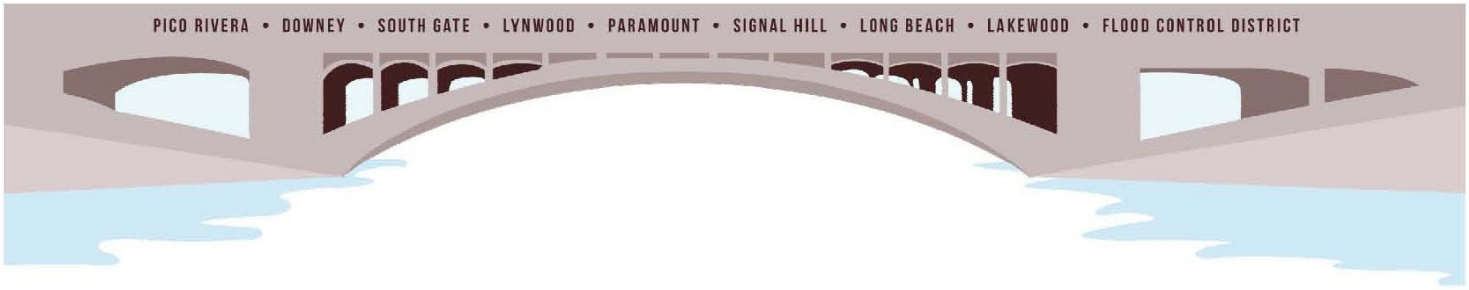

Lower Los Angeles River Watershed Management Program

June 12, 2015

Prepared For:

Lower Los Angeles River Watershed Group

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EXECUTIVE SUMMARY

This Watershed Management Program (WMP) sets forth a path to achieve pollutant reductions in the waterbodies of the Lower Los Angeles River and its tributaries. The WMP includes a discussion of existing and planned watershed control measures, a Reasonable Assurance Analysis (RAA) based upon the Watershed Management Modeling System previously developed by the Los Angeles County Flood Control District in collaboration with the USEPA and a Coordinated Integrated Monitoring Program (CIMP) to be implemented over a three year period.

The Watershed Group has been working cooperatively towards the goal of a cleaner Los Angeles River for several years. Beginning in the late 2000s, all Cities within the Group (as part of a larger Gateway cities effort) pursued and were awarded a grant to install full trash-capture inserts and partial capture retractable screens catch basins. Thus far nearly 4,800 full capture inserts have been installed in the Lower LAR drainage area. In 2009 the Lower LAR cities again worked together, forming Technical Committees and funding the development of Implementation Plans for Reach 1 and Reach 2 and tributaries for the Metals TMDL of the Los Angeles River. The Technical Committees that were formed as a result of the Metals TMDL effort continued their effort and in 2011, applicable agencies of both the Reach 1 and 2 committees merged into a single Lower LAR Watershed Committee. The funding of Committee activities has been authorized by city council and governing board Memorandums of Understanding through 2028. This cooperative effort continues and in 2014, the Watershed Group was notified of their successful multi-city grant application (as part of a larger Gateway effort) to install 23 LID BMPs along selected major thoroughfares.

These efforts are in addition to many equally successful efforts by individual agencies which have resulted in the planning, construction and installation of both regional and local stormwater treatment systems. These include:

- The Los Angeles County Flood Control District's Dominguez Gap Wetlands,
- South Gate's Azalea infiltration system,
- South Gate's Atlantic Boulevard tree box filtration systems,
- Signal Hill's and Long Beach's Hamilton Bowl trash capture systems and
- Downey's over 500 treatment systems on individual parcels.

Many additional individual treatment systems are located in cities throughout the Lower LAR Watershed. This summer, ground breaking is anticipated for the City of Long Beach's Deforest Park natural habitat.

Prior to 2012, National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer system (MS4) Permits required cities and agencies to implement a series of best management practices such as street sweeping and catch basins cleaning to demonstrate compliance. With the adoption of the fourth term MS4 permit by the Los Angeles Regional Water Quality Control Board on November 8, 2012, the emphasis shifted to a more watershed based effort that includes the goals of achieving specific pollutant targets as runoff leaves the storm drain system and enters the main river channels.

This WMP is a long-term planning document that takes a comprehensive look at the Lower LAR Watershed, including its land uses, MS4 system, existing and planned control measures (both structural and nonstructural), existing storm water treatment systems, historical monitoring data and the various segments of the Los Angeles River and its tributaries that have been identified as impaired by various pollutants. Using that data, the Watershed Management Modeling System – one of the three modeling system authorized by the MS4 Permit – is used to generate the RAA which predicts an optimal combination of structural treatment systems and construction timelines to achieve the goals of the MS4 Permit. The RAA distributes the responsibility for implementation of future treatment systems amongst all Lower LAR Watershed Cities.

The RAA identifies wet weather zinc as the primarily pollutant of concern[1] and that by designing treatment systems and other non-structural controls measures for zinc, the targets for other pollutants of concern will also be met. The first target for zinc occurred in 2012, when 25% of the area within the Lower LAR Watershed was to meet the wet weather zinc reduction goal. The wetlands, detention basins, extensive number of per-parcel treatment systems and non-structural control measures were designed to achieve that goal along with other pollutant reductions and multi-use factors such as groundwater recharge and recreational use.

The next wet weather target specified in the MS4 Permit occurs in 2024 when 50% of the area must achieve the zinc reduction goal. In order to maintain continued progress towards the 2024 goal, this WMP establishes an early-action milestone of 31% that is to be achieved through an effective combination of enhanced non-structural control measures and structural treatment projects that have been completed or are substantially through the planning and design phase by December 28, 2017. The RAA provides a recommended volume of wet weather runoff on a city-by-city basis to be used as the target in order to meet the early-action step of 31% by December 28, 2017, and the MS4 Permit targets of 50% by 2024 and 100% by 2028. Cumulatively, the RAA establishes a final (2028) goal of capturing and treating 803.2 acre feet. The ultimate cost will vary considerably depending on the availability and configuration of suitable treatment locations and effectiveness of nonstructural watershed control measures but is estimated to be in the range of $156 million - $293 million. The treatment volumes recommended by the RAA are estimates based on current land used data, historical monitoring and assumed treatment system efficiencies. The WMP also incorporates an adaptive management strategy to adjust and modify the various control measures as necessary.

A Coordinated Integrated Monitoring Program (CIMP) has been developed at a part of this WMP which greatly expands the monitoring of water quality in the Lower LAR watershed. The CIMP goals are in part to measure the overall effectiveness of the control measures the Watershed Group is implementing. Four new outfall monitoring sites along the Los Angeles River Channel and three new bacteria TMDL monitoring sites within the Los Angeles River Estuary are scheduled to be phased in over a 3-year period. These will be in addition continued operation of three of the four existing Metals TMDL

[1] The discharge of copper is anticipated to be reduced as copper is removed from brake pads over the next decade. Trash is on a separate compliance path with cities individually reporting greater than 90 percent of all catch basins retrofitted with full trash capture inserts or equivalent within the current Trash TMDL reporting year (ending September 30, 2014)

monitoring stations and the existing Mass Emission Station currently operated by the Los Angeles County Flood Control District near the interface of the river and estuary which measures the comingled runoff from the entire Los Angeles River Watershed.

This WMP and its components, including Chapter 3 *Selection of Watershed Control Measures*, Chapter 4 *RAA* and Chapter 8 *CIMP* outline a path to achieve significantly improved water quality in the Lower LAR Watershed. The WMP outlines a path based on the optimal placement of treatment systems determined by the RAA, but this is not the only viable path. The Watershed Group can follow the adaptive management strategy described in Chapter 9 to adjust the number, locations and sizes of future treatment systems as long as the timelines and goals of this WMP are followed. While this WMP is developed for the Watershed Group to implement the recommended volume reduction goals on a city-by-city basis, it does not preclude participating agencies from collaborating on potentially more cost effective regional and multi-city runoff treatment systems.

As part of the overall collaborative and inclusive effort, this Draft Watershed Management Program was presented at a public stakeholder meeting at the Downey City Hall on May 1, 2014. The Watershed Control Measures, Reasonable Assurance Analysis and Coordinated Integrated Monitoring Programs were discussed and comments from interested members of the public were solicited.

1 INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

This Watershed Management Program (WMP) has been developed to implement the requirements of Los Angeles Regional Water Quality Control Board Order Nos. R4-2012-0175 and R4-2014-0024 (National Pollutant Discharge Elimination System (NPDES) Permit Nos. CA004001, CA004003 respectively) on a watershed scale. In addition, elements of this WMP relating to Total Maximum Daily Loads (TMDLs) address requirements of California State Water Resources Control Board Order No. 2012-0011-DWQ (the Caltrans Stormwater Permit) for those TMDLs within the watershed area as described in the following section. Combined, the Orders set forth waste discharge requirements for the Municipal Separate Storm Sewer (MS4) discharges by Caltrans, the Los Angeles County Flood Control District (LACFCD), the County of Los Angeles and 85 cities within the coastal watersheds of Los Angeles County (Permittees). These requirements include three fundamental elements: (i) effectively prohibit nonstormwater discharges through the MS4, (ii) implement controls to reduce the discharge of pollutants to the maximum extent practicable, and (iii) other provisions the Regional Water Board has determined appropriate for the control of such pollutants.[1] The ultimate goals of the WMP are listed in Section 1.2.3.

1.1.1 PARTICIPATING AGENCIES

This WMP is a collaborative effort of ten participating agencies with MS4 facilities within the subwatersheds[2] of Reach 1 and Reach 2 of the Los Angeles River, Compton Creek and the Rio Hondo. For the purposes of this WMP, the area defined by the boundaries of the participating agencies with these subwatersheds is referred to as the Lower Los Angeles River Watershed (Lower LAR Watershed). The participating agencies and their respective MS4 stormwater Permits addressed by this WMP are listed in Table 1-1.

Table 1-1: Participating Agencies of the Lower LAR Watershed

Agency	Permit Order No.	Permit Name
Downey	R4-2012-0175	Los Angeles County NPDES MS4 Permit (LA MS4 Permit)
LACFCD[3]		
Lakewood		
Lynwood		
Paramount		
Pico Rivera		
Signal Hill		
South Gate		
Long Beach	R4-2014-0024	Long Beach NPDES MS4 Permit (LB MS4 Permit)
Caltrans[3]	2012-0011-DWQ	Caltrans Stormwater Permit (Caltrans MS4 Permit)

[1] 2012 LA NPDES MS4 Permit Findings, pg. 20

[2] Subwatersheds within this WMP are the "HUC-12 Equivalent" drainage areas as defined in 1.E.3.

[3] LACFCD and Caltrans participation is restricted to their land and facilities in the Lower LAR Watershed.

1.1.2 MS4 PERMITS ADDRESSED

As noted in Table 1-1, Caltrans and the City of Long Beach are regulated under their own MS4 Permits, separate from the Los Angeles MS4 Permit. The extent to which this impacts the contents of this WMP is explained in this section.

LONG BEACH AND LOS ANGELES MS4 PERMITS

The Long Beach and Los Angeles MS4 Permits, adopted by the Los Angeles Regional Water Quality Control Board (Regional Board) within 15 months of each other, contain similar language and requirements. Specifically, both Permits include a WMP approach to compliance. These similarities allow for the preparation of one WMP to address the requirements of both permits. Except where otherwise noted, the term *MS4 Permit* will refer exclusively to the Los Angeles and Long Beach MS4 Permits.

CALTRANS STORMWATER PERMIT

Discharges to Caltrans' MS4 are regulated through the Caltrans MS4 Permit. Although the Caltrans Stormwater Permit does not include a WMP compliance approach like the Los Angeles and Long Beach MS4 Permits, its TMDL provisions do require cooperation with agencies subject to the same TMDLs. As such, Caltrans' participation is restricted to those sections of the WMP related to TMDL requirements. Caltrans has acknowledged their intent to participate.

1.1.3 NON-PARTICIPATING AGENCIES

All other permitted agencies within these subwatersheds that are not listed above have developed either individual or collaborative WMPs or draft EWMPs separately and are not participating in this WMP. Non-participating agencies include the County of Los Angeles (unincorporated areas), the Cities of Los Angeles, Compton and Carson and multiple cities within Reach 2 of the Los Angeles River and the Rio Hondo. Figure 1-1 shows the participating agencies within the Lower LAR.

1.1.4 THE LOWER LOS ANGELES RIVER WATERSHED GROUP

DESIGNATION

The participating agencies have a long history of working together to address TMDL issues. Prior to the adoption of the current MS4 Permits[4], the agencies were under a Memoranda of Understanding to develop Implementation Plans for the Los Angeles River Metals TMDL. After Permit adoption, the agencies decided to continue their collaborative efforts to develop a WMP. In addition, the LACFCD decided to participate in this joint effort. The agencies' intent was to focus collective resources on water quality prioritization and implementation efforts to their shared receiving waters. The ten agencies submitted a Notice of Intent to develop a WMP to the Regional Board prior to the June 28, 2013[5], deadline and each signed a Memoranda of Understanding to develop the WMP.

[4] The Los Angeles MS4 Permit adopted November 8, 2012, expires December 28, 2017 and the Long Beach MS4 Permit adopted February 6, 2014, expires March 28, 2019

[5] The Notice of Intent was approved by the Regional Board on September 25, 2013

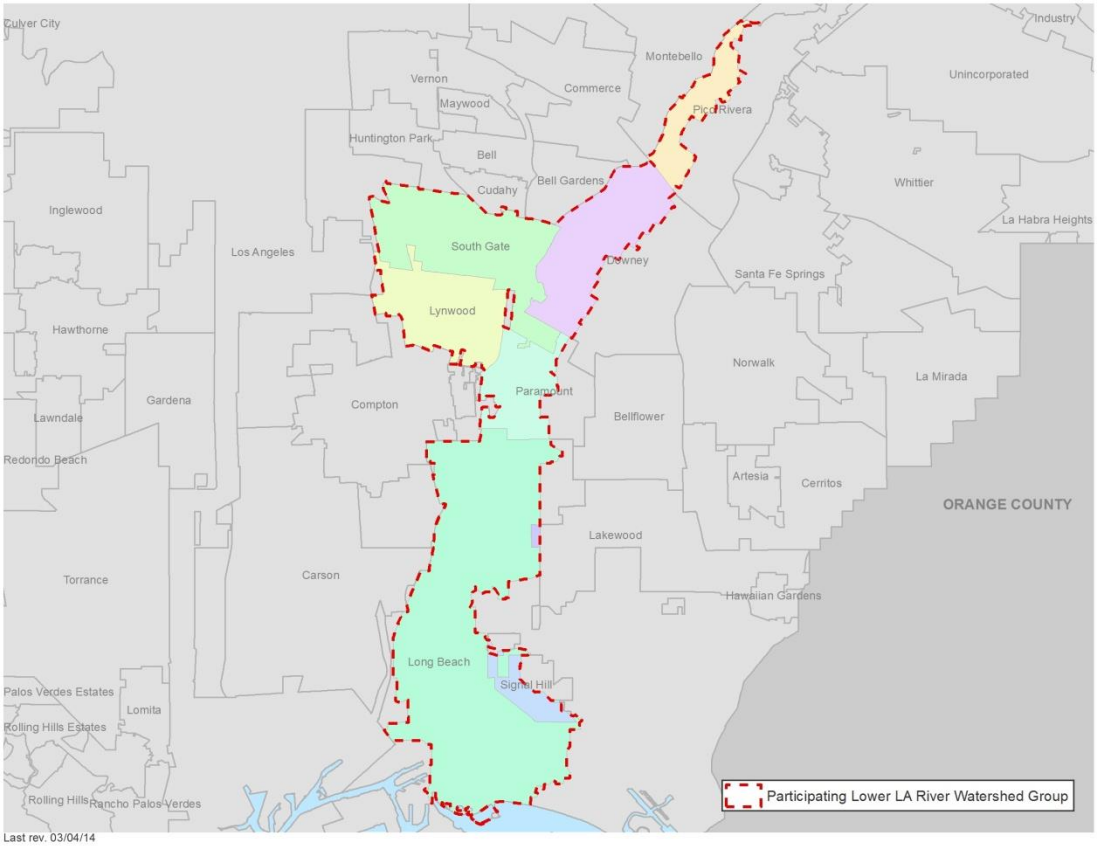


Figure 1-1: Participating Agencies Map

BOUNDARIES

The Lower LAR Watershed is located within the Los Angeles River Watershed Management Area (WMA) as designated in the Los Angeles MS4 Permit (Figure B-4). The three main water bodies located within the Lower LAR - Compton Creek, Los Angeles River (Reach 1 and 2)[6] and Rio Hondo Reach 1 - are defined by the Regional Board as inland Surface Waters of the State. As part of the main stem of the Los Angeles River, Reaches 1 and 2 and the Estuary are designated Waters of the United States (EPA, 2010). By definition its tributaries are also Waters of the United States, which includes Compton Creek and Rio Hondo.

Within the Lower LAR Watershed, the main channels of the Los Angeles River, Compton Creek and the Rio Hondo and most of their tributaries are owned by the LACFCD. The Army Corps of Engineers does not have ownership of channels, although there are privately owned and maintained drains and open channels.

[6] The LAR Estuary is not considered an inland Surface Water of the State

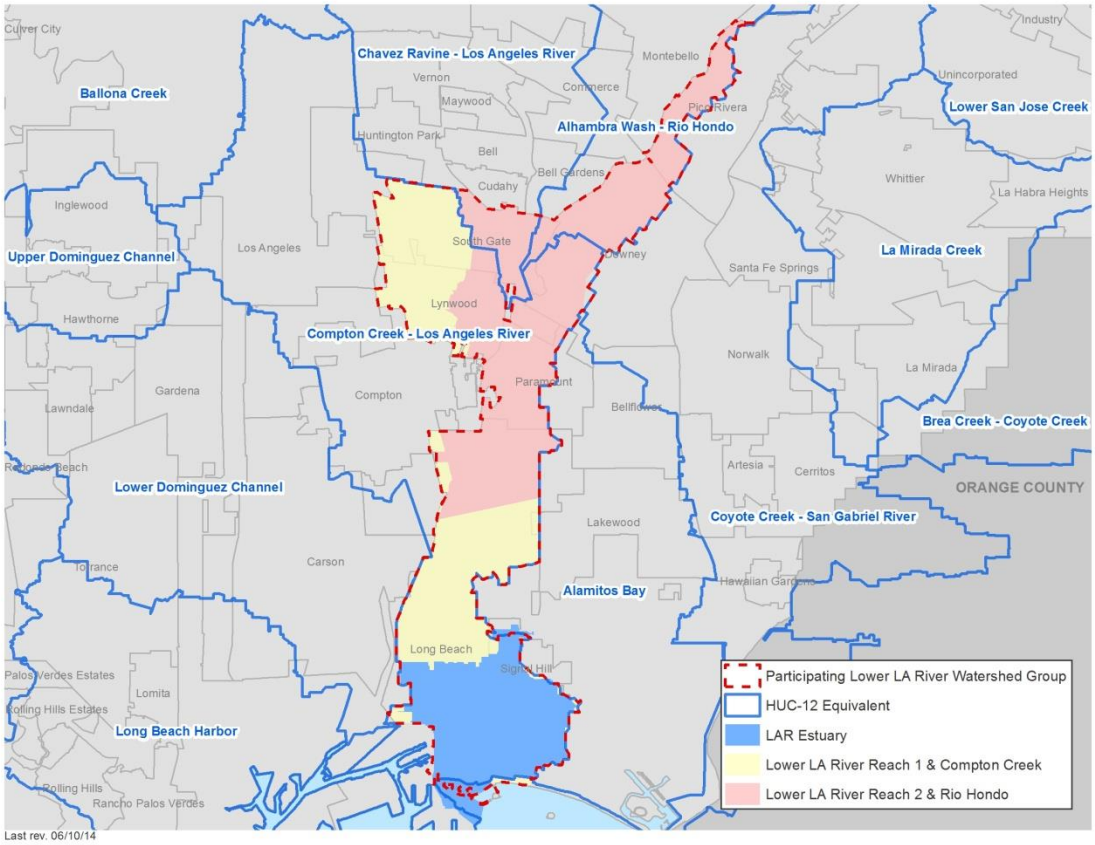


Figure 1-2: Watershed Map with HUC-12 Equivalent Subwatersheds

HYDROLOGIC UNIT CODES (HUC)

The United States Geological Survey's (USGS) Hydrologic Unit Codes (HUCs) are referenced in the MS4 Permit requirements. The HUC system divides the United States into a hierarchical classification of defined, hydrologically-based watersheds. The LACFCD found that some of the HUC boundaries within the Los Angeles Basin were incorrect and have since developed more accurate "HUC equivalents". Following the HUC equivalent system, Compton Creek and the Los Angeles River Estuary and Reach 1 are within subwatershed 180701050402, the Los Angeles River Reach 2 is within subwatersheds 180701050401 and 180701050402 and Rio Hondo Reach 1 is within subwatershed 180701050303. The subwatersheds of the Lower LAR are shown in Figure 1-2 and listed in Table 1-2.

The subwatersheds defined by these 12 digit numbers are referred to as HUC-12. Groups of subwatersheds that share a common downstream waterbody form a watershed. A watershed is designated by the first 10 digits of a HUC-12 and as such is referred to as HUC-10. In the case of the Lower LAR Watershed, Compton Creek and Los Angeles River Reach 1 and 2 are within the Lower Los Angeles River HUC-10 watershed and the Rio Hondo Reach 1 is within the neighboring Rio Hondo HUC-10 watershed. Both watersheds are within the Los Angeles HUC-08 subbasin, which shares most of its borders with the Los Angeles River WMA (Figure B-4).

Table 1-2: Subwatersheds/Water Bodies within the Lower LAR Watershed

Subwatershed/ Water Body	HUC 12 Equivalent	HUC Name	Area within Lower LAR Watershed (mi^2)
Compton Creek	180701050402	Compton Creek – Los Angeles River	6.83
LA River Reach 1	180701050402	Compton Creek – Los Angeles River	16.3
LA River Reach 2	180701050402	Compton Creek – Los Angeles River	16.18
	180701050401	Chavez Ravine – Los Angeles River	
LA River Estuary	180701050402	Compton Creek – Los Angeles River	
Rio Hondo Reach 1	180701050303	Alhambra Wash – Rio Hondo	6.04

WATERSHED AUTHORITY GROUP

Watershed Authority Groups (WAGs) as described in State Assembly Bill 2554, which in 2010 amended the Los Angeles County Flood Control District Act, are referenced in the MS4 Permits. The purpose of the WAGs is to implement collaborative water quality improvement projects and services, with the goal of improving water quality and reducing stormwater and urban runoff pollution. The creation and funding of the WAGs has not yet occurred - it is dependent upon voter approval of the LACFCD's Water Quality Funding Initiative (a countywide parcel fee). AB 2554 divides the County into nine WAGs - the Lower LAR Watershed is located within the Lower Los Angeles River WAG, which shares borders with the Lower Los Angeles River HUC-10 watershed. Figure 1-3 is a complete map of the WAG groups.

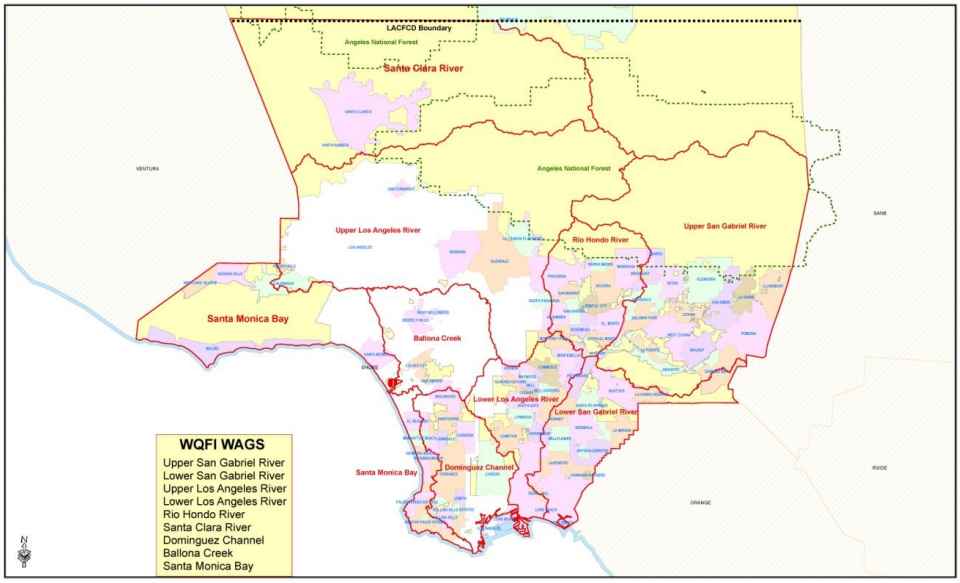


Figure 1-3: Watershed Authority Groups Map

1.2 THE WATERSHED MANAGEMENT PROGRAM

1.2.1 PURPOSE OF THE MS4 PERMIT

MS4s receive stormwater and non-stormwater discharges from various sources, including municipal MS4s and other public agencies, discharges under NPDES permits or authorized by the USEPA[7], groundwater and natural flow. As the discharges flow over the urban landscape, they may pick up pollutants generated by urban activities, such as metals, bacteria, pesticides, fertilizers and trash. Polluted stormwater and non-stormwater discharges conveyed through the MS4 ultimately reach receiving waters, resulting in adverse water quality impacts.[8]

The goal of the MS4 Permit is to reduce the discharge of these pollutants from MS4s to the maximum extent practicable.

1.2.2 WATERSHED MANAGEMENT EMPHASIS

The watershed management approach to permit implementation – described in the current MS4 Permits as a voluntary approach to compliance – is a departure from previous permit structures. The previous MS4 Permits (Order Nos. 01-182 and 99-060) addressed implementation through jurisdictional Stormwater Quality Management Programs (SQMPs). The Los Angeles countywide SQMP, prepared jointly by the Permittees and approved by the Regional Board in 2001, described the controls to be implemented in order to comply with the special provisions (now referred to as the Minimum Control Measures, or MCMs) of the MS4 Permit. These controls were identical for each Permittee and did not 1) differentiate between watersheds or agencies or 2) target or identify priority pollutants.

The emphasis of the prior SQMP approach was rote program development and implementation. In contrast, management actions under the WMP are driven by the water quality conditions of the receiving waters and outfalls within the watershed.

The Regional Board outlines several reasons for this shift in emphasis from the previous MS4 Permit. A watershed based structure for permit implementation is consistent with TMDLs developed by the Regional Board and USEPA, which are established at a watershed or subwatershed scale and are a prominent part of the MS4 Permit. The participating agencies have already begun collaborating on a watershed scale to develop monitoring and implementation plans required by TMDLs.

1.2.3 WATERSHED MANAGEMENT GOALS

Addressing MS4 discharges on a watershed scale focuses on water quality results by emphasizing the receiving waters and outfalls within the watershed[9]. The conditions of the receiving waters drive

[7] Including discharges subject to a decision document approved pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

[8] MS4 Permit Fact Sheet (pg. F7)

[9] MS4 compliance is measured at 1) Receiving water monitoring, 2) Stormwater outfall based monitoring, 3) Non-storm water outfall based monitoring, and 4) New Development/Re-development effectiveness tracking.

management actions, which in turn focus on the measures to address pollutant contributions from MS4 discharges.

The ultimate goals of the Watershed Management Programs is to ensure that discharges from the MS4:

1. Achieve applicable Water Quality Based Effluent Limitations (WQBELs) that implement TMDLs,
2. Do not cause or contribute to exceedances of receiving water limitations,
3. Nonstormwater discharges from the MS4 are not a source of pollutants to receiving waters.

1.2.4 WATERSHED MANAGEMENT APPROACH

In order to achieve the goals listed in the previous section, the approach of the WMP is to:

- Prioritize water quality issues resulting from stormwater and non-stormwater discharges from the MS4 to receiving waters,
- Identify and implement strategies, control measures, and BMPs that:
    - Achieve applicable water quality-based effluent limitations[10]
    - Do not cause or contribute to exceedances of receiving water limitation[11]
    - Do not include non-stormwater discharges that are effectively prohibited[12]
    - Ensure that controls are implemented to reduce the discharge of pollutants to the maximum extent practicable[13]
- Execute an integrated monitoring program and assessment program[14] to determine progress towards achieving applicable limitations and/or action levels
- Modify strategies, control measures, and BMPs as necessary based on analysis of monitoring data collected pursuant to the Monitoring and Reporting Program (MRP) to ensure that applicable water quality-based effluent limitations and receiving water limitations and other milestones set forth in the WMP are achieved in the targeted timeframes.
- Provide opportunity for meaningful stakeholder input. This includes participation in a permit-wide WMP technical advisory committee (TAC) that advises and participates in the development of the WMP from month six through the date of program approval.

The overall approach is adaptive, whereby BMPs will be implemented, their effectiveness monitored and modifications to this WMP will be made as needed. These modifications will maintain consistency with the assumptions and requirements of applicable TMDL Waste Load Allocations.

