reduction in total amount of water infiltration at the local scale. Other potential concerns include the need for property owners to carefully manage stored water from cisterns so as not to over water or result in runoff of stored water.

Local capture system option for use within the MCW, including analysis of cost, siting and usage are addressed in Section 4, Alternative Development and Evaluation; Section 5, Implementation Plan Commitments; and Section 6, Subwatershed Specific Implementation Plan.

2.2.2.2 On-site Infiltration

For Malibu Creek Watershed, the regional groundwater recharge opportunities are only slightly better than those for the coastal watersheds, which are minimal. LVMWD has investigated several locations, inside and outside the watershed, for groundwater recharge of recycled water through infiltration or injection. From this list of potential projects, LVMWD has not identified any viable projects, largely because of the same difficulties that face reuse of stormwater: lack of suitable alluvial aquifer, seasonality and need for storage, treatment needs, and poor aquifer water quality.

The one location that recharge of stormwater may be possible is Russell Valley. Even though the alluvial aquifer is shallow, it is connected in the subsurface to the Thousand Oaks alluvial aquifer. Infiltration of stormwater in Russell Valley may, if the subsurface aquifer geometry is conducive, allow for recharge of considerably more water than the small amount of storage considered available just within Russell Valley proper, by causing groundwater to flow to the north and west into Thousand Oaks Valley. An investigation of Russell and Thousand Oaks basins would be required to fully understand the consequence of recharge. Russell Valley is at the upper reaches of Triunfo Creek and Lindero Creek, and to the extent that urban runoff from MS4s could be re-routed to infiltration systems (e.g. above ground basins, below ground storage and infiltration systems) rather than to these two creeks, it could ultimately benefit downstream water quality. However, because of the location at the upper reaches of the watershed, the quantity of water available for infiltration will not represent a significant portion of the MCW storm flows.

LVMWD has investigated a number of possibilities for increasing use of recycled water in Malibu Creek Watershed. Many of these possibilities include transfer of water out of the basin, or increased treatment and transfer to local reservoirs. The bedrock aquifers, through injection, have been considered for aquifer storage and recovery projects (LVMWD, 2005), but because of poor water quality as well as issues of storage and treatment needed for stormwater, are not considered suitable. None of the LVMWD studied projects would be suitable for stormwater, due to stormwater timing, quantities and flow rates involved, storage and treatment difficulties.

Local, or on-site, infiltration projects could be more successful. Specific areas where local infiltration projects would be useful, based on the presence of alluvial deposits, include the creeks of the upper portion of Malibu Creek Watershed, in particular Upper Lindero and Upper Medea creeks. These areas are within the service areas of wastewater treatment districts, and therefore infiltration would not impact onsite wastewater treatment systems. Consideration of local infiltration sites outside of wastewater district service areas will need to consider impacts on nearby onsite wastewater treatment systems prior to implementation.

To the extent that LVMWD identifies and implements expansions to their recycled water system, regional watershed stormwater management efforts benefit from these successes. As LVMWD finds customers or beneficial uses for all of its recycled water, stormwater may ultimately be able to fill any gap that develops between recycled water production and demand. For this reason, watershed management practices that further the goals of recycled water providers, will ultimately improve the likelihood of increased beneficial uses of stormwater.

The spatial distribution of alluvial deposits limits the potential areas of regional recharge. This highlights the importance of identifying local, on-site, infiltration sites associated with structural BMPs. The upper reaches of Malibu Creek Watershed, in particular Upper Lindero and Upper Medea creeks, where these alluvial deposits exist in areas of concentrated urban development, represent the initial focus area for siting local infiltration projects.

Opportunities exist for on-site infiltration, particularly in the neighborhoods of the upper watershed where local on-site infiltration BMPs could be effective for capturing runoff from small or low intensity intermediate sized storms. Most of these upper Malibu Creek Watershed tributaries contain moderate levels of development, making them optimal targets for BMP implementation.

2.2.3 Regional Reuse Opportunities

There are significant potential benefits for reuse of dry or wet-weather urban runoff where appropriate such as:

- Reducing downstream flows and BMP sizing
- Replacing/reducing the need for potable water
- Addressing multiple pollutants

Regional reuse opportunities considered include:

- Regional groundwater recharge to enhance water supply;
- Reuse of water for recreational uses; and
- Regional capture and reuse as irrigation or other non-potable supply.

This section provides an evaluation of regional capture and reuse for irrigation or other non-potable supply.

The largest single area for reuse of stormwater runoff is irrigation. Landscape irrigation is prevalent at golf courses, schools, parks and transportation or highway corridors. Reuse of stormwater for this purpose requires capture, storage, treatment and distribution.

Within the Malibu Creek Watershed, LVMWD has a well-developed recycled wastewater program that presently uses 60 percent of TWRF effluent, with the goal of using 100 percent. LVMWD has identified Malibu County Golf Course as a major potential customer, and has designed, and is presently seeking funding for, a distribution system to supply recycled water to the golf course (LVMWD, 2005). Wastewater reuse, and the simultaneous reduction of potable water imports into the watersheds, is a high priority consideration in any integrated watershed management plan.

LVMWD studies have identified numerous possible projects for use of recycled water (Kennedy Jenks, 2005). Many of these projects incorporate transfer of water out of the watershed in one form or another, and therefore are not considered further here. Several other projects consider the expanding use of recycled water by identifying new customers. Other projects of interest include constructing new, or increasing existing, surface storage facilities. In conjunction with groundwater recharge or wetland infiltration, storage projects could result in the beneficial reuse of considerable quantities of stormwater. Several storage/recharge projects were associated with Ahmanson Ranch development, and are therefore no longer viable. The remaining surface storage projects are also unlikely to occur due to the high costs involved in acquiring real estate (Kennedy Jenks, 2005).

As presented in Section 2.1.3.2, Regional Groundwater Recharge, the alluvial aquifers available for recharge projects are limited in number and size. In addition, the lack of existing significant groundwater extraction and poor water quality, result in a general lack of groundwater recharge opportunities for beneficial reuse of storm runoff.

Malibu Creek Watershed presents opportunities for regional reuse of stormwater, but difficulties identified by LVMWD for expansion of their existing recycled water program suggest similar difficulties for a regional reuse system for stormwater. These difficulties include lack of surface storage capability, lack of significant additional customer base, and high treatment and distribution costs. Lack of large alluvial aquifers, with existing significant groundwater withdrawals, limits opportunities for groundwater recharge and subsequent beneficial reuse of significant quantities of stormwater.

These limitations on regional reuse scenarios emphasize the importance of distributed, watershed wide, local small-scale stormwater reuse and infiltration projects as the most suitable management tool for reducing storm runoff. Opportunities exist for on-site infiltration, particularly in the neighborhoods of the upper watershed where local on-site infiltration BMPs could be effective for capturing runoff from small or low intensity intermediate sized storms. Most of these upper Malibu Creek Watershed tributaries contain moderate levels of development, making them optimal targets for BMP implementation.

2.2.4 Opportunities for Recreational Benefits

Implementation planning to address water quality impairments can also provide other benefits such as addressing needs for recreation, endangered species issues, wildlife habitat, public values (e.g., greenbelts and open spaces), and flood management. Likewise, developing recreational and open space opportunities often involves activities that can improve water quality and water conditions, thereby addressing other regional issues, such as TMDL requirements and ecological needs and benefits. Recreational lands and opportunities potentially suitable for integration with water quality improvement projects were identified for consideration in BMP siting.

Recreational sites with potential multi-beneficial use are listed and grouped by sub-watershed in Table 2-3, Recreational Sites in the Malibu Creek Watershed. Maps referenced in Table 2-3 showing the recreational sites can be found in Technical Memorandum 3.3 attached in Appendix B.

Sites identified as potentially appropriate for a combined recreational and water quality use were further assessed for appropriateness of various types of BMPs such as natural treatment systems, infiltration areas, or other structural BMPs that may be combined with enhanced recreational or education opportunities. Sites identified for specific types of recreational uses, such as equestrian trails or campgrounds were considered for site-specific BMPs such as increased signage or berms and planting to stabilize soil at trails or campgrounds.

Table 2-3
Recreational Sites in the Malibu Creek Watershed

Watershed	Sites	Map Number
Cheseboro Creek	Los Angeles County Landfill	2
	Liberty Canyon Open Space	2
Cold Creek	Cold Creek Kenders Open Space	4 and 5
	Cold Creek Valley Open Space	5
	Piuma Ridge Open Space	5 and 10
	Segalle Open Space	5
	Stunt Ranch Open Space	5
	Western Cold Creek Preserve	5
Hidden Valley Creek	Hidden Valley Open Space	2 and 3
Lower Las Virgenes Creek	Local Parks	2
	Malibu Creek State Park	2
Lower Lindero Creek	Local Parks	2
Lower Malibu Creek	Malibu Creek State Park	9
Lower Medea Creek	Paramount Ranch	2 and 4
Malibu Lagoon	Malibu Creek State Park	9 and 10
	Malibu Legacy Project	9 and 10
	Malibu Lagoon	9 and 10
Middle Malibu Creek	Tapia Park	5
Palo Comado Creek	Liberty Canyon Open Space	2
	Local Parks	2
Potrero Canyon Creek	Westlake Lake	2
Stokes Creek	Malibu Creek State Park	5
Triunfo Creek	Local Park	2
	Malibu Lake	2 and 4
Upper Las Virgenes Creek	Ahmanson Ranch (now called Upper Las Virgenes Open Space)	1
Upper Lindero Creek	North Ranch Open Space	2
Upper Malibu Creek	Malibu Creek State Park	5
Upper Medea Creek	Rancho Simi Park District	2
	Oak Park	2
Westlake	Westlake Area	2
	Lakeview Canyon Open Space	2

2.3 Description and Evaluation of Structural BMPs

Structural BMPs can be grouped into four general BMP categories, or "families." The primary differentiators of these structural BMP families are the size of tributary drainage area and implementing entities. The following BMP families include:

- Structural Institutional BMPs
- Distributed BMPs
- Regional/Subregional BMPs
- Stream Enhancement Measures

The BMPs within these families work by effecting treatment of pollutants or volume reduction. Treatment by disinfection is a conventional solution to bacterial contamination. While disinfection has been a standard practice in wastewater and water treatment for many years, many technologies can be adapted to stormwater applications. Stormwater disinfection may be accomplished through chemical treatment or natural treatment. It may be done in a larger regional facility or in smaller distributed facilities. Due to the various sources of bacterial pollutants and the difficulty in controlling them, regional or subregional disinfection strategies are common in bacteria control plans. However it should be noted that the successful control of bacteria in stormwater or dry-weather flows using standard disinfection practices is not well documented. In fact, bacterial regrowth immediately downstream of UV disinfection facilities has been observed in recent studies (City of Encinitas, 2006; Flow Science, 2005), indicating that a high level of treatment upstream may not necessarily equate to decreased water quality exceedance frequencies downstream. This issue is getting significant attention in a number of areas, one area of focus in whether bacteria growth really occurs for human pathologies.

Volume reduction is an important part of a larger strategy for controlling bacterial loads. Volume reduction measures include distributed BMPs such as downspout disconnects and bioretention areas, and regional or subregional BMPs such as infiltration basins. Volume reduction BMPs serve a treatment function (infiltrated water and associated bacteria is treated by soil and is completely removed from surface waters), a source reduction function (less water running across contaminated surfaces), and a peak flow mitigation function (although likely limited during large events). In addition, the reduction of flow rates and volumes reaching regional or sub-regional treatment facilities allows for smaller regional facility designs.

Table 2-4 identifies and provides brief descriptions of BMPs within each of these families that could contribute to achievement of the Bacteria TMDL and the primary pollutant reduction mechanism employed.

Table 2-4
Structural BMPs

BMP Category / Type	Potential Mechanisms	Description
Structural Institutional BMPs	Coordinated programs that are developed and implemented by local or County jurisdictions. With high levels of participation, structural-institutional BMPs can be a cost-effective stormwater quality and volume management strategy.	
Development and Redevelopment Design Standards	Volume Reduction, Flow Control, WQ	Standards requiring implementation of BMPs associated with new or re-development activities.
Downspout Disconnection Program	Volume Reduction, Flow Control	Program to decrease system connectivity and increase on-site infiltration; can be incentive-based
Residential Stormwater Fee Discount Programs	Volume Reduction, Flow Control, WQ	Offer discounted stormwater fees for implementation of on-site BMPs
Commercial and Industrial Area Retrofit Programs	Volume Reduction, Flow Control, WQ	Encourages voluntary implementation of structural retrofits in commercial and industrial developments
Stream Buffers	Volume Reduction, WQ	Provides natural vegetation corridors to help protect stream banks and reduce pollutant loads from urban runoff
Horse Farm Retrofit Program	Source Control	Includes design standards, education, and BMP retrofits to reduce pollutant runoff loads
Distributed BMPs	BMPs that employ a variety of natural and constructed features to reduce the rate of runoff, filter pollutants, and facilitate the infiltration of water into the ground at the parcel scale.	
Local Capture System	Volume Reduction, Flow Control	Cisterns, rain barrels or other holding tanks for peak flow reduction and on-site reuse
Vegetated Treatment Systems	WQ, Volume Reduction, Flow Control	Vegetated swales, bioretention areas, etc. to filter and infiltrated runoff; support natural treatment mechanisms
Media Filtration	WQ	Specialized filtration processes for removal of pollutants, including bacteria; can include cartridge filtration, sand filtration, etc.
Local Infiltration Systems	Volume Reduction, Flow Control	Site-scale infiltration basins or pervious wearing surfaces such as grass pavers or pervious asphalt
Street and Parking Lot Biofiltration Retrofits	WQ, Volume Reduction, Flow Control	Small scale vegetated facilities to improve WQ, and promote infiltration
Equestrian Related Post-Construction BMPs	Volume Reduction, Source Control	Facilities and practices for horse farms to reduce pollutant loadings and runoff volume
Regional/Subregional BMPs	Facilities that provide treatment for moderate to large size catchments, on the scale of 10s to 100s of acres, up to square miles	
Regional Detention	Flow Control, WQ	Provide peak flow mitigation and some WQ benefits through the detention of runoff in large basins
Regional Infiltration	Volume Reduction	Large, shallow basins that retain and infiltrate all contributing runoff

Table 2-4 (Continued)
Structural BMPs

BMP Category / Type	Potential Mechanisms	Description
Regional Natural Treatment Systems	WQ, Volume Reduction, Flow Control	Vegetated facilities that rely on natural mechanisms to improve WQ, also promote infiltration; examples below.
Free Surface Flow Wetlands	WQ, Volume Reduction, Flow Control	Constructed wetlands in which water flows on the ground surface
Sub-Surface Flow Wetlands	WQ, Volume Reduction, Flow Control	Constructed wetlands in which runoff is routed through a sub-surface matrix that supports surface vegetation, provides aerated and anoxic zones
Treatment Facilities	WQ, Disinfection	Regional and subregional disinfection facilities that inactivate bacterial loads; examples below
Wastewater Treatment Plant	WQ, Disinfection	Stormwater diversions to WWTPs reduce pollutant loads to streams, provide reliable treatment
UV Irradiation	Disinfection	Facilities using UV light to inactivate pathogens
Ozone	WQ, Disinfection	Ozone is generated onsite and used as a disinfecting agent.
Biocides and Peracetic Acids (PAA)	WQ, Disinfection	Disinfects runoff through oxidation with PAA
Riparian Enhancement	The use of upland, riparian, and in-stream techniques to enhance natural riparian functions.	
Bank and Channel Stabilization	Habitat Enhancement, WQ	BMPs to mitigate erosion and hydrodynamic impacts of watershed urbanization on streams; support natural uptake and filtration mechanisms mechanism; protect against regrowth and remobilization issues.
Wetland Enhancement	Habitat Enhancement, WQ	BMPs to improve wetland function; support natural treatment mechanisms found in wetlands

BMP – Best Management Practice
PAA - Peracetic Acids
UV – Ultra Violet
WQ – Water Quality
WWTP – Waste Water Treatment Plant

Additional information on the structural BMPs listed can be found in Technical Memorandum 7.2 attached in Appendix B.

Many of the BMPs found in Table 2-4 also provide treatment for other common stormwater constituents. In the interest of integrated resource management, the other treatment capabilities of BMPs should be identified and considered when selecting suites of BMPs for bacteria control. Treatment capabilities of the structural BMPs listed in Table 2-4 can be found in Table 2-5.

Table 2-5
Pollutant Removal Capabilities of Structural BMPs

Structural BMP Category	Target Pollutants					
	Trash	**Sediment**	**Nutrients**	**Metals**	**Bacteria**	**Organic Pollutants**
Distributed BMPs						
Local Capture Systems	◐	◐	◐	◐	◐	◐
Vegetated Treatment Systems	●	●	●	◐	◐	◐
Media Filters	●	●	○	◐	○	○
Local Infiltration Systems	●	●	●	●	●	●
Street and Parking Lot Biofiltration Retrofits	●	●	●	◐	◐	◐
Equestrian Related BMPs	○	◐	●	○	●	○
Regional/Sub Regional BMPs						
Regional Detention	●	●	◐	○	○	○
Regional Infiltration	●	●	●	●	●	●
Regional Natural Treatment Systems	●	●	●	◐	◐	◐
Treatment Facilities (Wastewater Treatment Plant, UV, Ozone)	●	●	○	◐	●	◐
Biocides	○	○	○	○	◐	○
Bank and Channel Stabilization	○	●	◐	○	◐	◐
Wetland Enhancement	●	●	●	●	●	●

[1] ● High Effectiveness ◐- Moderate Effectiveness ○ - Limited Effectivenes
[2] All pollutant groups include trash, sediment, nutrients, metals, bacteria, and organic pollutants

2.3.1 General Treatment Strategies

Various combinations of the BMPs discussed above could be used to control bacteria and other pollutant loads in the MCW. In this section, several general treatment strategies are developed for subwatershed scale bacterial and multi-pollutant control. These general treatment strategies are defined by the way the effects of bacteria and other pollutants in stormwater runoff are mitigated. They include: 1) treatment and discharge, 2) treatment and beneficial reuse/recharge, 3) infiltration, and 4) enhancement of natural systems. This section outlines the ways in which each treatment strategy could be applied to a generic subwatershed, identifies possible combinations of BMPs for each category, and discusses factors to consider for cost, risk, performance and implementation of each general strategy. Application of the general treatment strategies to specific subwatersheds is the focus of Section 6.

2.3.1.1 Treatment and Discharge

Strategies that involve the treatment and release of stormwater can be versatile for implementation in almost any subwatershed. The level of treatment provided by such strategies can also be easily modified as needed through the selection of different components. As described earlier in Section 2.3, BMPs are available on either the distributed level or the regional level that are capable of various levels of treatment. This general treatment strategy encompasses any BMP or combination of BMPs in which treatment is provided and released to streams (without beneficial reuse) is the primary disposal mechanism. Potential combinations of BMPs that could constitute a treatment and release strategy utilizing the preferred BMPs include:

- Distributed vegetated treatment facilities
- Distributed media filtration facilities
- Regional off-line constructed wetland (with or without distributed volume reduction)
- Regional UV disinfection facility (with or without distributed volume reduction)
- Regional ozone disinfection facility (with or without distributed volume reduction)
- Capture and diversion to a wastewater treatment plant (WWTP).

2.3.1.2 Treatment and Beneficial Reuse

Strategies that involve the treatment and beneficial reuse or recharge of stormwater can be very efficient methods for the reduction of bacterial and other pollutant loads to receiving waters and the reduction of demands on in-stream water rights or municipal water supplies. Where the demand exists for reused water, treatment and reuse strategies can be developed to fit most subwatersheds. The level of treatment provided by such strategies can also be modified based on the requirements of the reuse application. BMPs supporting this strategy are available on either the distributed level or the regional level that are capable of various levels of treatment. This general treatment strategy encompasses any BMP or combination of BMPs in which treatment is provided and either beneficial reuse or recharge is the primary disposal mechanism. Potential combinations of BMPs that could constitute a treatment and reuse/recharge strategy utilizing the preferred BMPs include:

- Distributed capture with beneficial reuses
- Regional treatment with beneficial reuses.

2.3.1.3 Treatment and Infiltration

Strategies involving the full or partial infiltration of stormwater runoff can be very effective as bacterial control strategies. Where soils and topography are favorable, infiltration strategies can eliminate or significantly reduce the volume of stormwater runoff and its corresponding bacterial and other pollutant loads. While infiltration facilities are not intended to recharge groundwater directly, infiltrated water can percolate downward towards aquifers, mimicking the more natural hydrology of a site. Infiltration facilities can be located at either the distributed or regional scale. An infiltration strategy for a subwatershed could include:

- Distributed infiltration facilities
- Regional infiltration facilities
- Combination of regional and distributed infiltration facilities.

In general, infiltration can be considered when water can infiltrate in approximately 48 to 72 hours.

2.3.1.4 Riparian Enhancement

Strategies involving riparian enhancement could potentially be effective for bacterial control by mitigating potential bacterial regrowth and resuspension of bacteria-laden sediments. Where streams are degraded, their natural bacteria-controlling functions can be compromised. Degraded streams could potentially be a source of bacteria in the watershed due to the animal populations they support and the sediment loads they can contribute to downstream waters. Enhancements to streams and wetlands can help them recover their natural bacteria-controlling functions which include filtration, sediment retention, predation and competition. While these enhancements are not usually considered to be stand-alone treatment strategies, they could contribute to bacteria control in the MCW. Enhancement strategies for a subwatershed could include:

- Stream enhancement
- Stream enhancement with distributed treatment/volume reduction/ flow control BMPs
- Stream enhancement with regional flow control facilities.

It should be noted that stream buffers placed near animal grazing areas may actually cause an increase in bacteria because of the movement of animals into the buffered area for food and shelter. The use of fencing or other obstructions may be necessary to keep grazing animals out of these areas.

2.3.2 Criteria for Evaluation of Treatment Strategies

Among the treatment strategies identified, costs, risks, performance and implementability vary greatly. In the selection of treatment strategies each of these factors, and others, should be considered and weighted appropriately. Comparing a program of downspout reconnections to a regional disinfection facility illustrates this point. The cost, both for installation and O&M, of the former is much less than that of the latter. However, the reliability and performance associated with the regional facility could prove to be worth the cost. How these conflicting areas should be weighted can depend on agency-specific and/or subwatershed-specific factors. Agencies reserve their legal rights, pursuant to state and federal law, to implement treatment strategies for this and other TMDLs in the manner they deem most effective in consideration of the goals and factors set forth herein. This section discusses the factors that should be considered when evaluating the cost, risk, performance, and implementability of a treatment strategy. Integrated management considerations are also discussed, as well as, subwatershed-specific considerations in terms of how they could impact the selection of a treatment strategy.

2.3.2.1 Cost Considerations

When determining the cost of a treatment strategy on a subwatershed scale, various costs should be assessed. These costs should include: design and installation costs, land acquisition costs, O&M costs, and replacement costs. Often these costs will need to be estimated when they are dependent on voluntary participation or other unpredictable factors. For example, if incentives were offered for onsite BMP retrofits, project cost would depend on the level of participation in the program. In an integrated management approach, the level of expenditure on one system element, could impact the cost of another element. For example, if a strategy was proposed that coupled distributed infiltration facilities with regional disinfection facilities, the required size of the disinfection facility could be impacted by the extent of implementation of distributed infiltration facilities.

These examples suggest that the use of unit cost methods at the planning level would be appropriate. Unit cost methods allow for rough cost estimates by developing relationships between BMPs costs and independent variables such as the volume or flowrate to the treatment facility, the area of land or number of lots draining to a facility, or the number of participants in a program. The relationships are intended to be applied broadly and do not account for site-specific variations. Despite these limitations, unit cost methods can be valuable tools for preliminary planning.

2.3.2.2 Non-compliance Risk Considerations

Risk is defined as the risk of non-compliance with regulatory limits. Non-compliance could be due to ineffectiveness of a treatment strategy, component failure, or inadequate sizing of facilities. Risk of hazard to human health, environmental risk, and the risk of detrimental impact to other beneficial uses are not included in the evaluations. These risks should be the focus of subsequent planning and design activities.

Risk of non-compliance and treatment strategy performance are integrally linked. The primary factors influencing risk of non-compliance are the effectiveness and performance of the BMPs that make up a treatment strategy. Therefore, a proper evaluation of risk of a treatment strategy should include an assessment of the system components and their performance and limitations. For some BMPs, such as active regional facilities, performance can be controlled through process modifications. Conversely, for most passive BMPs, it is difficult to modify performance once they are operational. For some of these, extensive studies have been completed to predict the performance of these facilities. For others, levels of performance are less certain. Both the level of performance and the reliability of a BMP are important to consider.

Because compliance is usually gauged at a subwatershed level, the performance of a treatment strategy at the subwatershed level is ultimately more important than the performance of individual BMPs. However, due to the number of variables that exist on a subwatershed scale, level of performance at this level is harder to predict. Subwatershed-scale models can be developed to help with the prediction, but the degree of certainty of these models is less than for a smaller better-defined catchment. Due to the difficulty of estimating performance at the subwatershed scale, the concept of adaptive management is widely used. Simply stated, adaptive management involves selecting a treatment strategy, making predictions of performance, implementing the strategy, monitoring performance, and making modifications to the strategy where they are needed. Adaptive management, if responsive, can be a very effective way of mitigating risk on a subwatershed or watershed scale.

2.3.2.3 Implementation Considerations

The implementability of a treatment strategy is among the most important of the factors considered in the selection process. A strategy can appear to be the most appropriate in terms of cost, performance, and risk, but if it cannot be reasonably implemented, the strategy may not be feasible. Fortunately, a variety of implementation strategies are available.

Different implementation strategies are applicable at different scales. Distributed BMPs are often implemented as institutional structural BMPs. For institutional structural BMPs, two basic implementation strategies are available: ordinance-based and incentive based. An example of ordinance-base implementation would be the development of design standards for new and re-development. Property owners seeking to develop or re-develop land would be required to include BMPs in their design. An example of incentive-based implementation would be a program that offers discounted stormwater fees for BMP installation on private lots. Watershed-specific factors would help determine which would be more appropriate. Other BMPs are implemented through public works projects. These projects can be implemented through retro-fit of existing right-of-way, inclusion of BMPs in design standard for public works projects, or constructing BMPs on public or acquired lands. Examples might include planter-box swales in street redevelopment, pervious pavement in public parks or the acquisition of a large parcel of land for an infiltration basin.

Potential barriers to implementation should be identified and considered. These could include:

- Conflicts of interest with respect to public land use,
- Difficulty in land acquisition,
- Poor participation in or resistance to voluntary programs,
- Lack of funding and/or staff to complete public works projects,
- Conflicting beneficial uses,
- Jurisdictional issues, and
- Regulatory conflicts.

Identification and consideration of potential barriers to implementation should be a component of subwatershed-specific evaluations.

2.3.2.4 Integrated Resource Management (Beneficial Reuse) Considerations

Integrated resource management of stormwater involves the development of management strategies that address as many pollutants as possible and support beneficial uses. In the selection of strategies for bacteria control in the MCW, integrated management should be a consideration. Some treatment strategies for bacterial control are also effective for controlling other pollutants; others are only effective for bacteria or provide limited treatment of other contaminants. Likewise, some strategies support beneficial reuses more than others. Effort should be made to understand the full treatment capabilities of BMPs and the beneficial reuses that could be supported within a subwatershed. Where possible, treatment strategies should be selected that use “multi-purpose” BMPs and support beneficial reuses. However, because bacteria contamination is regulated under the TMDL, and the purpose of the treatment strategies developed in this evaluation are specifically to address this TMDL, treatment strategy effectiveness should not be unnecessarily sacrificed to support integrated management goals. It may be the case that the only appropriate strategies for some subwatersheds are those that treat only bacteria.

2.3.2.5 Subwatershed-specific Considerations

In the selection of a treatment strategy for a subwatershed, the characteristics of the subwatershed should play a major role. While the other considerations discussed in this section, such as cost and risk, are important, the selection of a strategy that best fits the unique nature of the subwatershed generally satisfies the other considerations as well. For example, a watershed with uniquely infiltrative soil would lend itself to the implementation of an infiltration-based strategy which would be cost effective, low risk, high-performing and implementable. The following list includes subwatershed-specific factors that should be considered when selecting a treatment strategy.

- Priority ranking of the subwatershed,
- Pollutant sources within the subwatershed,
- Land use distribution in the subwatershed,
- Availability of land suitable for regional BMPs,
- Jurisdictional authorities within the subwatershed,
- Available capacity in local WWTPs,
- Specific beneficial reuse options within the subwatershed,
- Soil and topographic data for the subwatershed, and
- Riparian conditions.

The impacts of each of these aspects on the selection of treatment strategies are discussed below.

Subwatershed priority ranking. As described in Section 2.2, subwatersheds within the MCW were identified as high-, medium-, or low-priority based on their relative contribution of pollutants and the impact of these pollutants on the water quality in 303(d)-listed waterbodies within the MCW. The priority ranking of a subwatershed should have a significant impact on which treatment option is selected. For higher priority subwatersheds, more emphasis should be placed on treatment effectiveness than on cost, while for lower priority subwatersheds it may be more appropriate to use lower cost, if less effective BMPs. For example, using distributed BMPs as a stand-alone solution for a high-priority watershed would not be advisable. While distributed BMPs such as vegetated treatment, media filtration, or local treatment could provide some volume reduction, peak flow mitigation and/or treatment, widespread application of these BMPs would be necessary to provide load reductions sufficient to meet regulatory criteria. In some cases, the best possible performance through distributed BMPs may not be enough. For such a subwatershed, a regional facility may be a better option for achieving reliable compliance. Distributed BMPs could be implemented to reduce the size of and optimize the function of a regional BMP.

Pollutant sources. The nature of pollutant sources within the subwatershed may impact which treatment strategy is selected. Where pollutant sources are well-defined and/or localized, distributed BMPs could be more appropriate than regional facilities. Where pollutant sources are less defined or less concentrated, regional strategies may be the only option to remove a significant portion of the load. In this case, distributed facilities could provide benefits through volume reduction, but might not be able to remove a significant fraction of the load. For example, if the majority of bacterial loading in a subwatershed is thought to originate from a specific area of commercial development or from several horse farms, it would be more appropriate to implement distributed BMPs or sub-regional treatment facilities to control this loading closer to the source than to attempt to treat runoff from the entire basin in a regional facility.

Beneficial reuse options. Beneficial reuse of stormwater can be a desirable alternative in semi-arid regions such a Southern California. Therefore, the options for beneficial reuse within the subwatershed and their locations should be identified. Water quality and volume requirements for these beneficial uses should also be identified. In the case of high volume demands and low water quality standards, a detention pond and transmission pipeline could accomplish this. More likely, a steady, controlled flow of partially treated water might be desired for applications such as supplying a wetland. In the case of a beneficial reuse (such as residential irrigation) desiring a large supply of disinfected water, a regional treatment and distribution facility could be necessary.

Land use distribution. The subwatersheds within the MCW vary significantly in their land use distributions. Selection of a treatment strategy should take into account the land use within the subwatershed. For example, where land use is primarily undeveloped or agricultural, but bacteria loadings are high, distributed or regional BMPs that address runoff from developed areas may be ineffective. It may be more appropriate to look at BMPs that focus on agricultural runoff or identify stream enhancement projects that could provide better in-stream treatment of bacteria from natural sources. Relative size and proximity of land-uses may be important in conjunction with the identification of potential beneficial uses. If a subwatershed has a large demand for reused stormwater, but a small area that would generate capture-able runoff, a regional facility may be the only option to meet the demand. Conversely, if a watershed has more capture-able runoff potential than reuse demand, it may be more appropriate to implement distributed detention over part of the subwatershed and address the other areas with treatment and recharge or another type of treatment strategy. A potential source of reusable stormwater located in close proximity to a potential demand could indicate the potential for a beneficial reuse strategy.

Availability of land suitable for regional BMPs. Regional BMPs generally require a significant amount of land in an appropriate location within the subwatershed. Regional infiltration facilities require large flat parcels. While treatment facilities would have small footprint, the accompanying detention/sedimentation facility that is necessary for flow equalization would require a large lot. Lack of a suitable site for a regional facility within a subwatershed would suggest the use of distributed BMPs for stand-alone treatment or the widespread use of distributed volume reduction BMPs to reduce the regional facility to an acceptable size for the available land.

Soil and topography. The performance of infiltration facilities is very dependent on soil characteristics, topography, and subsurface geologic and groundwater conditions, thus these factors should be considered when selecting an infiltration strategy for a subwatershed. For example, if soils offer better infiltration in the upper areas of a subwatershed than near the outlet of the catchment, it may be more appropriate to institute distributed infiltration facilities in these areas to eliminate or place less demand on a regional infiltration facility. Conversely, if a large section of the subwatershed is made up of impervious soils, a regional infiltration facility may be required to accept runoff from these areas. As another example, if the terrain in the lower part of the catchment is too steep for a regional detention facility, sub-regional or distributed facilities may be the only infiltration strategies available. Because infiltration is a desirable option for bacterial control, soil and topography of a subwatershed should always be considered to identify areas where infiltration may be implemented.

Jurisdictional issues. Some subwatersheds within the MCW are split between two or more jurisdictions. In such a subwatershed, the selection of a treatment strategy could be impacted by jurisdictional issues. For example, the implementation of a distributed BMP program could be more difficult and/or less effective if jurisdictional issues kept the program from being applied throughout the subwatershed.

Available capacity in local WWTP. In order to consider a strategy involving capture and diversion of stormwater to a WWTP the capacity of the plant would have to be shown to be adequate. The TWRF is the only wastewater treatment facility in MCW.

Riparian conditions. The condition of riparian areas should be considered when selecting a treatment option. At sites with degraded or historic wetlands, the potential for water quality benefits could be high with wetland enhancement. Wetland enhancements provide excellent opportunities to improve the natural bacteria-controlling function of the watershed and implement integrated management. Where erosion due to high peak flows is evident (down cutting, etc.) in streams, bank and channel enhancement projects should be considered in conjunction with energy-reducing flow control facilities. Mitigating the damage to stream channels and reducing the sediment transport can have positive effects on bacteria control. Stream restorations are also a good example of integrated management.

2.4 Description of Potential Non-Structural BMPs

Enhancements to existing non-structural BMPs and/or new non-structural BMPs that address the major sources thought to be substantially contributing to exceedances of water quality objectives for all pollutants in both dry- and wet-weather conditions have been assessed for their ability to reduce pollutant loading within the Malibu Creek Watershed as well as provide multi-benefits.

BMPs from the existing MS4 NPDES Programs (Los Angeles County, Ventura County, Caltrans) were reviewed to identify the baseline BMP programs currently being implemented. An evaluation of these BMPs provided the basis for identifying and evaluating new or enhanced BMP programs that can assist in meeting regulatory requirements. Five criteria were developed as a means to evaluate the enhanced and new non-structural BMPs to address dry- and wet-weather pollutant loading:

- Target constituents
- Relative cost
- Risk of implementing a BMP
- Risk of not implementing a BMP
- Dry- and wet-weather applicability

In addition, for each BMP evaluated, applicable performance measures were developed to measure the success of the BMP. Definitions of the evaluation criteria and rating scales are provided within this section.

BMPs included additions to the NPDES permit programs such as: public outreach, industrial/ commercial facility control, development planning and development construction, public agency activity, and public agency illicit connection/illicit discharge control, as well as opportunities for OWTS management.

The program enhancements identified include items from the following sources:

- Existing watershed efforts and stakeholder input,
- MCW Bacteria TMDL Work Group meeting discussions,
- Notable programs or BMPs being implemented in parts of the watershed, and
- Notable programs being implemented in other jurisdictions.

The potential new or enhanced non-structural BMPs for implementation, were evaluated, as described below for inclusion as part of the TMDLIP.

2.4.1 Effectiveness Criterion

An effectiveness criterion is used to determine the degree to which non-structural BMPs would have an impact on alleviating both dry- and wet-weather bacterial loading to water courses in the MCW. Effectiveness for purposes of this evaluation is a subjective assessment of the relative ability of a non-structural BMP to reduce dry and/or wet-weather bacterial loading, thus presumably improving water quality in the MCW. In the absence of detailed source identification data that can directly relate bacteria data in runoff to specific sources, it is difficult to adequately quantify the effectiveness of non-structural BMPs. Therefore, a broad scale was developed and applied to the effectiveness criterion to assist in developing uniform criteria for evaluation:

- Above Average – BMP is more effective in reducing bacteria loading than other BMPs;
- Average – BMP is average in reducing bacteria loading as compared to the other BMPs; and
- Below Average – BMP is less effective in reducing bacterial loading than other BMPs.

The following provide examples of how these ratings might be applied:

- If a BMP targets a source that is likely to have a high bacterial loading and the BMP would affect a relatively large area or a large group within the watershed, then the effectiveness relative to other BMPs would be considered above average.
- If a BMP targets a source that is not a major contributor of bacterial loading loading but may be somewhat significant and if its applicability throughout the watershed is moderate, the BMP would be considered average in its effectiveness relative to other BMPs.
- If a BMP affects only a minor or infrequent source of bacterial loading to the watershed and its applicability to the watershed is relatively isolated, its effectiveness rating relative to other BMPs would be considered below average.

2.4.1.1 Cost Criterion

Evaluating the relative cost of each non-structural BMP in combination with the other criteria is necessary to assist in determining if a BMP should be implemented. For purposes of this evaluation, costs include a relative measure of the costs associated with additional staff time on behalf of the implementing agencies and materials and equipment, including both start-up costs, and ongoing operational requirements. Costs are reflective of the cost to an agency and do not reflect costs assumed by others, such as the cost of treatment control BMPs that would be paid for by developers.

The TMDLIP submitted for the Santa Monica Bay Beaches Wet-Weather Bacteria TMDL, Jurisdictions 1/4 (J 1/4) developed in 2005, included a method for identifying and evaluating the most appropriate BMPs to achieve the desired TMDL objectives. Consistent with the methodology that was used in the J 1/4 Wet-Weather Bacteria TMDLIP, the following scale was developed to evaluate costs for each BMP in the MCW:

- Low cost - $0 to $10,000;
- Medium cost- $10,001 to $250,000; and
- High cost - $250,001 and up.

A value of "low-medium" or "medium-high" denotes an additional range of cost for that BMP.

2.4.1.2 Risk of Implementing Criterion

Each non-structural BMP has a risk associated with implementation. Implementation risks include financial or other burdens placed on businesses, residents, and non-residents; increased level of effort required on behalf of public agencies; regulatory constraints; public resistance; political issues; and over saturation of public outreach materials. The higher the implementation risk, the less of a chance a BMP will be performed properly and sustained, and consequently the lower the likelihood that the BMP will result in a reduction of bacterial loading. The following scale was used to evaluate implementation risk of non-structural BMPs:

- Low – Risk associated with implementation is low. There is a low chance that the BMP will not be successfully implemented;
- Medium – Risk associated with implementation is medium. There is medium chance the BMP will not be successfully implemented; and
- High – Risk associated with implementation is high. There is a high chance the BMP will not be successfully implemented to the extent anticipated.

A value of "low-medium" or "medium-high" denotes an additional range of risk for that BMP.

2.4.1.3 Risk of Not Implementing Criterion

Not implementing a non-structural BMP also has an associated risk. A lack of implementation can result in an agency not achieving compliance with the Dry- and Wet-Weather Bacteria TMDL for the MCW and/or the applicable NPDES permit. By not implementing a BMP that targets a source associated with high bacterial loading, for example, the risk of not achieving compliance with the TMDL would be increased. The risk of not implementing a BMP is measured using the following scale:

- Low – Risk associated with no implementation is low. There is a low chance that not implementing the BMP will result in non-compliance;
- Medium – Risk associated with no implementation is medium. There is medium chance that not implementing a BMP will result in non-compliance; and
- High – Risk associated with no implementation is high. There is a high chance not implementing a BMP will result in non-compliance.

A value of "low-medium" or "medium-high" denotes an additional range of risk of not implementing for that BMP.

2.4.1.4 Dry- and/or Wet-Weather Applicability

Each non-structural BMP is more or less effective under either dry-weather runoff conditions, wet-weather runoff conditions, or equally effective under both. Evaluation of the BMPs under the two runoff conditions allows for determination of the proper suite of non-structural BMPs for implementation to address bacterial loading under both the dry- and wet-weather conditions recognized in the TMDL. The following scale was used to determine the specific weather condition the BMP operates best under:

- Wet – BMP tends to be more dominant in addressing bacterial loading during wet-weather;
- Dry – BMP tends to be more dominant in eliminating non-stormwater flows or reducing bacterial loading during dry-weather; and
- Both – BMP tends to be more or less equal in addressing bacterial loading during wet- and dry-weather.

2.4.1.5 Performance Measures

Success of non-structural BMPs is determined by a set of performance measures. Performance measures allow agencies to determine if a non-structural BMP is operating within a specified range of performance. Unlike structural BMPs, success of a non-structural BMP is not readily defined as a measurable reduction in bacterial loading based upon sampling results. Success for non-structural BMPs are determined by meeting pre-defined performance targets set by the agencies, such as the number of impressions associated with public outreach materials or the frequency of restaurant inspections.

2.4.2 Potential Activities and Enhancements

Potential new or enhanced non-structural BMPs for implementation, along with their evaluation are summarized in Tables 2-6, 2-7, 2-8, 2-9, 2-10 and 2-11.

Table 2-6
Public Information and Participation Programs (PIPP)
Enhancement Program Evaluation

BMP Name	Description	Evaluation Criteria: Effectiveness for Reducing Bacteria	Cost	Risk of Implementing	Risk of Not Implementing	Effectiveness in Dry or Wet Weather	Performance Measures
Residential PIPP							
Pets							
Outreach to Pet Owners Linking Waste to Bacterial Loading	Outreach to pet owners establishing a link between animal wastes and health issues and focus on point of contact. The objective of this recommendation is to target pet owners with information about pet waste and its impact on water bodies.	Above Average	Low	Low	Medium-High	Both	Number of impressions
Animal License Fee Add-on	Increase animal license fees (dogs and horses) with fee to contribute towards partially paying for treatment of bacterial loading from pets; educate pet owners on reason for increased fee	Above Average	Low	Medium	Medium	Both	Additional funds raised
Place Pet Waste Bag Dispensers at Trailheads	Place pet waste bag dispensers at trailheads and trash cans with lids, if trash cans with lids are not already present.	Above Average	Low	Low	Medium-High	Both	Number of trailheads with bags and number of bags distributed
Pet Store/Vet/Shelter POS Campaign	Distribution of outreach materials at point of sale facilities regarding the link between pets and bacterial loading of water bodies.	Above Average	Low	Low	Medium-High	Both	Number of participants.
Residential Equestrian							
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Bacteria TMDLs (combine with commercial inventory effort)	This program will educate the owners of confined animals about bacteria TMDLs and steps they can take to decrease negative impacts on the environment. A network of volunteers from environmental organizations could be trained in this area.	Above Average	Low	Medium	Medium-High	Both	Number of owners trained and survey.
Educate horse/livestock users on the use of exclusion fences	Create educational materials for horse/livestock owners about exclusion fences and the benefits	Above Average	Low	Medium	Medium	Both	Number reached.
Educate horse/livestock users on the manure management	Create educational materials for horse/livestock owners about manure management	Above Average	Low	Medium	Medium	Both	Number trained and number of fences installed.
Support Efforts to Create Updated Horse BMP Outreach Materials	Support RCD and County efforts to create horse BMP outreach materials for both the County-wide horse community and agency regulatory staff. Work with other stakeholders to distribute materials and create awareness.	Above Average	Medium	Low	Medium	Both	Completion of updated Horse BMP Outreach Materials and number distributed.
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots	Post signs at City and County-owned trailheads designated for equestrian users to not clean out horse trailers in parking lots and to clean up horse waste.	Below Average	Low	Medium	Low	Both	Number of signs installed
Visitors/Recreation							
Outreach at Trailheads to Emphasize use of Restrooms and Proper Waste Disposal	Posting signs at trailheads to remind hikers to use the restroom before a hike will both increase awareness and prevent improper waste disposal.	Below Average	Low	Medium	Low	Both	Number of signs installed
Increase Lagoon & State Park Educational Signage on Water Quality	Encourage incorporation of watershed-related info at Lagoon and other state parks – update signage, add kiosks, include watershed model.	Average	Low	Medium	Low	Both	Development of revised signs and installation
Partner with California State Parks and NPS to Develop Educational Signs in Campgrounds to Target Visitors	Work closely with State Parks and NPS to install educational signs in campgrounds and parks, including language on proper disposal of diapers and wipes.	Below Average	Low	Medium	Medium	Both	Number of signs installed
Work with the County Outreach Coordinators to Identify Methods to Reach Visitors to the Watershed	Develop an outreach campaign to educate visitors on the general watershed concept	Average	Low-Medium	Medium	Medium	Both	TBD based on program.
OWTS							
Voluntary Septic Inspection and Maintenance Program	Implement a voluntary inspection and reporting program including education on the importance of proper maintenance; reminders would be sent with property taxes or utility bills; incentives possible offered for participation	Average	Low	Low	Low	Both	Number of calls or requests.
Provide Septic System (OWTS) Pumpers and Customers with Septic System Guides	The goal of this suggestion is to provide septic system owners with information pertaining to their septic system and how to prevent pollution using proper maintenance procedures.	Above Average	Low	Low	Medium	Both	Number of impressions

Table 2-6
Public Information and Participation Programs (PIPP)
Enhancement Program Evaluation

BMP Name	Description	Evaluation Criteria: Effectiveness for Reducing Bacteria	Cost	Risk of Implementing	Risk of Not Implementing	Effectiveness in Dry or Wet Weather	Performance Measures
Dry-Weather Flow							
Mailers or Other Outreach for Proper Pool Drainage	Mailers to residents with pools, point of sale distribution of materials (pool stores, other stores selling pool chemicals and maintenance items), distribution of materials to HOAs and Poolmen's Association to not drain pools into the storm drain system and provide alterantive practive recommendations (eg. drain to landscaping). Reducing dry weather flow in drainage system reduces opportunities for bacteria pick-up, transport, and regrowth.	Below Average	Low	Low	Low	Dry	Number of materials distributed, number trained.
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation	Partnerships with HOAs to educate residents; work with HOAs to reduce runoff from common area landscaping.	Above Average	Low	Low	Low	Dry	Number of HOA partnerships established, number trained, number of presentations, and percentage reduction in water use.
Work with LVMWD, WBMWD, and District No. 29 to Support/Expand Water Audit and Conservation Programs	Work with Las Virgenes Municipal Water District (LVMWD) and West Basin Municipal Water District (WBMWD), Los Angeles County Waterworks District No. 29 (District No. 29) and to support and expand water conservation and water audit programs and make link to bacterial loading caused by runoff.	Above Average	Medium	Low-Medium	Medium	Dry	Number of water audits conducted, number of conservation programs, and percentage reduction in water use.
Partnership with LVMWD, WBMWD, and District No. 29 in Relating Conservation of Water to Water Quality of Urban Runoff to the Public	Work closely with Las Virgenes Municipal Water District (LVMWD) and West Basin Municipal Water District (WBMWD), Los Angeles County Waterworks District No. 29 (District No. 29) and the press to feature articles on water conservation and water quality of urban runoff.	Above Average	Medium	Low-Medium	Medium	Dry	Number of articles published
Include Water Conservation in Existing Educational Programs at Schools	Develop water conservation into existing curriculum on water quality.	Below Average	Medium	Low-Medium	Medium	Dry	Number of participating schools
Water Conservation Signs	Posted signs regarding water conservation.	Below Average	Low-Medium	Low	Medium	Dry	Number of signs installed
Outreach Campaigns							
Develop a Watershed Awareness Campaign Incorporating Key Outreach Elements to Address Bacteria and Other Pollutant Impairments in the MCW	Develop an outreach campaign to educate residents on the general watershed concept and building a sense of ownership in the watershed.	Below Average	Low	Low	Low-Medium	Both	Development of programs and number of impressions
Clean Water Program for Residents and Businesses Based on the Malibu Program	Develop a Clean Water Program for residents and businesses in Malibu with a mascot, stickers for participating businesses.	Below Average	Medium	Low	Low	Both	Number of participants
Outreach BMP Elements							
Educational Water Quality Videos with an Emphasis on Bacteria TMDLs and Water Conservation	Create a video educating residents and businesses on BMPs and water conservation.	Above Average	Low-Medium	Low	Low	Both	Number of live presentations of videos and assessment with audience.
Focused Outreach to Residents Surrounding the Lagoon	Provide direct outreach to residents surrounding the lagoon on BMPs, OWTS maintenance, water conservation, and water quality.	Above Average	Low	Low	High	Both	Number of impressions
Increase Articles in Local Newspapers on Water Quality and Water Conservation	Work closely with the press to feature articles in water conservation and water quality.	Above Average	Low	Low	Medium	Both	Number of articles published
Fact Sheets on Water Quality	Distribute fact sheets at point-of-sale facilities (e.g. Home Depot) detailing techniques that consumers can use to prevent stormwater pollution.	Below Average	Low	Low	Low	Both	Number of impressions
Billing Inserts with Water Quality Messages	Billing insert distributed with trash bills emphasizing methods to reduce stormwater pollution.	Below Average	Low	Low	Low	Both	Number of calls and webhits.
Workshops for Businesses and Residents on Septic Maintenance, Drought and Fire Resistant Plants, Water Conservation Slope Stabilization	Offer workshops on slope stabilization/erosion control, septic maintenance, drought and fire resistant plants, and water conservation; workshops targeted to businesses.	Above Average	Low-Medi	Low	Low	Both	Number of workshop, number of participants, and assessment of learning.
Speakers	Stormwater/runoff presentations to various groups.	Average	Low	Low	Low	Both	Number of presentations and number of attendees
Field Trips	Field trips for students to educate students on water quality issues.	Average	Low	Low	Medium	Both	Number of students participating
Plan-It Earth	Countywide Environmental Education Program on stormwater and source reduction issues.	Below Average	Low	Low	Low	Both	Number of participants in programs

Table 2-6
Public Information and Participation Programs (PIPP)
Enhancement Program Evaluation
Page (3 of 3)

