CHAPTER 2
Project Description

2.1 Introduction

The preparation of the 12 separate Enhanced Watershed Management Programs (EWMPs) is a collective effort among the Los Angeles County Flood Control District (LACFCD) and the applicable Permittees in each Watershed Management Group (WMG). The 12 EWMPs are being prepared on a parallel schedule to the Program Environmental Impact Report (PEIR). The 12 EWMPs will vary for each watershed group, but will generally provide the opportunity for Permittees to customize their stormwater programs to achieve compliance with applicable receiving water limitations and/or water-quality-based effluent limits in accordance with the Municipal Separate Storm Sewer System (MS4) Permit through implementation of stormwater Best Management Practices (BMPs) or watershed control measures. Each Permittee is responsible for discharges in its jurisdiction and meeting the water quality goals for these discharges.

The EWMPs provide for a collaborative effort by Permittees on a watershed basis. The EWMP process allows for greater collaboration and accountability. The EWMPs, once complete, will include specific projects and identify Permittees that may benefit from the projects. Projects may be implemented individually or with partners. Each Permittee is responsible for the content of the EWMP projects that meet the water quality goals for the MS4 discharges within their jurisdiction.

This Project Description describes types of BMPs presented in the 12 Notices of Intent (NOIs), EWMP Work Plans, and input from the EWMP WMG. The BMPs listed in each EWMP are in various phases of planning or implementation. Examples of existing BMPs are used to illustrate the function, type of construction, and general locations of the BMP types for the purpose of the environmental assessment of the BMP types identified in the EWMPs.

BMPs vary in function and type, with each BMP providing unique design characteristics and benefits from implementation. The overarching goal of BMPs in the EWMPs is to reduce the impact of stormwater and non-stormwater on receiving water quality and address the water quality priorities as defined by the MS4 Permit. The development of each EWMP will involve the evaluation and selection of multiple BMP types, including nonstructural (institutional) and distributed, centralized, and regional structural watershed control measures, that will be implemented to meet compliance goals and strategies under the 2012 MS4 Permit. The LACFCD has limited jurisdictional authority for ordinance and code enactment or enforcement and therefore is limited in nonstructural BMPs to education and outreach measures.

The structural watershed control measures that will be implemented by the LACFCD will be multi-benefit stormwater projects that emphasize flood risk mitigation and water conservation and supply.

The LACFCD has a vested interest in increasing opportunities for stormwater capture and groundwater recharge as a means of assisting local water supply augmentation. The LACFCD will be working with the applicable Permittees and other stakeholders in all 12 EWMP watersheds to develop such projects. The EWMPs will be implemented by the Permittees that have jurisdiction within each EWMP area. The implementing agencies will be responsible for the contents of the EWMPs affecting their jurisdictions and for implementing the projects developed by the EWMPs.

2.2 Goals and Objectives

The primary goals and objectives of the EWMPs are:

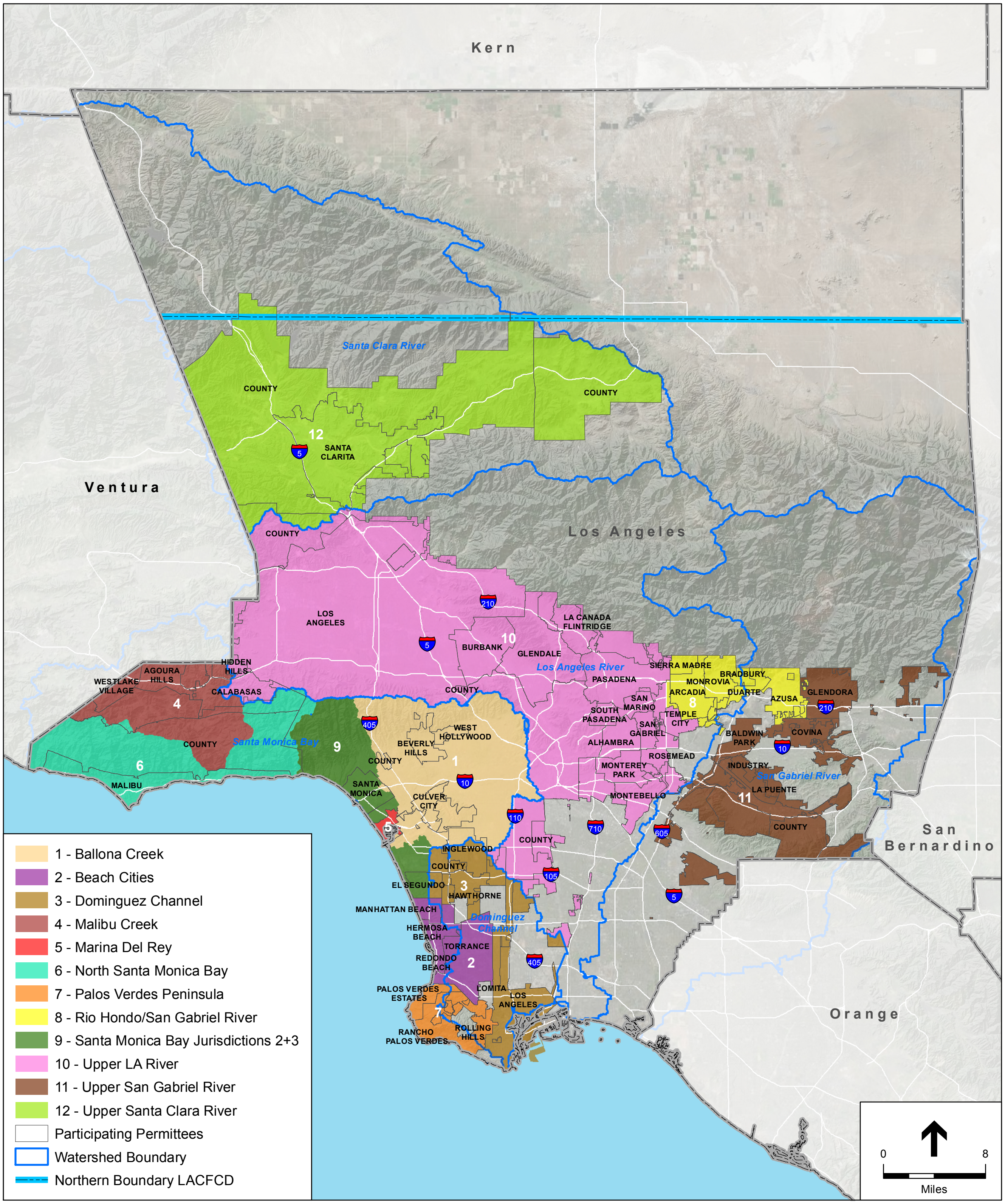
- To collaborate among agencies (Permittee jurisdictions) across the watershed to promote more cost-effective and multi-beneficial water quality improvement projects to comply with the MS4 Permit.
- To develop watershed-wide EWMPs that will, once implemented, remove or reduce pollutants from dry- and wet-weather urban runoff in a cost-effective manner.
- To reduce the impact of stormwater and non-stormwater on receiving water quality.

2.3 Watersheds, Participants, and Process

Following the adoption of the MS4 Permit by the Los Angeles Regional Water Quality Control Board (LARWQCB), some Permittees from each EWMP area formed WMGs to collaborate on the development of EWMPs. The proposed program includes several WMGs of Los Angeles County, covering the following EWMP areas: Ballona Creek, Beach Cities, Dominguez Channel, Malibu Creek, Marina del Rey, North Santa Monica Bay Coastal Watersheds, Palos Verdes Peninsula, Rio Hondo/San Gabriel River, Santa Monica Bay, Upper Los Angeles River, Upper San Gabriel River, and Upper Santa Clara River. The geographic scope covered by each of these 12 EWMPs is detailed in **Table 2-1** and shown in **Figure 2-1.**

TABLE 2-1 - EWMP PARTICIPANTS AND WATERSHEDS

Watershed Management Group	Affected Watersheds	Cities/Permittees	Lead/Coordinator
Ballona Creek	Ballona Creek Watershed	Beverly Hills, Culver City, Inglewood, Los Angeles, Santa Monica, West Hollywood, LA County, LACFCD	Los Angeles
Beach Cities	Santa Monica Bay Watershed Jurisdictional Group (SMB JG) 5 & 6, Dominguez Channel Watershed, and Machado Lake Watershed	Hermosa Beach, Manhattan Beach, Redondo Beach, Torrance, LACFCD	Redondo Beach
Dominguez Channel	Dominguez Channel Watershed, the Machado Lake Watershed, and the Los Angeles/Long Beach Harbors Watershed	El Segundo, Hawthorne, Inglewood, Los Angeles, Lomita, LA County, LACFCD	Los Angeles
Malibu Creek	Malibu Creek Watershed	Agoura Hills, Calabasas, Hidden Hills, Westlake Village, LA County, LACFCD	Calabasas
Marina del Rey	Marina del Rey Watershed	Culver City, Los Angeles, LACFCD, LA County	LA County
North Santa Monica Bay	SMB JG 1, SMB JG 4, and a portion of Malibu Creek within the City of Malibu's borders	LA County, LACFCD, Malibu	Malibu
Palos Verdes Peninsula	Most of the SMB JG7, the Los Angeles Harbor subwatershed, and the Machado Lake subwatershed	Palos Verdes Estates, Rancho Palos Verdes, Rolling Hills Estates, LA County, LACFCD	Rancho Palos Verdes
Rio Honda/San Gabriel River	Portions of the Los Angeles and San Gabriel River Watersheds	Arcadia, Azusa, Bradbury, Duarte, Monrovia, County, LACFCD, Sierra Madre	Sierra Madre
Santa Monica Bay	SMB JG2 and SMB JG3	Los Angeles, El Segundo, Santa Monica, LA County, LACFCD	Los Angeles
Upper LA River	Upper reaches of the Los Angeles River Watershed	Alhambra, Burbank, Calabasas, Glendale, Hidden Hills, La Canada Flintridge, Los Angeles, Montebello, Monterey Park, Pasadena, Rosemead, San Gabriel, San Marino, South Pasadena, Temple City, LA County, LAFCD	Los Angeles
Upper San Gabriel River	Portions of the San Gabriel River Watershed	Baldwin Park, Covina, Glendora, Industry, La Puente, LACFCD, LA County	LA County
Upper Santa Clara River	Upper Santa Clara River Watershed	LA County, LACFCD, Santa Clarita	Santa Clarita



SOURCE: ESRI.

LA County PEIR EWMP . 140474

Figure 2-1
Watersheds and EWMP Groups within LACFD Boundaries

2.4 EWMP BMP Types

A variety of BMP types are defined in the EWMP Work Plans and NOIs. The following section provides an overview of non-structural and structural BMP types that will be part of the EWMPs. This section also includes a summary of planned and ongoing projects listed in the EWMP Work Plans for each BMP type to provide information on the anticipated scale, construction methods, and general locations of these BMP types. Additional information and figures on the location and distribution of potential and priority BMPs based on available data at the time of publication of this PEIR, are presented in Section 2.5*, EWMP Watershed Characteristics and BMP Implementation Strategies*.

2.4.1 Non-Structural Control Measures/Institutional BMPs

These are policies, actions, and activities which are intended to minimize or eliminate pollutant sources. Most institutional BMPs are implemented to meet Minimum Control Measure (MCM) requirements in the MS4 permit; MCMs are considered a subset of institutional BMPs. These BMPs are not constructed, but may have costs associated with the procurement and installation of items such as signage or spill response kits. The MS4 Permit categorizes institutional BMPs into six program categories:

- ***Development Construction Programs***, which establish standards for stormwater management from construction sites of all sizes (e.g., with or without a stormwater pollution prevention plan [SWPPP]).
- ***Industrial/Commercial Facilities Programs***, which establish standards for pollutant reduction and control measures at industrial and commercial facilities.
- ***Illicit Connection and Illicit Discharges (IC/ID) Detection and Elimination Programs***, which describe procedures for identifying, eliminating, and reporting illicit connections and discharges to the stormwater system.
- ***Public Agency Activities Programs***, which describe a broad range of municipal practices such as street cleaning, landscape management, storm drain operation, and more.
- ***Planning and Land Development Programs***, which encourage the application of smart growth and low-impact development (LID) practices to development and redevelopment projects.
- ***Public Information and Participation Programs***, which educate and engage the public on a broad range of pollution- and stormwater-related issues.

Permittees can evaluate the MCMs, identify potential modifications that will address water quality priorities, and provide justification for modification or elimination of any MCM that is determined to be ineffective (with the exception of the Planning and Land Development Program, which may not be eliminated or modified). MCM customization may include replacement, reduced implementation, augmented implementation, focused implementation, or elimination.

Because the LACFCD has limited jurisdictional authority for ordinance and code enactment or enforcement, it is limited in application of MCMs to activities such as public information and participation programs.

2.4.2 Structural Control Measures/Structural BMPs – General BMP Types and Categories

Structural control measures are constructed BMPs that reduce the impact of stormwater and non-stormwater on receiving water quality. They are broken into three categories:

- ***Distributed Structural BMPs***, which treat runoff close to the source and typically implemented at a single- or few-parcel level (e.g., facilities typically serving a contributing area less than one acre).
- ***Centralized Structural BMPs***, which treat runoff from a contributing area of multiple parcels (e.g., facilities typically serving a contributing area on the order of tens or hundreds of acres or larger).
- ***Regional Structural BMPs***, which are meant to retain the 85th percentile storm over 24 hours from a contributing area. Generally, the 85^{th} percentile storm is approximately 0.75 inches over 24 hours

Whether distributed, centralized, or regional, the major structural BMP functions are infiltration, treatment, and storage that may be used individually or combination:

- ***Infiltration,*** where runoff is directed to percolate into the underlying soils. Infiltration generally reduces the volume of runoff and increases groundwater recharge.
- ***Treatment***, where pollutants are removed through various unit processes, including filtration, settling, sedimentation, sorption, straining, and biological or chemical transformations.
- ***Storage***, where runoff is captured, stored (detained), and slowly released into downstream waters. Storage can reduce the peak flow rate from a site, but does not directly reduce runoff volume.

The types of structural BMPs to be implemented will vary between EWMPs, but most EMWPs will include a variety of distributed, centralized, and regional BMPs.

Table 2-2 describes the sub-types of distributed, centralized, and regional structural BMPs that form the basis of the water quality improvements proposed in the EWMPs. The following sub-sections provide further description and examples of the BMP types and subcategories under the categories of distributed, centralized, and regional structural BMPs.

TABLE 2-2
TYPICAL STRUCTURAL BEST MANAGEMENT PRACTICES

Main BMP Category	BMP Types to be Assessed	Sub-types of BMPs
Distributed Structural BMPs	Site-scale detention	Dry detention basin Wet detention pond Detention chambers
	Green infrastructure/Low-impact development (LID)	Bioretention Biofiltration Permeable pavement Green streets Infiltration BMPs Bioswales Planter boxes Rainfall harvest
	Flow-through treatment BMPs	Debris booms/nets End-of-pipe nets Floating trash booms Hydrodynamic separators Water clarifiers Stormwater quality vaults
	Source control treatment BMPs	
Centralized Structural BMPs (do not retain the 85th percentile storm)	Infiltration BMPs	Surface infiltration BMPs (infiltration basins, infiltration trenches, infiltration galleries, bioretention, permeable pavement – implemented as single or multiple types), subsurface infiltration galleries Multi-directional infiltration BMPs (dry wells, hybrid bioretention and dry wells)
	Capture and use BMPs	Underground cisterns, storage and use as irrigation
	Bioinfiltration BMPs	Generally implemented as multiple types for regional BMPs: Bioretention with underdrain, bioinfiltration, high-flow biotreatment and raised underdrain, vegetated swales, filter strips
	Detention (promote settling out of larger particles)	Aboveground, belowground
	Treatment facilities (capture, storage and treatment-train)	
	Low-flow diversion (dry-weather flow and low-flow storm events)	
	Engineered/constructed wetlands	Aboveground, belowground
	Creek/river/floodplain/estuary restoration	
	Multi-benefit flood management project	
Regional Structural BMPs (retain the 85th percentile storm)	Infiltration	Surface infiltration BMPs: Infiltration basins, infiltration trenches, infiltration galleries, and bioretention-implemented as single or multiple types Multidirectional infiltration BMPs: Dry wells, hybrid bioretention, and dry wells
	Capture and use BMPs	Underground cisterns, storage, and use as irrigation

2.4.3 Distributed Structural BMPs – Overview and Example BMPs

The following discussion presents an overview of various types of distributed BMPs and illustrates these further through example projects. The example project lists are based on existing and planned projects that will be part of the EWMPs. Included with each overview of the types of these BMPs is a discussion of the anticipated construction activities to implement these projects.

Because of their nature (intended to treat runoff at the parcel-scale), distributed BMPs are most likely to be implemented in high-density urban, commercial, industrial, and transportation areas, where they will either replace or improve upon existing stormwater infrastructure. These types of BMPs are generally "retrofit" type projects that replace existing impervious surfaces with pervious surfaces such as bioinfiltration cells, bioswales, porous pavement, and filter strips that tie into existing stormwater management systems as part of the MS4. These projects may also augment the existing MS4 with additional inlet screens, filter media systems, sediment removal systems, and diversions to sanitary sewer lines. Types of distributed structural BMPs are discussed in the following pages; the definitions and photographs of these BMPs are from the "Structural Fact Sheets" as presented in some EWMP Work Plans (e.g., Ballona Creek).