1.2.5 CALIFORNIA ENVIRONMENTAL QUALITY ACT

The goals and objectives of the WMP may be achieved by development of storm water structural controls that may require discretionary approval subject to review under the California Environmental

[10] Pursuant to Part VI.E and Attachments L through R pursuant to corresponding compliance schedules
[11] Pursuant to Parts V.A and VI.E and Attachments L through R of the Permit
[12] Pursuant to Part III.A of the Permit
[13] Pursuant to Part IV.A.1 of the Permit
[14] Pursuant to Attachment E – MRP, Part IV of the Permit

Quality Act (CEQA). The participating agencies intend to comply with CEQA when implementing structural BMPs. Public agencies responsible for carrying out or approving stormwater structural controls are identified as the lead agency. The environmental review required imposes both procedural and substantive requirements. At a minimum, the lead agency must adhere to the consultation and public notice requirements set forth in the CEQA Guidelines, make determinations whether the proposed stormwater structural control is a "project", and if so, conduct an initial review of the project and its environmental effects. The lead agency must identify and document the potential environmental impacts of the proposed project in accordance with CEQA, (Public Resources Code Section 21000 et seq.), and the CEQA Guidelines (Title 14 of the California Code of Regulations, Section 15000, et seq.).

Certain classes of projects have been determined not to have significant effect on the environment and are exempt from the provisions of CEQA by statute or category. When a public agency decides that a project is exempt from CEQA, and the public agency approves or determines to carry out the project, the agency may file a Notice of Exemption. For projects deemed not exempt, the lead agency will prepare and Initial Study and decide whether a Negative Declaration will be required for the project, or depending on the potential effects, a further, and more substantial review may be conducted in the form of an Environmental Impact Report (EIR). A project may not be approved as submitted if feasible alternatives or Mitigation Measures are able to substantially lessen the significant environmental effects of the project. Moreover, environmental review must include provisions for wide public involvement, formal and informal, in order to receive and evaluate public reactions to environmental issues, and when deciding the matter, the lead agency must consider all comments it receives (Cal. Pub. Res. Code § 21091(d)(1); 14 CCR § 15074(b)). The lead agency will use the EIR in determining the environmental effects of the proposed storm water treatment control project, and whether or not to approve the proposed project. If the proposed project is approved, all conditions and mitigations made in the adopted EIR will become part of any subsequent actions taken by the lead agency. The EIR will also be used by permitting agencies, funding agencies and the public to support proposed project decisions.

The National Environmental Quality Act (NEPA) comes into play less often than CEQA, but may be included for storm water treatment control projects involving federal funding. A joint NEPA and CEQA review process is encouraged to improve coordination and avoid redundancies. Like CEQA, NEPA process provides opportunities to address issues related to proposed projects early in the planning stages. NEPA was codified under Title 42 of the United States Code sections 4331 et seq. (42 U.S.C. 4331 et seq.).

1.3 LOWER LOS ANGELES RIVER WATERSHED

1.3.1 OVERVIEW OF THE LOS ANGELES RIVER WATERSHED

The Los Angeles River Watershed drains a watershed of 824 square miles[15]. The Los Angeles River WMA is one of the largest in the region and is also one of the most diverse in terms of land use patterns. Approximately 324 square miles of the watershed are covered by forest or open space land including the area near the headwaters, which originate in the Santa Monica, Santa Susana, and San Gabriel Mountains. The remainder of the watershed is highly developed. The river flows through the San Fernando Valley past heavily developed residential and commercial areas. From the confluence with the Arroyo Seco, north of downtown Los Angeles, to the confluence with the Rio Hondo, the river flows through industrial and commercial areas and is bordered by rail yards, freeways, and major commercial and government buildings. From the Rio Hondo to the Pacific Ocean, the river flows through industrial, residential, and commercial areas, including major refineries and petroleum products storage facilities, major freeways, rail lines, and rail yards serving the Ports of Los Angeles and Long Beach. Due to major flood events at the beginning of the century, by the 1950s most of the Los Angeles River was lined with concrete. The Los Angeles River tidal prism/estuary begins in Long Beach at Willow Street and runs approximately three miles before joining with Queensway Bay. The channel has a soft bottom in this reach with concrete-lined sides.

The remaining discussion on the watershed will solely refer to the specific characteristics of the Lower Los Angeles River Watershed.

1.3.2 LOWER LOS ANGELES RIVER WATERSHED AREA

REGIONAL AND LOCAL SETTING

The Lower LAR Watershed encompasses approximately 43.7 square miles (27,981 acres) within Los Angeles County and comprises 5.3% of the drainage area of the Los Angeles River Watershed. The boundaries of the watershed are shown in Figure 1-1 and further explained in Section 1.1.

CLIMATE

Average annual precipitation for the watershed area is highly variable and terrain-dependent, averaging fifteen (15) inches annually and mainly occurring during the winter months (November through April). Due to the atmospheric dominance of the stable marine layer, significant precipitation is rare between May and October.

During the winter months Pacific storms often push cold fronts across California from northwest to southeast. These storms and frontal systems account for the vast bulk of the area's annual rainfall. Such rainy season storms are migratory, with wet and dry periods alternating during the winter and early

[15] MS4 Permit Fact Sheet (pg. F94)

spring with irregularity in timing and duration. Rainfall patterns average 3.68 inches of rainfall in February to 0.01 inches of rainfall in July[16].

With the highly developed conditions within the watershed, most stormwater flows generated by the rainfall is routed to the ocean through the curb and gutters along the streets, catch basins and storm drains into the Los Angeles River. The velocity of the storm flows within this watershed ranges up to 20 feet per second within the waterways.

RAINFALL AND FLOW CHARACTERISTICS

Historical rainfall records from two existing rain gauges located near the Lower LAR Watershed were obtained and utilized in this analysis. These meteorological stations and resulting rain gauge data are maintained by National Climatic Data Center. The gauges were chosen due to their active status and the duration of available data. Their locations are shown in Figure 1-4 with detailed location information provided in Table 1-3.

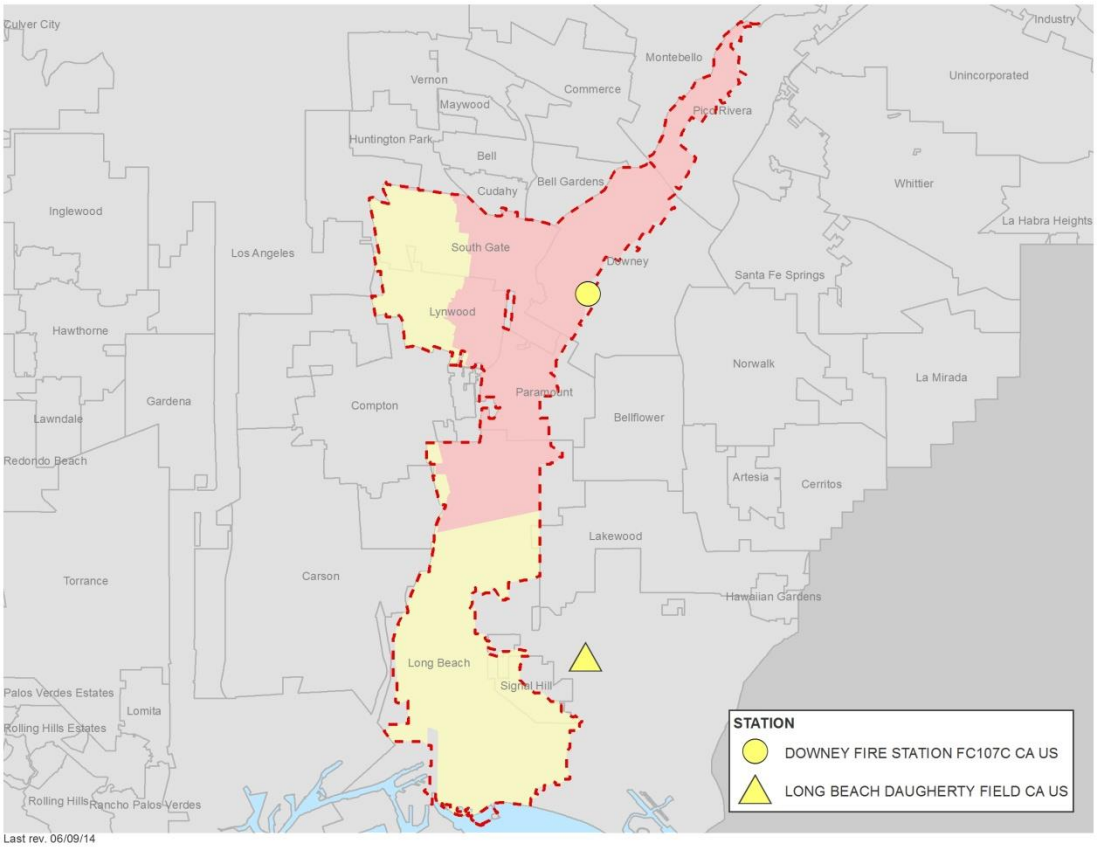


Figure 1-4: Rainfall Gauge Stations in Downey and Long Beach (Yellow Squares)

[16] National Climatic Data Center, http://lwf.ncdc.noaa.gov

Table 1-3: Rainfall Data Summary

Station ID	Station	Period	Latitude	Longitude	Elevation (ft)	Mean Annual Precipitation (in)	85th Percentile Storm (in)
USC00042494	Downey Fire Station	1949 - 2012	33.929	-118.145	110.0	12.32	0.22
USW00023129	Long Beach Daugherty Field	1949-2014	33.811	-118.146	30.84	11.20	0.18

(1) National Climatic Data Center, http://lwf.ncdc.noaa.gov

Average monthly rainfall for the historical record has been calculated for each rain gauge and is provided in Table 1-4. The monthly values are similar among the two rain gauges.

Table 1-4: Summary of Average Monthly Rainfall (in)

Month	Downey Fire Station	Long Beach Daugherty Field
January	3.0	2.6
February	3.2	2.9
March	2.4	1.8
April	1.1	0.7
May	0.2	0.2
June	0.1	0.1
July	<0.1	<0.1
August	0.1	0.1
September	0.3	0.2
October	0.4	0.4
November	1.6	1.2
December	2.5	1.8
Total Average Monthly Rainfall	**1.2**	**1.0**

(1) National Climatic Data Center, http://lwf.ncdc.noaa.gov

DRY WEATHER FLOWS TO THE LOWER LOS ANGELES RIVER

Dry weather flow in the Los Angeles River comes predominantly from effluent discharges and groundwater inflow. Sources of effluent discharges in the Lower LA River watershed include wastewater treatment plants, urban runoff such as irrigation overflows and car wash water, and various industrial discharges.

The Sanitation Districts of Los Angeles County maintain a regional, interconnected sewerage system called the Joint Outfall System. The Joint Outfall System includes six satellite water reclamation plants (WRPs), including the Whittier Narrows WRP, which discharges effluent during dry weather into the Rio Hondo above the Whittier Narrows dam. The Whittier Narrows WRP is located at 301 N. Rosemead Boulevard in the City of El Monte. The plant occupies 27 acres south of the Pomona (60) Freeway, and provides primary, secondary and tertiary treatment for 15 million gallons of wastewater per day. Most of the reclaimed water is reused as groundwater recharge into the Rio Hondo and San Gabriel Coastal

Spreading Grounds, or for irrigation at an adjacent nursery. Remaining effluent is discharged directly into the Rio Hondo and the San Gabriel River at 3 effluent discharge points.

The average monthly effluent discharge from the LA County Sanitation District's Whittier Narrows Water Reclamation Plant was 6.44 MGD in 2012, with the average monthly max being 8.05 MGD and the average monthly minimum flows measured at 4.97 MGD.

The three publicly owned treatment works (POTWs) discharge to the Los Angeles River (Tillman Water Reclamation Plant, LA-Glendale Water Reclamation Plant, and Burbank Water Reclamation Plant) and constitute the majority of the flow and metals loadings during dry weather[17]. The critical flow for the entire river (each reach and tributary) is 203 cfs, which is equal to the combined design flow of the three POTWs (169 cfs) plus the median flow from the storm drains and tributaries (34 cfs).

WET WEATHER FLOWS TO THE LOWER LOS ANGELES RIVER

In addition to stormwater flows within the Los Angeles Basin, wet weather flows from the Santa Monica Mountains, the Verdugo Mountains, the Santa Susana Mountains and the San Gabriel Mountains also contribute to flows in the Los Angeles River.

WATERSHED CATCHMENT HYDROLOGIC CONNECTIVITY

The upstream limit of the LLAR subwatershed begins at the north stem of Reach 2 Los Angeles River within the City of South Gate and the downstream limit ends at the Estuary. The main reach through the watershed is the Los Angeles River, with Compton Creek and the Rio Hondo as major tributaries. The stretch of Los Angeles River within the watershed consists of a concrete lined channel spanning 400 to 465 feet in width. Compton Creek and the Rio Hondo are primarily concrete channels within the Lower LAR Watershed. Figure 1-5 shows the LACFCD storm drain system within the Lower LAR Watershed as well as its main channels and tributaries.

The Compton Creek subwatershed drains approximately 42 square miles to its confluence with the Los Angeles River. The subwatershed is almost entirely developed.

The Rio Hondo subwatershed drains approximately 143 square miles to its confluence with the Los Angeles River.

The Lower LAR Watershed drains runoff directly from urbanized area totaling approximately 43.7 square miles. From its upstream beginning in South Gate to its downstream confluence with the Los Angeles River Estuary, the Lower LAR stretches approximately 13.3 miles.

The Los Angeles County Department of Public Works provided the delineation of the catchments within each subwatershed. Approximately 53 catchments are located within this watershed[18]. These delineations are based on a combination of contour information and existing underground storm drain systems.

[17] Los Angeles River Metals TMDL Basin Plan Amendment, 2006

[18] Los Angeles County Watershed Management Modeling System, http://dpw.lacounty.gov/wmd/wmms/

Drainage areas for individual outfalls are not readily available at this time. Defining these areas would require significant resources. The Group proposes to provide drainages areas for major outfalls with significant discharges and outfalls to be monitored as part of the CIMP. To complete this task, existing drainage maps from the LACFCD and/or cities will be obtained and converted to GIS project files. This task will be completed within one year of WMP approval

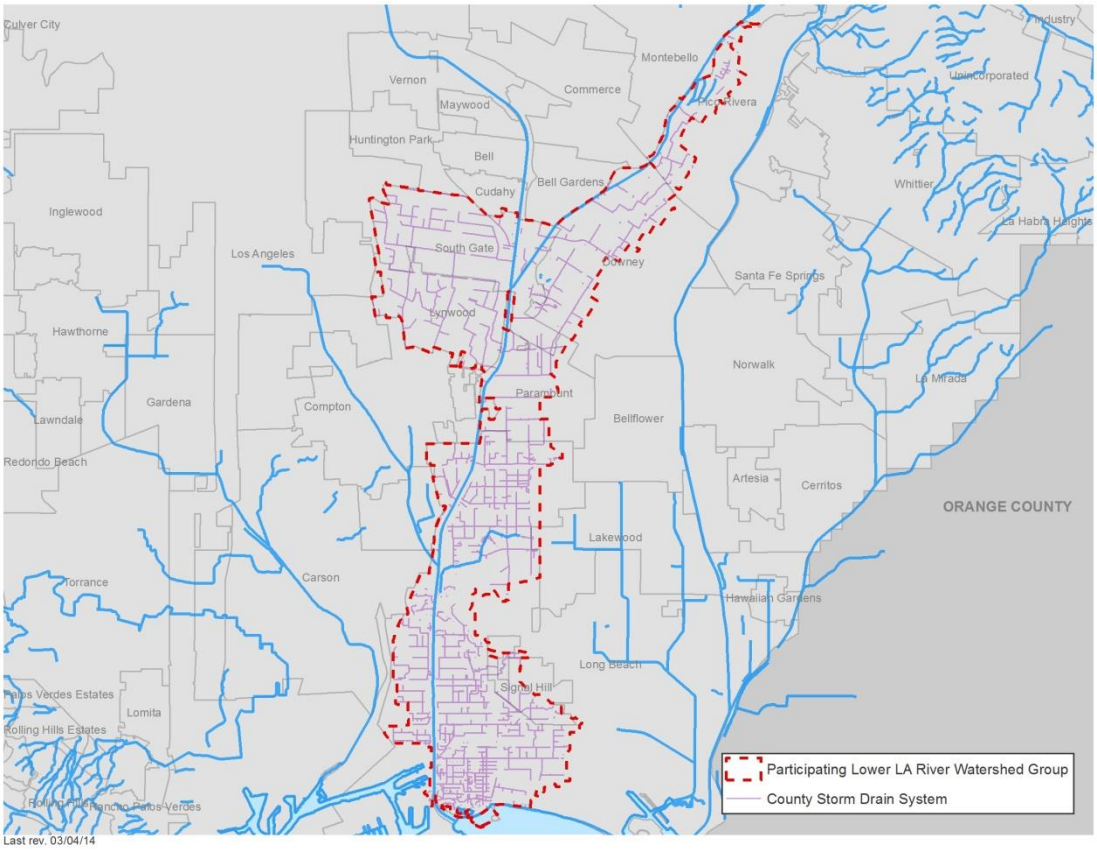


Figure 1-5: LACFCD Storm Drains

The watershed is predominantly served by storm sewer systems, across ten agency jurisdictions, connecting drainage in urbanized areas with the main tributaries. Due to the narrow shape of the watershed, the participating agencies are directly adjacent to either the Lower LAR or its main tributaries Compton Creek and the Rio Hondo.

GEOPHYSICAL SETTING

TOPOGRAPHY

Natural topography is comprised of the existing soils, ground elevation/slope, vegetation, stream network, and groundwater. These features impact each other in both the natural and built environments, and therefore should not be analyzed independently when evaluating BMP location options.

SOILS

The Lower LAR Watershed can be characterized as having seven soil types. Figure 1-6 shows the various soil types underlying the watershed. Soils range from sandy loam to clay loam, having a varying range of saturated hydraulic conductivity.

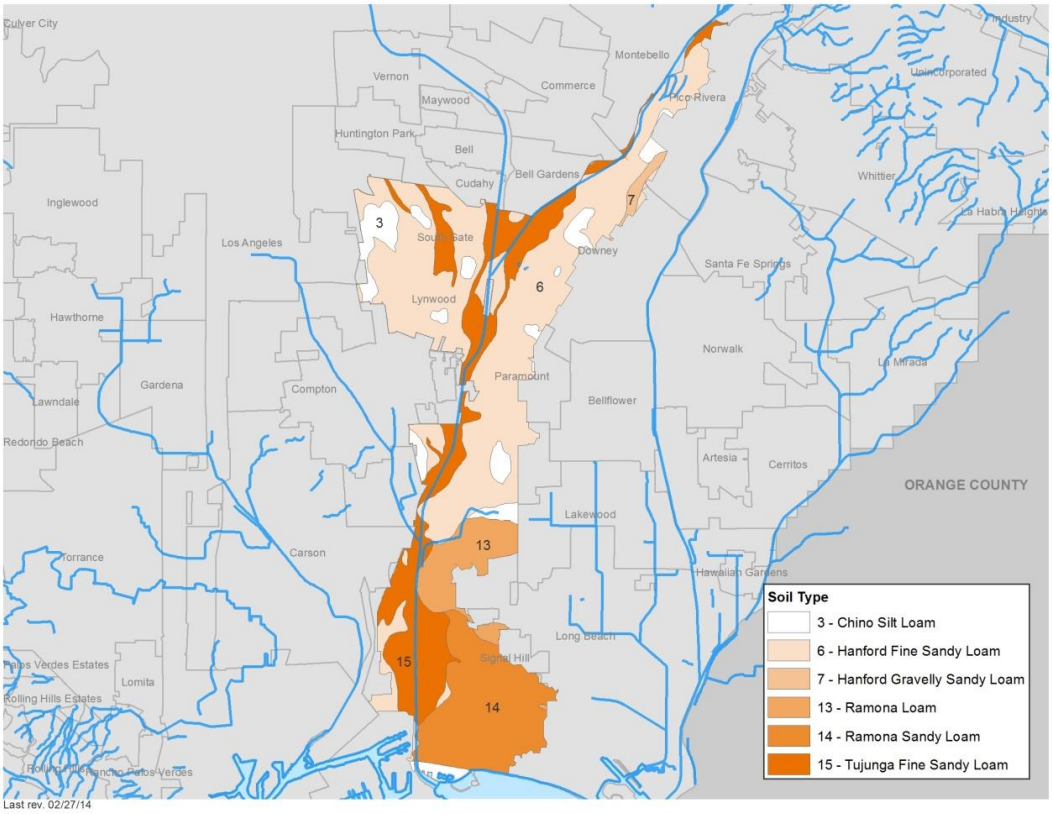


Figure 1-6: Soil Types[19]

GROUNDWATER

Groundwater flow in the Lower LAR Watershed generally mimics surface topography. Depth to the groundwater varies from 11 feet to greater than 40 feet. Figure 1-7 shows the groundwater basin for the Lower LAR Watershed.

WATERSHED LAND AREA

Table 1-5 lists the percent land area within the Lower LAR for each participant.

LAND USES

Table 1-6 lists and Figure 1-8 shows the developed and undeveloped land within the Lower LAR Watershed.

[19] Source: LA County Department of Public Works, **http://ladpw.org/wrd/publication/Engineering/hydrology/soil_types.zip**

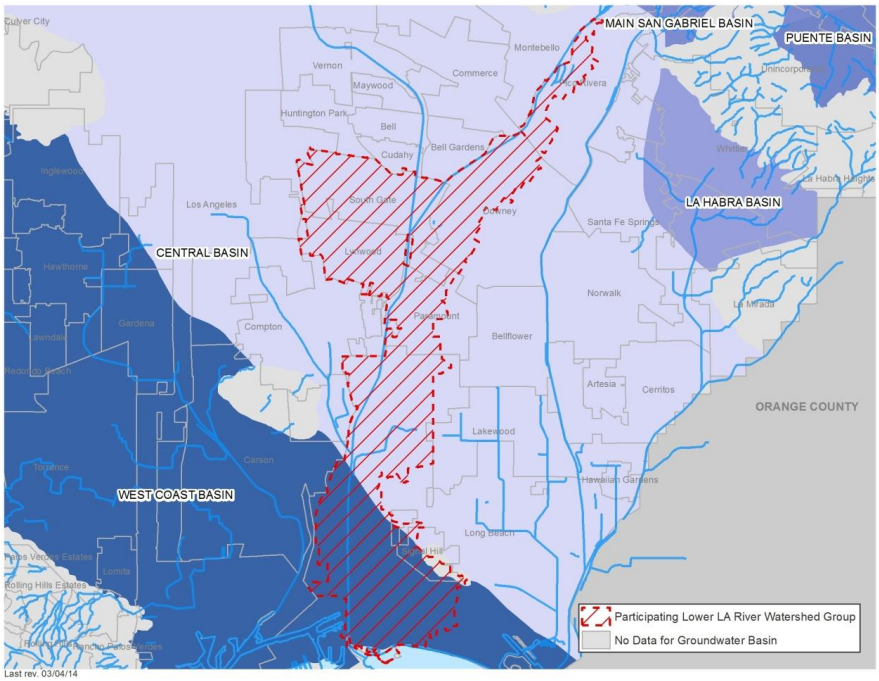


Figure 1-7: Groundwater Basins

Table 1-5: Watershed Land Area by Participant

Agency	Land area (Acres)	Percent of total area (%)
Downey	3,546	13
Lakewood	51	<1
Long Beach	12,301	42
Lynwood	3,098	11
Paramount	1,997	7
Pico Rivera	1,510	5
Signal Hill	774	3
South Gate	4,704	15
Caltrans	Caltrans owns and operates approximately 4% of the watershed	
LACFCD	N/A	N/A

Table 1-6: Developed and Undeveloped Land

Agency	Acres developed	Acres undeveloped	% Developed lands
Downey	5,074	379	93%
LACFCD	ND	ND	ND
Lakewood	47	3	94%
Long Beach	18,068	1,320	93%
Lynwood	2,180	50	98%
Paramount	3,350	26	99%
Pico Rivera	1,580	13	99%
Signal Hill	1,890	17	99%
South Gate	3,820	14	99%
Caltrans	ND	ND	ND

ND - Not delineated

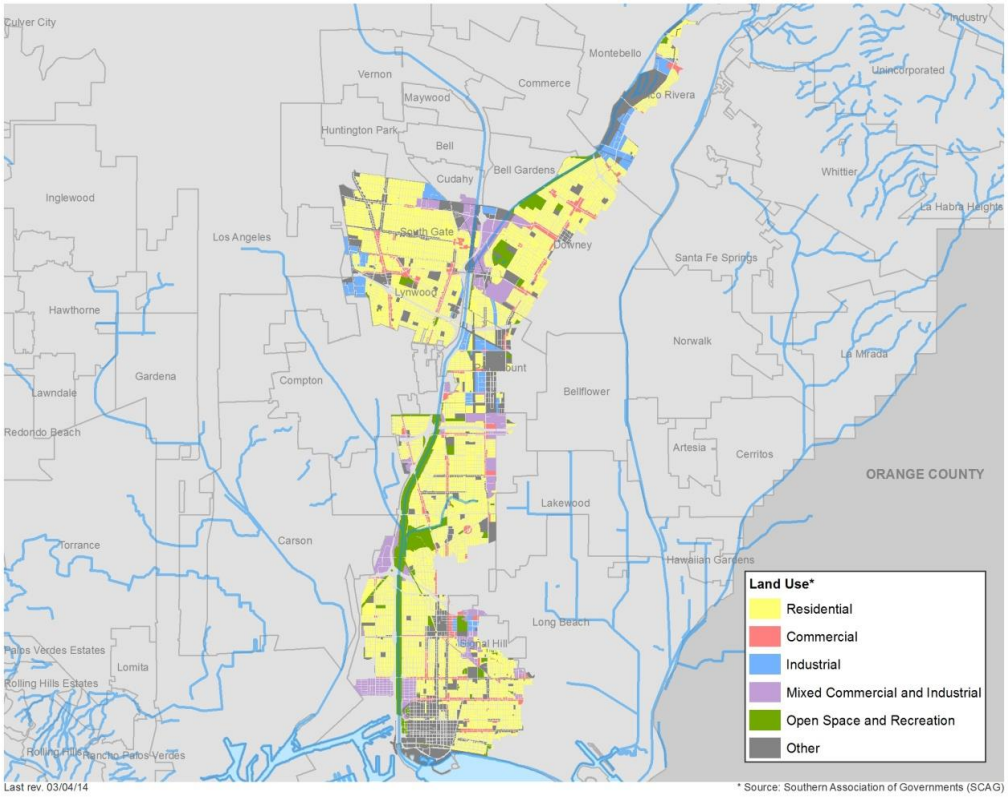


Figure 1-8: Land Use Map

DISADVANTAGED COMMUNITY

The Lower LAR Watershed is in a geographic area encompassing all or part of eight cities. This area is a high-minority and economically disadvantaged region. Of the eight cities participating in this WMP, three are categorized as disadvantaged communities as a whole, meaning that the median income levels in the city as a whole are less than 80% of the state's median household income ($48,706)[20]. All of the remaining five cities that are not disadvantaged as a whole are disadvantaged in part. Table 1-7 lists the income statistics for each city and Figure 1-9 is a map of the disadvantaged communities.