BMP Name	Description	Evaluation Criteria: Effectiveness for Reducing Bacteria	Cost	Risk of Implementing	Risk of Not Implementing	Effectiveness in Dry or Wet Weather	Performance Measures
Water Education for Teachers	Program geared towards training teachers to teach children about water quality and water conservation.	Average	Medium	Low	Medium	Both	Number of teachers participating
Adopt-a-Waterway	Business sponsors participating in Adopt-A-Waterway purchase beautifully designed signs in high traffic areas along city streets. Adopt-A-Waterway donates 50 percent of advertising revenues from these signs to participating local governments, who then apply those funds solely to runoff mitigation and prevention (www.adoptawaterway.com)	Average	Low	Low	Medium	Both	Number of adoptions
Increase Public Awareness of BMPs for Restaurants for Citizens to Report Non-compliance	Inform the public about restaurant BMPs so they can report improper housekeeping practices.	Average	Low-Medi	Low	Low	Both	Number of presentations and reportings
Creek Clean-ups	Creek clean-up day sponsored by City and coordinated with local schools.	Above Average	Low	Low	Low	Both	Number of events and material removed
Increased Coordination Between Agencies and Environmental Organizations in Preparing Outreach Materials.	Numerous efforts are continually put forth to produce outreach materials, but production is not always coordinated between organizations and agencies.	Above Average	Low-Medium	Low-Medium	Medium	Both	Number of joint outreach materials and programs, and program results.
Partnership Program PIPP							
Partner with Chambers of Commerce to Present Workshops & Outreach	Partner with our local Chambers of Commerce to present workshops, distribute materials and involve local business participation in public outreach.	Average	Low	Low	Low	Both	Number of partnerships
Partnerships with Chamber of Commerce and Contractors Association to Extend Outreach	Partnerships with the local Chamber of Commerce and Contractors Association to extend outreach.	Average	Low	Low	Low	Both	Number of partnerships
Create Sustainable Quality Awards for Businesses that Implement Certain BMPs	Create "sustainable quality awards" similar to City of Santa Monica program.	Below Average	Low-Medium	Low	Medium	Both	Number of participants.
Cross Promotions with Businesses to Increase Bacteria TMDL Awareness	Promotions in conjunction with businesses.	Average	Low	Low-Medium	Low	Both	Number of participants.
Signs On or Near Dumpsters to Keep Lids Closed	Signs on dumpsters to keep lids closed throughout the MCW.	Above Average	Low	Low-Medium	Low-Medium	Both	Number of dumpsters with labels
Media Partnership with CalTrans	Media partnership with CalTrans.	Average	Low-Medium	Low-Medium	Low	Both	Number of impressions
Large Landscape Conservation/Runoff Reduction Management and Outreach Program	West Basin Municipal Water District: Through the installation and management of landscape weather-based irrigation controllers, an estimated 20%-50% of irrigated water will be conserved, thus reducing imported water needs. A major component of this program is the development of "Ocean Friendly Garden" workshops designed to educate the public on water conservation and water quality.	Above Average	Medium	Low	High	Dry	Number of installations

Table 2-7
Industrial/Commercial Facilities Control Program
Enhancement Program Evaluation

BMP Name	Description	Evaluation Criteria: Effectiveness for Reducing Bacteria	Cost	Risk of Implementing	Risk of Not Implementing	Effective in Dry or Wet Weather	Performance Measures
Inspection and Enforcement Programs							
Pilot Inspections and Education of Convenience Stores and Other Food Marts within the Restaurant Inspection Program	Pilot inspection of convenience stores and food marts to evaluate potential for BMP improvements.	Average	Medium	Medium	Low	Both	Number of inspections and impressions
Enhance Inspection Frequency by Adding Education Visits	Interim educational visits in target areas to supplement inspections.	Average	Low-Medium	Medium	Medium	Both	Development of consistent inspection schedule and enforcement structure
Adopt a Uniform Fine Structure and Method to Facilitate Enforcement of BMP Requirements	Adopt a uniform fine structure and method to facilitate enforcement of BMP requirements consistent with NPDES requirements.	Average	Low	Medium	Low	Both	Tracking of fines and enforcement actions.
Modify Inspection Staff Training to Include Bacteria Issues	Training staff that conduct inspections, tailgate meetings, formal classroom training, and self guided training.	Average	Low	Medium	Medium	Both	Completion of inspection consistency
Enforce Parking Lot Street Sweeping for Commercial Businesses	Enforce parking lot street sweeping requirements within city limits for commercial businesses (as is already required within LA County). Would potentially require ordinance modification.	Above Average	Low-Medium	Medium	Medium	Both	Number of enforcement actions
Mandatory Servicing and Inspection of Existing Septic Tank Systems	A licensed septic tank specialist would inspect the system during servicing and report the results to the Department of Health Services and to the City.	Above Average	Medium-High	Medium-High	Medium-High	Both	Number of commercial/industrial septic systems inspected; complete analysis of providing incentives for septic replacement for residents
Inspection Consistency Across Jurisdictions in MCW	Assure Consistency in baseline elements of inspection programs across jurisdictions.	Average	Low	Low	Low	Both	Development of consistent baseline elements
General Training and Outreach and Incentive Programs							
Letters to Trash Haulers to Close Lids Prior to Pushing Bins Against Walls. Send Thank You Letters to Businesses that are in Compliance with BMPs	Send letters to trash haulers to prevent lids from being pinned against walls.	Above Average	Low	Low	High	Both	Number of letters sent
Meet with Trash Haulers, Property Managers, and All Non-Inspected Businesses in Centers with Businesses Required to be Inspected to Discuss Water Quality and Importance of Closing Dumpster Lids	Meet with waste haulers; businesses not required to be inspected, but sharing dumpsters with those that are inspected; and property managers to discuss importance of closing dumpster lids.	Above Average	Low	Low	High	Both	Number of meetings and number of attendees
Targeted Pollution Prevention Brochures	Brochures targeting painting contractors, landscape and pool maintenance personnel, contractors, site supervisors, and horse owners.	Above Average	Low-Medium	Low	High	Both	Number of impressions
Business Reward/Stewardship Program	Develop business reward program to reward businesses helping keep the environment clean.	Above Average	Low-Medium	Low	Medium	Both	Number of awards awarded
Educate Businesses on Drought Landscaping Plants and Fire Resistant Native Vegetation	Educate businesses on drought landscaping plants and fire resistant native vegetation.	Average	Low	Low	Medium	Dry	Number of impressions
Provide Businesses with Outreach Materials on Reducing Runoff from Landscape Irrigation	Provide outreach materials emphasizing reducing runoff when irrigating.	Average	Low	Low	Medium	Dry	Number of impressions

Table 2-7
Industrial/Commercial Facilities Control Program
Enhancement Program Evaluation

BMP Name	Description	Evaluation Criteria: Effectiveness for Reducing Bacteria	Cost	Risk of Implementing	Risk of Not Implementing	Effective in Dry or Wet Weather	Performance Measures
Incentives program for maintenance compliance	Increase incentives, such as "seal of approval" (example LEED certifications), for compliance with stormwater and bacteria BMPs by homeowners and businesses. Categories for compliance include landscaping, containment, energy conservation, equestrian containment, etc.	Above Average	Medium	Medium	Low	Both	Number of incentives awarded
Incentives and "Emission Reduction Credit" Type Program for BMP Compliance	Provide financial incentives and credits (trading, such as allowed for air quality) for homeowners and businesses complying with BMPs.	Above Average	Medium	Medium	Low	Both	Number of incentives awarded, number of credits
Include Bacterial Source Loading Information in Outreach Material Distribution	Outreach materials are provided to businesses during inspections.	Average	Low	Low	Low	Both	Revision of outreach materials to include bacteria
Business Assistance Program Where Businesses Become Team Members (Malibu Clean Water Program)	Develop program similar to Malibu's Clean Water Program where businesses become team members.	Average	Medium	Low	Low	Both	Number of participants
Partner with Chamber of Commerce	Partnership with Chamber of Commerce to educate businesses on TMDLs.	Average	Low	Low	Low	Both	Number of partnerships
Conduct Additional Industry Specific Workshops on Water Quality	Conduct additional industry specific workshops and coordinate across MCW.	Average	Low-Medium	Medium	Medium	Both	Number/frequency of additional workshops
Targeted Business Outreach with Greatest Potential to Contribute Pollutants of Concern for Extended Outreach and Education (agriculture, commercial equestrian, car washes, mobile businesses)	Target businesses with the greatest potential to contribute Pollutants of Concern for outreach and education (agriculture, commercial equestrian, car washes, mobile businesses).	Above Average	Medium	Low	High	Both	Number of businesses targeted
Targeted BMP Material for Distribution to Businesses in Conjunction With Chamber of Commerce's and Local Contractor's Association	Distribute targeted BMP information at public counters in conjunction with Chamber of Commerce and Malibu Contractor's Association.	Average	Low	Low	Low	Both	Number of impressions
Commercial Equestrian Facilities							
Equestrian Facility Education	Educate equestrian facilities on impacts of waste.	Above Average	Low	Low	High	Both	Number of impressions
Develop Outreach Program for Commercial Horse Stables and Equestrian Centers	Conduct outreach program and handout previously produced pamphlets dealing with specific BMPs; educate owners regarding BMPs and bacteria TMDL; coordinate horse outreach materials among agencies.	Above Average	Low	Low	High	Both	Development of program and number of impressions
Identify/Develop a listing of Commercial Horse Stables and Equestrian Centers for Outreach	Develop a listing of all commercial horse stables for targeted outreach.	Above Average	Low	Low	High	Both	Number of impressions
Pilot Program for Commercial Horse Stables and Equestrian Centers with Pre- and Post-BMP Sampling	Establish pilot program for commercial horse stables and equestrian centers with sampling of runoff before BMP introduction and after.	Average	Medium	Medium	Medium	Both	Completion of pilot program
Restaurants/Food Processors							
BMP Inspections Combined with Health Inspections for Restaurants	Coordination between health inspectors and BMP inspectors at restaurant and food processing facilities. Stormwater Ordinance is currently being developed for industrial / commercial facility certification inspection program in Los Angeles County. Restaurant inspections will be handled by DHS. Violations will be forwarded to DPW.	Average	Low	Medium	Medium	Both	Number of coordinated inspections

Table 2-7
Industrial/Commercial Facilities Control Program
Enhancement Program Evaluation
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BMP Name	Description	Evaluation Criteria: Effectiveness for Reducing Bacteria	Cost	Risk of Implementing	Risk of Not Implementing	Effective in Dry or Wet Weather	Performance Measures
Modify Health Rating Inspections for Restaurant and Food Processing Facilities to Incorporate BMP Compliance	Incorporate compliance with BMPs into health rating system for restaurants and food processing facilities.	Above Average	Low	Medium-High	High	Both	Incorporation of requirements into health rating system
Establish a BMP Grading System for business similar to Dept of Public Health ratings.	Establish a "report card" grade on BMP compliance. Post information about businesses' compliance online. Encourage business with good grades to post NON-compulsory BMP Grades in widows. Educate public about patronizing businesses with high BMP grades.	Average	Low	Medium-High	Medium	Both	Number of participates
Increase Frequency of Restaurant and Food Processing Material Facility Inspections	Increased inspections (such as combining w/previously mentioned health inspections).	Above Average	Medium	Medium	High	Both	Frequency of inspections
Mandatory Restaurant Training Program on BMPs Conducted in Conjunction with Health Department	Mandatory restaurant training program provided by LA County DHS on BMPs and making modifications to prevent urban runoff.	Above Average	Low	Low	Medium	Both	Number of training sessions
BMP Restaurant Practice Workshops	Workshops for restaurant chains held with the Food Sanitary Advisory Council, focus on four areas: spill prevention, control and clean-up; waste-disposal and handling; building and grounds maintenance; and employee training.	Above Average	Low	Low	Medium	Both	Number of workshops
Increase Public Awareness of BMPs for Restaurants for Citizens to Report Non-compliance	Inform the public about restaurant BMPs so they can report improper housekeeping practices.	Average	Low-Medium	Low	Low	Both	Number of impressions, number of complaints
Restaurant Reward and Recognition Program	Recognition of restaurants that implement stormwater quality BMPs including bacteria BMPs on a quarterly basis.	Above Average	Low-Medium	Medium	Medium	Both	Number of awards
Increase Frequency of Trash Collection at Restaurants and Food Processing Facilities that Commonly Have Excess Trash	Require restaurants to have refuse picked up more often if bins are overflowing.	Above Average	Low	Medium	Medium	Both	Frequency of trash pick-ups
Industrial Specific BMPs							
Joint Inspections with RWQCB	Joint inspections with RWQCB for regulated industrial users (that require both RWQCB and co-permittee inspections) to coordinate inspections to prevent receiving conflicting information.	Average	Low	Low	Medium	Both	Number of joint inspections
Educational Training Workshop on General Industrial Permit	Workshop to discuss requirements of General Industrial Permit and educate industries.	Average	Low	Low	Low	Both	Number of workshops and number of attendees
Educational Brochures for Industrial Facilities	Brochures distributed during site visits of industrial facilities stipulating that facilities must file NOI, develop SWPPP, illegal discharges, what to do in case of spills, and penalties for non-compliance.	Average	Low	Low	Low-Medium	Both	Number of impressions
Miscellaneous Business Specific BMPs							
Educate and Inspect Mobile Businesses	Educate and inspect mobile businesses as part of normal inspection duties.	Above Average	Medium	Medium	High	Both	Number of inspections conducted on mobile businesses
Proper Management of Solid Waste Associated with Mobile Food Sales	Require mobile food vendors to dispose of solid wastes generated in the preparation process.	Above Average	Low	Medium	Medium	Both	Implementation of program
Distribution of Posters at Automotive Facilities	During inspections of automotive facilities posters are handed out to provide guidance to reduce water pollution.	Average	Low	Low	Low	Both	Number of impressions
Educate Landscape Maintenance Businesses on Pesticide Use, Fertilizers, Vegetative Matter and its Relationship to Water Quality	Educate landscape maintenance businesses on pesticide use, fertilizers, vegetative matter and its relationship to water quality.	Average	Low	Low	Medium	Both	Number of impressions
Pool Maintenance Guide Fact Sheet	Guide developed by VC Environmental Health Department and Co-permittees containing BMPs for pool maintenance geared towards both pool service professionals and homeowners .	Average	Low	Low	Medium	Both	Number of impressions

Table 2-8
New Development/Redevelopment Planning
Proposed Enhancements Evaluation
(Page 1 of 2)

BMP Name	Description	Evaluation Criteria: Effectiveness for Reducing Bacteria	Cost	Risk of Implementing	Risk of Not Implementing	Effective in Dry or Wet Weather	Performance Measures
Programmatic Enhancements							
Incorporate Requirements into General Plan	Cities that have not done so to date should incorporate the SQUIMP/SUSMP requirements into their applicable General Plans	Average	Low	Low	Low-Medium	Both	Number of cities that have incorporated requirements into General Plans
Incorporate TMDL requirements into CEQA process	Incorporate TMDL requirements into the CEQA process to adequately review proposed projects	Above Average	Low	Low-Medium	High	Both	Completion of incorporation
Educate Agencies and Planning Departments on use of Initial Study Guidelines to Support the BMP Selection Process	Conduct watershed wide workshops for representatives from each of the agencies within the MCW on how to use the Initial Study Guidelines as a tool to support the BMP selection process	Average	Medium	Medium	Low	Both	Number of workshops
Improve use of Conditions of Approval on Projects to Reduce Dry- and Wet-weather runoff	Conduct watershed wide workshops for representatives from each of the agencies within the MCW on how to improve the use of Conditions of Approval to reduce dry- and wet-weather runoff	Average	Low	Medium	High	Both	Number of workshops
Increase Inspections of Post-Development BMPs	As part of the conditions of approval of a project or CEQA mitigation measures require project applicants and future owners to conduct inspections on a periodic basis to ensure proper maintenance of BMPs per covenant agreements with the approving agency.	Above Average	Medium	Medium	Medium	Both	Number of inspections
Identify New Techniques to Improve Monitoring and BMP Implementation	Develop techniques to monitor BMP implementation	Below Average	Medium	Medium	Low	Both	Number of new techniques identified
Complete BMP Technical Manual for SUSMP to Provide Detailed Requirements	LA County finalize its Countywide BMP Technical Manual for SUSMP	Average	Medium-High	Low	Low-Medium	Both	Completion of manual
Improve Consistency of SUSMP or SQUIMP Requirements and Enforcement by Individual Agencies	Ensure that enforcement and regulations are consistent across agencies in the MCW	Average	Medium	Medium	Low	Both	Complete report on review of enforcement and regulations
BMPs							
Encourage site design techniques that promote infiltration where applicable	Encourage developers to expand the use of BMPs beyond catch basin inserts through outreach	Above Average	Low	Low	Medium	Both	Number of projects that incorporate infiltration
Encourage infiltration of parking lot & roof runoff	Encourage regulated projects to have areas to infiltrate parking lot runoff and roof runoff	Above Average	Low	Low	Medium-High	Both	Number of projects that incorporate infiltration
Develop vegetative filter BMP	Develop a standard Vegetative Filter Detail	Above Average	Low	Low-Medium	High	Wet	Development of BMP
Requirement to have conservation easements	Require new projects with tenants that have a high probability of introducing bacteria into water courses to provide conservation easements between the project and water courses	Above Average	Low	Medium-High	Medium	Both	Number of projects conditioned to have conservation easements
Minimization of directly connected impervious areas	Require projects to minimize impervious areas or break-up impervious areas with pervious surfaces in the MCW where soils are permeable. Develop a minimum requirement for impervious vs. pervious area.	Above Average	Low	Medium	Medium	Both	Number of projects conditioned to minimize directly connected impervious surfaces
Prohibit garbage disposal installation in new buildings with septic tank systems	Require new projects with septic tank systems to not install garbage disposals	Average	Low	Medium	Low	Both	Number of projects conditioned to not have garbage disposals
Mandatory servicing and inspection of existing septic tank systems	Condition of approval requiring a licensed septic tank specialist to inspect the system during servicing and report the results to the Department of Health Services and to the City.	Above Average	Medium	Low	Medium-High	Both	Number of projects conditioned with requirement septic systems inspected
Training & Outreach to Public							
Educate Developers of Small Projects not Required to Comply with the SUSMP or SQUIMP on Runoff Reduction Techniques	Provide brochures to developers and discuss items the developer can do during the permitting process to reduce runoff from the project	Average	Low	Low	Medium	Both	Number of impressions
Educate the Community on Low Impact Developments	Provide brochures and engage in other outreach mechanisms to educate the community on low impact developments	Below Average	Low	Low	Low	Both	Number of impressions

Table 2-8
New Development/Redevelopment Planning
Proposed Enhancements Evaluation

BMP Name	Description	Evaluation Criteria: Effectiveness for Reducing Bacteria	Cost	Risk of Implementing	Risk of Not Implementing	Effective in Dry or Wet Weather	Performance Measures
New Programs							
Develop seal of approval for new projects that incorporate dry- and wet-weather reductions in runoff into proposed projects	Develop a program that recognizes new projects that incorporate dry- and wet-weather reductions	Above Average	Low	Medium	Medium	Both	Number of awards
Develop Similar Program to Santa Monica Green Building Program (Stormwater Management Performance Ordinance)	Financial incentives for LEED certification, priority permit processing	Above Average	Medium	High	Medium	Both	Number of incentives awarded

Table 2-9
Development Construction Program
Enhanced Programs Evaluation

BMP Name	Description	Evaluation Criteria: Effectiveness for Reducing Bacteria	Cost	Risk of Implementing	Risk of Not Implementing	Effective in Dry or Wet Weather	Performance Measure
Increase Frequency of Inspections During Construction	Increase the frequency of stormwater related inspections during wet weather beyond the minimum requirements in the NPDES Permits, for example, twice per rainy season.	Below Average	Medium-High	Low	Medium	Both	Number of inspections at each site
During Inspections Increase Emphasis on BMPS that can Reduce Bacteria Loading (such as temporary toilets, waste management, and runoff management)	Increase emphasis on BMPs such as proper handling of temporary toilets, proper disposal of refuse including food; reduction dry- and wet-weather runoff	Above Average	Low	Low	Medium	Both	Less repeat violations for non compliance with BMPs related to bacteria.
Increased Contractor Education	Increase education of contractors through workshops, interaction during the permit process, and brochures.	Below Average	Low	Low	Low	Both	Number of workshops and attendance

Table 2-10
Public Agency Activity
Enhancement Programs
Page (1 of 2)

BMP Name	Description	Evaluation Criteria: Effectiveness for Reducing Bacteria	Cost	Risk of Implementing	Risk of Not Implementing	Effective in Dry or Wet Weather	Performance Measures
Public Construction Activities Management							
Require SWPPP/WPCP for All Construction Sites	Sites with over 1 acre of disturbed land require filing of NOI for State General Construction Permit and a State SWPPP. Other sites will require a Local SWPPP or WPCP.	Average	Medium	Medium	Medium	Both	Number of construction sites with approved SWPPP/WPCP
Storm Drain Operation and Management							
Standardize Training, Inspection, and Reporting Methods	Establish standard training and inspection reporting methods.	Below Average	Medium	Low	Low	Both	Completion of standardized inspection and reporting program
Establish Optimal Cleaning Cycles for Drainage Facilities	Cleaning drainage facilities regularly at optimal intervals removes trash, sediments, and debris that may carry bacteria into the storm drain.	Above average	Medium-High	Low	Low	Both	Frequency of cleaning
Treatment Feasibility Study							
Watershed Inventory of Potential Pollutant-Causing Facilities/Activities	Develop a detailed watershed-wide inventory of existing facilities and activities that may generate pollutant laden runoff to the MS4. The inventory should include tables and figures with facility locations, uses, pollutant potential, contact persons, an	Below Average	Medium	Low	Low	Both	Number of facilities inventoried
Database Program to Standardize Inventories	Investigate feasibility of implementation of a watershed-wide stormwater program software that will manage and standardize BMP inventories.	Below Average	Medium	Low	Low	Both	Completion of report on feasibility of watershed wide database
Sewage Systems Maintenance, Overflow, Spill Prevention, and Septic							
Inventory of Sanitary Sewer Systems	Develop a watershed-wide inventory of sanitary sewer systems and require regular reporting and updates from local sewering agencies	Average	Low	Medium	Low	Both	Completion of inventory and frequency of updates
Emergency Equipment or Contracts	Assure that emergency equipment or contracts are locally and immediately available, even during high-traffic hours, to address overflows or spills.	Above average	Low	Low	High	Both	Availability of Equipment
Review Existing Emergency Operation Plans	Review and update current emergency operating plans for sewage spills or other overflow/spill cases.	Above average	Low	Low	Medium	Both	Completion of review of emergency operating plans, frequency of updates
Investigate Incentive Programs for Replacing Improperly Operating Septic Tanks	Investigate cost and benefits of incentive programs to businesses and residents for replacing septics with on-site wastewater treatment plants.	Above average	Low	Medium	Medium-High	Both	Completion of investigation
Septic Inspections Upon Change in Ownership	Develop program that requires septic tank inspection and maintenance when a property is sold.	Average	Medium	Low	Medium	Both	Completion of program
Assure Coordination During Emergency or Other Spill Clean-up Events	Assure coordination during emergency or other spill clean-up events.	Above Average	Medium	Low	Medium	Both	Completion of coordination agreements among agencies
Incorporation of State Water Board's Statewide General Waste Discharge Requirements	Incorporation of State Water Board's Statewide General Waste Discharge Requirements for Sanitary Sewer Systems to ensure consistancy and continued coordination with programs.	Average	Medium	Low	Medium	Both	Development and implemenation of a plan
Streets and Roads Maintenance							
Investigate Street Sweeping Practices & Equipment Improvements; Establish Standard Prioritized Sweeping Schedule for All Jurisdictions	Review and update current street sweeping programs to identify effectiveness. Investigate the feasibility of combining resources and cost sharing among the watershed cities to contract higher end street sweepers. Investigate impact of parked cars, types	Average	Medium	Medium	Medium	Both	Completion of program updates; Completion of standardized prioritized street sweeping for all MCW watersheds
Evaluate Street and Road Maintenance BMP Programs to Assure Consistency Across Jurisdictions.	Evaluate BMPs and implementation to assure consistency in implementation	Below Average	Low	Medium	Low	Both	Completion of consistent street and road maintenance BMPs for MCW
Investigate Street Washing Programs	Investigate feasibility of citywide street washing programs.	Above average	High	Medium	Medium	Both	Completion of feasibility study on street washing programs

Table 2-10
Public Agency Activity
Enhancement Programs

BMP Name	Description	Evaluation Criteria: Effectiveness for Reducing Bacteria	Cost	Risk of Implementing	Risk of Not Implementing	Effective in Dry or Wet Weather	Performance Measures
Vehicle Maintenance/Material Storage Facilities/Corporation Yards Management							
Evaluate Consistency of BMPs at Corporate Yards Across Jurisdictions	Review BMP programs in other jurisdictions and modify programs to assure consistency across jurisdictions.	Low	Medium	Medium	Low	Both	Completion of consistent BMP program for all MCW agencies
Inspect Corporate Yards for BMP Implementation and Improvements and Share Lessons Learned Across Jurisdictions	Implement routine and consistent inspections of corporate yards and share BMP improvements across agencies.	Average	Low-Medium	Low	Medium	Both	Number of inspections completed; number of meetings held to share lessons learned
Assure that Contractors Providing Maintenance Services Adhere to BMPs Required for Corporate Yards Through Lease Language and Inspections	Implement contract language with contractors providing maintenance services to assure implementation of BMPs in work activities and at facility storage locations. Inspect to assure compliance.	Average	Low	Low	High	Both	Number of updated contracts, number of inspections
Landscape and Recreational Facilities Management							
Installation of Doggy Loos or Pooch Patches	Install doggy loos or pooch patches at recreational facilities. Doggy loos are disposal units installed in the ground; decomposition occurs within the unit. Minimal maintenance is required (no refuse collection).	Average	Medium	Low	Low	Both	Number of Doggy Loos installed
Creation of Riparian Buffers and/or Wetlands in Flood Plain Areas	Create riparian buffer and/or wetlands between flood plane areas and direct pathways to drainage areas.		High	Medium	Medium	Both	Number of acres of buffers installed.
Locate recreational areas away from water courses or create buffers	Locate recreational areas, such as urban parks and picnic areas, away from water courses or create buffers.	Above average	Medium	Low	Medium	Both	Number of new recreational areas located away from water courses
Contract Language to Ensure Contractor Compliance with NPDES Requirements; Implement Inspection Program to Assure Compliance	Incorporate landscaping fertilizer/pesticide usage, native planting requirements into Contracts; Standardize language to be regionally consistent.	Average	Low	Low	High	Both	Number of updated contracts, number of inspections
Public Industrial Activities Management							
Additional Trash Pick Up During High Use Periods in High Use Sites	Empty trash cans during high use times during weekends or holidays and coordinate volunteer cleanups of sites heavily littered.	Above Average	Low-Medium	Low	Medium	Both	Frequency of trash pick-ups in high use areas, number of volunteer clean-ups

Table 2-11
Illicit Connection/Illicit Discharge
Enhancement Programs

BMP Name	Description	Evaluation Criteria: Effectiveness for Reducing Bacteria	Cost	Risk of Implementing	Risk of Not Implementing	Effective in Dry or Wet Weather	Performance Measures
Illicit Connection/Illicit Discharge Programs							
Guidelines to Prevent Non-Stormwater Discharges from Public Events	Develop and implement guidelines to prevent non-stormwater discharges from entering the storm drains during/after parades, community events, etc.	Above Average	Medium	Medium	Medium	Dry	Completion of guidelines to prevent non-stormwater discharges from public events
Designate Primary & Secondary Staff for IC/ID	Maintain assigned staff to respond to IC/ID reports during business hours. When the primary IC/ID responder is out of the office, an alternate shall be designated.	Average	Low	Low	Low	Dry	Complete designation of staff
Standardize Training, Inspection, and Reporting Methods	Develop and use watershed wide standardized IC/ID investigation report forms for documentation of reports and investigations.	Average	Low	Medium	Low	Dry	Program Development, Use of standardized forms
Develop a Common Database and Map of Storm Drain Structures	Develop and maintain a map of all storm drain infrastructure watershed wide. This map shall include enough information to identify what receiving water a discharge will be released into from any point of discharge.	Average	Medium-High	Low	Low	Dry	Completion of database and maps, date since last update
Video Monitoring at High Priority Storm Drains	Monitor discharges at high priority drains to identify IC/ID. Four years ago, the City of Malibu monitored two of the Civic Center drains using video surveillance.	Average	Medium-High	Low	Medium	Dry	Number of priority drains monitored
Recreational Vehicle (RV) Disposal Site Outreach Program	Outreach program designed to encourage and teach RV owners to properly dispose of holding tank waste.	Average - Above Average	Low-Medium	Low	Medium	Both	Number of impressions
Equestrian-Related Waste-Management Plan	Develop a method/plan to manage equestrian waste on public properties.	Average - Above Average	Medium	Medium	Medium	Both	Development and implemenation of a plan
RV Disposal and Haul Truck/Transfer Truck Outreach	Outreach program addressing proper RV disposal and truck transfer/hauling proceedures in order to reduce possible spills and pollution from runoff.	Average	Low-Medium	Low	Medium	Both	

2.5 Regulatory and Permitting Considerations

This section describes the current regulations and ordinances that will affect the implementation of the various treatment BMP options being developed for the TMDLIP. Table 2-12 at the end of this section provides an overview of the federal, state, and local agencies that may have jurisdiction over the implementation of the various runoff management implementation options, as well as a summary of potentially applicable regulations and permits. Figure 2-4 delineates the California Costal Zone areas within the MCW. Figure 2-5 presents the critical habitat for the California red-legged frog. Figure 2-6 provides a general vegetation map from the State of California Environmental Information Catalog (CEIC) Gap Analysis that depicts the various types of vegetation within the MCW area.

Institutional and distributed BMPs are already permitted under state and federal regulations. Only in an extreme situation in which the solution would have the potential to damage a natural resource protected by a state or federal resource agency, (e.g. a wetland) would it be considered necessary to go beyond the requirements of the existing permits. However, for the regional solutions which involve treatment, discharge, or reuse of stormwater, the state and federal regulations would be applicable if:

- The location of the regional facility impacts the natural aquatic, terrestrial or avian resources protected by the state and federal resource protection agencies.
- The location of the facility is in the Coastal Zone, thereby requiring a Coastal Development Permit, local planning and zoning approval, and a Public Works Plan for the Coastal Commission.
- The location of the facility would impact a wetland or Waters of the U.S., requiring dredging and filling of a wetland or Waters of the U.S., which would involve the USACE and the state and federal water quality and resource protection agencies.
- A new surface water discharge is developed for the product (effluent) of the regional facility requiring a new NPDES permit, and potentially an anti-degradation analysis.
- The product or effluent of the regional facility is reused as a non-potable water supply either directly or after storage in an aquifer where it is injected. This would require the Regional Board and LA County Department of Health Services (DHS) to permit the reuse and the groundwater replenishment.

Additional information on potential regulatory requirements and ordinances pertaining to the implementation of the BMPs can be found in Section 7.

Table 2-12
Regulatory and Permitting Considerations

Permit/Regulation	Jurisdiction	Actions Required	Timeline for Implementation
Federal Requirements/Permits			
*If Federally endangered/threatened species are present: Section 7 Consultation	U.S. Fish and Wildlife Service (via U.S. Army Corps of Engineers)	Conduct appropriate plant/wildlife surveys, prepare a Biological Assessment and submit to USFWS prior to receiving their Biological Opinion	Once Biological Assessment is deemed complete, USFWS has 90-150 days to request USACE consultation, 45 days to formulate Biological Opinion.
*If Federal Funding: Environmental Document pursuant to NEPA	Agency for source of federal funding	Evaluate environmental impacts of project in a EA FONSI/EIS and make document available for public review and comment	9 to 12 months for an EA/FONSI 12 to 18 months for an EIS
404 Permit	U.S. Army Corps of Engineers	Pre-application consultation and submit ENG Form 4345 to regulatory office	Once application is deemed complete, individual permit decisions- 2 to 6 months and for general permits- within 30 days
State Requirements/Permits			
*If state endangered/threatened species are present: 2081 Permit	California Department of Fish and Game	CDFG will review documents provided to USFWS. CDFG will issue a 2081 stating concurrence with findings of USFWS	Same as process for USFWS Section 7 Incidental Take Permit
1603 Permit- Streambed Alteration Agreement	California Department of Fish and Game	File notification and application package and submit fees to CDFG regional office. An on-site inspection may be required.	Once application is deemed complete, CDFG will submit a draft agreement to applicant within 60 calendar days
401 Water Quality Certification	Regional Water Quality Control Board, Los Angeles Region	Submit a completed 401 Water Quality Standards Certification Application form and fees to the Regional Board	Once application is deemed complete, the LARWQCB has between 60 days and 1 year to make a decision.
Waste Discharge Requirements Permit and/or NPDES Permit	Regional Water Quality Control Board, Los Angeles Region	File a ROWD (Form 200) with LARWCB for a WDR and Form 2D with Regional Board for a NPDES	Once application is deemed complete, USEPA will review and comment. Process takes approximately six months.
NPDES Construction General Permit, 99-08-DWQ	State of California Water Resources Control Board	File an Notice of Intent and complete a SWPPP	Once application is deemed complete, coverage is obtained within 7 to 10 business days

Table 2-12 (Continued)
Regulatory and Permitting Considerations

Permit/Regulation	Jurisdiction	Actions Required	Timeline for Implementation
Local Requirements/Permits			
NPDES Permit CAS004001 (MS4 Permit)	Cities, and County of Los Angeles	Facility must be constructed in compliance with MS4 Permit requirements	Not Applicable
NPDES Permit CAS004002 (MS4 Permit)	Cities, and County of Ventura	Facility must be constructed in compliance with MS4 Permit requirements	Not Applicable
Environmental Document pursuant to CEQA	(Cities, and/or Counties of Los Angeles and Ventura	Evaluate environmental impacts of project in a MND/EIR and make document available for public review and comment	6 to 9 months for an MND 9 to 14 months for an EIR

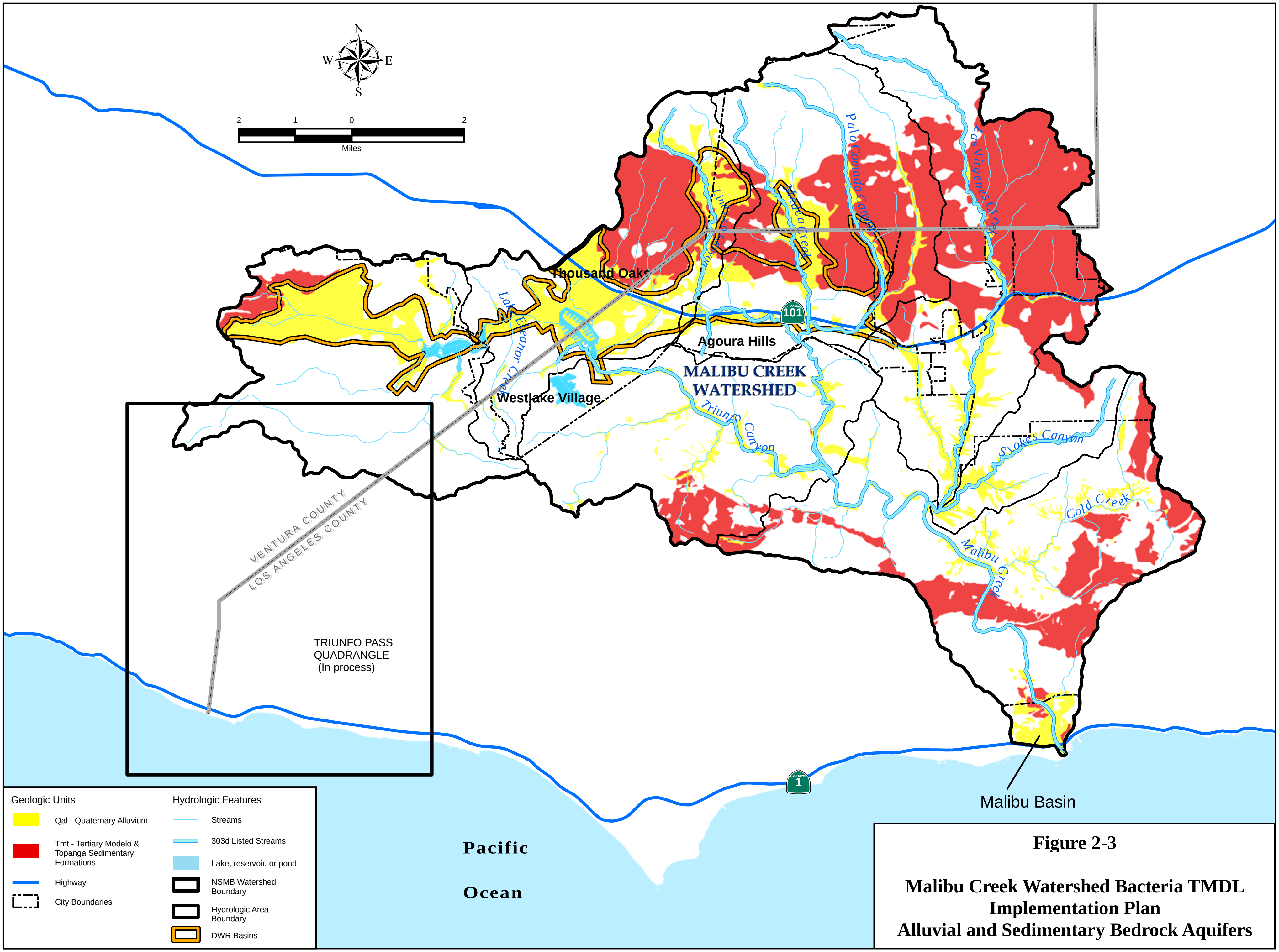


Figure 2-3

Malibu Creek Watershed Bacteria TMDL Implementation Plan
Alluvial and Sedimentary Bedrock Aquifers

Figure 2-4
Malibu Creek Watershed Bacteria TMDL
Implementation Plan
California Coastal Zone Area within Malibu Creek Watershed

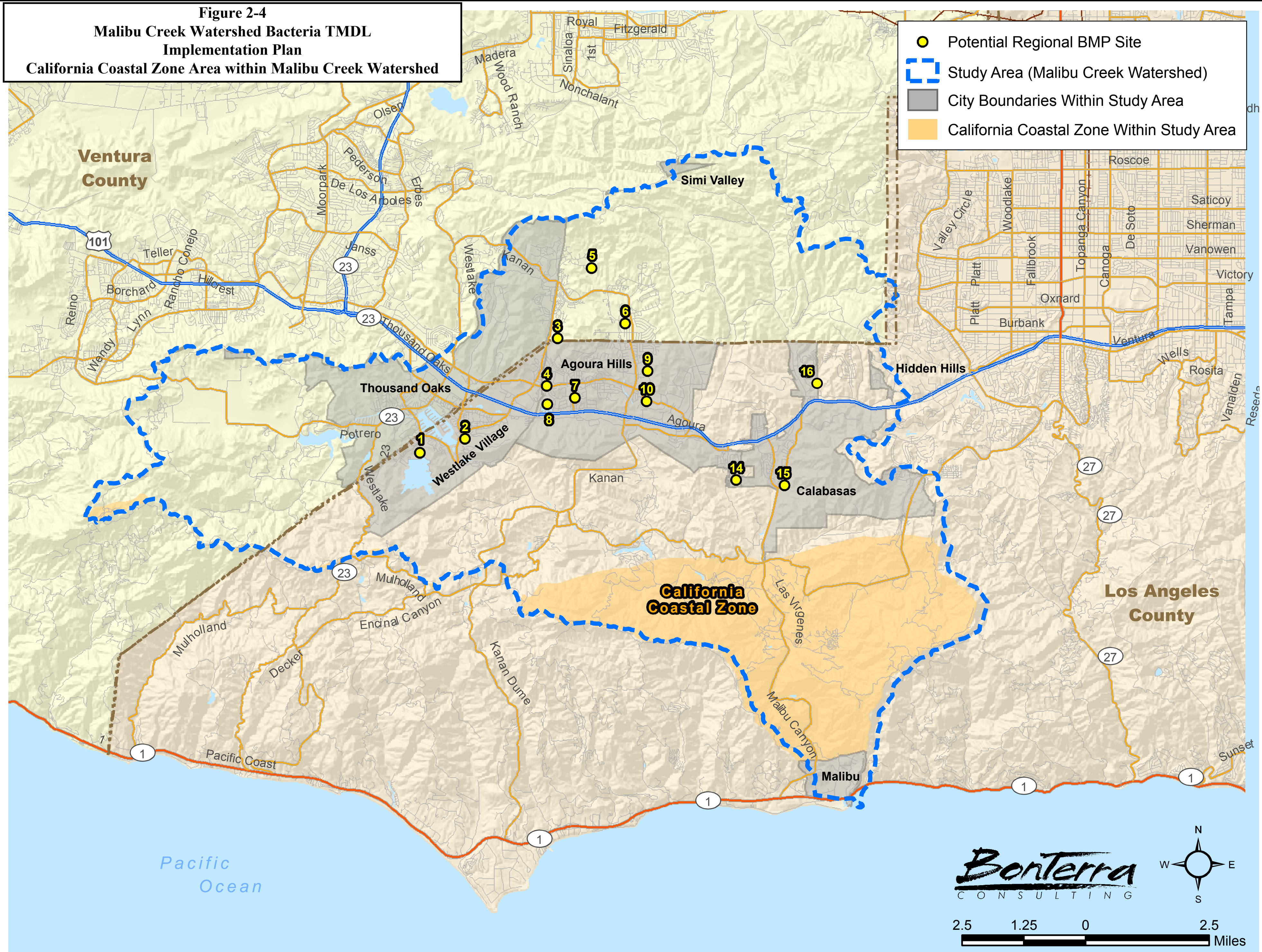


Figure 2-5
Malibu Creek Watershed Bacteria TMDL
Implementation Plan
Critical Habitat for the California Red Legged Frog

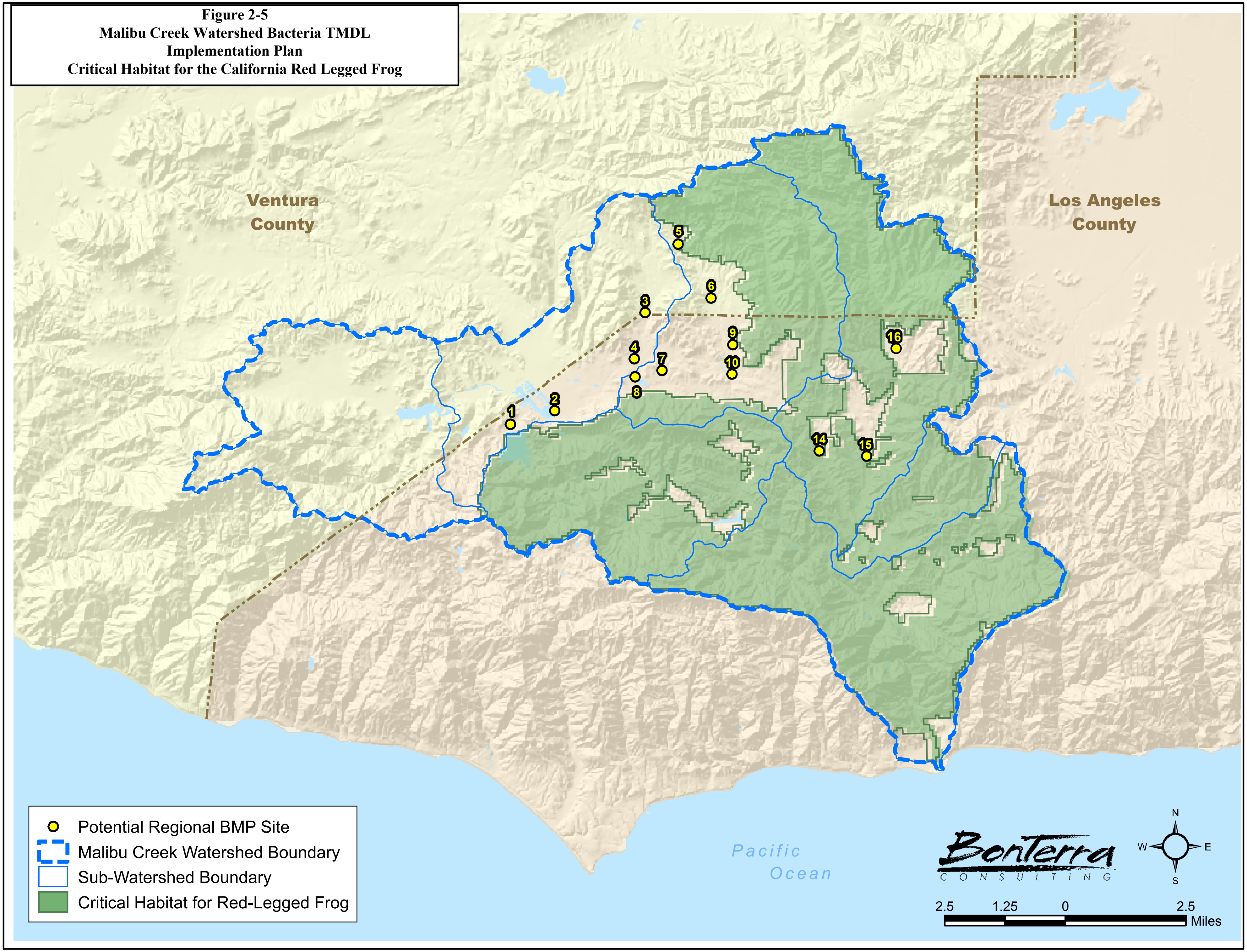
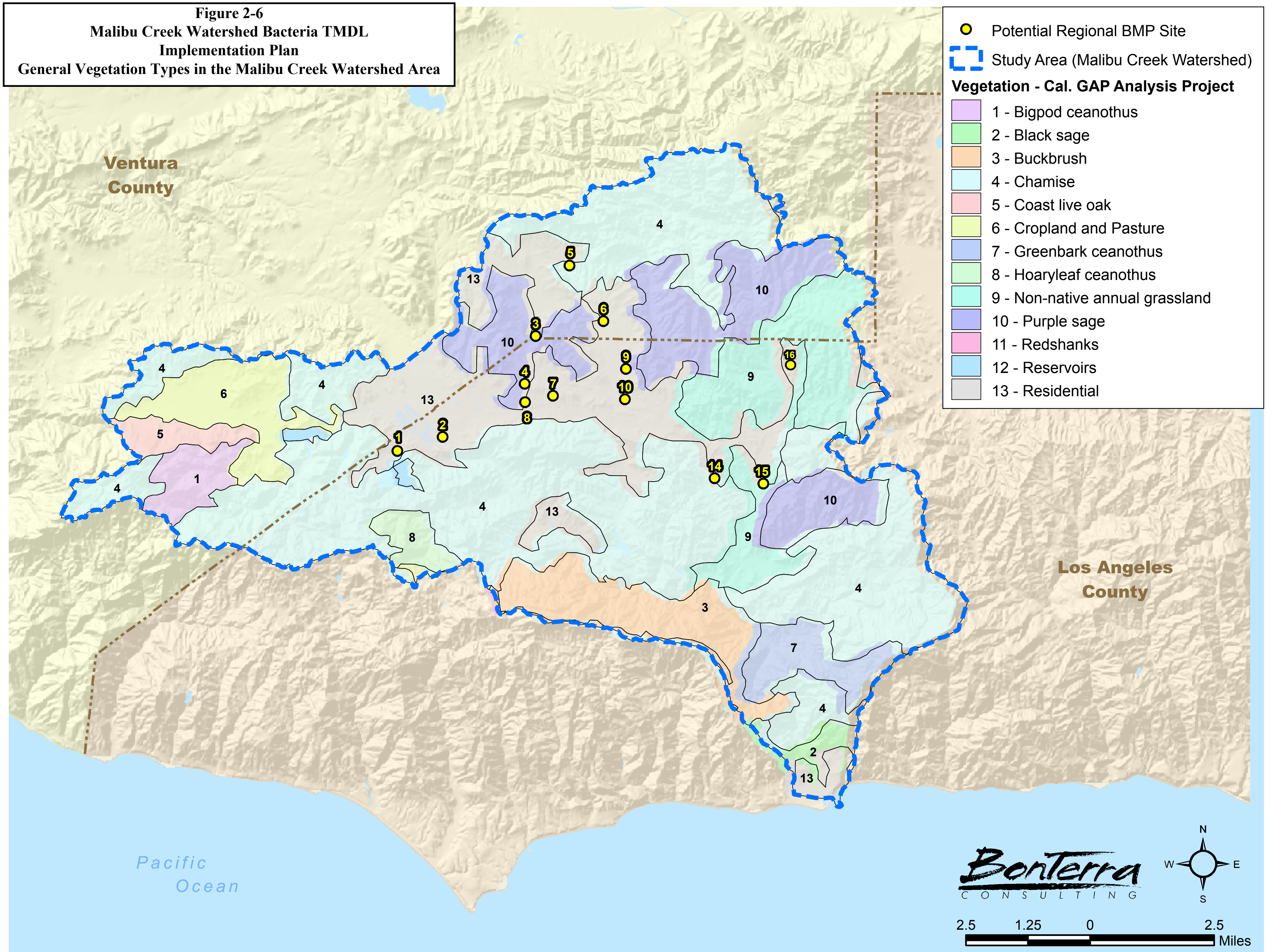


Figure 2-6
Malibu Creek Watershed Bacteria TMDL
Implementation Plan
General Vegetation Types in the Malibu Creek Watershed Area



Section 3
Existing Monitoring and Water Quality Information

Water quality monitoring in the MCW is conducted by several municipalities and by volunteers through non-profit organizations. Water quality data and studies have been reviewed to identify specific areas and pollutants of concern; this information was then used in the identification of appropriate BMPs within the watershed. The water quality monitoring programs and associated monitoring locations referred to for this purpose are described below.

3.1 Existing Monitoring Programs

Table 3-1 provides a brief summary of each water quality data source that will be integrated into a single database for regional analyses. All of these agencies analyze for bacteria indicators, which are the primary constituents of concern for the MCW Bacteria TMDL Implementation Plan. The following data sets are from available water quality monitoring programs through mid-2006 and encompass waterbodies including lower Malibu Creek, its tributaries, and inland lakes. Some programs monitor during wet-weather events. This data was used to evaluate water quality Areas of Concern (AOC), and target these AOCs for subwatershed specific plans to achieve the necessary load reductions. Most of these programs are ongoing and will continue to provide expanded information in the future.

3.1.1 LACoDPW Mass Emission and Other Monitoring

Mass emission monitoring has been conducted by the LACoDPW as part of its NPDES monitoring requirements since 1994. One mass emission monitoring location is within the MCW and is located on Malibu Creek downstream of the confluence with Cold Creek.

During 2005, the LACoDPW contracted with Weston Inc. to monitor the wet and dry-weather water quality from seven sites upstream of the TWRF in the MCW. Three storm events and three dry-weather days were sampled during the wet season and nine dry-weather days were sampled during the dry season.

3.1.2 Ventura County Stormwater Quality Management Program

The Ventura County Stormwater Quality Management Program was developed to comply with stormwater NPDES requirements which include monitoring of water quality in receiving waterbodies. Three tributaries in the upper Malibu Creek Watershed were used as monitoring locations between 1996 and 1998.

Table 3-1
Summary of Water Quality Data Reviewed

Program	Lead Agency	Locations	Period of Record
Mass Emission Monitoring	LA County DPW	Malibu Creek below Cold Creek confluence (S02)	1994 to 2005
Malibu Creek Watershed Water Quality Monitoring Project	LA County DPW	7 inland Malibu Creek Watershed sites above Tapia plant	2005
Ventura Countywide Stormwater Quality Management Program	Ventura County WPD	Las Virgenes, Medea, and Lindero Creeks in Upper Malibu Creek Watershed (3 sites)	1996 to 1998
J1/4 Wet-Weather Bacteria TMDL Implementation Plan	LA County DPW, City of Malibu, Caltrans	J1/4 Creeks (6 sites in Topanga and other coastal NSMBW)	August 28 & October 17, 2004
Coordinated Shoreline Monitoring Program (CSMP)	LA County DHS and City of LA EMD	Throughout NSMBW (22 sites)	2004 to 2005
Malibu Creek Watershed Monitoring Program (MCWMP)	City of Calabasas	Inland Stations within Malibu Creek Watershed (12 sites)	Feb 2005 to September 2006
Las Virgenes MWD NPDES Monitoring	Las Virgenes MWD	Malibu Creek downstream of Tapia Water Reclamation Facility (7 sites)	1997 to 2005
Malibu Creek Stream Team	Heal the Bay	Inland and Coastal Stations of Malibu Creek Watershed (17 sites) and NSMBW (3 reference sites)	Nov 1998 to January 2006
Other Lake Monitoring Programs	Westlake Management Association, Sherwood Lake Homeowners Association	Westlake Lake, Sherwood Lake	TBD

3.1.3 J 1/4 SMBBB Wet-Weather Bacteria TMDL Implementation Plan Monitoring

This monitoring was conducted for County of Los Angeles, City of Malibu, and Caltrans. Two storm events were monitored to aid in the development of the SMBBB Wet-Weather Bacteria TMDL Implementation Plan for J 1/4. The sampling was done at six sites including Topanga Creek, Solstice Creek, Trancas Creek, Marie Canyon, and Sweetwater Creek. While these locations are not directly in the Malibu Creek Watershed, they provide some additional indication of water quality in nearby similar watersheds.