Site-scale detention. Site-scale detention facilities are designed to detain runoff from an individual parcel and improve water quality through pollutant settling. Site-scale detention facilities can reduce peak flows and improve water quality by storing water in a basin before slowly draining the water through an orifice to the downstream waterway. Settling of sediment and sediment-bound pollutants is the primary pollutant removal mechanism. There are two primary types of site-scale detention: *dry detention basin*s, in which runoff fully drains during storm events, and *wet detention ponds*, which capture water in a temporary storage zone above a permanent pool. Both types are illustrated in the following photographs..

Drv Detention Basin

Wet Detention Pond

Anticipated Construction Activities: The construction of detention basins typically requires the permanent removal of aboveground infrastructure and/or surface materials such as asphalt and concrete for retrofit type projects and excavation and grading for projects on soil-covered sites. Ground disturbance for distributed detention is typically less than 1 to 2 acres in extent, but may extend in some limited applications up to 5 acres where space is available. Site soils must be excavated to create the desired storage volume for stormwater. The depth of excavation will vary with available space, existing grades, and desired storage volume. For these smaller-scale systems, excavation is likely to be several feet and up to 10 feet. Generally, excavation below

6 feet is limited by the size of these systems and available space to provide adequate slope grading for safety and stability. Berms may be used to increase storage to reduce cost of excavation. Berms for these types of projects are several feet. Higher berms may be possible in some limited locations where space is available. Increasing berm height increases the footprint of these facilities to accommodate side slopes for safety and stability factors. On parcels where there is adequate room, soils may be placed on-site to balance cut and fill; smaller parcels may necessitate the off-hauling of excavated soils. Construction of dry detention basins in areas with high groundwater may limit the depth of the basins to meet minimum groundwater separation distances. The construction of dry detention basins may include the installation of recreational elements (nets, benches, etc.) so that the basins can serve as playing fields when not inundated. Wet detention ponds may require engineering (separate outlet structures with low-flow orifices, circulation elements, etc.) to ensure that the permanent pool does not become stagnant and a magnet for mosquito production (must be emptied within 72 hours). Detention basin includes berms and outlet structures that control the volume stored and the flow and velocity of the discharge.

Green infrastructure/Low-impact development (LID). This BMP category describes a broad range of development elements that aim to manage and treat stormwater as a resource, and minimize the differences between pre- and post-development hydrology. BMP subtypes in this category include:

- ***Bioretention and Biofiltration.*** *Bioretention* areas are shallow, depressed, vegetated basins with permeable soil media and no underdrains. Runoff temporarily ponds on the surface of these basins before filtering through the soil. *Biofiltration* areas are bioretention areas with underdrains. Infiltration is these systems is considered incidental, although substantial infiltration can occur in some unlined systems. Both systems are illustrated below; these examples use planted filter media and an underdrain to remove pollutants from stormwater.

Residential Bioretention

Bioretention in an Alley

Parking Lot Biofiltration

Anticipated Construction Activities: Similar to distributed detention basins, distributed bioretention and biofiltration BMPs would typically require the permanent removal of aboveground infrastructure and/or surface materials such as asphalt and concrete for retrofit type projects and excavation and grading for projects on soil covered sites. Ground disturbance for LID distributed BMPs is typically less than 1 to 2 acres in extent, but may extend in some limited applications up to 5 acres where space is available and where linear projects extend to adjacent parcels. The extent of land disturbance depends on the type of distributed BMP and may be more linear for bioswales and filter strips, compared to larger continuous areas for bioretention cells that store and then filter or infiltrate stormwater. In areas proposed for biofiltration without suitably permeable soils, native soils will have to be excavated, amended, and put back in place, or replaced entirely with biofiltration media (e.g., coarse gravels). The replacement of local soils would likely require that those soils then be hauled off-site. Systems with underdrains may require more extensive excavation and construction so that the underdrain can be connected to the MS4. The depth of excavation for these distributed systems will vary from several feet and up to 10 feet depending on the thickness and number of filter and storage layers. Generally, excavation is limited to 4 to 6 feet below existing grade for these systems.

- ***Permeable Pavement.*** Permeable pavement is a stable load-bearing surface that allows for stormwater infiltration. Beneath the permeable surface is a crushed-rock/ aggregate reservoir that provides structural support while allowing runoff to percolate to the underlying soils. Permeable pavement can be fully infiltrating or can have an underdrain like biofiltration practices. There are multiple types of permeable pavement; three are illustrated below. The mixes for *pervious concrete* and *porous asphalt* exclude fines from the aggregate to create permeable void space. Permeable interlocking *concrete pavers* allow infiltration of stormwater through joints between the blocks.


Pervious Concrete


Permeable Interlocking


Porous Asphalt

Anticipated Construction Activities: Similar to distributed bioretention and biofiltration BMPs, porous pavement BMPs would typically require the permanent removal of aboveground infrastructure and/or surface materials such as asphalt and concrete for retrofit type projects and excavation and grading for projects on soil covered sites. Porous pavement projects are generally retrofit type projects to increase infiltration and/or filtering of stormwater, but may include installation in new development and redevelopment, which may require clearing and grubbing activities prior to installation. Ground disturbance for these systems is typically less than 1 to 2 acres in extent, but may extend in some limited applications up to 5 acres where space is available. The depth of excavation for these distributed systems will vary from several feet and up to 6 feet depending on the thickness and number of structural support, filter, underground stormwater storage, and underdrain transmission layers. Systems with underdrains will require additional excavation. Generally, excavation is limited to 2 to 6 feet below existing grade for these systems. The installation of permeable pavement is frequently associated with the reconstruction of transportation elements such as parking lots, sidewalks, non-motorized paths, and related features.

- ***Green streets.*** Green streets are systems of multiple BMPs arranged in a linear fashion within the street right-of-way (as opposed to a parcel-based implementation). Green streets are designed to reduce runoff and improve water quality of runoff from the roadway and adjacent parcels by replacing impervious surfaces with more porous ones, and directing stormwater to vegetated systems that can filter and infiltrate stormwater. Bioretention, biofiltration, and permeable pavement BMPs are commonly used in conjunction and can be hydraulically connected using subsurface stone reservoirs. The examples below show curb cuts that direct stormwater from the parking areas and roadways to a bioswale designed to collect, filter, and infiltrate stormwater.

Green Street

Green Street

Anticipated Construction Activities: The installation of green street BMPs is similar to the construction activities that are summarized for the porous pavement and the LID-type distributed BMPs provided above as these include elements of both these types. These BMPs would typically require the permanent removal of aboveground infrastructure and/or surface materials such as asphalt and concrete for retrofit type projects and excavation and grading for projects on soil covered sites. Ground disturbance for green streets is typically less than 1 to 2 acres in extent, but may extend in some limited applications up to 5 acres where space is available and where these more linear projects extend to adjacent parcels. In areas proposed for biofiltration without suitably permeable soils, native soils will either have to be excavated, amended, and put back in place, or replaced entirely with biofiltration media (e.g. coarse gravels). The replacement of local soils would likely require that those soils then be hauled off-site. Systems with underdrains may require more extensive excavation and construction so that the underdrain can be connected to the MS4. The depth of excavation for these distributed systems will vary from several feet up to 6 feet depending on the thickness and number of filter and storage layers. Generally, excavation is limited to 4 feet below existing grade for these systems.

- ***Infiltration BMPs.*** Infiltration BMPs capture and infiltrate runoff into unvegetated underlying soils. Runoff is typically stored in subsurface trenches or vaults filled with engineered soil media, gravel, or concrete chambers. There are multiple types of infiltration BMPs, including: *dry/wet wells*, which are gravel-surrounded vaults with perforated walls that receive runoff form a pipe and allow it to infiltrate into the ground, and infiltration trenches, which are media-filled trenches that capture runoff in pore space prior to infiltration. These following pictures illustrate these types of BMPs.

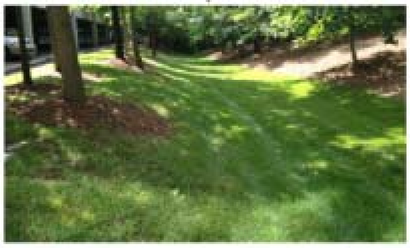
Various Dry-Well Sizes(Source: www.peerlessconcrete.com)

Infiltration Trench

Infiltration Trench

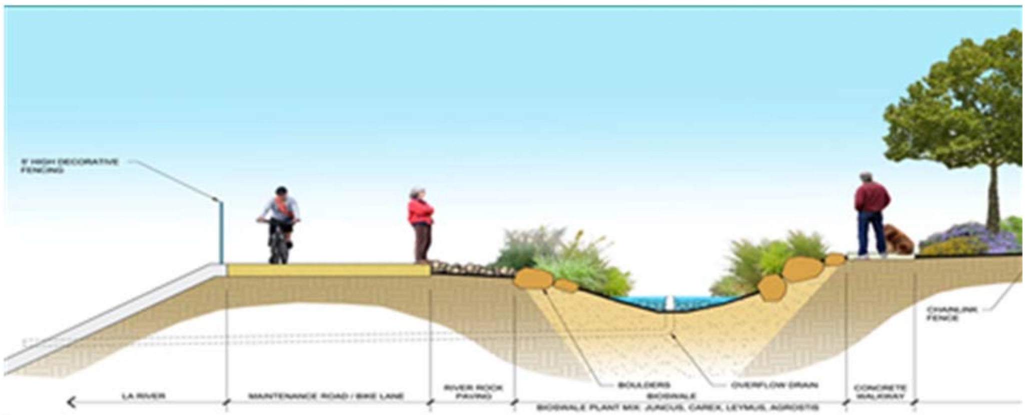
Anticipated Construction Activities: The ground disturbance footprint necessary to install infiltration BMPs can vary depending on the project's size and location. As illustrated above, infiltration trenches tend to be linear features and as such typically have relatively small footprints (less than 1 acre) unless they are very long (e.g., associated with transportation upgrades – roads, rail corridors, etc.). Subsurface excavation is typically required to replace native soils with highly porous infiltration media, vaults or other subsurface storage structures that will retain runoff and allow it to infiltrate into the subsurface. Larger underground storage and infiltration structures will require greater depths and volume of excavation. These types of infiltration BMPs may disturb larger (2 to 3 acres) areas. Larger systems are designed for multi-parcels and are characterized as centralized BMPs rather than distributed BMPs that are for one to two parcels. Depth of excavation of infiltration BMPs will depend on the storage requirements and depth to groundwater. Minimum separation distances of 10 feet to groundwater are typical. Excavation for these distributed type infiltration projects is generally 2 to 4 feet for infiltration trenches and 4 to 8 feet for vault and dry well systems. Dry/wet wells require deeper excavation but are more localized and smaller in footprint.

- ***Bioswales.*** Bioswales are BMPs that convey storm flow through vegetated, shallow depressions to remove sediment-associated pollutants by settling and filtering mechanisms. Infiltration and filtration through soil media are not key components of bioswales; rather, bioswales are typically implemented to act as pretreatment and used to transport runoff to an associated bioretention cell or infiltration type of distributed BMP to provide additional pollutant removal and volume reduction. There are two primary types of bioswales: vegetated swales (which are linear), vegetated channels that convey concentrated flow to another structural BMP (detention, infiltration, storage), and vegetative filter strips (which are more broadly sloped than swales).



Vegetated Swale

Vegetative Filter Strip



Bioswale Integrated with Community Park/Trail

Anticipated Construction Activities: The construction of bioswales typically requires the removal and off-hauling of any impermeable surfaces within the bioswale footprint, and the regrading of site soils to facilitate drainage to the associated storage/infiltration BMP. Bioswales with more landscaping and natural contouring elements may have more complex grading.

- ***Planter Boxes.*** Planter boxes are bioretention systems enclosed in concrete structures. They are most commonly designed to drain runoff from paved areas or roofs. They are typically used in urbanize settings where space constraints limit the implementation of other LID elements such as bioswales and biorentention systems. Planter boxes may be designed to both filter and store runoff using a series of filter media and aggregate layers below the vegetated layers. They can be used in combination with rain barrels and cisterns that store the runoff and then direct it these boxes to filter the runoff.

  Anticipated Construction Activities: Construction activities associated with planter boxes will be in most cases much less than other types of distributed BMPs as the footprint of these BMPs are generally smaller and integrated into the construction and design of existing buildings and structures. The space saving advantages limits construction disturbance. Planter boxes for retrofit projects are generally fabricated off-site and installed after the ground surface is graded and prepared for the planters. Soil, filter media, and aggregate are generally brought to the site and placed in the planter boxes per the design requirements. Some excavation may be performed if portions of the planters are set below ground and connected to existing drainage pipes and MS4 through an underdrain system in the planter box.

- ***Rainfall Harvest.*** Rainfall harvesting improves water quality by intercepting rooftop runoff and lowering the overall impervious impact of a developed site. Runoff can be reduced through interception and evapotranspiration on green roofs or used for alternative uses with a cistern or rain barrel. There are multiple kinds of rainfall harvest mechanisms; two of the more common are *green roofs* and *cisterns/rain barrels*. Green roofs are engineered, vegetated roof structures meant to intercept rainfall within a plant growth medium. Cisterns and rain barrels are storage tanks used to intercept and store rooftop runoff for nonpotable use such as landscape irrigation or gradual infiltration.

Green Roof

Cistern

Anticipated Construction Activities: Similar to planter boxes, construction activities associated with green roofs and cisterns will be in most cases much less than other types of distributed BMPs as the footprint of these BMPs are generally smaller and integrated into the construction and design of existing buildings and structures. Construction activities associated with rainfall harvest systems tend to be minimal unless cisterns are placed underground, in which case subsurface excavation would be necessary. The depth and extent of excavation will depend on the size of the cisterns, but for single to several parcel distributed systems, the excavation will generally be limited to 4 to 6 feet and an area of less than an acre.

- ***Flow-Through Treatment BMPs.*** Manufactured flow-through devices are commercial products that aim to provide stormwater treatment using patented, innovative technologies. Typical types of manufactured devices for stormwater management include *cartridge/media filters* and *high-flow biotreatment devices*. Cartridge/media filters are proprietary filtration devices used to remove pollutants; high-flow biotreatment devices are modular, vault-type practices that contain high-flow media and typically incorporate vegetation.

Media/Cartridge Filter

High-Flow Biotreatment(Photo Source: Jonathan Page, NCSU-BAE)

Curb Inlet Biofilter

Anticipated Construction Activities: The construction activities necessary to install flow-through treatment BMPs can vary based on the location, size, and configuration of the BMP. These BMPs are generally installed as part of the MS4 within catch basins and curb inlets. Typically, flow-through BMPs have a relatively small footprint (< 1 ac) because they are designed to provide a higher rate of pollutant removal/transformation than less engineered approaches (e.g. infiltration trenches). Stormwater moves through most flow-through treatment BMPs via gravity flow. This may require expansion of existing catch basins or installation of new catch basin or vaults to intercept and direct storm flows to these treatment units and back into the MS4. This may then require limited subsurface excavation and off-hauling to create the below-grade space for the treatment device. The extent and volume of excavation is much less than LID, retention and Green Street projects.

- ***Source Control BMPs.*** Source control structural BMPs are commercial products designed to treat runoff in highly urbanized environments. Mechanical separation, or more complex physicochemical processes, provides separation of gross solids and other pollutants. Many models feature media or materials designed to sequester hydrocarbons and other pollutants. Two types of source control BMPs are illustrated below: *catch basin inserts*, which use nets, screens, fabric, or similar filtration media to separate sediment and gross solids from stormwater, and *hydrodynamic separators*, which use screens, baffles, or vertical flow to separate the two.

Catch Basin Insert

Hydrodynamic Separator

Connector Pipe Screen

Anticipated Construction Activities: Similar to flow-through devices, the construction activities necessary to construct source control BMPs can vary based on the location, size, and configuration of the BMP, but are generally less than other types of distributed BMPs. Source control measures such as catch basin inserts and connector pipe screens are typically installed as retrofits to the existing MS4 within catch basins and curb inlets, and generally do not result in an increased ground disturbance footprint. Hydrodynamic separators may require expansion of existing catch basins or installation of new catch basins or vaults to intercept and direct storm flows to these treatment units and back into the MS4. This may then require limited subsurface excavation and off-hauling to create the below-grade space for the treatment device. The extent and volume of excavation is much less than LID, retention and Green Street projects, and is usually limited to less than one acre.

Specific examples of distributed BMPs that are in various stages of planning and implementation and part of a possible EWMP are presented in **Table 2-3**. The locations of these examples of planned distributed BMPs are shown in **Figure 2-2**. Table 2-3 presents the locations, project description, and key elements of the distributed BMPs to further illustrate these types of structural BMPs that may be part of an EWMP. Additional information and figures on the location and distribution of potential and priority BMPs, where data is available, are presented in Section 2.5, *EWMP Watershed Characteristics and BMP Implementation Strategies*.