Table 1-7: DAC Percentage by City

City	DAC Percentage[1]
Downey	29%
Lakewood	3%
Long Beach	49%
Lynwood*	100%
Paramount*	100%
Pico Rivera	34%
Signal Hill	34%
South Gate*	100%

* Denotes disadvantaged community as a whole

[20] Integrated Regional Water Management, Grants, DAC Maps, *www.water.ca.gov/irwm/grants/resourceslinks.cfm*

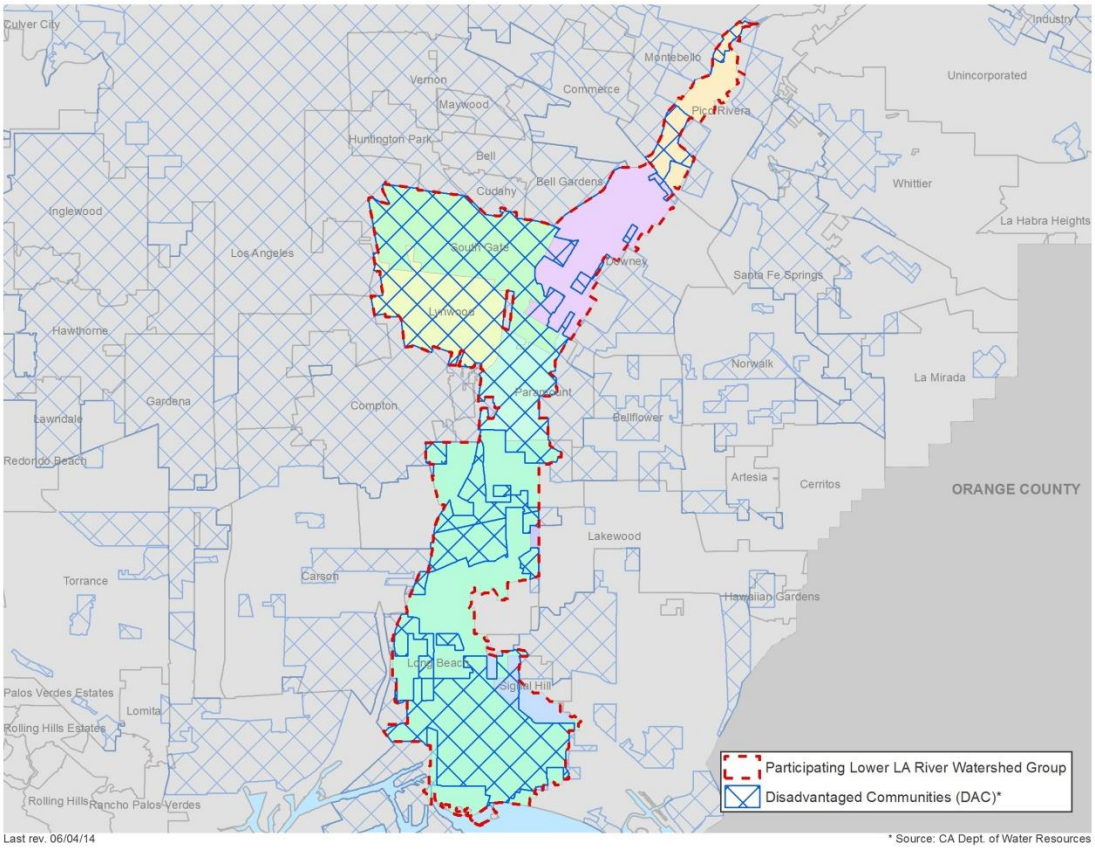


Figure 1-9 - Disadvantaged Community Map

1.4 WATER QUALITY IMPAIRMENTS

1.4.1 HISTORY OF IMPAIRMENTS IN THE LOWER LAR WATERSHED

Various reaches within the Lower LAR Watershed are on the 2010 CWA Section 303(d) List of impaired water bodies for trash, nitrogen compounds and related effects (ammonia, nitrate, nitrite, algae, pH, odor, and scum), metals (copper, cadmium, lead, zinc, aluminum and selenium), bacteria, and historic pesticides. Beneficial uses impaired by trash in the Los Angeles River are REC-1, REC-2, WARM, WILD, EST, MAR, RARE, MIGR, SPWN, COMM, WET and COLD. The excess nitrogen compounds may be causing impairments to the WARM and WILD designated beneficial uses of Los Angeles River. Excess metals may be causing impairments to the WILD, RARE, WARM, WET, and GWR designated beneficial uses of the Los Angeles River and its tributaries. Elevated indicator bacteria densities are listed impairments to the REC-1 and REC-2 designated beneficial uses of Los Angeles River.

1.4.2 ORGANIZING TO ADDRESS TMDLS

TMDLs represent large-scale efforts crossing jurisdictional boundaries and often encompassing the entire drainage of a major regional waterbody (e.g., Los Angeles River). Within the Lower LAR, these efforts have included the following:

- Beginning in 2009, the Los Angeles River working group was formed for development of the Metals TMDL implementation plan. The group eventually developed into the Lower LAR Watershed group to develop this WMP.
- All Lower LAR cities participated in and received funding as part of a grant to sixteen cities in the Gateway region whereby city-owned and LACFCD owned catch basins were retrofitted with full-capture trash inserts[21].
- The Cities of Signal Hill and Long Beach (together with the LACFCD) worked together and were awarded a grant to install full capture end-of-pipe trash nets and screens in Hamilton Bowl.
- The Cities of Downey, Lynwood, Paramount, Pico Rivera, Signal Hill and South Gate were awarded a Proposition 84 grant to install Low Impact Development (LID) BMPs along high traffic transportation corridors.

1.5 WATER QUALITY ISSUES AND THE HISTORY OF WATER QUALITY REGULATIONS

1.5.1 FEDERAL AND STATE LAW

The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for all inland surface waters, estuaries, and coastal waters. The federal Environmental Protection Agency (EPA) is ultimately responsible for

[21] State Water Board Project No C-06-6439-110, December 2011

implementation of the CWA and its associated regulations. However, the CWA allowed EPA to authorize the NPDES Permit Program to state governments, enabling states to perform many of the permitting, administrative, and enforcement aspects of the NPDES Program. California, like other states, implements the CWA by promulgating its own water quality protection laws and regulations. As long as this authority provides equivalent protections as the federal CWA, EPA can delegate CWA responsibilities to the state while retaining oversight responsibilities. In some cases, California has established requirements that are more stringent than federal requirements.

The 1970 Porter-Cologne Water Quality Control Act granted the California State Water Resources Control Board (SWRCB) and nine California Regional Water Quality Control Boards (Regional Boards) broad powers to protect water quality. This Act and its governing regulations provide the basis for California's implementation of CWA responsibilities. The Los Angeles Regional Water Quality Control Board (Regional Board) is the governing regulatory agency for the Lower LAR Watershed.

Section 303(d) of the CWA requires waterbodies not meeting water quality objectives even after all required effluent limitations have been implemented (e.g. through wastewater or stormwater discharge permits) to be regularly identified. These waters are often referred to as "303(d) listed" or "impaired" waters. Waterbodies that are listed on the 303(d) list typically require development of a Total Maximum Daily Load (TMDL) for the pollutant(s) impairing the use of the water. Development and approval of the 303(d) list is a lengthy state and federal process. A list is not effective until the EPA approves the list. The current EPA-approved 303(d) list for California is the 2010 list, which can be found in Appendix A-2-2.

A TMDL establishes the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. Depending on the nature of the pollutant, TMDL implementation requires limits on the contributions of pollutants from point sources (waste load allocation), nonpoint sources (load allocation), or both. The Regional Board is responsible for TMDL development in the Lower LAR Watershed.

Adoption of a TMDL requires an amendment to the Water Quality Control Plan (known as the Basin Plan) for the Los Angeles Region. The Regional Board's Basin Plan is designed to preserve and enhance water quality and protect the beneficial uses of regional waters. Specifically, the Basin Plan (i) designates beneficial uses for surface and ground waters, (ii) sets narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to the state's antidegradation policy, and (iii) describes implementation programs to protect all waters in the Region. The Basin Plan is reviewed and updated as necessary (Regional Board 1994, as amended). Following adoption by the Regional Board, the Basin Plan and subsequent amendments are subject to approval by the State Board, the State Office of Administrative Law (OAL), and the Environmental Protection Agency (EPA).

1.5.2 WATER QUALITY REQUIREMENTS

The Regional Board designates "beneficial uses" for waterbodies in the watersheds that it governs and adopts water quality objectives to protect these uses[22]. In some cases, EPA may also promulgate objectives where it makes a finding that the state's objectives are not protective enough to protect the beneficial use. The nature of the objectives is directly related to the type of beneficial use. For example, the freshwater warm habitat beneficial use protects aquatic organisms resident in warm-water streams. The associated water quality objectives are for those constituents known to affect both the growth and reproduction of aquatic life. These objectives range from physical characteristics such as temperature, dissolved oxygen, and pH to potential toxic constituents including metals and organics. In California, the objectives for metals and a number of organic compounds have been established by the federal EPA rather than the state (California Toxics Rule, 2000). The EPA promulgated numeric water quality criteria for priority toxic pollutants and other water quality standards provisions based on the determination that the numeric criteria were necessary (since the state had been without numeric water quality criteria for many priority toxic pollutants as required by the CWA) to protect human health and the environment. These Federal criteria are legally applicable in the state for inland surface waters, enclosed bays and estuaries for all purposes and programs under the CWA.

1.6 MS4 PERMIT REQUIREMENTS

The development of this WMP is a compliance option of the MS4 permits held by the Permittees[23]. The WMP includes an evaluation of existing water quality conditions, including characterization of storm water and non-storm water discharges from the MS4 and receiving water quality to support identification and prioritization/sequencing of management actions. At a minimum, water quality priorities within each Watershed Management Area must include achieving applicable water quality based effluent limitations and/or receiving water limitations established.

The MS4 permit requires that this WMP identifies strategies, control measures, and BMPs to implement through the stormwater management programs on a watershed scale, with the goal of creating an efficient program to focus collective resources on watershed priorities and effectively eliminate the source of pollutants. Customization of the BMPs to be implemented, or required to be implemented, is

[22] See Regional Board's 1994 Los Angeles Region Basin Plan, as amended.

[23] The Cities of Pico Rivera, Downey, Lynwood and Signal Hill (hereinafter "the Cities") submitted Administrative Petitions (Petitions) to the California State Water Resources Control Board (SWRCB) pursuant to section 13320(a) of the California Water Code requesting that the SWRCB review various terms and requirements set forth in the 2012 MS4 Permit, Order No. R4-2012-0175 (2012 Permit) adopted by the California Regional Water Quality Control Board, Los Angeles Region (Regional Board)." These Cities have participated in good faith in the development of this Lower Los Angeles River Watershed Management Program (WMP). Nothing in this WMP shall affect those cities' administrative petitions, nor shall anything in this WMP constitute a waiver of any positions or rights therein.

done with the goal of creating an efficient program to focus individual and collective resources on watershed priorities.

On the basis of the evaluation of existing water quality conditions, waterbody-pollutant combinations are classified into one of the following three categories:

- CATEGORY 1 (HIGHEST PRIORITY): Waterbody-pollutant combinations for which water quality based effluent limitations and/or receiving water limitations are included in the MS4 Permits to implement TMDLs.
- CATEGORY 2 (HIGH PRIORITY): Pollutants for which data indicate water quality impairment in the receiving water according to the State's Listing Policy and for which MS4 discharges may be causing or contributing to the impairment.
- CATEGORY 3 (MEDIUM PRIORITY): Pollutants for which there are insufficient data to indicate water quality impairment in the receiving water according to the State's Listing Policy, but which exceed applicable receiving water limitations contained in the MS4 permit and for which MS4 discharges may be causing or contributing to the exceedances.

Sources for the waterbody-pollutant combinations are identified by considering the following:

- Review of available data, including historical findings from the participating agencies' Minimum Control Measure and TMDL programs, watershed model results and other pertinent information, data or studies.
- Locations of major MS4 outfalls and major structural controls for stormwater and nonstormwater that discharge to receiving waters.
- Other known and suspected sources of pollutants from the MS4 to receiving waters.

Based on the findings of the source assessment, the issues within the watershed are prioritized and sequenced. Factors considered in establishing watershed priorities include:

1. Pollutants for which there are water quality based effluent limitations and/or receiving water limitations with interim or final compliance deadlines within the permit term.
2. Pollutants for which there are water quality based effluent limitations and/or receiving water limitations with interim or final compliance deadlines between October 26, 2012 and October 25, 2017.
3. Pollutants for which data indicate impairment in the receiving water and the findings from the source assessment implicates discharges from the MS4, but no TMDL has been developed.

1.6.1 REASONABLE ASSURANCE ANALYSIS AND WATERSHED CONTROL MEASURES

As part of the WMP plan, a Reasonable Assurance Analysis (RAA) is conducted for each waterbody-pollutant combination. The RAA consists of an assessment, through quantitative analysis or modeling, to demonstrate that the activities and control measures (i.e. BMPs) identified in the Watershed Control Measures section of the WMP are performed to demonstrate that applicable water quality based

effluent limitations and/or receiving water limitations with compliance deadlines during the permit term will be achieved. Watershed Control Measures are subdivided into 1) Minimum Control Measures, 2) Non-Stormwater Discharge Measures 3) TMDL Control Measures and 4) other control measures for water-body pollutant Categories 1, 2 and 3.

Schedules are developed for strategies, control measures and BMPs to be implemented by each individual Permittee within its jurisdiction and for those that will be implemented by multiple Permittees on a watershed scale. The schedules will measure progress at least twice during the permit term and incorporate 1) Compliance deadlines occurring within the permit term for all applicable interim and/or final water quality based effluent limitations and/or receiving water limitations to implement TMDLs, 2) Interim deadlines and numeric milestones within the permit term for any applicable final water quality based effluent limitation and/or receiving water limitation to implement TMDLs, where deadlines within the permit term were not otherwise specified, and 3) For watershed priorities related to addressing exceedances of receiving water limitations.

1.6.2 ADAPTIVE MANAGEMENT

An adaptive management process will be implemented every two years from the date of program approval, adapting the WMP to become more effective, based on, but not limited to the following:

1. Progress toward achieving the outcome of improved water quality in MS4 discharges and receiving waters through implementation of the watershed control measures,
2. Progress toward achieving interim and/or final water quality based effluent limitations and/or receiving water limitations, or other numeric milestones where specified, according to established compliance schedules,
3. Re-evaluation of the highest water quality priorities identified for the Watershed Management Area based on more recent water quality data for discharges from the MS4 and the receiving water(s) and a reassessment of sources of pollutants in MS4 discharges,
4. Availability of new information and data from sources other than the Permittees' monitoring program(s) within the Watershed Management Area that informs the effectiveness of the actions implemented by the Permittees,
5. Regional Water Board recommendations; and
6. Recommendations for modifications to the WMP solicited through a public participation process

Based on the results of the iterative process, modifications necessary to improve the effectiveness of the WMP will be reported in the Annual Report, and as part of the Report of Waste Discharge (ROWD). Any necessary modifications to the WMP will be implemented upon acceptance by the Regional Water Board Executive Officer or within 60 days of submittal if the Regional Water Board Executive Officer expresses no objections.

2 IDENTIFICATION OF WATER QUALITY PRIORITIES

2.1 WATERBODY POLLUTANT CLASSIFICATION

One of the goals of this Watershed Management Program (WMP) is to identify and address water quality priorities within the Lower Los Angeles River (Lower LAR) Watershed. In order to begin prioritizing water quality issues within the Lower LAR Watershed, an evaluation of existing water quality conditions, including characterization of stormwater and nonstormwater discharges from the Municipal Separate Storm Sewer System (MS4) and receiving waters has been completed per section VI.C.5.a of the MS4 Permit.

The existing water quality conditions of the Lower LAR Watershed were used to classify pollutants into three categories each containing specific subcategories. These categories form the basis for identifying watershed priorities, which include, at a minimum, achieving applicable water quality-based effluent limitations and/or receiving water limitations established pursuant to TMDLs. The three categories and their subcategories are described below:

CATEGORY 1: Waterbody-pollutant combinations for which water quality-based effluent limitations and/or receiving water limitations are established in Part VI.E TMDL Provisions and Attachments L through R of the MS4 Permit.

- CATEGORY 1A: Final deadlines within Permit term (after approval of WMP[1] and prior to December 28, 2017)
- CATEGORY 1B: Interim deadlines within Permit term (after approval of WMP[2] and prior to December 28, 2017)
- CATEGORY 1C: Final deadlines between December 29, 2017 - December 28, 2022
- CATEGORY 1D: Interim deadlines between December 29, 2017 - December 28, 2022
- CATEGORY 1E: Interim and final deadlines after December 28, 2022
- CATEGORY 1F: Past final deadlines (final deadlines due prior to approval of WMP)
- CATEGORY 1G: USEPA established TMDLs with no implementation schedule

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

- CATEGORY 2A: Non-legacy pollutants
- CATEGORY 2B: Bacterial indicators
- CATEGORY 2C: Legacy pollutants
- CATEGORY 2D: Water quality indicators

[1] Upon approval and no later than April 28, 2015.
[2] *Ibid.*

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

- CATEGORY 3A: Non-legacy pollutants
- CATEGORY 3B: Bacterial indicators
- CATEGORY 3C: Legacy pollutants
- CATEGORY 3D: Water quality indicators

The Lower LAR Watershed encompasses Reaches 1 and 2 of the Los Angeles River, the Los Angeles River Estuary, Reach 1 of the Rio Hondo, and Compton Creek. The pollutants for which the Lower LAR Watershed is listed as impaired for are shown on Figure 2-1.

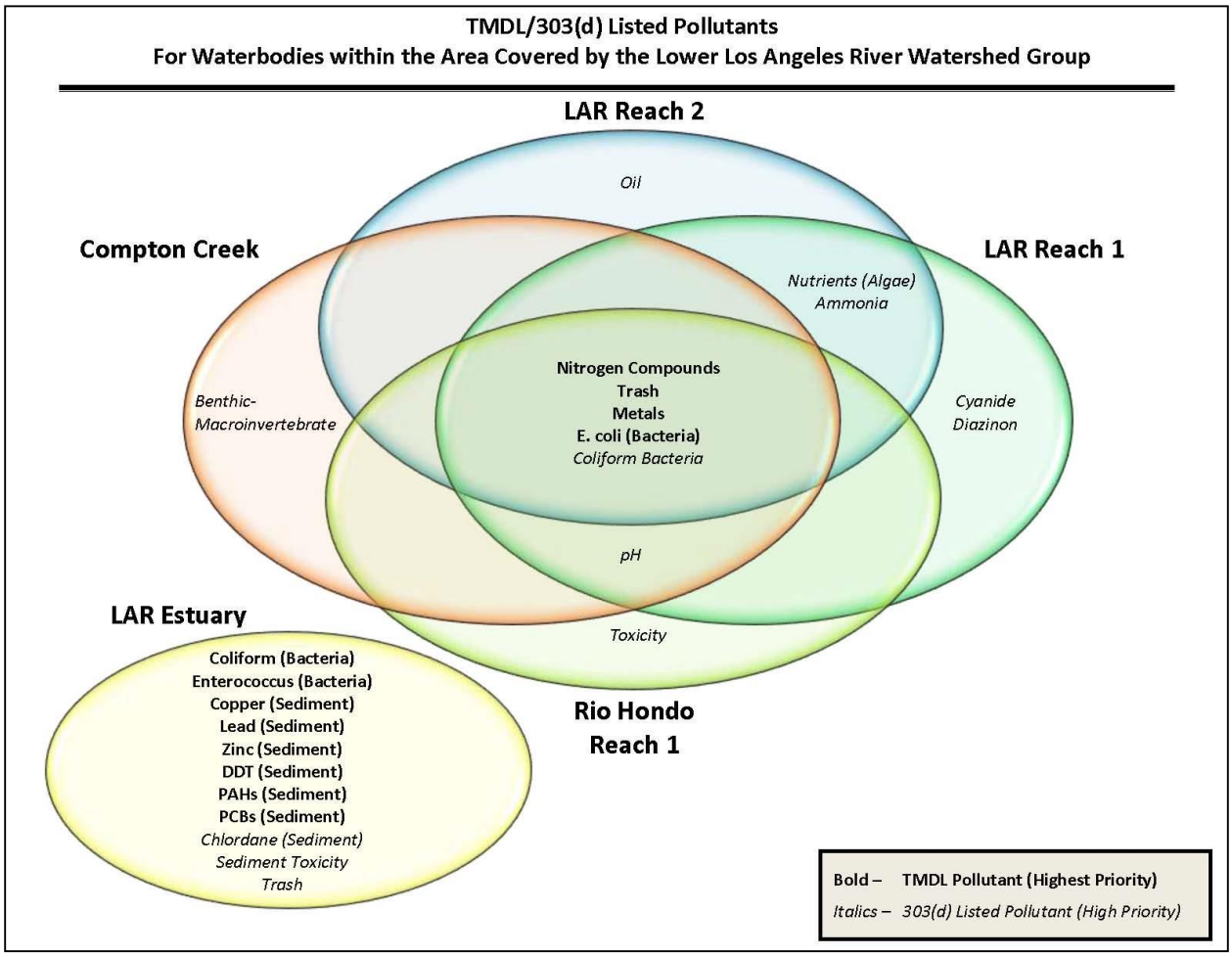


Figure 2-1: Lower Los Angeles River Watershed Pollutant Venn Diagram

The pollutant categories for the Lower LAR are summarized below including the weather condition for which impairment was determined:

CATEGORY 1A

- TRASH – Los Angeles River Reach 1 (Wet and Dry), Los Angeles River Reach 2 (Wet and Dry), Compton Creek (Wet and Dry), Rio Hondo Reach 1 (Wet and Dry)
- NITROGEN COMPOUNDS – Los Angeles River Reach 1(Wet and Dry), Los Angeles River Reach 2 (Wet and Dry), Compton Creek (Wet and Dry), Rio Hondo Reach 1 (Wet and Dry)

CATEGORY 1B

- COPPER – Los Angeles River Estuary (Wet and Dry)
- LEAD – Los Angeles River Estuary (Wet and Dry)
- ZINC – Los Angeles River Estuary (Wet and Dry)
- DDT – Los Angeles River Estuary (Wet and Dry)
- PAHS – Los Angeles River Estuary (Wet and Dry)
- PCBS – Los Angeles River Estuary (Wet and Dry)

CATEGORY 1C

- BACTERIA (E. COLI) – Los Angeles River Reach 1 (Wet and Dry), Compton Creek (Wet and Dry)

CATEGORY 1E

- CADMIUM – Los Angeles River Reach 1 (Wet), Los Angeles River Reach 2 (Wet), Compton Creek (Wet), Rio Hondo Reach 1 (Wet)
- COPPER – Los Angeles River Reach 1 (Wet and Dry), Los Angeles River Reach 2 (Wet and Dry), Compton Creek (Wet and Dry), Rio Hondo Reach 1 (Wet and Dry)
- LEAD – Los Angeles River Reach 1 (Wet and Dry), Los Angeles River Reach 2 (Wet and Dry), Compton Creek (Wet and Dry), Rio Hondo Reach 1 (Wet and Dry)
- ZINC – Los Angeles River Reach 1 (Wet), Los Angeles River Reach 2 (Wet), Compton Creek (Wet), Rio Hondo Reach 1 (Wet and Dry)
- BACTERIA (E. COLI) – Los Angeles River Reach 2 (Wet and Dry), Rio Hondo Reach 1 (Wet and Dry)

CATEGORY 1G (USEPA ESTABLISHED)

- BACTERIA (COLIFORM AND ENTEROCOCCUS) – Los Angeles River Estuary (Wet and Dry)

CATEGORY 2A

- CHLORDANE (SEDIMENT) – Los Angeles River Estuary (Wet and Dry)
- CYANIDE – Los Angeles River Reach 1 (Wet and Dry)
- DIAZINON – Los Angeles River Reach 1 (Wet and Dry)
- OIL – Los Angeles River Reach 2 (Wet and Dry)
- TRASH – Los Angeles River Estuary (Wet and Dry)

CATEGORY 2B

- COLIFORM BACTERIA – Los Angeles River Reach 1 (Wet and Dry), Los Angeles River Reach 2 (Wet and Dry), Compton Creek (Wet and Dry), Rio Hondo Reach 1 (Wet and Dry)

CATEGORY 2C

- ALUMINUM– Los Angeles River Reach 1(Wet and Dry)
- SELENIUM – Los Angeles River Reach 1 (Dry), Los Angeles River Reach 2(Dry)

CATEGORY 2D

- PH – Los Angeles River Reach 1 (Wet and Dry), Compton Creek (Wet and Dry), Rio Hondo Reach 1 (Wet and Dry)
- SEDIMENT TOXICITY[3] – Los Angeles River Estuary (Wet and Dry)
- BENTHIC-MACROINVERTEBRATE (BMI) BIOASSESSMENTS – Compton Creek (Wet and Dry)
- TOXICITY – Rio Hondo Reach 1 (Wet and Dry)
- MBAS – Los Angeles River Reach 1, Los Angeles River Reach 2 (Wet)

CATEGORY 3A

- BIS(2-ETHYLHEXYL)PHTHALATE – Los Angeles River Reach 1 (Wet and Dry)
- CHLORIDE – Los Angeles River Reach 1 (Dry), Los Angeles River Reach 2 (Dry), Rio Hondo Reach 1 (Wet)
- Chlorpyrifos – Compton Creek (Dry)
- CYANIDE – Rio Hondo Reach 1 (Wet and Dry)
- DIAZINON – Rio Hondo Reach 1 (Wet)
- PAHS – Los Angeles River Reach 1 (Wet and Dry), Los Angeles River Reach 2 (Wet and Dry)

CATEGORY 3C

- MERCURY – Los Angeles River Reach 1 (Wet and Dry)
- NICKEL – Los Angeles River Reach 1 (Dry)
- Thallium – Los Angeles River Reach 1 (Dry), Los Angeles River Reach 2 (Dry)

CATEGORY 3D

- DISSOLVED OXYGEN[4] – Los Angeles River Reach 1 (Wet), Los Angeles River Reach 2 (Wet)
- PH – Rio Hondo Reach 1 (Wet and Dry)

Tables 2-1 and 2-2 summarize the waterbody pollutant combinations for the Lower LAR Watershed Group.

[3] It is anticipated that the control measures used to address the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Toxics TMDL will address sediment toxicity in the Los Angeles River.
[4] This listing is based on an exceedance that occurred during the 03-04 storm year. There have been no exceedances since that time.

Table 2-1: Wet Weather Waterbody/Pollutant Classifications for the Lower LAR Watershed Group

Category	Pollutant	Waterbody				
		LARE[a]	LAR1[b]	LAR2[c]	CC[d]	RH1[e]
1	Cadmium		×	×	×	×
	Copper	×	×	×	×	×
	Lead	×	×	×	×	×
	Zinc	×	×	×	×	×
	Trash[1]		×	×	×	×
	Nitrogen Compounds[2]		×	×	×	×
	DDT	×				
	PCBs	×				
	PAHs	×				
	E. coli		×	×	×	×
	Coliform and Enterococcus	×				
2	Chlordane (sediment)	×				
	Coliform Bacteria		×	×	×	×
	Aluminum		×			
	Diazinon		×			
	Oil			×		
	Trash	×				
	Toxicity					×
	Sediment Toxicity	×				
	Cyanide		×			
	MBAS		×	×		
	Benthic Macroinvertebrate Bioassessments				×	
	pH		×		×	×
3	Chloride					×
	Mercury		×			
	Diazinon					×
	PAHs		×	×		
	Bis(2-ethylhexyl)phthalate		×			
	Cyanide					×
	pH					×
	Dissolved Oxygen		×	×		

(a) Los Angeles River Estuary
(b) Los Angeles River Reach 1
(c) Los Angeles River Reach 2
(d) Coyote Creek
(e) Rio Hondo Reach 1

1. Trash will be addressed by Annual Reports of compliance with the installation of full capture systems.
2. Ammonia and Nutrients (algae) included in nitrogen compounds for category 1

Table 2-2: Dry Weather Waterbody/Pollutant Classifications for the Lower LAR Watershed Group

Category	Pollutant	Waterbody				
		LARE[a]	LAR1[b]	LAR2[c]	CC[d]	RH1[e]
1	Copper	×	×	×	×	×
	Lead	×	×	×	×	×
	Zinc	X				×
	Trash[1]		×	×	×	×
	Nitrogen Compounds[2]		×	×	×	×
	DDT	×				
	PAHs	×				
	PCBs	×				
	E. coli		×	×	×	×
	Coliform and Enterococcus	×				
2	Chlordane (sediment)	×				
	Coliform Bacteria		×	×	×	×
	Aluminum		×			
	Selenium		×	×		
	Cyanide		×			
	Oil			×		
	Trash	×				
	Toxicity					×
	Sediment Toxicity	×				
	Benthic Macroinvertebrate Bioassessments				×	
	pH		×		×	×
3	Chloride		×	×		
	Cyanide					×
	pH					×
	Mercury		×			
	Nickel		×			
	Thallium		×	×		
	Chlorpyrifos				×	
	PAHs		×	×		
	Bis(2-ethylhexyl)phthalate		×			

(a) Los Angeles River Estuary
(b) Los Angeles River Reach 1
(c) Los Angeles River Reach 2
(d) Coyote Creek
(e) Rio Hondo Reach 1
1. Trash will be addressed by Annual Reports of compliance with the installation of full capture systems.
2. Ammonia and Nutrients (algae) included in nitrogen compounds for category 1

2.1.1 CATEGORY 1 POLLUTANTS

TRASH

Trash is classified as a Category 1A pollutant for the Los Angeles River (Reaches 1 and 2), Compton Creek, and Rio Hondo Reach 1 which have final TMDL deadlines within the MS4 Permit term.

NITROGEN COMPOUNDS (INCLUDING AMMONIA)

Nitrogen compounds are classified as a Category 1A pollutant for the Los Angeles River (Reaches 1 and 2), Compton Creek, and Rio Hondo Reach 1 which have final TMDL deadlines within the MS4 Permit term.

METALS (CADMIUM, COPPER, LEAD, AND ZINC)

Cadmium, Copper, Lead, and Zinc (herein collectively referred to as "Metals") are classified as a Category 1E pollutant for the Los Angeles River (Reaches 1 and 2), Compton Creek, and Rio Hondo Reach 1 which have final TMDL deadlines after December 28, 2022.

According to the California 2010 Integrated Report, cadmium is being considered for removal from the 303(d) list for Los Angeles River Reach 1. The weight of evidence indicated that there is sufficient justification for removing this water segment pollutant combination from the 303(d) list based on the conclusion that the data used satisfies the quality requirements of the State's Listing Policy, and the amount of samples exceeding water quality objectives do not exceed the allowable frequency listed in Table 4.1 of the State's Listing Policy. It has been recommended that the decision to remove Cadmium be approved by the State Board; however, it has not yet been removed from the 303(d) list for Reach 1 of the Los Angeles River[5].

ESTUARY METALS (COPPER, LEAD, AND ZINC)

Copper, Lead, and Zinc are classified as a Category 1B pollutant for the Los Angeles River Estuary, which has an interim TMDL deadline within the MS4 Permit term[6].