3.1.4 Coordinated Shoreline Monitoring Program (CSMP)

The Coordinated Shoreline Monitoring Program (CSMP) is a re-organization of prior water quality monitoring along the beaches in Santa Monica Bay as a result of the adoption of the Santa Monica Bay Beaches Bacteria (SMBBB) Wet- and Dry- Weather TMDLs. The program combines existing beach monitoring by the DHS, City of Los Angeles Environmental Monitoring Division of the Bureau of Sanitation (EMD), and the County Sanitation Districts.

Prior to initiation of the CSMP, the Ocean Water Monitoring Program was managed by the Recreational Health Department of the DHS. This program was developed to protect swimmers from harmful water quality conditions at commonly utilized beaches. This program includes 10 beaches in North Santa Monica Bay that have recently been integrated into the CSMP. Additionally, the EMD was required to monitor water quality at beaches near its Hyperion treatment plant ocean outfall under a NPDES wastewater discharge permit. Following years of compliance with effluent standards, the monitoring requirements were shifted to the stormwater NPDES monitoring program, and now these locations are included in the CSMP. There are no monitoring locations in the NSMBW portion of the CSMP that are managed by the County Sanitation Districts.

3.1.5 Malibu Creek Watershed Monitoring Program (MCWMP)

This monitoring program was developed under a Prop 13 grant administered by the Regional Board to assess water quality conditions as they relate to beneficial uses within the Malibu Creek Watershed. The City of Calabasas is acting as the program manager. Water quality samples were collected at 13 sites between February and June 2005 and the results were summarized in a "Malibu Creek Watershed Monitoring Program Baseline Report". The MCWMP will continue to collect samples at these 13 sites to characterize water quality conditions during all seasons.

3.1.6 Las Virgenes MWD NPDES Monitoring

The TWRF discharges to Malibu Creek above the confluence with the Las Virgenes River. As part of the NPDES requirements, the Las Virgenes MWD has monitored a full suite of water quality parameters at seven sites along Malibu Creek upstream and downstream of the discharge. LVMWD has sampled for fecal coliform since 1997, following the requirement for tertiary treatment of effluent (NPDES Permit No. CA0053953, Order No. 97-135). This monitoring program is currently being re-evaluated by the Regional Board and LVMWD based on the presence of other watershed wide monitoring programs and review of historical water quality data in Malibu Creek from the LVMWD monitoring stations. Additionally, 18 monthly samples (July 2001 - December 2002) were collected from Malibu Creek (R-1) and analyzed for volatile and semi-volatile pollutants, heavy metals, and pesticides to assess compliance with the California Toxics Rule (CTR).

3.1.7 Heal the Bay/Stream Team

Heal the Bay is a non-profit organization committed to protection of water quality throughout California. They have been active in monitoring water quality in the Santa Monica Bay and its contributing watersheds through a volunteer group called the "Stream Team". The Stream Team has collected samples since 1998 from 17 locations in the Malibu Creek Watershed and 3 locations in the J1 subwatersheds.

3.2 Water Quality Monitoring Locations

Water quality data has been collected and recorded in the MCW area since early bacteria sampling at several beaches by the LA County DHS Ocean Water Monitoring Program and the Heal-the-Bay Beach Report Card program. NPDES regulated dischargers and non-profit groups began to monitor inland sites, within the Malibu Creek Watershed, during the mid-1990s. Lake monitoring programs also arose in response to homeowners concerns in the villages of Lake Sherwood and Westlake. Recent water quality monitoring programs, beginning in the wet season 2004-2005, have dramatically increased monitoring locations for inland waterbodies within the Malibu Creek Watershed.

A consolidated mapped inventory of all the sampling locations from the multitude of monitoring programs described above is presented in Figure 3-1. For informational purposes, the monitoring locations in the surrounding Topanga and Rural subwatersheds have been included in both the Figure 3-1 and Table 3-2. Additional information including the inventory documents the station name, period of record, lead agency, and the subwatershed, can be found in Technical Memorandum 3.1, attached in Appendix B.

3.3 Regional Water Quality Conditions of Concern

Review of water quality data aids the development of an effective TMDL Implementation Plan, by identifying and prioritizing areas where different measures will be most effective at reducing bacteria related to runoff. The elements of the Implementation Plan will include both non-structural and structural BMPs. Structural facilities are costly and therefore should be located, if deemed necessary, where pollution reduction benefits are maximized, for instance, downstream of potential non-point pollution source areas.

In this section, current bacteria data from the Malibu Creek Watershed are analyzed in relation to water quality objectives for REC-1 use established in the Basin Plan to assess potential hot spots. Following this review, sources of bacteria in the Malibu Creek Watershed, as identified in the TMDL Staff Report and other watershed studies, are summarized. The spatial distribution of existing water quality hot spots is combined with a land-use based source characterization to prioritize water quality areas of concern for subwatersheds within Malibu Creek. It is assumed that structural BMPs, if deemed necessary, will be most beneficial for achieving regional water quality improvements when they are located in the highest priority areas.

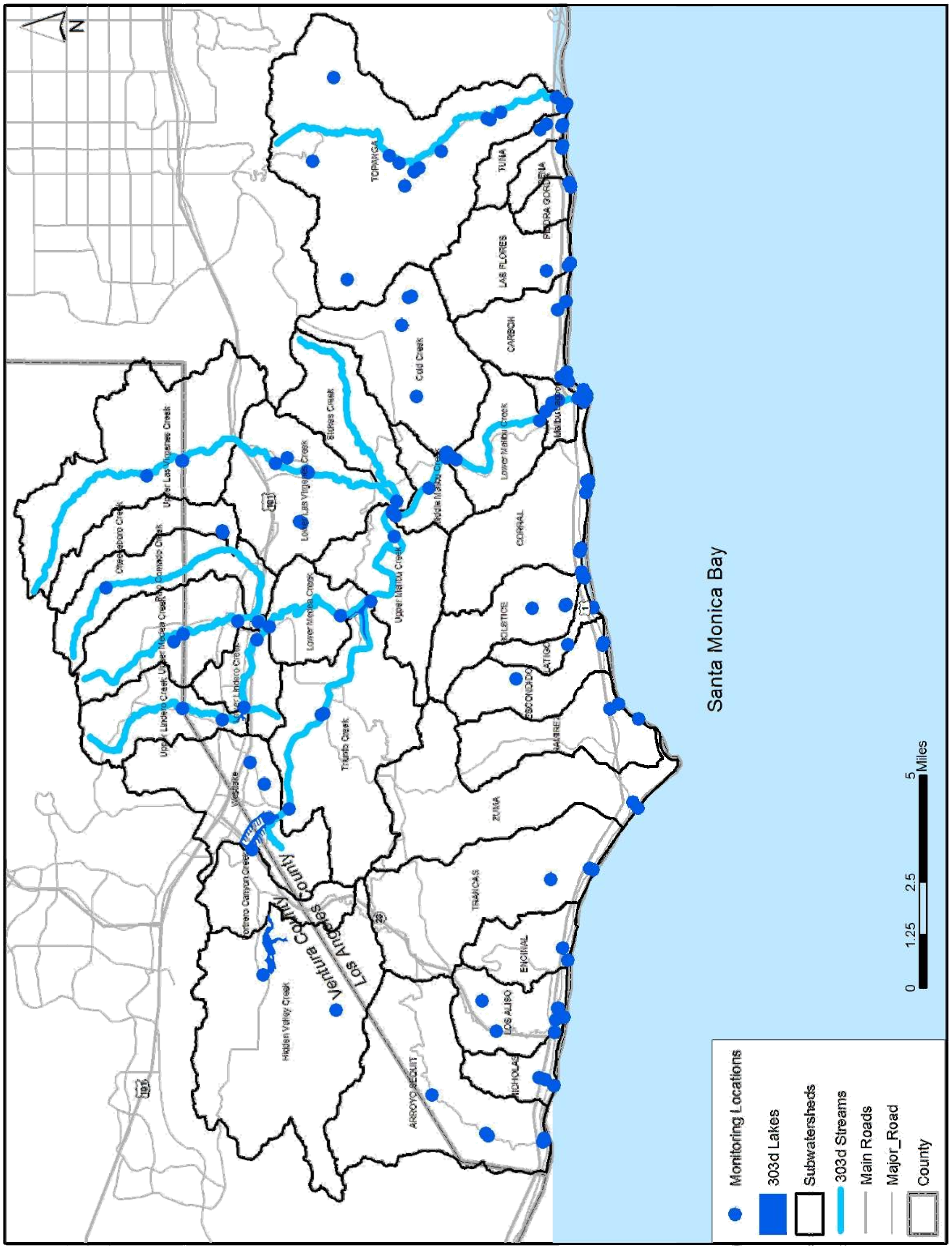


Figure 3-1
Water Quality Monitoring Locations in the MCW and Neighboring Coastal and Topanga Watersheds

Table 3-2
Exceedance Days for Malibu Creek, Malibu Lagoon, and Las Virgenes Creek as Reported in the Malibu Creek Bacteria TMDL Staff Report

Waterbody	Season (Allowable Exceedance Days)	1998	1999	2000	2001	2002
Malibu Creek	Summer (0 days)	1	1	2	2	4
	Winter (3 days)	3	0	3	12	1
Malibu Lagoon (above PCH)	Summer (0 days)			0	0	2
	Winter (3 days)			1	2	0
Malibu Lagoon (below PCH)	Summer (0 days)			2	6	3
	Winter (3 days)			8	3	1
Las Virgenes Creek	Summer (0 days)		2	26	16	15
	Winter (3 days)		1	14	25	3

The following section details bacteria conditions of concern and summarizes other conditions of concern for various pollutants/stressors within the MCW. As this TMDLIP was developed using an integrated water resources approach, existing data for other pollutants, such as nutrients and metals has been included here to provide background with respect to the prioritization of watersheds and selection of BMPs that may help address other pollutants in addition to bacteria.

3.3.1 Bacteria

3.3.1.1 Existing Conditions

Malibu Creek Bacteria TMDL Staff Report

In the Malibu Creek Bacteria Staff Report TMDL water quality data recorded from 1998 to 2002 in Malibu Creek, Malibu Lagoon, and Las Virgenes Creek was utilized to assess compliance with the dry-weather exceedance day standards (Table 3-2). One caveat is that daily monitoring was not used to count exceedance days, and therefore the number of annual exceedance days would likely be higher than reported.

Wet-weather bacteria data from the LACoDPW mass emission station S02 in relation to the Basin Plan water quality objective for fecal coliform of 400 MPN/100ml was evaluated and reported in the Malibu Creek Bacteria TMDL. The Staff Report summarized that 86.5% of 52 samples collected between 1995 and 2002 exceeded the fecal coliform objective. A review of recently published (post TMDL adoption) LACoDPW wet-weather bacteria data recorded at this station, revealed that 73% of 11 samples exceeded the Basin Plan objective for fecal coliform. These findings show that exceedances of bacteria objectives have a high probability in Malibu Creek during wet-weather conditions.

Additional Bacteria Data Analysis

Recent water quality monitoring programs, beginning in the wet season 2004-2005, increased the distribution of bacteria monitoring locations within the Malibu Creek Watershed. This data was combined with longer term monitoring data (dating back to 1995) to develop a watershed wide common database of bacteria records. The database contains bacteria monitoring data collected between 1995 and 2005.

In order to assess water quality areas of concern, this bacteria database was analyzed in relation to the Basin Plan's single sample E. coli objective of 235 MPN/100ml for REC-1 use. The maximum bacteria count from each calendar month was extracted for the database and used to assess compliance, rather than evaluating every individual sample. This approach reduces weighting of months with more samples collected and follows more closely the intent of the Basin Plan objective (10% of samples within a 30-day period).

Following the collection and quality assurance checking of MCW bacteria data, a complete point layer of sampling locations was developed. MS Access was used to develop queries of the dataset to assess compliance by comparing actual data with the established REC-1 use water quality objectives. Fields in the point attribute table of the bacteria monitoring location GIS layer were created to show the results of the database queries. Results from queries of the database were joined to the attribute table using a reference location identifier. These fields were used to symbolize sampling locations in the GIS model. The points on these maps are symbolized by two attributes, 1) percent of non-compliant calendar months and 2) number of non-compliant calendar months when sufficient data was present to determine compliance. These attributes are depicted as varying intervals of color and size of points, respectively.

Stratification of the data record at each bacteria station separated water quality conditions during wet-weather. To extract wet-weather samples from the long term bacteria database, rainfall data from the Monte Nido meteorological station was obtained. The historical rainfall record from this station was used to identify wet-weather days at each of the bacteria monitoring stations; where daily rainfall exceeded 0.1 inches at the meteorological station. Queries were also developed to show frequencies of exceedances of water quality objectives for bacteria during dry-weather conditions. Exceedances of objectives based on bacteria samples collected during dry-weather days were compared between seasons. The rainy season was defined as November 1st through March 31st and the non-rainy season, April 1st though October 31st. Wet-weather data was excluded from this seasonal analysis to assess differences in bacteria water quality in dry-weather flow between the rainy and non-rainy seasons. No queries were developed to compare wet-weather samples collected at different times of year, due to the limited number of samples.

The results of this analysis are mapped to show the spatial distribution of bacteria exceedances during dry-weather summer (Figure 3-2), dry-weather winter (Figure 3-3), and wet-weather (Figure 3-4) flow conditions.

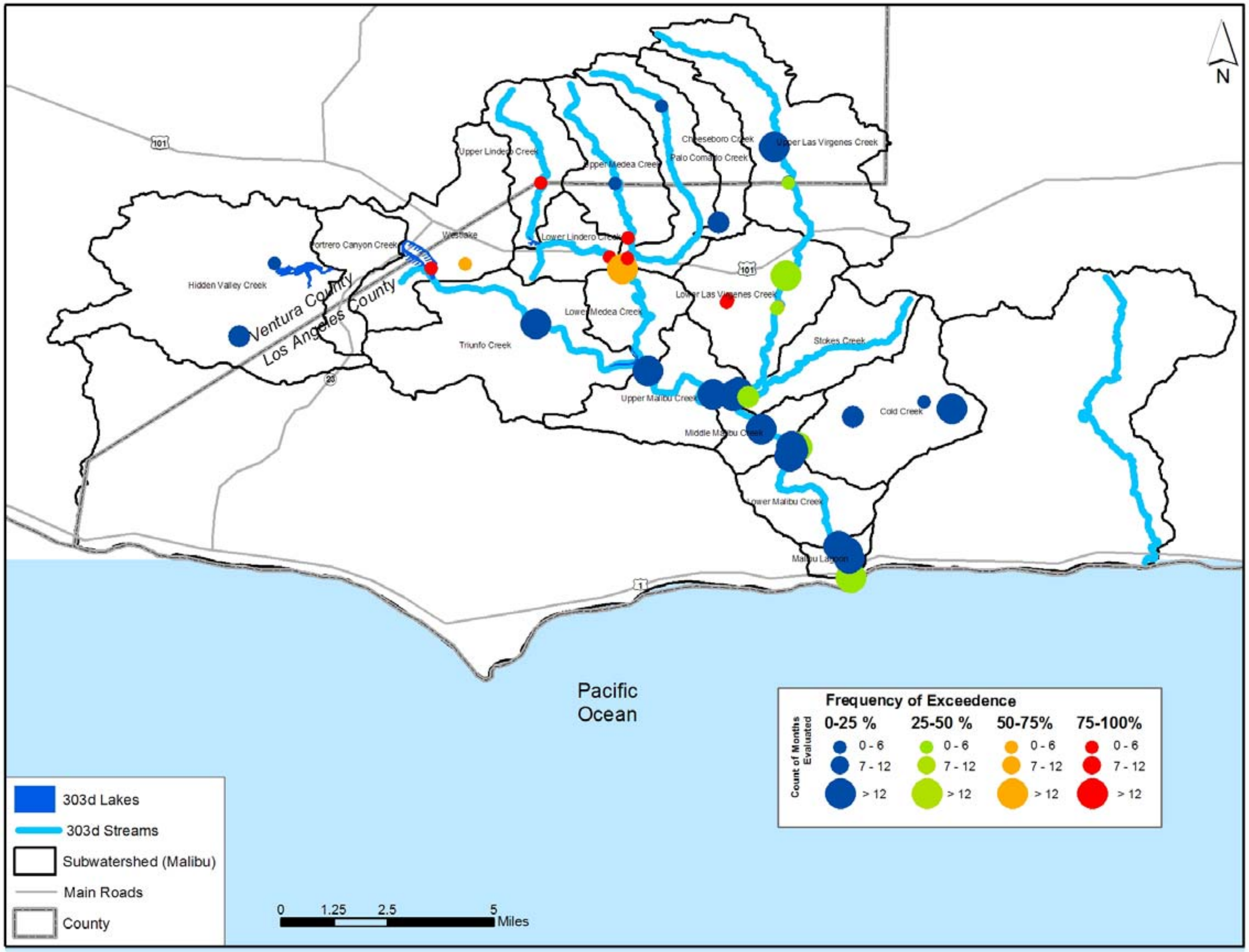


Figure 3-2
Frequency of Exceedance of E. coli Water Quality Objectives in the Malibu Creek Watershed during Dry Weather between April 1 and October 31

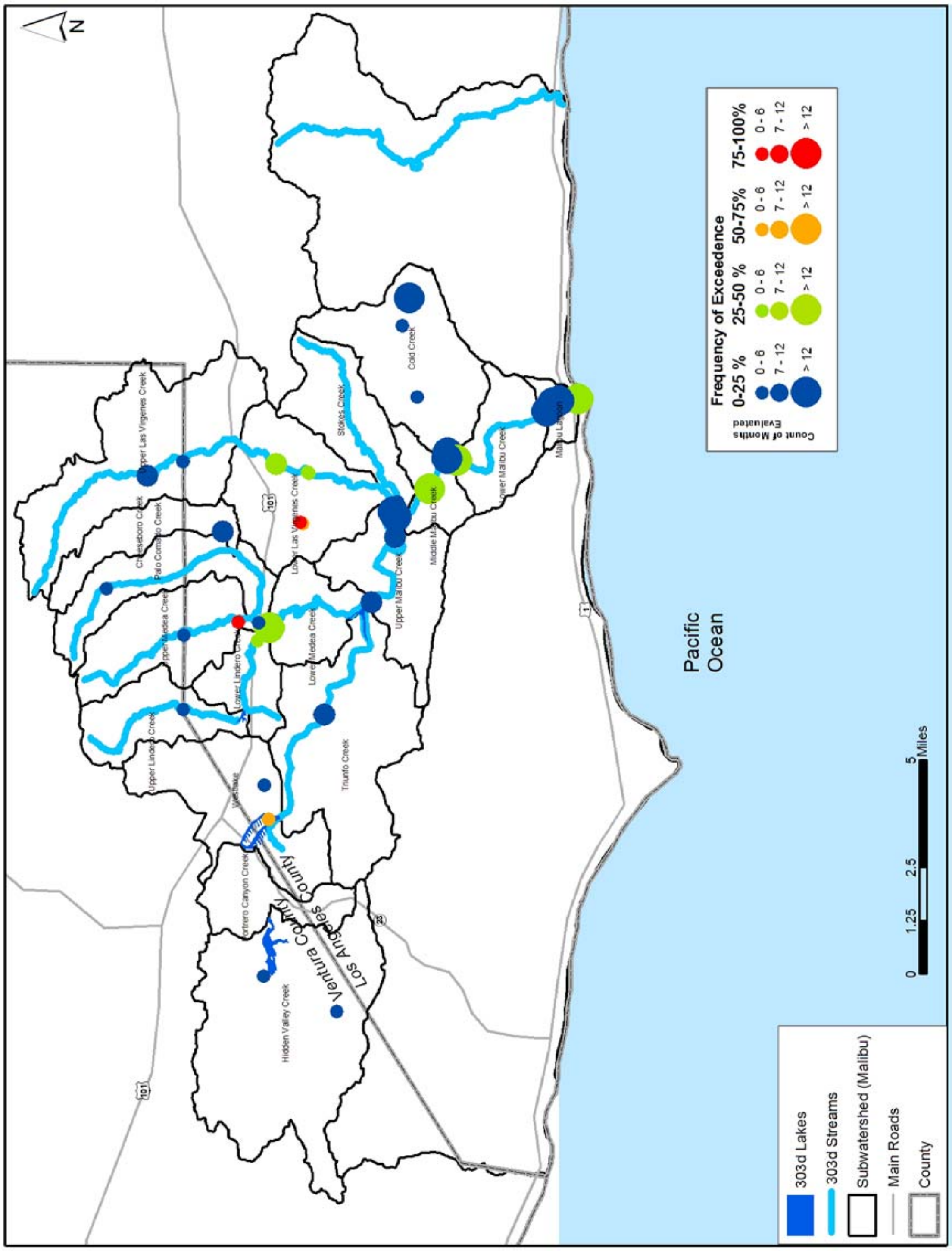


Figure 3-3
Frequency of Exceedance of E. coli Water Quality Objectives in the Malibu Creek Watershed during Dry-Weather between November 1 and March 31

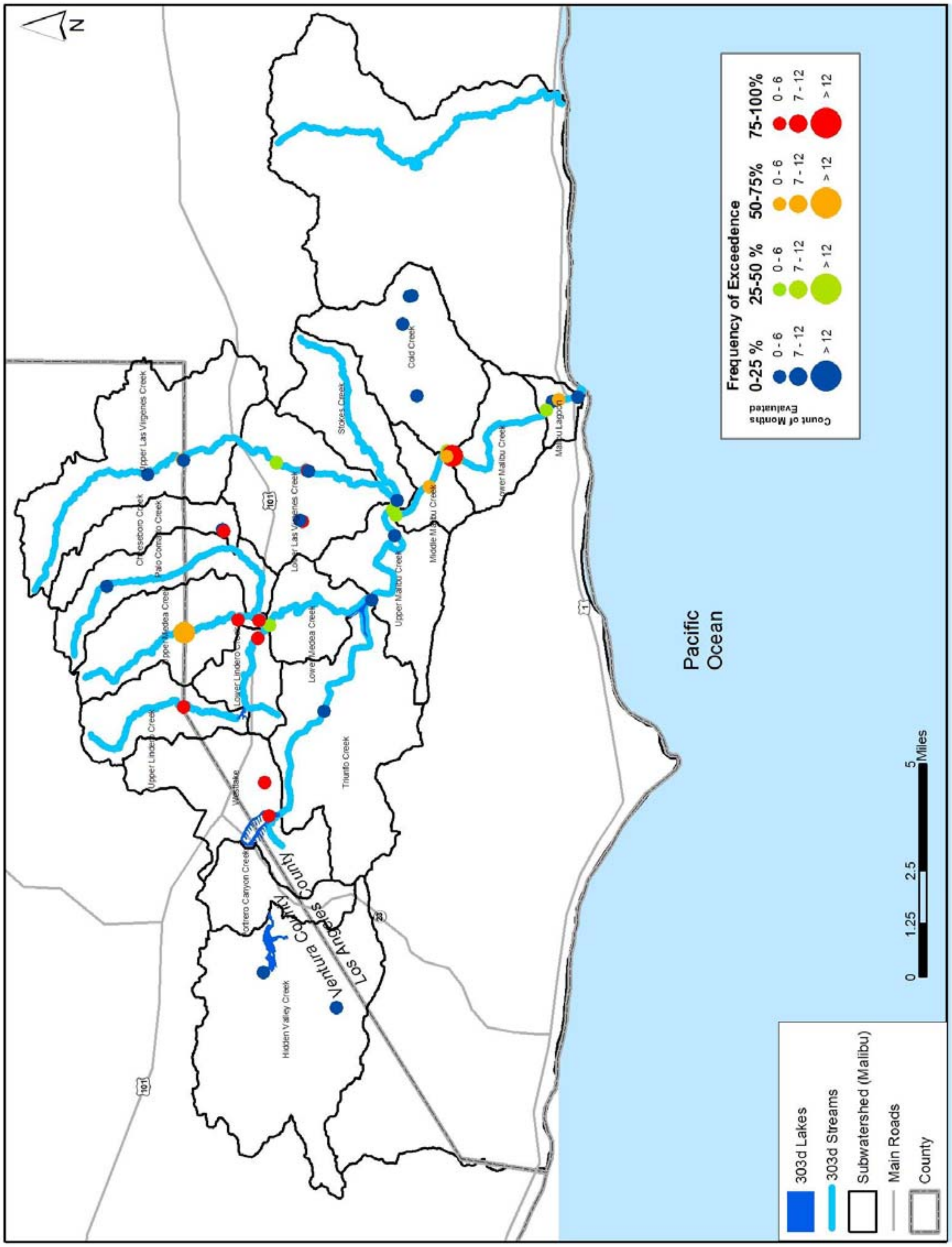


Figure 3-4
Frequency of Exceedance of E. coli Water Quality Objectives in the Malibu Creek Watershed during Wet-Weather

3.3.1.2 Source Characterization

The Malibu Creek Bacteria TMDL Staff Report identified potential point and non-point sources of bacteria in the watershed. Bacteria loads expected from each of these potential sources were input into a pollutant transport model (Hydrologic Simulation Program – FORTRAN). The model was developed by Tetra Tech under contract to EPA to simulate water quantity and quality from the 18 subwatersheds shown in the preceding maps, including major tributaries and lakes within each subwatershed and the results are documented in the Staff Report and Appendicices. Historical receiving water quality data was compared to model simulations results at five locations within the watershed (LVMWD monitoring site R2, R3, R4, R9, and R11). Relative loading from watershed sources was then adjusted to calibrate the model to actual water quality data at these locations. The results of this model calibration provide a relative contribution of bacteria to the Malibu Creek Watershed from each source category, which was used to set load reduction targets, in the form of waste load allocations (WLA) for point sources and load allocations (LA) for non-point sources (Table 3-3).

Modeled pollutant loads from these sources vary significantly depending upon the season. The model was not validated due to data limitations; therefore the relative source allocation should be considered an estimate. Each of the sources is further described below.

<u>Direct and indirect wastewater effluent</u> – The Tapia WRF has a capacity of 16 mgd and is located at the confluence of Las Virgenes and Malibu Creeks. Due to Title 22 wastewater NPDES requirements, the effluent from the Tapia WRF is chlorinated so that fecal coliform counts do not exceed 2.2 MPN/100ml. As a result, this discharge is not a concern for bacteria loading, but rather serves to dilute bacteria in Lower Malibu Creek. However, direct discharges from Tapia WRF to Malibu Creek are prohibited during the summer season (between April 15th and November 15th) by Regional Board Order No. 97-135. This prohibition during the summer months eliminates the dilution effect that the effluent discharge has on bacteria in lower Malibu Creek. For this reason, bacteria conditions in Malibu Creek are a greater concern during summer dry-weather than winter dry-weather flow conditions. Conversely, during the period that the Lagoon is not breached, there is no direct flow from the Creek to the downstream beach.

<u>On-site Wastewater Treatment Systems (OWTS)</u> – Properly designed and maintained OWTS should not be a potential source of bacteria. Bacteria in effluent from these systems is removed as it percolates through the soil matrix in a leachfield. Conversely, OWTSs that are located in high groundwater areas, not regularly maintained, or are short-circuited can be a significant source of bacteria in the Malibu Creek Watershed.

Table 3-3
Relative Contribution from Potential Source Categories based on Calibrated TMDL Linkage Model

Source Category	Estimated Annual Bacteria Load (billion counts/year)	% of Existing Bacteria Load
Tapia Discharge	59	0%
Stormwater Runoff		
Commercial/Industrial	2,550,000	39%
High/Med. Density Residential	2,700,000	42%
Low Density Residential	344,000	5%
Rural Residential	97,500	2%
Agriculture/Livestock	32,100	0%
Onsite Wastewater Treatment Systems	247,000	4%
Effluent Irrigation	12	0%
Dry-Weather Runoff		
Entire Watershed (except Lagoon)	5,210	0%
Malibu Lagoon	18	0%
Birds	450,000	7%
Tidal Inflow	16,100	0%
Natural Sources Other than Birds		
Vacant	1,950	0%
Chaparral/Sage Scrub	37,700	1%
Grasslands	2,690	0%
Woodlands	809	0%
TOTAL	6,485,148	100%

Residential areas in the upper Malibu Creek Watershed are mostly sewered; however outside the cities of Calabasas, Agoura Hills, Thousand Oaks, and Westlake Village rural residential homes utilize OWTS. Additionally, the residential areas in the City of Malibu in lower Malibu Creek Watershed are completely unsewered. There are also 20 commercial OWTS, which are designed to treat wastewater from shopping areas and some multi-family developments in the City of Malibu. The total number of septic systems watershed wide was estimated at 2,420 in 2001 (Tetra Tech, 2002). The distribution of OWTS is provided in Table 3-4.

Regional Board found high fecal coliform counts in shallow groundwater in the vicinity of OWTS in the Malibu Colony and Cross Creek shopping area. These areas are characterized by typically high groundwater and they are close to Malibu Lagoon, therefore failed systems may contribute effluent directly to the Lagoon.

The TMDL calibrated linkage model assumed that 8% of residential OWTS were failing and that 40% of this bacteria load could reach a surface waterbody. For the commercial OWTS, the model assumed a 20% failure rate and 100% transport of the loads to Malibu Lagoon due to the high groundwater in the Malibu Lagoon subwatershed. These assumptions use information from various prior studies cited in the TMDL document, but are not based on actual data.

Table 3-4
Number of OWTS in Malibu Creek Subwatersheds

Subwatershed	Number of OWTS
Hidden Valley Creek	625
Portrero Canyon Creek	0
Westlake	60
Upper Lindero Creek	0
Lower Lindero Creek	0
Upper Medea Creek	0
Palo Comado Creek	0
Cheseboro Creek	0
Lower Medea Creek	110
Triunfo Creek	820
Upper Malibu Creek	95
Upper Las Virgenes Creek	0
Lower Las Virgenes Creek	50
Stokes Creek	85
Middle Malibu Creek	50
Cold Creek	300
Lower Malibu Creek	5
Malibu Lagoon	0
Above Lagoon	170
Adjacent to Lagoon	30
Commercial near Lagoon	20
Total	**2,420**

Runoff from residential and commercial areas – According to the TMDL staff report, runoff from urbanized areas is estimated to be the greatest source of bacteria in the Malibu Creek Watershed, especially during wet-weather flow conditions. Build up of bacteria on impervious surfaces in residential and commercial areas is washed off during rain events or by irrigation overflow and car/driveway washing during dry-weather. Sources of bacteria in urbanized areas include the following:

- Lawn and landscape fertilization
- Organic debris from gardens, landscaping, and parks
- Trash
- Domestic animal waste
- Human waste
- Non-anthropogenic sources

Horse and Livestock – Bacteria in horse and livestock manure is a potential source in the Malibu Creek Watershed. The Malibu Creek Bacteria TMDL Staff Report inventoried the number of horses, cattle, and sheep or goats in each subwatershed and applied a per animal fecal production load. This was then reduced because of manure collection programs for horse stables, except in the Hidden Valley Creek subwatersheds where there are open pastures. According to the Staff Report, the relative contribution of this source category was not significant.

Wildlife – A large portion (~75%) of the Malibu Creek Watershed is open space and provides habitat for 50 species of mammals and 380 species of birds. The Malibu Creek Bacteria TMDL used reference values that LACoDPW developed for chaparral/sage scrublands, grasslands, and woodlands as a means to estimate contributions from wildlife. Recent monitoring of water quality at undeveloped reference beaches in southern California, including two NSMB beaches, showed that during wet-weather, 20% of samples exceeded Basin Plan objectives (Schiff et al., 2005) which may suggest contribution from natural sources including wildlife.

Waterfowl are a component of the Malibu Lagoon ecosystem and are believed to be a potentially important source of nutrients in the Lagoon (Warshall et al, 1992). For this reason, the TMDL independently considered waterfowl loading to Malibu Lagoon. The linkage model estimated that waterfowl in Malibu Lagoon alone contribute as much as 7% of the total bacteria load from the Malibu Creek Watershed.

High-use Recreational Areas - Bacteria loading impacts can result from activities associated with high recreational usage or where additional recreational facilities may be needed. For example, heavy use of beaches and open space areas where public restrooms are not readily available or wading in natural or constructed pools or in stream courses where no public restrooms are available may result in bacteria loading. Bacteria loading is possible from horse manure in high use equestrian areas such as staging areas, trail heads, parking areas, and on trails or from pet waste left on trails. Another additional potential source of bacteria is the use of the riparian area as a "camp" by homeless inhabitants.

3.3.2 Nutrients

3.3.2.1 Existing Conditions

Certain water quality impairments in the MCW are related to elevated levels of nitrogen and phosphorous found in many of the inland watersheds. Particularly, inland lakes (Lake Sherwood, Westlake Lake, Lake Lindero, and Malibu Lake) and some streams (Malibu Creek, Malibu Lagoon, Las Virgenes Creek, Lower Medea Creek, Upper Medea Creek, and Lindero Creek) have 303(d) listed impairments for algae, eutrophic conditions, scum/odors, ammonia, organic enrichment, and low dissolved oxygen. These impairments stem from increased in-stream concentrations of nutrients and thus they are addressed by the EPA-adopted Nutrient TMDL for the Malibu Creek Watershed.

Nutrient-related impairments are not well correlated to either nitrogen or phosphorous, based on several studies that attempted to identify the limiting factors for algal growth. Consequently, EPA Region 9 developed a TMDL and set numeric targets based on the reference waterbody approach. Since nutrient impairments are amplified during the summertime when water temperatures rise, flushing of algal growth is reduced, and daytime length increases, the TMDL includes numeric targets for nitrate-nitrite nitrogen (1 mg/l) and total phosphorous (0.1 mg/l) during the summer and nitrate-nitrite nitrogen (8 mg/l) during the winter. Based on these targets, the final proposed nitrogen and phosphorous Nutrient TMDLs were developed by EPA and are presented in Table 3-5. These will be updated upon completion of the TMDL being developed the Regional Board.

Table 3-5
TMDLs for Total Nitrogen and Total Phosphorous

Season	Total Nitrogen	Total Phosphorous
Summer (April 15 – November 15)	27 lbs/day	2.7 lbs/day
Winter (November 16 – April 14)	8 mg/l (NO_2 + NO_3)	N/A

3.3.2.2 Source Characterization

The EPA-adopted Nutrient TMDL and other Malibu Creek Watershed studies have assessed specific sources of nutrients in the Malibu Creek WMA, which are in some cases different than those identified for bacteria. The final load allocations and waste load allocations from the linkage model show an estimated proportion of total nutrient transport from each of the sources that were identified. These sources are shown in Table 3-6.

Table 3-6
Relative Contribution from Potential Source Categories based on Calibrated TMDL Linkage Model

Source Category	% of Total Nitrogen Load During Winter	% of Total Nitrogen Load During Summer	% of Total Phosphorous Load During Summer
Waste Load Allocations			
Tapia Direct Discharge	34	5	8
Load Allocations			
Septic Systems	9	22	21
Effluent irrigation/sludge	8	15	13
Runoff from developed areas	11	6	6
Golf Course Fertilization	5	9	16
Agriculture/Livestock	5	8	4
Dry-Weather Urban Runoff	2	13	11
Runoff from undeveloped land	22	9	11
Other	5	14	10
Total	100	100	100

3.3.3 Metals

3.3.3.1 Existing Conditions

Various impairments exist within the MCW resulting from elevated metal concentrations. Specifically, Westlake Lake and Sherwood Lake are 303(d) listed for lead and mercury, respectively, and segments of Triunfo Creek, Lindero Creek, Medea Creek, and Las Virgenes Creek are listed for metal impairments including lead, mercury, and selenium. To date, no TMDL has been developed for the metal impairments found within the watershed. However, many organizations within the Malibu Creek Watershed Advisory Council are continually monitoring metal levels throughout the basin.

3.3.3.2 Source Characterization

Limited studies have been conducted to identify watershed-specific sources of high metal concentrations. Studies have been conducted on the trace metal levels found in fish and invertebrates in the coastal wetlands of this area. Reports have mainly linked metals to storm runoff from developed areas. This urban runoff can include metals from landscape irrigation, street cleaning, and accidental sewer overflows, as well as illegal industrial and commercial discharges. Metals can also be traced to natural background and atmospheric deposition. Metals of concern are further described below.

<u>Selenium</u> - Selenium can occur naturally in the environment. It is released through both natural processes and human activities. Selenium is discussed in limited detail in the Malibu Creek Natural Resource Plan where sources of trace metals are identified as domestic and industrial discharges, urban runoff, and direct atmospheric deposition. Naturally occurring selenium can be mobilized to waterways when soils are disturbed through storm events, construction, and/or agricultural activities, particularly irrigated agriculture where selenium can be easily transported through ditches. During this refining and purification, there can be some loss of selenium into the environment. In addition, industries concerned with the production of glass, electronic equipment, or certain metals may emit selenium into the environment in the immediate vicinity of the factories involved.

<u>Lead</u> - Lead is a naturally occurring element in the earth’s crust. Elevated lead levels have been measured in Westlake Lake and segments of Triunfo Creek. According to the EPA, lead in the environment can be traced to the following sources: past lead additives in gasoline, paint, household dust and soil around homes, lead piping, and industrial emissions. Sources of lead in surface water include deposits of lead-containing dust from the atmosphere, waste water from industries that handle lead (iron and steel and lead producers), and urban runoff from roadways and residential areas.

<u>Mercury</u> - Mercury is found naturally in soils and elevated levels have been documented in Nevada and California. The ultimate source of mercury to most aquatic ecosystems is deposition from the atmosphere, primarily associated with rainfall. In addition, particles attach to soils and are washed into streams and lakes through storm runoff. Mercury can be associated with industry, particularly in the manufacturing of electrical equipment (batteries, lamps, switches, and rectifiers). It may enter the environment through mining, smelting (not found in this watershed), and fossil fuel combustion. Fungicides used in agricultural practices can contain mercury. Mercury can also be reintroduced through sediment releases where anoxic bottom conditions exist in lakes and reservoirs.

3.3.4 Hydromodification

3.3.4.1 Existing Conditions

Hydromodification is defined by EPA (US EPA 1993) as the "alteration of the hydrologic characteristics of surface waters, which in turn could cause degradation of water resources." In the MCW area, there is a potential for hydromodification of natural streams downstream of urbanizing areas. Urbanization can cause hydromodification when downstream waterbodies do not have the capacity to convey increasing flow volumes and durations that are associated with increasing imperviousness in the watershed. Higher flows increase the erosive stresses on bed materials beyond the level that would naturally occur within the stream. This can be a major concern in a watershed such as Malibu Creek with upstream development covering greater than 10 percent of the land area. It can also be tied to mitigation if there is ongoing degradation that contributes to pollutant loading.

When evaluating the impacts of hydromodification as a potential source of sediment impairments within the MCW area, it must be considered that the watershed terrain is naturally susceptible to landslide and higher soil loss rates.

3.3.4.2 Impacts of Hydromodification

Hydromodification activities can have beneficial purposes such as creating drinking water supplies, reducing flood impacts, expanding road networks, increasing drainage, preventing erosion, and reducing sediment loss. However, many hydromodification activities also lead directly or indirectly to adverse impacts on aquatic ecosystems. Hydromodification activities can negatively affect streams in numerous ways.

Stream channelization can cause streambed scouring and hardening, streambank erosion, altered waterways, and altered hydrochemistry. As a result, there is a potential to adversely affect water quality by altering pH, water temperature, metals concentration, dissolved oxygen, sediment loads, and nutrient levels. The hardening of banks along waterways also increases surface water flows and the transport of pollutants from the upper reaches of watersheds into coastal waters. Hydromodification also provides adverse changes to channel characteristics and sediment transport. According to EPA, a frequent result of channelization is also a diminished suitability of in-stream and streamside habitat for fish and wildlife (URL: http://www.epa.gov/owow/nps/MMGI/hydro.html). In unchannelized waterbodies, increasing streambank erosion can lead to excessively high sediment loads that can contribute to increased levels of turbidity that eventually settle causing problems for submerged vegetation, shellfish beds, natural stream pools, and tidal flats.

A separate, but related concern is associated with the future addressing of sediment as an impairment for certain watersheds. Removal of sediment sources has the potential to further aggravate stream degradation.

3.3.5 Pesticides

3.3.5.1 Existing Conditions

EPA defines a pesticide as "any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest." Substances found in pesticides, such as chlordane and dieldrin, are on the 303(d) list due to elevated levels found in fish tissue within the Santa Monica Bay area. The LACoDPW monitors pesticides in Malibu Creek as part of its NPDES stormwater mass emissions monitoring program. Various other organizations also list pesticides as monitored parameters as well.

In order to assist the Regional Board's TMDL development for the Malibu Creek Watershed, Southern California Coastal Water Research Project (SCCWRP) produced a technical report regarding a study of organophosphorus pesticides within the basin. Three streams were assessed for contamination by pesticides. Monthly samples were collected between June 2002 and March 2003 from Malibu Creek, Las Virgenes Creek, and Medea Creek. Two storm events in February 2003 were also sampled on Malibu Creek. The study found that water quality was most impaired in Medea and Las Virgenes Creeks, indicated by the survival of C. dubia (Brown, Jeffrey and Steven Bay. 2003).

3.3.5.2 Sources and Impacts of Pesticide Use

As discussed in Section 3.3.5.1, chemicals associated with pesticides are on the 303(d) list for areas within the MCW region. Many of the persistent pesticides such as dieldrin, chlordane, and DDT are no longer produced in the United States, yet they remain in the ecosystem. Many pesticides are persistent in the environment and bioaccumulate in aquatic species.

Pesticides are introduced to the environment through industrial, commercial, agricultural, and household use. Many pesticides cause adverse enzymatic and hormonal changes in fish that lead to impaired reproductive ability.

Chemicals associated with pesticides can enter and contaminate water through direct application, runoff, wind transport, and atmospheric deposition. Generally, runoff from agricultural areas produces locally high concentrations of pesticides, while atmospheric deposition causes low-level but widespread contamination. Atmospheric deposition occurs through the processes of wet and dry deposition. Wet deposition happens when chemicals in the gas phase bond to particles in the air that are then washed out by rainfall. On the other hand, dry deposition is a constantly occurring process when chemically bonded particles settle to the land or water surface.

3.4 Prioritization of Regional Water Quality Areas of Concern

To address water quality impairments and concerns within the MCW, non-structural and structural BMPs are identified within this TMDLIP for incorporation into existing water quality control programs to achieve pollution reduction goals. To determine where BMPs will provide the greatest benefits and to assist in developing a schedule for BMP implementation, water quality areas of concern (AOC) have been identified and prioritized.

The MCW area is broken into 18 subwatersheds. The prioritization method addresses AOCs for these 18 subwatersheds as a whole. It should be noted that while this is a TMDLIP for bacteria, in following an integrated water resources approach, numerous pollutants were evaluated and included in the prioritization.

The approach used to prioritize the MCW subwatersheds was an enhancement of the approach used to prioritize subwatersheds for the SMBBB TMDLIP J 1/4 and draws concepts from a BMP prioritization methodology that index approach that has been developed for use in other watersheds in the county.

The catchment prioritization index (CPI) approach provides an indication of the likelihood of a subwatershed to be a source of pollution relative to other subwatersheds in the region. Elements considered in this approach to prioritizing water quality AOC include the following:

- Pollutant event mean concentrations (EMCs),
- Runoff potential estimated by watershed imperviousness,
- Presence of an existing 303(d) impairment or completion of a TMDL, and
- Existing monitoring data documented in Section 3.

The CPI for a subwatershed is a function of the pollutant-specific catchment prioritization indices (PCPI) of each of the pollutants that are assessed and available water quality data. Seven potential pollutants representing five pollutant groups were considered in this analysis - fecal coliform, nitrate, trash, total metals (copper, lead, zinc), and total suspended solids. The PCPI for a pollutant is the product of the area-weighted runoff coefficient and the area-weighted EMC for each pollutant in each subwatershed with adjustments for the relative importance of specific pollutants and actual monitoring data. Details of the calculation of the CPI for each Malibu Creek subwatershed is presented in Technical Memorandum 3.1, included in Appendix B. The existing water quality conditions of the MCW were incorporated into the CPI to prioritize the 18 MCW subwatersheds.

The calculated CPIs that are used to assign priorities to each subwatershed are summarized in Table 3-7 and mapped in Figure 3-5. The subwatersheds were categorized into priority categories based on CPI, where:

- High Priority (30-100)
- Medium Priority (20-29)
- Low Priority (0-19)

The result of incorporating nutrient and bacteria ratings into the CPI calculation resulted in a 40 percent increase in the maximum CPI score. The remaining subwatersheds are normalized to this higher CPI score. Some subwatersheds increased in priority as a result of moderate or high ratings. Conversely, the CPI of some subwatersheds with low ratings or missing data was reduced due to normalization to a higher maximum CPI.

Table 3-7
Prioritization Results from Water Quality AOC Analysis in the MCW Area

Subwatershed	CPI Ranking	Priority
Westlake	100	High
Lower Lindero Creek	85	High
Malibu Lagoon	83	High
Upper Lindero Creek	82	High
Upper Medea Creek	78	High
Lower Las Virgenes Creek	57	High
Portrero Canyon Creek	52	High
Hidden Valley Creek	49	High
Stokes Creek	36	High
Lower Medea Creek	32	High
Middle Malibu Creek	29	Medium
Lower Malibu Creek	27	Medium
Upper Las Virgenes Creek	25	Medium
Palo Comado Creek	23	Medium
Cheseboro Creek	20	Medium
Triunfo Creek	18	Low
Cold Creek	17	Low
Upper Malibu Creek	8	Low

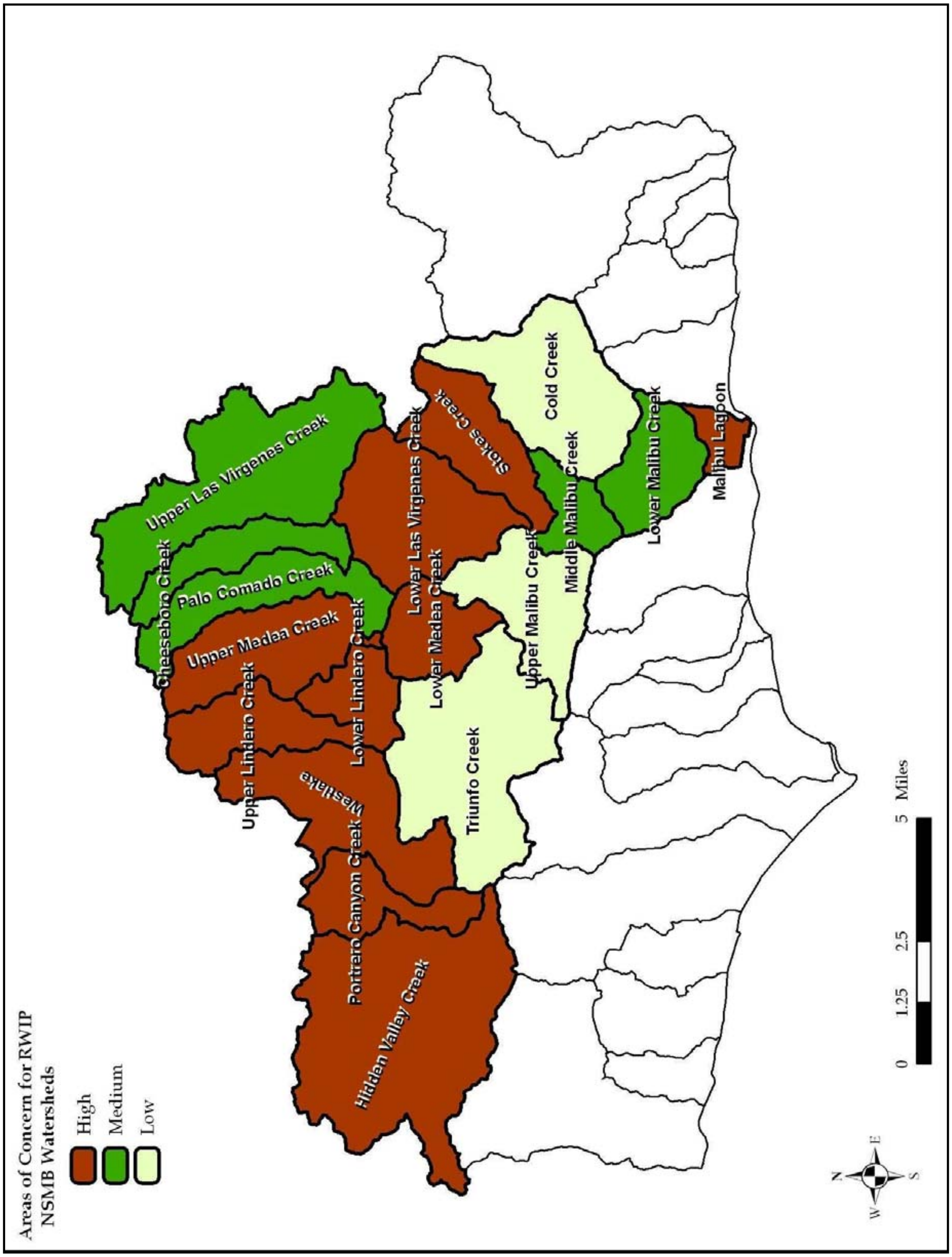


Figure 3-5
Prioritization of Water Quality AOCs for Malibu Creek Subwatersheds

Section 4
Plan Development and Evaluation

Subwatershed suites of recommended BMPs have been developed using the watershed priorities, non-structural and structural BMPs developed and evaluated in Sections 2 and 3, and feedback from the MCW stakeholders regarding priorities for BMP implementation. Stakeholders helped identify the relative priority (or weightings) of evaluation criteria as described below. Non-structural and structural BMPs were ranked by using these weightings and the previously developed subwatershed prioritizations. Each BMP received a weighted score on a subwatershed basis allowing for the formation of BMP suites for each watershed prioritization type. A follow-on evaluation was performed to identify specific BMPs of the higher-ranked BMPs to commit to implementing, commit to piloting, or for future consideration.

The evaluation criteria and commit-pilot-consider model are further described in the following section.

4.1 BMP Evaluation Criteria

Separate criteria were developed for both non-structural and structural BMPs. The criteria are described below for both non-structural and structural BMPs. This is followed by a description of the relative importance or weighting of each criterion for evaluating the BMP. The BMP evaluation methodology, applying the criterion weighting, is described in detail in Section 4.2.

4.1.1 Structural Criteria

Four structural criteria were used to assist in developing a weighted score for each BMP on a subwatershed basis – cost, effectiveness, implementability, and other factors/environmental. These criteria were established to be consistent with the *Los Angeles County-Wide Structural BMP Prioritization Methodology* developed jointly by Heal the Bay, the County of Los Angeles, the City of Los Angeles, and GeoSyntec Consultants.