TABLE 2-3
EXAMPLES OF PLANNED OR INSTALLED DISTRIBUTED BMP PROJECTS

EWMP Group	Project Name and Photo	Status of Project	Project Description	Project Features: Treatment	Recharge/ Infiltration	Storage	Habitat Restoration	Water conservation/ Reuse	Improved landscaping and aesthetics	Water Quality	Flood Protection	Wetland	Recreation
Dominguez Channel	**Phase IV Trash TMDL Implementation** 	Installation of catch basin covers began the summer of 2013.	This project primarily proposes the installation of catch basin (CB) opening screen covers and inserts in those structures found in the Santa Monica Bay, Machado Lake, and Dominguez Channel watersheds of the City of Los Angeles. The CB opening screen covers are coarse screens that are installed in the CB openings and prevent trash from entering the storm drain system. Each CB opening screen cover has a self-opening device activated by a predetermined street gutter flow to disengage its locking mechanism. The CB inserts are perforated screens that are installed inside the CB in front of the outlet pipe of the catch basin.	●						●			
Malibu Creek	**Citywide Smart Irrigation Control System** 	Unknown	This project calls for the installation of a smart irrigation control system using evapotranspiration technology. This system would be put into place at all City of Calabasas-owned facilities, street medians, and parkways. This project will reduce irrigation run off and prevents pollutants from reaching the receiving waters. Replacement of irrigation controllers is projected to provide regional benefits by reducing urban runoff that is associated with nutrient loaded recycled water used for irrigation and will reduce discharges of other pollutants to the MS4 system carried by overwatering of landscaped areas. The City uses 66,431 gallons of water on annual basis for landscape irrigation. It's anticipated that with the new system, the City will save between 13,300 to 16,600 gallons of water. It will translate to approximately 5,000 to 7,000 gallon of reduction in run-off.					●		●			

EWMP Group	Project Name and Photo	Status of Project	Project Description	Project Features: Treatment	Recharge/ Infiltration	Storage	Habitat Restoration	Water conservation/ Reuse	Improved landscaping and aesthetics	Water Quality	Flood Protection	Wetland	Recreation
North Santa Monica Bay Coastal Watersheds	**Wildlife Road Storm Drain Improvements** 	Construction work on the Wildlife Road Storm Drain Improvements project was scheduled to begin March 2014 and continue through August 2014.	This project is located within a developed residential neighborhood. Two existing storm drain inlets, SD-1 and SD-2 are located on Whitesands Place and Wildlife Road in the City of Malibu. The Project consists of the installation of bioretention swales and biofilters within the City Right of Way, treating stormwater and urban runoff prior to the entering of flows into City-owned catch basins. Due to the limited about of space within the City's Right of Way, the project will include a combination of bioretention swales and biofilters.	●						●			
Palos Verdes Peninsula	**Model Equestrian Center** 	Completion anticipated June 2015	The Model Equestrian Center project will use the existing municipal Peter Weber Equestrian Center, a 7.5-acre facility that houses 116 horses, to create a public demonstration site for environmentally sustainable horse-keeping practices while improving the quality of stormwater and other runoff. This project will be divided into two parts. Part A of this project will involve retrofits of the existing equestrian facilities to improve drainage and stormwater runoff quality. These retrofits will include downspout redirection, drainage correction from existing horse stalls, bioswale or similar water quality treatment system installation, cover for daily manure storage, and drainage improvements to existing arenas and the overall site. Water quality will be improved by providing a permanent cover for daily manure storage, directing runoff away from areas where horses are kept, and bioswales will provide stormwater treatment by filtering large particles in the swale and removing smaller particles and associated contaminants through the bioretention portion provided by the vegetation. Part B of this project involves new construction. A new 15,000-square-foot barn and associated improvements will be constructed on the 2.5-acre northwest portion of the site. Key water quality features will include a covered horse wash area with wash water captured and reused for subsurface irrigation to maintain appearance of habitat buffers and treatment bioswales, manure management to control vectors, odors and runoff, and a cistern or rain barrels to collect rainfall from the barn roof for use in irrigation. In addition, the facility will use low-impact development (LID) and green building techniques, integrated pest management through structural design, and equine-safe native and drought-proof plant buffers. Interpretive signage will demonstrate and educate the equestrian community on how the BMPs protect and improve stormwater quality. This signage will be installed to educate horse boarders and visitors on the specific BMPs integrated into the facilities and on the site.	●				●		●			
Upper LA River	**Brandon Street and Green Street Improvements Project** 	Construction Spring 2014 to Fall 2014	The project will reconstruct approximately 0.16 miles of roadway on Green Street and 0.39 miles on Brandon Street. The design includes several green street elements including permeable pavers, bio-retention planters, sediment filtration catch basins, and an underground infiltration basin. Much of the runoff from the streets and private properties that would have otherwise drained to the Rio Hondo will be directed to the infiltration area.	●	●			●		●	●		

EWMP Group	Project Name and Photo	Status of Project	Project Description	Project Features									
				Treatment	Recharge/ Infiltration	Storage	Habitat Restoration	Water conservation/ Reuse	Improved landscaping and aesthetics	Water Quality	Flood Protection	Wetland	Recreation
Upper San Gabriel River	**Avocado Heights Multiuse Trail Project** 	Constructed	The project will construct multiuse trails to provide a safer route to equestrian, bicycle, and pedestrian users away from existing traffic hazards. The majority of the existing roadway width will be reduced from 40 to 36 feet, thereby reducing the amount of impermeable surfaces as well as runoff. Approximately 2,300 feet of the multiuse trail on 5th Avenue will be constructed with decomposed granite to provide 14,000 cubic feet of infiltration capacity. In addition, an infiltration swale will be constructed at the end of 5th Avenue immediately adjacent to San Jose Creek to provide 3,200 cubic feet of capacity. Combined together, up to 115 acre-feet of groundwater will be recharged annually.	●	●	●				●	●	●	
Upper Santa Clara River	**Trash removal BMPs** 	Planned Implementation Date July 2015	Trash removal BMPs for 79 storm drains in a commercial/industrial park (County of LA) and 110 storm drain inlets in a commercial/industrial park (City of Santa Clarita).	●						●			

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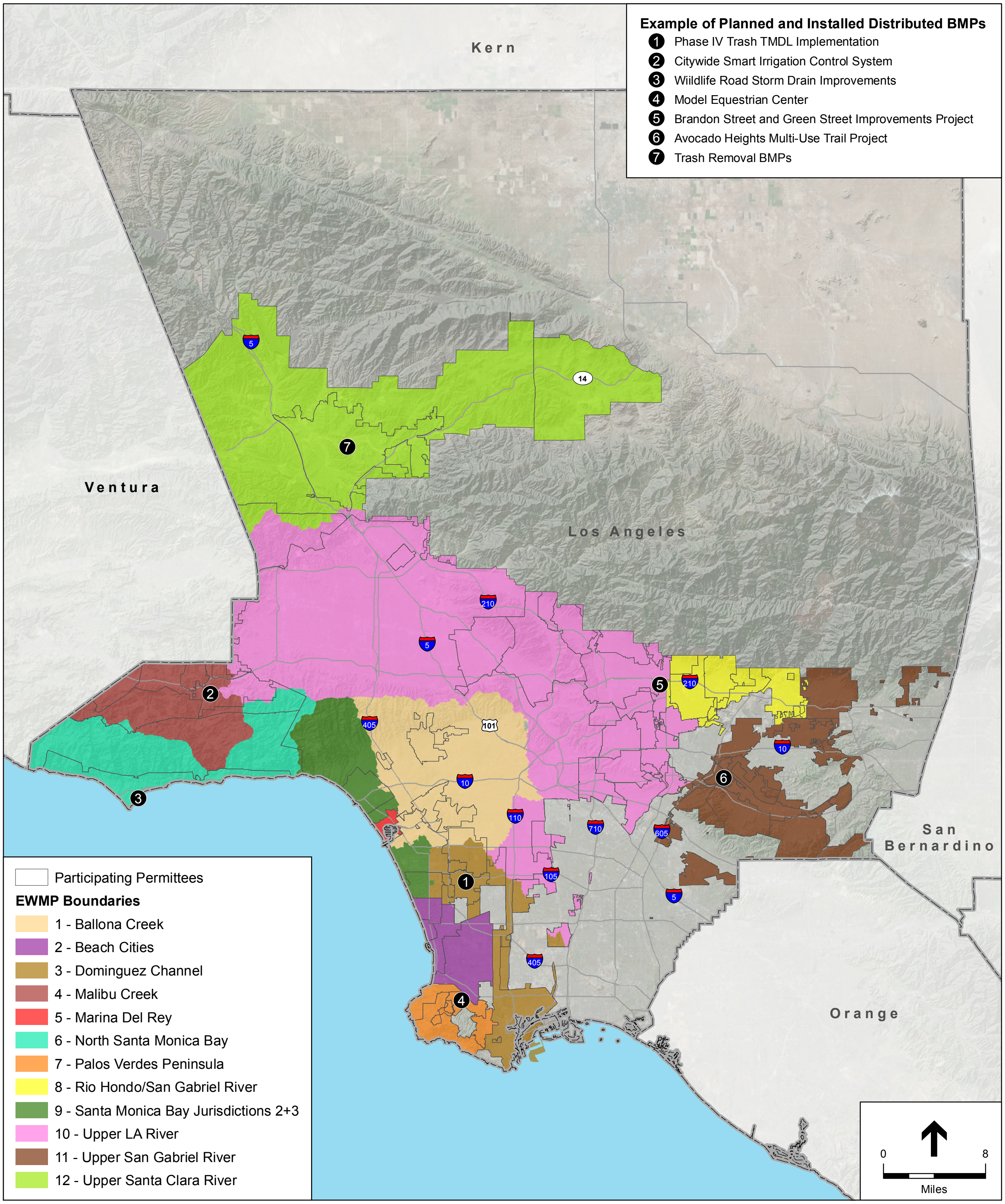


SOURCE: ESRI.

LA County PEIR EWMP . 140474

Figure 2-2
Location of Example Planned and Installed Distributed BMP Projects

2.4.4 Centralized Structural BMPs

Centralized structural BMPs use similar elements to the LID, infiltration and biofiltration type BMP used in distributed structural BMPs, but collect, store, treat and filter stormwater from multiple parcels and much larger drainage areas. Centralized BMPs also include diversion and treatment type BMPs that use similar technologies for these types of BMPs under distributed BMPs, but can be implemented on a much larger scale collecting, diverting and treating urban runoff (dry-weather flows) or limited stormwater flows from multiple parcels and large drainage areas. Therefore, centralized structural BMPs require greater footprints for construction and implementation, but provide a greater potential for water quality improvement through the filtering, treatment and/or infiltration of greater volume and rates of stormwater and urban runoff. Centralized BMPs that include storage and infiltration or storage and use have similar functions and construction methods to regional BMPs using the same stormwater management elements. However, regional BMPs have the distinct requirement per the Permit to retain on-site the 85th percentile 24-hour storm event for the drainage area served by the BMP (i.e., in the Los Angeles area, the 85th percentile storm is around 0.75 inch of rain in a 24-hour period). Finally, centralized BMPs include two unique BMP types, treatment wetlands and stream/creek restoration projects. Unlike the other structural BMP types described, these BMPs use natural systems to filter and clean the water. Treatment wetlands are typically off-line treatment systems that are not in the receiving waters, but may have habitat benefits through the establishment of more native plants and ecosystems. Creek, river, and estuary restoration projects provide a unique opportunity to restore natural cleansing processes, reestablish habitats and address impacts from hydromodification and urban runoff. These projects are the only BMPs that are implemented within the receiving water. Types of centralized structural BMPs and the definitions for these BMPs (which were taken from Los Angeles Department of Public Works' "Structural Fact Sheets") include the following:

- ***Infiltration BMPs.*** Infiltration facilities are designed to decrease runoff volume through groundwater recharge and improve water quality through filtration and sorption. Facilities can incorporate engineered media to improve percolation into native soils. Infiltration facilities can be *open-surface basins* or *subsurface galleries* (see the following photographs). Surface infiltration basins can be vegetated to encourage evapotranspiration and aesthetics; subsurface infiltration galleries are often used when limited land is available for BMP implementation. An example of a centralized infiltration BMP is the infiltration gallery that was installed as part of the Elmer Avenue Neighborhood Retrofit Project in Los Angeles. The project includes two infiltration galleries capable of infiltrating over 1,300 gallons a minute from a 40-acre drainage area (CWH 2014). Catch basins divert stormwater to the infiltration galleries, while bioswales capture and treat additional urban runoff.

Surface Infiltration Basin

Subsurface Infiltration Gallery

Anticipated Construction Activities: Centralized infiltration facilities are generally larger than distributed BMPs and can vary from 2 to 10 acres in size, depending on the number of parcels (drainage area). Subsurface excavation is typically required to replace native soils with highly porous infiltration media, vaults or other subsurface storage structures that will retain runoff and allow it to infiltrate into the subsurface. Larger underground storage and infiltration structures will require greater depths and volume of excavation. Depth of excavation of infiltration BMPs will depend on the storage requirements and depth to groundwater. Minimum separation distances of 10 feet to groundwater are typical. Excavation for these centralized infiltration project is generally 2 to 6 feet for surface infiltration and 4 to 10 feet for vault or infiltration gallery systems. Excavated soils must also be off-hauled unless the site is of an adequate size to allow balancing of cut and fill on-site. Subsurface infiltration galleries require that subsurface soils be excavated and replaced with highly permeable structures that rapidly infiltrate stormwater. These structures are typically transported to the site on flatbed trucks and then lowered into the ground using specialized cranes and related equipment. Subsurface infiltration galleries also require pretreatment facilities to remove sediment and debris prior to entering the galleries or vaults to reduce the potential for clogging. These systems increase the project footprint and required excavation by 25 to 50 percent of the vault footprint.

- ***Capture and Use BMPs.*** Capture and use BMPs capture stormwater runoff and store it for later use, typically as irrigation water. An example of a centralized capture and use BMP is the cistern at the Tuxford Green Project in Los Angeles. The cistern can hold up to 45,000 gallons of treated stormwater, which is then used to irrigate native landscaping.

  Anticipated Construction Activities: The construction activities for these BMPs are similar to those summarized for the infiltration galleries above with the exception that these galleries and vaults are designed to retain and reuse (not infiltrate) the stormwater. In addition to the anticipated ground surface disturbance and excavation for the installation of the underground storage units, these systems also require a pre- and post-treatment system that generally consist of additional and more sophisticated treatment steps and thereby a larger footprint. In addition, these systems need to be connected to a distribution system for the treated water that can be used for irrigation or for grey water or groundwater recharge systems. This additional infrastructure will require additional construction grading, excavation, and transportation of materials and equipment on--- and off-site.

- ***Bioinfiltration BMPs.*** Centralized bioinfiltration BMPs are a larger-scale version of their distributed counterpart, and typically incorporate elements of both infiltration (using native soils or underdrains) and treatment (using vegetated swales or filter strips).

  Anticipated Construction Activities: Bioretention and biofiltration BMPs typically require the permanent removal of aboveground infrastructure and/or surface materials such as asphalt and concrete for retrofit type projects and excavation and grading for projects on soil covered sites. Ground disturbance for bioinfiltration centralized BMPs is typically 2 to 5 acres in extent, but may extend in some limited applications up to 10 acres where space is available. The extent of land disturbance depends on the type of BMP and may be more linear for bioswales and filter strips, compared to larger continuous areas for bioretention cells that store and then filter or infiltrate stormwater. In areas proposed for biofiltration without suitably permeable soils, native soils will either have to be excavated, amended, and put back in place, or replaced entirely with biofiltration media (e.g., coarse gravels). The replacement of local soils would likely require that those soils then be hauled off-site. Systems with underdrains may require more extensive excavation and construction so that the underdrain can be connected to the MS4. The depth of excavation for these distributed systems will vary from several feet to up to 10 feet depending on the thickness and number of filter and storage layers. Generally, excavation is limited to 4 to 6 feet below existing grade for these systems.

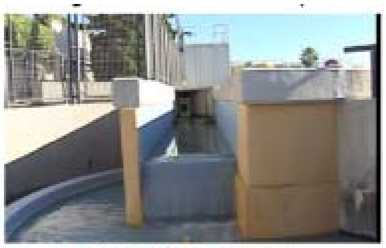
- ***Detention BMPs.*** Centralized detention facilities are designed to detain runoff and improve water quality through pollutant settling. Facilities encourage settling by decreasing runoff flow rates and allowing ponding to occur. Detention facilities can be open-surface practices or subsurface galleries and can be dry during non-rainy seasons or wet year-round. *Surface detention basins* are designed to detain stormwater runoff for a specified amount of time so that particle-bound pollutants can settle. *Subsurface detention galleries* are underground storage systems designed to detain water in areas where limited land is available for BMP implementation.

Surface Detention Basin

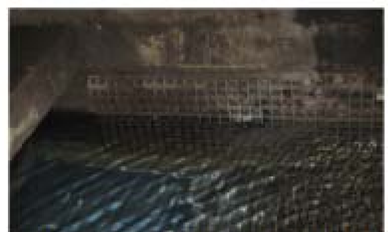
Subsurface Detention Gallery

  Anticipated Construction Activities: Centralized detention facilities can range from between an acre to 5 acres in size, and up to 10 acres. Surface detention basins require the removal and off-hauling of surface armoring and infrastructure, as well as the excavation of adequate soil to create the target storage volume. Excavated soils may either be balanced on-site or hauled off-site; the latter is more likely in most cases due to the larger size of centralized basins. Surface detention basins may in some cases be utilized as recreational facilities during the dry season, allowing for the installation of features such as athletic fields and benches. Subsurface detention galleries require the excavation of native soils and their replacement with engineered structures that detain water underground. The construction and installation of these structures can be complex and require the use of specialized cranes and related construction equipment.