BACTERIA (E. COLI)

E. Coli bacteria is classified as a Category 1C pollutant for the Los Angeles River Reach 2 which has a final TMDL deadline between December 29, 2017 to December 28, 2022 and a Category 1E for the Los Angeles River Reach 1, Compton Creek, and Rio Hondo Reach 1 which have final TMDL deadlines after December 28, 2022.

BACTERIA (COLIFORM AND ENTEROCOCCUS)

Coliform and enterococcus bacteria are classified as a Category 1G pollutant for the Los Angeles River Estuary.

[5] Based on data from the State Listing Policy lines of evidence ID #2332 and #2331 collected by the County of Los Angeles Department of Public Works.
[6] Dominguez Channel and Great Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL

2.1.2 CATEGORY 2 POLLUTANTS

The following pollutants have been categorized as Category 2 because data indicate water quality impairment according to the State's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Listing Policy)[7].

ALUMINUM

LA County Flood Control District (LACFCD) mass emissions station S(10) detected 30 out of 40 wet weather and 11 out of 23 dry weather exceedances of the USEPA National Recommended Water Quality Criteria for aluminum between 2002 and 2012. Since this meets the State Listing Policy for 303(d) listing, aluminum will be classified as a Category 2C pollutant for Reach 1 of the Los Angeles River.

COLIFORM BACTERIA

Coliform bacteria are microorganisms known to be harmful in water with high concentrations. The 303(d) List has indicated that the Los Angeles River (Reaches 1 and 2), Compton Creek, and Rio Hondo Reach 1 are impaired by coliform bacteria; therefore, coliform bacteria is classified as a Category 2B pollutant for Reaches 1 and 2 of the Los Angeles River, Compton Creek, and Reach 1 of the Rio Hondo.

BENTHIC-MACROINVERTEBRATE (BMI) BIOASSESSMENTS

Benthic macroinvertebrate (BMI) communities are both bioindicators of stream condition and a food resource for fish. The 303(d) List has indicated that Compton Creek is impaired as indicated through BMI bioassessments; therefore, BMIs are classified as a Category 2D for Compton Creek.

The State Water Board staff has determined that BMI populations are impacted by a wide range of anthropogenic stressors and has recommended listing for benthic-macroinvertebrate bioassessment. It is anticipated that the BMI population will be subsequently improved by the control measures implemented for other pollutants.

CHLORDANE (SEDIMENT)

Chlordane is an organochlorine compound used as a pesticide. The 303(d) List has indicated that sediment in Los Angeles River Estuary is impaired by chlordane; therefore, chlordane is classified as a Category 2A pollutant for the Los Angeles River Estuary.

CYANIDE

Cyanide is an inorganic chemical compound. The 303(d) List has indicated that Los Angeles River Reach 1 is impaired by cyanide; therefore, cyanide is classified as a Category 2A pollutant for the Reach 1 of the Los Angeles River.

[7] An excerpt of the 2010 California 303(d) List of Water Quality Limited Segments for Region 4 is included in Appendix 2-1.

DIAZINON

Diazinon is an organophosphate insecticide. The 303(d) List has indicated that Los Angeles River Reach 1 is impaired by diazinon; therefore, diazinon is classified as a Category 2A pollutant for the Reach 1 of the Los Angeles River.

METHYLENE BLUE ACTIVE SUBSTANCE (MBAS)

An MBAS assay is used to detect the presence of detergents or foaming agents in water samples.

Although the waterbodies within the Lower LAR Watershed are not listed as impaired by MBAS, the LACFCD Mass Emissions station S(10) in the LA River collected 11 out of 40 wet weather samples that exceeded the LA Basin Plan Water Quality Objective (WQO) for MBAS between 2002 and 2012, which meets the State Listing Criteria for 303(d) listing[8]. Therefore, MBAS will be classified as a Category 2D within this WMP. It is anticipated that the control measures used to address the pollutants of concern in this watershed will subsequently address MBAS levels; however, if exceedances are found to occur and the implemented or proposed control measures do not address MBAS, the WMP will be revised to include control measures to address the pollutant directly.

OIL

Oil is a chemical substance. The 303(d) List has indicated that the Los Angeles River Reach 2 is impaired by oil; therefore, oil is classified as a Category 2A pollutant for Reach 2 of the Los Angeles River.

PH

pH is a measure of the acidity or basicity of an aqueous solution. The 303(d) List has indicated that Los Angeles River Reach 1, Compton Creek, and Rio Hondo Reach 1 are impaired by pH; therefore, pH is classified as a Category 2D for Reach 1 of the Los Angeles River, Compton Creek, and Reach 1 of the Rio Hondo.

SEDIMENT TOXICITY

Sediment Toxicity is a measurement of toxicity within a sediment sample. The 303(d) List has indicated that the Los Angeles River Estuary contains sediment toxicity; therefore, it is classified as a Category 2D for the Los Angeles River Estuary. It is anticipated that sediment toxicity in the Los Angeles River Estuary will be addressed through the Dominguez Channel and Greater Los Angeles and Long Beach Harbors Toxics TMDL.

SELENIUM

Although the waterbodies within the Lower LAR Watershed are not listed as impaired by selenium, the LACFCD Mass Emissions station S(10) in the LA River collected 2 out of 23 dry weather samples that exceeded the CTR Chronic WQO for selenium between 2002 and 2012, which meets the State Listing

[8] According to the Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List Minimum Number of Measured Exceedances Needed to Place a Water Segment on the Section 303(d) List for Toxicants and Conventionals – Tables 3.1 and 3.2.

Criteria for 303(d) listing[9]. Selenium will be considered as a Category 2C pollutant within this WMP when determining the control measures to be implemented in the Los Angeles River Reaches 1 and 2. It is anticipated that the control measures used to address the pollutants within Los Angeles River and Tributaries Metals TMDL will subsequently address selenium levels; however, if exceedances are found to occur and the implemented or proposed control measures do not address selenium, the WMP will be revised to include control measures to address the pollutant directly.

TOXICITY

The 303(d) List has indicated that Rio Hondo Reach 1 is impaired by toxicity; therefore, toxicity is classified as a Category 2D for Reach 1 of Rio Hondo.

TRASH

Although the Los Angeles River Estuary is not included in the Los Angeles River Watershed Trash TMDL, the 303(d) List has indicated that the Los Angeles River Estuary is impaired by trash; therefore, trash is classified as a Category 2A pollutant for the Los Angeles River Estuary.

2.1.3 CATEGORY 3 POLLUTANTS

The waterbody-pollutant combinations described below have been identified as exceeding water quality objectives (WQOs) in the Lower LAR Watershed. Through the adaptive management process, water quality priorities identified in this WMP will be re-evaluated every two years, and if exceedances of Category 3 WQOs are identified through monitoring, then the WMP will be adapted to become more effective in addressing these constituents, per Section VI.C.8.a.ii of the MS4 Permit.

BIS(2-ETHYLHEXYL)PHTHALATE

LACFCD mass emission station S(10) detected 2 out of 40 wet weather and 4 out of 23 dry weather exceedances of the National Toxics Rule WQO for bis(2ethylhexyl)phthalate between 2002 and 2012. Therefore, bis(2ethylhexyl)phthalate will be classified as a Category 3A pollutant within this WMP for Reach 1 of the Los Angeles River.

CHLORIDE

Although the waterbodies within the Lower LAR Watershed are not listed as impaired by chloride, the LACFCD Mass Emissions station S(10) in the LA River collected 1 out of 23 dry weather samples, and the tributary station TS06 (Rio Hondo) collected 1 out of 9 wet weather samples exceeding the Basin Plan WQO for this pollutant between 2002 and 2012. Chloride will be considered as a Category 3A pollutant within this WMP. If exceedances are found to occur and the implemented or proposed control measures

[9] According to the Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List Minimum Number of Measured Exceedances Needed to Place a Water Segment on the Section 303(d) List for Toxicants – Table 3.1.

are not expected to address chloride pollutants, the WMP will be revised to include control measures to address the pollutant directly.

CHLORPYRIFOS

Although the waterbodies within the Lower LAR Watershed are not listed as impaired by chlorpyrifos, data from the LACFCD mass emission monitoring and the City of Los Angeles Status and Trends Monitoring program detected 3 out of 91 dry weather exceedances in Los Angeles River Reach 1 and 2 9ut of 112 dry weather exceedances in Los Angeles River Reach 2 of the CTR WQO for chlorpyrifos between 2001 and 2013. Chlorpyrifos is classified as a Category 3A pollutant within this WMP. If exceedances are found to occur and the implemented or proposed control measures are not expected to address chlorpyrifos, the WMP will be revised to include control measures to address the pollutant directly.

CYANIDE

Cyanide is listed as a Category 2 pollutant for the LA River Reach 1; however, no other reaches are listed on the State's 303(d) list for cyanide. Although the other waterbodies are not listed as impaired by cyanide, the LACFCD Tributary station TS(06) in the Rio Hondo collected 1 out of 9 wet weather samples and 2 out of 3 dry weather samples exceeding the CTR WQO for this pollutant between 2002 and 2012. Cyanide will be considered as a Category 3A pollutant within this WMP. If exceedances are found to occur and the implemented or proposed control measures are not expected to address cyanide, the WMP will be revised to include control measures to address the pollutant directly.

DIAZINON

Diazinon is listed as a Category 2 pollutant for the LA River Reach 1; however, no other reaches are listed on the State's 303(d) list for Diazinon. Although the other waterbodies are not listed as impaired by Diazinon, the LACFCD Tributary station TS(06) in the Rio Hondo collected 3 out of 9 wet weather samples exceeding the California Department of Fish and Game's WQO for this pollutant between 2002 and 2012. Diazinon will be considered as a Category 3A pollutant within thisWMP. If exceedances are found to occur and the implemented or proposed control measures are not expected to address diazinon, the WMP will be revised to include control measures to address the pollutant directly.

DISSOLVED OXYGEN

Although the waterbodies within the Lower LAR Watershed are not listed as impaired by low dissolved oxygen, the LACFCD Mass Emissions station S(10) in the LA River collected 1 out of 39 wet weather samples below the dissolved oxygen water quality criteria between 2002 and 2012. This exceedance occurred during the 2003-04 storm year and there have been no exceedances since this time. Therefore, dissolved oxygen will be classified as a Category 3D within this WMP, however will not be addressed directly through this WMP. If exceedances are found to occur and the implemented or proposed control measures are not expected to address dissolved oxygen, the WMP will be revised to include control measures to address it directly.

MERCURY

LACFCD mass emission station S(10) detected 1 out of 40 wet weather and 1 out of 23 dry weather exceedances of the USEPA National Recommended Water Quality Criteria for mercury between 2002 and 2012. Therefore, mercury will be classified as a Category 3C pollutant within this WMP for Reach 1 of the Los Angeles River.

NICKEL

LACFCD mass emission station S(10) detected 1 out of 23 dry weather exceedances of the CTR WQO for nickel between 2002 and 2012. Therefore, nickel will be classified as a Category 3C pollutant within this WMP for Reach 1 of the Los Angeles River.

PH

pH is listed as a Category 2 pollutant for the LA River Reaches 1 and 2 and Compton Creek; however, no other reaches are listed on the State's 303(d) list for pH. Although the other waterbodies are not listed as impaired by pH, the LACFCD Tributary station TS(06) in the Rio Hondo collected 1 out of 9 wet weather samples and 1 out of 3 dry weather samples exceeding the LA Basin Plan WQO for this pollutant between 2002 and 2012. pH will be considered as a Category 3D pollutant within this WMP. If exceedances are found to occur and the implemented or proposed control measures are not expected to address pH, the WMP will be revised to include control measures to address the pollutant directly.

POLYCYCLIC AROMATIC HYDROCARBONS (PAHS)

PAHs are chemical compounds that occur naturally in the environment and can also be man-made. PAHs are created during incomplete combustion of coal, oil, gas, and garbage. According to the Toxic Release Inventory, there are approximately twenty compounds defining this group, even though there are hundreds of PAH combinations.

Although the waterbodies within the Lower LAR Watershed are not listed as impaired by PAHs, a five year SCCRWP study conducted partially in the watershed estimates that the LA River is a source of PAH loading to the ocean. Therefore, PAHs will be classified as Category 3A pollutants within this WMP. If exceedances are found to occur and the implemented or proposed control measures are not expected to address PAH pollutants, the WMP will be revised to include control measures to address them directly.

THALLIUM

Although the waterbodies within the Lower LAR Watershed are not listed as impaired by thallium, the LACSD WRP effluent monitoring collected 1 out of 4 dry weather samples exceeding the USEPA National Recommended Water Quality Criteria this pollutant between 2009 and 2011. Thallium is classified as a Category 3C pollutant within this WMP. If exceedances are found to occur and the implemented or proposed control measures are not expected to address thallium, the WMP will be revised to include control measures to address the pollutant directly.

2.1.4 POLLUTANT CLASSIFICATION

In order to determine the sequence of addressing pollutants of concern, the pollutants have been placed into classification groups. Pollutants have been identified to be in the same "class" if they have a similar fate and transport, can be addressed via the same types of control measures, and can be addressed within the same timeline. The seven following classes have been identified:

- Metals
- Nutrients
- Pesticides
- Bacteria
- Semivolatile Organic Compounds (SVOC)Water Quality Indicators/General
- Trash

The specific classes and pollutants associated can be found below. Since similar control measures and timelines are to be implemented for pollutants within the same class, each class will be treated with the highest priority of any one pollutant within that class. See Section 2.4 for a table of Water Quality Priorities (WQPs). Watershed Control Measures and Implementation Schedules are discussed in Sections 3 and 5, respectively.

METALS	PESTICIDES	WATER QUALITY INDICATORS/GENERAL	TRASH
Aluminum	Chlordane	Benthic-Macroinvertebrate (BMI)	Trash
Cadmium	Chlorpyrifos	Chloride	
Copper	DDT	Cyanide	
Lead	Diazinon	Dissolved Oxygen	
Mercury	PCBs	MBAS	
Nickel		Oil	
Selenium		pH	
Thallium		Sediment Toxicity	
Zinc		Toxicity	

NUTRIENTS	BACTERIA	SVOC
Ammonia	Coliform and	Bis(2ethylhexyl)phthalate
Nitrogen Compounds	Enterococcus	PAHs
Nutrients (Algae)	e. Coli	

2.2 WATER QUALITY CHARACTERIZATION

In order characterize existing water quality conditions in the Lower LAR watershed, and to identify pollutants of concern for prioritization per section VI.C.5.a.ii of the MS4 Permit, available monitoring data collected during the previous ten years were analyzed. The following sources were utilized during the water quality characterization:

- LACFCD Mass Emission and Tributary Monitoring Programs
- LA County Sanitation Districts Monitoring
- City of Long Beach Stormwater Monitoring Program
- LAR Metals, Trash, and Bacteria TMDL Monitoring Programs
- Southern California Coastal Water Research Project (SCCWRP) Pollutant Loading Study
- Los Angeles River Watershed Monitoring Program (LARWMP)

A summary of each of these monitoring efforts and relevant findings is presented below. In addition to providing a characterization of the current conditions within the watershed, this information will be used to target watershed management efforts in the Lower LAR watershed.

2.2.1 MASS EMISSIONS HISTORICAL DATA ANALYSIS

Since 1994, the LACFCD has conducted stormwater monitoring in Los Angeles County. The LACFCD operates seven mass emission monitoring stations, which collect runoff from the major watersheds in the county with the goal of estimating the mass emissions from the MS4, assessing mass emissions trends, and determining whether the MS4 is contributing to exceedances of water quality objectives by comparing results to applicable objectives in the Water Quality Control Plan for the Los Angeles Region (Basin Plan), and the California Toxics Rule (CTR).

The LACFCD Monitoring Station, S(10), collects samples that are applicable to the Lower LAR Watershed. Station S(10) is located in the Los Angeles River at the existing stream gauge station (Stream Gauge No. F319-R) between Willow Street and Wardlow Road in the City of Long Beach and is shown in Figure 2-2. At this location, which was chosen to avoid tidal influences, the total upstream tributary drainage area for the Los Angeles River is 825 square miles. Station S(10) is equipped with automated samplers with integral flow meters, and collects flow composite samples from a minimum of three storm events, including the first storm, and two dry weather events in accordance with the 1996 MS4 Permit.

Monitoring data from stormwater collected at Station S(10) during the previous ten years of monitoring (2002-2012) were compared to the most stringent applicable water quality objectives (WQOs)to date to determine exceedances of receiving water limitations. WQOs were determined pursuant to TMDLs, the Basin Plan and the California Toxics Rule, 40 CFR Part 131.38 (CTR). Water quality objectives for chlorpyrifos and diazinon are determined using the freshwater final acute criteria set by the California Department of Fish and Game. Many of the WQOs were used as benchmarks for determining Water Quality Priorities, and should not be used for compliance purposes. Please refer to the Lower LAR

Watershed Coordinated Integrated Monitoring Plan (CIMP) for a table of monitored constituents along with their most up-to-date WQOs.

A summary of the constituents not attaining WQOs at station S(10) during the monitoring years 2002-2012 is presented in Tables 2-3 and 2-4. Complete tables of monitoring results can be found in Appendix A-2-2.

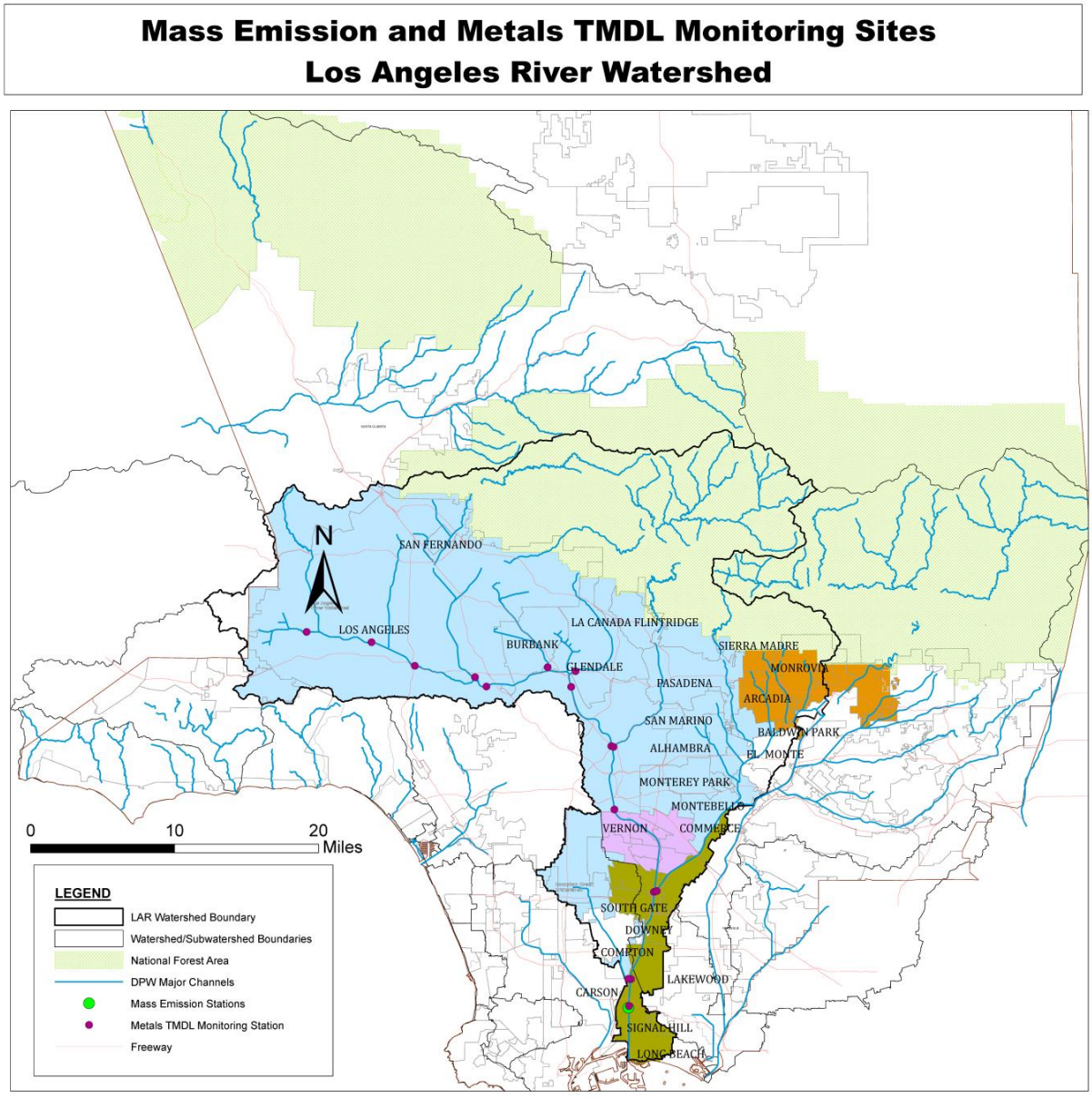


Figure 2-2: Mass emission and metals TMDL monitoring sites courtesy of LACFCD

Table 2-3: S10 Constituents exceeding WQOs during wet weather

Constituent	No Samples	No. Exceeding Applicable WQOs	Percent of Samples Exceeding WQOs	Source of Lowest Applicable WQO Value	Source
Cyanide	40	9	23	0.022	CTR Freshwater Aquatic Life Protection, Acute
pH	40	5	13	6.5-8.5	LA Basin Plan
DO	39	1	3	5	LA Basin Plan
Total Coliform	40	40	100	10000	LA Basin Plan - Marine Waters
Fecal Coliform	40	39	98	235	LA Basin Plan Fresh- Rec 1 Standard
Fecal Enterococcus	40	40	100	104	LA Basin Plan - Marine Waters
MBAS	40	11	28	0.5	LA Basin Plan
Total Aluminum	40	30	75	750	USEPA National Recommended WQ Criteria
Total Cadmium	40	5	13	3.1	LA River Metals TMDL
Total Copper	40	33	83	17	LA River Metals TMDL
Total Lead	40	10	25	62	LA River Metals TMDL
Total Mercury	40	1	2.5	0.051	CTR Human Health
Dissolved Zinc	40	9	23	120	CTR-100mg/L CMC
Total Zinc	40	24	60	159	LA River Metals TMDL
Bis(2-ethylhexyl)phthalate	40	2	5	5.9	National Toxics Rule Human Health
Diazinon	40	2	5	0.08	CADF&G

Table 2-4: S10 Constituents exceeding WQOs during dry weather

Constituent	No Samples	No. Exceeding Applicable WQOs	Percent of Samples Exceeding WQOs	Source of Lowest Applicable WQO Value	Source
Cyanide	23	20	87	0.0052	CTR Freshwater Aquatic Life Protection, Chronic
pH	23	11	48	6.5-8.5	LA Basin Plan
Total Coliform	22	6	27	10000	LA Basin Plan - Marine Waters
Fecal Coliform	23	11	48	235	LA Basin Plan Fresh- Rec 1 Standard
Fecal Enterococcus	23	14	61	104	LA Basin Plan - Marine Waters
Chloride	23	1	4	150	LA Basin Plan
Nitrate	8	2	25	8	LA River Nutrient TMDL
Nitrite	22	6	27	1	LA River Nutrient TMDL
Total Aluminum	23	11	48	87	USEPA National Recommended WQ Criteria
Total Copper	23	2	9	23	LA River Metals TMDL
Total Mercury	23	1	9	0.051	CTR Human Health
Total Nickel	23	1	9	24	CTR Chronic
Total Selenium	23	2	9	5	National Toxics Rule
Total Zinc	23	1	4	131	LA River Metals TMDL
Bis(2-ethylhexyl)phthalate	23	4	17	5.9	National Toxics Rule Human Health
Diazinon	23	2	9	0.05	CADF&G

2.2.2 LACFCD TRIBUTARY MONITORING

In addition to the Mass Emission Station monitoring, LACFCD conducted tributary monitoring during the 2002-03 and 2003-04 storm years. This monitoring occurred at 1 tributary station in the Lower LAR Watershed: Rio Hondo (TS06). Rio Hondo Channel monitoring station is located on Beverly Boulevard, downstream of Whitter Narrows dam, at the USGS – U.S. Army Corps of Engineers (ACOE) Stream gage No. 1102300 or E327-R. The upstream tributary watershed area is approximately 142 square miles.

Monitoring data from stormwater collected at station TS06 was compared to the most stringent applicable water quality objectives (WQOs) to determine exceedances of receiving water limitations. WQOs were determined pursuant to TMDLs, the Basin Plan and the California Toxics Rule, 40 CFR Part 131.38 (CTR). Water quality objectives for chlorpyrifos and diazinon were determined using the freshwater final acute criteria set by the California Department of Fish and Game. Many of the WQOs were used as benchmarks for determining Water Quality Priorities, and should not be used for compliance purposes. Please refer to the Lower LAR Watershed Coordinated Integrated Monitoring Plan (CIMP) for a table of monitored constituents along with their most up-to-date WQOs.

A summary of the constituents not attaining WQOs at station TS06 during the monitoring years 2002-2012 is presented in Tables 2-5 and 2-6. Complete tables of monitoring results can be found in Appendix A-2-2.

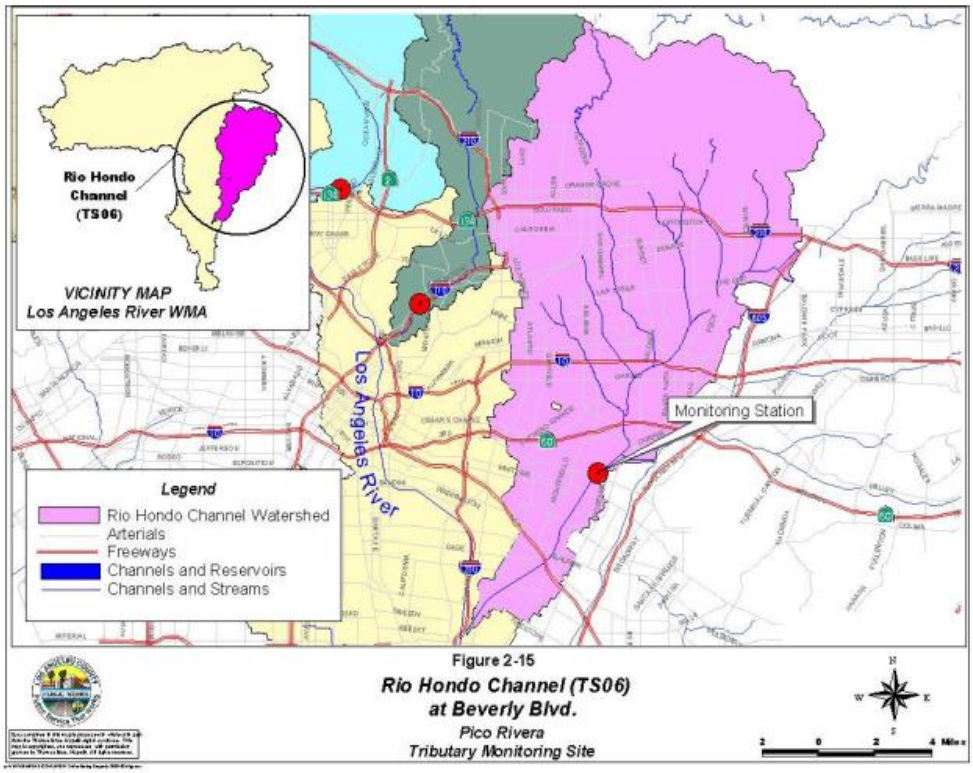


Figure 2-3: Rio Hondo tributary station

Table 2-5: TS06 constituents exceeding WQOs during wet weather

Constituent	No Samples	No. Exceeding Applicable WQOs	Percent of Samples Exceeding WQOs	Source of Lowest Applicable WQO Value	Source
Cyanide	9	1	11	0.022	CTR Freshwater Aquatic Life Protection, Acute
pH	9	1	11	6.5-8.5	LA Basin Plan
Total Coliform	9	9	100	10000	LA Basin Plan - Marine Waters
Fecal Coliform	9	9	100	235	LA Basin Plan Fresh- Rec 1 Standard
Fecal Enterococcus	9	9	100	104	LA Basin Plan - Marine Waters
Chloride	9	1	11	150	LA Basin Plan
Total Copper	9	4	44	17	LA River Metals TMDL
Total Lead	9	1	11	62	LA River Metals TMDL
Total Zinc	9	1	11	159	LA River Metals TMDL
Diazinon	9	3	33	0.08	CADF&G

Table 2-6: TS06 constituents exceeding WQOs during dry weather

Constituent	No Samples	No. Exceeding Applicable WQOs	Percent of Samples Exceeding WQOs	Source of Lowest Applicable WQO Value	Source
Cyanide	3	2	67	0.0052	CTR Freshwater Aquatic Life Protection, Chronic
pH	3	2	67	6.5-8.5	LA Basin Plan
Total Coliform	3	1	33	10000	LA Basin Plan - Marine Waters
Fecal Coliform	3	2	67	235	LA Basin Plan Fresh- Rec 1 Standard
Fecal Enterococcus	3	2	67	104	LA Basin Plan - Marine Waters
Total Copper	3	2	67	13	LA River Metals TMDL

2.2.3 LA COUNTY SANITATION DISTRICT MONITORING

The County Sanitation Districts of Los Angeles County (LACSD) are a confederation of 23 independent special districts serving the water pollution control management needs of about 5.7 million people in Los Angeles County. The Sanitation Districts' service area covers approximately 820 square miles and encompasses 78 cities and unincorporated territory within the County. With regard to wastewater treatment, the Sanitation Districts construct, operate and maintain facilities to collect, treat and dispose of wastewater and industrial wastes.