4.1.1.1 Cost

The cost criteria includes: design and installation costs, land acquisition costs, O&M costs, and replacement costs. Two sub-criteria were developed: capital and O&M costs. Costs are evaluated on per unit costs for both capital and O&M costs. Planning level cost estimates were developed for both the distributed and regional BMP families in Section 2.3. These cost estimates serve as the basis for ranking structural BMPs. A BMP that has a low per unit capital and O&M cost would receive a high score.

4.1.1.2 Effectiveness

The effectiveness criterion measures the effectiveness of a particular BMP based on a number of sub-criteria. Effectiveness is impacted by the amount of flow that can be treated within the space available, as well as removal rates for pollutants. Four sub-criteria were developed: effluent concentration by pollutant group, other pollutants (toxics and bioaccumulators), volume mitigation, and reliability. Effluent concentration by pollutant group is broken down into the following pollutants: trash, nutrients (nitrate), metals, bacteria, and sediments (TSS). Percent concentrations are individually assigned based on the subwatershed. The other pollutants sub-criterion measures the ability of a BMP to reduce toxics and chemicals that bioaccumulate in the environment. Volume mitigation is the ability of a BMP to reduce runoff volumes. Reliability represents a measure of the ability of the alternatives to consistently meet bacteria TMDL regulations. A low ranking for any of the sub-criteria indicates low effectiveness of the BMP.

4.1.1.3 Implementation

The implementability of a BMP is among the most important of the factors considered in the selection process. A strategy can appear to be the most appropriate in terms of cost and effectiveness, but if it cannot be reasonably implemented, the strategy may not be feasible. Implementation is a measure of the ability of a project to be completed. The higher the ranking the more likely a project will result in successful implementation. This criterion is divided into two main sub-criteria: implementation issues and safety of the public.

Implementation issues are further sub-divided into: engineering/siting feasibility, ownership/right of way/ jurisdictions, environmental clearance, and permitting and water rights and safety:

- Engineering/siting feasibility is a measure of the ability of a BMP to be designed to properly work given constraints, such as, but not limited to, area of land available, hydrology, and geology.

- Ownership of land, the ability to use right of ways, and jurisdictional location of BMPs is critical to the successful siting of structural BMPs. Stakeholders have indicated they are not willing to use eminent domain to site BMPs on land owned by unwilling sellers.

- Environmental clearance is necessary for all BMPs. Implementation of a BMP may be more difficult depending on environmental impacts that the project may cause. Construction in sensitive ecological areas is not permissible. BMPs may impact endangered species, aggravate groundwater quality problems, or cause erosion if not properly sited.

- Permitting and water rights issues are also key to successfully implementing a BMP. All projects must be able to obtain all permits required for construction. BMPs that impinge upon existing water rights by removing surface flows or altering ground water flows will reduce the ability of a project to be successfully implemented.

Safety of the public may impact the successful implementation of a BMP. BMPs must be adequately sited and designed to prevent dangers to the public, including but not limited to property damage, personal injuries, or death in the case of accidental drownings. BMPs that present dangers to the public are ranked lower.

4.1.1.4 Environment/Other Factors

The environment/other factors criteria are a measure of a BMP to create both benefits and potential impacts. Benefits and potential impacts are sub-criteria. Benefits of BMPs would include integrated resource management or beneficial reuse. Beneficial reuse would result in the reuse of runoff for irrigation or groundwater recharge, if feasible, reducing demands on imported potable water. Other potential BMPs resulting in beneficial reuse would receive higher rankings than those BMPs that do not have a reuse component. BMPs can also result in potential impacts such as the creation of vector sources.

4.1.1.5 BMP Criteria Weighting

The criteria categories were weighted using stakeholder input regarding the relative importance of cost, risk, and multi-beneficial use for each subwatershed priority. The general weighting scheme was decided with the Stakeholders in a meeting on June 13, 2006. The relationship of the criteria to the cost, risk, and multi-benefit criteria discussed at the Stakeholder Meeting on June 13 is as follows:

- Cost : Cost

- Effectiveness and Implementability : Risk

- Environment/Other Factors : Multi-benefits

Table 4-1 presents the weighting percentages as gathered from stakeholder feedback, applied to each criterion for each of the three subwatershed prioritizations. Effectiveness and implementation were considered equally as part of the risk of implementing or not implementing a BMP.

Table 4-1
Structural BMP Criteria Weighting by Subwatershed Priority

Low Priority		**Medium Priority**		**High Priority**	
Criteria	Percentage	Criteria	Percentage	Criteria	Percentage
Effectiveness	15%	Effectiveness	25%	Effectiveness	35%
Implementation	15%	Implementation	25%	Implementation	35%
Low Cost:	50%	Low Cost:	25%	Low Cost:	10%
Multi-Benefit:	20%	Multi-Benefit:	25%	Multi-Benefit:	20%
	100%		100%		100%

Table 4-2 illustrates the percentages assigned to the sub-criteria, for each of the three families of BMPs. These percentages were initially developed by the Consultant Team and modified to be consistent with agency stakeholder priorities, and reflect a consensus of the stakeholder representatives.

Table 4-2
Structural BMP Category Sub-Criteria Weighting by BMP Family

	Institutional	**Distributed**	**Regional**
Cost			
– Capital	40%	40%	40%
– Operations and Maintenance	60%	60%	60%
Total Maximum for Cost Category	100%	100%	100%
Effectiveness			
– Effluent Conc. (by pollutant group)	40%	50%	55%
Trash	Percent contribution for each individual pollutant group determined on a subwatershed by subwatershed basis.		
Nitrate			
Metals			
Bacteria			
TSS			
– Other Pollutants (toxicity, bioaccum.)	2.5%	5%	5%
– Volume Mitigation	40%	35%	30%
– Reliability	17.5%	10%	10%
Total Maximum for Effectiveness Category	100%	100%	100%
Implementation			
– Implementation Issues			
Engineering/Siting/ROW/Ownership	10%	30%	50%
Expected extent of implementation	60%	30%	10%
Environmental Clearance	10%	20%	20%
Permitting, Water Rights	5%	10%	10%
– Safety (Public)	15%	10%	10%
Total Maximum for Implementation Category	100%	100%	100%
Environment/Other Factors			
– Other Potential Benefits (eg, conservation)	60%	60%	60%
– Other Potential Impacts (eg, vectors)	40%	40%	40%
Total Maximum for Other Category	100%	100%	100%

4.1.2 Non-Structural Criteria

Three non-structural criteria were used to assist in developing a weighted score for each BMP on a subwatershed basis. These criteria are consistent with other Santa Monica Bay TMDL Implementation Plans and reflect a desire to balance competing criteria, while meeting required objectives.

4.1.2.1 Cost

For purposes of this evaluation the cost criteria includes a relative measure of the costs associated with additional staff time on behalf of implementing agencies and materials and equipment, including both start-up costs, and ongoing operational costs. Costs are reflective of costs to an agency and do not reflect costs assumed by others. A high ranking corresponds to low cost.

4.1.2.2 Multi-Pollutant

The multi-pollutant criterion measures the ability of a BMP to effectively target more than one pollutant. A low ranking means that a BMP targets fewer pollutants than a high ranking BMP. Three sub-criteria were developed: prioritized pollutants, organics/toxics, and oil and grease. Prioritized pollutants are further broken down into bacteria, nutrients (nitrate), sediments (TSS), trash, and metals. Percent contributions are individually assigned to the prioritized pollutants based on the subwatershed.

4.1.2.3 Risks

The risk criterion is further subdivided into the following sub-criteria: risk of implementing a BMP and risk of not implementing a BMP. Each non-structural BMP has a risk associated with implementation.

Implementation risks include financial or other burdens placed on businesses, residents, and non-residents; increased level of effort and coordination required on behalf of public agencies; regulatory constraints; public resistance; political issues; and oversaturation of public outreach materials. The higher the implementation risk and the lower the ranking, the less of a chance a BMP will be performed properly and sustained, and consequently the lower the likelihood that the BMP will result in a reduction of bacterial loading.

Not implementing a non-structural BMP also has an associated risk. A lack of implementation can result in an agency not achieving compliance with the Dry- and Wet-weather Bacteria TMDL for the MCW and/or the applicable NPDES permit. By not implementing a BMP that targets a source associated with high bacterial loading, for example, the risk of not achieving compliance with the TMDL would be increased. The risk of not implementing can be generally equated to an estimate of the relative effectiveness of a BMP. A higher ranking means that the risk of not implementing a BMP is high.

4.1.2.4 BMP Criteria Weighting

The criteria categories were weighted using stakeholder input regarding the relative importance of cost, risk, and multi-benefit (multi-pollutant) for each subwatershed priority. The general weighting scheme was decided with the Stakeholders in a meeting on June 13, 2006. Table 4-3 presents the weighting percentages, as gathered from stakeholder feedback, applied to each criterion for each of the three subwatershed prioritizations.

Table 4-3
Non-Structural BMP Weighting Criteria by Subwatershed Priority

Low Priority		**Medium Priority**		**High Priority**	
Criteria	Percentage	Criteria	Percentage	Criteria	Percentage
Low Risk	25%	Low Risk:	33%	Low Risk:	45%
Low Cost:	50%	Low Cost:	33%	Low Cost:	10%
Multi-Benefit:	25%	Multi-Benefit:	33%	Multi-Benefit:	45%
	100%		100%		100%

Table 4-4 illustrates the percentages assigned to the sub-criteria.

Table 4-4
Non-Structural BMP Sub-Criteria Weighting

Nonstructural BMPs	
Cost	
Total Costs	100%
	100%
Multi-Pollutant	
- Prioritized Pollutants	90%
Bacteria	Percent contribution for each individual pollutant group determined on a subwatershed by subwatershed basis.
Sediments (TSS)	
Trash	
Metals	
- Organics/Toxics	5%
- Oil and Grease	5%
	100%
Risks	
Risk of Implementing	50%
Risk of Not Implementing	50%
	100%

Additional information on the criteria weighting calculations and application of the weight percentages can be found below in Section 4.2.

4.2 BMP Evaluation Methodology

The evaluation methodology for developing a "short list" of BMPs for further consideration of inclusion in the implementation plan was as follows:

Step 1 – Evaluate the BMPs performance relative to each criterion
For each criteria element, each individual BMP was scored on a scale of 1 to 5, with a score of 1 being a low or undesirable score, and a score of 5 being a high or desired score. The un-weighted scores for each structural BMP were determined based on the information presented in Section 2, stakeholder feedback, and on best available information. The unweighted scores for each nonstructural BMP were determined based on the information presented in Section 2, stakeholder feedback, and on best available information.

Step 2 – Applying the appropriate weighting to the criterion
Instead of a straight average of all unweighted scores being applied uniformly to all subwatersheds, the percent weights described in Section 4.1 were used based on BMP type, subwatershed priority, and subwatershed specific estimated pollutant loadings. First the subwatershed priority was used to determine the overall criteria percentage to be used as presented in Table 4-2 for nonstructural BMPs and Table 4-4 for Structural BMPs. These main criteria weightings were applied to the specific sub-criteria weightings, including the watershed specific pollutant weightings.

These percent weightings were multiplied by the corresponding unweighted scores. The weighted scores were totaled across all criteria to arrive at a total, weighted score for a specific BMP. Table 4-5 below shows an example calculation for one nonstructural BMP in a high priority subwatershed.

Step 3 – Select the BMPs
Generally, those BMPs with an overall score of 3.0 or higher for a subwatershed were continued on for further consideration and analysis using the commit-pilot-consider model presented below in Section 4.3. Those BMPs with a score of less than 3.0 were tabled for future consideration.

4.3 Commit-Pilot-Consider Model

A commit-pilot-consider model was developed to assist with further defining the BMPs for implementation. Three levels of implementation are proposed in this Implementation Plan:

Table 4-5
Example of BMP Weighting Process

Criteria/Subcriteria	Total Criteria Weighting	Subcriteria Weighting	Overall Weighting	Unweighted Score	Weighted Score
Example Subwatershed: Westlake Subwatershed (High Priority)					
Example Non-Structural BMP: Residential BMP "Savings Fund"					
Potential Pollutants (Multi-Benefit/Pollutant)					
Bacteria	45%	36%	16.0%	3	0.5
Nutrients		22%	9.7%	3	0.3
Sediments		5%	2.3%	3	0.1
Trash/Debris		14%	6.4%	3	0.2
Metals		13%	6.1%	3	0.2
Organics/Toxics		5%	2.3%	3	0.1
Oil and Grease		5%	2.3%	3	0.1
Cost					
Low Cost	10%	100%	10.0%	2	0.2
Risk					
Risk of Implementing	45%	50%	22.5%	3	0.7
Risk of Not Implementing (Relative Effectiveness)		50%	22.5%	4	0.9
				Total Score:	**3.1**

Commit: Agencies commit to cost effectively engage in the activities so designated within the indicated time frame. Effectiveness of any BMP program or project will be periodically evaluated and reassessed for maximum cost benefit. Other factors may be considered as well in this re-evaluation. Though not the intent, it is recognized that commitment to an item may go only as far as a feasibility analysis if the results of that analysis are unfavorable toward removing impairments. Through the iterative-adaptive process some commitments may prove to be unnecessary and therefore not carried out. For purposes of this Implementation Plan and the predicted effectiveness of implementation, it is assumed that "Commit"-designated projects will be implemented.

Pilot: Agencies commit to limited scale implementation to establish the overall effectiveness (including factors such as cost) of the measure (structural and non-structural) and to help identify the severity of the potentially targeted source.

Consider: If the perceived need for this BMP, based on preliminary studies and early implementation, is not apparent, or if the subject technology is potentially costly or unproven, these activities will be considered in future phases of implementation. "Consider" designated projects will not have an assumed level of implementation for effectiveness assessment purposes.

In general, the basis for determining the appropriate level of implementation is illustrated in Tables 4-6, 4-7 and 4-8 below. The commit-pilot-consider model varies for each subwatershed priority to account for different needs and focuses within the different prioritized subwatersheds.

Table 4-6
Commit-Pilot-Consider Model – High Priority Subwatersheds

		Implementation Requirements Rating		
		Difficult	**Moderate**	**Easy**
Potential Effectiveness Rating (Risk of Not Implementing)1	High	Pilot	Commit	Commit
	Medium	Consider	Pilot	Commit
	Low	Consider	Consider	Consider

Table 4-7
Commit-Pilot-Consider Model – Medium Priority Subwatersheds.

		Implementation Requirements Rating		
		Difficult	**Moderate**	**Easy**
Potential Effectiveness Rating (Risk of Not Implementing)2	High	Consider	Pilot	Commit
	Medium	Consider	Pilot	Pilot
	Low	Consider	Consider	Consider

Table 4-8
Commit-Pilot-Consider Model – Low Priority Subwatersheds.

		Cost Rating		
		Difficult	**Moderate**	**Easy**
Potential Effectiveness Rating (Risk of Not Implementing)3	High	Consider	Pilot	Pilot
	Medium	Consider	Consider	Pilot
	Low	Consider	Consider	Consider

This approach of subwatershed focusing and using a commit-pilot-consider model was generally used to identify the projects and programs for inclusion in the Implementation Plan discussed in Section 5. In some cases other factors were considered in identifying a BMP for commitment piloting or consideration.

[1] For purposes of Table 4-6 effectiveness is ranked high-medium-low. This is a relative ranking within the set of BMPs that have been proposed for consideration and that were deemed potentially effective.
[2] For purposes of Table 4-7 effectiveness is ranked high-medium-low. This is a relative ranking within the set of BMPs that have been proposed for consideration and that were deemed potentially effective.
[3] For purposes of Table 4-8 effectiveness is ranked high-medium-low. This is a relative ranking within the set of BMPs that have been proposed for consideration and that were deemed potentially effective.

- Dry-Weather BMPs– Subwatersheds were evaluated separately for dry-weather BMPs. BMPs that had higher scores for dry-weather flow sources were identified as commit or pilot and included in the overall dry- and wet-weather recommendations.

- Watershed-Wide BMPs – A number of BMPs have been identified to support overall improvement in watershed BMP implementation. These BMPs were also evaluated and the top ranking BMPs identified for implementation at a commit or pilot scale in all jurisdictions.

4.4 Ranking of Regional Structural BMPs

Regional Structural BMPs were reviewed on a subwatershed basis and ranked for order of consideration for implementation. The weighting of cost, effectiveness, implementation, and other factors for each BMP type (treatment facilities, regional detention, infiltration, natural treatment systems) along with the site-specific analyses, presented in Section 2, were used as the basis for evaluation as follows:

- Those BMPs (treatment facilities, and regional detention) which scored low in the initial evaluation scoring and commit-pilot-consider were tabled for future consideration.

- Those BMPs remaining (infiltration and natural treatment) were further evaluated and ranked based on estimated effectiveness. Estimated BMP costs were preliminarily evaluated, and all appeared reasonably close, so cost was not considered further with respect to ranking of BMP opportunities.

- Effectiveness was estimated based on the amount of water, as measured by flow in cubic feet per second, that could be managed/treated at the individual location by each type of BMP.

- The BMP type and locations that could affect the greatest flows were generally ranked highest for initial consideration.

A number of local factors need to be considered for final ranking of BMPs for pilot studies, including, but not limited to:

- Loss or creation of recreation opportunities

- Land ownership – some apparently favorable opportunities are on privately owned land

- Plans for future use of the lands

- Feasibility of BMP implementation

- Feasibility of implementing stream enhancements for nearby receiving waters in conjunction with any regional BMP pilot study.

4.5 Implementation Plan Framework

The detailed results of the initial comparison and ranking of both non-structural and structural BMPs for each watershed are contained in Technical Memorandum Task 10 contained in Appendix B. Based on the focused approach resulting from these comparisons for each subwatershed, and using the commit-pilot-consider model, an overall implementation plan framework was developed for the entire MCW area. The plan summarizes the options and BMPs that would form the program within each subwatershed, the level of commitment, and potential phasing. This framework is presented and the plan described in detail in Sections 5 and 6.

Section 5
Implementation Plan Commitments

5.1 General Approach

This section presents an overview of the Implementation Plan commitments. It describes the general approach to implementation, the implementation phases and overall schedule, and the methods for plan assessment, monitoring and reporting. Detailed descriptions of specific activities, programs and projects and the specific plan commitments on a subwatershed basis are described in Section 6.

The Implementation Plan consists of combinations of non-structural activities, institutional, distributed structural measures and regional structural measures selected for each subwatershed based on the approach described in Section 4. The elements contained in the plan for each subwatershed include those that are committed either for implementation or pilot programs/projects. Other measures may be considered at some point in the future depending upon the effectiveness of the committed and piloted programs or in response to specific opportunities that may be presented but are not part of the initial commitments. A summary of the plan is shown in Table 5-1.

Table 5-1
BMP Selection and Implementation Commitments

Subwatershed	Watershed Priority	Non-Structural Measures	Structural Solutions		
			Institutional	Distributed	Regional
Cheseboro Creek	Medium	Commit, Pilot & Consider	Pilot	Commit & Consider	-
Cold Creek	Low	Commit, Pilot & Consider	Consider	Commit & Consider	-
Hidden Valley Creek	High	Commit, Pilot & Consider	Commit, & Pilot	Commit & Pilot	-
Lower Las Virgenes Creek	High	Commit, Pilot & Consider	Commit	Commit & Pilot	Pilot
Lower Lindero Creek	High	Commit, Pilot & Consider	Commit	Commit & Pilot	Pilot
Lower Malibu Creek	Medium	Commit, Pilot & Consider	Pilot	Commit & Consider	-
Lower Medea Creek	High	Commit, & Pilot	Commit	Commit & Pilot	-
Malibu Lagoon	High	Commit, Pilot & Consider	Commit	Commit,& Pilot	-
Middle Malibu Creek	Medium	Commit, Pilot & Consider	Pilot	Commit & Consider	-
Palo Comado	Medium	Commit, Pilot & Consider	Pilot	Commit & Consider	-
Portrero Canyon Creek	High	Commit, Pilot & Consider	Commit, & Pilot	Commit& Pilot	-
Stokes Creek	High	Commit, Pilot & Consider	Commit	Commit & Pilot	-

Table 5-1 (Continued)
BMP Selection and Implementation Commitments

Subwatershed	Watershed Priority	Non-Structural Measures	Structural Solutions		
			Institutional	Distributed	Regional
Triunfo Creek	Low	Commit, Pilot & Consider	Consider	Commit & Consider	-
Upper Las Virgenes	Medium	Commit, Pilot & Consider	Pilot	Commit & Consider	-
Upper Lindero Creek	High	Commit, Pilot & Consider	Commit	Commit & Pilot	Pilot
Upper Malibu Creek	Low	Commit, Pilot & Consider	Consider	Commit & Consider	-
Upper Medea Creek	High	Commit, Pilot & Consider	Commit, & Pilot	Commit & Pilot	Pilot
Westlake	High	Commit, Pilot & Consider	Commit, & Pilot	Commit & Pilot	Pilot

5.2 Plan Execution (partnerships by watershed)

The initial strategy for reducing exceedances is tied to a combination of reducing bacteria at the source through non-structural and on-site measures, and reducing the amount of runoff that reaches the receiving water, rather than focusing exclusively on treating the flow collected in the storm drain system for bacteria reduction and other pollutants. This strategy emphasizes the beneficial use of runoff and the installation of local solutions where possible to reduce downstream flows. It also focuses on local source control to reduce the level of bacteria and other pollutants discharged into the storm drains. Water quality improvements in the receiving waters will be realized from source control, as well as water quantity (flow) management practices, including local structural BMPs utilizing large-scale, end-of-pipe, regional solutions minimizes the risk of noncompliance, it also carries with it larger costs and potential impacts to the local, communities. Therefore, regional solutions are proposed to be limited to pilot scale implementation, and only after appropriate feasibility studies are conducted.

At the TMDL re-opener scheduled for January 2009, only very limited, short-term information and data will be available to assess the effectiveness of these measures for achieving water quality improvements in the MCW. While, the numeric target, load allocation, and pathogen indicators for this TMDL may be revisited at the January 2009 re-opener, the basis for compliance will not likely be reconsidered as sufficient research may not have been conducted by this time. If monitoring data is available, the results may not have been evaluated for applicability to this TMDL by this time. Therefore, it is recommended that additional re-openers be planned to more adequately incorporate the results of monitoring and special studies as well as BMP performance in reviewing the TMDL approach.

5.2.1 BMP Implementation

The Implementation Plan assumes an iterative and phased approach to implementation. Nonstructural and institutional/distributed structural options will be implemented initially and the results of these efforts monitored to determine the subsequent course of action. In parallel, the Malibu Creek Watershed and Lagoon Bacteria TMDL Compliance Monitoring Plan will provide additional water quality information and feedback regarding BMP effectiveness.

As stated previously, for committed BMPs, agencies commit to engaging in the activities so designated within the indicated time frame. Effectiveness of any BMP program or project will be periodically evaluated and reassessed for maximum cost and water quality benefit. Other factors may be considered as well in this re-evaluation. Though not the intent, it is recognized that commitment to an item may go only as far as a feasibility analysis if the results of that analysis are unfavorable toward cost effectively removing impairments. Through the iterative-adaptive process some commitments may prove to be unnecessary and therefore not carried out. For purposes of this Implementation Plan and the predicted effectiveness of implementation, it is assumed that "Commit"-designated projects will be implemented. Any subregional/regional BMP that is actually feasible, funded, and constructed will include a water quality monitoring component in its operating plan to develop a body of BMP performance data for the region.

Similarly, for pilot BMPs, agencies commit to limited scale implementation to establish the overall effectiveness (including factors such as cost) of the measure (structural and non-structural) and to help identify the severity of the potentially targeted source. After evaluation of pilot results, the agencies may choose to implement the BMP or evaluate potentially more effective, alternative BMPs.

Those BMPs with a "consider" level of implementation commitment, which are not committed or piloted BMPs, agencies will consider for implementation following a determination that additional or alternative BMPs are necessary for the successful implementation of the Plan. Similar to pilot BMPs, after an initial evaluation, the agencies may choose to implement the BMP or evaluate potentially more effective, alternative BMPs.

5.2.2 Multi-Beneficial Use

An integrated water resources approach has been applied in the development of this TMDLIP, providing a range of multi-beneficial use programs and solutions. BMPs described in Sections 2.3 and 2.4, and included in the subwatershed specific plans provided in Section 6 include a variety of BMPs that can provide water quality improvements and other multiple benefits as follows:

- Non-structural BMPs that promote conservation and address multiple pollutants
- Institutional BMPs that promote reuse through infiltration and groundwater recharge and address multiple pollutants

- Distributed BMPs that promote direct reuse and groundwater recharge through infiltration as well as address multiple pollutants

- Regional BMPs that promote groundwater recharge through infiltration, address multiple pollutants, and provide for other recreational benefits.

Table 5-2 provides a summary of the percent of annual runoff captured by various BMPs and the integrated benefits provided by those BMPs.

Table 5-2
Percent of Annual Runoff Captured by Various Structural BMPs

BMP Type	Targeted Bacteria Sources	% of Source Treated	% of annual source runoff captured	Integrated Benefits
Residential Rain Barrel Incentive Program	Single Family Residential	5 %	Minimal	Reuse Multi-pollutant treatment
Constructed Concrete Cistern Incentive Program	Multiple Family Residential (MFR)	5 %	80 % (SUSMP design)	Reuse Multi-pollutant treatment
On-Site Underground Storage and Reuse	Schools, Government Offices, Local Parks	3 %	80 % (SUSMP design)	Reuse Multi-pollutant treatment
Local Infiltration – Permeable Pavement	MFR, Commercial, Industrial, Other Public	5 %	80 % (SUSMP design)	Reuse Multi-pollutant treatment
Bioretention / Vegetated Swales	MFR, Commercial, Industrial, Other Public	10 %	80 % (SUSMP design)	Multi-pollutant treatment
Regional Infiltration	All Upstream Developed Land	~ 35 %	20 – 100 % of target runoff	Reuse Multi-pollutant treatment
Regional Subsurface Flow Wetland	All Upstream Developed Land	~ 15 %	7 – 100 % of target runoff	Multi-pollutant treatment

5.2.3 Ability to Execute the Plan

Based on a review of City and County Ordinances and the proposed BMPs selected for implementation, the responsible agencies and jurisdictions all have ordinances in place that cover BMP implementation for protection of water quality, and no new ordinances are presently considered necessary to support implementation of BMPs for the dry- or wet-weather TMDL Implementation Plan.

Additional information on potentially applicable permit or regulatory requirements can be found in Technical Memorandum 13.2, attached in Appendix B.

5.3 Monitoring

The Malibu Creek and Lagoon Bacteria TMDL Compliance Monitoring Plan was submitted to the Regional Board on May 24, 2006. The plan as submitted provides the sampling program design and methodology. The monitoring plan is attached in Appendix C. As the monitoring plan is implemented and transitioned from the current MCW monitoring plan, a consolidated database will be accumulated. This database could also be supplemented with data from other ongoing programs in the watershed.

5.4 Additional Detailed Studies Needed

As funding permits, a Source Identification study will be performed to identify potential sources of bacterial loading, including both natural (i.e. wildlife) and anthropogenic sources (e.g. wastewater systems).

5.5 Reporting

Annual Implementation Plan progress reporting documenting compliance activities will be provided by the Responsible Agencies. It is anticipated that this report will not be exhaustive, but a summary of progress, results, and requested modifications to the Implementation Plan. It is proposed that no additional reporting of monitoring results be required, but that monitoring results would be provided in an annual summary report of Implementation Plan Progress. This report would reference activities conducted to date, compared to commitments made in this Implementation Plan.

As each of the regional structural BMP projects move forward, an appropriate performance monitoring plan will be developed. BMP effectiveness results for bacteria treatment in the Malibu Creek Watershed could be beneficial for developing other implementation plans in Southern California.

Section 6
Subwatershed Specific Plans

6.1 Summary and Overview of Sub-Watershed Specific Plans

This section describes specific activities for implementation. These activities are based on the previously-described source and watershed prioritization efforts described in previous sections, and include structural and nonstructural measures. The subwatershed-specific matrices indicate a level of commitment for each activity ("commit-pilot-consider") and the time frame (or implementation schedule phase) in which the activity would be implemented. Specific implementation schedules for the BMPs are provided in Section 6.3. The plans include a range of institutional, distributed and regional structural BMPs as well as non-structural BMPs.

6.1.1 Selection of Institutional and Distributed Structural BMPs

The following is a summary of institutional and distributed structural measures that were identified for consideration, commitment to implement, or commitment to initiate pilot studies or programs. Structural-institutional BMPs are coordinated programs that are developed and implemented by local or county jurisdictions. The coordinated programs target specific groups, practices, and/or sources of pollutants. The basic idea behind distributed BMPs (often referred to as "low impact development" practices) is to reduce runoff volumes and loads at the source. As such, the stormwater management strategy is concerned with reducing the hydrologic impact caused by development and maintaining or restoring the natural hydrologic and hydraulic functions of a site. Distributed BMPs employ a variety of natural and constructed features that reduce the rate of runoff, filter pollutants, and facilitate the infiltration of water into the ground at the parcel scale.

Additional information on each of the structural BMPs can be found in Technical Memorandum 7.2 attached to this Implementation Plan as Appendix B.

Table 6-1
Institutional and Distributed Structural BMPs
Page (1 of 1)

BMP Category / Type	Potential mechanisms	Description	Targeted Pollutants[1]	Removal Effectiveness[1]
Structural Institutional BMPs	Coordinated programs that are developed and implemented by local or County jurisdictions. With high levels of participation, structural-institutional BMPs can be a cost-effective stormwater quality and volume management strategy.			
Development and Redevelopment Design Standards	Volume Reduction, Flow Control, WQ	Standards requiring implementation of BMPs associated with new or re-development activities.	Trash	NA
			Sediment	NA
			Nutrients	NA
			Metals	NA
			Bacteria	NA
Voluntary Downspout Disconnection Program	Volume Reduction, Flow Control	Program to decrease system connectivity and increase on-site infiltration; can be incentive-based	Trash	High
			Sediment	High
			Nutrients	High
			Metals	High
			Bacteria	High
Stream Buffers	Volume Reduction, WQ	Provides natural vegetation corridors to help protect stream banks and reduce pollutant loads from urban runoff	Trash	Moderate
			Sediment	High
			Nutrients	Limited
			Metals	High
			Bacteria	Limited
Horse Farm Retrofit Program	Source Control	Includes design standards, education, and BMP retrofits to reduce pollutant runoff loads	Trash	Limited
			Sediment	Limited
			Nutrients	High
			Metals	Limited
			Bacteria	High
Distributed BMPs	BMPs that employ a variety of natural and constructed features to reduce the rate of runoff, filter pollutants, and facilitate the infiltration of water into the ground at the parcel scale.			
Local Capture Systems	Volume Reduction, Flow Control	Cisterns, rain barrels or other holding tanks for peak flow reduction and on-site reuse	Trash	Moderate
			Sediment	Moderate
			Nutrients	Moderate
			Metals	Moderate
			Bacteria	Moderate
Vegetated Treatment Systems	WQ, Volume Reduction, Flow Control	Vegetated swales, bioretention areas, etc. to filter and infiltrated runoff; support natural treatment mechanisms	Trash	High
			Sediment	High
			Nutrients	High
			Metals	Moderate
			Bacteria	Moderate
Local Infiltration Systems	Volume Reduction, Flow Control	Site-scale infiltration basins or pervious wearing surfaces such as grass pavers or pervious asphalt	Trash	High
			Sediment	High
			Nutrients	High
			Metals	Moderate
			Bacteria	Moderate
Street and Parking Lot Biofiltration Retrofits	WQ, Volume Reduction, Flow Control	Small scale vegetated facilities to improve WQ, and promote infiltration	Trash	High
			Sediment	High
			Nutrients	High
			Metals	High
			Bacteria	High

Notes:
1 - Data were adapted from Table 2-5 and/or the Quantitative Analysis Tasks 2 and 3.

6.1.2 Selection of Non-Structural Activities

The following is a summary of non-structural measures that were identified for consideration, commitment to implement, or commitment to initiate pilot studies or programs.

6.1.3 Regional Pilot Projects

A total of 13 sites were identified as potential opportunities for regional BMPs in six of the ten high priority subwatersheds located within the MCW. The potential sites and a brief description are provided below in Table 6-3.

Other regional structural BMPs that are planned or are being implemented by local agencies to address bacteria and other water quality concerns are described separately in each subwatershed plan.

Additional information on some of the regional BMPs can be found in Technical Memorandum 7.3 attached to this Implementation Plan as Appendix B. Since the initial analysis presented in Technical Memorandum 7.3, additional refinements to the suite of regional BMPs have been made to include additional BMPs, or remove BMPs that have been determined infeasible. The 13 BMPs presented below summarizes the regional structional BMPs proposed for pilot implementation. It should be noted that the descriptions provided below are preliminary estimates. A feasibility analysis will be conducted for each piloted BMP to determine flow rates and BMP sizing.

6.1.3.1 Three Springs Park

Three Springs Park is located on a residential street at 3000 Three Springs Drive in Westlake Village. The park has a lower elevation than the surrounding street and the northwest side of the park has a grass berm separating it from Three Springs Drive. At the northernmost point in the park, adjacent to the berm, is a concrete structure with a 3 foot storm drain. Three Springs Creek brings flow from Las Virgenes Reservoir and runs along the northeast side of the park at the base of a hill, and another hill borders the park on the south side, separating it from the Las Virgenes Reservoir. The Las Virgenes Municipal Water District Westlake Pump Station is situated on the southern end of the park, and the remainder of the park features basketball courts, a playground, barbeques, picnic tables, a large grassy field, and a path around the perimeter.

There is a small amount of development upstream of this location and all drainage originates in residential neighborhoods. The main drainage upstream of Three Springs Park begins where Kirsten Lee Drive meets Sycamore Canyon Drive and continues to west of Barrett Drive where it enters the Barrett Basin. The Barrett Basin also receives drainage in this area from lines along Barrett Drive and Three Springs Drive, as well as flow from Three Springs Creek.

This project would include the construction of subsurface flow wetland on approximately 0.8 acres within Three Spring Park. The wetland would treat a tributary area of approximately 951 acres at a flow rate of 0.4 cubic feet per second (cfs).

Table 6-2
Non-Structural BMPs

Proposed Non-Structural BMP	Additional BMP Description	Pollutants Potentially Targeted
Public Information and Participation Programs		
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation	Partnerships with HOAs to educate residents; work with HOAs to reduce runoff from common area landscaping.	Toxics Sediment Nutrients Metals Bacteria
Include Water Conservation, and Water Quality in Existing Educational Programs at Schools	Program geared towards training teachers to teach children about water quality and water conservation. Field trips for students to educate students on water quality issues.	Toxics Sediment Nutrients Metals Bacteria
Outreach Fact Sheets on Water Quality for Point-of-Sale Distribution	Distribution of outreach materials at point of sale facilities regarding the link between specific activities and bacterial loading of water	Bacteria
Work with LVMWD, WBMWD, and District No. 29 to Support/Expand Water Use Survey and Conservation Programs	Work with Las Virgenes Municipal Water District (LVMWD) and West Basin Municipal Water District (WBMWD), Los Angeles County Waterworks District No. 29 (District No. 29) and to support and expand water conservation and water use survey programs and make link to bacterial loading caused by runoff.	Toxics Sediment Nutrients Metals Bacteria
Horse Stables and Confined Animal Facility Outreach and Education	Support efforts to create horse BMP outreach materials for both the County-wide horse community and agency regulatory staff. Work with other stakeholders to distribute materials and create awareness.	Toxics Sediment Nutrients Metals Bacteria
Outreach to Pet Owners Linking Waste to Water Quality Impairments	Outreach to pet owners establishing a link between animal wastes and health issues and focus on point of contact. The objective of this recommendation is to target pet owners with information about pet waste and its impact on waterbodies.	Toxics Sediment Nutrients Metals Bacteria
Place Pet Waste Bag Dispensers at Trailheads	Place pet waste bag dispensers at trailheads and trash cans with lids, if trash cans with lids are not already present.	Nutrients Bacteria
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Water Quality Impairments and BMPs (combine with commercial inventory effort)	This program will educate the owners of confined animals about bacteria TMDLs and steps they can take to decrease negative impacts on the environment. A network of volunteers from environmental organizations could be trained in this area.	Sediment Nutrients Bacteria
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots	Post signs at City and County-owned trailheads designated for equestrian users to not clean out horse trailers in parking lots and to clean up horse waste.	Toxics Sediment Nutrients Metals Bacteria
Recreational Vehicle (RV) Disposal Site Outreach Program	Outreach program designed to encourage and teach RV owners to properly dispose of holding tank waste.	Toxics Nutrients Bacteria
Coordinate with watershed agencies to identify methods to reach visitors to the watershed		Toxics Sediment Nutrients Metals Bacteria
Outreach at Trailheads Regarding Waste Disposal and Restroom Use	Posting signs at trailheads to remind hikers to use the restroom before a hike will both increase awareness and prevent improper waste disposal.	Toxics Sediment Nutrients Metals Bacteria

Proposed Non-Structural BMP	Additional BMP Description	Pollutants Potentially Targeted
Coordinate Meetings Between Agencies and Environmental Organizations for Preparing Outreach Materials	Numerous efforts are continually put forth to produce outreach materials, but production is not always coordinated between organizations and agencies.	Toxics Sediment Nutrients Metals Bacteria
Provide Septic System (OWTS) Pumpers and Customers with Septic System Guides	The goal of this suggestion is to provide septic system owners with information pertaining to their septic system and how to prevent pollution using proper maintenance procedures.	Toxics Sediment Nutrients Metals Bacteria
Investigate Incentive Programs for Replacing Improperly Operating Septic Tanks		Nutrients Bacteria
Septic Inspections Upon Change in Ownership		Nutrients Bacteria
Outreach to homeowners and HOAs to promote native landscaping	Outreach program designed to educate homeowners about the benefits of native landscaping	Toxics Sediment Nutrients Bacteria
Industrial/Commercial Facilities Control Programs		
Trash Hauler Outreach	Meet with waste haulers; businesses not required to be inspected, but sharing dumpsters with those that are inspected; and property managers to discuss importance of closing dumpster lids.	Nutrients Bacteria
Develop Targeted Outreach for Businesses with Greatest Potential to Contribute Pollutants of Concern (including Restaurants, Automotive, Equestrian, Industrial, Landscape Maintenance, Mobile Businesses)	Brochures targeting painting contractors, landscape and pool maintenance personnel, contractors, site supervisors, and horse owners. Distribute targeted BMP information at public counters in conjunction with Chamber of Commerce and Malibu Contractor's Association.	Toxics Sediment Nutrients Metals Bacteria
Expand Media Partnership with Caltrans		Toxics Sediment Nutrients Metals Bacteria
Develop Minimum Requirements and Program to Enforce Parking Lot Street Sweeping for Commercial Businesses		Toxics Sediment Nutrients Metals Bacteria
Modify Inspection Staff Training to Include Enhanced Training on Water Quality Impairments and BMPs	Training staff that conduct inspections, tailgate meetings, formal classroom training, and self guided training.	Toxics Sediment Nutrients Metals Bacteria
Develop a Reward/Stewardship Program for Businesses	Develop business reward program to reward businesses helping keep the environment clean.	Toxics Sediment Nutrients Metals Bacteria
During Inspections Emphasize BMPS that Reduce Pollutants of Concern	Outreach materials are provided to businesses during inspections.	Toxics Sediment Nutrients Metals Bacteria

Table 6-2
Non-Structural BMPs

Proposed Non-Structural BMP	Additional BMP Description	Pollutants Potentially Targeted
New Development/Redevelopment Planning		
Incorporate TMDL requirements into CEQA process	Incorporate TMDL requirements into the CEQA process to adequately review proposed projects	Toxics Sediment Nutrients Metals Bacteria
Increase Inspections of Post-Development BMPs	As part of the conditions of approval of a project or CEQA mitigation measures require project applicants and future owners to conduct inspections on a periodic basis to ensure proper maintenance of BMPs per covenant agreements with the approving agency and submit documentation to the approving agency	Toxics Sediment Nutrients Metals Bacteria
Enhance Education for Developers of Projects outside SUSMP/SQUMP requirements	Provide brochures to developers and discuss items the developer can do during the permitting process to reduce runoff from the project	Toxics Sediment Nutrients Metals Bacteria
Develop vegetative filter BMP	Develop a standard Vegetative Filter Detail	Toxics Sediment Nutrients Metals Bacteria
Complete LA County BMP Technical Manual and Include Detailed BMP Requirements Related to Water Quality Impairments	LA County finalize its Countywide BMP Technical Manual for SUSMP	Toxics Sediment Nutrients Metals Bacteria
Public Agency Activities		
Emergency Spill Management - Review Existing Emergency Operation Plans on a Regular Schedule; assure availability of emergency equipment during peak traffic hours	Assure that emergency equipment or contracts are locally and immediately available, even during high-traffic hours, to address overflows or spills.	Toxics Sediment Nutrients Metals Bacteria
Additional Trash Pick Up During High Use Periods in High Use Sites	Empty trash cans during high use times during weekends or holidays and coordinate volunteer cleanups of sites heavily littered.	Sediment Nutrients Metals Bacteria
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections	Implement contract language with contractors providing maintenance services to assure implementation of BMPs in work activities and at facility storage locations. Inspect to assure compliance.	Toxics Sediment Nutrients Metals Bacteria
Establish Optimal Cleaning Cycles for Drainage Facilities	Cleaning drainage facilities regularly at optimal intervals removes trash, sediments, and debris that may carry bacteria into the storm drain.	Toxics Sediment Nutrients Metals Bacteria

Table 6-3
Potential Regional BMP Site Summary
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Site	Location/Name	Type of BMP	Jurisdiction	Setting	Targeted Pollutants	Removal Effectiveness
1	Three Springs Park	Subsurface Flow Wetland	Westlake Village	Suburban pocket-park	Trash	High
					Sediment	High
					Nutrients	High
					Metals	Moderate
					Bacteria	Moderate
					Organic Pollutants	Moderate
2	Triunfo Creek - Riparian Enhancement	Subsurface Flow Wetland	Westlake Village	Riparian corridor treating outflow from the Westlake reservoir	Trash	High
					Sediment	High
					Nutrients	High
					Metals	Moderate
					Bacteria	Moderate
					Organic Pollutants	Moderate
3	Upper Lindero Creek at County Line	Infiltration Basin	Thousand Oaks	Rural open space with natural drainage	Trash	High
					Sediment	High
					Nutrients	High
					Metals	High
					Bacteria	High
					Organic Pollutants	High
4	Lake Lindero Country Club	Infiltration Basin	Agoura Hills	Lindero Creek passes directly through the Country Club	Trash	High
					Sediment	High
					Nutrients	High
					Metals	High
					Bacteria	High
					Organic Pollutants	High
5	Oak Canyon Community Park	Subsurface Flow Wetland	Oak Park- County of Ventura	Rural setting with culvert, then creek passing through park	Trash	High
					Sediment	High
					Nutrients	High
					Metals	Moderate
					Bacteria	Moderate
					Organic Pollutants	Moderate

Table 6-3
Potential Regional BMP Site Summary

Site	Location/Name	Type of BMP	Jurisdiction	Setting	Targeted Pollutants	Removal Effectiveness
6	Medea Creek Park	Infiltration Basin	Oak Park- County of Ventura	Natural drainage near roadway and residential	Trash	High
					Sediment	High
					Nutrients	High
					Metals	High
					Bacteria	High
					Organic Pollutants	High
7	Reyes Adobe Park	Subsurface Flow Wetland	Agoura Hills	Pocket park and stream in urban residential setting	Trash	High
					Sediment	High
					Nutrients	High
					Metals	Moderate
					Bacteria	Moderate
					Organic Pollutants	Moderate
8	Upper Lindero Creek Subwatershed	Infiltration Basin	Agoura Hills	Valley Oaks Memorial Park in urban setting near Lake Lindero	Trash	High
					Sediment	High
					Nutrients	High
					Metals	High
					Bacteria	High
					Organic Pollutants	High
9	Sumac Park	Infiltration Basin	Agoura Hills	Urban park with subsurface storm drain	Trash	High
					Sediment	High
					Nutrients	High
					Metals	High
					Bacteria	High
					Organic Pollutants	High
10	Chumash Park	Infiltration Basin	Agoura Hills	Urban park with small channelized drainages near Medea Creek	Trash	High
					Sediment	High
					Nutrients	High
					Metals	High
					Bacteria	High
					Organic Pollutants	High

Table 6-3
Potential Regional BMP Site Summary
Page (3 of 3)

Site	Location/Name	Type of BMP	Jurisdiction	Setting	Targeted Pollutants	Removal Effectiveness
14	Liberty Canyon Creek	Subsurface Flow Wetland	Calabasas	Open space with channelized creek entering natural drainage	Trash	High
					Sediment	High
					Nutrients	High
					Metals	Moderate
					Bacteria	Moderate
					Organic Pollutants	Moderate
15	Las Virgenes Creek at De Anza Park	Infiltration Basin	Calabasas	Agricultural land at Las Virgenes Creek- channelized stream	Trash	High
					Sediment	High
					Nutrients	High
					Metals	High
					Bacteria	High
					Organic Pollutants	High
16	Mountain View Homeowners Association	Wetland or Detention Pond	Unincorporated LA County	Natural creek, between a storm drain outlet and concrete drainage channel, tributary to Las Virgenes Creek	Trash	High
					Sediment	High
					Nutrients	High
					Metals	Moderate
					Bacteria	Moderate
					Organic Pollutants	Moderate

Notes:

1 - Data were adapted from Table 2-5.

6.1.3.2 Triunfo Creek – Riparian Enhancement

The project will contribute toward a local riparian restoration effort and to improving downstream water quality, by expanding the existing 2 acre riparian corridor and creating approximately two to three acres of additional wetland area. This project anticipates treating the discharge from the artificial lake which varies from wet season to dry season, but on average equates to 0.16 cfs. Wetland creation and revegetation will be accomplished by targeted grading and redistribution of earth on site to the extent possible and replanting of native wetland species, including those species that effectively filter pollutants, including appropriate sedges, grasses, and reeds, as well as the existing cattail on site.

6.1.3.3 Upper Lindero Creek at County Line

The Upper Lindero Creek at County Line opportunity encompasses a large area east of Lindero Canyon Road and north of Thousand Oaks Boulevard in Thousand Oaks. The site is just north of a planned housing development. Lindero Creek runs along the base of the hills and appears to be unimpacted, with no signs of trash or other pollution, however there is evidence of scouring on the east side of the creek in the area directly opposite Blackbird Avenue.

The Upper Lindero Creek at County Line opportunity is the most upstream potential regional BMP location along Lindero Creek, and receives drainage along the length of the creek upstream of this point, which begins north of the intersection of Kanan Road and Collingswood Court in Ventura County. The contributing area is primarily residential with some commercial areas along Lindero Canyon Road.

This project would include the construction of infiltration facilities on approximately 8.2 acres within the Upper Lindero Creek subwatershed. Infiltration facilities would treat approximately 1,929 acres of tributary area at a flow rate of 5.8 cfs.

6.1.3.4 Lake Lindero Country Club

The Lake Lindero Country Club is located at 5719 Lake Lindero Drive in Agoura Hills. The area features developed and landscaped buildings and green space, including a golf course.

This project would include the construction of infiltration facilities on approximately 2.5 acres within Lake Lindero Country Club. Infiltration facilities would treat approximately 2,293 acres of stormwater runoff at flow rate of 1.8 cfs.

6.1.3.5 Oak Canyon Community Park

The Oak Canyon Community Park opportunity includes an area south of the intersection of N. Napolean Avenue and Bromely Drive in Oak Park. The Medea Creek does not appear to be channelized in this area, however it does flow through a box culvert under Bromely Drive and there is a man-made cement dam as well as some other man-made features along the length of the creek. The surrounding neighborhood is primarily residential and the area adjacent to the creek features a trail leading down to Oak Canyon Community Park with educational signage explicating the natural and man-made features along the creek, such as plant species and the dams.

There is a storm drain that runs parallel to the creek, from Lindero Canyon Road to the north; however upstream of this residential area, there does not appear to be additional drainage. The creek originates in the hills approximately one mile north of this opportunity.

This project would include the construction of a subsurface flow wetland on approximately 4.7 acres within Oak Canyon Community Park. The wetland would treat a tributary area of approximately 541 acres with a design flow rate of 1.8 cfs.

6.1.3.6 Medea Creek Park

The Medea Creek Park opportunity encompasses a large area around the creek along Oak Hills Drive in Oak Park. There is a good deal of space around the creek at the intersection of Oak Hills Drive and Medea Creek Lane. There is additional space for regional BMP opportunities upstream along the west side of Oak Hills Drive. This space currently includes an exercise course, fields, and areas with trees. Storm drains from primarily residential neighborhoods, as well as a non 303(d) tributary creek, enter Medea Creek at this location. An additional non 303(d) tributary, with a parallel storm drain, enters Medea Creek upstream of this location just south of Kanan Road.

This project would include the construction of infiltration facilities on approximately 4.9 acres within Medea Creek Park. Infiltration facilities would treat strom water runoff from approximately 1,759 acres with a treatment flow rate of 3.5 cfs.

6.1.3.7 Reyes Adobe Park

Reyes Adobe Park is located on a residential street at 31400 Rainbow Crest Drive, Agoura Hills. The east side of the park is the location of the historic Reyes Adobe, built around 1850 and one of Agoura Hill's earliest homes. Along the western side of the Reyes Adobe runs a small stream which flows into a drain at the southern side of the park. The area is fairly hilly except for an area on the eastern side and the land slopes towards the residences on the southern side. The park features a playground, restrooms, a picnic area with barbeques, and a parking lot on the flatter, eastern portion of the parcel.

There is a fair amount of drainage passing under and around Reyes Adobe Park from the surrounding, primarily residential neighborhood. The main drain originates shortly upstream of the intersection of Reyes Adobe Road and Stonecrest Drive. There also appears to be a subsurface creek tributary to the Lindero Creek which passes under the west side of the park.

This project would include the construction of subsurface flow wetland on approximately 1.7 acres within Reyes Adobe Park. The treatment flow rate of the wetland would be approximately 0.8 cfs and would treat a tributary area of approximately 361 acres.

6.1.3.8 Upper Lindero Creek Subwatershed

The Upper Lindero Creek Subwatershed opportunity is located in the area between Lake Crest Drive and Russell Ranch Road in Agoura Hills. This site is adjacent to the Valley Oaks Memorial Park. At the northern end of Lake Crest Drive, situated behind the residences, is the entrance of Lindero Creek into the lake via a concrete spillway, with a concrete energy dissipater at the entrance to the lake. Runoff from this spillway would be pumped and conveyed to the treatment location (~500ft southward) prior to entering the lake. A 3 ft. storm drain and a drainage ditch from a shopping center parking lot connect to the creek upstream of the spillway, which also receives overland flow from a grassy area north of the residences. The creek appears to be impacted by trash from this contributing drainage, with debris collecting in the streambed just upstream of the spillway, and ultimately impacting the lake water quality.

Lindero Creek enters Lake Lindero on the northwest side of the lake at this location and brings drainage from the entire length of the creek upstream of this point, which begins north of the intersection of Kanan Road and Collingswood Court in Ventura County. In addition to the drainage received at the nearby upstream opportunity at Lake Lindero Country Club, storm drains bring flow to this location from the residential and commercial areas to the north and west of the lake.