- ***Treatment Facilities and Low-Flow Diversions.*** Other centralized water quality technology falls into the *low-flow diversion* (LFD) and *treatment facilities* subcategories. LFDs reduce stormwater pollution by diverting a design flow rate to a sanitary sewer for treatment. Treatment facilities convey stormwater through a physical, chemical, or radiological treatment system before returning it to the original channel, or diverting it for beneficial reuse. Below are photographs of an example LFD. LFDs may include on-site treatment of the diversion low flows prior to discharge back into the storm drain, or diversion to a local wastewater treatment plant. The LFD that has been installed at Marie Canyon in Malibu, shown in the photographs below, has an on-site treatment facility to reduce indicator bacteria concentrations prior to discharge back into the storm drain. This LFD is designed to filter and treat as much as 100 gallons per minute of dry-weather flows (Los Angeles Department of Public Works, 2007).



Treatment Facility



Low-Flow Diversion Dam and Inlet in a Storm Drain

Marie Canyon Low-Flow Diversion – Flat Gate Diverting flow to treatment unit for bacteria

Anticipated Construction Activities: Low-flow diversions and treatment facilities usually have a relatively small footprint of less than 2 acres. Construction typically requires subsurface excavation and off-haul of excavated soils in order to create adequate room for the subsurface engineered structures. The installation of these BMPs can often be complex due to the need to retrofit existing stormwater infrastructure and, in the case of LFDs, connect to active wastewater treatment infrastructure.

- ***Constructed Wetlands.*** Constructed wetlands are engineered, shallow-marsh systems designed to control and treat stormwater runoff. Particle-bound pollutants are removed through settling, and other pollutants are removed through adsorption and biogeochemical transformation. Constructed wetlands must always maintain a baseflow into the system, which can come from an intersected groundwater or an associated LFD using dry-weather flows. There are two primary types of constructed treatment wetlands: *wetland basins*, which have shallow permanent pools and outlet structures that regulate dewatering, and *flow-through/linear wetlands*, which are typically constructed parallel to existing channels so water can be easily diverted in/out of the wetland. An example of a treatment wetland includes the South LA Wetland Park, which will use an approximately 4.5-acre constructed wetland to treat a portion of the runoff from a 525-acre tributary watershed.

Wetland Basin

Flow-Through/Linear Wetland

Anticipated Construction Activities: Due to their multi-benefit nature and their ability to provide significant habitat benefits (most wetlands within the Los Angeles Basin have been lost to development and urbanization), most constructed wetland projects are greater than 5 acres in size and may be up to 10 acres or larger. Typical constructed wetland projects require extensive grading of site soils, though excavated soils are often balanced on-site to provide material for levees, berms, ecotones, and other flood control/habitat features. Many constructed wetland projects require the construction/installation of water control structures such as screw gates and culverts to manage how water is directed into, out of, and through the wetland. Constructed wetlands are often actively planted to accelerate the establishment of mature wetland vegetation and resultant stormwater treatment.

- ***Creek/River/Floodplain/Estuary Restoration.*** This category includes multi-benefit projects that typically combine elements of habitat restoration for fish and wildlife as well as flood management and water quality improvement. Project components such as setback levees, floodplain bench excavation, levee breaches, and other actions can increase the flood storage capacity of a water body and thereby slow flow rates. An example of a multi-benefit creek restoration project is the Tujunga Wash Greenway and Stream Restoration Project in Los Angeles. This project restored 1.2 miles of natural-bottomed creek habitats, which are capable of infiltrating up to 118 million gallons of stormwater form the wash into the local groundwater aquifer. Plants in the wash also aid the biogeochemical removal of pollutants such as nitrogen.

Before and After – Tujunga Wash Greenway Restoration Project

Anticipated Construction Activities: These projects may require ground disturbance and construction to convert lined flood channels into more naturalized creek/river systems. Projects are typically greater than 5 acres in size, and many have footprints of over 10 acres. This category of BMP may require removal and off-hauling of concrete and asphalt, grading/excavation/off-hauling of site soils (particularly if contaminants are present, since they could pose a threat to the health of fish and wildlife), the construction of elements such as setback levees and water control structures, and active revegetation with native plants. Projects that aim to enhance habitats within more naturalized settings (e.g., floodplain expansion along an unarmored/channelized creek) would have to account for the potential for construction to disturb existing natural communities, and incorporate appropriate impact avoidance/minimization/mitigation measures, though most projects are designed to be self-mitigating.

- ***Multi-benefit flood management projects.*** This category includes a broad range of redevelopment, transit, transportation improvement, and related projects that are designed to result in direct or indirect benefits to flood management. For example, greenway projects such as the Tujunga Wash Greenway project that incorporates infiltration and/or detention elements can improve flood management by reducing stormwater flow rates and/or volumes.

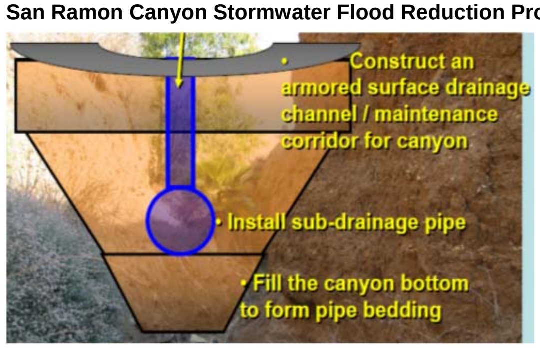
  Construction Impacts. Multi-benefit flood management projects are typically expansive projects that range from a few to tens of acres in size. Construction requirements can vary extensively based on the nature of the project. Because of their scale, multi-benefit flood management projects usually require extensive excavation and grading of site soils, off-hauling of soils and related materials, utility relocation, infrastructure construction, and related activities. It is not uncommon for these types of projects to be constructed over multiple construction seasons.

Specific examples of centralized BMPs that are in various stages of planning and implementation and are part of the EWMP are presented in **Table 2-4**. The locations of these examples of planned and implemented centralized BMP are shown in **Figure 2-3**. Table 2-4 presents the location, project description and key elements of the centralized BMPs to further illustrate these types of structural BMPs that are part of the EWMP. Additional information and figures on the location and distribution of potential and priority BMPs, where data is available, are presented in Section 2.5, *EWMP Watershed Characteristics and BMP Implementation Strategies*.

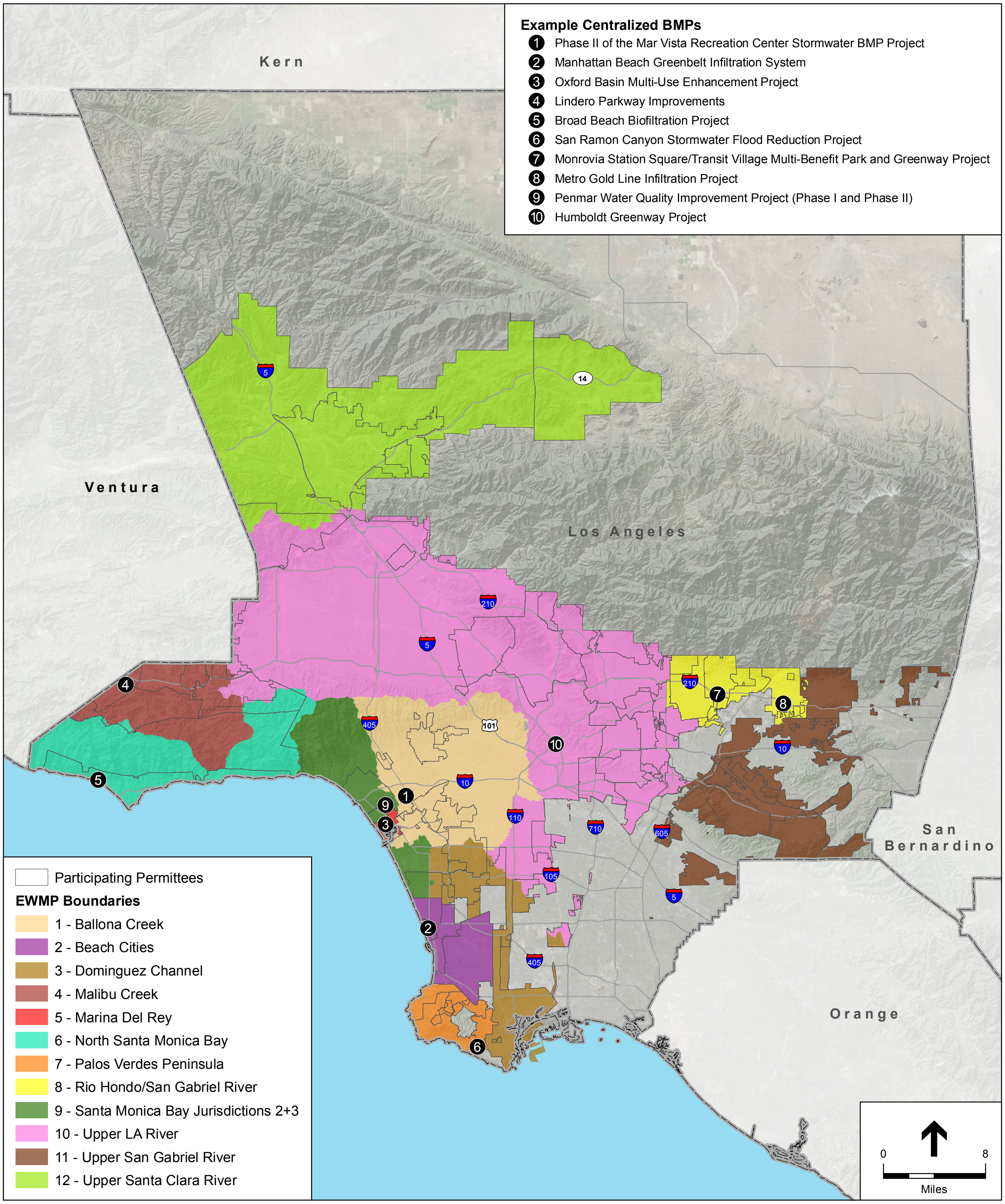
TABLE 2-4
EXAMPLES OF PLANNED CENTRALIZED BMP PROJECTS

EWMP Group	Project Name and Photo	Status of Project	Project Description	Project Features									
				Treatment	Recharge/ Infiltration	Storage	Habitat Restoration	Water conservation/ Reuse	Improved landscaping and aesthetics	Water Quality	Flood Protection	Wetland	Recreation
Ballona Creek	**Phase II of the Mar Vista Recreation Center Stormwater BMP Project** 	Phase II is expected to be completed by December 2014.	The Phase II project components are expected remove 6,000 gallons per day (5.5 acre-ft/year) of stormwater and provide additional storage space for the underground cisterns that were constructed during Phase I. Phase I facilities include : 1) storm drain diversion structure; 2) trash maintenance hole; 3) stormwater lift station; 4) hydrodynamic separator; 5) 270,000-gallon underground detention tank; 6) disinfection facility; 7) overflow/return piping; and 8) pump and control systems. Phase I was completed and is operational at limited capacity. Phase II includes the following stormwater beneficial reuse components: • Stormwater drip irrigation system for 43 shrubs, 86 bushes, and 68 trees • Installation of an irrigation pump station and associated components • Creation of 3,800 square feet of plant community • Installation of back-flow prevention system • Construction of flow containment curbs The objective of Phase II is to include an irrigation system to beneficially use the treated water at the park, to increase the treatment capacity of the facility and associated pollutant load reductions and to conduct a facility optimization project to fine-tune the grey and green infrastructure components of the project and optimize overall performance of the facility.	●		●		●	●	●			
Beach Cities WMG	**Manhattan Beach Greenbelt Infiltration System**  	The project construction was completed February 19, 2013.	The Manhattan Beach Greenbelt Infiltration project was designed to utilize the linear greenbelt parkland which runs through the City of Manhattan Beach to intercept and infiltrate dry-weather and wet-weather low flows from existing storm drains that cross or abut the parkway. Low flows from a 50-acre drainage area are screened to remove trash and gross solids before flowing by gravity to a subsurface infiltration system which also provides limited storage of storm flows for subsequent percolation into the sandy soils below the greenbelt. The Greenbelt Low Flow Infiltration system was designed to effectively divert dry-weather and wet-weather low flows from the storm drain system year round.	●	●	●			●	●			

EWMP Group	Project Name and Photo	Status of Project	Project Description	Project Features: Treatment	Recharge/ Infiltration	Storage	Habitat Restoration	Water conservation/ Reuse	Improved landscaping and aesthetics	Water Quality	Flood Protection	Wetland	Recreation
Marina Del Rey	**Oxford Basin Multi-Use Enhancement Project** 	LACFCD anticipates the project to commence construction by the end of this year or early 2015.	The project involves removing approximately 3,000 cubic yards of accumulated contaminated sediment from the bottom of Oxford Basin, constructing a berm in the center of Oxford Basin to enhance water quality through circulation, planting new native or drought-resistant plants, and installing new bioswales. The proposed berm that will be installed to improve circulation, in conjunction with the reprogramming of the operating cycles of the existing tide gates, will maximize the circulation of the water around the berm during the daily tidal cycles. During a rising tide, the water will enter via one of the tide gates on one side of the new berm, circulate around Oxford Basin, and then exit via a second tide gate during a falling tide. This innovative approach to improving water quality through circulation will increase dissolved-oxygen levels in the water within Oxford Basin, which is expected to result in less algae growth, lower bacteria levels, and reduction of unpleasant odors. The proposed project will also implement Low-Impact Development features to reduce the impacts of the existing roads adjacent to Oxford Basin. The project's Low-Impact Development features include a bioswale along the bike path at Washington Boulevard to collect surface runoff and two bioretention systems along Admiralty Way to collect local runoff from the roadway. The project will also enhance recreational opportunities for visitors through the installation of observation areas and decks, interpretive signage, a lighted walking/jogging path, and fencing that will provide enhanced viewing of the improved habitat.	●			●		●	●			●
Malibu Creek	**Lindero Parkway Improvements**  	Construction of the proposed improvements is expected to commence either Spring 2015 or early Summer 2015.	The project is part of an overall City of Westlake Village streetscape improvement project that creates infiltration and urban pollutant mitigation opportunities along all arterial medians and parkways. This parkway project is 30 foot wide by over a mile long. Half of this parkway was originally a flood control maintenance road and the other half a landscaped area. This project will have a Riparian Zone theme. With the new project, the combined width of the old maintenance road and landscaped area, this area will become a new walking path where there is currently no sidewalk. This project, when completed, will provide a long and meandering walking path with conversation seating areas. This project will also include drainage facilities that will include specific BMP's. The newly renovated area will be drained via bio-swales throughout the entire length of the project. These swales will meander thru the entire length with the main goal of percolation and evaporation of all nuisance flows throughout the year. Stormwater runoff would then be treated in the bio-swale followed by discharge into Westlake Lake. This project will also have educational signage on a riparian zone and the stormwater cleanup objectives of this project.	●					●	●	●		●

EWMP Group	Project Name and Photo	Status of Project	Project Description	Project Features: Treatment	Recharge/ Infiltration	Storage	Habitat Restoration	Water conservation/ Reuse	Improved landscaping and aesthetics	Water Quality	Flood Protection	Wetland	Recreation
North Santa Monica Bay Coastal Watersheds	**Broad Beach Biofiltration Project** 	January 2014 (Commencement of Construction) June 2014 (Completion)	The Project consists of the installation of different types of biofilters at nine catch basins within the City of Malibu Right of Way, treating stormwater and urban runoff prior to the entering of flows into City-owned catch basins, which discharge to privately owned storm drain systems. The Project includes a combination of biofilters, and flow control, with potential to incorporate harvest and use systems for Malibu drains. Three types of biofilters are contemplated; small footprint biofilters, biofilters with volume control, and harvest and use systems.	●				●		●			
Palos Verdes Peninsula	**San Ramon Canyon Stormwater Flood Reduction Project** 	Anticipated to be completed June 2015.	The San Ramon Canyon provides a natural drainage course for areas near Palos Verdes Drive East. Because of the geographical characteristics of the San Ramon Canyon, landslide induced rock and soil deposits in the canyon bottom are transported during heavy rainfall events. This creates flooding of the roadway, overwhelming existing drainage facilities, endangering nearby roadway integrity and threatening downstream residents. The San Ramon Canyon Stormwater Flood Reduction Project, involves significant drainage restoration work to stabilize Palos Verdes Drive East and Palos Verdes Drive South.							●	●		
Rio Honda - San Gabriel River	**Monrovia Station Square/Transit Village Multi-Benefit Park and Greenway Project** 	Planned Implementation Date Spring 2015.	This project will include design and development of a 2.5-acre multi-benefit green space along the future Metro Gold Line Foothill Extension. The project includes a multi-use trail, native trees and shrubs, runoff storage and infiltration systems prior to discharging into Sawpit Wash and Peck Road Water Conservation Park to the south.	●	●	●			●	●			●

EWMP Group	Project Name and Photo	Status of Project	Project Description	Project Features: Treatment	Recharge/ Infiltration	Storage	Habitat Restoration	Water conservation/ Reuse	Improved landscaping and aesthetics	Water Quality	Flood Protection	Wetland	Recreation
Rio Honda - San Gabriel River	**Metro Gold Line Infiltration Project**	Planned Implementation Date Spring 2016.	The City of Azusa in coordination with the Foothill Construction Authority for the Gold Line Project has constructed infiltration systems at some of the major crossings in town. Infiltration will occur at the catch basins which are soft bottom. Anticipated tributary areas are approximately 17 acres and will include the rail corridor. The 10 year storm event is to be infiltrated.		●	●				●			
Santa Monica Bay Jurisdictions 2 and 3	**Penmar Water Quality Improvement Project (Phase I and Phase II)** 	Phase II – expected completion by Spring 2015.	Phase II of the Penmar project is expected to supply approximately 34.7 million gallons of treated water per year for irrigation of Penmar Golf Course and the Penmar Park & Recreation Center in the City of Los Angeles and the Marine Park in the City of Santa Monica. Replacing this volume of potable water with treated storm water produced in Phase II provides 34.7 million gallons per year increase to annual runoff diversion capacity of Phase I, resulting in a significant pollutant load reduction into the Santa Monica Bay. Phase II entails the incorporation of the reuse component of the project offering additional water quality benefits as well as multi-regional benefits. By installing the reuse option, the overall project capacity will increase, thereby also increasing the volume of urban runoff that can be retained by the project for use as an alternative source of water to potable water for landscape irrigation.	●				●		●			
Upper LA River	**Humboldt Greenway Project** 	Under Construction	This project will intercept an existing storm drain system and construct a stormwater greenway with a "stream" eco-system through the corridor on Humboldt Street with a pedestrian path connecting Avenue 18 and Avenue 19. The project is adjacent to the Los Angeles River, just north of Civic Center area of the City of Los Angeles. The bioremediation elements include a pollution reduction/infiltration system and an approximately 175-foot-long graded swale/open-channel, which is surrounded by a vegetated basin. Work also includes a) an overflow structure; b) a pedestrian bridge; c) an irrigation system; d) landscaping and tree planting; and e) solar lighting.	●	●			●	●				●



SOURCE: ESRI.