Seventeen of the 23 districts are signatory to an agreement which provides for sewerage service to the majority of residential, commercial and industrial users (IUs) within the County, but mostly located outside of the City of Los Angeles service area. This treatment system, known as the Joint Outfall System (JOS), currently consists of the Joint Water Pollution Control Plant (JWPCP) located in the City of Carson and six upstream water reclamation plants (WRPs); the Whittier Narrows WRP near the City of South El Monte, the Los Coyotes WRP in the City of Cerritos, the San Jose Creek WRP adjacent to the City of Industry, the Long Beach WRP in the City of Long Beach, the Pomona WRP in the City of Pomona and the La Cañada WRP in La Cañada Flintridge. All JOS facilities except the La Cañada WRP are regulated under the NPDES program; all six WRPs are subject to California Waste Discharge or Water Reclamation Requirements. See Chapter 1 Introduction for more detail on the WRP discharges within the Lower LAR Watershed.

The LACSD monitors its effluent at multiple locations within the Lower LAR Watershed. Data from 2004 to 2012 was analyzed and exceedances of WQOs were added to the Lower LAR WQPs.

2.2.4 LOS ANGELES RIVER METALS TMDL MONITORING DATA ANALYSIS

The Los Angeles River Metals TMDL became effective on October 29, 2008. For compliance with the requirements of this TMDL, a Coordinated Monitoring Plan (CMP) was developed and implemented jointly by the responsible LA River Watershed MS4 Permittees in October 2008. Wet and dry weather monitoring began at 13 locations in the LA River and major tributaries (shown in Figure 2-2) in 2008 to characterize ambient water quality and measure attainment of effluent limitations set forth in the TMDL and outlined in Table 2-7.

Table 2-7: Los Angeles River Metals Water Quality Based Effluent Limitations (Total Recoverable)

	Effluent Limitations Daily Maximum (µg total recoverable metals/L)		
Waterbody	Copper	Lead	Zinc
LA River Reach 2	WER[1] x 22	WER[1] x 11	-
LA River Reach 1	WER[1] x 23	WER[1] x 12	-
Compton Creek	WER[1] x 19	WER[1] x 8.9	-
Rio Hondo Reach 1	WER[1] x 13	WER[1] x 5.0	WER[1] x 131

[1] WER(s) have a default value of 1.0 unless site-specific WER(s) are approved via the Basin Plan Amendment process.

Five of the thirteen monitoring locations identified in the CMP are located within, and collect runoff from, the Lower LAR Watershed:

LAR I-9: The LAR I-9 sampling site is located between the 710 Freeway bridge to the north and Imperial Highway bridge to the south in the main channel, upstream of the Rio Hondo confluence. The site is located in Reach 2.

LAR I-10: LAR I-10 is currently monitored by the City of Los Angeles as part of its Status and Trends Monitoring Program. The site is located in Reach 2.

LAR I-11: LAR I-11 is located in Long Beach at Del Amo Boulevard in the main channel upstream of the Compton Creek confluence. The site is located at the bottom of Reach 2.

LAR I-12: LAR I-12 is currently monitored by the City of Los Angeles as part of its Status and Trends Monitoring Program. The site is located in Reach 1.

LAR I-13: LAR I-13 is an existing Los Angeles County mass emission sampling site located in Long Beach south of Wardlow Road and north of Willow Street in the main channel. This is the location of an existing Los Angeles County gauging station identified as F319-R. The site is located in Reach 1.

A summary of the constituents not attaining applicable WQBELs at these monitoring locations during the monitoring years 2008-2012 is shown in Tables 2-8 and 2-9. Note that while some collected samples were found to exceed WQBELs during this time, the watershed is on schedule to meet applicable interim and final WLAs as outlined in the LA River Metals TMDL and the JG1 and JG2 LA River Metals TMDL Implementation Plans.

Table 2-8: Lower LAR metal exceedances, dry weather exceedances by location (total dry samples)

	LAR I-9	LAR I-10	LAR I-11	LAR I-12	LAR I-13
Constituent	Reach 2 at 710 Freeway	Rio Hondo	Reach 2 at Rio Hondo	Compton Creek	Reach 1 at Wardlow
Total Recoverable Copper	0	7(10)	0	0	0
Total Recoverable Zinc	0	0	0	0	0
Total Recoverable Lead	0	2(10)	0	0	0

Table 2-9: Lower LAR metal exceedances, wet weather exceedances by location (total dry samples)

	LAR I-11	LAR I-13
Constituent	Reach 2 at Rio Hondo	Reach 1 at Wardlow
Total Recoverable Copper	17(17)	20(20)
Total Recoverable Zinc	3(17)	4(20)
Total Recoverable Lead	16(17)	16(20)
Total Recoverable Cadmium	0	0

*Only sampling locations LAR I-11 and LA I-13 are sampled during wet weather in the Lower LAR Watershed

2.2.5 CITY OF LONG BEACH STORMWATER MONITORING

The City of Long Beach first established a monitoring site at the Dominguez Gap Pump Station during the 2000/2001 wet season. Refer to Section 5 (the RAA) for further information on the project.

The Dominguez Gap Pump Station and adjacent infiltration/detention basin started undergoing major renovations during the summer of 2006 and work extended through most of the 2007/2008 wet season. During that time period, land disturbances associated with development of the wetland system resulted in elevated levels of sediment. By late 2009 the wetland vegetation had become well established and the water quality changes observed during the construction phase were no longer evident.

The Dominguez Gap has been determined to play a critical role in attainment of TMDL requirements for Reach 1. Discussions with the LACFCD have emphasized the benefits of operating water levels to benefit both the wetland habitat and minimize mass emissions of trace metals and other contaminants to (or back to) the Los Angeles River.

The Los Angeles River Metals TMDL established concentration-based targets at 23 µg/L for total recoverable copper and 12 µg/L for total recoverable lead at the downstream Wardlow monitoring site during dry weather. A summary of all dry weather monitoring data from the Dominguez Gap Pump Station for these metals (Tables 2-10 and 2-11 and Figure 2-4) shows consistently low concentrations of copper, lead and zinc in both the total recoverable and dissolved forms. Concentrations of these metals in Dominguez Gap Pump Stations dry weather discharges have also remained lower than measurements made within the Los Angeles River by the Coordinated Monitoring Program. This indicates that the wetland system is has very effective in removing these metals.

The Los Angeles River Metals TMDL establishes wet weather water quality targets based on the acute CTR criteria and the 50th percentile hardness values for stormwater collected at the County's Wardlow water quality monitoring site on the Los Angeles River. These targets are for total recoverable metals:

- Cadmium: 3.1 ug/l
- Copper: 17 ug/l
- Lead: 62 ug/l
- Zinc: 159 ug/l

In a total of 37 monitored storm events concentrations of total cadmium have never exceeded 0.55 µg/L and the median concentration has been 0.26 µg/L. Long-term trends for discharges of total copper, lead and zinc are illustrated in Figure 2-5. This figure examines trends in flow, concentrations of the target metals, and loads of trace metal discharges. The graphs on the left side of the figure illustrate trends both before and after implementation of the TMDL while the graphs on the right side of the figure trends without regard to the implementation date. Stormwater discharges have tended to decrease over time however this watershed was reconfigured when the treatment wetland system was created. It now has a smaller drainage area. Concentrations of total copper, total lead and total zinc were all increasing prior to both completion of the wetland treatment system and implementation of the TMDL. General trends

suggest that loads of all three metals have been decreasing in recent years but further data will be necessary to confirm this trend. Concentrations of total copper still occasionally exceed the current water quality target established for the Los Angeles River at Wardlow (17 ug/L) but measured concentrations in the past three years have never exceeded 21 ug/L. Concentrations of total lead present in wet weather discharges from the Dominguez Gap Pump Station are less than 25% of the established objective. Concentrations of total zinc are also declining and, in recent years, have remained less than 2/3 of the water quality target in Los Angeles River Reach 1.

The Los Angeles River Nitrogen TMDL established WLAs for both ammonia-N and nitrate-N that apply to minor discharges that discharge both below the Los Angeles-Glendale WRP and within Reach 1 of the Los Angeles River. Ammonia-N WLAs were established for a 1-hour average (8.7 mg/L) and a 30-day average (2.4 mg/L). WLAs for both nitrate-N and nitrate+nitrite-N were both set at 8.0 mg/L for a 30-day average. Concentrations of ammonia-N have consistently been less than 0.7 mg/L during both dry and wet weather monitoring (Figure 2-6). Median concentrations of ammonia are 0.18 mg/L during dry weather and 0.38 mg/L during wet weather discharges. Concentrations of nitrate-N in dry weather discharges have never exceeded 1.9 mg/L and all wet weather discharges have had concentrations of less than 1.4 mg/L. Thus all discharges from the Dominguez Gap Pump Station continue to achieve the WLAs established for nitrogen compounds. Furthermore, total nitrogen (TKN plus nitrate/nitrite-N) concentrations typically range between 2.0 and 3.0 mg/L with the highest measured concentration being reported at 5.02 mg/L during a wet weather discharge.

Table 2-10: Total metals in dry weather discharges from the Dominguez Gap pump station

Statistic	*Copper*	*Lead*	*Zinc*
LA River @ Wardlow TMDL objective	23	12	
No. of Events	7	7	7
Mean	4.2	3.5	23.8
Standard Deviation	2.2	1.5	12.0
Minimum	1.7	2.2	8.8
Median	3.9	3.1	21
Maximum	8.8	6.5	47

Table 2-11: Dissolved metals in dry weather discharges from the Dominguez Gap pump station

Statistic	*Copper*	*Lead*	*Zinc*
CTR Objective (median hardness 282 mg/L, 10^{th} percentile hardness 219 mg/L)	22	7.6	230
No. of Events	7	7	7
Mean	1.88	0.6	12.8
Standard Deviation	1.04	0.22	6.68
Minimum	0.54	0.39	6.3
Median	2.1	0.62	11
Maximum	3.6	1.0	24

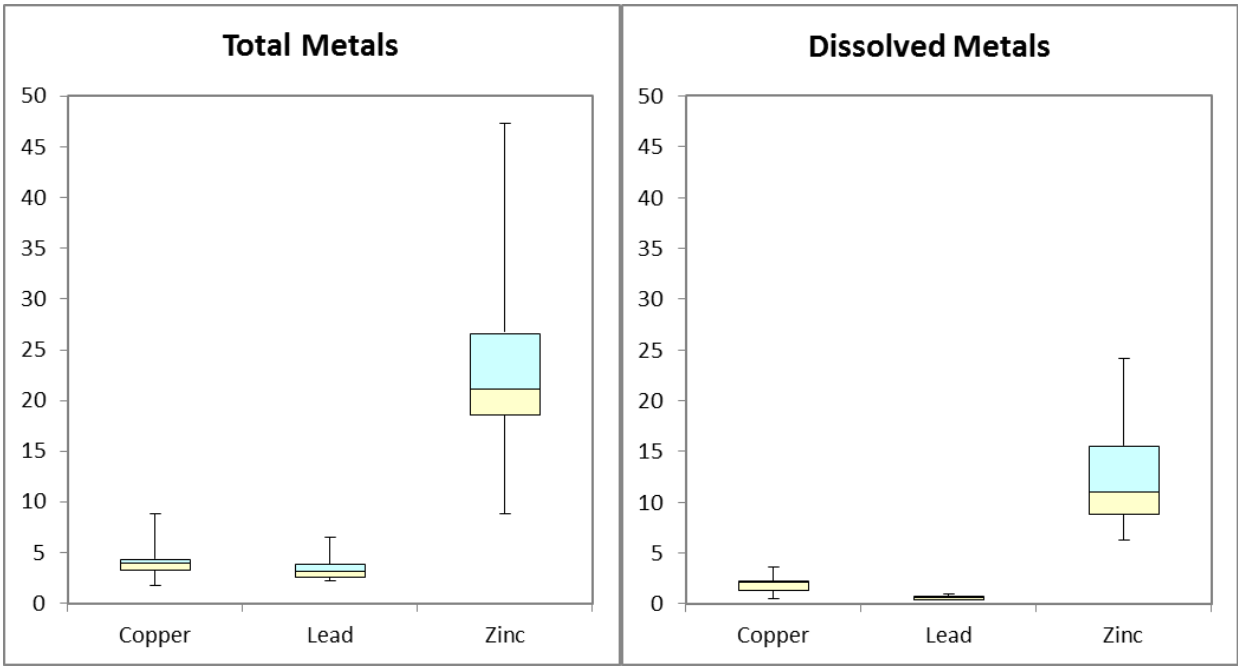
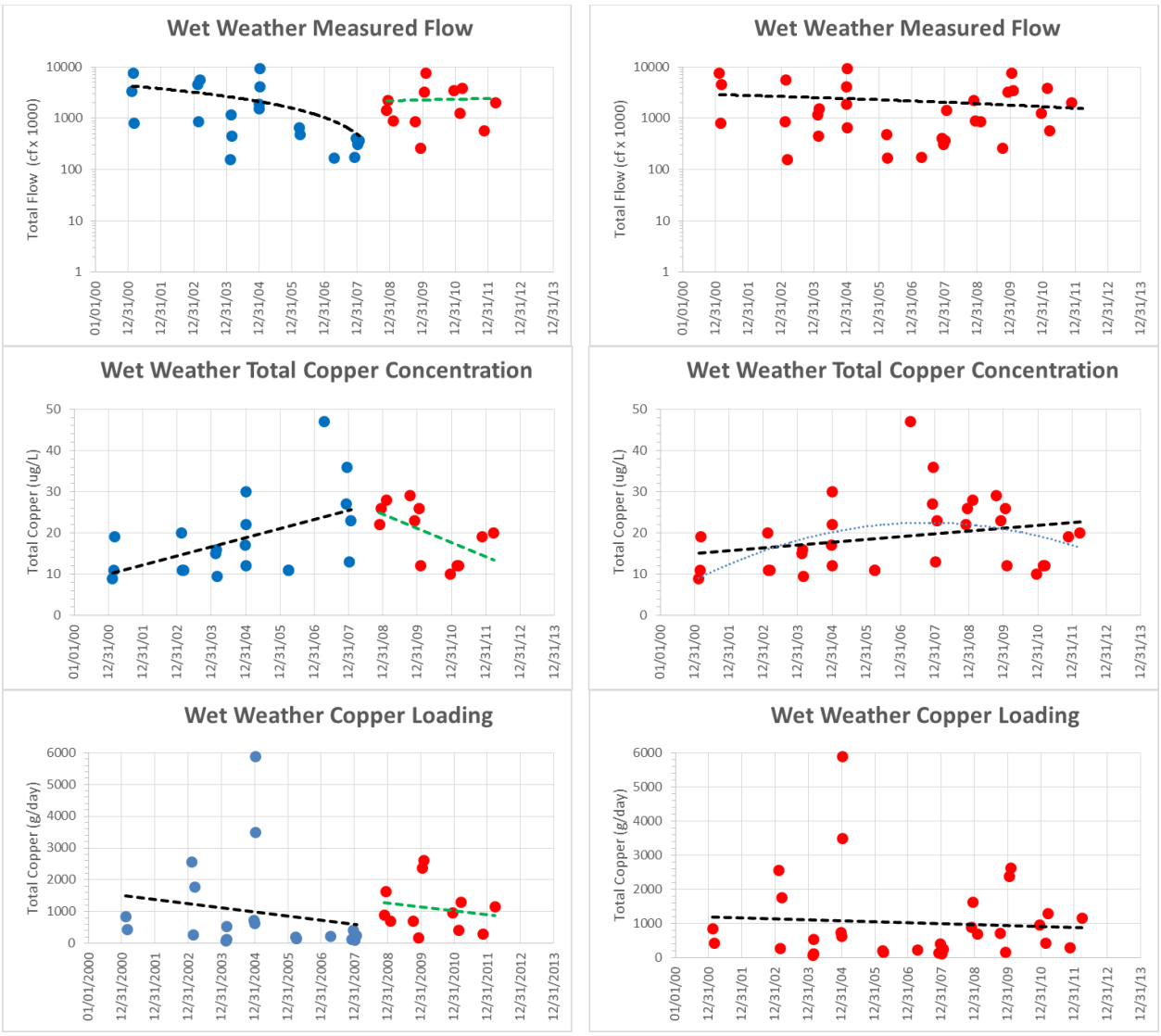
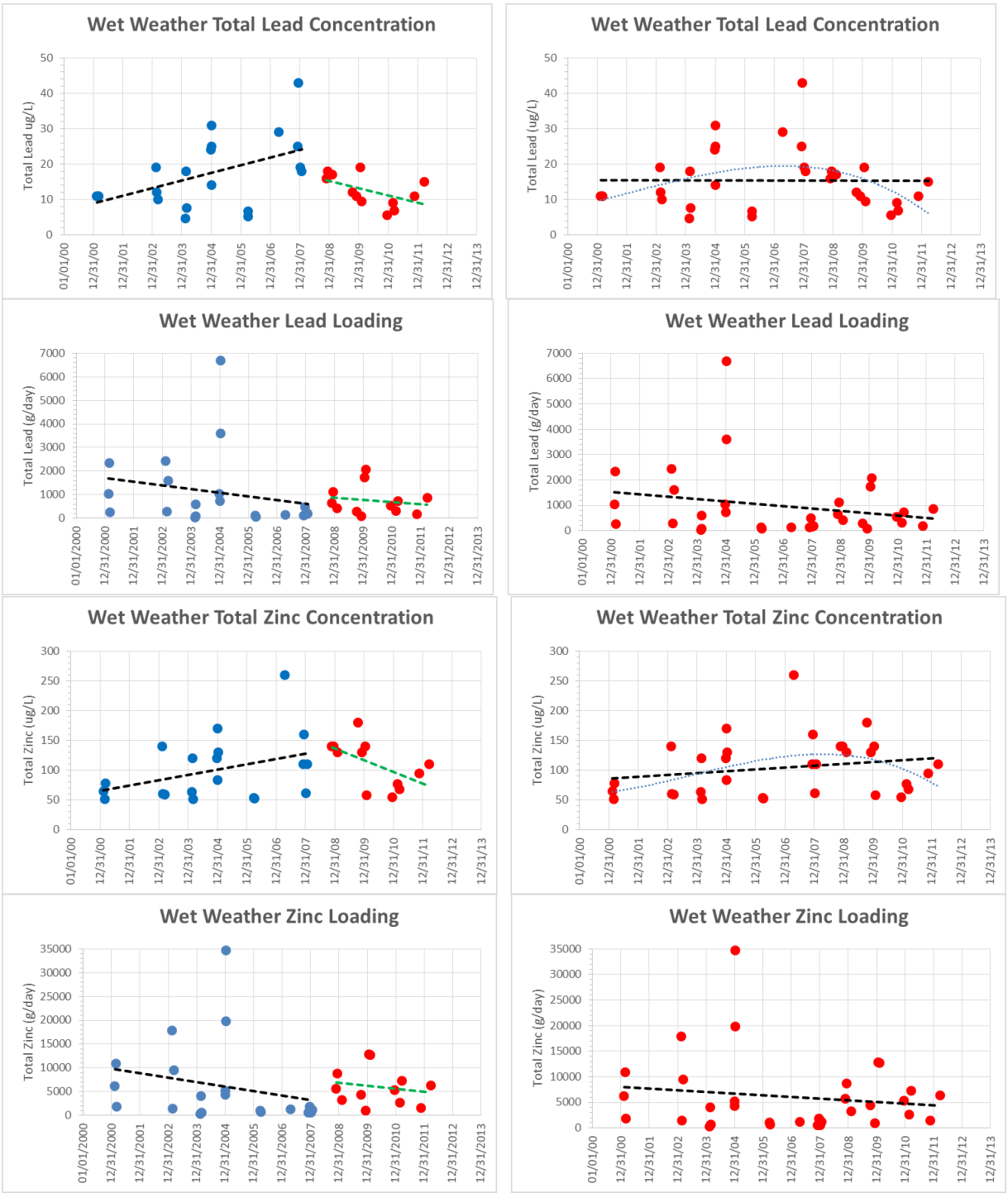


Figure 2-4: Total and dissolved metals in dry weather discharges from the Dominguez Gap pump station



Note: Graphs on the left illustrate samples taken before and after the effective date of the TMDL (10/29/2008). Graphs on the right illustrate trends without consideration of the effective date of the TMDL. Dashed lines are based upon simple linear regression. The fine dotted line represents a non-linear regression.

Figure 2-5: Stormwater flow, concentration and loads for total Cu, Pb and Zn at the Dominguez Gap



Note: Graphs on the left illustrate samples taken before and after the effective date of the TMDL (10/29/2008). Graphs on the right illustrate trends without consideration of the effective date of the TMDL. Dashed lines are based upon simple linear regression. The fine dotted line represents a non-linear regression.

Figure 2-5 (Cont.): Stormwater flow, concentration and loads for total Cu, Pb, Zn - Dominguez Gap pump station

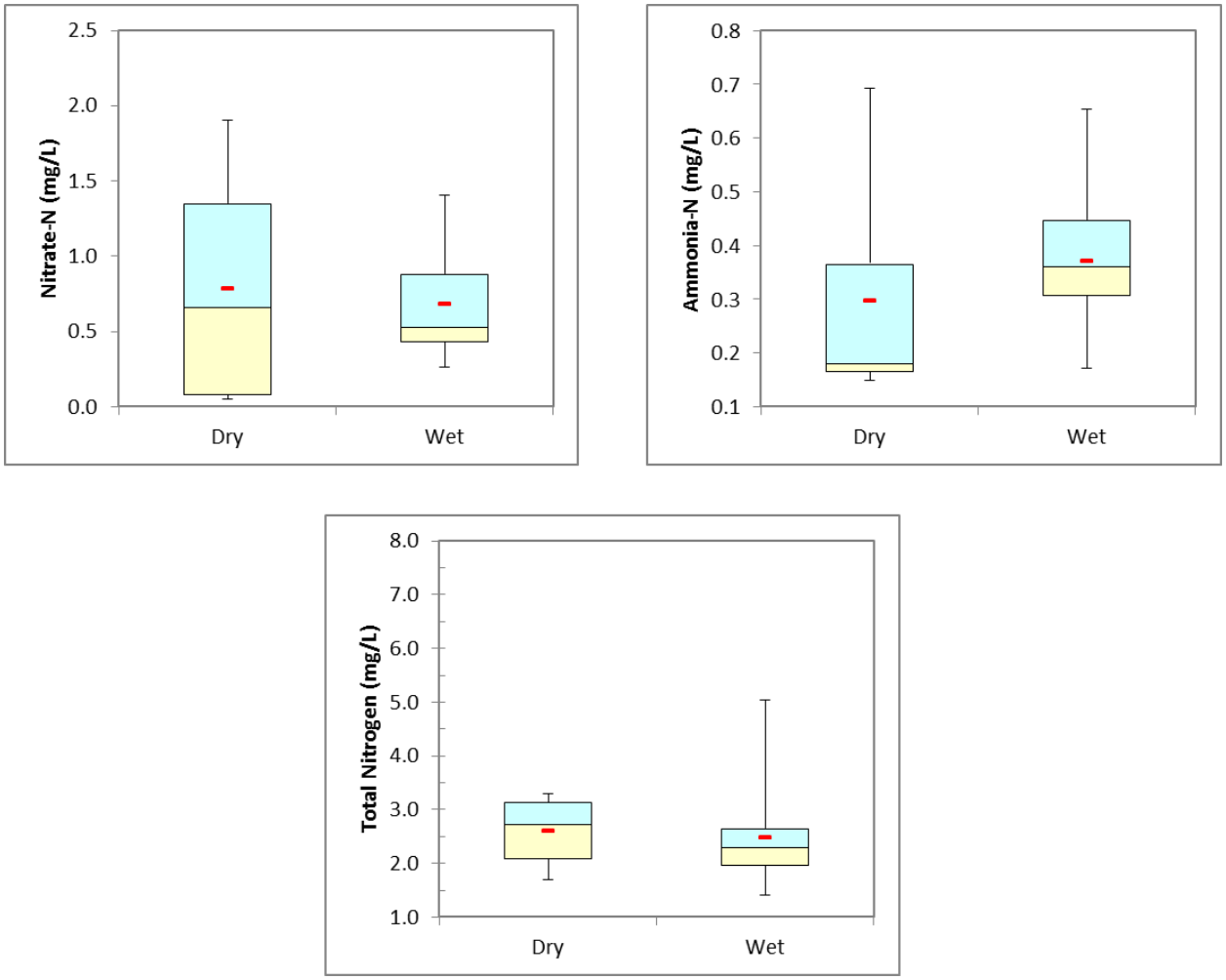


Figure 2-6: Distribution of Ammonia-N, Nitrate-N and Total Nitrogen measured in both dry and wet weather discharges from the Dominguez pump station, 2008-2013

2.2.6 LOS ANGELES RIVER BACTERIA SOURCE IDENTIFICATION STUDY/CLEANER RIVERS THROUGH EFFECTIVE STAKEHOLDER-LED TMDLS (CREST) STUDY

Multiple data sets were analyzed during the development of the LA River Bacteria TMDL. Data from the City of Los Angeles' Status and Trends monitoring program, the Monitoring and Reporting Programs for the City of Los Angeles' LA-Glendale and D.C. Tillman Water Reclamation Plants and the Burbank Water Reclamation Plant, and data from the Mass Emission and Tributary instream monitoring stations under the Monitoring and Reporting Program of the MS4 Permit were analyzed over a period beginning November 1997 and ending February 2008.

The data in Table 2-12 were compiled by the Regional Board for the Los Angeles River Watershed Bacteria TMDL. Exceedance percentages, which are calculated as the number of single sample exceedances of Rec-1 WQOs divided by sample count are shown for the monitoring locations relevant to the Lower LAR Watershed. The exceedance count and sample count are also listed next to the exceedance percentage in parentheses.

On average, E. Coli and fecal coliform samples exceeded WQOs over 80% of the time in the LA River, and over 75% of the time in LA River Tributaries.

It should be noted that the Regional Board recognizes that there are natural sources of bacteria within watersheds that may contribute to exceedances of the Rec-1 WQOs, and have implemented a reference system/antidegradation compliance procedure. According to the LA River Bacteria TMDL, under this protocol, "*a certain frequency of exceedance of the single sample objectives shall be permitted on the basis of the observed exceedance frequency in the selected reference system(s) or the targeted waterbody*"(Staff Report pg. 18). In addition, the LA River and the Rio Hondo are subject to the high flow suspension (HFS) of Rec-1 WQOs for bacteria during days with rainfall of 0.5" inches or greater and the following 24 hours, so many of the wet weather exceedances expressed above over- represent the bacterial impairment in these waterbodies[10].

A map of monitoring locations sampled is shown in Figure 2-7.