This project would include the construction of infiltration facilities on approximately 15.8 acres within Valley Oaks Memorial Park. Infiltration facilities would treat a tributary area of approximately 2,511 acres with a design flow rate of 10 cfs

6.1.3.9 Sumac park

Sumac Park is located at 6000 Calmfield Avenue in Agoura Hills, adjacent to Sumac Elementary School in a mostly residential neighborhood. The park is fairly flat and features a playground and restrooms on the west side, and picnic tables around the north and east sides. There are several catch basins located around the perimeter of the park.

This project would include the construction of infiltration facilities on approximately 1.5 acres within Sumac Park. Infiltration facilities would treat a tributary area of approximately 521 acres, with a treatment flow rate of 1.0 cfs.

6.1.3.10 Chumash Park

Chumash Park is an L-shaped park with gentle slopes, located at 5500 Medea Valley Drive, Agoura Hills. The park features a playground, restrooms, and trees in the middle portion, and a baseball diamond on the west side. There is a trail that begins with a wooden bridge in the southwest corner of the park and runs south along a creek that is tributary to the Medea Creek. The bridge crosses a drainage ditch that can carry flow to the creek. There is also a drainage ditch the runs along the southern side in the western portion of the park.

Chumash Park does not appear to receive significant drainage, although the few drains that pass under the park, from the residential community to the east, do drain into Medea Creek just west of this location. There is also the tributary, non 303(d) stream originating to the north, east of Eagleton Street, which flows along the southern portion of the park and into Medea Creek.

This project would include the construction of infiltration facilities on approximately 3.3 acres within Chumash Park. Infiltration facilities would treat storm water runoff from approximately 352 acres, with a design flow rate of 2.0 cfs.

6.1.3.11 Liberty Canyon Creek

The Liberty Canyon Creek opportunity is located along Liberty Canyon Road near the intersection with Park Vista Road in Agoura Hills. The channelized Liberty Canyon Creek runs along the eastern side of Liberty Canyon Road and enters a box culvert which carries flow under a grassy area north of Park Vista Road and downstream under the road to the south. The creek exits the box culvert approximately 700 feet south of Park Vista Road and flows through a series of energy dissipaters before entering a natural channel. There is a good deal of open space on the west side of Liberty Canyon Road in this otherwise mostly residential neighborhood. The open space just west of the channel is posted as a West Pointe Homes site and therefore some or all of the available open space may be a planned location for future development.

The Liberty Canyon Creek opportunity receives drainage from the primarily residential neighborhood immediately upstream of the opportunity location as well as flow from a tributary creek which meets Liberty Canyon Creek near Agoura Road. The tributary creek receives drainage from a residential neighborhood around Via Amistosa. Liberty Canyon Creek originates approximately 2 miles north of this location.

This project would include the construction of a subsurface flow wetland on approximately 3.7 acres alongside Liberty Canyon Creek. The treatment flow rate of the wetland would be approximately 1.9 cfs and would treat a tributary area of approximately 902 acres.

6.1.3.12 Las Virgenes Creek near De Anza Park

The site evaluated as a potential regional structural BMP opportunity is located southeast of the intersection of Las Virgenes Road and Lost Hills Road. Las Virgenes Creek is mostly channelized upstream of the site, however shortly upstream of the site, the creek enters natural banks. This opportunity is a privately owned agricultural field that may be no longer utilized. Directly across Las Virgenes Road from the site and south of De Anza Park is a piece of relatively flat land that is part of Malibu Creek State Park. This area could also be considered for siting a regional structural BMP.

The Las Virgenes Creek near De Anza Park opportunity is the most downstream regional BMP location prior to the confluence of the Las Virgenes Creek and Malibu Creek. Las Virgenes Creek originates a far distance north of this location and receives flow directly from a large number of non 303(d) tributaries, along with the associated drainage from primarily small residential communities to the north. Immediately upstream of this opportunity site in the area south of the 101 Freeway is a mixed residential and commercial neighborhood that contributes significant urban runoff to this section of Las Virgenes Creek.

This project would include the construction of infiltration facilities at the previously described location on approximately 11.4 acres. Infiltration facilities would treat a tributary area of approximately 9,499 acres with a design flow rate of 8.2 cfs.

6.1.3.13 Upper Las Virgenes Creek (Mountain View Homeowners Association)

The project location is in an area of open space owned by the Mountain View Homeowners Association, within unicorporated Los Angeles County. Within this area, there is a natural creek connecting flow between a storm drain outlet and a concrete drainage channel, which is a tributary to Las Virgenes Creek. There is available land upstream of the concrete drainage channel that could be used to treat flow before it enters Las Virgenes Creek.

Additional information is still being developed for this project and will be included as it becomes available.

6.2 Subwatershed Specific Plans

6.2.1 Cheseboro Creek

6.2.1.1 Subwatershed Description

The Cheseboro Creek Subwatershed was determined to be a medium-priority subwatershed as described in Section 3.4.

The Cheseboro Creek subwatershed is 2,133 acres of predominately open and vacant lands within Los Angeles County. The small amount of developed area is entirely commercial business use. Land-use by percentage is as follows:

- 94.8 percent open space and vacant lands
- 5.2 percent commercial and industrial land uses.

6.2.1.2 Subwatershed Specific Plan

Table 6-4 summarizes the activities specifically designated for this subwatershed. The basis for activities selected is primarily the subwatershed priority and land-uses as described in Sections 2 and 3. Descriptions of the general activities and structural solutions selected for this subwatershed have been provided in Section 6.1. Specifics regarding implementation scheduling can be found in Section 6.3.

Table 6-4
Cheseboro Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Structural BMPs					
Development Standards		X		Phase I	Phase II
Voluntary Downspout Redirect Program		X		Phase III	Phase III
Stream Buffers		X		Phase III	Phase III
Voluntary Horse farm retrofit program		X		Phase I	Phase II
Local Capture Systems			X		
Vegetated treatment systems			X		
Local infiltration systems			X		
Street and parking lot biofiltration retrofits	X			Phase III	Phase IV
Nonstructural BMPs					
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots			X		
Recreational Vehicle (RV) Disposal Site Outreach Program			X		
Coordinate with watershed agencies to identify methods to reach visitors to the watershed			X		

Table 6-4 (continued)
Cheseboro Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Outreach at Trailheads Regarding Waste Disposal and Restroom Use			X		
Coordinate Meetings Between Agencies and Environmental Organizations for Preparing Outreach Materials	X			Phase I	Phase II
Trash Hauler Outreach		X		Phase II	Phase II
Develop Targeted Outreach for Businesses with Greatest Potential to Contribute Pollutants of Concern			X		
Expand Media Partnership with Caltrans		X		Phase II	Phase II
Develop Minimum Requirements and Program to Enforce Parking Lot Street Sweeping for Commercial Businesses			X		
Modify Inspection Staff Training to Include Enhanced Training on Water Quality Impairments and BMPs			X		
Develop a Reward/Stewardship Program for Businesses			X		
During Inspections Emphasize BMPS that Reduce Pollutants of Concern		X		Phase III	Phase III
Incorporate TMDL requirements into CEQA process			X		
Increase Inspections of Post-Development BMPs			X		
Enhance Education for Developers of Projects outside SUSMP/SQUMP requirements			X		
Develop vegetative filter BMP		X		Phase II	Phase II
Emergency Spill Management		X		Phase II	Phase II
Additional Trash Pick Up During High Use Periods in High Use Sites			X		
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections			X		

6.2.2 Cold Creek

6.2.2.1 Subwatershed Description

The Cold Creek Subwatershed was determined to be a low-priority subwatershed as described in Section 3.4.

The Cold Creek subwatershed is 5,221 acres of predominately open and vacant lands within Los Angeles County. The majority of developed land is residential, with small amounts of commercial, agricultural, recreational areas and horse ranches. Land-use by percentage is as follows:

- 88.1 percent open space and vacant lands
- 11 percent residential
- 0.6 percent commercial and industrial land uses.
- 0.2 percent horse ranches
- 0.1 percent parks and recreation
- 0.2 percent agricultural

6.2.2.2 Subwatershed Specific Plan

Table 6-5 summarizes the activities specifically designated for this subwatershed. The basis for activities selected is primarily the subwatershed priority and land-uses as described in Sections 2 and 3. Descriptions of the general activities and structural solutions selected for this subwatershed have been provided in Section 6.1. Specifics regarding implementation scheduling can be found in Section 6.3.

Table 6-5
Cold Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Structural BMPs					
Development Standards			X		
Voluntary Downspout Redirect Program			X		
Stream Buffers			X		
Voluntary Horse farm retrofit program			X		
Local Capture Systems			X		
Vegetated treatment systems			X		
Local infiltration systems			X		
Street and parking lot biofiltration retrofits	X			Phase III	Phase IV
Nonstructural BMPs					
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation		X		Phase II	Phase III
Offer Opportunities for Water Conservation, and Water Quality in Existing Educational Programs at Schools		X		Phase II	Phase II

Table 6-5 (Continued)
Cold Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Outreach Fact Sheets on Water Quality for Point-of-Sale Distribution		X		Phase I	Phase II
Work with LVMWD, WBMWD, and District No. 29 to Support/Expand Water Use Survey and Conservation Programs			X		
Horse Stables and Confined Animal Facility Outreach and Education				Phase I	Phase I
Outreach to Pet Owners Linking Waste to Water Quality Impairments			X		
Place Pet Waste Bag Dispensers at Trailheads			X		
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Water Quality Impairments and BMPs (combine with commercial inventory effort)			X		
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots			X		
Recreational Vehicle (RV) Disposal Site Outreach Program			X		
Coordinate with watershed agencies to identify methods to reach visitors to the watershed			X		
Outreach at Trailheads Regarding Waste Disposal and Restroom Use			X		
Coordinate Meetings Between Agencies and Environmental Organizations for Preparing Outreach Materials	X			Phase I	Phase II
Trash Hauler Outreach		X		Phase II	Phase II
Develop Targeted Outreach for Businesses with Greatest Potential to Contribute Pollutants of Concern			X		
Develop Minimum Requirements and Program to Enforce Parking Lot Street Sweeping for Commercial Businesses			X		

Table 6-5 (Continued)
Cold Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Modify Inspection Staff Training to Include Enhanced Training on Water Quality Impairments and BMPs			X		
Develop a Reward/Stewardship Program for Businesses			X		
During Inspections Emphasize BMPS that Reduce Pollutants of Concern		X		Phase III	Phase III
Incorporate TMDL requirements into CEQA process			X		
Increase Inspections of Post-Development BMPs			X		
Enhance Education for Developers of Projects outside SUSMP/SQUMP requirements			X		
Develop vegetative filter BMP		X		Phase II	Phase II
Emergency Spill Management		X		Phase II	Phase II
Additional Trash Pick Up During High Use Periods in High Use Sites			X		
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections			X		
Provide Septic System (OWTS) Pumpers and Customers with Septic System Guides			X		
Investigate Incentive Programs for Replacing Improperly Operating Septic Tanks	X			Phase I	Phase II
Septic Inspections Upon Change in Ownership			X		

6.2.3 Hidden Valley Creek

6.2.3.1 Subwatershed Description

The Hidden Valley Creek Subwatershed was determined to be a high-priority subwatershed as described in Section 3.4.

The Hidden Valley Creek subwatershed is 10,792 acres and is comprised of a mixture open space, parks, and agricultural areas within Los Angeles and Ventura Counties. The many streams within the Hidden Valley Creek subwatershed all eventually drain into Sherwood. The Hidden Valley Creek subwatershed is the largest and among the least developed of all high-priority subwatersheds in MCW. Developed area is mostly residential. Land uses consist of:

- 5.1 percent residential
- 0.2 percent commercial
- 0.01 percent horse ranches
- 94.7 percent open space and vacant lands

Soils are generally poor (Group C or D), and steep grades are prevalent in the subwatershed, ranging up to 58%.

6.2.3.2 Subwatershed Specific Plan

Table 6-6 summarizes the activities specifically designated for this subwatershed. The basis for activities selected is primarily the subwatershed priority and land-uses as described in Sections 2 and 3. Descriptions of the general activities and structural solutions selected for this subwatershed have been provided in Section 6.1. Specifics regarding implementation scheduling can be found in Section 6.3.

Table 6-6
Hidden Valley Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Structural BMPs					
Development Standards	X			Phase I	Phase I
Voluntary Downspout Redirect Program	X			Phase II	Phase III
Stream Buffers		X		Phase II	Phase III
Voluntary Horse farm retrofit program	X			Phase I	Phase I
Local Capture Systems		X		Phase II	Phase III
Vegetated treatment systems	X			Phase I	Phase III
Local infiltration systems		X		Phase II	Phase III
Street and parking lot biofiltration retrofits	X			Phase I	Phase III
Nonstructural BMPs					
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation		X		Phase II	Phase III
Offer Opportunities for Water Conservation, and Water Quality in Existing Educational Programs at Schools		X		Phase II	Phase II
Outreach Fact Sheets on Water Quality for Point-of-Sale Distribution	X			Phase I	Phase II
Work with LVMWD, WBMWD, and District No. 29 to Support/Expand Water Use Survey and Conservation Programs		X		Phase I	Phase II

Table 6-6 (Continued)
Hidden Valley Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Horse Stables and Confined Animal Facility Outreach and Education	X			Phase I	Phase I
Outreach to Pet Owners Linking Waste to Water Quality Impairments	X			Phase I	Phase II
Place Pet Waste Bag Dispensers at Trailheads		X		Phase I	Phase II
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Water Quality Impairments and BMPs (combine with commercial inventory effort)		X		Phase I	Phase II
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots		X		Phase II	Phase II
Recreational Vehicle (RV) Disposal Site Outreach Program		X		Phase I	Phase II
Coordinate with watershed agencies to identify methods to reach visitors to the watershed		X		Phase I	Phase II
Outreach at Trailheads Regarding Waste Disposal and Restroom Use		X		Phase II	Phase II
Coordinate Meetings Between Agencies and Environmental Organizations for Preparing Outreach Materials	X			Phase I	Phase II
Trash Hauler Outreach		X		Phase II	Phase II
Develop Targeted Outreach for Businesses with Greatest Potential to Contribute Pollutants of Concern		X		Phase I	Phase II
Expand Media Partnership with Caltrans		X		Phase II	Phase II
Develop Minimum Requirements and Program to Enforce Parking Lot Street Sweeping for Commercial Businesses		X		Phase II	Phase II
Modify Inspection Staff Training to Include Enhanced Training on Water Quality Impairments and BMPs		X		Phase II	Phase II
Develop a Reward/Stewardship Program for Businesses			X		
During Inspections Emphasize BMPS that Reduce Pollutants of Concern	X			Phase II	Phase II
Incorporate TMDL requirements into CEQA process		X		Phase II	Phase II
Increase Inspections of Post-Development BMPs		X		Phase II	Phase II

Table 6-6 (Continued)
Hidden Valley Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Enhance Education for Developers of Projects outside SUSMP/SQUMP requirements		X		Phase II	Phase II
Develop vegetative filter BMP		X		Phase II	Phase II
Complete LA County BMP Technical Manual and Include Detailed BMP Requirements Related to Water Quality Impairments		X		Phase II	Phase II
Emergency Spill Management	X			Phase I	Phase I
Additional Trash Pick Up During High Use Periods in High Use Sites		X		Phase II	Phase II
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections		X		Phase II	Phase II
Establish Optimal Cleaning Cycles for Drainage Facilities		X		Phase I	Phase II
Provide Septic System (OWTS) Pumpers and Customers with Septic System Guides	X			Phase I	Phase I
Investigate Incentive Programs for Replacing Improperly Operating Septic Tanks	X			Phase I	Phase II
Septic Inspections Upon Change in Ownership			X	Phase I	Phase I

6.2.4 Lower Las Virgenes Creek

6.2.4.1 Subwatershed Description

The Lower Las Virgenes Creek Subwatershed was determined to be a high-priority subwatershed as described in Section 3.4.

The Lower Las Virgenes Creek subwatershed is 4,887 acres and is comprised of a mixture of urban and recreational land uses. Surrounding the 101 Freeway are urban parts of the Cities of Calabasas and Agoura Hills. The middle of the subwatershed is within Malibu Creek State Park and the Santa Monica Mountains National Recreation Area (SMMNRA). Runoff in Malibu Creek reaches the Lagoon and either continues to flow into Santa Monica Bay or is retained depending on the season. The Lower Las Virgenes Creek subwatershed is moderately developed compared to other high-priority subwatersheds in MCW with land uses consisting of:

- 9.6 percent residential
- 2.6 percent commercial
- 1.6 percent major roads

- 0.2 percent horse farms
- 86.0 percent open space and vacant lands

Soils are generally poor (Group C or D) and grades range from less than 1% to 32%.

6.2.4.2 Subwatershed Specific Plan

Table 6-7 summarizes the activities specifically designated for this subwatershed. The basis for activities selected is primarily the subwatershed priority and land-uses as described in Sections 2 and 3. Descriptions of the general activities and structural solutions selected for this subwatershed have been provided in Section 6.1. Specifics regarding implementation scheduling can be found in Section 6.3.

Table 6-7
Lower Las Virgenes Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Structural BMPs					
Development Standards	X			Phase I	Phase I
Voluntary Downspout Redirect Program	X			Phase II	Phase III
Stream Buffers	X			Phase II	Phase III
Voluntary Horse farm retrofit program	X			Phase I	Phase I
Local Capture Systems		X		Phase II	Phase III
Vegetated treatment systems	X			Phase I	Phase III
Local infiltration systems		X		Phase II	Phase III
Street and parking lot biofiltration retrofits	X			Phase I	Phase III
Las Virgenes Creek near De Anza Park (Regional Infiltration)		X		Phase I	Phase II
Liberty Canyon Creek (Subsurface Flow)		X		Phase I	Phase II
Nonstructural BMPs					
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation		X		Phase II	Phase III
Offer Opportunities for Water Conservation, and Water Quality in Existing Educational Programs at Schools		X		Phase II	Phase II
Outreach Fact Sheets on Water Quality for Point-of-Sale Distribution	X			Phase I	Phase II

Table 6-7 (Continued)
Lower Las Virgenes Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Work with LVMWD, WBMWD, and District No. 29 to Support/Expand Water Use Survey and Conservation Programs		X		Phase I	Phase II
Horse Stables and Confined Animal Facility Outreach and Education	X			Phase I	Phase I
Outreach to Pet Owners Linking Waste to Water Quality Impairments	X			Phase I	Phase II
Place Pet Waste Bag Dispensers at Trailheads		X		Phase I	Phase II
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Water Quality Impairments and BMPs (combine with commercial inventory effort)		X		Phase I	Phase II
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots		X		Phase II	Phase II
Recreational Vehicle (RV) Disposal Site Outreach Program		X		Phase I	Phase II
Coordinate with watershed agencies to identify methods to reach visitors to the watershed		X		Phase I	Phase II
Outreach at Trailheads Regarding Waste Disposal and Restroom Use		X		Phase II	Phase II
Coordinate Meetings Between Agencies and Environmental Organizations for Preparing Outreach Materials	X			Phase I	Phase II
Trash Hauler Outreach		X		Phase II	Phase II
Develop Targeted Outreach for Businesses with Greatest Potential to Contribute Pollutants of Concern		X		Phase I	Phase II
Expand Media Partnership with Caltrans		X		Phase II	Phase II
Develop Minimum Requirements and Program to Enforce Parking Lot Street Sweeping for Commercial Businesses		X		Phase II	Phase II
Modify Inspection Staff Training to Include Enhanced Training on Water Quality Impairments and BMPs		X		Phase II	Phase II
Develop a Reward/Stewardship Program for Businesses			X		

Table 6-7 (Continued)
Lower Las Virgenes Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
During Inspections Emphasize BMPS that Reduce Pollutants of Concern	X			Phase II	Phase II
Incorporate TMDL requirements into CEQA process		X		Phase II	Phase II
Increase Inspections of Post-Development BMPs		X		Phase II	Phase II
Enhance Education for Developers of Projects outside SUSMP/SQUMP requirements		X		Phase II	Phase II
Develop vegetative filter BMP		X		Phase II	Phase II
Complete LA County BMP Technical Manual and Include Detailed BMP Requirements Related to Water Quality Impairments		X		Phase II	Phase II
Emergency Spill Management	X			Phase I	Phase I
Additional Trash Pick Up During High Use Periods in High Use Sites		X		Phase II	Phase II
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections		X		Phase II	Phase II
Establish Optimal Cleaning Cycles for Drainage Facilities		X		Phase I	Phase II
Provide Septic System (OWTS) Pumpers and Customers with Septic System Guides	X			Phase I	Phase I
Investigate Incentive Programs for Replacing Improperly Operating Septic Tanks	X			Phase I	Phase II
Septic Inspections Upon Change in Ownership		X		Phase I	Phase I

6.2.4.3 Other Regional BMPs

The City of Calabasas is currently in the construction phase of an underground stormwater treatment facility at De Anza Park. The facility will capture and infiltrate up to 3 cfs of primary urban runoff that is currently discharged to Las Virgenes Creek. This provides sufficient capacity to treat 100% of dry-weather runoff from a 670-acre drainage area.

6.2.5 Lower Lindero Creek

6.2.5.1 Subwatershed Description

The Lower Lindero Creek Subwatershed was determined to be a high-priority subwatershed as described in Section 3.4.

The Lower Lindero Creek subwatershed is 1,698 acres and is comprised of a mixture of open space, dense residential development, and parks within the City of Agoura Hills. Lower Lindero Creek drains out of Lake Lindero and joins with Lower Medea Creek at the corner of Kanan Road and Cornell Road. The Lower Lindero Creek subwatershed is one of the most developed subwatershed in MCW with land uses consisting of:

- 28.0 percent residential
- 7.5 percent commercial
- 4.2 percent major roads
- 60.3 percent open space and vacant lands

Soils are generally poor (Group C or D) and grades range from less than 1% to 45%.

6.2.5.2 Subwatershed Specific Plan

Table 6-8 summarizes the activities specifically designated for this subwatershed. The basis for activities selected is primarily the subwatershed priority and land-uses as described in Sections 2 and 3. Descriptions of the general activities and structural solutions selected for this subwatershed have been provided in Section 6.1. Specifics regarding implementation scheduling can be found in Section 6.3.

Table 6-8
Lower Lindero Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Structural BMPs					
Development Standards	X			Phase I	Phase I
Voluntary Downspout Redirect Program	X			Phase II	Phase III
Stream Buffers	X			Phase II	Phase III
Voluntary Horse farm retrofit program	X			Phase I	Phase I
Local Capture Systems		X		Phase II	Phase III
Vegetated treatment systems	X			Phase I	Phase III
Local infiltration systems		X		Phase II	Phase III
Street and parking lot biofiltration retrofits	X			Phase I	Phase III
Lower Lindero Creek Subwatershed (Subsurface Flow)		X		Phase I	Phase II
Reyes Adobe Park (Subsurface Flow)		X		Phase I	Phase II

Table 6-8 (Continued)
Lower Lindero Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Nonstructural BMPs					
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation		X		Phase II	Phase III
Offer Opportunities for Water Conservation, and Water Quality in Existing Educational Programs at Schools		X		Phase II	Phase II
Outreach Fact Sheets on Water Quality for Point-of-Sale Distribution	X			Phase I	Phase II
Work with LVMWD, WBMWD, and District No. 29 to Support/Expand Water Use Survey and Conservation Programs		X		Phase I	Phase II
Horse Stables and Confined Animal Facility Outreach and Education	X			Phase I	Phase I
Outreach to Pet Owners Linking Waste to Water Quality Impairments	X			Phase I	Phase II
Place Pet Waste Bag Dispensers at Trailheads		X		Phase I	Phase II
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Water Quality Impairments and BMPs (combine with commercial inventory effort)		X		Phase I	Phase II
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots		X		Phase II	Phase II
Recreational Vehicle (RV) Disposal Site Outreach Program		X		Phase I	Phase II
Coordinate with watershed agencies to identify methods to reach visitors to the watershed		X		Phase I	Phase II
Outreach at Trailheads Regarding Waste Disposal and Restroom Use		X		Phase II	Phase II
Coordinate Meetings Between Agencies and Environmental Organizations for Preparing Outreach Materials	X			Phase I	Phase II
Trash Hauler Outreach		X		Phase II	Phase II

Table 6-8 (Continued)
Lower Lindero Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Develop Targeted Outreach for Businesses with Greatest Potential to Contribute Pollutants of Concern		X		Phase I	Phase II
Expand Media Partnership with Caltrans		X		Phase II	Phase II
Develop Minimum Requirements and Program to Enforce Parking Lot Street Sweeping for Commercial Businesses		X		Phase II	Phase II
Modify Inspection Staff Training to Include Enhanced Training on Water Quality Impairments and BMPs		X		Phase II	Phase II
Develop a Reward/Stewardship Program for Businesses			X		
During Inspections Emphasize BMPS that Reduce Pollutants of Concern	X			Phase II	Phase II
Incorporate TMDL requirements into CEQA process		X		Phase II	Phase II
Increase Inspections of Post-Development BMPs		X		Phase II	Phase II
Enhance Education for Developers of Projects outside SUSMP/SQUMP requirements		X		Phase II	Phase II
Develop vegetative filter BMP		X		Phase II	Phase II
Complete LA County BMP Technical Manual and Include Detailed BMP Requirements Related to Water Quality Impairments		X		Phase II	Phase II
Emergency Spill Management	X			Phase I	Phase I
Additional Trash Pick Up During High Use Periods in High Use Sites		X		Phase II	Phase II
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections		X		Phase II	Phase II
Establish Optimal Cleaning Cycles for Drainage Facilities		X		Phase I	Phase II

6.2.6 Lower Malibu Creek

6.2.6.1 Subwatershed Description

The Lower Malibu Creek Subwatershed was determined to be a medium-priority subwatershed as described in Section 3.4.

As a medium-priority subwatershed, a qualitative land-use based approach, as described above in Section 6.1, was used to identify both structural and nonstructural BMP strategies in the area.

The Lower Malibu Creek subwatershed is 2,484 acres of predominately open and vacant lands within Los Angeles County. The major component of developed land is residential. Land-use by percentage is as follows:

- 99.5 percent open space and vacant lands
- 1 percent residential

6.2.6.2 Subwatershed Specific Plan

Table 6-9 summarizes the activities specifically designated for this subwatershed. The basis for activities selected is primarily the subwatershed priority and land-uses as described in Sections 2 and 3. Descriptions of the general activities and structural solutions selected for this subwatershed have been provided in Section 6.1. Specifics regarding implementation scheduling can be found in Section 6.3.

Table 6-9
Lower Malibu Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Structural BMPs					
Development Standards		X		Phase I	Phase II
Voluntary Downspout Redirect Program		X		Phase III	Phase III
Stream Buffers		X		Phase III	Phase III
Voluntary Horse farm retrofit program		X		Phase I	Phase II
Local Capture Systems			X		
Vegetated treatment systems			X		
Local infiltration systems			X		
Street and parking lot biofiltration retrofits	X			Phase III	Phase IV
Nonstructural BMPs					
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation		X		Phase II	Phase III
Offer Opportunities for Water Conservation, and Water Quality in Existing Educational Programs at Schools		X		Phase II	Phase II
Outreach Fact Sheets on Water Quality for Point-of-Sale Distribution		X		Phase I	Phase II

Table 6-9 (Continued)
Lower Malibu Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Work with LVMWD, WBMWD, and District No. 29 to Support/Expand Water Use Survey and Conservation Programs			X		
Horse Stables and Confined Animal Facility Outreach and Education	X			Phase I	Phase I
Outreach to Pet Owners Linking Waste to Water Quality Impairments			X		
Place Pet Waste Bag Dispensers at Trailheads			X		
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Water Quality Impairments and BMPs (combine with commercial inventory effort)			X		
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots			X		
Recreational Vehicle (RV) Disposal Site Outreach Program			X		
Coordinate with watershed agencies to identify methods to reach visitors to the watershed			X		
Outreach at Trailheads Regarding Waste Disposal and Restroom Use			X		
During Inspections Emphasize BMPS that Reduce Pollutants of Concern		X		Phase III	Phase III
Incorporate TMDL requirements into CEQA process			X		
Increase Inspections of Post-Development BMPs			X		
Enhance Education for Developers of Projects outside SUSMP/SQUMP requirements			X		
Develop vegetative filter BMP		X		Phase II	Phase II
Emergency Spill Management		X		Phase II	Phase II
Additional Trash Pick Up During High Use Periods in High Use Sites			X		

**Table 6-9 (Continued)
Lower Malibu Creek BMP Selection and Implementation Commitments**

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections			X		
Provide Septic System (OWTS) Pumpers and Customers with Septic System Guides			X		
Investigate Incentive Programs for Replacing Improperly Operating Septic Tanks	X			Phase I	Phase II
Septic Inspections Upon Change in Ownership			X		

6.2.7 Lower Medea Creek

6.2.7.1 Subwatershed Description

The Lower Medea Creek Subwatershed was determined to be a high-priority subwatershed as described in Section 3.4.

The Lower Medea Creek subwatershed is 2,159 acres and is comprised of a mixture of open space, pockets of residential development, and recreational area within county land. About half of the land in this subwatershed is within the SMMNRA. Lower Medea Creek flows into Malibou Lake and the eastern shore of Malibou Lake falls within the Lower Medea Creek subwatershed. The Lower Medea Creek subwatershed is moderately developed compared to other high-priority subwatersheds in MCW and developed area is mostly residential. Land uses consist of:

- 12 percent residential
- 0.7 percent horse ranches
- 87.3 percent open space and vacant lands

Soils are generally poor (Group C or D) with pockets of Group B soils. Grades range from less than 1% to 60%.

6.2.7.2 Subwatershed Specific Plan

Table 6-10 summarizes the activities specifically designated for this subwatershed. The basis for activities selected is primarily the subwatershed priority and land-uses as described in Sections 2 and 3. Descriptions of the general activities and structural solutions selected for this subwatershed have been provided in Section 6.1. Specifics regarding implementation scheduling can be found in Section 6.3.

Table 6-10
Lower Medea Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Structural BMPs					
Development Standards	X			Phase I	Phase I
Voluntary Downspout Redirect Program	X			Phase II	Phase III
Stream Buffers	X			Phase II	Phase III
Voluntary Horse farm retrofit program	X			Phase I	Phase I
Local Capture Systems		X		Phase II	Phase III
Vegetated treatment systems	X			Phase I	Phase III
Local infiltration systems		X		Phase II	Phase III
Street and parking lot biofiltration retrofits	X			Phase I	Phase III
Lower Medea Creek (Subsurface Flow)		X		Phase I	Phase II
Nonstructural BMPs					
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation		X		Phase II	Phase III
Offer Opportunities for Water Conservation, and Water Quality in Existing Educational Programs at Schools		X		Phase II	Phase II
Outreach Fact Sheets on Water Quality for Point-of-Sale Distribution	X			Phase I	Phase II
Work with LVMWD, WBMWD, and District No. 29 to Support/Expand Water Use Survey and Conservation Programs		X		Phase I	Phase II
Horse Stables and Confined Animal Facility Outreach and Education	X			Phase I	Phase I
Outreach to Pet Owners Linking Waste to Water Quality Impairments	X			Phase I	Phase II
Place Pet Waste Bag Dispensers at Trailheads		X		Phase I	Phase II
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Water Quality Impairments and BMPs (combine with commercial inventory effort)		X		Phase I	Phase II
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots		X		Phase II	Phase II
Recreational Vehicle (RV) Disposal Site Outreach Program		X		Phase I	Phase II

Table 6-10 (Continued)
Lower Medea Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Coordinate with watershed agencies to identify methods to reach visitors to the watershed		X		Phase I	Phase II
Outreach at Trailheads Regarding Waste Disposal and Restroom Use		X		Phase II	Phase II
During Inspections Emphasize BMPS that Reduce Pollutants of Concern	X			Phase II	Phase II
Incorporate TMDL requirements into CEQA process		X		Phase II	Phase II
Increase Inspections of Post-Development BMPs		X		Phase II	Phase II
Enhance Education for Developers of Projects outside SUSMP/SQUMP requirements		X		Phase II	Phase II
Develop vegetative filter BMP		X		Phase II	Phase II
Complete LA County BMP Technical Manual and Include Detailed BMP Requirements Related to Water Quality Impairments		X		Phase II	Phase II
Emergency Spill Management	X			Phase I	Phase I
Additional Trash Pick Up During High Use Periods in High Use Sites		X		Phase II	Phase II
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections		X		Phase II	Phase II
Establish Optimal Cleaning Cycles for Drainage Facilities		X		Phase I	Phase II
Provide Septic System (OWTS) Pumpers and Customers with Septic System Guides	X			Phase I	Phase I
Investigate Incentive Programs for Replacing Improperly Operating Septic Tanks	X			Phase I	Phase II
Septic Inspections Upon Change in Ownership		X		Phase I	Phase I

6.2.8 Malibu Lagoon

6.2.8.1 Subwatershed Description

The Malibu Lagoon Subwatershed was determined to be a high-priority subwatershed as described in Section 3.4.

The Malibu Lagoon subwatershed is 692 acres and is comprised primarily of developed land within the City of Malibu that drains directly to Malibu Creek. Runoff in Malibu Creek reaches the Lagoon and either continues to flow into Santa

Monica Bay or is retained, depending upon the wet versus dry season pattern. The Malibu Lagoon subwatershed is moderately developed compared to other high-priority subwatersheds in MCW with land uses consisting of:

- 24 percent residential
- 6 percent commercial
- 2 percent horse ranches
- 68 percent open space and vacant lands

Soils are generally poor (Group C or D) with pockets of Group B soils. Grades range from less than 1% to 50%.

6.2.8.2 Subwatershed Specific Plan

Table 6-11 summarizes the activities specifically designated for this subwatershed. The basis for activities selected is primarily the subwatershed priority and land-uses as described in Sections 2 and 3. Descriptions of the general activities and structural solutions selected for this subwatershed have been provided in Section 6.1. Specifics regarding implementation scheduling can be found in Section 6.3.

6.2.8.3 Other Regional BMPs

The City of Malibu is in the construction phase of an urban runoff and stormwater treatment facility in the Civic Center area. Another project to be added as a component of this treatment facility is for regional detention, natural treatment, and potential reuse at Malibu Legacy Project. This project is in the early planning phase and the City has developed a Request for Proposal (RFP) for a design that will meet water quality requirements developed in the SMBBB and MCW Bacteria TMDLs.

Table 6-11
Malibu Lagoon BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Structural BMPs					
Development Standards	X			Phase I	Phase I
Voluntary Downspout Redirect Program	X			Phase II	Phase III
Stream Buffers	X			Phase II	Phase III
Voluntary Horse farm retrofit program	X			Phase I	Phase I
Local Capture Systems		X		Phase II	Phase III
Vegetated treatment systems	X			Phase I	Phase III
Local infiltration systems		X		Phase II	Phase III
Street and parking lot biofiltration retrofits	X			Phase I	Phase III

Table 6-11
Malibu Lagoon BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Nonstructural BMPs					
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation		X		Phase II	Phase III
Offer Opportunities for Water Conservation, and Water Quality in Existing Educational Programs at Schools		X		Phase II	Phase II
Outreach Fact Sheets on Water Quality for Point-of-Sale Distribution	X			Phase I	Phase II
Work with LVMWD, WBMWD, and District No. 29 to Support/Expand Water Use Survey and Conservation Programs		X		Phase I	Phase II
Horse Stables and Confined Animal Facility Outreach and Education	X			Phase I	Phase I
Outreach to Pet Owners Linking Waste to Water Quality Impairments	X			Phase I	Phase II
Place Pet Waste Bag Dispensers at Trailheads		X		Phase I	Phase II
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Water Quality Impairments and BMPs (combine with commercial inventory effort)		X		Phase I	Phase II
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots		X		Phase II	Phase II
Recreational Vehicle (RV) Disposal Site Outreach Program		X		Phase I	Phase II
Coordinate with watershed agencies to identify methods to reach visitors to the watershed		X		Phase I	Phase II
Outreach at Trailheads Regarding Waste Disposal and Restroom Use		X		Phase II	Phase II
Coordinate Meetings Between Agencies and Environmental Organizations for Preparing Outreach Materials	X			Phase I	Phase II
Trash Hauler Outreach		X		Phase II	Phase II
Develop Targeted Outreach for Businesses with Greatest Potential to Contribute Pollutants of Concern		X		Phase I	Phase II
Expand Media Partnership with Caltrans		X		Phase II	Phase II

Table 6-11 (Continued)
Malibu Lagoon BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Develop Minimum Requirements and Program to Enforce Parking Lot Street Sweeping for Commercial Businesses		X		Phase II	Phase II
Modify Inspection Staff Training to Include Enhanced Training on Water Quality Impairments and BMPs		X		Phase II	Phase II
Develop a Reward/Stewardship Program for Businesses			X		
During Inspections Emphasize BMPS that Reduce Pollutants of Concern	X			Phase II	Phase II
Incorporate TMDL requirements into CEQA process		X		Phase II	Phase II
Increase Inspections of Post-Development BMPs		X		Phase II	Phase II
Enhance Education for Developers of Projects outside SUSMP/SQUMP requirements		X		Phase II	Phase II
Develop vegetative filter BMP		X		Phase II	Phase II
Complete LA County BMP Technical Manual and Include Detailed BMP Requirements Related to Water Quality Impairments		X		Phase II	Phase II
Emergency Spill Management	X			Phase I	Phase I
Additional Trash Pick Up During High Use Periods in High Use Sites		X		Phase II	Phase II
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections		X		Phase II	Phase II
Establish Optimal Cleaning Cycles for Drainage Facilities		X		Phase I	Phase II
Provide Septic System (OWTS) Pumpers and Customers with Septic System Guides	X			Phase I	Phase I
Investigate Incentive Programs for Replacing Improperly Operating Septic Tanks	X			Phase I	Phase II
Septic Inspections Upon Change in Ownership			X		

6.2.9 Middle Malibu Creek

6.2.9.1 Subwatershed Description

The Middle Malibu Creek Subwatershed was determined to be a medium-priority subwatershed as described in Section 3.4.

The Middle Malibu Creek subwatershed is 1,462 acres of predominately open and vacant lands within Los Angeles County. The major component of developed land within the subwatershed is park and institutional, with small amounts of residential, commercial, agricultural, and horse ranch land uses. Land-use by percentage is as follows:

- 84.3 percent open space and vacant lands
- 9.2 percent parks and recreation
- 3 percent residential
- 1.4 percent agricultural
- 1.3 percent commercial and industrial land uses.
- 0.4 percent horse ranches

6.2.9.2 Subwatershed Specific Plan

Table 6-12 summarizes the activities specifically designated for this subwatershed. The basis for activities selected is primarily the subwatershed priority and land-uses as described in Sections 2 and 3. Descriptions of the general activities and structural solutions selected for this subwatershed have been provided in Section 6.1. Specifics regarding implementation scheduling can be found in Section 6.3.

Table 6-12
Middle Malibu Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Structural BMPs					
Development Standards		X		Phase I	Phase II
Voluntary Downspout Redirect Program		X		Phase III	Phase III
Stream Buffers		X		Phase III	Phase III
Voluntary Horse farm retrofit program		X		Phase I	Phase II
Local Capture Systems			X		
Vegetated treatment systems			X		
Local infiltration systems			X		
Street and parking lot biofiltration retrofits	X			Phase III	Phase IV

Table 6-12
Middle Malibu Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Nonstructural BMPs					
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation		X		Phase II	Phase III
Offer Opportunities for Water Conservation, and Water Quality in Existing Educational Programs at Schools		X		Phase II	Phase II
Outreach Fact Sheets on Water Quality for Point-of-Sale Distribution		X		Phase I	Phase II
Work with LVMWD, WBMWD, and District No. 29 to Support/Expand Water Use Survey and Conservation Programs			X		
Horse Stables and Confined Animal Facility Outreach and Education				Phase I	Phase I
Outreach to Pet Owners Linking Waste to Water Quality Impairments			X		
Place Pet Waste Bag Dispensers at Trailheads			X		
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Water Quality Impairments and BMPs (combine with commercial inventory effort)			X		
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots			X		
Recreational Vehicle (RV) Disposal Site Outreach Program			X		
Coordinate with watershed agencies to identify methods to reach visitors to the watershed			X		
Outreach at Trailheads Regarding Waste Disposal and Restroom Use			X		
Coordinate Meetings Between Agencies and Environmental Organizations for Preparing Outreach Materials	X			Phase I	Phase II
Trash Hauler Outreach		X		Phase II	Phase II
Develop Targeted Outreach for Businesses with Greatest Potential to Contribute Pollutants of Concern			X		

Table 6-12 (Continued)
Middle Malibu Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Expand Media Partnership with Caltrans		X		Phase II	Phase II
Develop Minimum Requirements and Program to Enforce Parking Lot Street Sweeping for Commercial Businesses			X		
Modify Inspection Staff Training to Include Enhanced Training on Water Quality Impairments and BMPs			X		
Develop a Reward/Stewardship Program for Businesses			X		
During Inspections Emphasize BMPS that Reduce Pollutants of Concern		X		Phase III	Phase III
Incorporate TMDL requirements into CEQA process			X		
Increase Inspections of Post-Development BMPs			X		
Enhance Education for Developers of Projects outside SUSMP/SQUMP requirements			X		
Develop vegetative filter BMP		X		Phase II	Phase II
Emergency Spill Management		X		Phase II	Phase II
Additional Trash Pick Up During High Use Periods in High Use Sites			X		
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections			X		
Provide Septic System (OWTS) Pumpers and Customers with Septic System Guides			X		
Investigate Incentive Programs for Replacing Improperly Operating Septic Tanks	X			Phase I	Phase II
Septic Inspections Upon Change in Ownership			X		

6.2.10 Palo Comado Creek

6.2.10.1 Subwatershed Description

The Palo Comado Creek Subwatershed was determined to be a medium-priority subwatershed as described in Section 3.4.

The Palo Comado Creek subwatershed is 3,341 acres of predominately open and vacant lands within Los Angeles County. The major component of developed land is residential, with small amounts of commercial, agricultural, recreational areas and horse ranches. Land-use by percentage is as follows:

- 83.3 percent open space and vacant lands
- 11 percent residential
- 3.7 percent commercial and industrial land uses.
- 0.5 percent horse ranches
- 0.4 percent parks and recreation
- 0.3 percent agricultural

6.2.10.2 Subwatershed Specific Plan

Table 6-13 summarizes the activities specifically designated for this subwatershed. The basis for activities selected is primarily the subwatershed priority and land-uses as described in Sections 2 and 3. Descriptions of the general activities and structural solutions selected for this subwatershed have been provided in Section 6.1. Specifics regarding implementation scheduling can be found in Section 6.3.

6.2.10.3 Other Regional BMPs

LACDPW is developing plans to divert urban runoff away from the storm drain system (i.e. streets, canyons, waterways, etc.) and into the sanitation system. The Dry-Weather Discharge and Diversion project includes a candidate inlet for diversion near Old Agoura Park.

Table 6-13
Palo Comado Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Structural BMPs					
Development Standards		X		Phase I	Phase II
Voluntary Downspout Redirect Program		X		Phase III	Phase III
Stream Buffers		X		Phase III	Phase III

Table 6-13
Palo Comado Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Voluntary Horse farm retrofit program		X		Phase I	Phase II
Local Capture Systems			X		
Vegetated treatment systems			X		
Local infiltration systems			X		
Street and parking lot biofiltration retrofits	X			Phase III	Phase IV
Nonstructural BMPs					
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation		X		Phase II	Phase III
Offer Opportunities for Water Conservation, and Water Quality in Existing Educational Programs at Schools		X		Phase II	Phase II
Outreach Fact Sheets on Water Quality for Point-of-Sale Distribution		X		Phase I	Phase II
Work with LVMWD, WBMWD, and District No. 29 to Support/Expand Water Use Survey and Conservation Programs			X		
Horse Stables and Confined Animal Facility Outreach and Education				Phase I	Phase I
Outreach to Pet Owners Linking Waste to Water Quality Impairments			X		
Place Pet Waste Bag Dispensers at Trailheads			X		
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Water Quality Impairments and BMPs (combine with commercial inventory effort)			X		

Table 6-13 (Continued)
Palo Comado Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots			X		
Recreational Vehicle (RV) Disposal Site Outreach Program			X		
Coordinate with watershed agencies to identify methods to reach visitors to the watershed			X		
Outreach at Trailheads Regarding Waste Disposal and Restroom Use			X		
Coordinate Meetings Between Agencies and Environmental Organizations for Preparing Outreach Materials	X			Phase I	Phase II
Trash Hauler Outreach		X		Phase II	Phase II
Develop Targeted Outreach for Businesses with Greatest Potential to Contribute Pollutants of Concern			X		
Expand Media Partnership with Caltrans		X		Phase II	Phase II
Develop Minimum Requirements and Program to Enforce Parking Lot Street Sweeping for Commercial Businesses			X		
Modify Inspection Staff Training to Include Enhanced Training on Water Quality Impairments and BMPs			X		
Develop a Reward/Stewardship Program for Businesses			X		
During Inspections Emphasize BMPS that Reduce Pollutants of Concern		X		Phase III	Phase III
Incorporate TMDL requirements into CEQA process			X		
Increase Inspections of Post-Development BMPs			X		
Enhance Education for Developers of Projects outside SUSMP/SQUMP requirements			X		
Develop vegetative filter BMP		X		Phase II	Phase II
Emergency Spill Management		X		Phase II	Phase II

Table 6-13 (Continued)
Palo Comado Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Additional Trash Pick Up During High Use Periods in High Use Sites			X		
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections			X		

6.2.11 Portrero Canyon Creek

6.2.11. Subwatershed Description

The Portrero Canyon Creek Subwatershed was determined to be a high-priority subwatershed as described in Section 3.4.

The Portrero Canyon Creek subwatershed is 2,266 acres and is comprised of a mixture of open space, dense residential development, and parks within the Cities of Westlake Village and Thousand Oaks. Portrero Canyon Creek drains out of Lake Sherwood and flows into Westlake Lake. The Portrero Canyon Creek subwatershed is moderately developed compared to other high-priority subwatersheds in MCW and developed area is mostly residential. Land uses consist of:

- 26 percent residential
- 0.2 percent commercial
- 1.3 percent horse ranches
- 72.5 percent open space and vacant lands

Soils are generally poor (Group C or D) with pockets of Group B soils. Grades range from less than 1% to 42%.

6.2.11.2 Subwatershed Specific Plan

Table 6-14 summarizes the activities specifically designated for this subwatershed. The basis for activities selected is primarily the subwatershed priority and land-uses as described in Sections 2 and 3. Descriptions of the general activities and structural solutions selected for this subwatershed have been provided in Section 6.1. Specifics regarding implementation scheduling can be found in Section 6.3.

Table 6-14
Portrero Canyon Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Structural BMPs					
Development Standards	X			Phase I	Phase I
Voluntary Downspout Redirect Program	X			Phase II	Phase III
Stream Buffers		X		Phase III	Phase III
Voluntary Horse farm retrofit program	X			Phase I	Phase I
Local Capture Systems		X		Phase II	Phase III
Vegetated treatment systems	X			Phase I	Phase III
Local infiltration systems		X		Phase II	Phase III
Street and parking lot biofiltration retrofits	X			Phase I	Phase III
Nonstructural BMPs					
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation		X		Phase II	Phase III
Offer Opportunities for Water Conservation, and Water Quality in Existing Educational Programs at Schools		X		Phase II	Phase II
Outreach Fact Sheets on Water Quality for Point-of-Sale Distribution	X			Phase I	Phase II
Work with LVMWD, WBMWD, and District No. 29 to Support/Expand Water Use Survey and Conservation Programs		X		Phase I	Phase II
Horse Stables and Confined Animal Facility Outreach and Education	X			Phase I	Phase I
Outreach to Pet Owners Linking Waste to Water Quality Impairments	X			Phase I	Phase II
Place Pet Waste Bag Dispensers at Trailheads		X		Phase I	Phase II
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Water Quality Impairments and BMPs (combine with commercial inventory effort)		X		Phase I	Phase II

Table 6-14 (Continued)
Portrero Canyon Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots		X		Phase II	Phase II
Recreational Vehicle (RV) Disposal Site Outreach Program		X		Phase I	Phase II
Coordinate with watershed agencies to identify methods to reach visitors to the watershed		X		Phase I	Phase II
Outreach at Trailheads Regarding Waste Disposal and Restroom Use		X		Phase II	Phase II
Coordinate Meetings Between Agencies and Environmental Organizations for Preparing Outreach Materials	X			Phase I	Phase II
Trash Hauler Outreach		X		Phase II	Phase II
Develop Targeted Outreach for Businesses with Greatest Potential to Contribute Pollutants of Concern		X		Phase I	Phase II
Expand Media Partnership with Caltrans		X		Phase II	Phase II
Develop Minimum Requirements and Program to Enforce Parking Lot Street Sweeping for Commercial Businesses		X		Phase II	Phase II
Modify Inspection Staff Training to Include Enhanced Training on Water Quality Impairments and BMPs		X		Phase II	Phase II
Develop a Reward/Stewardship Program for Businesses			X		
During Inspections Emphasize BMPS that Reduce Pollutants of Concern	X			Phase II	Phase II
Incorporate TMDL requirements into CEQA process		X		Phase II	Phase II
Increase Inspections of Post-Development BMPs		X		Phase II	Phase II
Enhance Education for Developers of Projects outside SUSMP/SQUMP requirements		X		Phase II	Phase II
Develop vegetative filter BMP		X		Phase II	Phase II

Table 6-14 (Continued)
Portrero Canyon Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Complete LA County BMP Technical Manual and Include Detailed BMP Requirements Related to Water Quality Impairments		X		Phase II	Phase II
Emergency Spill Management	X			Phase I	Phase I
Additional Trash Pick Up During High Use Periods in High Use Sites		X		Phase II	Phase II
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections		X		Phase II	Phase II
Establish Optimal Cleaning Cycles for Drainage Facilities		X		Phase I	Phase II

6.2.12 Stokes Creek

6.2.12.1 Subwatershed Description

The Stokes Creek Subwatershed was determined to be a high-priority subwatershed as described in Section 3.4.

The Stokes Creek subwatershed is 3,074 acres and is comprised of a mixture of open space, pockets of residential development, and recreational areas within County lands. Mulholland Highway crosses Stokes Creek toward the mouth of the subwatershed. Stokes Creek flows into Las Virgenes Creek just above the confluence between Las Virgenes Creek and Malibu Creek. The Stokes Creek subwatershed is the least developed compared to other high-priority subwatersheds in MCW and developed area is mostly residential. Land uses consist of:

- 3.5 percent residential
- 0.3 percent commercial
- 0.6 percent horse ranches.
- 95.6 percent open space and vacant lands

Soils are generally poor (Group C or D) with significant pockets of Group B soils. Grades range up to 31%.

6.2.12.2 Subwatershed Specific Plan

Table 6-15 summarizes the activities specifically designated for this subwatershed. The basis for activities selected is primarily the subwatershed priority and land-uses as described in Sections 2 and 3. Descriptions of the general activities and structural solutions selected for this subwatershed have been provided in Section 6.1. Specifics regarding implementation scheduling can be found in Section 6.3.