LA County PEIR EWMP . 140474

Figure 2-3
Location of Example Planned and Installed Centralized BMP Projects

2.4.5 Regional Structural BMPs

Regional structural BMPs are those that can capture the volume of water from an 85th percentile, 24-hr storm in a contributing watershed, known as the *design volume (*Generally, the 85th percentile storm is approximately 0.75 inches over 24 hours). The two types of regional BMPs are retention/infiltration and capture and use, though many regional projects would incorporate more than one BMP type. The definitions of these BMPs are the same as for centralized BMPs with the exception that they can capture the design volume. Like centralized BMPs, regional BMPs can be implemented in a broad range of land use types, from high-density urban to open space, and can have multiple benefits (e.g. habitat, recreation, aesthetics). An additional example of a multi-benefit/multi-type regional BMP is the suite of improvements being made to Sun Valley Park in Los Angeles. The project's BMPs improve stormwater quality and alleviate local flooding by collecting runoff from a 21-acre drainage area, routing it through flow-through treatment units (hydrodynamic separators and settling units) to remove suspended solids and heavy metals, and directing it into two underground infiltration galleries buried beneath soccer and baseball fields. Bioswales at the site treat local runoff and are vegetated with native plants.

Sun Valley Park Regional Infiltration Project – (from upper left to lower right) Storm water Pre-Treatment Devices to Remove Trash and Sediment / Bioswale and Bioretention Area / Construction of Underground Storage and Infiltration Vaults

Anticipated Construction Activities: The construction activities for regional BMPs are generally similar to those of their centralized counterparts, with the exception of regional retention BMPs, which must have adequate storage capacity to hold runoff from the design storm. The need for this capacity will generally result in more extensive excavation and off-hauling of site soils. Larger, multi-benefit regional BMPs are similar to centralized multi-benefit regional flood management projects (above) that their scale and complexity often requires an intensive construction effort executed over multiple seasons.

Specific examples of regional BMPs that are in various stages of planning that are part of the EWMP are presented in **Table 2-5.** The locations of these examples of regional BMPs are shown in **Figure 2-5**. Table 2-5 presents the location, project description, and key elements of the regional BMPs to further illustrate these types of structural BMPs that are concepts being developed through the EWMP process. Additional information and figures on the location and distribution of potential and priority BMPs, where data is available, are presented in Section 2.5, *EWMP Watershed Characteristics and BMP Implementation Strategies*.

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TABLE 2-5
EXAMPLE OF PLANNED REGIONAL PROJECTS

EWMP Group	Project Name and Photo	Status of Project	Project Description	Project Features: Treatment	Recharge/ Infiltration	Storage	Habitat Restoration	Water conservation/ Reuse	Improved landscaping and aesthetics	Water Quality	Flood Protection	Wetland	Recreation
Beach Cities WMG	**Torrance Stormwater Basin Recharge and Enhancement Project** 	Construction was scheduled for Spring 2014.	The Torrance Stormwater Basin Recharge and Enhancement Project will retrofit three existing detention basins serving 1,453 acres of drainage area in total within the City of Torrance. The project will use a number of BMPs to conserve water, recharge the aquifer, create critical habitat, and improve stormwater quality that discharges into the Santa Monica Bay, and eliminate non-stormwater discharges to the Dominguez Channel. This Stormwater Basin Recharge and Enhancement project proposes significant advances over the current system by providing wetland treatment of stormwater and non-stormwater runoff at the detention basins, recharging vitally needed groundwater supplies, and sustaining wetland habitat during the dry season in the basins. The Project will eliminate dry-weather runoff and associated load for multiple pollutants. The Project will treat all stormwater from 1,453 acres for multiple pollutants, including priority pollutants such as trash and sediments by a combination of wetland treatment and infiltration. The project will capture and recharge an estimated 20 acre feet per year of runoff that would have otherwise been discharged to the Santa Monica Bay. The project will enable the elimination of all discharges from the drainage area to Dominguez Channel, will eliminate dry-weather discharges to Santa Monica Bay and will reduce the wet-weather discharge to the Santa Monica Bay from this system.	●	●	●	●	●	●			●	
North Santa Monica Bay Coastal Watersheds	**Malibu Legacy Park Pump Station Improvements** 	Anticipated to be completed June 2015.	Malibu Legacy Park is a regional project that provides water quality and water resources benefits. The project exceeds requirements to put over 300 acres of Malibu (including City Hall) into full compliance with Malibu Creek Bacteria TMDL requirements, providing a capture volume consistent with Los Angeles Standard Urban Stormwater Mitigation Plan requirements (assuming no upstream LID or source control measures). Captured water is managed, disinfected, and used to offset potable water uses for park irrigation.	●	●	●		●	●			●	●

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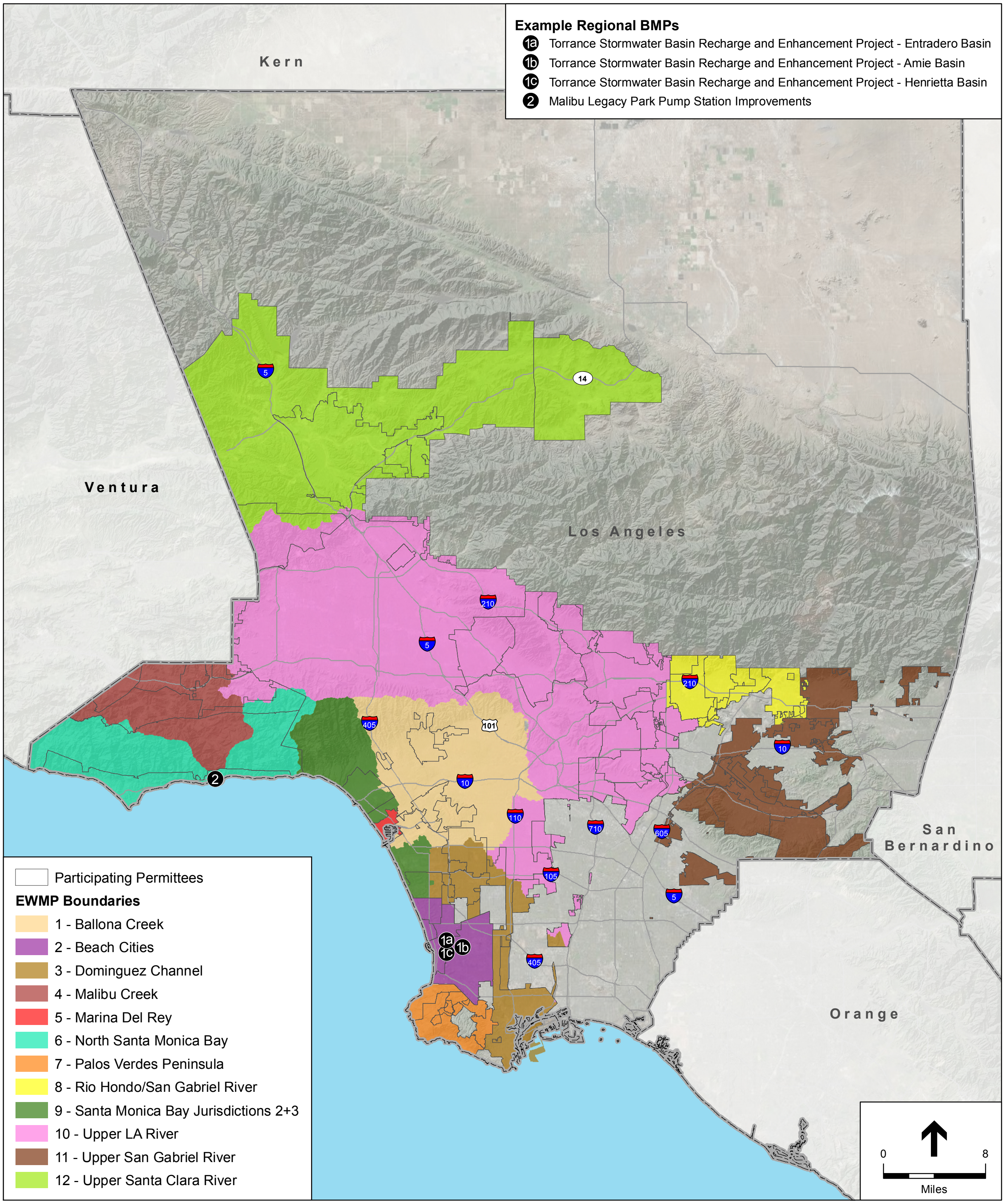

SOURCE: ESRI.

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Figure 2-4
Location of Example Planned and Installed Regional BMP Projects

2.5 EWMP Watershed Characteristics and BMP Implementation Strategies

Summarized below are the general characteristics of the watersheds within the EWMP Groups and the overall strategies for BMP implementation that reflect these characteristics. The twelve EWMPs are consolidated to six watershed areas grouped by similar watershed characteristics. This summary provides additional detail on the distribution and location of potential and priority BMPs, where data is available, based on the overall BMP implementation strategy and maps of BMP distribution. These maps are presented for each EWMP and show the location and distribution of planned and priority regional/centralized BMPs for which data are available at the time of publication of this PEIR. The priority BMPs are a subset of the potential BMPs that have undergone a site review and project evaluation that has identified these BMPs as a priority. These priority projects are shown based upon available data at the time of publication of this PEIR. **Appendix G** provides the location and general description of the priority BMPs shown on the figures referenced in this discussion. Distributed BMPs are planned to be implemented throughout the urbanized areas of each EWMP.

1. **South Santa Monica Bay EWMP Watersheds** (Marina del Rey, Ballona Creek, Beach Cites, South Santa Monica Bay Jurisdictional Group 2 and 3, and Peninsula Cities EWMP groups) – These watershed groups are dominated by urbanized beach communities with high density residential and commercial land uses throughout the watershed. Key BMP strategies in these watersheds are to address dry and wet-weather flows that may impact beach water quality through bacteria loading. Other water quality priorities include trash, marine debris, metals, and toxics. The BMP strategy includes LFDs to comply with dry-weather metals and bacteria Total Maximum Daily Loads (TMDLs). Although large regional and centralized retention and infiltration BMPs will be part of the wet-weather pollutant load reduction strategy, the predominate structural BMP will be smaller distributed BMPs such as bioinfiltration, media filtration, and flow-through BMPs located in street right-of-ways, parking lots, landscaped areas, and as part of green streets and buildings.

   Because of the high ground water near the shore, capture and reuse regional projects or treatment BMP opportunities will be preferred. The receiving waters for the South Santa Monica Bay include the Santa Monica Bay, the Ballona Creek, and the Marina del Rey Harbor.

   Marina del Rey EWMP – **Figure 2-5** provides the location and distribution of potential regional/centralized BMPs for the Marina del Rey EWMP. Distributed BMPs will be located throughout the urbanized areas of the EWMP. Because of the tidal influence of the marina to most of the watershed, regional projects will be located near the upstream end of the watershed where ground water depths are favorable. The tidally influenced areas will consist of mostly treatment distributed BMPs, including bioinfiltration or tree wells.

Ballona Creek EWMP – **Figure 2-6** provides the locations and distribution of potential regional/centralized BMPs for the Ballona Creek EWMP. Regional infiltration BMPs will be well distributed throughout the watershed and will be incorporated with distributed BMPs consisting mostly of distributed BMPs such as green streets. LFDs may also be pursued to comply with dry-weather TMDL requirements.

Beach Cities EWMP – Figure 2-7 provides the location and distribution of potential regional/centralized BMPs for the Beach Cities EWMP. Distributed BMPs will be located throughout the urbanized areas of the EWMP. The Beach Cities will focus their efforts on regional projects near the outlet on the Beach similar to the Hermosa Beach Infiltration Trench or the Torrance infiltration basins. Where regional projects are infeasible, distributed projects will be implemented such as green streets.

Santa Monica Bay J2/3 – Figure 2-8 provides the location and distribution of potential regional/centralized BMPs for the Santa Monica Bay J2/3 EWMP. Many efforts have already been completed for the Santa Monica Bay J2/J3 Watershed including LFDs and reuse facilities. The group will investigate the possibility of more regional projects that are able to capture and reuse the flow. Remaining areas will be subject to distributed BMPs.

Peninsula Cities – Figure 2-9 provides the location and distribution of potential regional/centralized BMPs for the Peninsula Cities EWMP. Distributed BMPs will be located throughout the urbanized areas of the EWMP. The Santa Monica Bay J7 side of the Peninsula Cities area is mostly comprised of anti-degradation sites so there will not be many control measures in this subwatershed.

2. **<u>Northern Coastal EWMP Watersheds</u>** (Malibu Creek and North Santa Monica Bay Coastal Watersheds EWMP groups) **–** These watersheds are characterized by lower density development along the coast and the larger creeks with greater open space and park areas inland. There is increased development in the upper areas of the Malibu Creek Watershed. Receiving waters in these watersheds are largely unlined and riparian corridors remain.

   Water quality priorities include bacteria, toxics, trash, and nutrients as well as benthic community impairments. **Figures 2-10 and 2-11** provide the location and distribution of potential regional/centralized BMPs for the Malibu Creek and North Santa Monica Bay Coastal Watersheds EWMP groups, respectively. Smaller distributed BMPs that include biofiltration, media filtration, green streets, and flow-through BMPs will be used in greater percentage than larger centralized BMPs and will be located in developed areas as retrofit BMPs.

3. **<u>Upper San Gabriel Watershed</u> –** This watershed is characterized by higher density development in the lower watershed area and lower density and open space in the upper watershed where the foothills to the San Gabriel Mountains begin. The priority pollutants in these watersheds include selenium in dry-weather flows, and metals in wet weather flows. This watershed is further differentiated by the importance of groundwater recharge basins that are supplied by a series of reservoirs further upstream in the mountains. The San Gabriel

River is unlined in the upper watershed and conveys controlled non-storm and storm flows to recharge basins and downstream sections of the river. **Figure 2-12** provides the location and distribution of potential regional/centralized BMPs for the Upper San Gabriel EWMP. The BMP strategy in this watershed focuses more on regional and centralized retention and infiltration BMPs that take advantage of the favorable groundwater recharge characteristics of this area. These BMPs are located near or adjacent to the river. Distributed smaller BMPs are located in urbanized areas as retrofits in existing developments and streets.

4. **Rio Hondo/San Gabriel and Upper Los Angeles River Watersheds** (Rio Hondo/ San Gabriel and Upper Los Angeles EWMPs) – These watersheds traverses a large diverse area of the Los Angeles Basin with characteristics of Upper San Gabriel in the farthest upper reaches near the foothills, but most of this watershed is characterized by greater urbanization similar to Ballona Creek watershed. The greater urbanization also results in additional priority pollutants compared to Upper San Gabriel watershed, and include nutrients, trash, metals, bacteria and sediment impacted by metals and organic compounds (DDT, PCBs, PAHs).

   The Rio Hondo/San Gabriel EWMP is characterized by increasing urbanization south of the foothills and industrial and commercial development along the 210 corridor. **Figure 2-13** provides the location and distribution of potential regional/centralized BMPs for the Rio Hondo/San Gabriel EWMP. The strategy for the locations and types of regional/centralized BMPs is to use remaining available sites for retention and infiltration, which takes advantage of the favorable infiltration rates of this area, including existing groundwater recharge basins near the San Gabriel River. Distributed BMPs will be located in throughout the urbanized areas of the EWMP.