[10] Los Angeles River Watershed Bacteria Total Maximum Daily Load. Staff Report, California Regional Water Quality Control Board, Los Angeles Region. July 15, 2010

Table 2-12: LA River bacteria source identification study monitoring data exceedance summary

	Parameter	LA River Reach 1 Nov '97-Feb '08 Exceedance %	LA River Reach 2 Jan '01-Feb '08 Exceedance %	Compton Creek Jan '02-Feb '08 Exceedance %	Rio Hondo Reach 1 Jan '02-Feb '08 Exceedance %
Single Sample	Fecal Coliform	86.2% (50/58)	80.0% (4/5)	87.5% (14/16)	90.9% (10/11)
	E. Coli	83.1% (226/272)	81.9% (443/541)	53.3% (48/90)	69.1% (56/81)
	Exceedance Days	84.4% (276/327)	82.3% (445/541)	57.3% (59/103)	79.0% (64/81)
	Dry Weather	79.4% (189/238)	79.3% (345/435)	58.7% (54/92)	78.3% (54/69)
	Wet Weather	91.6% (87/95)	88.5% (100/113)	45.5% (5/11)	83.3% (10/12)
	Summer	77.0% (134/174)	79.2% (244/313)	90.5% (38/42)	49.2% (38/48)
	Winter	89.3% (142/159)	87.7% (201/229)	63.4% (21/33)	68.8% (22/32)
Geometric Means	Fecal Coliform	100.0% (11/11)	N/A	N/A	N/A
	E.Coli	100.0% (22/22)	100.0% (59/59)	N/A	N/A
	Exceedance Days	100.0% (33/33)	100.0% (59/59)	N/A	N/A
	Summer	100.0% (3/3)	100.0% (6/6)	N/A	N/A
	Winter	100.0% (30/30)	100.0% (53/53)	N/A	N/A

** Data expressed in terms of exceedance days of the Basin Plan Rec-1 WQO in which single sample bacteria densities exceed bacteria water quality standards for Rec-1 Beneficial Use.
***LA River is subject to the High Flow Suspension of Rec-1 WQOs, therefore these exceedances may be overrepresented

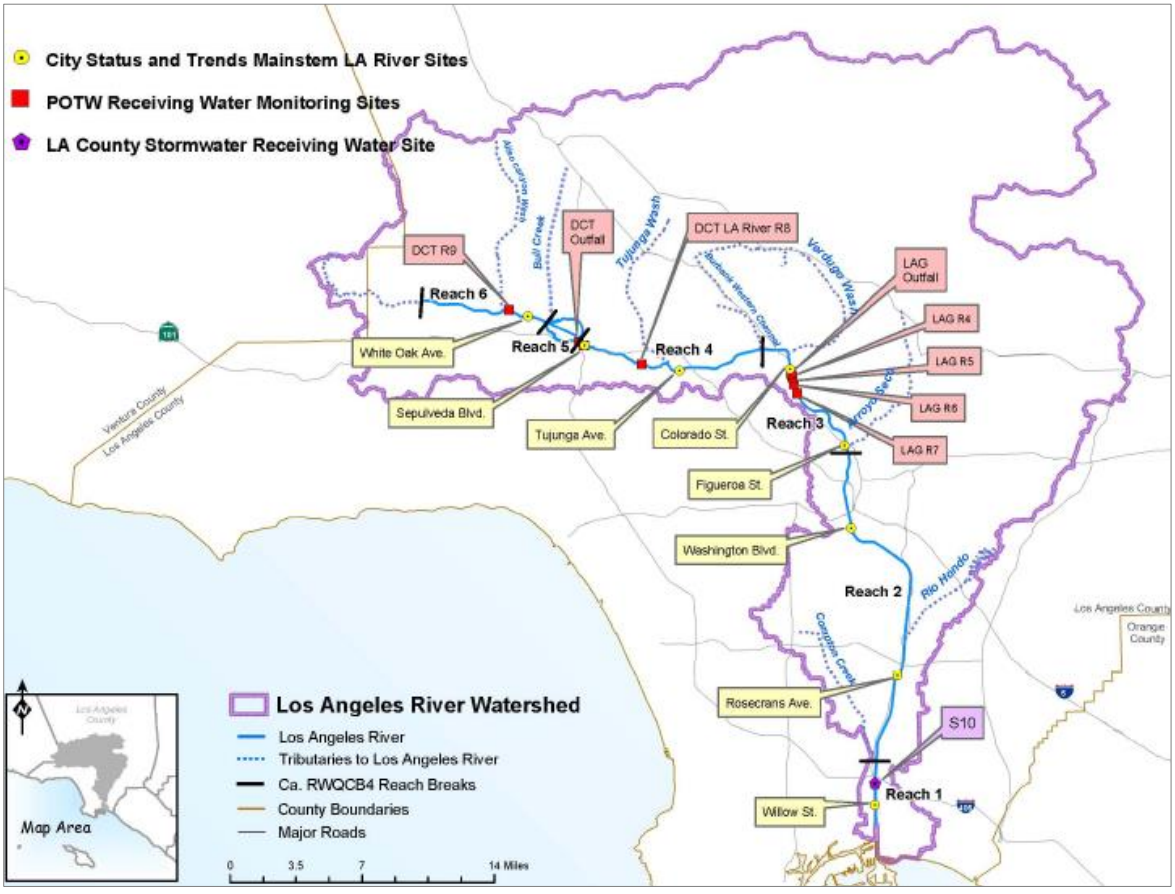


Figure 2-7: LA River Bacteria Source Identification Study monitoring locations

2.2.7 LA RIVER TRASH TMDL DATA

The Cities have successfully implemented the LA River Trash TMDL, achieving a greater than 80% reduction in trash through the installation of certified full capture catch basin inserts, trash nets, and retention basins. Table 2-13 displays each City's status in achieving 100% trash capture.

Table 2-13: Percentage of catch basins equipped with full capture devices by City

City	Percentage of Catch Basins Equipped with Full Capture Device
Downey	90
Lakewood	100
Pico Rivera	84
Paramount	94
Signal Hill	89
South Gate	86
Long Beach	90

2.2.8 SCCRWP POLLUTANT LOADING STUDY

The Southern California Coastal Water Research Project, which was formed in 1969 to "enhance the scientific understanding of linkages among human activities, natural events, and the health of the Southern California coastal environment" conducted a five-year study of the spatial and temporal patterns of stormwater contaminants from 2000 through 2005 in five watersheds throughout Los Angeles County. They collected data during 11 storm events from twelve mass emissions sites and eight land use types to characterize pollutant loading of trace metals, organic compounds, and bacteria. Ten (10) to fifteen (15) grab samples were collected for each event, and samples were targeted at early season storms and large rainfall events. Data was collected from the LA River at Wardlow, making the results of this study applicable to the Lower LAR Watershed.

Researchers found that stormwater concentrations of trace metals exceeded CTR WQOs in greater than 80% of the wet weather samples at mass emissions sites. They also found consistent fecal indicator bacteria exceedances at both mass emissions and land use sites. Results also indicated that annual loading of Polycyclic aromatic hydrocarbons (PAHs) from the Los Angeles River watershed into the Pacific Ocean is approximately 92.8 kg/year. The EPA regulatory guidelines suggest a practical PAH detection limit between 1 - 5ug/L, and this study mostly found mean PAH concentrations below this threshold. However, they suggest that PAH concentrations may be underreported due to the fact that most monitoring efforts collect composite samples, and this study observed almost all PAH pollutant loading to occur during the first flush of a storm event.

2.2.9 COUNCIL FOR WATERSHED HEALTH LOS ANGELES RIVER WATERSHED MONITORING PROGRAM

Since 2007, the Los Angeles River Watershed Monitoring Program (LARWMP), a group of stakeholders representing major permittees, regulatory and management agencies, and conservation groups led by the

Council for Watershed Health, has conducted watershed scale monitoring at targeted and random sites throughout the Los Angeles River watershed. A map of monitoring locations is shown in Figure 2-8.

Significant observations found during the 2010 monitoring season under this program are as follows[11]:

- "The ambient condition of streams in the Los Angeles River Watershed was assessed using a variety of indicators collected at randomly selected sites in three sub-regions (natural, urban and effluent dominated). Indicators included water chemistry, toxicity, bioassessment and physical habitat condition."
- "Dissolved oxygen, pH and temperature were greatest at effluent dominated sites and lowest at natural upper watershed sites. Water Reclamation Plants and urban run-off discharge into concrete lined channels, with limited canopy cover. Therefore, sunlight has the opportunity to increase water temperature and encourage photosynthesis, which results in cyclic oscillation in pH and dissolved oxygen."
- "The concentrations of zinc, selenium, and lead were highest at effluent dominated sites and arsenic, chromium and copper were higher at urban sites. Other than copper and selenium in urban streams, concentrations of the other metals were generally below CTR thresholds."
- "Effluent-dominated sites had higher median concentrations of dissolved nutrients compared to the other sub-regions and the range of values was greatest at the urban sites. Nitrogen concentrations at all watershed sub-regions were below the basin plan objective of 10 mg/L-N for nitrate and 1.0 mg/L-N for nitrite."
- "Watershed-wide, 80% of the random sites sampled had IBI scores that indicated degraded habitat or ecosystem conditions, most of these were concrete lined channels in the urban and effluent dominated sub-regions. The BMI communities were strongly affected by the 2009 Station Fire which reduced the biological condition in the upper watershed."
- "Physical habitat conditions, as measured by CRAM, were poorest in the lower watershed, where concrete channels predominate, and best in the upper watershed."
- "There was a strong positive correlation between good biological conditions (IBI scores) and canopy cover and stream slope. Each of these habitat characteristics was favorable for BMIs in the upper watershed where IBI scores were correspondingly high. IBI scores were generally lowest in the urban and effluent sub regions, where concrete lined channels predominate."

The Lower LAR Watershed will use these results, and continue to track future LARWMP results to help target watershed control measures identified in the WMP.

[11] Morris, K. et al.

Figure 2-8: LARWMP 2010 monitoring locations

2.3 SOURCE ASSESSMENT

This section identifies the potential sources of pollutants within the Lower LAR Watershed for the waterbody-pollutants classified in section 2.2. Information was gathered from several water quality monitoring programs and special studies related to pollutant sources and conditions that contribute to the highest water quality priorities to identify known and suspected stormwater and nonstormwater pollutants sources to and from the Municipal Separate Storm Sewer System (MS4).

The pollutants addressed in this section are bacteria, nutrients, metals, sediment, and trash. To generally describe the potential sources in the Lower LAR Watershed for these pollutants, pollutant sources have been divided into the following categories: NPDES discharges, road infrastructure, atmospheric deposition, and wastewater from sanitary sewer and SSOs.

2.3.1 NPDES SOURCES

There are two categories of pollutant sources, point sources and non-point sources. Point source discharges are regulated through National Pollutant Discharge Elimination System (NPDES) permits. Point sources include those associated with the MS4 (stormwater and urban runoff) and other NPDES discharges. Stormwater runoff in the watershed is regulated through four types of permits including MS4 permits, a statewide stormwater permit for Caltrans; a statewide Construction General Permit (CGP); and a statewide Industrial General Permit (IGP). The NPDES IGP regulates stormwater discharges and authorized non-stormwater discharges from ten specific categories of industrial facilities, including manufacturing facilities, oil and gas mining facilities, landfills, and transportation facilities. Furthermore, the NPDES CGP regulates stormwater discharges from construction sites that result in land disturbances equal to or greater than one acre. Point source discharges from thee IGP, CGP, residential, commercial and transportation activities can be a significant source of pollutant loads.

Non-point sources, by definition, include pollutants that reach waters from a number of land uses and are not regulated through NPDES permits. Non-point sources include existing contaminated sediments within the watershed and direct air deposition to the waterbody surface.

The following provides additional discussion regarding the presence of pollutants in stormwater runoff within the Lower LA River watershed.

BACTERIA

As discussed in Section 2.2.6 relating to the CREST study for the LA River Bacteria TMDL, based on the assessment from several monitoring programs, on average E. Coli and fecal coliform samples exceeded WQOs over 80% of the time in the LA River and over 75% of the time in LA River Tributaries. According to the Bacteria TMDL, dry weather urban runoff and stormwater conveyed by storm drains are the primary sources of elevated bacterial loadings in the watershed[12]. Significant contributors of bacteria are

[12] LARWQCB (Los Angeles Regional Water Quality Control Board). 2010. Los Angeles River Watershed Bacteria Total Maximum Daily Load. California Regional Water Quality Control Board- Los Angeles, CA

associated with categories such as anthropogenic, non-anthropogenic, and environmental sources, which may include:

SANITARY SEWERS OVERFLOWS (SSOS)

SSOs are potential sources of contaminants. Aging systems in need of repair or replacement, severe weather, improper system operation and maintenance (O&M), clogs, and root growth can contribute to sanitary sewer leaks and overflows. When sanitary sewers overflow or leak, they can release raw sewage into the environment, which can contain pollutants such as suspended solids, pathogenic organisms, toxic pollutants, oil and grease but in particular, high concentrations of bacteria and nutrients[13]. SSOs can occur during the dry or wet weather and at any point in the collection system, include overflows from manholes.

According to the Sanitary Sewer Overflow (SSO) database in the California Integrated Water Quality System (CIWQS), a total of 226 SSOs have been recorded within the watershed since 2006. Table 2-14 includes information on the total reported SSO discharges[14].

Table 2-14: Total number of SSOs and volume

Total SSOs	Total Volume (gal)
226	360,476

ANIMAL WASTES

The bacteria indicators used to assess water quality are not specific to human sewage; therefore, natural influences of fecal matter from animals and birds can also be a source of elevated levels of bacteria[12].

ILLICIT CONNECTIONS AND ILLICIT DISCHARGES (IC/IDS)

IC/IDs to the MS4 are also likely sources of bacteria in stormwater discharges[12]. Table 2-15 includes data based on annual reports submitted to the LA County DPW (the previous Principal Permittee), for illicit connections and illicit discharges. Current data on the constituents for the IC/IDs recorded during this period is not available.

Table 2-15: Illicit Connections/Illicit Discharges 2001-2012

Agency	Illicit Connections	Illicit Discharges
Downey	6	467
Lakewood	0	162
Long Beach	No Data	No Data
Lynwood	1	38
Pico Rivera	No Data	No Data
Signal Hill	0	88
South Gate	0	104
Total	7	917

[13] SWRCB (State Water Resources Control Board). 2014. Sanitary Sewer Overflow (SSO) Reduction Program. http://www.waterboards.ca.gov/wate_issues/programs/sso/.

[14] SWRCB (State Water Resources Control Board). 2014. California Integrated Water Quality System Project (CIWQS). Spill Public Report - Summary Page. http://www.waterboards.ca.gov/ciwqs

WASTEWATER TREATMENT PLANTS

According to the Bacteria TMDL Staff Report for the Los Angeles River, during dry weather, effluent discharged from wastewater reclamation plants accounts for roughly 72% of the flow in the river and less than 1% in the wet weather. Although wastewater treatment plants are not considered to be a source of exceedances of bacteria water quality objectives in the river, when these systems do fail they may be sources of bacteria loads during the wet or dry weather conditions.

OTHER SOURCES

Urban runoff has also been found to carry high levels of bacteria and can be expected to exceed water quality criteria for bacteria during and immediately after storm events. During dry weather, flows into the storm drain system include residential and commercial runoff from activities such as over-irrigation, car washes, pavement cleaning, etc. Organic debris from gardens, landscaping, parks, food waste and illegal dumping from recreational vehicle holding tanks among others, can be a source of elevated levels of total coliform bacteria. In addition, decaying vegetation and soils can play a role in bacterial loadings in the watershed[15].

NUTRIENTS

Possible sources of nutrients include runoff from residential and commercial areas due to landscaping activities and use of fertilizer for lawns and gardens, including organic debris. Activities such as washing cars, parking lots and driveways can contribute to nutrients pollutants in the MS4 since most of the detergents used contain phosphorus[16]. Other sources of nutrients include food wastes, domestic animal waste; and human waste from areas inhabited by the homeless. These pollutants build up and are then washed into the waterways through the storm drain system when it rains. These kinds of loads are typically highest during the first major storm flush and even after extended periods of dry weather when pollutants have accumulated. Other major categories of nutrients sources include:

- As discussed in the TMDL for Nitrogen Compounds and Related Effects, direct discharges from wastewater reclamation plants within the Los Angeles River comprise the largest source of nutrients loadings. The three largest POTWs within the LA River watershed are: Donald C. Tillman Water Reclamation Plant, Los Angeles Glendale Water Reclamation Plant, and Burbank Water Treatment Plant, which provide an average of 2,243 MT/yr in total nitrogen loadings[16].
- Golf courses – these are a major source of nutrients since fertilization activities and watering rates are generally much greater than the residential and commercial areas. The excess nutrients

[15] LARWQCB (Los Angeles Regional Water Quality Control Board). 2006. Total Maximum Daily Loads for Bacterial Indicator Densities in Ballona Creek, Ballona Estuary, and Sepulveda Channel. California Regional Water Quality Control Board- Los Angeles, CA

[16] LARWQCB (Los Angeles Regional Water Quality Control Board). 2003. Total Maximum Daily Loads for Nitrogen Compounds and Related Effects. California Regional Water Quality Control Board, Los Angeles Region, Los Angeles, CA.

accumulated in the soils can be transported to waterways through excess irrigation or stormwater runoff. There are approximately 15 golf courses within the watershed area.

METALS

Heavy metals including copper, lead, and zinc are Category 1 pollutants in the Lower LAR Watershed. Although naturally occurring, concentrations of these metals are a concern in many watersheds because of potential industrial and urban discharges. The Los Angeles River TMDL for Metals addresses the main types of sources within the watershed. During dry weather, Publicly Owned Treatment Works (POTWs) account for the majority of flow and metal loadings, the remaining loading sources are identified from other permitted NPDES discharges which include Industrial General Permit (IGP) covered facilities, Construction General Permit (CGP) covered facilities, and other types of urban activities[17]. According to the Los Angeles River Metals TMDL, most of the annual metal loadings are associated with wet weather. The final staff reports estimates stormwater flows contributing as much as 40 percent of the cadmium loading, 80 percent of the copper loading, 95 percent of the lead loading and 90 percent of the zinc loading on an annual basis.

POTWS

POTWS are considered significant contributors of metals in the river. During dry weather, they constitute the majority of discharge in the river. Monitoring data as evaluated in the Metals TMDL indicates POTWs as contributing fairly large percentages of the total dry-weather metal loadings. The concentrations of metals from the POTWs may be low, but loadings are high due to their large flows[18].

INDUSTRIAL GENERAL PERMIT ACTIVITIES

The types of facilities covered under the IGP have the potential for metal loads, in particular metal plating, transportation, scrap yards and recycling and manufacturing facilities.

According to the Stormwater Multiple Application and Report Tracking System (SMARTS) database, there are approximately 227 current active industrial permits within the watershed; and from 2002-2012 there have been approximately 287 combined, active/terminated, industrial permits. Approximately 141 violations were recorded on the SMARTS database for inspections conducted from 2002-2012[18]. No further data is available to determine the kind of violations or the kind of pollutants these facilities contributed to.

[17] LARWQCB (Los Angeles Regional Water Quality Control Board). 2005. Total Maximum Daily Load for Metals Los Angeles River and Tributaries. California Regional Water Quality Control Board- Los Angeles, CA prepared in Coordination with Environmental Protection Agency Region 9.

[18] SWRCB (State Water Resources Control Board). 2014. Storm Water Multiple Application and Report Tracking System (SMARTS). http://www.waterboards.ca.gov/smarts/faces/SwSmartsLogin.jsp

Table 2-16: Active IGP Facilities as of May 1, 2014[18]

Agency	Total
Downey	22
Lakewood	1
Long Beach	78
Lynwood	15
Paramount	40
Pico Rivera	12
Signal Hill	6
South Gate	53
Total	227

CONSTRUCTION GENERAL PERMIT ACTIVITIES

Discharges covered under the CGP also have the potential to contribute metals loading from construction sites. Sediment delivered from construction sites can contain metals from construction materials and heavy equipment. Additionally, metals can leach out of building materials and construction waste exposed to stormwater[19].

Pollutants sources from construction activities are not considered a major concern since the watershed is mainly built-out. However, according to the SMARTS database, there are approximately 78 current active constructions permits within the watershed; and from 2002-2012 there have been approximately 337 combined, active/inactive, construction permits[18]. Approximately 28 violations were recorded on the SMARTS database for inspections conducted from 2002-2012. No further data is available to determine the kind of violations or the kind of pollutants these facilities contributed to.

Table 2-17: Active CGP sites as of May 1, 2014[18]

Agency	Total
Downey	7
Lakewood	4
Long Beach	44
Lynwood	3
Paramount	2
Pico Rivera	9
Signal Hill	5
South Gate	4
Total	78

LAND USE ACTIVITIES

These include general wear and tear of automotive parts which can be a significant source of metals. For example, brake wear can release copper, lead, and zinc into the environment and this contributes to concentrations of metals in urban runoff. Motor oil and automotive coolants spills are another potential land use source of metals. Pesticides, algaecides, wood preservatives, galvanized metals, and

[19] Raskin, L., M.J. Singer, and A. DePaoli. 2004. Final Report to the State Water Resources Control Board Agreement number 01-269-250. University of California, Davis, CA.

paints used across the watershed can also contain these metals. In the watershed, sources for these heavy metals have been identified as automotive repair, maintenance, fueling, cleaning and painting locations, metal fabrication facilities, and transportation activities and facilities[20].

The fertilizers used for lawn and landscape maintenance are also a source of metals and organic chemicals. Fertilizers, herbicides, and pesticides contain metals such as cadmium, copper, mercury, zinc, lead, iron, and manganese, which are also distributed when applying fertilizers and pesticides[21].

Monitoring program activities, which includes the mass emission monitoring as discussed in the Metals TMDL Implementation Plan for Jurisdiction 1, dry weather analysis predicted an exceedance frequency ranging between 3 and 12 percent for copper and 5 to 9 percent for lead[22]. Samples analyzed from 2009-2010 indicated that no samples exceeded the numeric water quality targets for dry weather. Based on the same historic monitoring information, the TMDL Implementation Plan for Jurisdiction 1 indicated wet weather flows routinely exceed numeric water quality targets for copper and zinc and to a lesser degree lead and cadmium for Reaches 2 through 6.

TRASH

According to the Trash TMDL for the Los Angeles River, the primary source of trash in the river results from litter, which is intentionally or accidentally discarded in watershed drainage areas. Transport mechanisms include storm drains, wind action and direct disposal. Several studies have shown that commercial operations generate more pollutants than residential operations, and as much as three times the amount generated from light industrial operations[23]. The TMDL also states that based on several studies, urban runoff is the dominant source of trash. The large amounts of trash conveyed by urban stormwater to the LA River is evidenced by the amount of trash that accumulated at the base of the storm drains. The amount and type of trash that is washed into the storm drain system appears to be a function of the surrounding land use.

2.3.2 ROAD INFRASTRUCTURE SOURCES

Runoff from highways and roads carries a significant load of pollutants. Pollutants originate from cars, roadway degradation, and surrounding landscape. Typical contaminants associated with these include sediment, heavy metals, oils and grease, debris, fertilizers, and pesticides, among others[24]. The use and wear of cars is one of the most prevalent sources of roadway pollutants. A study found that cars are the leading source of metal loads in stormwater, producing over 50 percent of copper, cadmium, and zinc

[20] City of San Diego and Caltrans. 2012. Tecolote Watershed Comprehensive Load Reduction Plan. Final Report. San Diego, CA

[21] County of Los Angeles. 2010. Multi-pollutant TMDL Implementation Plan for the Unincorporated County Area of Los Angeles River Watershed. County of Los Angeles, Los Angeles, CA

[22] Los Angeles River Jurisdictional Group 1. 2010. Metals TMDL Implementation Plan. Los Angeles, CA

[23] LARWQCB. 2007. Trash Total Maximum Daily Loads for the Los Angeles River Watershed. Los Angeles, CA.

[24] Caltrans (California Department of Transportation). 2003. Discharge characterization study report. California Department of Transportation, Sacramento, CA.

loads[25]. Vehicle brake pads constitute the single largest source of copper[26]. Simultaneously, tires, and engine parts are also a significant source of metals pollutants; almost 50 percent of tire wear accounts for over 50 percent of the total cadmium and zinc loads[27]. Roadways can also be a source of nutrients because nutrients are found in fertilizers that are commonly applied.

Table 2-18: Typical Sources of Pollutants from Road Infrastructure[28]

Source	Cadmium	Chromium	Copper	Iron	Nickel	Lead	Zinc	PAHs	Nutrients	Synthetic Organic Chemicals
Gasoline	●		●			●	●			
Exhaust					●	●		●		●
Motor oil and grease				●	●	●	●	●		
Antifreeze	●	●	●	●		●	●	●		
Undercoating						●	●			
Brake Linings			●	●	●	●	●			
Tires	●		●			●	●	●		
Asphalt	●		●		●		●	●		
Concrete			●		●		●			
Diesel Oil	●	●				●	●			●
Engine wear				●	●	●	●			
Fertilizers, pesticides, and herbicides	●		●	●	●		●		●	●

2.3.3 ATMOSPHERIC DEPOSITION

Atmospheric deposition is the direct and indirect transfer of pollutants from the air to surface waters. Pollutants in the atmosphere deposit onto solid surfaces and can then be washed off by rain, becoming part of the stormwater runoff that reaches the watershed. Atmospheric deposition of pollutants can be a large source of contamination to surface waters. Typical pollutants associated with atmospheric deposition are metals, PAHs, PCBs, and, to a lesser extent, nutrients. These pollutants enter the atmosphere from point sources (i.e., industrial facility emitting metals into the air). A comparison of trace metal contributions from aerial deposition, sewage treatment plans, industrial activities, and power plants is shown in Table 2-19.

[25] Schueler, T., and H.K. Holland. 2000. The Practice of Watershed Protection. Center for Watershed Protection, Ellicott City.
[26] TDC Environmental 2004, Copper Sources in Urban and Shoreline Activities. San Francisco, CA.
[27] Davis A.P., M. Shokouhian, and S. Ni. 2001. Loading estimates of lead, copper, cadmium, and zinc in urban runoff from specific sources. Chemosphere.
[28] Nixon, H., and J.D. Saphores. 2007. Impacts of motor vehicle operation on water quality: Clean-up costs and policies. Transportation Research Part D. Transport and Environment.

In addition to the trace metals, nutrients are also atmospherically deposited. The annual loading of nitrogen through atmospheric deposition in the Los Angeles River watershed is 5,559 tons per year, with 845 tons per year in the neighboring Ballona Creek watershed.[29]

Table 2-19 Comparison of source annual loadings to Santa Monica Bay (metric tons/year)

Metal	Aerial Deposition	Non-Aerial Sources		
		Sewage Treatment Plants	Industrial	Power Plants
Chromium	0.5	0.6	0.02	0.14
Copper	2.8	16	0.03	0.01
Lead	2.3	<0.01	0.02	<0.01
Nickel	0.45	5.1	0.13	0.01
Zinc	12.1	21	0.16	2.4

2.3.4 EXISTING WATERSHED MODEL RESULTS

The technical modeling used to develop the Los Angeles River Metals TMDL applied hydrodynamic and water quality models to assess the effects of metal loadings under both dry and wet weather conditions[30]. For dry weather, the model indicated concentrations below the CTR standards, which was consistent with the monitoring data since POTWs provide most of the dry-weather flows and generally discharge effluent that meets water quality standards. Estimates of storm loadings by the wet weather model were higher than loadings estimated from monitoring data.

A quantification methodology was used in the Reach 2 Metals TMDL Implementation Plan to evaluate the effectiveness of non-structural BMPs and to estimate the pollutant load reductions achieved through BMP implementation[31]. Pollutant buildup and wash-off analyses were completed for specific sources of metals. Hydrologic simulations were used to estimate the wash-off pollutant from the watershed surface, while exponential functions were used to estimate pollutant buildup and wash-off associated with specific sources of metals in the watershed. This approach demonstrated the mass of accumulated sediment on a given day is an exponential function of the 1) maximum carrying capacity, 2) residual pollutant not washed off during the preceding runoff event, and 3) dry days prior to the event. Pollutant buildup occurs at the fastest rate in the initial days following a wash-off event, but declines as buildup approaches the maximum carrying capacity over longer dry periods.

Chapter 4 of this plan includes details of the Reasonable Assurance Analysis conducted for the LLAR Watershed. A computer based modeling system was used to quantify flow and loadings from known watershed pollutants sources. Pollutant loading estimates were developed for the modeled constituents

[29] Lu, R., K. Schiff, S. Solzenbach, and D. Keith. 2004. *Nitrogen Deposition on Coastal Watersheds in the Los Angeles Region*. Southern California Coastal Water Research Project Annual Report. 2003-2004. pp. 73– 81.

[30] Tetra Tech. 2004. Modeling Analysis for Development of TMDL for Metals in the Los Angeles River and Tributaries. Prepared for LARWQCB and EPA Region 9.

[31] CDM. 2010. Los Angeles and Tributaries Total Maximum Daily Load for Metals Final Implementation Plan for Reach 2 Participating Jurisdictions.

including bacteria (fecal coliform), nutrients (nitrogen and phosphorus), metals (copper, lead and zinc) and sediment. A summary of the model performance by constituent can be found in Appendix A-4-1.

2.3.5 SUMMARY

Typical sources of these pollutants are summarized in Table 2-20.

Table 2-20: Typical sources of pollutants[32]

	Pollutants			
Potential Source	Bacteria	Nutrients	Metals	TSS/ Turbidity
NPDES Sources				
Residential land areas	●	●		●
Agricultural activities (i.e., animal operations, land applications)	●	●		●
Metallurgical industries/activities			●	
Construction activities			●	●
Industrial/municipal activities	●		●	
POTW discharges			●	
Landscaping, fertilizers		●		
Homeless encampments	●			
Pet waste	●	●		
Wildlife	●			
Native geology		●	●	
Land surface erosion			●	●
Detergents		●		
Car washing				●
Road Infrastructure				
Transportation sources (i.e., copper brake pads, tire wear)			●	
Pavement erosion			●	●
Atmospheric Deposition				
Industrial activities			●	
Construction activities			●	
Roofing			●	
Resuspension of historic emissions in road dusts and soil particles			●	
Land surface erosion		●		
Sanitary Sewer and sanitary sewer overflows (SSOs)				
Sewer Leaks, SSOs, illicit discharges, septic systems	●	●		●
POTW discharges		●	●	

[32] City of San Diego and Caltrans. 2012. Tecolote Watershed Comprehensive Load Reduction Plan. Final Report. San Diego, CA

2.4 PRIORITIZATION

Section VI.C.5.a.iv of the MS4 Permit outlines factors that should be considered when developing the sequence of addressing pollutants of concern within the Lower LAR Watershed. Based on the source assessment analysis, Water Quality Priorities (WQPs) within the watershed have been determined based on the following:

HIGHEST WQPS: TMDLS

- TMDL pollutants with past due interim or final limits
- TMDL pollutants with interim and final limits that fall within the MS4 Permit term, or the time period: September 6, 2012 – October 25, 2017
- Pollutants that are in the same class as a TMDL pollutant

HIGH WQPS: OTHER RECEIVING WATER CONSIDERATIONS

- Pollutants on the 303(d) List for which MS4 discharges are a suspected source based on findings from the source assessment
- Pollutants that exceed receiving water limitations and the findings from the source assessment indicate the MS4 as a source (these pollutants will be evaluated based on monitoring data collected as part of the CIMP).