Table 6-15
Stokes Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Structural BMPs					
Development Standards	X			Phase I	Phase I
Voluntary Downspout Redirect Program	X			Phase II	Phase III
Stream Buffers	X			Phase II	Phase III
Voluntary Horse farm retrofit program	X			Phase I	Phase I
Local Capture Systems		X		Phase II	Phase III
Vegetated treatment systems	X			Phase I	Phase III
Local infiltration systems		X		Phase II	Phase III
Street and parking lot biofiltration retrofits	X			Phase I	Phase III
Nonstructural BMPs					
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation		X		Phase II	Phase III
Offer Opportunities for Water Conservation, and Water Quality in Existing Educational Programs at Schools		X		Phase II	Phase II
Outreach Fact Sheets on Water Quality for Point-of-Sale Distribution	X			Phase I	Phase II
Work with LVMWD, WBMWD, and District No. 29 to Support/Expand Water Use Survey and Conservation Programs		X		Phase I	Phase II
Horse Stables and Confined Animal Facility Outreach and Education	X			Phase I	Phase I

Table 6-15
Stokes Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Outreach to Pet Owners Linking Waste to Water Quality Impairments	X			Phase I	Phase II
Place Pet Waste Bag Dispensers at Trailheads		X		Phase I	Phase II
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Water Quality Impairments and BMPs (combine with commercial inventory effort)		X		Phase I	Phase II
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots		X		Phase II	Phase II
Recreational Vehicle (RV) Disposal Site Outreach Program		X		Phase I	Phase II
Coordinate with watershed agencies to identify methods to reach visitors to the watershed		X		Phase I	Phase II
Outreach at Trailheads Regarding Waste Disposal and Restroom Use		X		Phase II	Phase II
Coordinate Meetings Between Agencies and Environmental Organizations for Preparing Outreach Materials	X			Phase I	Phase II
Trash Hauler Outreach		X		Phase II	Phase II
Develop Targeted Outreach for Businesses with Greatest Potential to Contribute Pollutants of Concern		X		Phase I	Phase II
Expand Media Partnership with Caltrans		X		Phase II	Phase II
Develop Minimum Requirements and Program to Enforce Parking Lot Street Sweeping for Commercial Businesses		X		Phase II	Phase II
Modify Inspection Staff Training to Include Enhanced Training on Water Quality Impairments and BMPs		X		Phase II	Phase II
Develop a Reward/Stewardship Program for Businesses			X		

Table 6-15 (Continued)
Stokes Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
During Inspections Emphasize BMPS that Reduce Pollutants of Concern	X			Phase II	Phase II
Incorporate TMDL requirements into CEQA process		X		Phase II	Phase II
Increase Inspections of Post-Development BMPs		X		Phase II	Phase II
Enhance Education for Developers of Projects outside SUSMP/SQUMP requirements		X		Phase II	Phase II
Develop vegetative filter BMP		X		Phase II	Phase II
Complete LA County BMP Technical Manual and Include Detailed BMP Requirements Related to Water Quality Impairments		X		Phase II	Phase II
Emergency Spill Management	X			Phase I	Phase I
Additional Trash Pick Up During High Use Periods in High Use Sites		X		Phase II	Phase II
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections		X		Phase II	Phase II
Establish Optimal Cleaning Cycles for Drainage Facilities		X		Phase I	Phase II
Provide Septic System (OWTS) Pumpers and Customers with Septic System Guides	X			Phase I	Phase I
Investigate Incentive Programs for Replacing Improperly Operating Septic Tanks	X			Phase I	Phase II
Septic Inspections Upon Change in Ownership		X		Phase I	Phase I

6.2.13 Triunfo Creek

6.2.13.1 Subwatershed Description

The Triunfo Creek Subwatershed was determined to be a low-priority subwatershed as described in Section 3.4.

The Triunfo Creek subwatershed is 7,388 acres of predominately open and vacant lands within Los Angeles County. The majority of developed land is residential, with small amounts of commercial, agricultural, and horse ranches. Land-use by percentage is as follows:

- 87.9 percent open space and vacant lands
- 9.0 percent residential
- 1.0 percent horse ranches
- 1.0 percent agricultural
- 0.9 percent commercial and industrial land uses.

6.2.13.2 Subwatershed Specific Plan

Table 6-16 summarizes the activities specifically designated for this subwatershed. The basis for activities selected is primarily the subwatershed priority and land-uses as described in Sections 2 and 3. Descriptions of the general activities and structural solutions selected for this subwatershed have been provided in Section 6.1. Specifics regarding implementation scheduling can be found in Section 6.3.

Table 6-16
Triunfo Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Structural BMPs					
Development Standards			X		
Voluntary Downspout Redirect Program			X		
Stream Buffers			X		
Voluntary Horse farm retrofit program			X		
Local Capture Systems			X		
Vegetated treatment systems			X		
Local infiltration systems			X		
Street and parking lot biofiltration retrofits	X			Phase III	Phase IV
Nonstructural BMPs					
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation		X		Phase II	Phase III

Table 6-16 (Continued)
Triunfo Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Offer Opportunities for Water Conservation, and Water Quality in Existing Educational Programs at Schools		X		Phase II	Phase II
Outreach Fact Sheets on Water Quality for Point-of-Sale Distribution		X		Phase I	Phase II
Work with LVMWD, WBMWD, and District No. 29 to Support/Expand Water Use Survey and Conservation Programs			X		
Horse Stables and Confined Animal Facility Outreach and Education				Phase I	Phase I
Outreach to Pet Owners Linking Waste to Water Quality Impairments			X		
Place Pet Waste Bag Dispensers at Trailheads			X		
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Water Quality Impairments and BMPs (combine with commercial inventory effort)			X		
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots			X		
Recreational Vehicle (RV) Disposal Site Outreach Program			X		
Coordinate with watershed agencies to identify methods to reach visitors to the watershed			X		
Outreach at Trailheads Regarding Waste Disposal and Restroom Use			X		
Coordinate Meetings Between Agencies and Environmental Organizations for Preparing Outreach Materials	X			Phase I	Phase II
Trash Hauler Outreach		X		Phase II	Phase II
Develop Targeted Outreach for Businesses with Greatest Potential to Contribute Pollutants of Concern			X		

Table 6-16 (Continued)
Triunfo Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Expand Media Partnership with Caltrans		X		Phase II	Phase II
Develop Minimum Requirements and Program to Enforce Parking Lot Street Sweeping for Commercial Businesses			X		
Modify Inspection Staff Training to Include Enhanced Training on Water Quality Impairments and BMPs			X		
Develop a Reward/Stewardship Program for Businesses			X		
During Inspections Emphasize BMPS that Reduce Pollutants of Concern		X		Phase III	Phase III
Incorporate TMDL requirements into CEQA process			X		
Increase Inspections of Post-Development BMPs			X		
Enhance Education for Developers of Projects outside SUSMP/SQUMP requirements			X		
Develop vegetative filter BMP		X		Phase II	Phase II
Emergency Spill Management		X		Phase II	Phase II
Additional Trash Pick Up During High Use Periods in High Use Sites			X		
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections			X		
Provide Septic System (OWTS) Pumpers and Customers with Septic System Guides		X			
Investigate Incentive Programs for Replacing Improperly Operating Septic Tanks	X			Phase I	Phase II
Septic Inspections Upon Change in Ownership		X			

6.2.14 Upper Las Virgenes Creek

6.2.14.1 Subwatershed Description

The Upper Las Virgenes Creek Subwatershed was determined to be a medium-priority subwatershed as described in Section 3.4.

The Upper Las Virgenes Creek subwatershed is 7,619 acres of predominately open and vacant lands within Los Angeles County. The majority of developed land is residential, followed by commercial and industrial land uses with small amounts of major roads and freeways, park and institutional and horse ranches. Land-use by percentage is as follows:

- 88.5 percent open space and vacant lands
- 7.0 percent residential
- 0.5 percent major roads/freeways
- 3.1 percent commercial and industrial land uses
- 0.1 percent horse ranches
- 0.4 percent park and institutional

6.2.14.2 Subwatershed Specific Plan

Table 6-17 summarizes the activities specifically designated for this subwatershed. The basis for activities selected is primarily the subwatershed priority and land-uses as described in Sections 2 and 3. Descriptions of the general activities and structural solutions selected for this subwatershed have been provided in Section 6.1. Specifics regarding implementation scheduling can be found in Section 6.3.

Table 6-17
Upper Las Virgenes Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Structural BMPs					
Development Standards		X		Phase I	Phase II
Voluntary Downspout Redirect Program		X		Phase III	Phase III
Stream Buffers		X		Phase III	Phase III
Voluntary Horse farm retrofit program		X		Phase I	Phase II
Local Capture Systems			X		
Vegetated treatment systems			X		

Table 6-17 (Continued)
Upper Las Virgenes Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Local infiltration systems			X		
Mountain View Homeowners Association		X		Phase I	Phase II
Street and parking lot biofiltration retrofits	X			Phase III	Phase IV
Nonstructural BMPs					
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation		X		Phase II	Phase III
Offer Opportunities for Water Conservation, and Water Quality in Existing Educational Programs at Schools		X		Phase II	Phase II
Outreach Fact Sheets on Water Quality for Point-of-Sale Distribution		X		Phase I	Phase II
Work with LVMWD, WBMWD, and District No. 29 to Support/Expand Water Use Survey and Conservation Programs			X		
Horse Stables and Confined Animal Facility Outreach and Education				Phase I	Phase I
Outreach to Pet Owners Linking Waste to Water Quality Impairments			X		
Place Pet Waste Bag Dispensers at Trailheads			X		
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Water Quality Impairments and BMPs (combine with commercial inventory effort)			X		
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots			X		
Recreational Vehicle (RV) Disposal Site Outreach Program			X		
Coordinate with watershed agencies to identify methods to reach visitors to the watershed			X		
Outreach at Trailheads Regarding Waste Disposal and Restroom Use			X		

Table 6-17 (Continued)
Upper Las Virgenes Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Coordinate Meetings Between Agencies and Environmental Organizations for Preparing Outreach Materials	X			Phase I	Phase II
Trash Hauler Outreach		X		Phase II	Phase II
Develop Targeted Outreach for Businesses with Greatest Potential to Contribute Pollutants of Concern			X		
Expand Media Partnership with Caltrans		X		Phase II	Phase II
Develop Minimum Requirements and Program to Enforce Parking Lot Street Sweeping for Commercial Businesses			X		
Modify Inspection Staff Training to Include Enhanced Training on Water Quality Impairments and BMPs			X		
Develop a Reward/Stewardship Program for Businesses			X		
During Inspections Emphasize BMPS that Reduce Pollutants of Concern		X		Phase III	Phase III
Incorporate TMDL requirements into CEQA process			X		
Increase Inspections of Post-Development BMPs			X		
Enhance Education for Developers of Projects outside SUSMP/SQUMP requirements			X		
Develop vegetative filter BMP		X		Phase II	Phase II
Emergency Spill Management		X		Phase II	Phase II
Additional Trash Pick Up During High Use Periods in High Use Sites			X		
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections			X		

6.2.14.3 Other Regional BMPs

LACDPW is developing plans to divert urban runoff away from the storm drain system (i.e. streets, canyons, waterways, etc.) and into the sanitation system. The Dry-Weather Discharge and Diversion Project includes two candidate inlets for diversion along Las Virgenes Road.

6.2.15 Upper Lindero Creek

6.2.15.1 Subwatershed Description

The Upper Lindero Creek Subwatershed was determined to be a high-priority subwatershed as described in Section 3.4.

The Upper Lindero Creek subwatershed is 2,635 acres and is comprised of a mixture of open space, dense residential development, and parks within the Cities of Agoura Hills, Thousand Oaks and Westlake. Upper Lindero Creek flows through the Lake Lindero Country Club into Lake Lindero.. Upper Lindero Creek flows through the Lake Lindero Country Club into Lake Lindero. The Upper Lindero Creek subwatershed is one of the most developed subwatersheds in MCW with land uses consisting of:

- 38 percent residential
- 3.6 percent commercial
- 0.2 percent major roads
- 58.2 percent open space and vacant lands

Soils are generally poor (Group C or D) and grades range from less than 1% to 21%.

6.2.15.2 Subwatershed Specific Plan

Table 6-18 summarizes the activities specifically designated for this subwatershed. The basis for activities selected is primarily the subwatershed priority and land-uses as described in Sections 2 and 3. Descriptions of the general activities and structural solutions selected for this subwatershed have been provided in Section 6.1. Specifics regarding implementation scheduling can be found in Section 6.3.

Table 6-18
Upper Lindero Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Structural BMPs					
Development Standards	X			Phase I	Phase I
Voluntary Downspout Redirect Program	X			Phase II	Phase III

Table 6-18 (Continued)
Upper Lindero Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Stream Buffers	X			Phase II	Phase III
Voluntary Horse farm retrofit program	X			Phase I	Phase I
Local Capture Systems		X		Phase II	Phase III
Vegetated treatment systems	X			Phase I	Phase III
Local infiltration systems		X		Phase II	Phase III
Street and parking lot biofiltration retrofits	X			Phase I	Phase III
Upper Lindero Creek Subwatershed (Regional Infiltration)		X		Phase I	Phase II
Upper Lindero Creek at County Line (Regional Infiltration)		X		Phase I	Phase II
Lake Lindero Country Club (Regional Infiltration)		X		Phase I	Phase II
Nonstructural BMPs					
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation		X		Phase II	Phase III
Offer Opportunities for Water Conservation, and Water Quality in Existing Educational Programs at Schools		X		Phase II	Phase II
Outreach Fact Sheets on Water Quality for Point-of-Sale Distribution	X			Phase I	Phase II
Work with LVMWD, WBMWD, and District No. 29 to Support/Expand Water Use Survey and Conservation Programs		X		Phase I	Phase II
Horse Stables and Confined Animal Facility Outreach and Education	X			Phase I	Phase I
Outreach to Pet Owners Linking Waste to Water Quality Impairments	X			Phase I	Phase II
Place Pet Waste Bag Dispensers at Trailheads		X		Phase I	Phase II

Table 6-18 (Continued)
Upper Lindero Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Water Quality Impairments and BMPs (combine with commercial inventory effort)		X		Phase I	Phase II
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots		X		Phase II	Phase II
Recreational Vehicle (RV) Disposal Site Outreach Program		X		Phase I	Phase II
Coordinate with watershed agencies to identify methods to reach visitors to the watershed		X		Phase I	Phase II
Outreach at Trailheads Regarding Waste Disposal and Restroom Use		X		Phase II	Phase II
Coordinate Meetings Between Agencies and Environmental Organizations for Preparing Outreach Materials	X			Phase I	Phase II
Trash Hauler Outreach		X		Phase II	Phase II
Develop Targeted Outreach for Businesses with Greatest Potential to Contribute Pollutants of Concern		X		Phase I	Phase II
Expand Media Partnership with Caltrans		X		Phase II	Phase II
Develop Minimum Requirements and Program to Enforce Parking Lot Street Sweeping for Commercial Businesses		X		Phase II	Phase II
Modify Inspection Staff Training to Include Enhanced Training on Water Quality Impairments and BMPs		X		Phase II	Phase II
Develop a Reward/Stewardship Program for Businesses			X		
During Inspections Emphasize BMPS that Reduce Pollutants of Concern	X			Phase II	Phase II
Incorporate TMDL requirements into CEQA process		X		Phase II	Phase II

Table 6-18 (Continued)
Upper Lindero Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Increase Inspections of Post-Development BMPs		X		Phase II	Phase II
Enhance Education for Developers of Projects outside SUSMP/SQUMP requirements		X		Phase II	Phase II
Develop vegetative filter BMP		X		Phase II	Phase II
Complete LA County BMP Technical Manual and Include Detailed BMP Requirements Related to Water Quality Impairments		X		Phase II	Phase II
Emergency Spill Management	X			Phase I	Phase I
Additional Trash Pick Up During High Use Periods in High Use Sites		X		Phase II	Phase II
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections		X		Phase II	Phase II
Establish Optimal Cleaning Cycles for Drainage Facilities		X		Phase I	Phase II

6.2.16 Upper Malibu Creek

6.2.16.1 Subwatershed Description

The Upper Malibu Creek Subwatershed was determined to be a low-priority subwatershed as described in Section 3.4.

The Upper Malibu Creek subwatershed is 3,571 acres of predominately open and vacant lands within Los Angeles County. All of the developed land is residential. Land-use as a percentage of total land in the subwatershed is as follows:

- 99.0 percent open space and vacant lands
- 1.0 percent residential.

6.2.16.2 Subwatershed Specific Plan

Table 6-19 summarizes the activities specifically designated for this subwatershed. The basis for activities selected is primarily the subwatershed priority and land-uses as described in Sections 2 and 3. Descriptions of the general activities and structural solutions selected for this subwatershed have been provided in Section 6.1. Specifics regarding implementation scheduling can be found in Section 6.3.

Table 6-19
Upper Malibu Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Structural BMPs					
Development Standards			X		
Voluntary Downspout Redirect Program			X		
Stream Buffers			X		
Voluntary Horse farm retrofit program			X		
Local Capture Systems			X		
Vegetated treatment systems			X		
Local infiltration systems			X		
Street and parking lot biofiltration retrofits	X			Phase III	Phase IV
Nonstructural BMPs					
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation		X		Phase II	Phase III
Offer Opportunities for Water Conservation, and Water Quality in Existing Educational Programs at Schools		X		Phase II	Phase II
Outreach Fact Sheets on Water Quality for Point-of-Sale Distribution		X		Phase I	Phase II
Work with LVMWD, WBMWD, and District No. 29 to Support/Expand Water Use Survey and Conservation Programs			X		
Horse Stables and Confined Animal Facility Outreach and Education				Phase I	Phase I
Outreach to Pet Owners Linking Waste to Water Quality Impairments			X		

Table 6-19 (Continued)
Upper Malibu Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Place Pet Waste Bag Dispensers at Trailheads			X		
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Water Quality Impairments and BMPs (combine with commercial inventory effort)			X		
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots			X		
Recreational Vehicle (RV) Disposal Site Outreach Program			X		
Coordinate with watershed agencies to identify methods to reach visitors to the watershed			X		
Outreach at Trailheads Regarding Waste Disposal and Restroom Use			X		
During Inspections Emphasize BMPS that Reduce Pollutants of Concern		X		Phase III	Phase III
Incorporate TMDL requirements into CEQA process			X		
Increase Inspections of Post-Development BMPs			X		
Enhance Education for Developers of Projects outside SUSMP/SQUMP requirements			X		
Develop vegetative filter BMP		X		Phase II	Phase II
Emergency Spill Management		X		Phase II	Phase II
Additional Trash Pick Up During High Use Periods in High Use Sites			X		
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections			X		
Provide Septic System (OWTS) Pumpers and Customers with Septic System Guides			X		

Table 6-19 (Continued)
Upper Malibu Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Investigate Incentive Programs for Replacing Improperly Operating Septic Tanks	X			Phase I	Phase II
Septic Inspections Upon Change in Ownership			X		

6.2.17 Upper Medea Creek

6.2.17.1 Subwatershed Description

The Upper Medea Creek Subwatershed was determined to be a high-priority subwatershed as described in Section 3.4.

The Upper Medea Creek subwatershed is 3,948 acres and is comprised of a mixture of open space, dense residential development, and recreational areas within the Cities of Agoura Hills and Oak Park and Ventura County. Upper Medea Creek becomes Lower Medea Creek at the confluence with Lindero Creek. The Upper Medea Creek subwatershed is one of the most developed subwatersheds in MCW with land uses consisting of:

- 38 percent residential
- 1.5 percent commercial
- 0.2 percent major roads
- 60.3 percent open space and vacant lands

Soils are generally poor (Group C or D) with the exception of some Group B soils in the upper reaches (mostly undeveloped areas). Grades range from less than 1% to 49%.

6.2.17.2 Subwatershed Specific Plan

Table 6-20 summarizes the activities specifically designated for this subwatershed. The basis for activities selected is primarily the subwatershed priority and land-uses as described in Sections 2 and 3. Descriptions of the general activities and structural solutions selected for this subwatershed have been provided in Section 6.1. Specifics regarding implementation scheduling can be found in Section 6.3.

Table 6-20
Upper Medea Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Structural BMPs					
Development Standards	X			Phase I	Phase I
Voluntary Downspout Redirect Program	X			Phase II	Phase III

Table 6-20 (Continued)
Upper Medea Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Stream Buffers		X		Phase III	Phase III
Voluntary Horse farm retrofit program	X			Phase I	Phase I
Local Capture Systems		X		Phase II	Phase III
Vegetated treatment systems	X			Phase I	Phase III
Local infiltration systems		X		Phase II	Phase III
Street and parking lot biofiltration retrofits	X			Phase I	Phase III
Medea Creek Park (Regional Infiltration)		X		Phase I	Phase II
Sumac (Regional Infiltration)		X		Phase I	Phase II
Upper Medea Creek Subwatershed (Subsurface Flow)		X		Phase I	Phase II
Oak Canyon Community Park (Subsurface Flow)		X		Phase I	Phase II
Chumash Park (Free Surface Flow)		X		Phase I	Phase II
Nonstructural BMPs					
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation		X		Phase II	Phase III
Offer Opportunities for Water Conservation, and Water Quality in Existing Educational Programs at Schools		X		Phase II	Phase II
Outreach Fact Sheets on Water Quality for Point-of-Sale Distribution	X			Phase I	Phase II

Table 6-20 (Continued)
Upper Medea Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Work with LVMWD, WBMWD, and District No. 29 to Support/Expand Water Use Survey and Conservation Programs		X		Phase I	Phase II
Horse Stables and Confined Animal Facility Outreach and Education	X			Phase I	Phase I
Outreach to Pet Owners Linking Waste to Water Quality Impairments	X			Phase I	Phase II
Place Pet Waste Bag Dispensers at Trailheads		X		Phase I	Phase II
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Water Quality Impairments and BMPs (combine with commercial inventory effort)		X		Phase I	Phase II
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots		X		Phase II	Phase II
Recreational Vehicle (RV) Disposal Site Outreach Program		X		Phase I	Phase II
Coordinate with watershed agencies to identify methods to reach visitors to the watershed		X		Phase I	Phase II
Outreach at Trailheads Regarding Waste Disposal and Restroom Use		X		Phase II	Phase II
Coordinate Meetings Between Agencies and Environmental Organizations for Preparing Outreach Materials	X			Phase I	Phase II
Trash Hauler Outreach		X		Phase II	Phase II
Develop Targeted Outreach for Businesses with Greatest Potential to Contribute Pollutants of Concern		X		Phase I	Phase II
Expand Media Partnership with Caltrans		X		Phase II	Phase II

Table 6-20 (Continued)
Upper Medea Creek BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Develop Minimum Requirements and Program to Enforce Parking Lot Street Sweeping for Commercial Businesses		X		Phase II	Phase II
Modify Inspection Staff Training to Include Enhanced Training on Water Quality Impairments and BMPs		X		Phase II	Phase II
Develop a Reward/Stewardship Program for Businesses			X		
During Inspections Emphasize BMPS that Reduce Pollutants of Concern	X			Phase II	Phase II
Incorporate TMDL requirements into CEQA process		X		Phase II	Phase II
Increase Inspections of Post-Development BMPs		X		Phase II	Phase II
Enhance Education for Developers of Projects outside SUSMP/SQUMP requirements		X		Phase II	Phase II
Develop vegetative filter BMP		X		Phase II	Phase II
Complete LA County BMP Technical Manual and Include Detailed BMP Requirements Related to Water Quality Impairments		X		Phase II	Phase II
Emergency Spill Management	X			Phase I	Phase I
Additional Trash Pick Up During High Use Periods in High Use Sites		X		Phase II	Phase II
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections		X		Phase II	Phase II
Establish Optimal Cleaning Cycles for Drainage Facilities		X		Phase I	Phase II

6.2.18.3 Other Regional BMPs

LACDPW is developing plans to divert urban runoff away from the storm drain system (i.e. streets, canyons, waterways, etc.) and into the sanitation system. The Dry-Weather Discharge and Diversion Project includes candidate inlets for diversion near Chumash Park and near the Kanan Road/Thousand Oaks Boulevard intersection.

6.2.18 Westlake

6.2.18.1 Subwatershed Description

The Westlake Subwatershed was determined to be a high-priority subwatershed as described in Section 3.4.

The Westlake subwatershed is 4,901 acres and is comprised of a mixture of open space, dense residential development, a golf course, and parks within the Cities of Westlake Village and Thousand Oaks. Westlake flows into Malibu Lake via Triunfo Creek. The Westlake subwatershed is among the most developed of MCW subwatersheds with:

- 26 percent residential areas
- 13 percent commercial areas
- 2.3 percent roads
- 58.7 percent open space and vacant lands

Soils are generally poor (Group C or D) and grades range from less than 1% to 53%.

6.2.18.2 Subwatershed Specific Plan

Table 6-21 summarizes the activities specifically designated for this subwatershed. The basis for activities selected is primarily the subwatershed priority and land-uses as described in Sections 2 and 3. Descriptions of the general activities and structural solutions selected for this subwatershed have been provided in Section 6.1. Specifics regarding implementation scheduling can be found in Section 6.3.

Table 6-21
Westlake BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Structural BMPs					
Development Standards	X			Phase I	Phase I
Voluntary Downspout Redirect Program	X			Phase II	Phase III
Stream Buffers		X		Phase III	Phase III
Voluntary Horse farm retrofit program	X			Phase I	Phase I
Local Capture Systems		X		Phase II	Phase III
Vegetated treatment systems	X			Phase I	Phase III
Local infiltration systems		X		Phase II	Phase III
Street and parking lot biofiltration retrofits	X			Phase I	Phase III

Triunfo Creek - Riparian Enhancement		X		Phase I	Phase II
Three Springs Park (SSF)		X		Phase I	Phase II
Nonstructural BMPs					
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation		X		Phase II	Phase III

Table 6-21 (Continued)
Westlake BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Offer Opportunities for Water Conservation, and Water Quality in Existing Educational Programs at Schools		X		Phase II	Phase II
Outreach Fact Sheets on Water Quality for Point-of-Sale Distribution	X			Phase I	Phase II
Work with LVMWD, WBMWD, and District No. 29 to Support/Expand Water Use Survey and Conservation Programs		X		Phase I	Phase II
Horse Stables and Confined Animal Facility Outreach and Education	X			Phase I	Phase I
Outreach to Pet Owners Linking Waste to Water Quality Impairments	X			Phase I	Phase II
Place Pet Waste Bag Dispensers at Trailheads		X		Phase I	Phase II
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Water Quality Impairments and BMPs (combine with commercial inventory effort)		X		Phase I	Phase II
Post Signs at City and County-owned Trailheads for Equestrian Users Emphasizing Clean-up of Manure in Parking Lots		X		Phase II	Phase II
Recreational Vehicle (RV) Disposal Site Outreach Program		X		Phase I	Phase II
Coordinate with watershed agencies to identify methods to reach visitors to the watershed		X		Phase I	Phase II

Table 6-21 (Continued)
Westlake BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Outreach at Trailheads Regarding Waste Disposal and Restroom Use		X		Phase II	Phase II
Coordinate Meetings Between Agencies and Environmental Organizations for Preparing Outreach Materials	X			Phase I	Phase II
Trash Hauler Outreach		X		Phase II	Phase II
Develop Targeted Outreach for Businesses with Greatest Potential to Contribute Pollutants of Concern		X		Phase I	Phase II
Expand Media Partnership with Caltrans		X		Phase II	Phase II
Develop Minimum Requirements and Program to Enforce Parking Lot Street Sweeping for Commercial Businesses		X		Phase II	Phase II
Modify Inspection Staff Training to Include Enhanced Training on Water Quality Impairments and BMPs		X		Phase II	Phase II
Develop a Reward/Stewardship Program for Businesses			X		
During Inspections Emphasize BMPS that Reduce Pollutants of Concern	X			Phase II	Phase II
Incorporate TMDL requirements into CEQA process		X		Phase II	Phase II
Increase Inspections of Post-Development BMPs		X		Phase II	Phase II
Enhance Education for Developers of Projects outside SUSMP/SQUMP requirements		X		Phase II	Phase II
Develop vegetative filter BMP		X		Phase II	Phase II
Complete LA County BMP Technical Manual and Include Detailed BMP Requirements Related to Water Quality Impairments		X		Phase II	Phase II
Emergency Spill Management	X			Phase I	Phase I

Table 6-21 (Continued)
Westlake BMP Selection and Implementation Commitments

Best Management Practices	Commit	Pilot	Consider	Initial Planning	Implementation
Additional Trash Pick Up During High Use Periods in High Use Sites		X		Phase II	Phase II
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections		X		Phase II	Phase II
Establish Optimal Cleaning Cycles for Drainage Facilities		X		Phase I	Phase II
Provide Septic System (OWTS) Pumpers and Customers with Septic System Guides	X			Phase I	Phase I
Investigate Incentive Programs for Replacing Improperly Operating Septic Tanks	X			Phase I	Phase II
Septic Inspections Upon Change in Ownership			X		

6.3 Schedule

6.3.1 Schedule Basis

The approach to developing the schedule, ultimately for inclusion in the TMDLIP, considers the TMDL dates for dry-weather and wet-weather compliance and the required elements and time frames for implementing a program or project. The TMDL milestone dates, proposed work breakdown structure for each BMP type, and the estimated implementation schedule are described below.

6.3.1.1 TMDL Milestone Dates

The TMDL document identifies a number of critical dates for TMDL compliance. The MCW TMDL became effective January 24, 2006. Milestone dates identified by the Regional Board are based upon this effective date. Dates of interest in developing a schedule for BMP implementation are the reopener dates (dates when the Water Board reconsiders certain technical and compliance requirements) and compliance dates. These milestone dates are shown in Table 6-22 and described below.

Reopener dates are of interest during TMDL implementation, as these are times when the Water Board reconsiders some of the technical issues related to TMDL compliance and can change the compliance targets or dates as a result of new information. Based on this information, the Implementation Plan may need to be revisited and modified. The following two reopeners of most interest for implementation of this TMDL are as follows:

- The Santa Monica Bay Beaches Bacteria TMDLs are schedule to be reviewed in July 2007. The review will include a possible revision to the allowable winter dry-weather and wet-weather exceedance days based on bacteria indicator densities in the wave wash, re-evaluation of the reference system for setting allowable exceedance levels; re-evaluation of the reference year; and review of the method for applying the 30-day geometric mean. Information considered in this reopener will affect the MCW TMDL reopener.

- The MCW TMDL will be considered 3 years from the effective date (January 24, 2009) to review similar issues: natural loading sources, reassessment of allowable winter dry-weather and wet-weather exceedance days, reevaluation of the reference year used to calculate exceedance days, and re-evaluation of the method for applying the 30-day geometric mean.

The TMDL also identifies dates for summer dry-weather compliance (3 years from the effective TMDL date), and winter dry- and wet-weather compliance (6 and 10 years, respectively, from the effective TMDL date). These are the time periods when water quality monitoring is expected to show compliance with the TMDL bacteria targets. The TMDL allows for the following extensions:

- An extension of the summer dry-weather compliance date, from 3 years to 6 years from the effective TMDL date. In order to be eligible for this extension, the plan must include a description of all local ordinances necessary to implement the dry-weather plan and assurances that such ordinances have been adopted before the request for an extension is granted.

- An extension of the winter wet-weather compliance from 10 years from the effective date to July 15, 2021. In order to be eligible for this extension, the plan must include a description of the integrated water resources approach to be implemented, identification of potential markets for water re-use, and estimate of the percentage of collected stormwater that can be re-used, identification of new local ordinances that will be required, a description of new infrastructure required, a list of potential adverse environmental impacts that may result from the integrated approach, and a workplan and schedule with significant milestones.

Table 6-22
TMDL Milestone Dates

Milestone	Date without extensions	Extended Date*
TMDL Effective Date	January 24, 2006	
Submit Water Quality Monitoring Plan	May 24, 2006	
Submit Implementation Plan	January 24, 2007	
SMBB/MCW Bacteria Reopener	July 15, 2007	
Report Quantifying Loading from Birds to Malibu Lagoon from CA Dept. of Parks and Recreation	January 24, 2008	
MCW Reopener	January 24, 2009	
Comply with Summer Dry-Weather Exceedance Days	January 24, 2009	January 24, 2012
Comply with Winter Dry-Weather Exceedance Days	January 24, 2012	
Comply with Wet-Weather Exceedance Days	January 24, 2016	July 15, 2021

*Extended dates apply if the integrated planning approach is approved and the dry-weather extension is approved.

6.3.1.2 BMP Work Breakdown Structure

A general work breakdown structure (WBS) applicable to non-structural and structural programs has been developed based on standard project and program items. Average durations for accomplishing each WBS element have been developed. The elements and durations are similar to those used for the Santa Monica Bay Beaches Jurisdictions 1 and 4 TMDL Implementation Plan. These WBS codes and durations are used to provide estimates for each individual BMP schedule. The WBS and durations for non-structural, institutional, distributed, and regional BMPs are shown in Tables 6-23, 6-24, and 6-25 below.

Table 6-23
Non-Structural, Institutional, and Programmatic Distributed BMP Work Breakdown Structure

Item	Assumed Duration*
Program development	219 Days/13 Months
Pilot	437 Days/25 Months
Startup full program	100 Days/6 Months
Program Operation	

*All days are based on a 4 day work week

Table 6-24
Distributed Constructed BMP Work Breakdown Structure

Item	Assumed Duration*
Planning (feasibility study, site acquisition, design, permits, environmental)	752 Days/36 Months
Construction Bid & Award	79 Days/4 Months
Construction	625 Days/29 Months**
Project Acceptance	52 Days/3 Months
Project Operation	

*All days are based on a 4 day work week

Table 6-25
Regional BMP Work Breakdown Structure

Item	Assumed Duration*
Pre-feasibility study	248 Days/15 Months
Feasibility Study	56 Days/3 Months
Project Concept	100 Days/6 Months
Construction Programming	20 Days/1 Month
Project Design	262 Days/18 Months
Construction Bid & Award	84 Days/5 Months
Construction Process	97 Days/6 Months**
Project Acceptance	51 Days/3 Months
Project Operation	

*All days are based on a 4 day work week
**Construction Phase – days are based on a 5 day work week.

6.3.1.3 Conceptual Schedule

Given the TMDL milestone dates identified for the extended compliance time frames for dry- and wet-weather a conceptual schedule and detailed schedule for each BMP has been developed. The schedule addresses dry and wet-weather implementation schedules, the time required for implementing major project/program phases, and a phased implementation of BMPs by subwatershed priority. To acknowledge the role of dry-weather effective BMPs in providing wet-weather pollutant reductions, the dry-weather schedule is referred to as the "dry- and wet-weather BMP schedule." To the extent possible, the durations for major work phases reflect the durations identified for each WBS element, however durations are shortened for implementing structural dry-weather BMPs to meet the dry-weather compliance deadline. Implementation has been broken into four phases, with a different emphasis in each phase:

- Phase I – Planning
- Phase II – Dry and Wet-Weather BMP Implementation
- Phase III – Wet-Weather BMP Implementation
- Phase IV – Refinement and Regional BMP Implementation

A general description of the activities anticipated in each phase is described in Table 6-26 below, and the schedule is provided in Figure 6-1. Additional schedule details can be found in Technical Memorandum 12 attached in Appendix B.

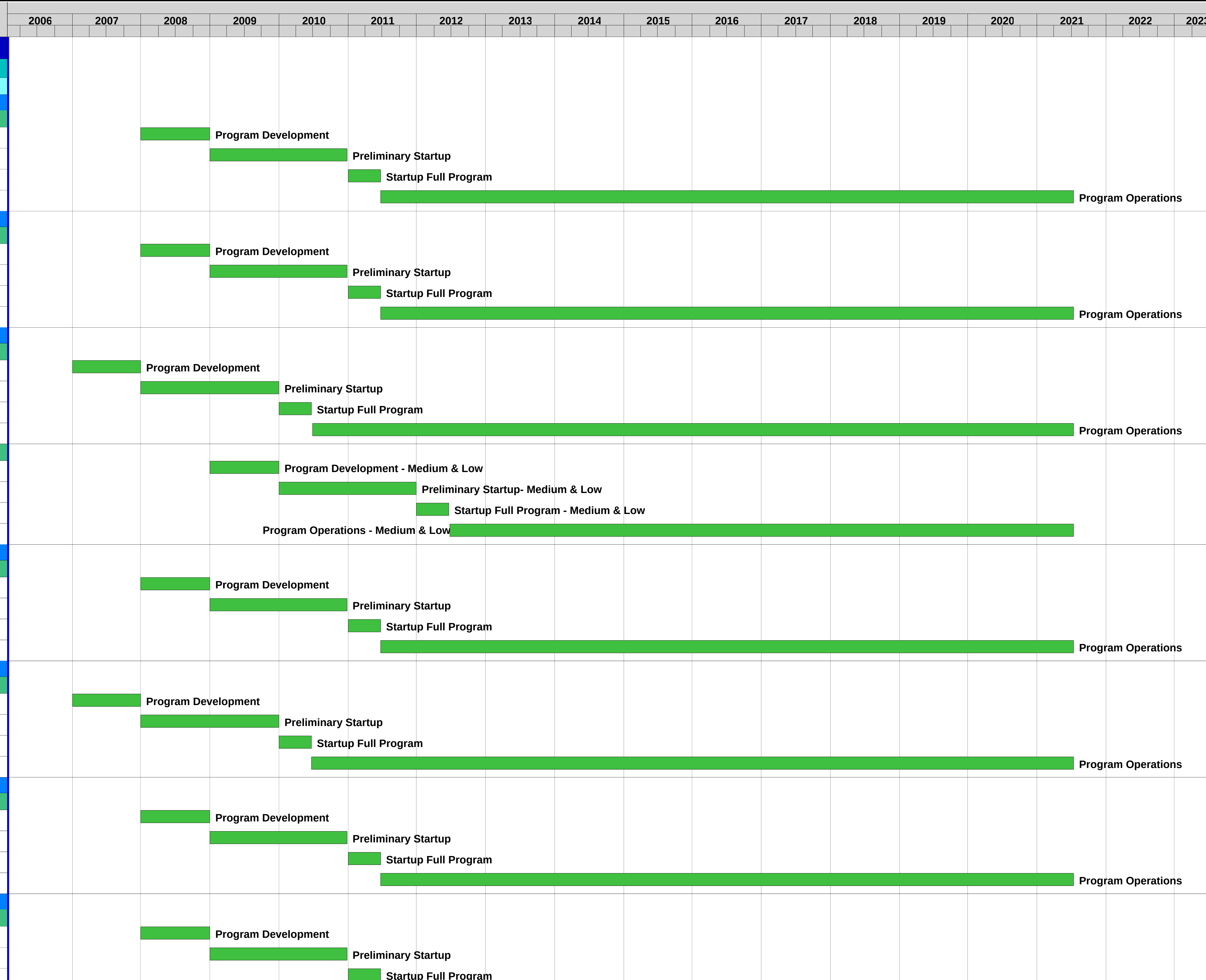
Table 6-26
Description of Activities Proposed for each TMDL Implementation Schedule Phase

Phase	Proposed Activities
Phase I	▪ Develop inter-agency agreements.
	▪ Develop programs and begin implementation or initial pilot phases of all committed dry-weather non-structural activities
	▪ Develop programs for pilot dry- and wet-weather non-structural activities
	▪ Initiate planning and feasibility studies for committed and pilot dry-weather institutional & distributed BMPs
	▪ Initiate planning and feasibility studies for regional pilot projects supportive of dry-weather compliance
	▪ Initiate monitoring and additional studies.
	▪ Consider information from SMBB/MCW Bacteria Reopener and adjust plan as needed.
Phase II	▪ Continue non-structural BMP implementation and adjust based on lessons-learned
	▪ Consider information from MCW Bacteria Reopener and adjust plan as needed.
	▪ Implement non-structural dry- and wet-weather pilot programs
	▪ Begin program development and implementation of pilot phases of wet-weather non-structural committed BMPs
	▪ Begin program development for non-structural wet-weather pilot BMPs
	▪ Design and construct committed and pilot dry-weather institutional and distributed BMPs
	▪ Complete feasibility study and construct subregional pilot projects supportive of dry-weather compliance
	▪ Initiate feasibility studies for distributed and institutional BMPs supportive of wet-weather compliance
	▪ Continue monitoring and additional studies
Phase III	▪ Evaluate compliance efforts and results of non-structural and structural pilot studies. Refocus efforts based on pilot study results and new information;
	▪ Continue to implement successful non-structural and structural pilot programs/projects
	▪ Complete feasibility studies, design and construct committed and pilot wet-weather institutional & distributed BMPs
	▪ Initiate feasibility studies for sub-regional pilot projects supportive of wet-weather
	▪ Continue monitoring and additional studies

Table 6-26 (Continued)
Description of Activities Proposed for each TMDL Implementation Schedule Phase

Phase	Proposed Activities
Phase IV	▪ Refocus and prioritize efforts based on feedback from monitoring and studies, pilot programs, and ongoing BMP projects and programs
	▪ Continue implementation of successful non-structural BMPs
	▪ Continue and expand implementation of successful institutional and distributed BMPs
	▪ Plan, design, and construct pilot wet-weather regional/sub-regional BMPs
	▪ Initiate additional sub-regional BMPs using lessons learned from pilot projects

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
Best Management Practices (BMP)				
Nonstructural BMPs				
Dry & Wet Weather				
Partnerships with HOAs to Increase Water Conserv				
Pilot				
A1117	Program Development	210	01JAN08*	31DEC08
A1118	Preliminary Startup	417	01JAN09	30DEC10
A1119	Startup Full Program	100	03JAN11	23JUN11
A1120	Program Operations	2,100	27JUN11	15JUL21
Offer Water Conservation in Programs at School				
Pilot				
B1120	Program Development	210	01JAN08*	31DEC08
B1124	Preliminary Startup	417	01JAN09	30DEC10
B1125	Startup Full Program	100	03JAN11	23JUN11
B1126	Program Operations	2,100	27JUN11	15JUL21
Outreach Fact Sheets -Point-of-Sale Distribution				
Committed				
C1100	Program Development	209	01JAN07*	31DEC07
C1105	Preliminary Startup	419	01JAN08	31DEC09
C1110	Startup Full Program	100	04JAN10	24JUN10
C1115	Program Operations	2,308	28JUN10	15JUL21
Pilot				
C1120	Program Development - Medium & Low	209	01JAN09*	31DEC09
C1124	Preliminary Startup- Medium & Low	416	04JAN10	29DEC11
C1125	Startup Full Program - Medium & Low	100	02JAN12	21JUN12
C1126	Program Operations - Medium & Low	1,892	25JUN12	15JUL21
Work w/ LVMWD/ WBMWD/WWD 29 Support Water Audit				
Pilot				
A1302	Program Development	210	01JAN08*	31DEC08
A1303	Preliminary Startup	417	01JAN09	30DEC10
A1304	Startup Full Program	100	03JAN11	23JUN11
A1305	Program Operations	2,100	27JUN11	15JUL21
Horse Stables and Animal Facility Outreach				
Committed				
A2105	Program Development	210	01JAN07*	01JAN08
A2110	Preliminary Startup	417	02JAN08	30DEC09
A2115	Startup Full Program	100	31DEC09	23JUN10
A2116	Program Operations	2,309	24JUN10	15JUL21
Develop an Inventory of Areas w/ Confined Animal				
Pilot				
A2046	Program Development	210	01JAN08*	31DEC08
A2047	Preliminary Startup	417	01JAN09	30DEC10
A2048	Startup Full Program	100	03JAN11	23JUN11
A2049	Program Operations	2,100	27JUN11	15JUL21
Recreational Vehicle Disposal Site Outreach Prog				
Pilot				
A2062	Program Development	210	01JAN08*	31DEC08
A2063	Preliminary Startup	417	01JAN09	30DEC10
A2064	Startup Full Program	100	03JAN11	23JUN11



Start Date	24JAN06
Finish Date	15JUL21
Data Date	24JAN06
Run Date	29SEP06 12:58

Early Bar
Progress Bar
Critical Activity

TMD1

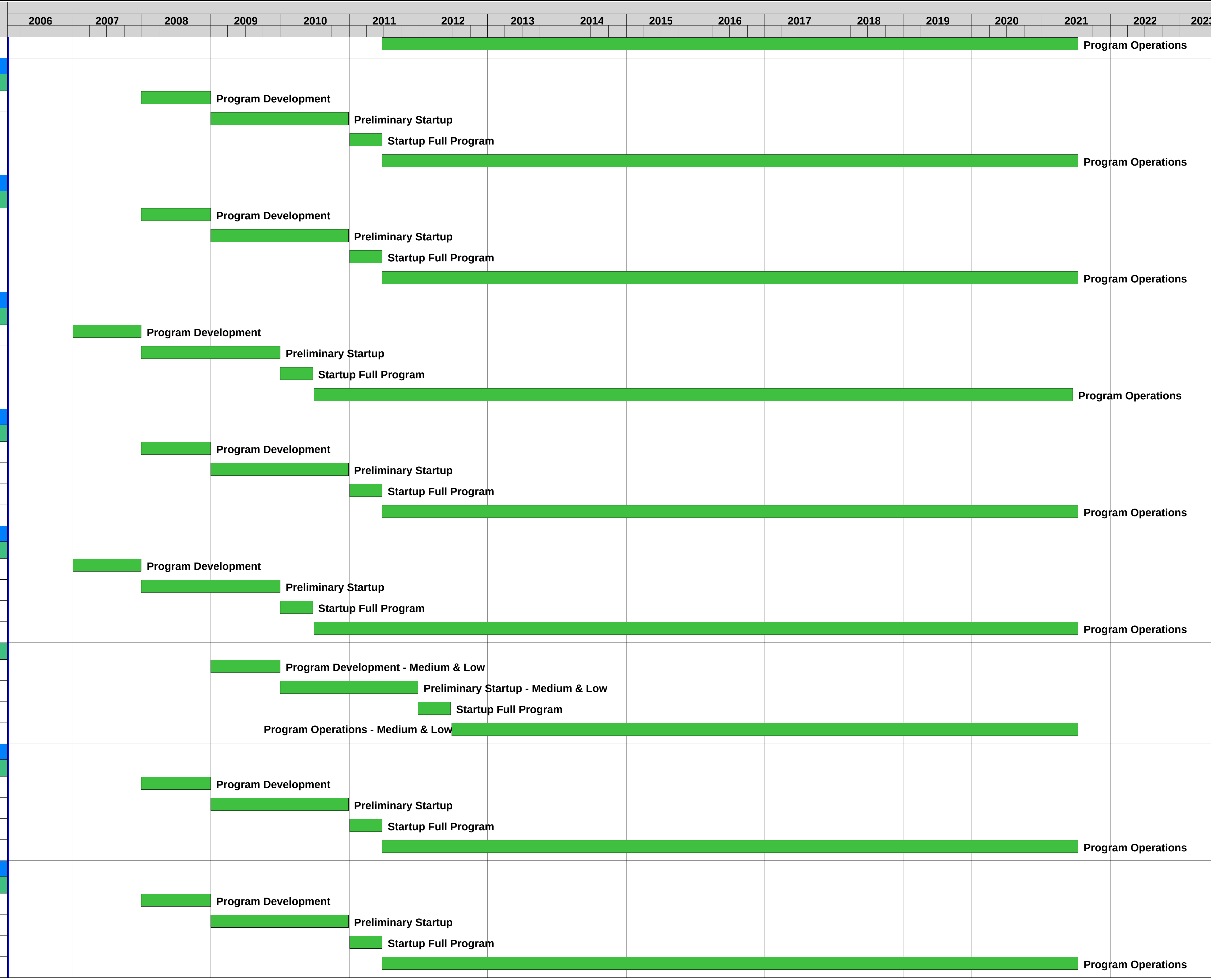
LACDPW

Sheet 1 of 5

TMDL Schedule For Integrated Plan With Dry Weather Extension

Date	Revision	Checked	Approved
29SEP06	FINAL	CAB	

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
A2065	Program Operations	2,100	27JUN11	15JUL21
Coord w/ Watershed Identify Method for Visitors				
Pilot				
A2072	Program Development	210	01JAN08*	31DEC08
A2073	Preliminary Startup	417	01JAN09	30DEC10
A2074	Startup Full Program	100	03JAN11	23JUN11
A2075	Program Operations	2,100	27JUN11	15JUL21
Outreach at Trailheads Regarding Waste Disposal				
Pilot				
C1230	Program Development	210	01JAN08*	31DEC08
C1233	Preliminary Startup	417	01JAN09	30DEC10
C1234	Startup Full Program	100	03JAN11	23JUN11
C1235	Program Operations	2,100	27JUN11	15JUL21
Coord Mtgs Btw Agencies and Enviro Organizations				
Committed				
C1305	Program Development	209	01JAN07*	31DEC07
C1310	Preliminary Startup	419	01JAN08	31DEC09
C1315	Startup Full Program	100	04JAN10	24JUN10
C1325	Program Operations	2,290	28JUN10	15JUN21
Develop Target Outreach for Busines w/ Pollutant				
Pilot				
A2082	Program Development	210	01JAN08*	31DEC08
A2083	Preliminary Startup	417	01JAN09	30DEC10
A2084	Startup Full Program	100	03JAN11	23JUN11
A2085	Program Operations	2,100	27JUN11	15JUL21
Emergency Spill Management				
Committed				
B3100	Program Development	209	01JAN07*	31DEC07
B3105	Preliminary Startup	419	01JAN08	31DEC09
B3110	Startup Full Program	100	04JAN10	24JUN10
B3115	Program Operations	2,308	28JUN10	15JUL21
Pilot				
B3120	Program Development - Medium & Low	208	01JAN09*	30DEC09
B3124	Preliminary Startup - Medium & Low	417	31DEC09	29DEC11
B3125	Startup Full Program	100	02JAN12	21JUN12
B3126	Program Operations - Medium & Low	1,892	25JUN12	15JUL21
Additional Trash Pick Up During High Use Periods				
Pilot				
B3150	Program Development	210	01JAN08*	31DEC08
B3154	Preliminary Startup	417	01JAN09	30DEC10
B3155	Startup Full Program	100	03JAN11	23JUN11
B3156	Program Operations	2,100	27JUN11	15JUL21
Assure that Contractors Provide BMP Maintenance				
Pilot				
C2050	Program Development	210	01JAN08*	31DEC08
C2054	Preliminary Startup	417	01JAN09	30DEC10
C2055	Startup Full Program	100	03JAN11	23JUN11
C2056	Program Operations	2,100	27JUN11	15JUL21



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TMDL Schedule For Integrated Plan With Dry Weather Extension