   The Los Angeles River is approximately 51 miles long, and five of six reaches lie within the Upper Los Angeles River EWMP. The natural hydrology of the Los Angeles River watershed has been altered by channelization and the construction of dams and flood control reservoirs. The Los Angeles River and many of its tributaries are lined with concrete for most or all of their length. Soft-bottomed segments of the Los Angeles River occur where groundwater upwelling prevents armoring of the river bottom. **Figure 2-14** provides the location and distribution of potential regional/centralized BMPs for the Upper Los Angeles River EWMP. Because of the greater extent and number of pollutant priorities, the BMP strategy in the Upper Los Angeles River watershed includes well over a hundred planned regional and centralized retention and infiltration BMPs that take advantage of the favorable groundwater recharge characteristics in defined areas of the watershed. Also planned are centralized treatment wetlands and bioinfiltration BMPs in parks and open spaces with favorable subsurface soils that promote higher infiltration rates. The BMP strategy also includes distributed smaller BMPs located throughout the urbanized areas of the watershed as retrofits in existing developments and streets. LFDs to comply with dry-weather bacteria TMDLs may also be included.

5. **<u>Dominguez Channel Watershed</u>** (Dominguez Channel EWMP, Beach Cities, Peninsula Cities) **–** This watershed is differentiated by a larger area of industrial land use, but also includes Beach Cities and Machado Lake. Because of the high density of development and industrial land uses, large regional and centralized infiltration type BMPs will be limited. **Figure 2-15** provides the location and distribution of potential regional/centralized BMPs for the Dominguez Channel EWMP. The structural BMP strategy will be more LFDs, both large (centralized) and small (distributed), located at MS4 outfalls near the channelized Dominguez Chanel. The other BMP strategy are smaller distributed BMPs that include the LID type BMP such as Green Streets and biofiltration BMPs throughout the Beach Cities. These distributed BMPs will be retrofit type BMPs that treat runoff from already developed properties and are located in street right-of-ways, parking lots, and limited open areas on public and private parcels. Distributed flow-through treatment BMPs will also be the other predominant BMP that will be retrofitted to the existing MS4 systems.

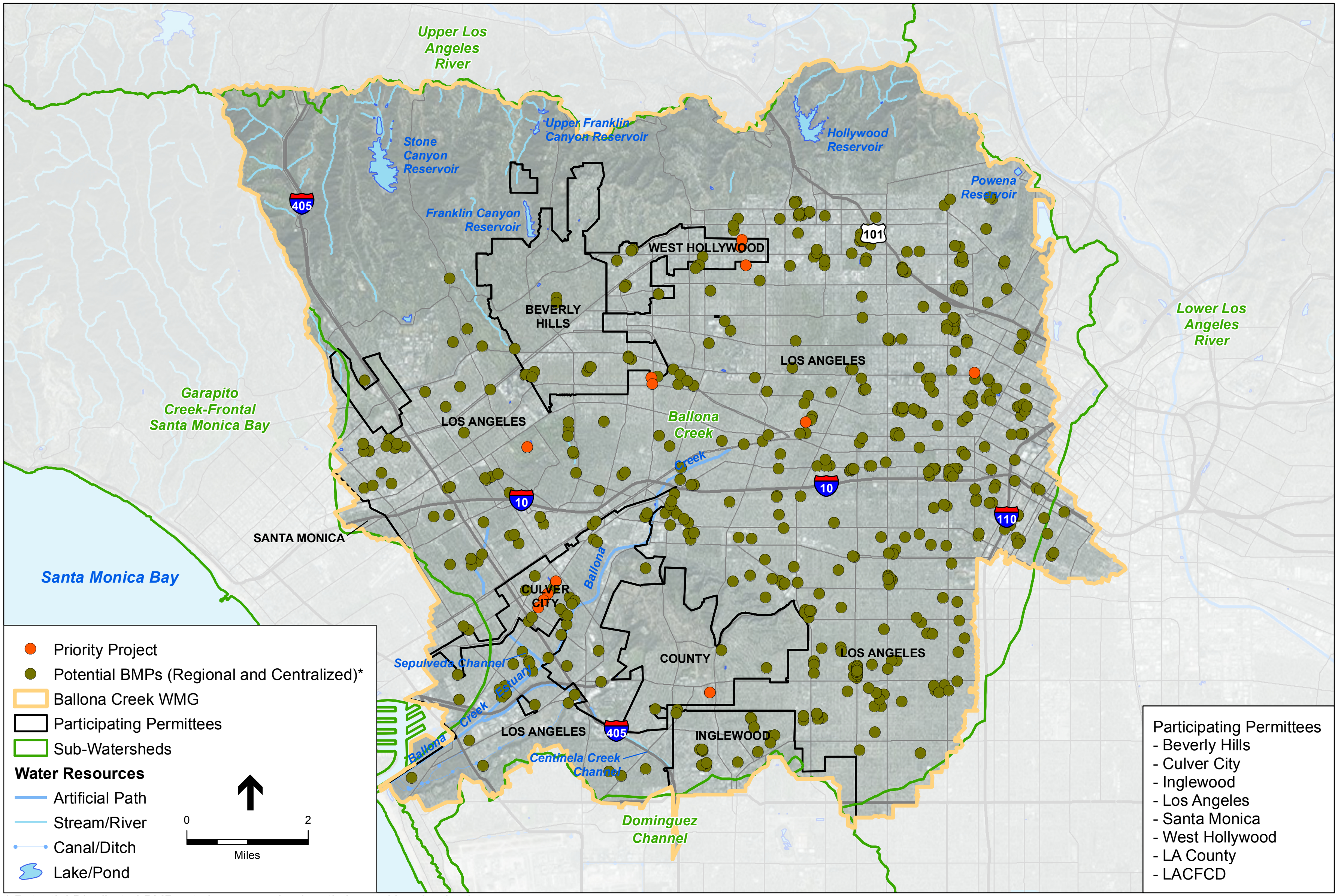
6. **<u>Upper Santa Clara River Watershed</u> –** The Santa Clara River Watershed is distinctive in that it is predominantly open space—nearly ninety percent of the watershed—is open space with approximately 88 percent being undeveloped. The watershed contains one of the last remaining natural rivers in Southern California. In years of significant rainfall, ephemeral springs and year-round flows exist in some tributaries and natural upstream areas. Flows in Santa Clara River reaches that pass through the EWMP area are predominantly stormwater runoff during wet-weather months and water reclamation plant effluent discharges in the drier months. Priority pollutants in the watershed are bacteria, nutrients, and chloride. In the source assessments for the Nutrients TMDL and the Chloride TMDL for the Santa Clara River, the storm drain system is not considered the primary source of these pollutants. Lake Elizabeth is also subject to a trash TMDL. The EWMP will evaluate potential MS4 nutrients and chlorides contributions and serve as the implementation plan for the Bacteria TMDL. BMP strategies for this watershed are likely to include a focus more on regional and centralized retention and infiltration BMPs and less on filtration type BMPs, which are not as effective at addressing bacteria. **Figure 2-16** provides the location and distribution of potential regional/centralized BMPs. Distributed BMPs will be located in the urbanized areas of the EWMP.

As shown in Figures 2-5 through 2-16, each of the EWMPs involves a wide distribution of BMPs to achieve permit compliance. Appendix G provides the locations and general descriptions of the priority BMPs (where data is available), shown in Figures 2-5 through 2-16. Priority Projects are projects that have been identified through the EWMP process as targeted for implementation within the first years following the EWMPs approval by the LARWQCB. Identification of Priority Projects is underway and has not been completed by all EWMPs at this time. The PEIR is being prepared in parallel to the EWMPs. Priority Projects will be defined in all the EWMPs to be submitted for public comment in June 2015. Priority Projects that have been identified at this time through the EWMP process are shown on the following figures. Priority Projects may be regional, centralized or distributed type BMPs. For potential projects that are shown on the following figure, the location of potential regional and centralized BMPS are shown. Distributed BMP will be distributed throughout the urbanized areas and are not shown on the following figures. Because of land availability restrictions, large parcels that can support regional or centralized BMPs are fewer and more difficult to obtain than smaller parcels or easements needed for distributed BMPs. The overall strategy engaged by each of the WMGs is to maximize the benefits of regional and centralized BMPs while relying on distributed and non-structural BMPs to achieve a larger majority of the water quality improvement benefits provided by the EWMP. The distributed BMPs will be scattered throughout the watersheds, predominantly in urbanized areas, resulting in widely distributed implementation impacts as discussed in Chapter 3.

SOURCE: ESRI; National Hydrology Dataset.

LA County PEIR EWMP . 140474

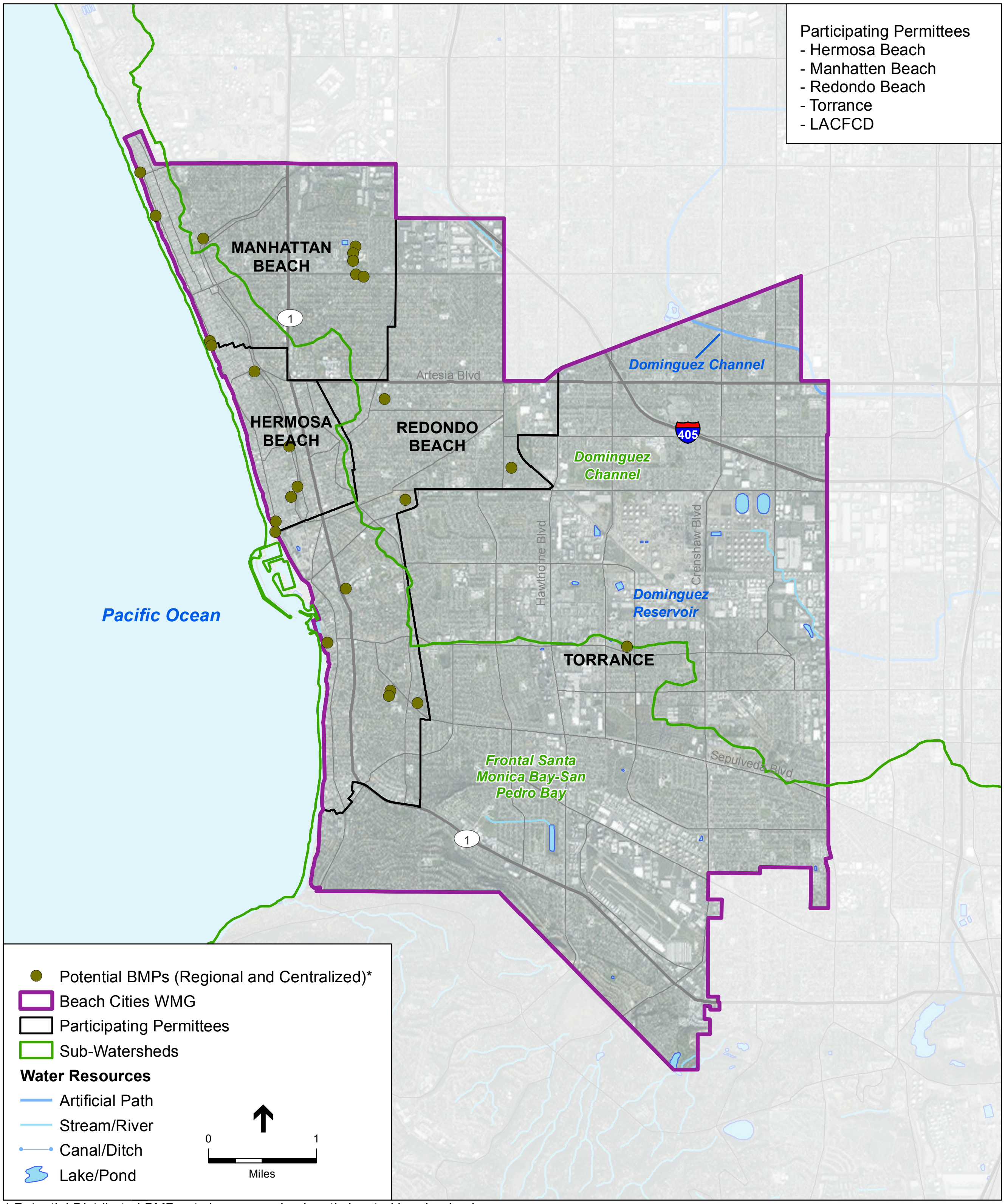
Figure 2-5
Marina del Rey
Watershed Management Group



** Potential Distributed BMP not shown - predominantly located in urbanized areas*

SOURCE: ESRI; National Hydrology Dataset.

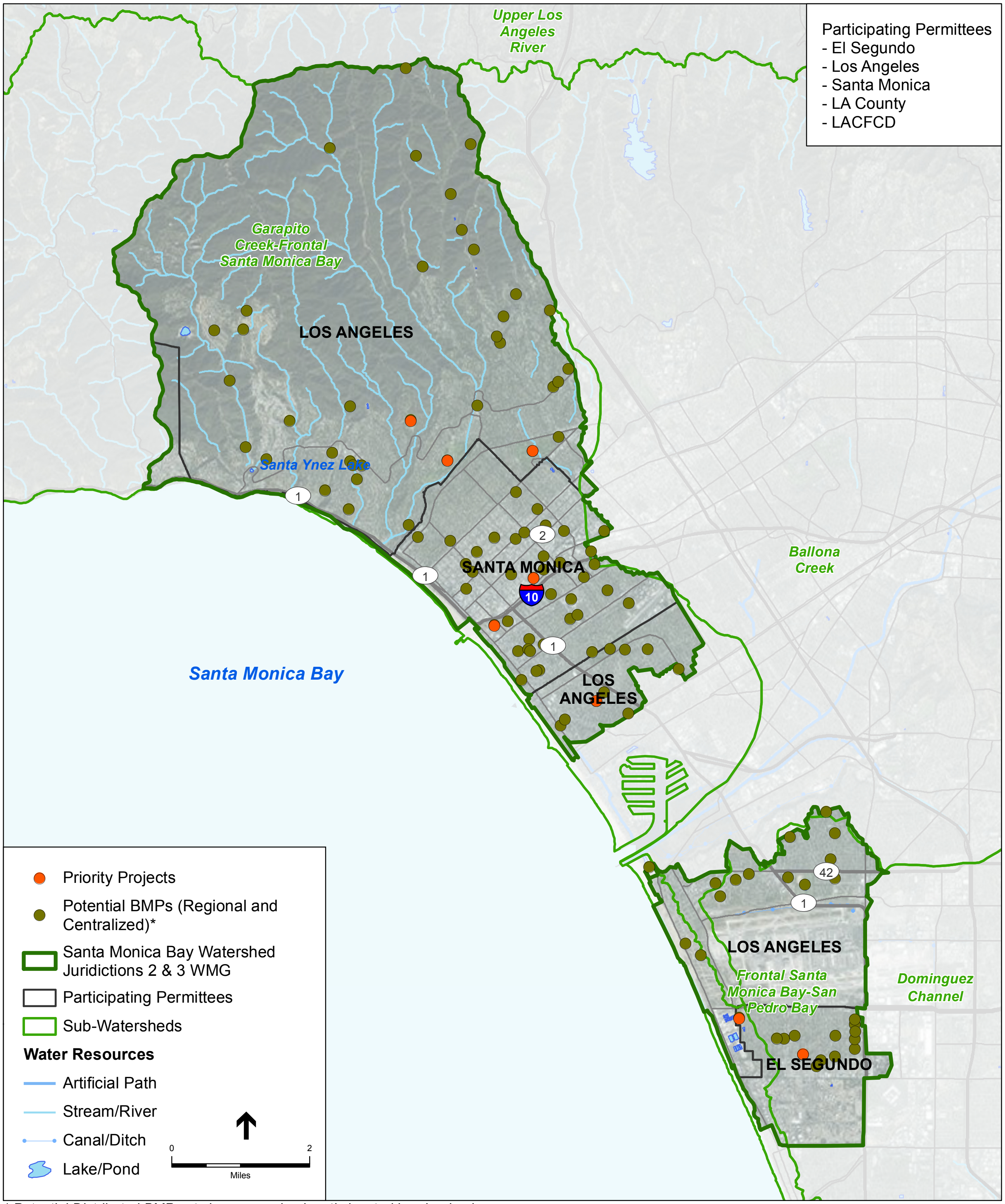
Figure 2-6
Ballona Creek
Watershed Management Group



** Potential Distributed BMP not shown - predominantly located in urbanized areas*

SOURCE: ESRI; National Hydrology Dataset.