All Category 1 pollutants with TMDL compliance deadlines that are past due, or that fall within the MS4 Permit term are prioritized as a Highest WQP. In addition, pollutants that fall within the same class (as defined in Section 2.1) as a TMDL pollutant with a compliance deadline that is past due or falls within the MS4 Permit term are prioritized as a Highest WQP. All other pollutants that are associated with the MS4 (based on the Source Assessment in Section 2.3) are prioritized as a High WQP. Table 2-21 summarizes the WQPs for the watershed based on the criteria described above.

Table 2-21: WQPs

Category	Class	Pollutant	Waterbody	Associated with MS4	Priority
Category 1	Trash	Trash	Los Angeles River Reach 1 & 2, Compton Creek, and Rio Hondo Reach 1	Yes	Highest
	Nutrients	Nitrogen Compounds	Los Angeles River Reach 1 & 2, Compton Creek, and Rio Hondo Reach 1	Yes	Highest
	Metals	Copper	Los Angeles River Estuary	Yes	Highest
		Lead	Los Angeles River Estuary	Yes	Highest
		Zinc	Los Angeles River Estuary	Yes	Highest
	Pesticides	DDT	Los Angeles River Estuary	Yes	Highest
		PCBs	Los Angeles River Estuary	Yes	Highest
	SVOC	PAHs	Los Angeles River Estuary	Yes	Highest
	Bacteria	Coliform & Enterococcus	Los Angeles River Estuary	Yes	High
	Metals	Cadmium	Los Angeles River Reach 1 & 2, Compton Creek, and Rio Hondo Reach 1	Yes	Highest
		Copper	Los Angeles River Reach 1 & 2, Compton Creek, and Rio Hondo Reach 1	Yes	Highest
		Lead	Los Angeles River Reach 1 & 2, Compton Creek, and Rio Hondo Reach 1	Yes	Highest
		Zinc	Los Angeles River Reach 1 & 2, Compton Creek, and Rio Hondo Reach 1	Yes	Highest
	Bacteria	e.Coli	Los Angeles River Reach 1 & 2, Compton Creek, and Rio Hondo Reach 1	Yes	High
Category 2	Metals	Aluminum	Los Angeles River Reach 1	UTD	Highest
		Selenium	Los Angeles River Reach 1 & 2	UTD	Highest
	Bacteria	Coliform and Enterococcus	Los Angeles River Reach 1 & 2, Compton Creek, and Rio Hondo Reach 1	Yes	High
	Pesticides	Chlordane	Los Angeles River Estuary	UTD	High
		Diazinon	Los Angeles River Reach 1	UTD	High
	Water Quality Indicators/ General	BMI	Compton Creek	UTD	High
		Cyanide	Los Angeles River Reach 1	UTD	High
		Oil	Los Angeles River Reach 2	Yes	High
		pH	Los Angeles River Reach 1, Compton Creek, and Rio Hondo Reach 1	UTD	High
		Toxicity	Los Angeles River Estuary, Rio Hondo Reach 1	Yes	High
		MBAS	Los Angeles River Reach 1 & 2	UTD	High
	Trash	Trash	Los Angeles River Estuary	Yes	Highest
Category 3	Metals	Mercury	Los Angeles River Reach 1	UTD	Highest
		Nickel	Los Angeles River Reach 1	UTD	Highest
		Thallium	Los Angeles River Reach 1, Los Angeles River Reach 2	UTD	Highest
		Dissolved Oxygen	Los Angeles River Reach 1 & 2	UTD	High

	Water Quality Indicators/ General	pH	Rio Hondo Reach 1	UTD	High
	SVOC	Bis(2-ethylhexyl)phthalate	Los Angeles River Reach 1	UTD	High
		PAHs	Los Angeles River Reach 1 & 2	Yes	Highest
	Water Quality Indicators/ General	Chloride	Los Angeles River Reach 1 & 2, Rio Hondo Reach 1	UTD	High
		Cyanide	Rio Hondo Reach 1	UTD	High
	Pesticides	Chlorpyrifos	Compton Creek	UTD	High
		Diazinon	Rio Hondo Reach 1	UTD	High

UTD – Unable to determine at this time

3 SELECTION OF WATERSHED CONTROL MEASURES

This chapter identifies Watershed Control Measures (WCMs) to implement through the Participating Agencies' jurisdictional stormwater management programs, and collectively on a watershed scale. The WCMs are structural and/or nonstructural controls designed with the following objectives:

- Prevent or eliminate nonstormwater discharges to the MS4 that are a source of pollutants from the MS4 to receiving waters.
- Implement pollutant controls necessary to achieve all applicable interim and final water quality-based effluent limitations and/or receiving water limitations pursuant to corresponding compliance schedules.
- Ensure that discharges from the MS4 do not cause or contribute to exceedances of receiving water limitations.

The goal is to create an efficient program that focuses individual and collective resources on water quality priorities (WQPs). The WCMs are categorized as

- Minimum Control Measures (MCMs),
- Nonstormwater Discharge (NSWD) Measures and
- Targeted Control Measures (TCMs), which are designed to achieve applicable water quality-based effluent limitations and receiving water limitations.

Each WCM category may be further categorized as either structural or nonstructural (nonstructural includes operation and maintenance procedures and pollution prevention measures) as well as either existing or proposed. Combined with Chapter 4 (RAA) and Chapter 5 (Compliance Schedules), the WMP includes the nature, scope and timing of implementation for each WCM and provides interim milestones for the WCMs to achieve TMDL compliance. Also included are the responsibilities of each Permittee.

3.1 STRATEGY FOR SELECTION AND IMPLEMENTATION OF WATERSHED CONTROL MEASURES

Pursuant to Part VI.C.1.a of the MS4 Permit (Part VII.C.1.a - LB Permit), the Watershed Group has developed customized strategies, control measures and BMPs to implement the requirements of the MS4 Permit. Addressing WQPs will be based on a multi-faceted strategy initially focused on source control, including total suspend solids (TSS) reduction and runoff reduction. If pollutants are not generated or released, they will not be available for transport to the receiving waters. In addition, if soils can be stabilized, sediment controlled, and dry-weather runoff and initial flushes of stormwater runoff eliminated or greatly reduced, the major transportation mechanisms will be eliminated or greatly reduced, and fewer pollutants will reach the receiving waters.

The Watershed Group is particularly focused on source control because major sources of many of the highest WQPs, such as copper, lead and zinc, are released into the atmosphere, resulting in widespread aerial deposition onto impervious surfaces in the Watershed. In addition, these pollutants are discharged directly onto streets, highways, parking lots, and driveways from motor vehicle components such as brakes, wheel weights, and tires. The Participating Agencies have concluded that the most cost-effective and long-lasting way to address WQPs is to develop and support state-wide or regional measures that will encourage or require, if necessary, product or material substitution at the manufacturing stage. This can be a complex and time-consuming process, but the payoff in water quality improvement can be tremendous.

For example, the recent efforts of the California Stormwater Quality Association (CASQA) and Sustainable Conservation that led to the passage of the SB 346 legislation is a milestone that will significantly reduce the level of copper in metropolitan area waters throughout the state. SB 346 requires incremental reduction in the amount of copper in vehicle brake pads, which constitute the single largest source of copper in metropolitan environments. Based on available information, which was largely developed through a lengthy collaboration among brake pad manufacturers, government agencies, and environmental groups in the Brake Pad Partnership, a preliminary estimate of copper runoff reduction due to this piece of legislation was developed[1]. The estimate examined three scenarios and determined a 45 - 60% reduction in copper in runoff could be attributed to reduction of its use in brake pads. Already in effect, new edge codes required on brake pads sold in California will provide information on copper content and a notice that on and after January 1, 2014 any motor vehicle brake friction materials sold in California must contain no more than 0.1 percent by weight of the following materials: cadmium and its compounds, chromium (VI) salts, lead and its compounds, mercury and its compounds, and asbestiform fibers.

In addition, the Department of Toxic Substances Control (DTSC) adopted new Safer Consumer Product Regulations that became effective October 1, 2013. These regulations contain a process for identifying and prioritizing Chemicals of Concern in Priority Products containing these constituents, as well as a process for eliminating or reducing the adverse impacts of Chemicals of Concern in Priority Products. It will apply to most consumer products placed into the stream of commerce in California. It specifically applies to adverse environmental impacts, including adverse water quality impacts, and it contains a petition process for identification and prioritization of chemicals and projects. CASQA, supported by Watershed Group, has started the process of conducting research and building a file of critical information to support the designation of zinc in tires as a future priority product/constituent combination.

As explained later in this chapter, many of the new requirements of the MS4 Permit also involve enhanced source control measures that will be implemented such as enhanced inspections programs and outfall screening measures. The *Targeted Control Measures* section of this chapter supplements these efforts with targeted source control measures such as incentives for irrigation control and upgraded street

[1] Based on the Los Cerritos Channel Watershed Group commissioned study, "Estimate of Urban Runoff Copper Reduction in Los Angeles County from the Brake Pad Copper Reductions Mandated by SB 346."

sweeping equipment, designed with the objective of achieving interim and final water quality-based effluent limitations and/or receiving water limitations.

In concert with these initial source control efforts, which constitute 10% of the load reduction in the RAA (higher reductions may be realized), structural controls will also be implemented. The MS4 Permit mandates implementation of structural LID BMPs for certain classes of new developments and roadway projects. In addition, the *Targeted Control Measures* section of this chapter describes supplemental targeted structural BMPs. These structural controls are used to meet the load reduction requirements and structural BMP capacities for each participating agency as noted in Chapter 4 (the RAA) following the schedules provided for each agency in Chapter 5 (Compliance Schedules).

3.2 MINIMUM CONTROL MEASURES

The Minimum Control Measures (MCMs) are baseline WCMs required for all Permittees. The MCMs are defined in the MS4 Permit (excluding modifications set forth in an approved WMP) and are generally implemented individually by each Permittee. The objectives of the MCMs are to 1) result in a significant reduction in pollutants discharged into receiving waters and 2) satisfy the requirements of 40 CFR §122.26(d)(2)(iv). The MCMs are separate from Targeted Control Measures, which are developed by the Watershed Group and included in the WMP to specifically address WQPs.

The MS4 Permit allows the modification of several MCMs programs, so long as the modified actions are set forth in the approved WMP and are consistent with 40 CFR §122.26(d)(2)(iv). The modifications are based on an assessment to identify opportunities for focusing resources on WQPs. The term "modifications" refers only to instances where language from the MS4 Permit MCM provisions is removed and/or replaced. Any control measures that are strictly enhancements of the existing programs (i.e. do not conflict with the MS4 Permit MCM provisions) are included in the separate category of Targeted WCMs.

The following sections include a summary of the assessment of each MCM program as well as a determination as to whether each Participating Agency will implement the MCM provisions 1) as explicitly stated in the corresponding section of the MS4 Permit or 2) with modifications to focus resources on WQPs. Independent of the determinations made, the Agencies may consider additional MCM modifications through the Adaptive Management Process. Implementation of the MCMs will follow the approval of this WMP by the Regional Board Executive Officer following MS4 Permit §VI.D.1.b (LB Permit - §VII.D.1.ii).

3.2.1 LOS ANGELES COUNTY FLOOD CONTROL DISTRICT MINIMUM CONTROL MEASURES

The LACFCD will implement the MCMs as defined from §VI.D.1 to §VI.D.4 of the MS4 Permit. See Appendix A-3-4 for additional information.

3.2.2 ASSESSMENT OF MINIMUM CONTROL MEASURES (CITIES ONLY)

Pursuant to MS4 Permit §VI.C.5.b.iv.(1).(a) (LB Permit - §VII.C.5.h.i), the following section is an assessment of the MS4 Permit MCMs, intended to identify opportunities for focusing resources on WQPs.

3.2.2.1 DEVELOPMENT CONSTRUCTION PROGRAM

ASSESSMENT

Although controlling sediment is not a WQP, the reduction of sediment through an effective Development Construction Program will address WQPs. This is because sediment mobilizes other pollutants, including many of the WQP pollutants. As such the Development Construction Program is an integral component of each City's jurisdictional stormwater management program.

Compared to the prior MS4 Permit, the current Permit expands the provisions for the Development Construction Program. This expansion includes additional or enhanced requirements for plan review, site tracking, inspection frequencies, inspection standards, BMP implementation and employee training. If implemented effectively, these enhancements will aid in the control of sediment within the Watershed, and consequently, will address WQPs. As such, no modifications to the provisions of the Development Construction Program have been identified.

DETERMINATION

The Cities will implement the MCMs as defined in §VI.D.8 of the MS4 Permit (§VII.D.K of the LB Permit). To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Appendix A-3-1.

3.2.2.2 INDUSTRIAL/COMMERCIAL FACILITIES PROGRAM

ASSESSMENT

The MS4 Permit provisions for the Industrial/Commercial Facilities Program provide opportunities for customization to address WQPs. Specifically, §VI.D.6.e.i.4 (§VII.D.G.5.i.4 - LB Permit) states that industrial inspection frequencies may be modified through the WMP development process. The Cities propose modifying the inspection frequencies of both industrial and commercial facilities based on a facility prioritization scheme that considers WQPs. For example, facilities that are deemed to have a high potential to discharge metals (a WQP pollutant) may be prioritized as "High" and inspected more frequently while facilities that have a small likelihood to adversely impact WQPs may be prioritized as "Low" and inspected less frequently.

DETERMINATION

Sections VI.D.6.d and VI.D.6.e of the MS4 Permit (Sections VII.D.G.4 and VII.D.G.5 of the LB Permit) will be replaced with the language in Table 3-3, which is located in the following *New Fourth Term Permit MCMs* section of this chapter and is identified as MCM-ICF-3.

In order to provide clarity to the Cities, one combined guidance document has been prepared for the Program, with the prioritization and revised inspection frequencies included – see Appendix A-3-1. The document is also intended to assist the Cities in the development and implementation of a jurisdictional program.

3.2.2.3 ILLICIT CONNECTION AND ILLICIT DISCHARGES ELIMINATION PROGRAM

ASSESSMENT

The purpose of the Illicit Connection and Illicit Discharges Elimination (ICID) Program is to detect, investigate and eliminate IC/IDs to the MS4. In order to address WQPs, a potential modification to MS4 Permit provisions would be the inclusion of a proactive approach for the detection of illicit discharges. However such an approach will be addressed through nonstormwater outfall based screening monitoring as outlined in the MRP. Also, such activities do not conflict with the MS4 Permit provisions for an IC/ID Program, and as such would be classified as a Targeted Control Measure. As such there is no need to modify the base provisions of the program.

DETERMINATION

The Cities will implement the MCMs as defined in §VI.D.10 of the MS4 Permit (§VII.D.M of the LB Permit). To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Appendix A-3-1.

3.2.2.4 PLANNING AND LAND DEVELOPMENT PROGRAM

ASSESSMENT

Following MS4 Permit §VI.C.5.b.iv.1.a (LB Permit - §VII.C.5.h.i.), the Planning and Land Development Program was not assessed for potential modifications.

DETERMINATION

The Cities will implement the MCMs as defined in §VI.D.7 of the MS4 Permit (§VII.D.J of the LB Permit). To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Appendix A-3-1.

3.2.2.5 PUBLIC AGENCY ACTIVITIES PROGRAM

ASSESSMENT

The Public Agency Activities Program is divided into several sub-programs. Many of the MS4 Permit provisions within the sub-programs consist of baseline BMPs that do not suggest modification. The sub-programs that do suggest a prioritized approach – such as street sweeping and catch basin cleaning frequencies – already provide this opportunity (frequencies are based on a City's assessment of trash and debris generation). The Public Facility Inventory sub-program also provides a prioritization opportunity, based on the tracking data obtained for each facility. However, since these facilities are not subject to regular "public agency" inspections as in the Industrial/Commercial Facilities Program, there is little utility

in incorporating such a prioritization. The provisions of the public construction activities sub-program are considered an integral component of the jurisdictional stormwater program, for the reasons explained in the assessment of the Development Construction Program provisions. In summary there is no need to modify the MS4 Permit provisions of the program.

DETERMINATION

The Cities will implement the MCMs as defined in §VI.D.9 of the MS4 Permit (§VII.D.L of the LB Permit). To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Appendix A-3-1.

3.2.2.6 PUBLIC INFORMATION AND PARTICIPATION PROGRAM

ASSESSMENT

The MS4 Permit allows a City to implement the requirements of the Public Information and Participation Program (PIPP) 1) by participating in a County-wide effort, 2) by participating in a Watershed Group effort, 3) individually within its jurisdiction or 4) through a combination of these approaches. The Cities will implement the PIPP following a combination of approaches. Consequently some clarifications of the MS4 Permit provisions are necessary.

In terms of modifications to address WQPs, the MS4 Permit provisions for the PIPP are not particularly prescriptive, thus allowing the Cities the flexibility to focus efforts on WQPs through the development of the program. As such, there is no need to modify the MS4 permit provisions of the program.

DETERMINATION

The table below provides clarification on elements of the MS4 Permit provisions for the PIPP:

Permit section	Clarification
§VI.D.5.c.(i) - MS4 Permit §VII.D.F.3.i - LB Permit Public Participation	Each City will participate in a County-wide sponsored PIPP to provide a means for public reporting of clogged catch basin inlets and illicit discharges/dumping, faded or missing catch basin labels, and general stormwater and nonstormwater pollution prevention information.
§VI.D.5.d - MS4 Permit §VII.D.F.4- LB Permit Residential Outreach Program	Each City will work in conjunction with a County-wide sponsored PIPP to implement the Residential Outreach Program. Elements of the program that will not be administered or implemented as a county-wide effort (currently the provision to provide educational materials to K-12 school children) will be addressed individually by each City or jointly on a watershed level. Through the adaptive management process, PIPP participation may develop into a watershed group or individual effort, or some combination of these approaches.

In order to provide clarity to the Cities, one combined guidance document has been prepared for the Program, with the approach for each provision (i.e. joint or individual effort) included – see Appendix A-3-1. The document is also intended to assist the Cities in the development and implementation of a jurisdictional program.

3.2.2.7 PROGRESSIVE ENFORCEMENT AND INTERAGENCY COORDINATION

ASSESSMENT

Following MS4 Permit §VI.C.5.b.iv.1.a (LB Permit - §VII.C.5.h.i), the Progressive Enforcement and Interagency Coordination Program was not assessed for potential modifications.

DETERMINATION

The Cities will implement the MCMs as defined in §VI.D.2 of the MS4 Permit (§VII.D.2 of the LB Permit). To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Appendix A-3-1.

3.2.3 THIRD TERM MS4 PERMIT MINIMUM CONTROL MEASURES

Until the WMP is approved by the Executive Officer of the Regional Board, the MCM provisions of the prior third term MS4 permit continue to be implemented by the participating agencies. Some of the MCMs of the current MS4 Permit are relatively unchanged carry-overs from the prior third term permit. The remaining MCMs are either enhancements of the third term MCMs or entirely new provisions. These new and enhanced fourth term MCMs are described in the following section.

3.2.4 NEW FOURTH TERM MS4 PERMIT MINIMUM CONTROL MEASURES (CITIES ONLY)

Part VI.D of the MS4 Permit and Part VII.D of the LB Permit (the MCM provisions) introduces many new provisions and program elements to be developed and incorporated within each participating agency's jurisdictional stormwater program. This section briefly describes the new and enhanced MCMs required for the Cities (City MCMs), excluding those required for the LACFCD in §VI.D.4. An MCM is considered new if it was not required by the prior MS4 Permit and is considered enhanced if it is an enhancement of a related provision of the prior MS4 Permit.

The details of each provision may be found in the relevant sections of the MS4 Permit, which are included. Unless an alternate date is provided in the MS4 Permit or in this section, the adoption date for the City MCMs coincides with the approval of the WMP by the Regional Board's Executive Officer.

3.2.4.1 STRUCTURAL CONTROLS

The new and enhanced MCMs consist primarily of nonstructural control measures, with the marked exception of the Planning and Land Development provisions, described as follows.

LID AND HYDROMODIFICATION

MS4 Permit §VI.D.7 (LB Permit §VII.D.J)

The LID and hydromodification provisions of the Planning and Land Development program are a significant enhancement from the prior MS4 Permit. The implementation of structural LID BMPs at new

developments throughout the watershed will appreciably decrease the effective impervious area, reducing flow and, consequently, pollutant loads. The program is unique in that it will increase in effectiveness over time as more and more existing developments are redeveloped and bound to the LID/hydromodification requirements.

TRASH EXCLUDER INSTALLATION

MS4 Permit §VI.D.9.h.vii.(1) (LB Permit §VII.D.L.8. vii.(1))

In areas that are not subject to a trash TMDL, the Public Agency Activities Program includes a requirement to install excluders (or equivalent devices) on or in Priority A (MS4 Permit §VI.D.9.h.iii.(1)), LB Permit §VII.D.L.8. iii.(1)) area catch basins or outfalls to prevent the discharge of trash to the MS4. For LA MS4 Permittees, the deadline is no later than four years after the effective date of the Permit. This provision may be supplanted by the statewide trash amendments, which in their current draft iteration include the installation of full-capture devices in the priority land use areas of high density residential, industrial, commercial, mixed urban and public transportation stations as a compliance route.

3.2.4.2 NONSTRUCTURAL CONTROLS

Table 3-2 lists the new and enhanced nonstructural City MCMs as well as the new and enhanced NSWD measures. The BMP effectiveness from Table 3-2 is based on similar BMPs listed in Tetra Tech's Comprehensive Load Reduction Plan (CLRP) for Chollas Creek Watershed in San Diego County, 2012. The correlation of BMP effectiveness with WQPs is based on Table 3-1. The pages following Table 3-2 describe each of the listed controls.

Table 3-1 Pollutant Category versus Water Quality Classification

Waterbody-pollutant classification	Type of pollutant								
	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and grease	Dissolved minerals	Trash
Category 1	✗	✗	✗		✗	✗			✗
Category 2	✗	✗	✗		✗	✗			✗
Category 3		✗	✗					✗	

Table 3-2 New Fourth Term MS4 Permit Nonstructural MCMs (Cities Only) and NSWDs

#	WCM Category/ID	WCM	BMP effectiveness with respect to WQPs					Agency							
			Category I	Category II	Category III	Sediment reduction	Volume or flow reduction	Downey	Lakewood	Long Beach	Lynwood	Paramount	Pico Rivera	Signal Hill	South Gate
		Planning and Land Development													
1	MCM-PLD-1	Amend development regulations to facilitate LID implementation	◆	◆	◈	◆	◆	✗	✗	✗	✗	✗	✗	✗	✗
2	MCM-PLD-2	Post-construction BMP tracking, inspections and enforcement	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
		Existing Development													
3	MCM-ICF-1	Increase in facility types inspected and number of inspections conducted	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
4	MCM-ICF-2	Business assistance program and BMP notification	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
5	MCM-ICF-3 (TCM-ICF-1)	Prioritize facilities/inspections based on water quality priorities	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
		Construction													
6	MCM-DC-1	Enhanced plan review program	◈	◈	◈	◆	◈	✗	✗	✗	✗	✗	✗	✗	✗
7	MCM-DC-2	Enhanced inspection standards and BMP requirements	◈	◈	◈	◆	◈	✗	✗	✗	✗	✗	✗	✗	✗

Table 3-2 New Fourth Term MS4 Permit Nonstructural MCMs (Cities Only) and NSWDs

#	WCM Category/ID	WCM	BMP effectiveness with respect to WQPs					Agency							
			Category I	Category II	Category III	Sediment reduction	Volume or flow reduction	Downey	Lakewood	Long Beach	Lynwood	Paramount	Pico Rivera	Signal Hill	South Gate
8	MCM-DC-3	Increased inspection frequencies	◈	◈	◈	◆	◈	✗	✗	✗	✗	✗	✗	✗	✗
9	MCM-TRA-1	Enhanced staff training program	◈	◈	◈	◆	◈	✗	✗	✗	✗	✗	✗	✗	✗
		Illicit Discharge Detection/Elimination													
10	MCM-ICID-1	Enhanced IC/ID enforcement and written procedures	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
11	NSWD-1	Outfall screening and source investigations	◈	◈	◈	◈	◆	✗	✗	✗	✗	✗	✗	✗	✗
12	MCM-TRA-1	Enhanced staff/contractor training	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
		Dry weather runoff reduction													
13	NSWD-1	Outfall screening and source investigations	◈	◈	◈	◈	◆	✗	✗	✗	✗	✗	✗	✗	✗
14	NSWD-2	Enhanced conditions for NSWDs, including irrigation reduction	◆	◆	◈	◆	◆	✗	✗	✗	✗	✗	✗	✗	✗
		Public Information and Participation													

Table 3-2 New Fourth Term MS4 Permit Nonstructural MCMs (Cities Only) and NSWDs

#	WCM Category/ID	WCM	BMP effectiveness with respect to WQPs					Agency							
			Category I	Category II	Category III	Sediment reduction	Volume or flow reduction	Downey	Lakewood	Long Beach	Lynwood	Paramount	Pico Rivera	Signal Hill	South Gate
15	MCM-PIP-1	Stormwater resources on City website	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
		Public Agency Activities													
16	MCM-PAA-1	Enhanced BMP requirements for fixed facility/field activities	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
17	MCM-PAA-2	Reprioritization of catch basins and clean-out frequencies	◆	◆	◆	◆	◇	✗	✗	✗	✗	✗	✗	✗	✗
18	MCM-PAA-3	Integrated Pest Management Program	◈	◈	◈	◇	◇	✗	✗	✗	✗	✗	✗	✗	✗
19	MCM-PAA-4	Enhanced measures to control infiltration from sanitary sewers	◆	◆	◇	◇	◇	✗	✗	✗	✗	✗	✗	✗	✗
20	MCM-PAA-5	Inspection and maintenance of Permittee owned treatment controls	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
21	MCM-TRA-1	Enhanced inspector/staff training	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗

ENHANCED STAFF/CONTRACTOR TRAINING PROGRAMS ***MCM-TRA-1***

MS4 Permit §VI.D.7.d.iv.(b), §VI.D.8.l, §VI.D.9.k, §VI.D.10.f (LB Permit §VII.D.J.5.iv.(b), §VII.D.K.xiv, §VII.D.L.11, §VII.D.M.6)

Measures introduced:

- Prescriptive staff training requirements to the Development Construction, Illicit Connections and Illicit Discharges Elimination and Public Agency Activities Programs. For example, relevant staff involved with the Construction Program must be knowledgeable in procedures consistent with the State Water Board sponsored Qualified SWPPP Practitioner/Developer (QSP/QSD) program.
- Inspections of structural BMPs under the Planning and Land Development Program must be conducted by trained personnel.
- Outside contractors are bound to the same training standards as in-house staff

These new and enhanced provisions will increase the overall effectiveness of the jurisdictional stormwater management programs (JSWMPs).

AMEND DEVELOPMENT REGULATIONS TO FACILITATE LID IMPLEMENTATION ***MCM-PLD-1***

MS4 Permit §VI.C.4.c.i, §VI.D.7.d.i (LB Permit §VII.C.4.c.i, §VII.D.J.5.i)

The participating agencies have developed and adopted LID ordinances and Green Street Policies. These measures will facilitate LID implementation.

POST-CONSTRUCTION BMP TRACKING, INSPECTIONS AND ENFORCEMENT ***MCM-PLD-2***

MS4 Permit §VI.D.7.d.iv (LB Permit §VII.D.J.5.iv)

The Cities must track post-construction BMPs, conduct BMP verification and maintenance inspections and follow the Progressive Enforcement Policy in cases of non-compliance. This will improve the effectiveness of the Planning and Land Development program.

INCREASE IN FACILITY TYPES INSPECTED AND NUMBER OF INSPECTIONS CONDUCTED ***MCM-IFC-1***

MS4 Permit §VI.D.6.d, §VI.D.6.e (LB Permit §VII.D.G.4, §VII.D.G.5) also affected by NPDES No. CAS000001, the State Water Resources Control Board's (SWRCB) Industrial General Permit (IGP)

Measures introduced:

- Inspect nurseries and nursery centers
- Perform follow-up *No Exposure Verification* inspections for at least 25% of industries that have filed a *No Exposure Certification (NEC)*
- Inspect light industrial facilities. Under the SWRCB's IGP adopted in April 1, 2014, light industries previously excluded from coverage under the IGP must now obtain coverage. Light industry is defined as SICs 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31 (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39 and 4221-4225. This includes facilities ubiquitous in

industrial zones such as warehouses and machine shops. Although many of these facilities will likely qualify for the NEC, the type and number of facilities requiring inspection under the MS4 Permit will still increase.

These new and enhanced measures will increase the effectiveness of the Industrial/Commercial Facilities Program.

BUSINESS ASSISTANCE PROGRAM AND BMP NOTIFICATION ***MCM-IFC-2***

MS4 Permit: §VI.D.6.c (LB Permit §VII.D.G.3)

Measures introduced:

- Notify industrial/commercial owner/operators of applicable BMP requirements.
- Implement a Business Assistance Program to provide technical information to businesses to facilitate their efforts to reduce the discharge of pollutants in stormwater. The business assistance program described in the prior LA MS4 Permit was an optional provision.

These new and enhanced measures will increase the effectiveness of the Industrial/Commercial Facilities Program.