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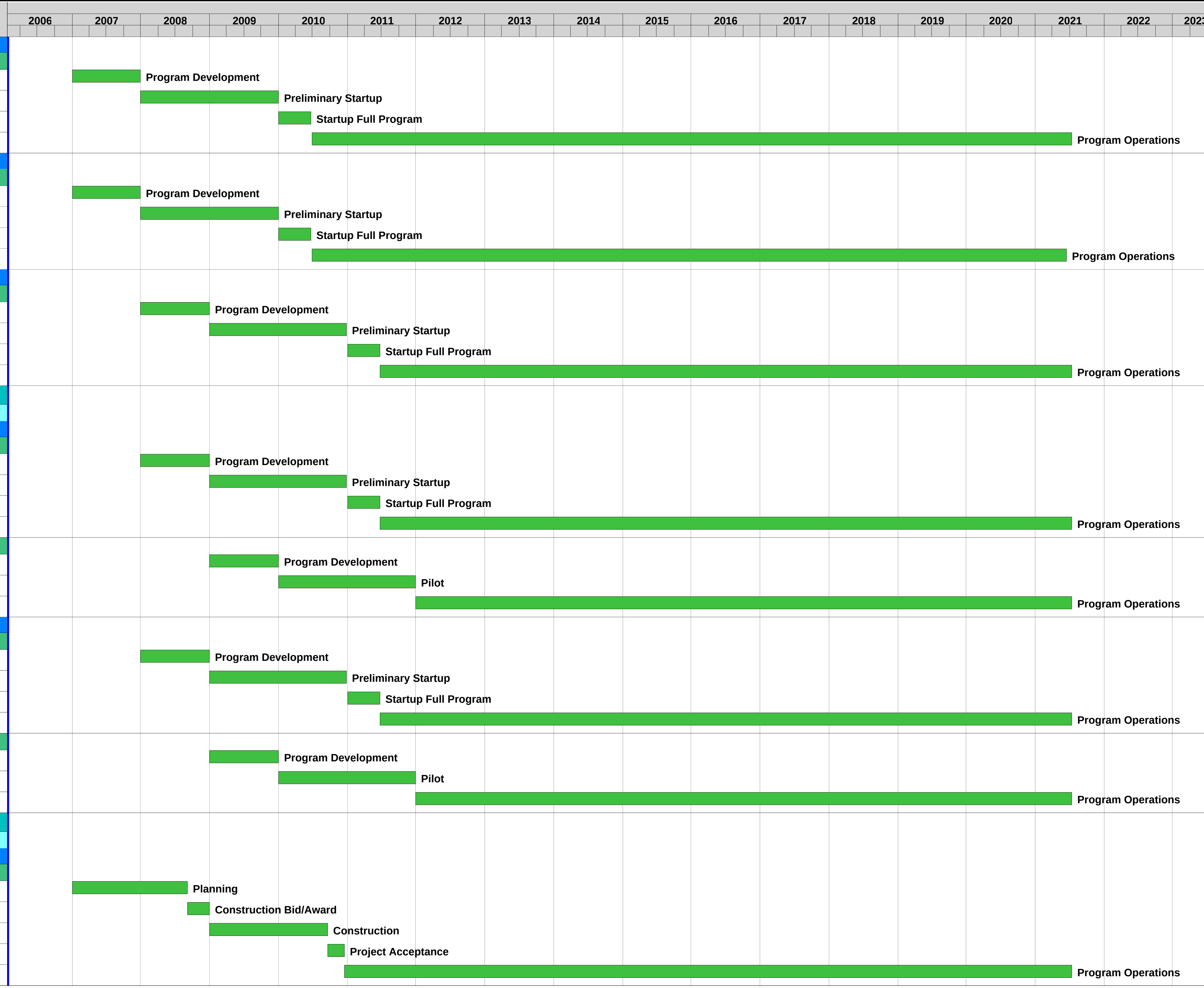
Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
Provide (OWTS) Pumpers and Customers w/ Guides				
Committed				
A3080	Program Development	209	01JAN07*	31DEC07
A3085	Preliminary Startup	419	01JAN08	31DEC09
A3090	Startup Full Program	100	04JAN10	24JUN10
A3095	Program Operations	2,308	28JUN10	15JUL21
Investigate Incentive Prog for Replacing Septic				
Committed				
E3080	Program Development	209	01JAN07*	31DEC07
E3085	Preliminary Startup	419	01JAN08	31DEC09
E3090	Startup Full Program	100	04JAN10	24JUN10
E3095	Program Operations	2,290	28JUN10	15JUN21
Septic Inspections Upon Change in Ownership				
Pilot				
A3720	Program Development	210	01JAN08*	31DEC08
A3724	Preliminary Startup	417	01JAN09	30DEC10
A3725	Startup Full Program	100	03JAN11	23JUN11
A3726	Program Operations	2,100	27JUN11	15JUL21
Institutional				
Dry & Wet Weather				
Development Standards				
Committed				
A3760	Program Development	210	01JAN08*	31DEC08
A3765	Preliminary Startup	417	01JAN09	30DEC10
A3770	Startup Full Program	100	03JAN11	23JUN11
A3775	Program Operations	2,100	27JUN11	15JUL21
Pilot				
A3780	Program Development	209	01JAN09*	31DEC09
A3785	Pilot	416	04JAN10	29DEC11
A3786	Program Operations	1,992	02JAN12	15JUL21
Voluntary Horse Farm Retrofit Program				
Committed				
A4000	Program Development	210	01JAN08*	31DEC08
A4005	Preliminary Startup	417	01JAN09	30DEC10
A4010	Startup Full Program	100	03JAN11	23JUN11
A4015	Program Operations	2,100	27JUN11	15JUL21
Pilot				
A4020	Program Development	209	01JAN09*	31DEC09
A4025	Pilot	416	04JAN10	29DEC11
A4026	Program Operations	1,992	02JAN12	15JUL21
Distributed				
Dry & Wet Weather				
Vegetated Treatment Systems - Construction				
Committed				
B3600	Planning	350	01JAN07*	02SEP08
B3605	Construction Bid/Award	69	03SEP08	31DEC08
B3610	Construction	625	01JAN09	17SEP10
B3615	Project Acceptance	52	20SEP10	16DEC10
B3617	Program Operations	2,208	20DEC10	15JUL21



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TMDL Schedule For Integrated Plan With Dry Weather Extension

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Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
Vegetated Treatment Systems - Program				
Committed				
P3600	Program Development	210	01JAN08*	31DEC08
P3605	Preliminary Startup	417	01JAN09	30DEC10
P3610	Startup Full Program	100	31DEC10	09APR11
P3615	Program Operations	2,144	11APR11	15JUL21
Local Infiltration Systems - Construction				
Pilot				
T3600	Planning	549	01JAN07*	17AUG09
T3605	Construction Bid/Award	79	18AUG09	31DEC09
T3610	Construction	625	01JAN10	17SEP11
T3615	Project Acceptance	52	19SEP11	15DEC11
T3617	Program Operations	2,000	19DEC11	15JUL21
Local Infiltration Systems - Program				
Pilot				
R3600	Program Development	209	01JAN09*	31DEC09
R3605	Preliminary Startup	416	04JAN10	29DEC11
R3610	Startup Full Program	100	30DEC11	07APR12
R3615	Program Operations	1,936	09APR12	15JUL21
St & Parking Lot Biofiltration Retrofit Constuct				
Committed				
B4146	Planning - High & Medium	350	01JAN07*	02SEP08
B4147	Construction Bid/Award - High & Medium	69	03SEP08	31DEC08
B4148	Construction - High & Medium	4,579	01JAN09	15JUL21
B4149	Project Acceptance - High & Medium	52	20SEP10*	16DEC10
B4151	Program Operations - High & Medium	2,208	20DEC10	15JUL21
B4200	Planning - Low	549	01JAN07*	17AUG09
B4205	Construction Bid/Award - Low	79	18AUG09	31DEC09
B4210	Construction - Low	4,214	01JAN10	15JUL21
B4215	Project Acceptance - Low	52	19SEP11*	15DEC11
B4220	Program Operations - Low	2,000	19DEC11	15JUL21
St & Parking Lot Biofiltration Retrofit Program				
Committed				
I4146	Program Development - High & Medium	210	01JAN08*	31DEC08
I4147	Preliminary Startup - High & Medium	417	01JAN09	30DEC10
I4148	Startup Full Program - High & Medium	100	03JAN11	23JUN11
I4149	Program Operations - High & Medium	2,100	27JUN11	15JUL21
I4200	Program Development - Low	209	01JAN09*	31DEC09
I4205	Preliminary Startup - Low	416	04JAN10	29DEC11
I4210	Startup Full Program - Low	100	02JAN12	21JUN12
I4215	Program Operations - Low	1,892	25JUN12	15JUL21
Regional				
Dry & Wet Weather				
Regional Infiltration				
Pilot				
K1010	Pre-Feasibility Study	248	01FEB07*	09APR08
K1030	Feasiblity Study	56	10APR08	16JUL08
K1040	Project Concept	100	17JUL08	07JAN09

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TMDL Schedule For Integrated Plan With Dry Weather Extension

Date	Revision	Checked	Approved
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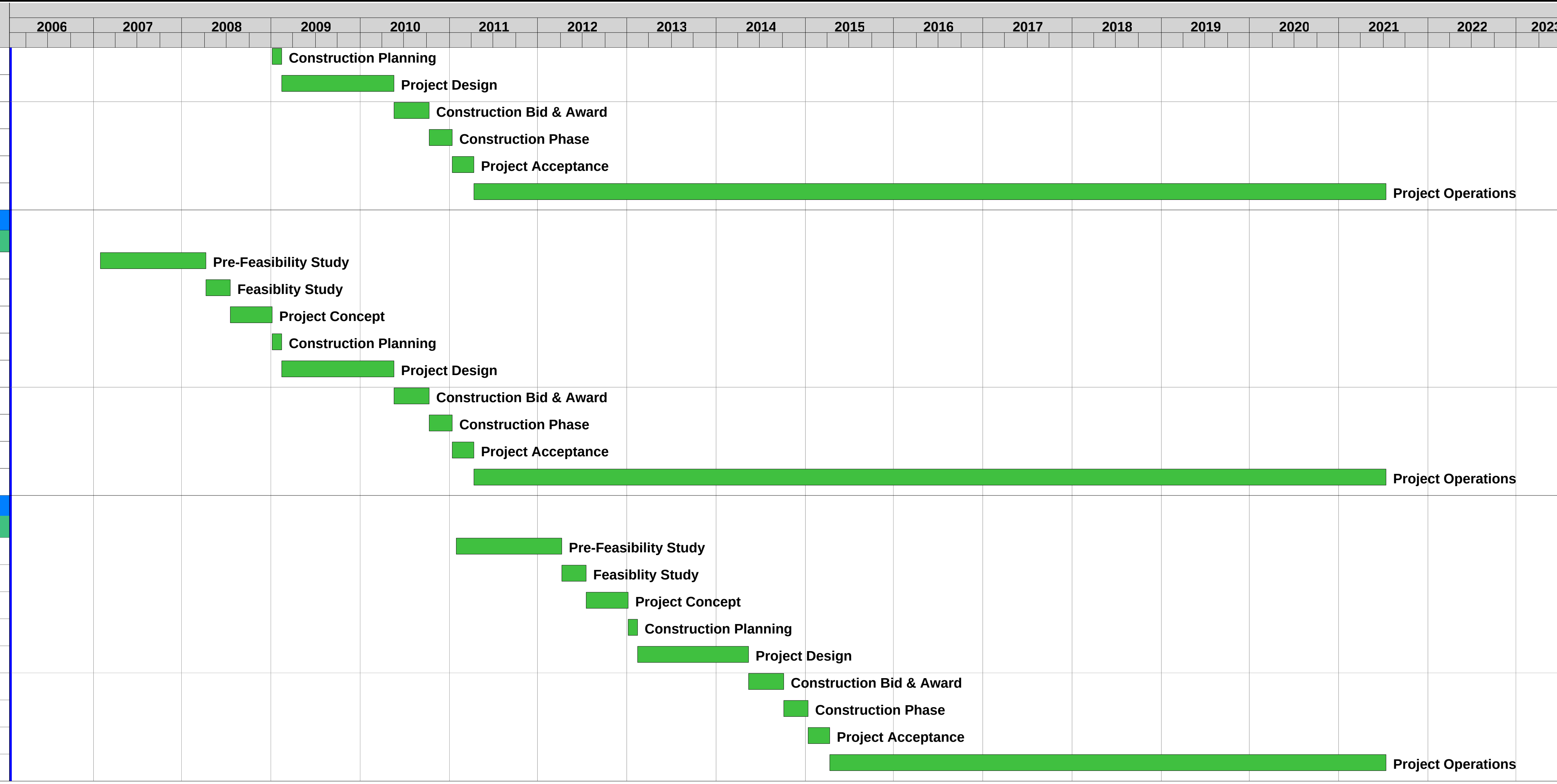
Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
K1050	Construction Planning	20	08JAN09	11FEB09
K1060	Project Design	262	12FEB09	17MAY10
K1070	Construction Bid & Award	84	18MAY10	11OCT10
K1080	Construction Phase	97	12OCT10	16JAN11
K1090	Project Acceptance	51	17JAN11	13APR11
K1100	Project Operations	2,141	14APR11	15JUL21
Regional Natural Treatment System				
Pilot				
J1010	Pre-Feasibility Study	248	01FEB07*	09APR08
J1030	Feasiblity Study	56	10APR08	16JUL08
J1040	Project Concept	100	17JUL08	07JAN09
J1050	Construction Planning	20	08JAN09	11FEB09
J1060	Project Design	262	12FEB09	17MAY10
J1070	Construction Bid & Award	84	18MAY10	11OCT10
J1080	Construction Phase	97	12OCT10	16JAN11
J1090	Project Acceptance	51	17JAN11	13APR11
J1100	Project Operations	2,141	14APR11	15JUL21
Regional Infiltration - Private Land Acquisition				
Pilot				
X1010	Pre-Feasibility Study	248	01FEB11*	09APR12
X1030	Feasiblity Study	56	10APR12	16JUL12
X1040	Project Concept	100	17JUL12	07JAN13
X1050	Construction Planning	20	08JAN13	11FEB13
X1060	Project Design	262	12FEB13	14MAY14
X1070	Construction Bid & Award	84	15MAY14	08OCT14
X1080	Construction Phase	97	09OCT14	13JAN15
X1090	Project Acceptance	51	14JAN15	13APR15
X1100	Project Operations	1,307	14APR15	15JUL21



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TMDL Schedule For Integrated Plan
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Section 7
Dry-Weather Implementation Plan

Summarized in this section is the dry-weather plan including the BMPs to address dry-weather sources, timelines for implementation, and assurance that appropriate ordinances are in place to implement the BMPs. This is provided in response to the following TMDL requirements:

> *…The responsible jurisdictions and responsible agencies shall provide a written report to the Regional Board outlining how each intends to cooperatively achieve compliance with the TMDL. The report shall include implementation methods, an implementation schedule, and proposed milestones. Specifically, the plan must include a comprehensive description of all steps to be taken to meet the 3-year summer dry-weather compliance schedule, including but not limited to a detailed timeline for all category of bacteria sources under their jurisdictions including but not limited to nuisance flows, urban stormwater, on-site wastewater treatment systems, runoff from homeless encampments, horse facilities, and agricultural runoff.*
>
> *…Within three years of the effective date of the TMDL, compliance with the allowable number of summer dry-weather exceedance days and the rolling 30-day geometric mean targets must be achieved. The TMDL further states that in response to a written request from the responsible jurisdiction or responsible agency the Executive Officer of the Regional Board may extend the compliance date for the summer dry-weather allocations from 3 to up to six years from the effective date of this TMDL so that within six years of the effective date of the TMDL, compliance with the allowable number of winter dry-weather exceedance days and the rolling 30-day geometric mean targets must be achieved.*
>
> *…If the responsible jurisdiction or agency is requesting an extension of the summer dry-weather compliance schedule, the plan must include a description of all local ordinances necessary to implement the detailed workplan and assurances that such ordinances have been adopted before the request for an extension is granted.*

7.1 Dry-Weather Plan

Individual subwatershed plans, including BMPs selected and level of implementation are provided in Table 7-1 below. Information on the general planning and implementation schedule for each listed BMP can be found in Section 6 for each individual subwatershed. Detailed scheduling information is provided below in Section 7.4

7.2 Implementation Schedule

The schedule for Dry-Weather BMP implementation is shown in Figure 7-1. The schedule is designed to provide for phased implementation of BMPs in *conformance* with the iterative adaptive approach, so that the optimum combination of effective BMPs will be implemented to meet the dry-weather TMDL requirements.

Table 7-1
Structural and Nonstructural BMP Selections
Dry-Weather TMDLIP

BMP Name	High Priority Subwatersheds										Medium Priority Subwatersheds					Low Priority Subwatersheds		
	Westlake	Lower Lindero Creek	Malibu Lagoon	Upper Lindero Creek	Upper Medea Creek	Lower Las Virgenes Creek	Portrero Canyon Creek	Hidden Valley Creek	Stokes Creek	Lower Medea Creek	Middle Malibu Creek	Lower Malibu Creek	Upper Las Virgenes Creek	Palo Comado Creek	Cheseboro Creek	Upper Malibu Creek	Cold Creek	Triunfo Creek
Nonstructural BMPs																		
Residential General Public																		
General/Residential Education Programs																		
Partnerships with HOAs to Increase Impressions and Promote Water Quality and Water Conservation	Pilot										Pilot					Pilot		
Offer Water Conservation, and Water Quality in Existing Educational Programs at Schools	Pilot										Pilot					Pilot		
Outreach Fact Sheets on Water Quality for Point-of-Sale Distribution	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Pilot					Pilot		
Work with LVMWD, WBMWD, and WWD 29 to Support/Expand Water Use Survey and Conservation Programs	Pilot										Consider	Consider	Consider	Consider		Consider	Consider	Consider
Horse, Confined Animals, Pets																		
Horse Stables and Confined Animal Facility Outreach and Education	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit		Consider	Consider	Consider
Develop an Inventory of Areas with Confined Animals and Educate Property Owners on Water Quality Impairments and BMPs (combine with commercial inventory effort)	Pilot										Consider	Consider	Consider	Consider		Consider	Consider	Consider
Visitors/Recreation																		
Recreational Vehicle (RV) Disposal Site Outreach Program	Pilot										Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider
Coordinate with watershed agencies to identify methods to reach visitors to the watershed	Pilot										Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider
Outreach at Trailheads Regarding Waste Disposal and Restroom Use	Pilot										Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider

Table 7-1
Structural and Nonstructural BMP Selections
Dry-Weather TMDLIP

BMP Name	High Priority Subwatersheds										Medium Priority Subwatersheds					Low Priority Subwatersheds		
	Westlake	Lower Lindero Creek	Malibu Lagoon	Upper Lindero Creek	Upper Medea Creek	Lower Las Virgenes Creek	Portrero Canyon Creek	Hidden Valley Creek	Stokes Creek	Lower Medea Creek	Middle Malibu Creek	Lower Malibu Creek	Upper Las Virgenes Creek	Palo Comado Creek	Cheseboro Creek	Upper Malibu Creek	Cold Creek	Triunfo Creek
Industrial/Commercial																		
Outreach Programs																		
Coordinate Meetings Between Agencies and Environmental Organizations for Preparing Outreach Materials	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit		Commit		Commit	Commit	Commit		Commit	Commit
Develop Targeted Outreach for Businesses with Greatest Potential to Contribute Pollutants of Concern (including Restaurants, Automotive, Equestrian, Industrial, Landscape Maintenance, Mobile Businesses)	Pilot										Consider		Consider	Consider	Consider		Consider	Consider
Work with LVMWD, WBMWD, and WWD 29 to Support/Expand Water Use Survey and Conservation Programs	Pilot										Consider		Consider	Consider	Consider		Consider	Consider
Public Agency Activity Programs																		
Activity Improvement																		
Emergency Spill Management - Review Existing Emergency Operation Plans on a Regular Schedule; assure availability of emergency equipment during peak traffic hours	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Pilot					Pilot		
Additional Trash Pick Up During High Use Periods in High Use Sites	Pilot										Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider
Assure that Contractors Providing Maintenance and Landscape Services Adhere to BMPs Through Contract Language and Inspections	Pilot										Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider

Table 7-1
Structural and Nonstructural BMP Selections
Dry-Weather TMDLIP

BMP Name	High Priority Subwatersheds										Medium Priority Subwatersheds					Low Priority Subwatersheds		
	Westlake	Lower Lindero Creek	Malibu Lagoon	Upper Lindero Creek	Upper Medea Creek	Lower Las Virgenes Creek	Portrero Canyon Creek	Hidden Valley Creek	Stokes Creek	Lower Medea Creek	Middle Malibu Creek	Lower Malibu Creek	Upper Las Virgenes Creek	Palo Comado Creek	Cheseboro Creek	Upper Malibu Creek	Cold Creek	Triunfo Creek
Onsite Wastewater Treatment Systems																		
Residential Programs																		
Provide Septic System (OWTS) Pumpers and Customers with Septic System Guides	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Consider	Consider	Consider	Consider		Consider	Consider	Consider
Sewage Systems Maintenance, Overflow, Spill Prevention, and Septic																		
Investigate Incentive Programs for Replacing Improperly Operating Septic Tanks	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit
Septic Inspections Upon Change in Ownership	Consider	Consider	Consider	Consider	Consider	Pilot	Consider	Consider	Pilot	Pilot	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider
Structural BMPs																		
Institutional																		
Development Standards	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Pilot					Consider	Consider	Consider
Voluntary Horse farm retrofit program	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Pilot	Pilot	Pilot	Pilot	Pilot	Consider	Consider	Consider
Distributed																		
Local Detention	Pilot										Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider
Vegetated treatment systems	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider
Local infiltration systems	Pilot										Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider
Street and parking lot biofiltration retrofits	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit	Commit
Regional																		
Treatment facilities	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider
Regional infiltration	Pilot	Pilot	Pilot	Pilot	Pilot	Pilot	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider
Regional natural treatment system	Pilot	Pilot	Pilot	Pilot	Pilot	Pilot	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider	Consider

7.3 Plan Execution

The initial strategy for reducing exceedances is tied to a combination of reducing bacteria at the source through non-structural and on-site measures, and reducing the amount of runoff that reaches the receiving water, rather than focusing exclusively on treating the flow collected in the storm drain system for bacteria reduction. This strategy emphasizes the beneficial use of runoff and the installation of local solutions where possible to reduce downstream flows. It also focuses on local source control to reduce the level of bacteria and other pollutants discharged into the storm drains. Water quality improvements in the receiving waters will be realized from water quantity (flow) management practices, including local structural BMPs, as well as source control. Utilizing large-scale, end-of-pipe, regional solutions minimizes the risk of noncompliance, it also carries with it larger costs and potential impacts to the local, communities. Therefore, regional solutions are proposed to be limited to pilot scale implementation, and only after appropriate feasibility studies are conducted.

Based on a review of City and County Ordinances and the proposed BMPs, the responsible agencies and jurisdictions all have ordinances in place that cover BMP implementation for protection of water quality, and no new ordinances are presently considered necessary to support implementation of BMPs for the wet- or dry- weather TMDL Implementation Plan. A summary of the ordinance review is provided below. Additional information on ordinances can be found in Technical Memorandum 13.2 attached in Appendix B.

7.3.1 Review of Ordinances

Ordinances pertaining to stormwater, and runoff pollution control, and other applicable ordinances for the counties (Los Angeles County and Ventura County) and cities (Malibu, Calabasas, Westlake Village, Agoura Hills, Hidden Hills, Thousand Oaks) were reviewed. Highlights of the ordinances reviewed are presented below.

Both counties have established codes that ensure compliance with NPDES permits, including discharge to storm drains, and discharge of pollutants. In addition, both counties have redevelopment and new development requirements for urban runoff (Standard Urban Stormwater Mitigation Plan (SUSMP) for Los Angeles County, and Stormwater Quality Urban Impact Mitigation Plan (SQUIMP) for Ventura County) that have been incorporated into stormwater quality ordinances.

Both counties have specific stormwater quality ordinances that prohibit non-stormwater discharges into the storm drain system. While this prohibition implicitly covers all urban dry-weather flows, there are also a number of explicit ordinances that prohibit specific types of flows.

Caltrans is subject to, and participates in, a statewide stormwater permit issued by the State Water Resources Control Board. It is subject to Federal and State statutes that govern stormwater runoff, specifically the Clean Water Act and the NPDES permit process that has evolved from the Act. As a state agency, Caltrans does not have or follow "local ordinances", and therefore is not considered further under this review of local ordinances.

7.3.1.1 Los Angeles County

The purpose of Los Angeles County's stormwater and runoff pollution control ordinances (Title 12, Chapter 12.80 Stormwater and Pollution Runoff Control) is as follows:

> To protect the health and safety of the residents of the county by protecting the beneficial uses, marine habitats, and ecosystems of receiving waters within the county from pollutants carried by stormwater and nonstormwater discharges. The intent of this chapter is to enhance and protect the water quality of the receiving waters of the county and the United States, consistent with the Act.

The ordinance specifically addresses:

- Discharge to the Storm Drain System – Prohibits illicit connections, pollutant discharge (where pollutant is defined as including animal waste, such as discharge from confinement facilities, kennels, pens, stables, etc.) construction runoff, discharge from industrial/commercial activities, and irrigation runoff.
- Runoff Management – Includes good housekeeping provisions, covering items such as animal waste, runoff from landscape irrigation and washing paved areas, BMP requirements for commercial and industrial activities, and construction activities.
- Violations and Enforcement – Included for illicit connections, nuisance discharge, and provisions for inspections.

Other ordinances applicable to bacteria loading include:

- Restrictions of horses on beaches, with exceptions.
- Animal care – Establishes requirements for owners and animal establishments to preserve human health and safety
  - Dog Kennels – Regulations on surfacing and sanitation of dog runs, including proper drainage
  - Prohibition of animal nuisances – Owners are required to pick-up after animals.

Los Angeles County also has a number of other ordinances that are aimed at minimizing water usage, in particular for irrigation. These ordinances are included in building codes, as well as explicitly listed as Water Waste Prevention – Chapter 20.09.020.

- Pending amendments to Los Angeles County ordinances - The County has a set of pending ordinances aimed at the control of pollutants carried by stormwater runoff, some of which could have an impact on dry-weather bacteria contamination. This ordinance change affects Chapter 12.80 of Title 12 – Environmental Protection, and includes:

  - Prohibition of littering and other discharges of pollutants including disposal of sanitary and septic waste or sewage into storm drain system from any property, residence, or recreational vehicle, camper, bus, boat, holding tank, portable toilet, vacuum truck or other mobile source of waste holding tank, container or device.

7.3.1.2 Ventura County

The purpose of Ventura County's Stormwater Quality Management Ordinance (Division 6, Chapter 9 – Stormwater Quality Management) is:

> To prescribe regulations as mandated by the Federal Water Pollution Control Act (referred to as the Clean Water Act), 33 U.S.C. 1251 et seq., as amended, and the California Water Code, to effectively prohibit non-stormwater Discharges into the Storm Drain System, flood control channels, and debris and detention basins, and to reduce the Discharge of Pollutants in Stormwater to the maximum extent practicable. Stormwater runoff is one step in the natural cycle of water. However, human activities, such as construction and the operation and maintenance of an urban infrastructure, may result in undesirable discharges of Pollutants, which may accumulate in local drainage facilities and eventually may be deposited in the waters of the United States. The intent of this Chapter is to ensure the health, safety, and general welfare of citizens, and protect and enhance water quality by controlling the contribution of urban Pollutants to runoff which enters the Storm Drain System and Watercourses of the County of Ventura.

The ordinance specifically addresses:

- Prohibition of non-stormwater discharges – Prohibits discharge of water other than stormwater, with exceptions for irrigation water, landscape irrigation, and lawn watering

- Illicit connections – Prohibits illicit connections

- Reduction of pollutants in stormwater – Discharge of stormwater containing pollutants that have not been reduced to the maximum extent practicable by applications of BMPs is prohibited; pollutants include animal waste.

- Inspections and enforcement

One other ordinance applicable towards reducing bacterial loading in stormwater is:

- Animals – Owner must clean-up after animals in public locations.

Ventura County has no explicit codes covering water waste, such as over irrigation, pavement washing, car washing, etc.

7.3.1.3 City Ordinances

The City ordinances generally follow or flow down from County ordinances reiterating NPDES permit requirements, SUSMP or SQUIMP requirements, non-stormwater discharge prohibition, and other related requirements.

Agoura Hills
Agoura Hills has a Stormwater and Urban Runoff Pollution Control ordinance (Chapter 5), which provides authority for compliance with NPDES permits, specifically the MS4 permit; prohibits non-stormwater discharge to storm drains (Section 4110); encourages good housekeeping activities(BMPs); and requires SUSMP for new and redevelopment projects. In addition, the City has created Guidelines for Landscaping, Planting and Irrigation Plans (Division 8), that requires an irrigation plan and water efficient landscaping for new and redevelopment projects, among other water conservation measures.

Thousand Oaks
Thousand Oaks has a Stormwater Discharges and Stormwater Quality Management ordinance (Chapter 8), that supports regulation and compliance with NPDES permits. In addition the City has Public Nuisance ordinances (Chapter 6) that prohibits, among other things, runoff from excessive irrigation. Chapter 2 of the City's code covers Water, and includes Water Conservation measures, establishing a phased set of conditions for water conservation in the event of drought.

Westlake Village
Westlake Village has a Stormwater Management and Discharge Control ordinance (Chapter 5.5) that provides authority for compliance with NPDES permit requirements, and is aimed at reducing pollutants in stormwater discharge to the maximum extent practicable. This includes prohibition of discharges to storm drain such as from municipal and commercial swimming pool filter backwash and discharges from mobile cleaning operations. Explicitly exempted activities include non-industrial and noncommercial activities that incidentally generate runoff, such as washing down pavement and sidewalks and noncommercial washing of vehicles.

Calabasas

Calabasas has a Stormwater and Urban Runoff Pollution Controls ordinance (Chapter 8.28) that provides authority for compliance with NPDES permits and requirement of SUSMP standards within the City. Together with other general provisions of stormwater runoff control, such as illicit connections, the City has included an ordinance requiring appropriate BMPs be implemented to control pollutant discharge, including animal waste. In addition the City requires all parking lots greater than 25 spaces to be swept during the wet season. The City has explicitly incorporated Leadership in Energy and Environmental Design (LEED) standards into ordinances, in particular those covering landscape. In addition, the City has incorporated specific urban runoff mitigation measures within its Land Use and Development (Title 17) ordinances.

Hidden Hills

The City of Hidden Hills has a Stormwater and Urban Pollution control (Title 3 Chapter 11) that provides authority for compliance with NPDES permits. The City is somewhat unique in that it consists almost entirely of large lot single family residential units, with very limited commercial zoning, and no industrial zoning. The stormwater ordinance follows standard language, encouraging good housekeeping measures, and BMP implementation for pollutant control. In addition the City has water waste provisions in its Water Use ordinance (Title 3, Chapter 5) that limit the amount of time water runoff from landscape irrigation is allowed (30 minutes in a 24 hour period), and prohibits draining swimming pools to the storm drain.

Malibu

The City of Malibu has a Stormwater Management and Discharge Control ordinance (Chapter 13.04) that provides authority for compliance with NPDES permits. This ordinance prohibits non-stormwater discharges; discharge of non-stormwater "wash waters", for example from gas stations and other automotive facilities; untreated wastewater from mobile auto washing, steam cleaning, and mobile carpet cleaning operations; discharge from chlorinated/brominated swimming pools and filter backwash. The ordinance also includes provisions for good housekeeping, such as minimizing runoff of water to the maximum extent practicable. The City requires Standard Urban Stormwater Mitigation Plan (SUSMP) for new and redevelopment projects. The City also has a Water Conservation ordinance (Chapter 9.20) that restricts irrigation practices and prohibits incidental washdown of pavement and sidewalks.

Section 8
Quantitative Analysis

8.1 Estimation of Targeted Reductions

The MCW Bacteria TMDL identified a compliance monitoring plan for dry- and wet-weather based on targets identified in the TMDL and an evaluation of naturally occurring background sources of bacteria in runoff. These targets were based on body contact recreational use water quality standards set in Water Quality Control Plan, Los Angeles Region (Basin Plan) which includes water quality objectives (WQOs) for E. coli and fecal coliform bacteria in inland surface waterbodies. The WQOs for fecal coliform include:

- Single sample limit of 400 MPN/100ml fecal coliform not to be exceeded in more than 10 percent of samples during a 30-day period

- Geometric mean limit of 200 MPN/100ml for any 30-day period with greater than 5 samples collected.

The MCW Integrated TMDLIP formulates an integrated plan to meet these conditions during dry and wet-weather. A wet-weather day is defined as one with 0.1 inches of rain or greater and the three days following the rain event. A sample is considered a wet-weather sample if it is taken on a wet-weather day. The number of allowable exceedances of water quality objectives varies depending on whether the exceedance occurs during winter dry-weather, summer dry-weather, or wet-weather. Winter is defined as November 1st through March 31st of each year and summer is defined as April 1st through October 31st.

Except where otherwise required to prevent further degradation in the watershed, for each sampling year, during wet-weather, 17 exceedances are allowed if samples are collected daily or 3 exceedances if samples are collected weekly. During winter month dry-weather, for each sampling year, 3 exceedances are allowed if samples are collected daily and 1 exceedance is allowed if samples are collected weekly. The sampling year is defined as November 1 through October 31. No exceedances are allowable during summer dry-weather no matter how frequently samples are collected.

8.1.1 Targeted Reduction Estimation Analysis

Available bacterial data collected throughout the Malibu Creek Watershed was analyzed to determine the degree of TMDL exceedances that exist under the various dry- and wet-weather conditions defined in the TMDL. Data was provided by several organizations and a thorough analysis was conducted to estimate the exceedance conditions for the periods of available data. This data was then used, when sufficient data existed, to determine targeted fecal coliform reductions for 17 subwatersheds within the Malibu Creek subwatershed. For the purposes of this analysis, data was considered sufficient when there were five or more samples for the weather condition being analyzed. The focus of the analysis was on inland subwatersheds and therefore Malibu Lagoon subwatershed data was not analyzed.

8.1.1.1 Description of Available Data

Available data was collected from various agencies and organizations that have conducted sampling in the Malibu Creek Watershed, including:

- Heal the Bay Stream Team (Stream Team);
- Los Angeles County Department of Public Works (LACoDPW);
- Las Virgenes Municipal Water District (LVMWD);
- City of Calabasas Malibu Creek Watershed Monitoring Program (MCWMP);
- Ventura County Watershed Protection District (VCWPD); and
- Southern California Coastal Water Research Project (SCCWRP), a Joint Powers Authority, including:
    - Orange County Sanitation District;
    - City of Los Angeles Bureau of Sanitation;
    - County of Los Angeles, Department of Public Works;
    - County of Orange;
    - County Sanitation Districts of Los Angeles County;
    - California State Water Resources Control Board;
    - California Regional Water Quality Control Board, Los Angeles Region;
    - California Regional Water Quality Control Board, San Diego Region;
    - California Regional Water Quality Control Board, Santa Ana Region;
    - City of San Diego Metro Wastewater Department;
    - U.S. Environmental Protection Agency, Region IX; and
    - Ventura County Watershed Protection District.

A total of 45 sites in 17 subwatersheds were included in the analysis, with varying data availability per site as summarized in the table and map included in Appendix D-1.

Appendix D-2, summarizes the sites that were sampled per subwatershed, as well as the data availability within each subwatershed. "Data Start" and "Data End" refer to the earliest and latest sampling dates of available data for either a sampling location or subwatershed. Stream Team data was generally available on a monthly basis, with the dates of data availability differing per site. LACoDPW data was available from the Malibu Creek Watershed Water Quality Monitoring Project (MS4 sites) from January through August 2005, and for site S02 from late 2000 to early 2004, with a variable sampling frequency. LVMWD sampling data was available for roughly every other week from the year 2000 through 2005. MCWMP data was collected by the City of Calabasas from spring 2005 through fall 2006 with varying sampling frequency. Only 1-2 data values were available for the two SCCWRP sampling locations. VCWPD data was available from late 1996 through mid 1998.

Raw LVMWD data featured several negative values: -2, -20, and -200, as well as several 0 values. A discussion with LVMWD provided information required to evaluate this data. Negative symbols are placed in front of numbers in the database to indicate "less than" values. LVMWD does not report zero values and therefore that data was eliminated from the dataset. Several low fecal coliform values (2, 4, etc.) were also present in the data and it was indicated that the analysis that produced that data did not include dilutions of the sample.

SCCWRP, Stream Team, and some LACoDPW data was not reported for fecal coliform but instead was reported only for E. coli. A conversion, developed and documented in the December 13, 2004 California Regional Water Quality Control Board, Los Angeles Region "Total Maximum Daily Loads for Bacteria Malibu Creek Watershed" report, was used to obtain approximate fecal coliform concentrations for the purpose of this analysis. This report should be consulted for further information on the development of the fecal coliform/E. coli relationship. The equation utilized is as follows:

$$[FecalColiform] = \frac{[E.coli] + 10.6}{1.00409}$$

Rainfall data from two rain gauges was utilized to determine wet and dry-weather days. The Monte Nido rain gauge provided data from October 1998 through December 14, 2005. Rainfall data outside that range was obtained from the Topanga rain gauge. In addition, data was unavailable from the Monte Nido gauge for February 14-16, 2005. Topanga rain gauge data was used as a surrogate during that time period.

8.1.1.2 Analysis Methodologies

Data was sorted per subwatershed for analysis purposes. The appropriate TMDL weather condition was determined for each value in the dataset, and data was sorted into wet-weather, summer dry-weather, and winter dry-weather. For each subwatershed and weather condition, the maximum fecal coliform concentration and total number of samples exceeding Basin Plan water quality objectives were determined. The TMDL does not include any provision for exceedance allowances during summer dry-weather, therefore reductions necessary for meeting the single sample water quality objectives were determined for each subwatershed, based on the maximum fecal coliform concentration.

For the winter dry-weather and wet-weather conditions, the TMDL allows a number of exceedances of water quality objectives for a sampling year, as listed in Table 8-1. If sampling were to occur daily, 17 days of wet-weather exceedances and 3 days of winter dry-weather exceedances would be removed from the record prior to assessing compliance for a sampling year, assuming antidegradation requirements did not provide a lower number of allowable exceedances. The theoretical percent reduction required to meet the single sample fecal coliform water quality objective would be calculated from the highest sample concentration remaining in the dataset after the maximum number of allowable exceedances are removed from the analysis. However, the data available for this analysis had variable frequencies which did not match the daily or weekly sampling frequencies specified in the TMDL.

In lieu of a number of days of exceedance allowance per sampling year, an allowable percent of exceedance for the dataset was determined for each weather condition. The allowable percent of exceedance was based on the number of allowable exceedances given daily sampling per sampling year divided by the number of days on which the weather condition might be expected to occur during each sampling year. In order to provide a conservative number of allowable exceedances, the number of days that wet-weather was expected to occur during the sampling year was based on a wet year, while the number of winter dry-weather days was based on the number of days in the winter season minus the number of wet days in an average year, as summarized in Table 8-1. This approach to evaluating the available dataset required several key assumptions to correlate the existing record to the monitoring that would be necessary to assess compliance with the TMDL:

- The limited available data for the whole period is representative of conditions that would be observed if samples were collected daily for an average year
- Wet years have 75 days that are categorized as “wet-weather” based on a recent wet-weather year (2004-2005)
- Average years have 92 days that are categorized as “winter dry-weather”
- In the average year, wet-weather only occurs during the winter season.

Table 8-1
Exceedance Allowances per Dataset

Weather Condition	Allowable Exceedances per TMDL per Sampling Year	Estimated Days of Weather Condition per Sampling Year	Max. Percent of Samples Removable from Dataset	Min. Samples Required to Remove One Exceedance
Wet-weather	17	75	23%	5
Winter Dry-weather	3	92	3%	31
Summer Dry-weather	0	214	---	---

Sampling data was eliminated from the analysis regardless of the sampling year in which the data was collected, therefore it is possible that the data removed was concentrated in a single sample year or spread across several sample years depending on the data availability and concentrations of the samples. Likewise, data was eliminated from the analysis regardless of the sampling location within the subwatershed. The number of samples that were removed from the analysis was the smaller of either the number of exceedances allowable or the number of exceedances within the dataset, as shown in Appendix D-3.

Due to the frequency of available data, the geometric mean concentrations and associated exceedances could not be determined. Geometric mean calculations require a minimum of five samples in the 30-day period for which the value is calculated for statistical purposes.

The following section describes challenges that were faced in estimating reductions that would be necessary to meet TMDL targets during wet-weather and winter dry-weather.

8.1.1.3 Uncertainties in Reduction Estimation Analysis

This analysis of available water quality data for sites within the MCW was undertaken to quantitatively assess the degree of bacteria reduction associated with the targets set forth in the Bacteria TMDL for each subwatershed. These targets were developed based on water quality objectives in the Basin Plan and an evaluation of naturally occurring exceedances of water quality objectives.

Sampling Frequencies

One of the most significant challenges faced in this compliance analysis is related to the frequency of available monitoring data. The TMDL targets provide an allowable number of exceedances during wet-weather or during winter season dry-weather runoff conditions. The number of allowable exceedances is directly related to the frequency of fecal coliform sample collection. Table 8-1 presents allowances for water quality objective exceedances when data is collected daily or weekly. As described in Section 8.2, available data for most of the inland surface waterbodies of the MCW has been collected on a less frequent schedule, such as bi-monthly, monthly or seasonally. Consequently, accounting for allowable exceedances using available data to meet the TMDL requirement cannot be done directly.

Two approaches to relating less frequent sampling to the weekly TMDL targets were considered, and both were determined to have major shortcomings. These approaches start from two very different assumptions:

- The available sample set does include the maximum concentrations that would have been captured if sampling had occurred on a weekly basis

- The available sample set does not include the maximum concentrations that would have been captured if sampling had occurred on a weekly basis

If it is assumed that the smaller set of data does include the maximum concentrations, then the highest three wet-weather values and highest one winter dry-weather value would be removed and reductions would be estimated based on the remaining dataset. On the other hand, if it is assumed that none of the samples represent the highest concentrations during wet-weather or winter dry-weather, then the reduction would be a function of the maximum of the sample set.

Neither of these approaches to evaluating the available data is technically defensible. For this reason, the alternative approach which will be described in Section 8.2 was undertaken. Uncertainties related to this approach stem from the assumptions that are made to relate a small, highly intermittent dataset to the results that will be generated by continuous weekly sampling as part of a focused TMDL compliance monitoring plan.

Hydrologic Condition
Uncertainty in this analysis also stems from the large size of the MCW and the varying spatial distribution of rainfall monitoring stations. The Monte Nido rainfall station is located within Malibu Canyon and may not be as representative for other parts of the watershed such as the Hidden Valley Creek subwatershed. This was determined to be acceptable because the study only required a distinction involving the presence or absence of rainfall above 0.1 inches.

Additionally, the period of record for fecal coliform data varies significantly between the water quality sampling locations. Some sites have been monitored from 1996 through present, while others have only come online in the spring of 2005. Temporal variation in hydrologic conditions for different years can significantly impact bacteria concentrations. For instance, the 2004-2005 year, included in many of the MCW bacteria data sets was one of the wettest years on record. Bacteria concentrations could be significantly different in a normal or dry year. Estimated reductions based on a limited number of sampling years may need to be re-evaluated as more data is collected.

8.1.2 Estimated TMDL Bacteria Target Reductions

8.1.2.1 Wet-weather

Wet-weather data was available for all inland subwatersheds except Palo Comado. Four subwatersheds, Cheseboro Creek, Hidden Valley Creek, Potrero Canyon Creek, and Upper Las Virgenes Creek, did not have sufficient amounts of data to determine and remove allowable exceedances. For all other subwatersheds, up to approximately one in five samples were removed from the analysis in order to determine the maximum non-allowable exceedance and percent reduction required to meet the TMDL single sample fecal coliform objective, as presented in tabular form in Appendix D-4. Appendix D-4 also contains graphs of the wet-weather samples analyzed for each subwatershed. Lower Las Virgenes Creek, Lower Lindero Creek, and Upper Medea Creek require the largest percent reductions, with greater than 90% reductions required to meet the wet-weather TMDL requirement.

8.1.2.2 Winter Dry-weather

Winter dry-weather data was available for all inland subwatersheds except Potrero Canyon Creek. For four subwatersheds that had sufficient data to remove allowable exceedances (Cold Creek, Lower Las Virgenes Creek, Lower Malibu Creek, and Middle Malibu Creek), up to approximately one in thirty-one samples were removed from the analysis in order to determine the maximum non-allowable exceedance and percent reduction required to meet the TMDL single sample fecal coliform objective. For subwatersheds that did not have at least thirty-one samples, but sufficient data to perform the analysis (five or more samples), the highest sample value was utilized to determine the required percent reduction to meet the fecal coliform objective. The maximum exceedance values and percent reductions are given in tabular form in Appendix D-5. Appendix D-5 also contains graphs of the winter dry-weather samples analyzed for each subwatershed. Lower Las Virgenes Creek, Upper Lindero Creek, and Upper Medea Creek require the largest percent reductions, with greater than 90% reductions required to meet the winter dry-weather TMDL requirement.

8.1.2.3 Summer Dry-weather

Summer dry-weather data was available for all 17 inland subwatersheds in the analysis, as summarized in tabular form in Appendix D-6. Appendix D-6 also contains graphs of the summer dry-weather samples analyzed for each subwatershed. As there are no allowable exceedances for summer dry-weather, the percent reduction required to meet the summer dry-weather single sample TMDL objective for fecal coliform was based on the maximum sample concentration for each subwatershed. Cheseboro Creek, Hidden Valley Creek, and Palo Comado Creek did not have exceedances in the sampling data. Nine subwatersheds will require percent reductions greater than 90% to meet the TMDL requirement: Lower Las Virgenes

Creek, Lower Lindero Creek, Lower Malibu Creek, Stokes Creek, Upper Las Virgenes Creek, Upper Lindero Creek, Upper Malibu Creek, Upper Medea Creek, and Westlake.

8.1.3 Sensitivity Analysis

An additional review of the currently available wet-weather, winter dry-weather, and summer dry-weather data was performed to evaluate the sensitivity of the reduction analysis to the high range of variability in the data. This sensitivity analysis was undertaken to provide a better portrayal of the nature of exceedances than only considering the targeted bacteria concentration (maximum concentration after removal of allowable exceedances) currently stated in the TMDL.

A statistical analysis of bacteria data was conducted to calculate the average (arithmetic mean) and 85th percentile concentrations of all exceedance values for each of the three hydrologic conditions, in each of the 18 MCW subwatersheds (Appendix D-7). The average and 85th percentile values for wet-weather and winter dry-weather were determined after allowable exceedances (per the TMDL and as previously described in this Section) were removed from the data set. For each hydrologic condition, plots were created to show the cumulative frequency distribution of exceedance data for the combined low, medium, and high priority subwatersheds (Appendix D-7). The cumulative frequency distribution of exceedance data for individual subwatersheds is also presented for each of the three evaluated hydrologic conditions (Appendix D-8).

The cumulative frequency distributions of exceedance data exhibit a similar trend for all subwatersheds and weather conditions, where a sufficient exceedance data set was available to generate a curve. The trend shows that most exceedances are relatively low, less than one order of magnitude above the 400 MPN/100ml water quality objective. A few exceedances in each subwatershed, representing only 10 to 20% of the data (80th to 90th percentiles), have concentrations that are two or more orders of magnitude above the water quality objective. These very high concentrations skew the mean to be greater than the 85th percentile for some subwatersheds, when evaluating dry-weather exceedance data, as shown in the sensitivity analysis results tables (Appendix D-7).

8.2 Expected Water Quality (Bacteria Benefits)

The following section describes the analysis methodology and results of a quantitative analysis performed to determine the bacteria reduction that could be expected if all (ultimate condition) non-structural, distributed structural, and regional best management practices (BMPs) in the TMDLIP were implemented.

8.2.1 Analysis Methodology

8.2.1.1 Institutional and Distributed Structural BMPs

BMP Descriptions

Distributed BMPs employ a variety of natural and constructed features to reduce the rate of runoff, filter pollutants, and facilitate the infiltration of water into the ground at the lot or parcel scale up to about five acres. Institutional structural BMPs are distributed BMPs that are developed and implemented primarily through local ordinances and programs. By reducing pollutant loads and potentially volumes through evapotranspiration and groundwater recharge, these BMPs help improve the quality of receiving surface waters, stabilize the flow rates of nearby streams, and reduce the hydraulic and pollutant loading burden on any downstream regional treatment facilities. The TMDLIP identifies a suite of institutional and distributed structural BMPs that are proposed to be implemented over the next 15 years. Table 8-2 provides an overview of the types of institutional and distributed BMPs proposed in the TMDLIP.

Table 8-2
Institutional and Distributed Structural BMPs Proposed in the Malibu Creek Watershed Bacteria TMDL Implementation Plan

BMP Type / Category	Potential Mechanisms	Description
Local Capture and Reuse Systems	Volume Reduction, Flow Control	Cisterns, rain barrels or other holding tanks for peak flow reduction and on-site reuse
Vegetated Treatment Systems	WQ, Volume Reduction, Flow Control	Vegetated swales and bioretention areas to filter and infiltrate runoff; support natural treatment mechanisms
Local Infiltration Systems	Volume Reduction, Flow Control	Site-scale infiltration basins or pervious wearing surfaces such as grass pavers or pervious asphalt
Street and Parking Lot Biofiltration Retrofits	WQ, Volume Reduction, Flow Control	Small scale vegetated facilities to improve WQ, and promote infiltration
Horse Farm Retrofit Program	Source Control	Installation of covered manure storage BMPs to reduce pollutant runoff loads from horse ranches
Stream Buffers	Volume Reduction, WQ	Provides natural vegetation corridors to help protect stream banks and reduce pollutant loads from urban runoff
Voluntary Downspout Disconnection Program	Volume Reduction, Flow Control	Program to decrease system connectivity and increase on-site infiltration; can be incentive based

The BMPs in Table 8-2 were included in a watershed model to estimate bacteria load reductions that could be achieved by the TMDLIP. This set of BMPs was selected to provide a range of BMPs that could be utilized to reduce bacteria from different sources and land cover types. Bacteria reduction that could be expected if 75 acres of horse ranches implemented the horse farm BMP retrofits was included in the model.

For local capture and reuse type BMPs, several different types of systems are included in the TMDLIP and therefore incorporated into the bacteria reduction model:

- Single family residential - Incentives for installation of 1,890 rain barrels (75-gallon) for capture and reuse of rooftop runoff. The bacteria reduction benefit of these systems is converted to the load from an equivalent acreage of treated land by assuming that each rain barrel captures an average of 2,500 ft^2 of rooftop runoff.

- Multi family residential – Incentives for construction of 50 concrete cisterns for capture and reuse of on-site runoff. The bacteria reduction benefit of these systems is converted to the load from an equivalent acreage of treated land by assuming that each concrete cistern captures an average of 1 acre of on-site runoff.

- Public lands – Construction of underground runoff capture and reuse systems at 15 locations such as government offices, schools, or developed parks. The bacteria reduction benefit of these systems is converted to the load from an equivalent acreage of treated land by assuming that each underground storage system captures an average of 10 acres of on-site runoff.

The vegetated treatment systems, local infiltration, street and parking lot biofiltration retrofits, stream buffers, and downspout disconnection BMPs in Table 8-2 are proposed to be implemented on a fraction of all developed land uses, considering an implementation factor of 5% or approximately 220 acres of developed drainage area for each BMP type. When added together, these institutional and distributed BMPs would capture stormwater runoff from 25% of all developed land uses.

Allocation of Institutional and Distributed Structural BMPs to Subwatersheds
Institutional and distributed BMPs were proposed in the TMDLIP to be implemented throughout the MCW. To estimate bacteria reduction for each subwatershed, the total treatment area for each BMP type was partitioned among the 18 subwatersheds. The catchment prioritization index (CPI), which was assigned to each subwatershed in the TMDLIP as an indication of the likelihood of a subwatershed to be a source of pollution relative to other subwatersheds in the region, was used to weight placement of BMPs to the subwatersheds with highest water quality areas of concern (AOC). Subwatersheds with the highest CPI received the largest area treated by distributed structural BMPs. Please see Technical Memorandum Task 3-1 attached in Appendix B for additional information on the CPI determinations.

The institutional and distributed structural BMP bacteria reduction model was designed so that the spatial distribution of distributed BMPs could be modified by the user to allocate BMPs in areas where they would be most effective, when considering the varying reduction targets for each subwatershed, and combined benefits of non-structural and regional structural BMPs. For example, if a regional structural BMP is included in the TMDLIP that would provide additional bacteria reduction for a subwatershed with a high CPI, then some of the drainage area initially allocated to implement distributed BMPs in this subwatershed can be eliminated and more of the distributed BMPs allocated to a subwatershed that does not have a regional BMP downstream.