Figure 2-7
Beach Cities Watershed Management Group

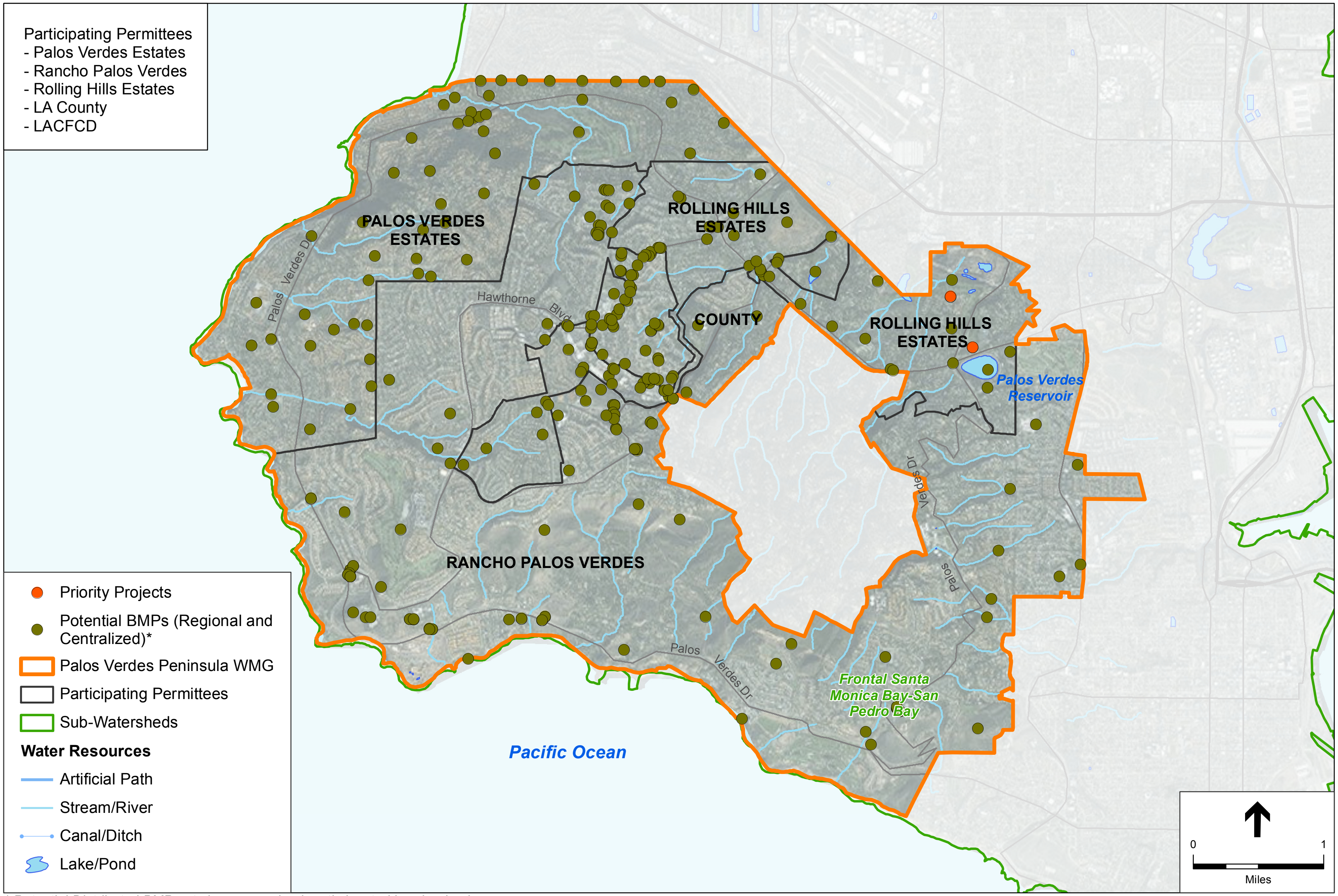


** Potential Distributed BMP not shown - predominantly located in urbanized areas*

SOURCE: ESRI; National Hydrology Dataset.

LA County PEIR EWMP . 140474

Figure 2-8
Santa Monica Bay Watershed Jurisdictions 2 and 3 Watershed Management Groups



* Potential Distributed BMP not shown - predominantly located in urbanized areas

SOURCE: ESRI; National Hydrology Dataset.

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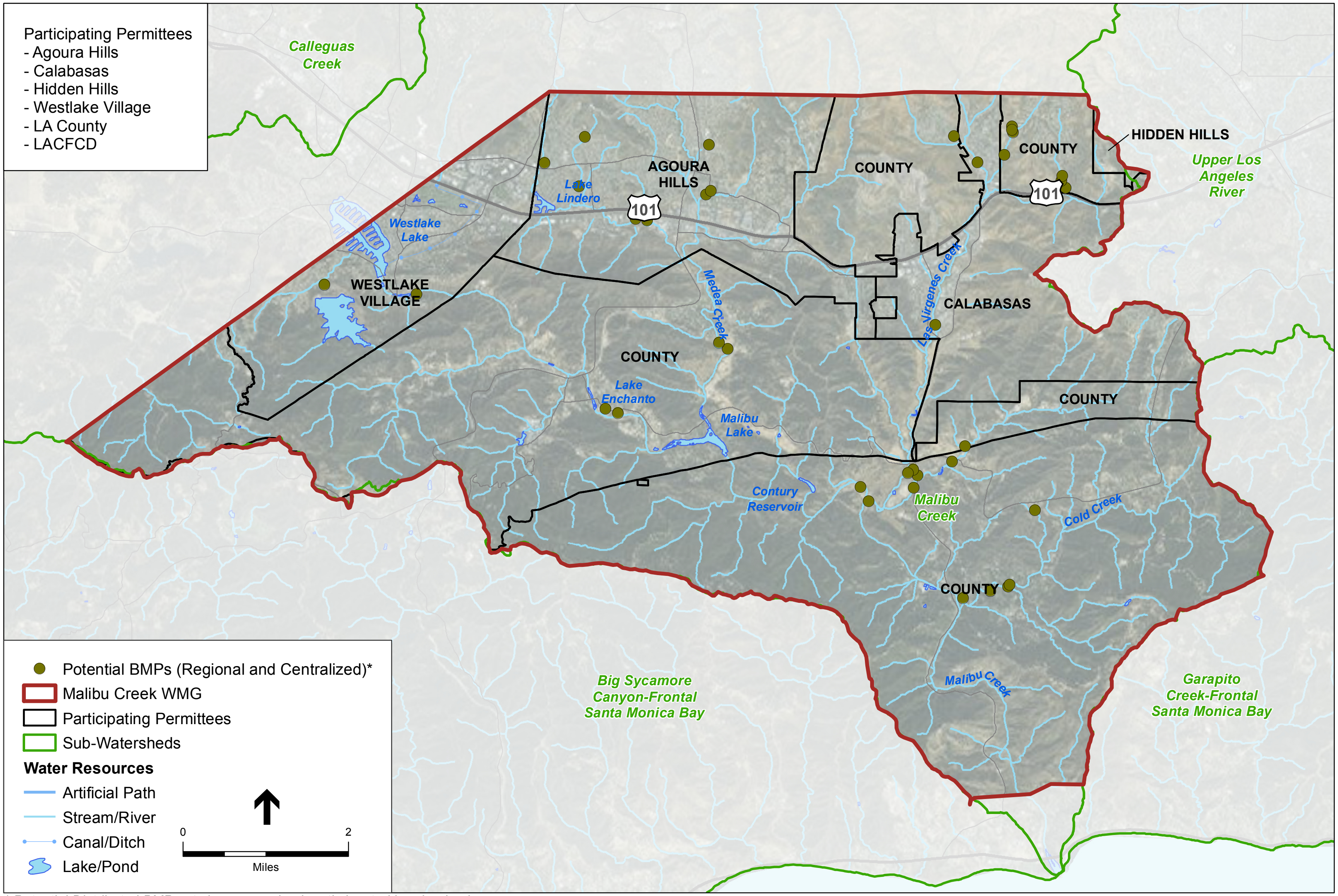
Figure 2-9
Palos Verdes Peninsula
Watershed Management Group



* Potential Distributed BMP not shown - predominantly located in urbanized areas

SOURCE: ESRI; National Hydrology Dataset.

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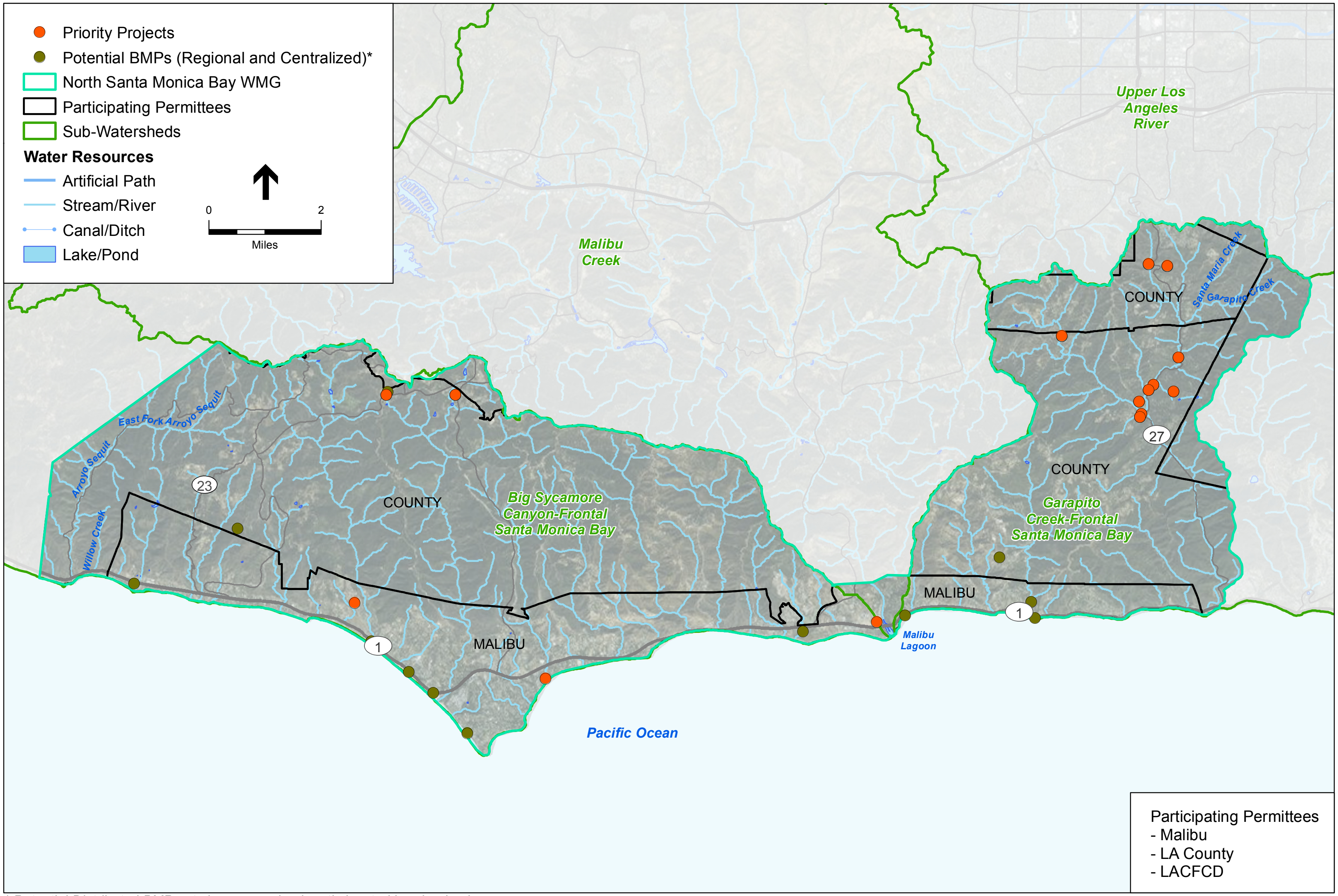
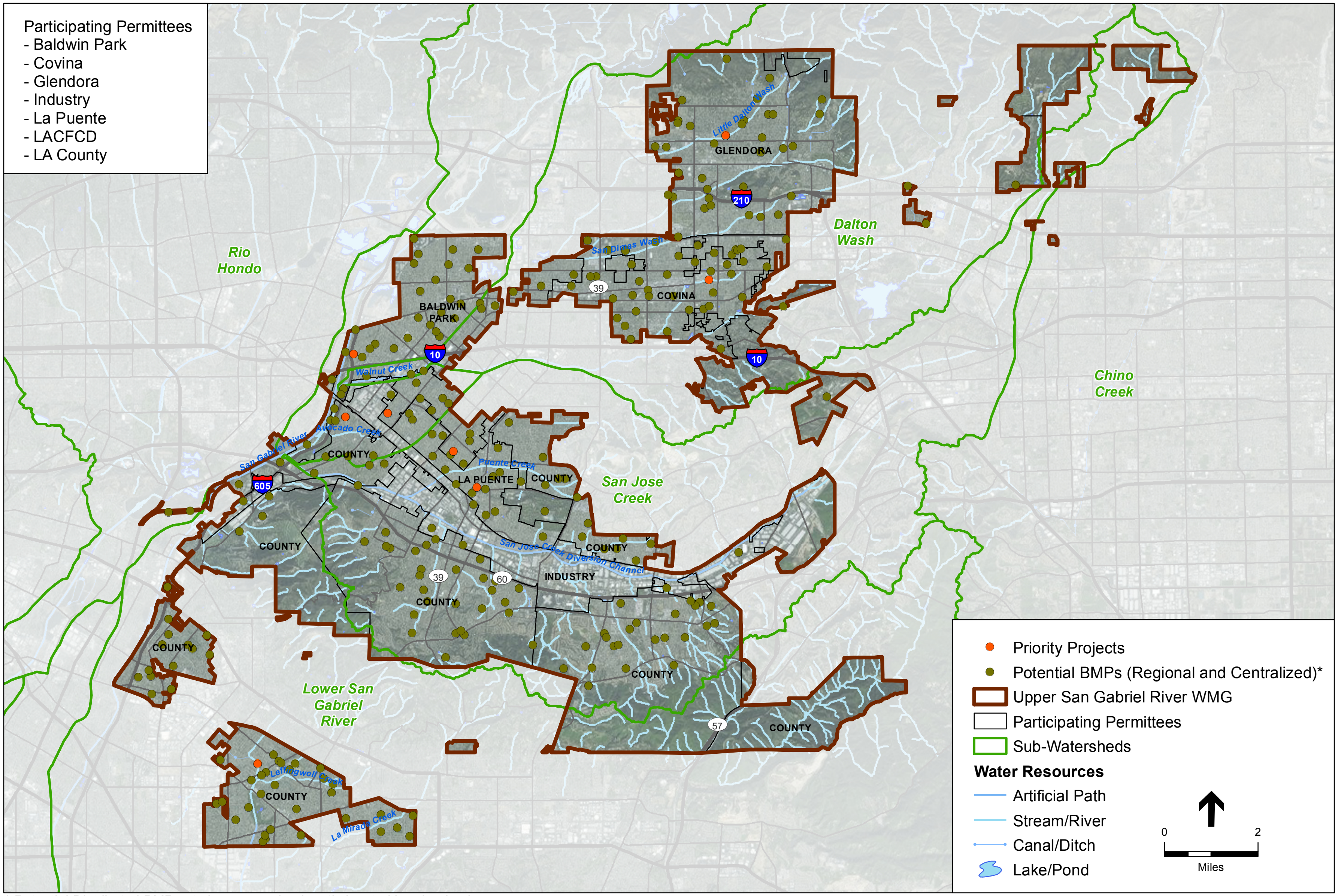
Figure 2-10
Malibu Creek
Watershed Management Group



* Potential Distributed BMP not shown - predominantly located in urbanized areas

SOURCE: ESRI; National Hydrology Dataset.

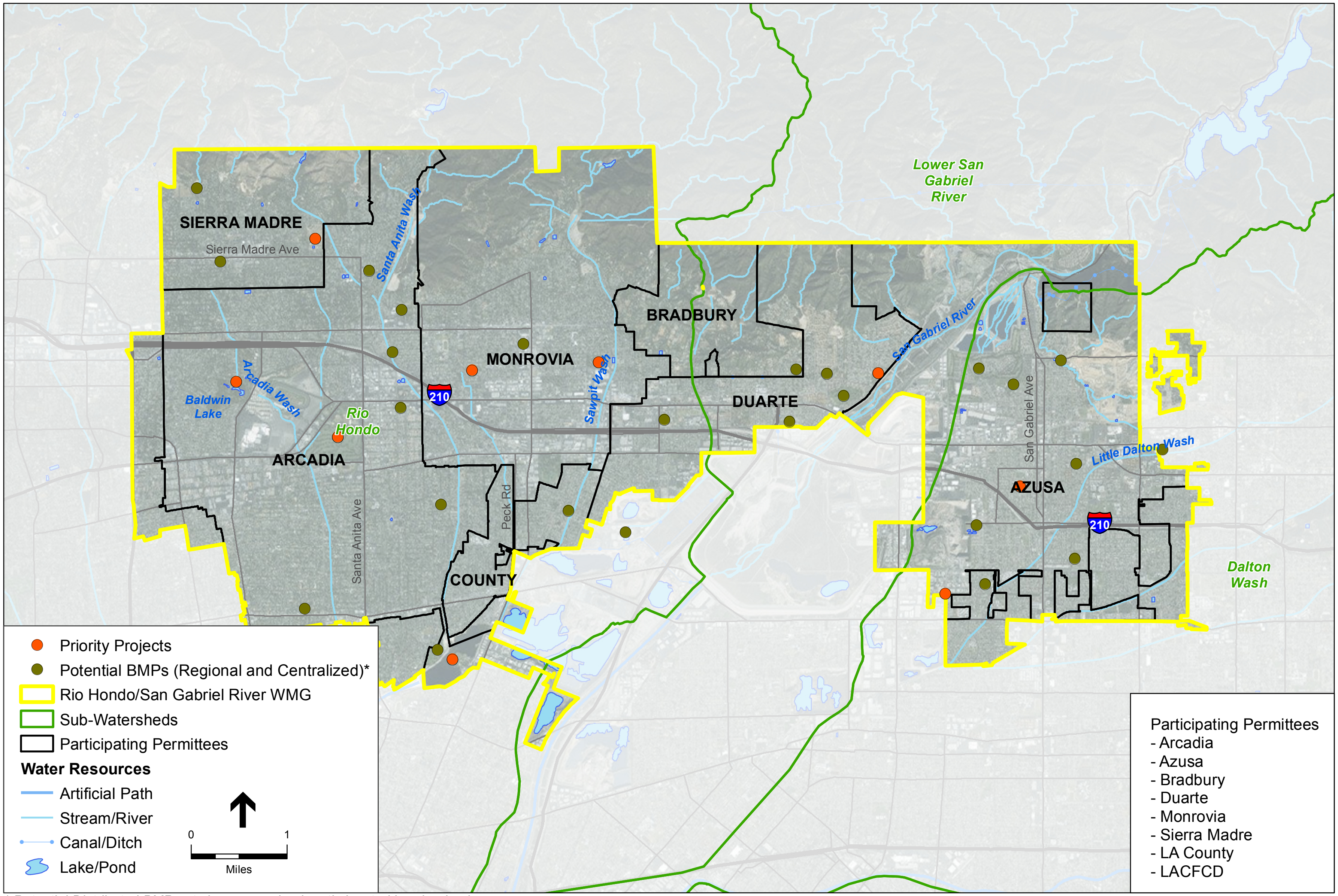
Figure 2-11
North Santa Monica Bay Coastal Watersheds



* Potential Distributed BMP not shown - predominantly located in urbanized areas

SOURCE: ESRI; National Hydrology Dataset.