The spatial distribution of distributed structural BMPs following adjustment from the initial estimation is shown in Table 8-3. Allocations of distributed BMPs between subwatersheds was not necessarily formally optimized, but rather involved an approximation effort that tested alternative treatment scenarios while considering knowledge of the watershed, reduction targets, and the bacteria reduction benefits related to different BMP types. The siting of distributed BMPs suggested in Table 8-3 should be reviewed by the stakeholder group.

Table 8-3
Distributed BMPs Acres Treated by Subwatershed

Subwatershed	CPI	SFR Cisterns	MFR Cisterns	Large Cisterns	Local Infiltration	Bioretention	Swale/Filter Strip	Horse Farm	Stream Buffers	Downspout Disconnection	Street and Parking Lot Retrofit
Westlake	100	15.0	5.0	10.0	15.0	55.0	10.0	0.0	0.0	1.0	12.0
Lower Lindero Creek	85	10.0	6.0	15.0	10.0	10.0	10.0	0.0	0.0	1.0	15.0
Malibu Lagoon	83	24.0	5.0	5.0	4.0	7.0	6.0	3.0	0.0	1.0	10.0
Upper Lindero Creek	82	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Upper Medea Creek	78	10.0	5.0	10.0	5.0	21.0	20.0	0.0	0.0	0.0	2.0
Lower Las Virgenes Creek	57	5.0	4.0	10.0	25.0	0.0	25.0	0.0	0.0	0.0	25.0
Potrero Canyon Creek	52	5.0	3.0	10.0	7.0	11.0	17.0	0.0	0.0	0.0	10.0
Hidden Valley Creek	49	5.0	2.0	10.0	7.0	11.0	3.0	47.0	2.0	3.0	10.0
Stokes Creek	36	10.0	8.0	0.0	20.0	15.0	25.0	0.0	0.0	3.0	32.0
Lower Medea Creek	32	5.0	3.0	10.0	15.0	21.0	23.0	0.0	4.0	2.0	11.0
Middle Malibu Creek	29	0.0	0.0	0.0	35.0	2.0	20.0	0.0	9.0	1.0	32.0
Lower Malibu Creek	27	0.0	0.0	0.0	6.0	6.0	0.0	0.0	0.0	0.0	1.0
Upper Las Virgenes Creek	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Palo Comado Creek	23	0.0	1.0	0.0	6.2	6.0	3.0	5.0	0.0	0.0	5.0
Cheseboro Creek	20	0.0	0.0	0.0	5.4	5.0	3.0	0.0	0.0	0.0	5.0
Triunfo Creek	18	18.0	8.0	20.0	59.0	50.0	55.0	20.0	11.0	3.0	50.0
Cold Creek	17	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Upper Malibu Creek	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total (from TMDLIP)		108	50	100	220	220	220	75	NM	15	220
Total from Above		108	50	100	220	220	220	75	26	15	220

Assumptions for Distributed Structural BMPs

Several assumptions related to the function and benefits of distributed structural BMPs were required to complete this analysis. These assumptions include:

- Runoff capture in single family residential rain barrel systems accounts for 20% of average annual runoff volume from the lots which BMPs are deployed and an equivalent bacteria load assuming uniform bacteria concentration.
- Runoff capture in multi-family concrete cisterns, underground storage and reuse, vegetated treatment systems, local infiltration, street and parking lot biofiltration retrofits, and stream buffers accounts for 80% of average annual runoff volume and bacteria load. This capture would be achieved for these BMPs by following Standard Urban Stormwater Management Plan (SUSMP) BMP design criteria.
- There is no bacteria reduction benefit from the proposed distributed structural BMPs during dry-weather conditions.
- Within each subwatershed, distributed BMPs would be located in areas not planned to be treated by a larger downstream regional BMP to the maximum extent possible.

8.2.1.2 Regional Structural BMPs

An analysis of potential parcels for siting regional structural best management practices (BMPs) within subwatersheds with significant water quality areas of concern (AOC) for the Malibu Creek Bacteria TMDLIP was completed and provided in Technical Memorandum (TM) Task 7-3 attached in Appendix B. Since completion of that technical memorandum, several of the preliminary regional structural BMP opportunities that were identified were omitted from the TMDLIP and some new projects have been identified. Regional structural BMP projects currently being considered in the TMDLIP are presented in Section 6 of this TMDLIP and are listed in Table 8-4.

Table 8-4
Regional Structural BMPs

BMP Name	Subwatershed	Type	Jurisdiction	Setting	Vegetation
Chumash Park	Upper Medea Creek	Infiltration Basin	Agoura Hills	Urban park with small channelized drainages near Medea Creek	Ornamental
Lake Lindero Country Club	Upper Lindero Creek	Infiltration Basin	Agoura Hills	Lindero Creek passes directly through the Country Club	Ornamental, possibly riparian
Las Virgenes near De Anza	Lower Las Virgenes Creek	Infiltration Basin	Calabasas	Agricultural land at Las Virgenes Creek channelized stream	Agricultural, riparian
Liberty Canyon Creek	Lower Las Virgenes Creek	Subsurface Flow Wetland	Calabasas	Open space with channelized creek entering natural drainage	Native, riparian
Medea Creek Park	Upper Medea Creek	Infiltration Basin	Oak Park – County of Ventura	Natural drainage near roadway and residential	Native, riparian
Oak Canyon Community Park	Upper Medea Creek	Subsurface Flow Wetland	Oak Park – County of Ventura	Rural setting with culvert, then creek passing through park	Native, riparian
Reyes Adobe Park	Lower Lindero Creek	Subsurface Flow Wetland	Agoura Hills	Pocket park in urban residential setting	Ornamental, possibly riparian
Sumac Park	Upper Medea Creek	Infiltration Basin	Agoura Hills	Urban park with subsurface storm drain	Ornamental
Three Springs Park	Westlake	Subsurface Flow Wetland	Westlake Village	Suburban pocket-park	Ornamental, riparian
Triunfo Creek Riparian Enhancement	Westlake	Freesurface Flow Wetland	Westlake Village	Riparian corridor treating outflow from the Westlake Reservoir	Native, riparian
Upper Las Virgenes Riparian Enhancement	Upper Las Virgenes Creek	Freesurface Flow Wetland	Unincorporated LA County	Natural creek between a storm drain outlet and a concrete drainage channel	Native, riparian
Upper Lindero Creek at the County Line	Upper Lindero Creek	Infiltration Basin	Thousand Oaks	Rural open space with natural drainage	Native, riparian
Upper Lindero Creek Subwatershed	Upper Lindero Creek	Infiltration Basin	Agoura Hills	Valley Oaks Memorial Park in urban setting near Lake Lindero	Ornamental

BMP Descriptions
Infiltration
Regional infiltration facilities generally consist of a large shallow basin, capable of detaining the entire volume of a design storm and infiltrating this volume over a specified period. The primary mechanism for bacteria removal in regional infiltration basins would be volume reduction to receiving waters and, for storms smaller than

the design storm, complete removal of bacteria by preventing any surface discharge. Infiltration facilities achieve high levels of treatment of bacteria and other pollutants by impounding water and allowing it to slowly percolate into the ground.

For the proposed projects, a 48 hour drawdown requirement was used for infiltration basin capacity estimates. The volume of runoff that could be captured in the proposed infiltration basins was a function of the infiltration capacity of underlying soils, which limit the depth of water that could be ponded and expected to drawdown within 48 hours, and the available area of the site.

Constructed Wetlands

Constructed wetlands are different from natural wetlands in that they are designed and maintained primarily for water quality treatment. These facilities have gained acceptance in recent years as a practical and cost-effective approach for treating runoff and wastewater. Constructed wetlands make use of processes that occur in natural wetlands as well as in conventional wastewater treatment plants, but are simpler than conventional technologies because they do not require advanced containment and control systems.

For the proposed constructed wetlands, the volume of runoff that could be captured for a given event was limited by the amount of runoff that could be routed through the subsurface flow wetland, providing a 2-day residence time. Bacteria reduction effectiveness for runoff treated in a constructed wetland was observed to be between one and two log removal with a 1-2 day residence time for subsurface flow wetlands (EPA, 1993; Lyon, 2006) and 7 day residence time for free surface flow wetlands (Bays and Palmer, 2003). For this study, a more conservative bacteria removal effectiveness factor of 70% was utilized for both types of constructed wetlands.

Freesurface Flow Wetlands. Freesurface flow (FSF) constructed wetlands are characterized by shallow ponded water at varying depths above the ground surface. The mechanisms for bacterial control in an FSF constructed wetland include filtration, sedimentation, oxidation, antibiosis, predation, and competition (Davies and Bavor, 2000). Solar irradiation is also thought to contribute to bacterial removal. Constructed wetlands can be applied as either inline or offline facilities, and can be integrated into other habitat enhancement projects.

Subsurface Flow Wetlands. In subsurface flow (SSF) wetlands, water flows through the sub-surface soil matrix, rarely surfacing. Wetland plant species are planted within the soil matrix and remove pollutants by uptake. The presence of aerated and anoxic zones also enhances removal. These facilities are not intended to provide stand-alone treatment of storm water runoff. A pre-settling underground detention facility would be included in the facility plan for each of these regional structural BMPs.

Bacteria Sources in Regional Structural BMP Drainage Areas

Regional BMP sites were selected where there was sufficient open space for new facilities located downstream of developed land use types. The land use distribution within the drainage area of each of the regional structural BMP types was determined using ArcGIS (Table 8-5). The spatial distribution of projects proposed in the TMDLIP and their respective drainage areas are shown in Figure 8-1. This figure shows that runoff from significant developed portions of the upper subwatersheds in the MCW would be routed to a regional structural BMP. Table 8-5 shows the fraction of developed land uses (residential, commercial, industrial, and other urban) that are within a regional structural BMP drainage area for each subwatershed.

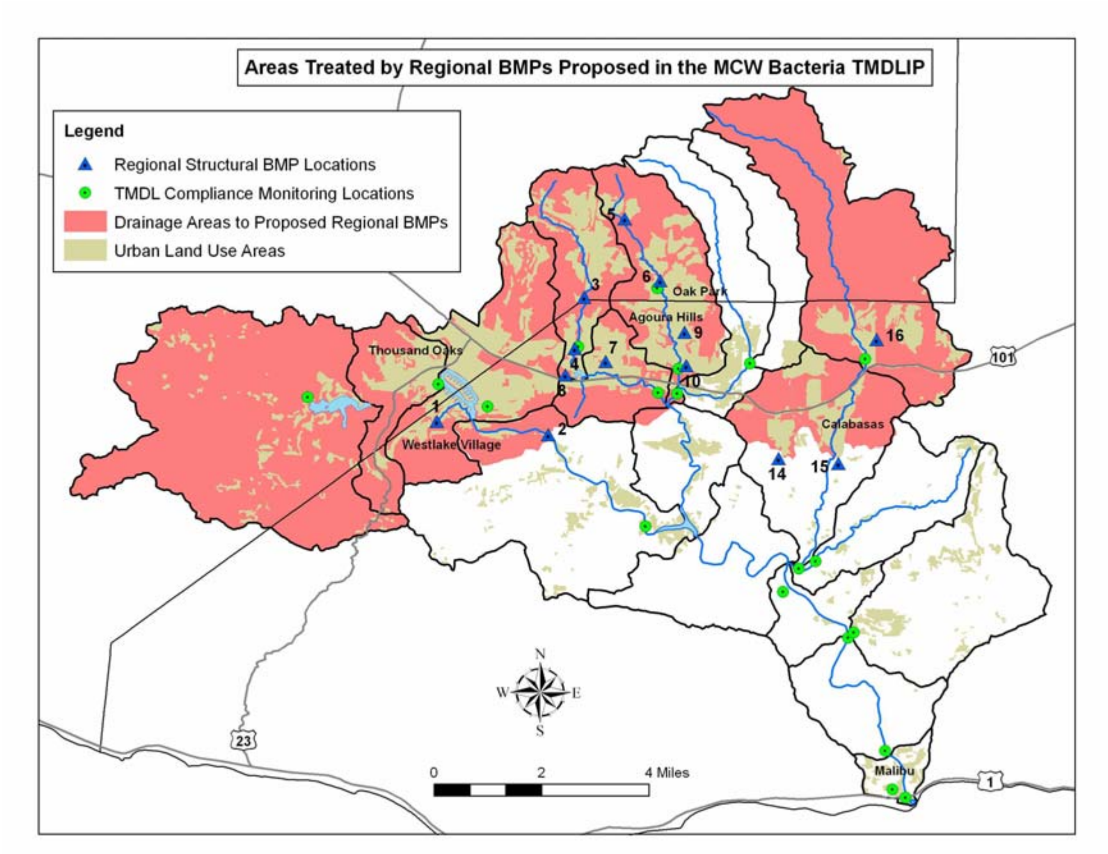

Figure 8-1
Map of TMDLIP Regional Structural BMP Site Locations and Drainage Areas

Table 8-5
Land Use Distribution in Drainage Area of Proposed Regional Structural BMPs

Subwatershed / Site	BMP	Drainage Area (ac)	Land Use Distribution (ac)					
			AGR	COM	IND	OPEN	URBAN	RES
Liberty Canyon (14)	SSF Wetland	878	2	5	49	648	31	145
Las Virgenes Creek near De Anza Park (15)	Infiltration Basin	9,499	39	152	497	7,968	173	671
Reyes Adobe Park (7)	SSF Wetland	361		0		133	6	222
Upper Lindero Creek at the County Line (3)	Infiltration Basin	1,929		50	14	1110	166	590
Lake Lindero Country Club (4)	Infiltration Basin	2,293		66	14	1433	174	759
Upper Lindero Creek Subwatershed (8)	Infiltration Basin	2,511		85	14	1450	174	798
Chumash Park (10)	Infiltration Basin	352		4		188	82	78
Sumac Park (9)	Infiltration Basin	521				204	22	295
Medea Creek Park (6)	Infiltration Basin	1759		7	22	1,294	164	273
Oak Canyon Community Park (5)	SSF Wetland	541				409		132
Three Springs Park (1)	SSF Wetland	951			16	781		154
Triunfo Creek Riparian Enhancement (2)	FSF Wetland	17,565	1,511	640	519	12,359	422	2,113
Upper Las Virgentes Riparian Enhancement (16)	FSF Wetland	426				326		100

Annual Stormwater Runoff Capture Efficiency

Regional structural BMPs were sized based on site limitations, which in most of the proposed projects resulted in facility treatment capacities that are less than the volume determined from the weighted average storm event (WASE) hydrograph. The WASE hydrograph was developed by the Los Angeles County Department of Public Works to be used as the target wet-weather runoff event for designing treatment facilities to meet the TMDL targets (no more than 17 days exceeding water quality objectives per year)..

Results of the BMP runoff capture analysis for each of the proposed regional structural BMPs are also included in Table 8-6.

Table 8-6
Estimated Average Annual Runoff Capture in Proposed Regional Structural BMPs

Site	BMP Type	Runoff Coefficient	Estimated Annual Runoff Capture
Liberty Canyon	SSF Wetland	0.16	34%
Las Virgenes Creek near De Anza Park	Infiltration Basin	0.65	25%
Reyes Adobe Park	SSF Wetland	0.27	31%
Las Virgenes Creek near De Anza Park	Infiltration Basin	0.11	34%
Upper Lindero Creek at the County Line	Infiltration Basin	0.21	54%
Lake Lindero Country Club	Infiltration Basin	0.22	18%
Upper Lindero Creek Subwatershed	Infiltration Basin	0.21	64%
Chumash Park	Infiltration Basin	0.22	75%
Sumac Park	Infiltration Basin	0.26	34%
Medea Creek Park	Infiltration Basin	0.15	51%
Oak Canyon Community Park	SSF Wetland	0.14	85%
Three Springs Park	SSF Wetland	0.12	12%
Triunfo Creek Riparian Enhancement	FSF Wetland	0.15	50%
Upper Las Virgenes Riparian Enhancement	FSF Wetland	0.14	100%

Assumptions for Regional Structural BMPs

Several assumptions related to the function and benefits of the proposed regional structural BMPs were required to complete this analysis. These assumptions include:

- Runoff volume captured in upstream infiltration based BMPs (regional or distributed types) will not contribute to the downstream BMP inflow.
- All dry-weather runoff from the upstream drainage areas of each of the proposed regional BMPs is captured and treated.
- Proposed infiltration projects have the capacity to draw down runoff volume within 48 hours
- Proposed SSF wetlands provide 1 cfs of flow through capacity for every 2 acres of surface area.

8.2.1.3 Estimated Bacteria Reduction

The following relationship was used to estimate a reduction in bacteria for each subwatershed as a result of the proposed structural BMPs presented in Section 6 of this TMDLIP. The bacteria loading potential in areas draining to structural BMPs within each subwatershed are compared to the bacteria loading potential of the whole subwatershed. Factors are included to account for the partial treatment of bacteria by

BMPs, due to the partial runoff volume treatment capacity (Eff_1) and the expected pollutant removal effectiveness (Eff_2).

$$\text{Load Reduction\%} = 100 * \frac{\left(\sum_{BMP_i}^{BMP_j} \text{EMC} * \text{Rc} * \text{Treated Area} * \text{Eff}_1 * \text{Eff}_2 \right)}{(\text{EMC} * \text{Rc} * \text{Subwatershed Area})}$$

where,

EMC	=	Event Mean Concentration, from Table 8-7
Rc	=	Runoff Coefficient, from Table 8-7
Treated Area	=	Area draining to BMP
Subwatershed Area	=	Area of entire subwatershed
Eff_1	=	Percent of runoff volume captured by BMP
Eff_2	=	Percent of pollutant removal by BMP, from Table 8-8

For each subwatershed, area-weighted event mean concentrations (EMC) were determined for the different land use distributions in the drainage areas of each of the proposed structural BMPs presented in Section 6 and for the entire subwatershed. EMC values used to determine these area-weighted averages are shown in Table 8-7.

Similarly, area-weighted runoff coefficients (Rc) were calculated for each BMP treatment area and the entire subwatershed based on values presented in Table 8-7. These coefficients are included in the analysis of bacteria reduction to account for the non-uniform surface runoff that can be expected from different land use categories. Areas with a higher runoff coefficient will generate higher runoff volumes. Both runoff volume and bacteria concentration impact the total bacteria load that will result from an event. This analysis did not need to incorporate a term for precipitation by using the simplified assumption that precipitation will be the same for all areas within each subwatershed, and thus not impact the percent reduction if included in the equation above (Rainfall depth over treated area / Rainfall depth over entire subwatershed = 1).

Table 8-7
Runoff Coefficients and EMC values for Different Land Use Categories

Land Use	Runoff Coefficient	Bacteria EMC (MPN/100mL)
Agricultural	0.100	6,842
Commercial	0.610	72,035
Industrial	0.640	32,679
Open Space	0.060	255
Other Urban	0.410	98,272
Residential	0.390	98,272

Additionally, removal effectiveness coefficients for bacteria were extracted from a review of available data and incorporated into the analysis of potential bacteria reduction (CASQA, 2003; Lyon, 2006; US EPA, 1993). Infiltration based BMPs are assumed to remove 100% of bacteria from surface runoff by volume reduction. These values are shown in Table 8-8.

Table 8-8
Structural BMP Effectiveness Factors

BMP	Potential Bacteria Removal Effectiveness
SFR Cisterns	100%
MFR Cisterns	100%
Large Cisterns	100%
Local Infiltration	100%
Bioretention	100%
Swale/Filter Strip	50%
Horse Farm	80%
Stream Buffers	50%
Downspout Disconnect	100%
Street / Parking Lot Retrofit	50%
SSF Wetland	70%
Infiltration Basin	100%

8.2.1.4 Non-Structural BMPs Assumptions and Methodologies

For evaluation purposes, the non-structural BMPs described in this TMDLIP were grouped into the following nine categories:

- General Outreach;
- Pet Outreach;
- Confined Animal Outreach;
- Septic Outreach;
- Education;
- Coordination;
- Enforcement;

- Emergency Spill; and,
- Trash.

Descriptions of all of the individual BMPs that make up each of the nine non-structural BMP categories can be found in Appendix D-9.

The potential for bacteria reduction for each non-structural BMP category was determined for each land use classification utilized in this TMDLIP as shown in Appendix D-10, with two exceptions where land use classifications were grouped into larger categories. The classifications Commercial, Commercial and Industrial Land Uses, and Park and Industrial, were combined into the Commercial/Industrial category. The classifications Major Roads, Major Roads/Freeways, and Roads were grouped into the land use category Transportation. The land use classifications are:

- Agricultural;
- Commercial/Industrial;
- Horse Ranches;
- Parks and Recreation;
- Open Space and Vacant Lands;
- Residential; and,
- Transportation.

Three studies were reviewed that investigated the contribution of bacteria from four bacteria source categories including humans, pets, birds, and wildlife (City of San Diego and MEC Analytical Systems – Weston Solutions, September 15, 2004; Jones, April 2003; Northern Virginia Regional Commission, March 31, 2004). Using the results of these studies, a range of potential percent source contributions was developed and split into a low range and a high range to be applied depending on how significant the contribution of a source is expected to be for a specific land use, as show in Table 8-9.

Table 8-9
Ranges of Bacteria Percent Source Contribution

Bacteria Source	Percentage of Bacteria from Various Sources	
	Low Range	High Range
Humans	5%-15%	15%-26%
Pets/Livestock	4%-9%	9%-13%
Birds	29%-48%	48%-67%
Wildlife (including rodents)	13%-19%	19%-25%

For each land use category, a low or high bacteria load rating was assigned to each of the four bacteria sources, as shown in Table 8-10. The range associated with a low or high rating (Table 8-9) was determined for each source and land use category. This provides an estimate of the total bacteria load within a subwatershed that could be reduced by implementing non-structural BMPs. Land use area percentages for each subwatershed can be found in Appendix D-11.

Table 8-10
Expected Source Percent Contribution per Land Use

Land Use Category	Human	Birds	Pets/Livestock	Wildlife
Agricultural	Low	Low	High	Low
Commercial/Industrial	Low	Low	Low	Low
Horse Ranches	Low	Low	High	Low
Transportation	Low	Low	Low	Low
Parks and Recreation	High	High	High	High
Open Space and Vacant Lands	Low	High	Low	High
Residential	Low	Low	High	Low

The ranges of contribution for each source in each land use area were multiplied by the range of effectiveness that each non-structural BMP was estimated to have for bacteria reduction, shown in Table 8-11, to develop estimates of bacteria reductions from individual non-structural BMPs. For each non-structural BMP and source within a given land use, percent reductions were calculated for two conditions to determine the range of potential bacteria reduction:

- Condition 1: low range value for source and low percent effectiveness for BMP
- Condition 2: high range value for source and high percent effectiveness for BMP

Table 8-11
Estimated Effectiveness of Non-Structural BMPs for Bacteria Reduction

BMP		Bacteria Source			
		Human	Birds	Pets/Livestock	Wildlife
Outreach - Pet	---			49%	
Outreach - General	Low	1%	0%	0%	0%
	High	20%	2%	0%	2%
Outreach - Confined Animals	Low	0%	0%	5%	0%
	High	0%	0%	25%	0%
Outreach - Septic	Low	20%	0%	0%	0%
	High	40%	0%	0%	0%
Education	Low	0%	0%	0%	0%
	High	2%	0%	2%	0%
Coordination	Low	0%	0%	0%	0%
	High	5%	5%	0%	5%
Enforcement	Low	0%	0%	0%	0%
	High	5%	5%	5%	5%
Emergency Spill	Low	0%	0%	0%	0%
	High	5%	0%	0%	0%
Trash	Low	0%	10%	0%	10%
	High	5%	30%	5%	30%

The potential range of overall reduction was calculated using the sum of all Condition 1 values as the lower end of the range and the sum of all Condition 2 values as the higher end of the range. The reduction potential range for each subwatershed can be found in Table 8-12. The average percent reduction in Table 8-12 is based on the average of the low and high ends of the percent reduction range for each subwatershed.

Table 8-12
Potential Reductions in Fecal Coli form from Non-Structural BMPs

Subwatershed	Range of Percent Reduction	Average Percent Reduction
Cheseboro Creek	0.3%-2.1%	1.2%
Cold Creek	1.1%-5.7%	3.4%
Hidden Valley Creek	0.5%-2.6%	1.5%
Lower Las Virgenes Creek	1.1%-6.3%	3.7%
Lower Lindero Creek	3.3%-18.1%	10.7%
Lower Malibu Creek	0%-0.2%	0.1%
Lower Medea Creek	1.2%-6.1%	3.6%
Malibu Lagoon	2.7%-14.8%	8.8%
Middle Malibu Creek	1.6%-8.5%	5.0%
Palo Comado Creek	1.4%-7.8%	4.6%
Potrero Canyon Creek	2.6%-13.2%	7.9%
Stokes Creek	0.4%-2%	1.2%
Triunfo Creek	1%-5.6%	3.3%
Upper Las Virgenes Creek	0.9%-5.2%	3.1%
Upper Lindero Creek	3.9%-19.9%	11.9%
Upper Malibu Creek	0.1%-0.5%	0.3%
Upper Medea Creek	3.8%-19.1%	11.4%
Westlake	3.3%-18.7%	11.0%

8.2.2 Estimated Bacteria Reductions and Reductions in Exceedance Days

The percent of bacteria load that can be reduced from each subwatershed, assuming that all non-structural and structural BMPs included Sections 6 are implemented, is shown in Table 8-13. Table 8-13 provides a comparison between the estimated load reductions and the targets needed to meet the TMDL requirements for dry- and wet-weather. The calculations used to estimate bacteria load reductions for wet-weather are shown in Appendix D-12. Dry-weather reductions were calculated in the same manner, however load reduction credit is only given to regional structural BMPs, and 100% of runoff volume is assumed to be captured. Bacteria reduction targets for TMDL compliance should be periodically updated with results from the future weekly compliance monitoring plan (CMP) for bacteria at 18 locations representing each of the subwatersheds in the Malibu Creek Watershed.

The results of this quantitative analysis show that bacteria load reductions required to meet TMDL targets are achieved in some, but not all, subwatersheds with implementation of the proposed non-structural and structural BMPs presented in Section 6. It should be noted that additional projects that are in varying stages of development can provide significant additions to the reductions estimated based on the BMPs presented in TMDLIP alone. These projects include:

- City of Malibu - Legacy Park
- City of Calabasas – De Anza Park infiltration project

It should be noted that dry-weather bacteria reductions are projected to be the greatest in those subwatersheds with regional BMPs that could potentially capture and reuse or treat all dry-weather flow. Distributed BMPs are not expected to provide a direct reduction of bacteria under dry-weather conditions, because these BMPs are generally intended to capture wet-weather runoff.

To approximate the reduction in days of exceedance of water quality objectives, additional analysis was conducted, which related estimated bacteria given the implementation of all of the BMPs proposed in this TMDLIP to TMDL targets. This analysis applied the estimated percent reduction in bacteria to each historical sampling concentration to determine the bacteria concentration that would be expected if all proposed BMPs were implemented. The expected bacteria concentrations were compared to the TMDL targets to determine the number of exceedance days that could expected after implementation of the BMPs. The reduction in exceedance days was determined by calculating the percent difference between historical exceedance days and the exceedance days expected after full implementation of the BMPs proposed in this TMDLIP. The results of this analysis show that substantial reductions in the number of days exceeding the water quality objective would be provided by this TMDLIP, however, complete reduction of exceedances would not be achieved (Table 8-14).

Bacteria reduction targets for the TMDL were determined based on a limited dataset, and therefore they should be re-evaluated when more regular data is available and related to expected reductions from the BMPs proposed in this TMDLIP.

Table 8-13
Percent Reduction in Fecal Coliform due to BMP Effectiveness

Subwatershed	Wet-weather		Winter Dry-weather		Summer Dry-weather	
	Target[a]	Achieved	Target	Achieved	Target	Achieved
Cheseboro Creek	75%	13%	0%	1%	*	1%
Cold Creek	*	3%	0%	3%	49%	3%
Hidden Valley Creek	64%	12%	70%	2%	*	2%
Lower Las Virgenes Creek	81%	41%	90%	97%	92%	97%
Lower Lindero Creek	86%	56%	81%	80%	91%	81%
Lower Malibu Creek	70%	37%	43%	47%	83%	47%
Lower Medea Creek	68%	37%	53%	48%	51%	48%
Malibu Lagoon	67%	37%	52%	47%	69%	47%
Middle Malibu Creek	73%	36%	0%	49%	41%	49%
Palo Comado Creek	*	8%	0%	5%	*	5%
Potrero Canyon Creek	*	12%	*	3%	20%	3%
Stokes Creek	46%	49%	0%	1%	94%	1%
Triunfo Creek	26%	42%	77%	55%	69%	55%
Upper Las Virgenes Creek	38%	12%	64%	12%	94%	12%
Upper Lindero Creek	58%	76%	96%	100%	88%	100%
Upper Malibu Creek	*	35%	31%	46%	97%	46%
Upper Medea Creek	89%	45%	97%	71%	87%	71%
Westlake	79%	48%	77%	76%	90%	76%

* Indicates that there was insufficient data for analysis
a Based on average of available wet-weather data with elimination of allowable exceedance days, where applicable
b Based on average of available all exceedances

Table 8-14
Reduction in Exceedance Days Due to BMP Effectiveness

Subwatershed	Wet-weather		Winter Dry-weather		Summer Dry-weather	
	Current	TMDLIP	Current	TMDLIP	Current	TMDLIP
Cheseboro Creek	1	1	0	0	0	0
Cold Creek	0	0	0	0	5	5
Hidden Valley Creek	1	1	3	3	0	0
Lower Las Virgenes Creek	10	7	19	1	54	9
Lower Lindero Creek	3	2	2	0	13	8
Lower Malibu Creek	19	16	2	0	9	3
Lower Medea Creek	2	2	3	2	13	4
Malibu Lagoon	18	14	19	13	48	24
Middle Malibu Creek	17	16	0	0	14	5
Palo Comado Creek	N/A	N/A	0	0	0	0
Potrero Canyon Creek	0	0	N/A	N/A	1	1
Stokes Creek	1	0	0	0	4	4
Triunfo Creek	1	0	4	2	9	5
Upper Las Virgenes Creek	2	2	1	1	5	5
Upper Lindero Creek	2	0	5	0	13	0
Upper Malibu Creek	0	0	1	0	1	1
Upper Medea Creek	7	6	8	6	25	10
Westlake	6	5	2	1	21	11

8.3 Expected Water Resources Benefits

This section summarizes the additional benefits, beyond bacteria reduction, provided by implementation of the structural and non-structural BMPs outlined in Section 6. The benefits described include beneficial reuse, non-bacterial water quality benefits, and habitat and recreational benefits.

8.3.1 Beneficial Reuse Benefits

8.3.1.1 On Site Storage and Reuse

On-site stormwater reuse options such as cisterns provide an important role in managing wet-weather runoff. Rain barrels and cisterns are low-cost water conservation devices that can be used to reduce runoff volume and, for smaller storm events, delay and reduce the peak runoff flow rates. Cisterns divert and store runoff from impervious roof areas that can provide a source of chemically untreated “soft water” for gardens and compost, free of most sediment and dissolved salts. Because residential irrigation can account for up to 40 percent of domestic water consumption, water conservation measures such as rain barrels also reduce the demand on the municipal water supply system. Several different types of these on-site storage and reuse systems are included in Section 6 and therefore incorporated into the bacteria reduction plan:

- Single family residential - Incentives for installation of 1,890 rain barrels (75-gallon) for capture and reuse of rooftop runoff. The water reuse benefit of these systems is estimated by assuming that each rain barrel captures an average drainage area of 2,500 ft^2 of rooftop.

- Multi family residential – Incentives for construction of 50 concrete cisterns for capture and reuse of on-site runoff. The water reuse benefit of these systems is estimated by assuming that each concrete cistern captures an average of 1 acre of on-site runoff.

- Public lands – Construction of underground runoff capture and reuse systems at 15 locations such as government offices, schools, or developed parks. The water reuse benefit of these systems is estimated by assuming that each underground storage system captures an average of 10 acres of on-site runoff.

The fraction of average annual runoff volume that could be expected to be captured and reused by these systems within each subwatershed of the MCW is summarized in Table 8-15. These results depend upon the spatial allocation of incentive funds for on-site storage and reuse projects. The allocation that generated the results in Table 8-15 was developed by attempting to increase the number of subwatersheds that would be brought into compliance with bacteria water quality objectives.

Table 8-15
Fraction of Average Annual Runoff Captured and Reused On-Site with Proposed BMPs in the MCW TMDLIP

Subwatershed / Site	Percent of Average Annual Runoff
Malibu Lagoon	3.1%
Lower Lindero Creek	1.9%
Lower Medea Creek	1.8%
Triunfo Creek	1.3%
Potrero Canyon Creek	1.0%
Stokes Creek	0.8%
Lower Las Virgenes Creek	0.7%
Upper Medea Creek	0.6%
Westlake	0.5%
Hidden Valley Creek	0.4%
Palo Comado Creek	0.0%
Cold Creek	0.0%
Middle Malibu Creek	0.0%
Cheseboro Creek	0.0%
Lower Malibu Creek	0.0%
Upper Las Virgenes Creek	0.0%
Upper Lindero Creek	0.0%
Upper Malibu Creek	0.0%

8.3.1.2 Groundwater Recharge

Local or on-site infiltration projects provide multiple benefits by reducing bacteria and other pollutants and also recharging groundwater. Four of these types of institutional and distributed structural BMPs were incorporated into this TMDLIP including:

- Local infiltration by permeable pavement
- Street and parking lot biofiltration retrofits
- Bioretention areas
- Downspout disconnection incentive program

These BMPs were incorporated into this TMDLIP by employing an implementation factor of 5% or approximately 220 acres of developed drainage area for each BMP type. When added together, these distributed BMPs would infiltrate captured stormwater runoff from 20% of all developed land uses. The fraction of average annual runoff that could be captured and infiltrated with these proposed on-site infiltration projects is presented in Table 8-16.

Regional BMPs incorporated into this TMDLIP that would serve to recharge groundwater while also removing bacteria include seven infiltration basins of varying sizes:

- Las Virgenes Creek near De Anza – 9,499 acre drainage area, 16.4 ac-ft capacity
- Lake Lindero Country Club – 2,293 acre drainage area, 3.6 ac-ft capacity
- Upper Lindero Creek at the County Line – 1,929 acre drainage area, 11.6 ac-ft capacity
- Upper Lindero Creek Subwatershed – 2,511 acre drainage area, 19.8 ac-ft capacity
- Chumash Park – 352 acre drainage area, 4.0 ac-ft capacity
- Medea Creek Park – 1,759 acre drainage area, 7.0 ac-ft capacity
- Sumac Park – 521 acre drainage area, 2.1 ac-ft capacity

To estimate the fraction of average annual runoff that is expected to be captured and treated in each of the proposed regional structural BMPs, a hydrologic simulation using historical hourly rainfall data was employed. NetSTORM is a hydrologic simulation model that estimates runoff inflow, drawdown, and overflow at an hourly time step. The model uses a modified rational method to generate runoff, which accounts for abstractions of effective rainfall. Hourly rainfall was extracted for the Los Angeles International Airport National Climatic Data Center (NCDC) Station.

Land use area-weighted runoff coefficients were determined using land use characteristic data (GeoSyntec Consultants. 2005. Draft Structural BMP Prioritization Methodology. Prepared for County of Los Angeles, City of Los Angeles, and Heal the Bay). The fraction of average annual runoff that could be captured and infiltrated in these BMPs is summarized by subwatershed in Table 8-16.

Table 8-16
Percent of Runoff Infiltrated for Groundwater Recharge from Different Proposed Structural BMP Types

Subwatershed / Site	On-Site Infiltration BMPs	Regional Infiltration Basins	Total Groundwater Recharge
Cheseboro Creek	4.1%	0%	4.1%
Cold Creek	0.0%	0%	0.0%
Hidden Valley Creek	1.6%	0%	1.6%
Lower Las Virgenes Creek	3.7%	15%	18.5%
Lower Lindero Creek	5.5%	0%	5.5%
Lower Malibu Creek	2.7%	0%	2.7%
Lower Medea Creek	9.1%	0%	9.1%
Malibu Lagoon	10.0%	0%	10.0%
Middle Malibu Creek	22.1%	0%	22.1%
Palo Comado Creek	1.6%	0%	1.6%
Potrero Canyon Creek	3.5%	0%	3.5%
Stokes Creek	11.0%	0%	11.0%
Triunfo Creek	9.2%	0%	9.2%
Upper Las Virgenes Creek	0.0%	34%	34.0%
Upper Lindero Creek	0.0%	64%	64.0%
Upper Malibu Creek	0.0%	0%	0.0%
Upper Medea Creek	1.8%	29%	30.3%
Westlake	3.1%	0%	3.1%

8.3.2 Non-Bacterial Water Quality Benefits

Technical Memorandum 3-1, attached in Appendix B, provides an analysis of existing water quality conditions within the MCW and summarizes results of the pollutant specific source assessments included in the TMDL Staff Report. Several additional surrogate pollutants beyond bacteria were selected for analysis, based on the availability of land use specific event mean concentrations (EMCs) including:

- Total Nitrogen (representing nutrients)
- Trash
- Total Lead (representing metals)

- Total Suspended Solids (representing sediment)

Reduction by Structural BMPs

For purposes of this analysis, this group of constituents was considered as representative of four generalized water quality categories: nutrients, trash, metals, and sediment. The same approach for estimating reduction in bacteria due to proposed non-structural and structural BMPs in Section 6 was applied to these constituents. The relationship used to estimate a load reduction for each subwatershed as a result of the proposed structural BMPs in this TMDLIP is:

$$\text{Load Reduction\%} = 100 * \frac{\left(\sum_{BMP_i}^{BMP_j} \text{EMC} * \text{Rc} * \text{Treated Area} * \text{Eff}_1 * \text{Eff}_2 \right)}{(\text{EMC} * \text{Rc} * \text{Subwatershed Area})}$$

Where	EMC	=	Event Mean Concentration, from Table 8-17
	Rc	=	Runoff Coefficient, from Table 8-17
	Treated Area	=	Area draining to BMP
	Subwatershed Area	=	Area of entire subwatershed
	Eff_1	=	Percent of runoff volume captured by BMP
	Eff_2	=	Percent of pollutant removal by BMP.

For each subwatershed, area-weighted event mean concentrations (EMC) were determined for the different land use distributions in the drainage areas of each of the proposed structural BMPs in Section 6 and for the entire subwatershed. EMC values used to determine these area-weighted averages are shown in Table 8-17.

Table 8-17
Land Use Specific Runoff Coefficients and EMCs for Non-Bacteria Pollutants

Land Use	Runoff Coefficient	Trash	Total Nitrogen (ppm)	Lead (ppb)	TSS (ppm)
Agricultural	0.1	0	11.33	20.4	698.9
Commercial	0.61	1	0.41	3.7	52.8
Industrial	0.64	1	0.56	4.8	149.7
Open Space	0.06	0	0.97	0.01	28.3
Other Urban	0.41	1	0.84	1.6	23.2
Residential	0.39	1	0.3	5.0	65.3

Similarly, area-weighted runoff coefficients (Rc) were calculated for each BMP treatment area and the entire subwatershed based on values presented in Table 8-17. These coefficients are included in the analysis of non-bacteria related water quality benefits to account for the non-uniform surface runoff that can be expected from different land use categories. Areas with a higher runoff coefficient will generate higher runoff volumes. Both runoff volume and pollutant concentration impact the total pollutant load that will result from an event. This analysis did not need to incorporate a term for precipitation by assuming that precipitation will be the same for all areas within each subwatershed, and thus not impact the percent reduction if included in the equation above (Rainfall depth over treated area / Rainfall depth over entire subwatershed = 1).

The percent of each of the four evaluated non-bacteria water quality constituents that can be reduced from each subwatershed, assuming that all non-structural and structural BMPs included in Section 6 are implemented, is shown in Table 8-18. These results vary from each other and the bacteria reduction estimates due to differences in pollutant source areas, as shown by different EMC values in Table 8-17. Also, the pollutant removal effectiveness of a BMP can differ greatly between constituents in the influent.

Table 8-18
Reduction in Non-Bacteria Related Pollutant Loads that Could be Achieved by BMPs Proposed in the TMDLIP

Subwatershed	Trash	Nutrients (Total Nitrogen)	Metals (Lead)	Sediment (TSS)
Lower Las Virgenes Creek	37%	30%	36%	33%
Lower Lindero Creek	45%	43%	45%	44%
Lower Medea Creek	31%	29%	29%	27%
Malibu Lagoon	33%	21%	30%	24%
Upper Las Virgenes Creek	7%	4%	7%	4%
Upper Lindero Creek	64%	64%	64%	64%
Upper Medea Creek	35%	42%	34%	34%
Westlake	41%	37%	38%	37%
Palo Comado Creek	3%	1%	3%	2%
Potrero Canyon Creek	6%	1%	3%	2%
Stokes Creek	56%	4%	27%	10%
Triunfo Creek	37%	27%	33%	30%
Cheseboro Creek	13%	3%	13%	9%
Cold Creek	0%	0%	0%	0%
Hidden Valley Creek	6%	0%	2%	1%
Lower Malibu Creek	33%	21%	30%	24%
Middle Malibu Creek	32%	22%	28%	25%
Upper Malibu Creek	30%	24%	28%	25%

Reduction by Non-Structural BMPs

The analysis that was completed to quantify a range of bacteria reduction from implementation of non-structural BMPs proposed in this Implementation Plan was not conducted for other water quality constituents of concern. Ratings were developed for each of the non-structural BMP categories by reviewing the list of proposed non-structural BMPs, considering the different bacteria sources that each could address (Table 8-19). This involved best scientific judgment of the different bacteria sources and their respective transport mechanisms in relation to the effect that each non-structural BMP could have upon water quality conditions. It is expected that non-structural BMPs will have a relatively small impact on water quality in relation to the proposed regional structural BMPs.

Table 8-19
Reduction in Non-Bacteria Related Pollutant Loads that Could be Achieved by Non-Structural BMPs Proposed in the TMDLIP

BMP	Trash	Nutrients	Metals	Sediment
Outreach - Pet	Low	High	Low	Medium
Outreach - General	Medium	Medium	Medium	Medium
Outreach - Confined Animal	Low	Medium	Low	Medium
Outreach - Septic	Low	High	Low	Low
Education	Medium	Medium	Low	Medium
Coordination	Medium	Medium	Medium	Medium
Enforcement	Medium	Medium	Medium	Medium
Emergency Spill	Medium	Low	Medium	Medium
Trash	High	Low	Low	Medium

8.3.3 Habitat and Recreational Benefits

Various structural BMPs proposed in Section 6 will provide additional habitat and recreational use benefits for the MCW. The regional structural BMPs as well as certain institutional and distributed structural BMPs, such as stream buffers and bank and channel stabilization, included in this Implementation Plan were selected by the stakeholder group to not only treat bacteria, but also provide or enhance recreational opportunities for residents of the MCW and/or to enhance habitat value for wildlife.

SSF wetlands are intended to be designed in a manner that provides opportunities for watershed residents to learn about pollution control through natural filtration and biological uptake. The sites where constructed SSF wetlands are proposed include developed parks, where such natural treatment systems can be integrated into the existing land. Other proposed sites would create new recreational spaces for residents in the watershed, such as the BMPs proposed in the Lindero Creek subwatershed.

8.4 Conclusions

As described in the above sections, the implementation of the BMP programs and projects identified in Section 6 will provide significant benefits with respect to total bacteria load reduction as well as reductions in other pollutants and certain water resources benefits and habitat/recreational enhancements.

8.4.1 Bacteria Reduction Estimates

The quantitative analysis was conducted on a somewhat limited set of data, since regular weekly (or daily) monitoring to assess conditions and ultimately compliance in all 18 subwatersheds as required by the TMDL has not yet been fully implemented.

Therefore, it is expected that over time, a more robust data set will be developed and this analysis will be periodically reassessed. Nonetheless, using the mean of the available data (allowing for a reduction of the highest wet-weather bacteria data to approximately the "exceedance allowance" provisions) and focusing on reduction in fecal coliform bacteria to simplify the analyses, the following summarizes the quantitative estimates that have been developed. These estimates are primarily based on control of runoff from the permitted MS4 systems.

With respect to BMP load reductions for wet-weather conditions:

- Four subwatersheds have either not shown any current exceedances or have insufficient sampling data. It should be noted that those subwatersheds that have insufficient data are typically low or medium priority watersheds and therefore would be expected to generally have lower bacteria levels. Therefore, there is no target load reduction necessary to achieve compliance in these four subwatersheds. However, implementation of the BMPs proposed in these watersheds would still further reduce bacteria loads when compared to current conditions.

- In three subwatersheds, the BMP load reductions are predicted to be more than the necessary target reductions.

- For eleven subwatersheds, load reductions are not projected to meet the necessary target reductions; however BMP load reductions would result in 12% to 56% of the targeted load reductions, improving current conditions.

With respect to BMP load reductions for winter, dry-weather conditions:

- Six subwatersheds have not shown any current exceedances or have insufficient sampling data. Therefore, there is no target load reduction to achieve compliance but implementation of the BMPs proposed would still further reduce bacteria loads from these subwatersheds compared to current conditions.

- The BMP load reductions are predicted to be more than the target reductions in five additional subwatersheds.

- For seven subwatersheds, load reductions are not projected to meet the necessary target reductions; however BMP load reductions are projected to range from 2% to 76% of the targeted load reductions, improving current conditions.

With respect to BMP load reductions for summer, dry-weather conditions:

- Three subwatersheds have either not shown any current exceedances or have insufficient sampling data. Therefore, there is no target load reduction to achieve compliance but implementation of the BMPs proposed would still further reduce bacteria loads from these subwatersheds compared to current conditions.

- The BMP load reductions are predicted to be equal to or greater than the target reductions in three additional subwatersheds.

- For eight subwatersheds, load reductions are not projected to meet the necessary target reductions; however BMP load reductions are projected to range from 1% to 81% of the targeted load reductions.

With respect to indicator bacteria Exceedance Day reductions:

- For wet-weather conditions, four subwatersheds do not have any required reduction in exceedance days or have insufficient data. Three subwatersheds that had some exceedance days under existing conditions are projected to be reduced to no exceedance days with implementation of BMPs. The remainder of the subwatersheds have projected reductions in exceedance days, though not meeting targets. While overall load reductions noted above are fairly significant for many of these subwatersheds, these do not always translate into an equivalent percentage of exceedance day reductions.

- For winter dry-weather conditions, six subwatersheds do not have any required reduction in exceedance days or have insufficient data. Four subwatersheds that had some exceedance days under existing conditions are projected to be reduced to no exceedance days with implementation of BMPs. The remainder of the subwatersheds have projected reductions in exceedance days, though not meeting targets. Again, while overall load reductions noted above are fairly significant for many of these subwatersheds, these do not always translate into an equivalent percentage of exceedance day reductions.

- For summer dry-weather conditions, three subwatersheds do not have any required reduction in exceedance days. One subwatershed that had some exceedance days under existing conditions is projected to be reduced to no exceedance days with implementation of BMPs. The remainder of the subwatersheds have projected reductions in exceedance days, though not meeting targets. Again, while overall load reductions noted above are fairly significant for many of these subwatersheds, these do not always translate into an equivalent percentage of exceedance day reductions. However, the projected reduction in exceedance days under summer dry-weather conditions is generally better than under winter dry-weather or wet-weather conditions.

8.4.2 Water Quality Benefits and Discussion

Although bacteria load reduction and exceedance day reduction targets are not predicted to be met in all subwatersheds under all conditions, the TMDLIP commitments are estimated to result in substantial reductions in many portions of the watershed. An issue of concern that could be a very significant factor in both monitoring and control of indicator bacteria organisms in a large and very diverse watershed such as Malibu Creek is the potential presence of natural sources of bacteria (native animals and waterfowl) that may be introduced both within urbanized areas and in portions of the watershed or drainage systems outside of these areas and/or potential re-growth of organisms in the system. Additional studies and monitoring projects evaluating sources of bacteria loading could prove an important tool in understanding natural sources of bacteria and effectively reducing human sources.

Furthermore, there is the potential (though largely unproven and therefore not possible to quantify) that contributions from improperly operating on-site wastewater treatment systems could be a contributing factor in certain areas. While the subject of some limited BMPs under this Implementation Plan, would largely be brought under control through State regulations and other local programs.

This TMDLIP is based on an iterative, adaptive process that commits to implementing and/or piloting a diverse suite of structural BMPs in a phased approach. At the same time that they are implementing BMPs, the responsible agencies will be compiling a more complete and longer-term set of watershed monitoring data that can be used to regularly update targeted reductions and eventually assess the effectiveness of implemented control measures. The combination of phased implementation of all types of committed BMPs, continual and enhanced local water quality monitoring, use of information from special studies such as natural source exclusion investigations, other reference watersheds studies and improved indicator organism studies that may be conducted in this watershed and/or other southern California watersheds and outside the area, and periodic reconsideration of the TMDL requirements at the three year and other milestones in the future will provide an opportunity for the responsible agencies to modify the Implementation Plan commitments as necessary over time.

8.4.3 Expected Water Resources Benefits

To be effective in reducing bacteria, most of the BMPs must also effectively reduce trash, suspended solids and some of the associated nutrients and metals. Since there are a number of committed or piloted institutional, distributed and regional structural BMPs in the Implementation Plan, this helps in meeting that goal. The Implementation Plan also incorporates water conservation, reuse and groundwater recharge components to the extent possible within this watershed. Finally, certain BMPs that may have water quality benefits can also serve to enhance recreational and/or habitat value in portions of the watershed.

Section 9
Conclusion

9.1 Summary of Dry-Weather Plan and Request for Extension

The dry-weather plan presented in Section 7 provides an integrated approach to addressing the water quality impairments in the MCW. As detailed in Section 7, the responsible agencies and jurisdictions all have ordinances in place that cover BMP implementation for protection of water quality, and no new ordinances are presently considered necessary to support implementation of BMPs for the wet- or dry- weather TMDL Implementation Plan.

As required, the applicable ordinances have been described in Section 7. In addition, permitting and regulatory requirements have been discussed in Section 2 of this TMDLIP. Therefore, it is requested that the TMDLIP be implemented initially according to the schedule presented in Section 7.2, which follows the extended compliance deadlines for the dry-weather Implementation Plan. The results of these efforts monitored to determine the subsequent course of action.

9.2 Summary of Wet-Weather Plan

The wet-weather plan presented in Section 6 provides an integrated approach to addressing the water quality impairments in the MCW. As described in Section 4, BMPs were selected based not only on bacteria removal effective but also on multiple-pollutant and multiple benefit applications. The BMPs selected will reduce multiple pollutants loadings, water conservation, and recreation benefits.

As the wet- and dry-weather implementation plan provides an integrated water resources approach, it is requested that the TMDLIP will be implemented initially according to the schedule presented in Section 6.3, which follows the extended compliance deadlines for the wet-weather Implementation Plan. The results of these efforts monitored to determine the subsequent course of action.

Section 10
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Appendix A
TMDL for Bacteria for the Malibu Creek and Lagoon

Appendix B
Technical Memorandums

Appendix C
Malibu Creek and Lagoon Bacteria TMDL Compliance Monitoring Plan

Appendix D
Qualitative Analysis Data

Appendix C
Malibu Creek and Lagoon Bacteria TMDL Compliance Monitoring Plan