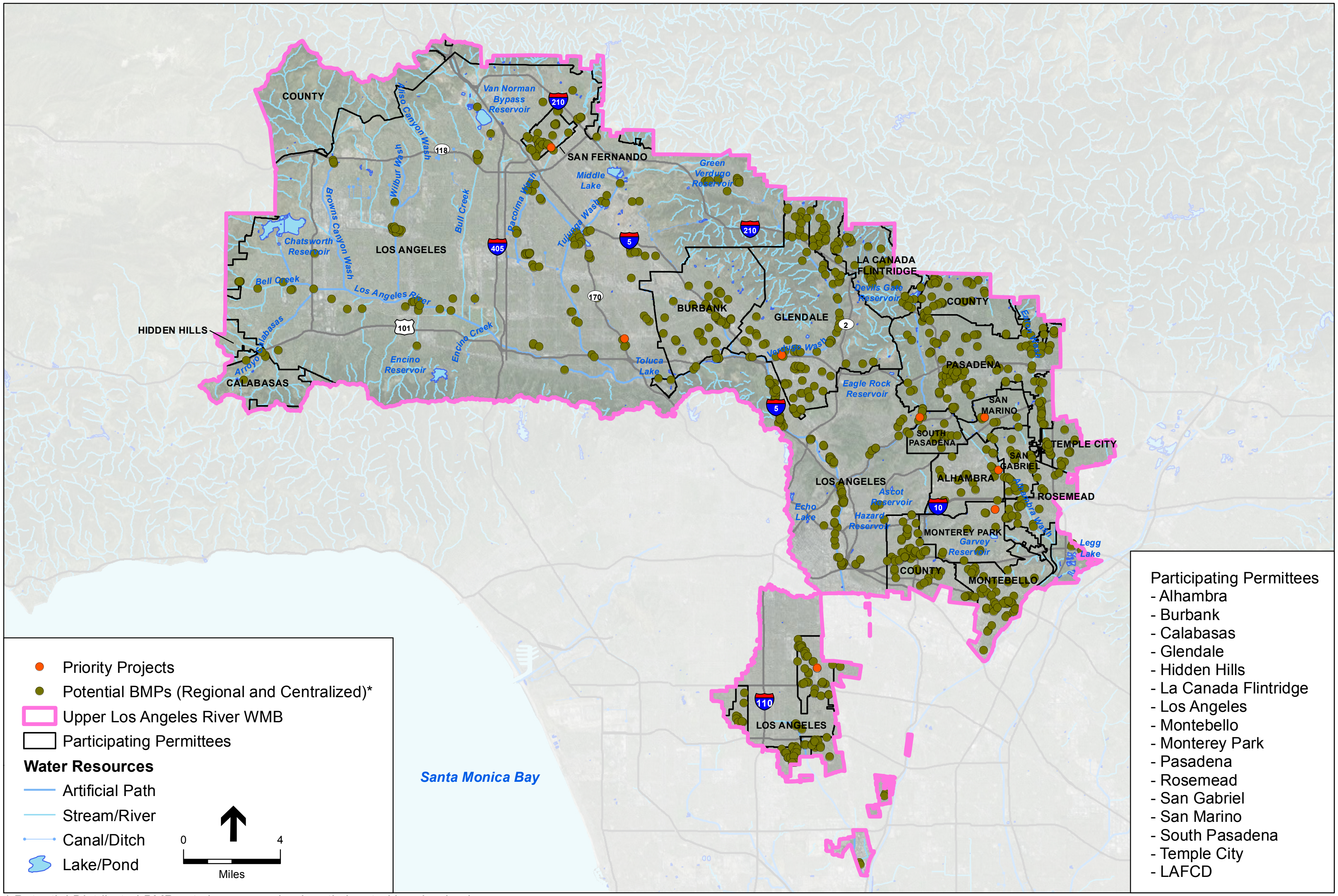
Figure 2-12
Upper San Gabriel River
Watershed Management Groups



** Potential Distributed BMP not shown - predominantly located in urbanized areas*

SOURCE: ESRI; National Hydrology Dataset.

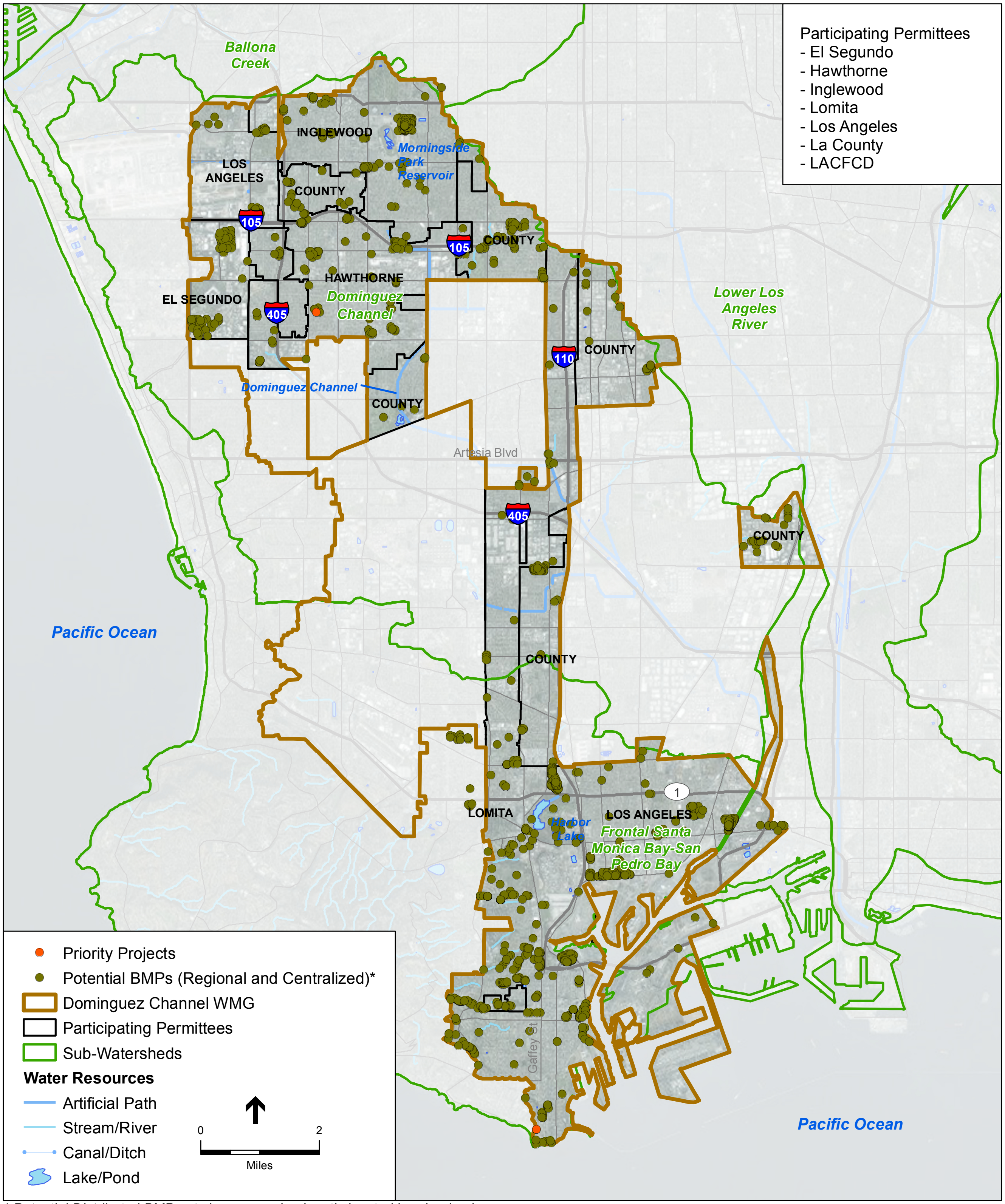
Figure 2-13
Rio Hondo / San Gabriel River
Watershed Management Group



** Potential Distributed BMP not shown - predominantly located in urbanized areas*

SOURCE: ESRI; National Hydrology Dataset.

Figure 2-14
Upper Los Angeles River
Watershed Management Group



** Potential Distributed BMP not shown - predominantly located in urbanized areas*

SOURCE: ESRI; National Hydrology Dataset.

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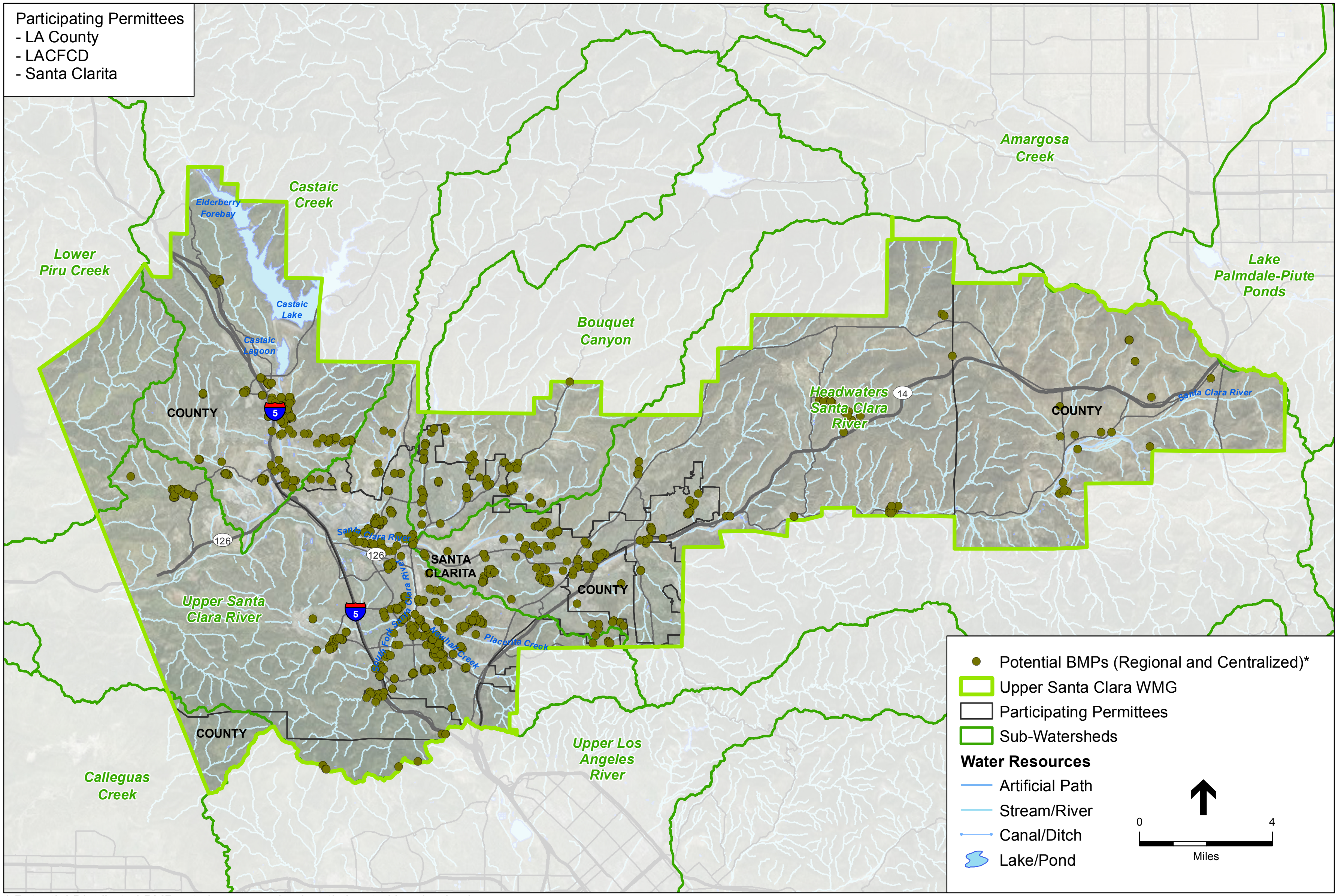
Figure 2-15
Dominguez Channel Watershed Management Group



** Potential Distributed BMP not shown - predominantly located in urbanized areas*

SOURCE: ESRI; National Hydrology Dataset.

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Figure 2-16
Upper Santa Clara River Watershed
Watershed Management Group

2.6 EWMP BMP Implementation Schedule

The EWMPs that are being prepared in parallel to the PEIR will provide a timeline for the implementation of the BMPs. The priority BMPs are a subset of the potential BMPs that have undergone a site review and project evaluation and have been identified as a priority project, based on available data at the time of publication of this PEIR. The EWMPs will be submitted to the LARWQCB in June 2015. Implementation of priority BMPs will begin following approval of the EWMPs by the LARWQCB, which is anticipated in the later part of 2015 or early 2016. Implementation of BMPs will depend on the approval of the EWMPs, further environmental assessment, permitting, and availability of funding sources. The RAA as part of the EWMPs provides a basis for the needed level of BMP implementation to meet water quality goals.

2.7 Operation and Maintenance

Once constructed, structural BMPs will require periodic maintenance. The level and frequency of operation and maintenance (O&M) will depend on the BMP type, size, and complexity. BMPs implemented and under the jurisdiction of the LACFCD would be maintained and operated to meet design performance standards and the efficiencies needed to meet the waste load reductions in accordance with the EWMPs. O&M will also include addressing identified minimum mitigation measures to avoid potential impacts.

Project Costs

Funding for installation and maintenance of the BMPs identified in each EWMP will be the responsibility of the implementing agencies. The EWMPs will include development of cost estimates for proposed watershed control measures. Financial strategies to implement the EWMP will also be developed and included in the EWMP Plan. The financial strategies may include available State grants, recent Water Bond funding, and partners that can benefit from these projects (e.g. Water agencies).

Each EWMP will define priority projects, and installation of these projects will move forward depending on the availability of funding and outcome of further project-specific CEQA review. Funding options for implementing agencies would include obtaining grant funds, low-interest loans, tax-based general funds, or special assessments. Each jurisdiction will be responsible for securing the necessary funds over time to achieve permit compliance.

2.8 Required Approvals

LACFCD intends to use this PEIR to consider implementation of the proposed program. As Lead Agency, LACFCD may use this PEIR to approve the proposed program, make Findings regarding identified impacts, and, if necessary, adopt a Statement of Overriding Considerations regarding these impacts. The LARWQCB has discretionary approval over the EWMPs themselves, while a broad range of responsible agencies have discretionary approval over the BMPs described in the EWMPs. These agencies and their approvals are described in **Table 2-**. The specific approvals necessary for each BMP will vary by BMP; for example, BMPs that do not result in fill of jurisdictional waters of the United States will not need a Clean Water Act Section 404 Permit.

TABLE 2-6
REQUIRED APPROVALS

Approving Agency	Approval
Implementing Agencies	CEQA approval
LA County Flood Control District	CEQA approval, Encroachment Permit
California Department of Transportation	Encroachment Permit
Local Railroad Authorities	Encroachment Permit
Local Cities/Permittees	Encroachment Permits, certification of compliance with local historic/cultural preservation policies
U.S. Army Corps of Engineers	Clean Water Act Section 404 Permit, Rivers and Harbors Act Sections 9 and 10 Permits
California Department of Fish and Wildlife	Lake/Streambed Alteration Agreement (1600 Permit)
U.S. Fish and Wildlife Service and National Marine Fisheries Service	Endangered Species Act consultations for Clean Water Act and Rivers and Harbors Act permits
California Coastal Commission	Coastal Development Permits
Regional Water Quality Control Board	Clean Water Act Section 401 Water Quality Certification
	Waste Discharge Requirements for discharge to waters of the state or to land
	Groundwater Anti-Degradation Analysis
	Water Recycling Requirements
	NPDES permits for discharges to waters of the United States
	Groundwater Recharge Recycled Water Project approval (currently draft regulations)
	General Construction Permit/SWPPP approval