PRIORITIZE FACILITIES/INSPECTIONS BASED ON WATER QUALITY PRIORITIES ***MCM-IFC-3 (TCM-ICF-1)***

MS4 Permit: Modified MCM (replaces §VI.D.6.d, §VI.D.6.e), LB Permit: (replaces §VII.D.G.4, §VII.D.G.5)

A program has been developed to prioritize industrial/commercial facilities based on their potential to adversely impact WQPs. The resulting prioritization scheme determines the inspection frequency, replacing the uniform inspection frequency provided in the MS4 Permit. This allows Cities to concentrate efforts on WQPs. Sections VI.D.6.d and VI.D.6.e of the MS4 Permit (Sections VII.D.G.4 and VII.D.G.5 of the LB Permit) will be replaced with the language presented in Table 3-3.

TABLE 3-3

REPLACES §VI.D.6.D AND §VI.D.6.E OF THE MS4 PERMIT
***REPLACES*§VII.D.G.4 AND §VII.D.G.5 OF THE LB PERMIT**

MS4 PERMIT VI.D.6.d (LB Permit VII.D.G.4) Prioritize Critical Industrial/Commercial Sources

MS4 Permit VI.D.6.d.i (LB Permit VII.D.G.4.i) Prioritization Method

Prioritizing facilities by potential water quality impact provides an opportunity to optimize the effectiveness of the Industrial/Commercial Facilities Program and to focus efforts on water quality priorities. The inventory fields in Part VI.D.6.b.ii (VII.D.G.2.i) provide information that allows for such a facility prioritization. Based on these fields, Figure ICF-1 establishes a method for each City to prioritize all industrial/commercial facilities into three tiers – High, Medium and Low. A City may follow an alternative prioritization method provided it is based on water quality impact and results in a similar three-tiered scheme.

Prioritization factors

Factor	Description
A	Status of exposure of materials and industrial/commercial activities to stormwater
B	Identification of whether the facility is tributary to a waterbody segment with impairments[2] for pollutants that are also generated by the facility
C	Other factors determined by the City, such as size of facility, presence of exposed soil or history of stormwater violations

Utilizing these factors, follow steps 1, 2 and 3 below:

1. Collect necessary information to evaluate factors

Factor	Initial method	Subsequent method
A	Satellite imagery	Results of stormwater inspection
B	Cross reference Table 4 or Table 5* with tributary TMDL/ 303(d) pollutants	Cross reference inspection results with tributary TMDL/ 303(d) pollutants
C	Varies	

* See pages 9 and 10 of Appendix A-3-1 ICF (guidance for the Industrial/Commercial Facilities Program)

2. Evaluate factors

Factor	Result	Score
	Low or no exposure	0
A	Moderate exposure	½
	Significant exposure	1
B	No**	0
	Yes***	1
	Low	0
C	Medium	½
	High	1

** No pollutant generation/impairment matches
*** ≥ 1 pollutant generation/impairment matches

3. Prioritize facilities

		C Score		
		0	**½**	**1**
A×B Score	**0**	Low	Medium	High
	½	Medium	High	High
	1	High	High	High

This method serves only as a guide to prioritization. The City may also prioritize facilities based on a qualitative assessment of factors A, B and C.

Figure ICF-1: Industrial/Commercial Facility Prioritization Scheme

[2] CWA §303(d) listed or subject to a TMDL

TABLE 3-3

REPLACES §VI.D.6.D AND §VI.D.6.E OF THE MS4 PERMIT
***REPLACES*§VII.D.G.4 AND §VII.D.G.5 OF THE LB PERMIT**

Step 3 in Figure ICF-1 may also be expressed by the relationships A·B + C ≥ 1 → High, 1 > A·B + C > 0 → Medium and A·B + C = 0 → Low. The purpose of multiplying A and B is to scale the impact of the presence of the pollutants at a facility (B) by the likelihood that they will be discharged to the MS4 (A). Factor C quantifies water quality concerns that are independent of A or B and as such is incorporated through addition. The purpose of this numerical approach is to provide consistency to the prioritization process. It is intended solely as a guide. The City may also prioritize facilities based on a qualitative assessment of factors A, B and C as listed in Figure ICF-1.

MS4 Permit VI.D.6.d.i.(1), (LB Permit VII.D.G.4.(1)), Prioritization Condition
The following condition will be met during the prioritization process: ***The total number of low priority facilities is less than or equal to 3 times the number of high priority facilities***. This condition is applied to maintain a minimum inspection frequency as explained in Section VI.D.6.e.i.

MS4 Permit VI.D.6.d.i.(2), (LB Permit VII.D.G.4.(2)), Prioritization Frequency
The default priority for a facility is Medium. Facilities will be reprioritized as necessary following the results of routine inspections. The City may also use any readily available information that clarifies potential water quality impacts (e.g., satellite imagery) in order to prioritize a facility before the initial inspection. Reprioritization may also be conducted at any time as new water quality based information on a facility becomes available. During reprioritization, the ratio of low priority to high priority facilities will remain at 3:1 or lower. Figure ICF-2 is a flowchart of the prioritization process.
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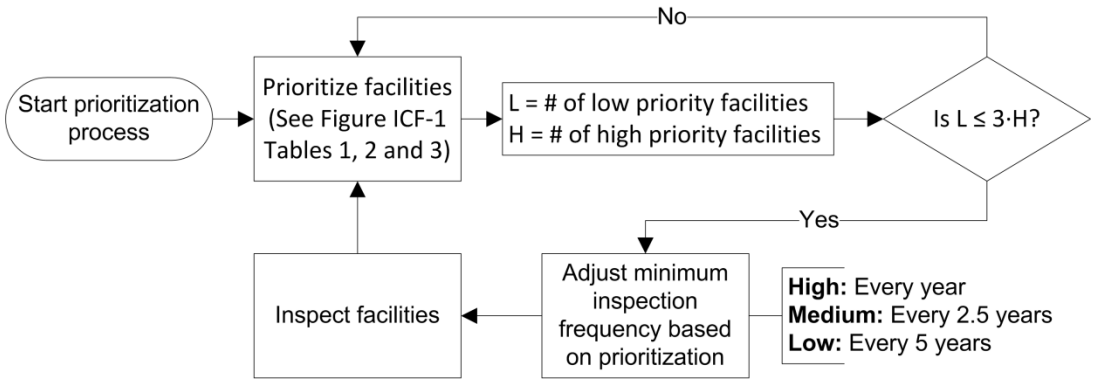


Figure ICF-2

MS4 Permit VI.D.6.e (LB Permit VII.D.G.5) Inspect Critical Industrial/Commercial Sources

MS4 Permit VI.D.6.e.i (LB Permit VII.D.G.5.i) Frequency of Industrial/Commercial Inspections
Following the facility prioritization method in Part VI.D.6.d.i, each City will inspect high priority facilities annually, medium priority facilities semi-quinquennially (once every 2.5 years) and low priority facilities quinquennially (once every five years). The frequencies may be altered by the exclusions defined in Part VI.D.6.e.i.(1). The condition in Part VI.D.6.d.i.(1) ensures at least the same average number of inspections conducted per year as the semi-quinquennial frequency defined in the MS4 Permit.

Each City will conduct the first compliance inspection for all industrial/commercial facilities within one year of the approval of their Watershed Management Program by the Executive Officer. A minimum interval of six months between the first and the second mandatory compliance inspection is required.
MS4 Permit VI.D.6.e.i.(1) (LB Permit VII.D.G.5.i(1)) Exclusions to the Frequency of Industrial Inspections

TABLE 3-3

REPLACES §VI.D.6.D AND §VI.D.6.E OF THE MS4 PERMIT
***REPLACES*§VII.D.G.4 AND §VII.D.G.5 OF THE LB PERMIT**

MS4 Permit VI.D.6.e.i.(1).(a) (LB Permit VII.D.G.5.i(1).(a)) Exclusion of Facilities Previously Inspected by the Regional Water Board

Each City will review the State Water Board's Stormwater Multiple Application and Report Tracking System (SMARTS) database at defined intervals to determine if an industrial facility has recently been inspected by the Regional Water Board. The first interval will occur approximately 2 years after the effective date of the Order. The City does not need to inspect the facility if it is determined that the Regional Water Board conducted an inspection of the facility within the prior 24 month period. The second interval will occur approximately 4 years after the effective date of the Order. Likewise, the City does not need to inspect the facility if it is determined that the Regional Water Board conducted an inspection of the facility within the prior 24 month period.

MS4 Permit VI.D.6.e.i.(1).(b) (LB Permit VII.D.G.5.i(1).(b)) No Exposure Verification

As a component of the first mandatory inspection, each City will identify those facilities that have filed a No Exposure Certification with the State Water Board. Approximately 3 to 4 years after the effective date of the Order, each City will evaluate its inventory of industrial facilities and perform a second mandatory compliance inspection at a minimum of 25% of the facilities identified to have filed a No Exposure Certification. The purpose of this inspection is to verify the continuity of the no exposure status.

MS4 Permit VI.D.6.e.ii (LB Permit VII.D.G.5.ii) Scope of Industrial/Commercial Inspections

MS4 Permit VI.D.6.e.ii.(1) (LB Permit VII.D.G.5.ii.(1) Scope of Commercial Inspections

Each City will inspect all commercial facilities to confirm that stormwater and nonstormwater BMPs are being effectively implemented in compliance with municipal ordinances. At each facility, inspectors will verify that the operator is implementing effective source control BMPs for each corresponding activity. Each City will require implementation of additional BMPs where stormwater from the MS4 discharges to a significant ecological area (SEA), a water body subject to TMDL provisions in Part VI.E, or a CWA §303(d) listed impaired water body. Likewise, for those BMPs that are not adequately protective of water quality standards, a City may require additional site-specific controls.

MS4 Permit VI.D.6.e.ii.(2) (LB Permit VII.D.G.5.ii.(2) Scope of Industrial Inspections

Each City will confirm that each industrial facility:

a) Has a current Waste Discharge Identification (WDID) number for coverage under the Industrial General Permit, and that a Stormwater Pollution Prevention Plan (SWPPP) is available on-site; or
b) Has applied for, and has received a current No Exposure Certification for facilities subject to this requirement;
c) Is effectively implementing BMPs in compliance with municipal ordinances. Facilities must implement the source control BMPs identified in Table 10, unless the pollutant generating activity does not occur. The Cities will require implementation of additional BMPs where stormwater from the MS4 discharges to a water body subject to TMDL Provisions in Part VI.E, or a CWA §303(d) listed impaired water body. Likewise, if the specified BMPs are not adequately protective of water quality standards, a City may require additional site-specific controls. For critical sources that discharge to MS4s that discharge to SEAs, each City will require operators to implement additional pollutant-specific controls to reduce pollutants in stormwater runoff that are causing or contributing to exceedances of water quality standards.
d) Applicable industrial facilities identified as not having either a current WDID or No Exposure Certification will be notified that they must obtain coverage under the Industrial General Permit and will be referred to the Regional Water Board per the Progressive Enforcement Policy procedures identified in Part VI.D.2 of the MS4 Permit (Part VII.D.2 of the LB Permit).

ENHANCED PLAN REVIEW PROGRAM ***MCM-DC-1***

MS4 Permit: §VI.D.8.h, §VI.D.8.i (LB Permit: §VII.D.K.x, §VII.D.K.xi)

In general the MS4 Permit introduces provisions that conform to the SWRCB's Construction General Permit. For construction sites one acre or greater, measures include the following:

- Construction activity operators must submit Erosion and Sediment Control Plans (ESCPs) prior to grading permit issuance, developed and certified by a QSD to SWPPP standards.
- Operators must propose minimum BMPs that meet technical standards. The cities must provide these standards.
- Develop procedures and checklists to review and approve relevant construction plans.

These new and enhanced measures will increase the effectiveness of the Development Construction Program, which in turn is expected to reduce TSS loading into the MS4. TSS reduction is an integral component in addressing WQPs.

ENHANCED INSPECTION STANDARDS/BMP REQUIREMENTS AT CONSTRUCTION SITES ***MCM-DC-2***

MS4 Permit: §VI.D.8.d, §VI.D.8.i, §VI.D.8.j (LB Permit: §VII.D.K.vi, §VII.D.K.xi, §VII.D.K.xii)

Measures introduced:

- Ensure BMPs from the ESCPs are properly installed and maintained.
- Ensure the minimum BMPs for sites less than one acre are installed and maintained.
- Develop and implement standard operating procedures for City stormwater inspections of construction sites.
- Require activity-specific BMPs for paving projects.

These new and enhanced measures will increase the effectiveness of the Development Construction Program, which in turn is expected to reduce TSS loading into the MS4. TSS reduction is an integral component in addressing WQPs.

INCREASED INSPECTION FREQUENCIES ***MCM-DC-3***

MS4 Permit: §VI.D.8.j (LB Permit: §VII.D.K.xii)

The inspection frequency for construction sites one acre or more has significantly increased. The prior LA MS4 Permit required a minimum of one inspection during the rainy season. The current MS4 Permit requires monthly inspections year-round, as well as mandatory inspections based on the phase of construction. This enhanced measure will increase the effectiveness of the Development Construction Program, which in turn is expected to reduce TSS loading into the MS4. TSS reduction is an integral component in addressing WQPs.

ENHANCED IC/ID ENFORCEMENT AND WRITTEN PROGRAM PROCEDURES ***MCM-ICID-1***

MS4 Permit: §VI.D.2, §VI.D.10; LB Permit: §VII.D.2 , §VII.D.M

Measures introduced:

- Develop and implement a Progressive Enforcement Policy that applies to the IC/ID Elimination, Development Construction, Planning and Land Development and Industrial/Commercial Facilities Programs. The Progressive Enforcement Policy is an augmentation of the policy listed in the prior LA MS4 Permit, which was restricted to the Industrial/Commercial Facilities Program.
- Maintain written procedures for receiving complaints, conducting investigations and responding to spills.

These new and enhanced measures will increase the effectiveness of the IC/ID Elimination program, as well as the related enforcement components of the Development Construction, Planning and Land Development and Industrial/Commercial Facilities Programs.

STORMWATER RESOURCES ON CITY WEBSITE ***MCM-PIP-1***

MS4 Permit: §VI.D.5.d.i.(4) (LB Permit: §VII.D.F.4.i.(4))

Measures introduced:

- The MS4 Permit introduces a requirement to maintain a stormwater webpage or provide links to stormwater websites via the City's website. The website (in-house or linked) will include:
  - Educational material and
  - Opportunities for the public to participate in stormwater pollution prevention and clean-up activities.

ENHANCED BMP REQUIREMENTS FOR FIXED FACILITY/FIELD ACTIVITIES ***MCM-PAA-1***

MS4 Permit: §VI.D.9.e (LB Permit: §VII.D.L.5)

Measures introduced:

- Implement effective source control BMPs for 65 specific pollutant-generating activities such as mudjacking, shoulder grading and spall repair.
- Contractually require hired contractors to implement and maintain the activity specific BMPs. Conduct oversight of contractor activities to ensure the BMPs are implemented and maintained.

These new and enhanced measures will increase the effectiveness of the Public Agency Activities program.

REPRIORITIZATION OF CATCH BASINS AND CLEAN-OUT FREQUENCIES ***MCM-PAA-2***

MS4 Permit: §VI.D.9.h.iii (LB Permit: §VII.D.L.8.iii)

In areas not subject to a trash TMDL, measures introduced include the following:

- Determine priority areas and update the map of catch basins with GPS coordinates and priority.
- Include the rationale or data to support the priority designations.

These new and enhanced measures will increase the effectiveness of the Public Agency Activities program.

INTEGRATED PEST MANAGEMENT PROGRAM ***MCM-PAA-3***

MS4 Permit: §VI.D.9.g (LB Permit: §VII.D.L.7)

The MS4 Permit introduces entirely new, prescriptive requirements to implement an Integrated Pest Management (IPM) Program for public agency activities and at public facilities. These requirements include adopting and verifiably implementing policies, procedures and/or ordinances that support the IPM program. Intertwined with the IPM provisions are additional requirements to control and minimize the use of fertilizers. These new and expansive measures will increase the effectiveness of the Public Agency Activities program and address WQPs.

ENHANCED MEASURES TO CONTROL INFILTRATION FROM SANITARY SEWERS ***MCM-PAA-4***

MS4 Permit: §VI.D.9.ix (LB Permit: §VII.D.L.ix)

The MS4 Permit introduces specific requirements to control infiltration from the sanitary sewer into the MS4. The measures include adequate plan checking, preventative maintenance, spill response, enforcement, interagency coordination and staff/contractor education. The requirements may be fulfilled through implementation of a Sewer System Management Plan in accordance with the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems.

INSPECTION AND MAINTENANCE OF PERMITTEE OWNED TREATMENT CONTROLS ***MCM-PAA-5***

MS4 Permit: §VI.D.9.x (LB Permit: §VII.D.L.x)

The MS4 Permit introduces requirements to implement an inspection and maintenance program for all Permittee owned treatment control BMPs, including post-construction treatment control BMPs. This measure will increase the effectiveness of the Public Agency Activities program.

3.3 NONSTORMWATER DISCHARGE MEASURES

The Participating Agencies will require dischargers that drain to their respective MS4s to implement the Nonstormwater Discharge (NSWD) Measures as defined in §III.A of the MS4 Permit (§IV.B of the LB Permit). If the Participating Agencies identify nonstormwater discharges from the MS4 as a source of pollutants that cause or contribute to exceedances of receiving water limitations, the WCMs will be modified and implemented – subject to the adaptive management process – to effectively eliminate the source of pollutants consistent with MS4 Permit §III.A and §VI.D.10 (LB Permit §IV.B and §VII.D.M). In these instances, potential WCMs may include prohibiting the nonstormwater discharge to the MS4, requiring the responsible party to 1) incorporate additional BMPs to reduce pollutants in the nonstormwater discharge or conveyed by the nonstormwater discharge or 2) divert to a sanitary sewer for treatment, or strategies to require the nonstormwater discharge to be separately regulated under a general NPDES permit.

It is important to note that the nonstormwater Outfall Based Screening and Monitoring Program (MRP §IX) introduces additional NSWD measures through the intensive procedures required for the identification of NSWDs from MS4 outfalls.

3.3.1 NEW FOURTH TERM PERMIT NONSTORMWATER DISCHARGE MEASURES

Parts III.A and VI.B (MRP IX) of the MS4 Permit (Parts IV.B and VII.B (MRP IX) of the Long Beach Permit introduce new provisions and program elements that address NSWDs. This section briefly describes these new and enhanced NSWD measures. A NSWD measure is considered new if it was not required by the prior MS4 Permit and is considered enhanced if it is an enhancement of a related provision of the prior MS4 Permit.

Table 3-2 from the previous section lists the new and enhanced nonstructural NSWD measures as well as the City MCMs. The BMP effectiveness from Table 3-2 is based on similar BMPs listed in Tetra Tech's CLRP for Chollas Creek Watershed in San Diego County, 2012. The correlation of BMP effectiveness with WQPs is based on Table 3-1. The following pages describe each of the listed controls. The details of each provision may be found in the relevant sections of the MS4 Permit, which are included. Unless an alternate date is provided in the MS4 Permit or in this section, the adoption date for the NSWD measures coincides with the approval of the WMP by the Regional Board's Executive Officer.

NSWD-1 OUTFALL SCREENING AND SOURCE INVESTIGATIONS *NSWD-1*

MS4 Permit: §VI.B (MRP §IX) (LB Permit: MRP §IX)

The outfall screening and source investigation provisions of the MS4 Permit constitute an entirely new, expansive addition to each City's JSWMP. Implementing these new provisions will significantly support the control of unauthorized nonstormwater discharges.

ENHANCED CONDITIONS FOR EXEMPT NONSTORMWATER DISCHARGES *NSWD-2*

MS4 Permit: §III.A (LB Permit: §IV.B)

The NSWD prohibitions of the MS4 Permit, which include specific measures to reduce irrigation runoff, are a significant enhancement from the prior LA MS4 Permit. Measures introduced include the following:

- Require the implementation of BMPs following established BMP manuals for discharges from non-emergency fire fighting activities and drinking water supplier distribution systems. Require specific BMPs for lake dewatering, landscape irrigation, pool and fountain discharges and non-commercial car washing.
- Require notification, monitoring (i.e. sampling) and reporting for drinking water supplier discharges and lake dewatering greater than 100,000 gallons.
- Require advance notification for any discharge of 100,000 gallons or more into the MS4.
- Minimize discharge of landscape irrigation through implementation of an ordinance specifying water efficient landscaping standards.
- Promote water conservation programs to minimize the discharge of landscape irrigation water into the MS4. This includes the following, where applicable:
    - Coordinate with local water purveyor(s) to promote:
        - Landscape water efficiency requirements for existing landscaping,
        - Drought tolerant, native vegetation, and
        - Less toxic options for pest control and landscape management.
    - Develop and implement a coordinated outreach and education program to minimize the discharge of irrigation water and pollutants associated with irrigation water.
- If monitoring results indicate that a conditionally exempt NSWD is a source of pollutants that causes or contributes to exceedances of applicable receiving water limitations and/or water quality-based effluent limitations, the Permittee must either:
    - Effectively prohibit the nonstormwater discharge to the MS4, or
    - Impose additional conditions, subject to approval by the Regional Water Board Executive Officer, or
    - Require diversion of the NSWD to the sanitary sewer, or
    - Require treatment of the NSWD prior to discharge to the receiving water.

Implementing these enhanced provisions will significantly support the control of unauthorized nonstormwater discharges.

3.4 TARGETED CONTROL MEASURES

Targeted Control Measures (TCMs) are additional control measures beyond the baseline MCMs and NSWD measures of the MS4 Permit that are intended to target the Watershed Group's WQPs. TCMs may be divided into two categories: nonstructural and structural. The selection of structural and nonstructural control measures to address WQPs within the Watershed Group is a vital component of the WMP planning process.

The Participating Agencies have already proposed and implemented a number of structural and nonstructural control measures in the watershed that collectively may contribute to considerable pollutant load reductions. These existing and planned BMPs provide a head start in the planning process to address WQPs within the Watershed Group. There are many different types of structural and nonstructural control measures that provide varying benefits from their implementation. The following sections describe Planned TCMs to be implemented, Potential TCMs that may be implemented (implementation is conditional upon factors such as site constraints, governing body approval, etc.) as well types of structural BMPs available to the Watershed Group.

3.4.1 CONTROL MEASURES IDENTIFIED IN TMDLS/IMPLEMENTATION PLANS

This section describes the control measures that have been previously identified in TMDLs and corresponding implementation plans and the status of their implementation. For those TMDLs that do not sufficiently identify control measures, or if implementation plans have not yet been developed, control measures are identified in the planned Targeted Control Measures as described in the following sections in this chapter.

3.4.1.1 LOS ANGELES RIVER NITROGEN COMPOUNDS AND RELATED EFFECTS

The Los Angeles River Nitrogen TMDL is the only TMDL applicable to the Lower Los Angeles River Watershed in which final water quality based effluent limits (WQBELs) went into effect prior to the MS4 Permit. The TMDL was adopted by the Regional Board (Resolution 2003-16) on December 4, 2003, and became effective on September 27, 2004.[3] Waste load allocations (WLAs) for point sources were established and required MS4 Permittees to: 1) submit a monitoring plan (completed March 23, 2005), and 2) incorporate monitoring at the Wardlow (S10) Mass Emission station in the LA River. Specific control measures were not included. The MS4 Permit modified the requirements of the TMDL by assigning WQBELs (MS4 Permit Appendix O).

CONTROL MEASURES AND IMPLEMENTATION

The LA River Nitrogen TMDL recommended implementation alternative allowed time for NPDES permitted Publically Owned Treatment Plants (POTWs) that discharge into the LA River to complete an upgrade of treatment facilities to nitrification/denitrification facilities without increasing current ammonia, nitrate and nitrite loads in the interim period. As the nitrification/denitrification facilities came on board, the

[3] MS4 Permit Fact Sheet (Page F-87)

reductions in ammonia and nitrate loads significantly reduced impairments caused by nutrient effects. These upgrades, in combination with the control measures the Watershed Group is implementing, appear to be effectively meeting the targets of the TMDL.

3.4.1.2 LOS ANGELES RIVER TRASH TMDL

In August 2007, The Regional Board adopted the Trash TMDL, which set a numeric limit of zero trash being discharged into the receiving water bodies from the storm drain system by the year 2016.

The MS4 permit provides four methodologies to determine compliance:

1. Full Capture Systems - The Regional Board's Executive officer has certified eight types of trash capture systems to be full capture[4]:
    a. Vortex Separation Systems (which include CDS units)
    b. Catch basin inserts (brush inserts; mesh screens; vertical and horizontal trash capture screens; and connector pipe screen (CPS).
    c. Specific designs of trash nets (including the Fresh Creek system at Hamilton Bowl)
    d. Two gross solids removal devices (including the Linear Radial systems at Hamilton Bowl)
2. Partial Capture Devices and institutional controls
    a. Partial capture devices estimated on demonstrated performance
    b. Daily Generation Rate (DGR) Studies
3. Combined Compliance Approaches
4. Minimum Frequency Assessment and Collection Approach (MFAC)[5]

CONTROL MEASURES AND IMPLEMENTATION

The Cities have implemented an effective combination of: (1) Full and partial capture catch basin inserts, (2) regional trash capture projects, and (3) institutional controls.

FULL CAPTURE INSERTS

In 2009, the Gateway Water Management Authority (GWMA) received funding from the State Revolving Fund through the American Recovery and Reinvestment Act to install full capture trash systems (CPS devices). The funding was for retrofitting all catch basins with full capture systems. Due primarily to physical constraints some of the catch basins could not be retrofitted and instead partial capture systems were installed. In some cases no systems were able to be installed due to retrofitting constraints.

PARTIAL CAPTURE SYSTEMS

During the installation of the full capture systems, on average, 8% - 16% of catch basins could not be retrofitted for a variety of reasons. This included: size constraints where the catch basin was found to be too small; catch basin outlets on the bottom which would compromise the CPS overflow capabilities and increase the chance of flooding; and inlets on the catch basins sides which would prevent the trash laden

[4] NPDES MS4 Permit, VI.E.5.b.

[5] Not a listed compliance option in the Los Angeles River Trash TMDL

flows from entering the CPS. Many of these catch basins could be retrofitted with an Automatic Retractable Screen (ARS) which has been demonstrated to be 86 percent effective[6].

Table 3-4: Number of catch basins installed with Full capture (CPS) and Partial Capture (ARS) systems

City	Catch basins installed with CPS	Catch basins in City	Catch basins with CPS (%)	Catch basins with only ARS	Catch basins with only ARS (%)
Downey	399	444	90	4	0.1
Lakewood	4	6	67	0	0
Long Beach	2707	3042	89	137	5
Lynwood	579	630	92	29	5
Paramount	230	245	94	0	0
Pico Rivera	56	67	84	8	12
Signal Hill	138	175	79	0 (2)	
South Gate	684	796	86	60	8

Regional Full Capture Systems

In addition to the catch basin inserts and screens, the following regional full capture systems are in place in the Lower LAR Watershed.

Table 3-5: Regional full trash capture systems

System	Description/location
Trash nets/radial systems	4 creek trash nets and two linear Radial systems installed in Hamilton Bowl beginning in the mid 2000s and subsequently by the City of Signal Hill as part of a Grant from the State Water Resources Board[7].
Long Beach trash nets	Trash nets have been installed at pump stations 3, 5, and 6 located along the LA River.
Long Beach CDS (vortex)	Walnut Ave and pump station 11
Lakewood Retention basin	Cherry Cove Park

Non-Structural and Institutional Controls

In addition to the structural controls summarized above, the agencies of the Lower LAR continue to implement a program of effective institutional controls. These programs are described below.

Daily Generation Rate Studies

Permittees have been authorized by the Regional Board to comply with the interim effluent limitations through the installation of partial capture devices and the implementation of institutional controls. The Cities of South Gate, Lynwood and Pico Rivera have participated in Daily Generation Rate (DGR) studies to determine the effectiveness of the institutional control measures in place (see Section 3.2 Minimum Control Measures, Section 3.3 Nonstormwater Discharge Measures, and Section 3.4 Targeted Control Measures for more detail on institutional control measures in the Lower LAR Watershed). The DGR uses a mass balance equation to estimate the amount of trash being deposited on the cities' public streets. To establish the DGR, trash from approximately 10% of the cities' curb miles in designated areas was collected prior to regularly scheduled street sweepings. The collected trash was quantified and used to

[6] City of Los Angeles Bureau of Sanitation, Watershed Protection Division, June 2006. *Technical Report: Assessment of Catch Basin Opening Screens Covers.*

[7] Systems are currently being replaced as part of recreational upgrade to Hamilton Bowl by the City of Long Beach

calculate the amount of trash flowing into the storm drain systems to determine the level of compliance. The studies have been conducted for several years and have determined that participating cities' are below the Trash TMDL levels and therefore in compliance. This compliance level is pre-insert and demonstrates that the participating cities' non-structural controls have a significant impact towards reducing the baseline amount of anthropogenic trash.

SUMMARY

The cities have implemented an effective program of structural and non-structural control measures and are currently meeting the interim WQBELs. See Section 5 Compliance Schedule for an analysis of achieved trash capture effectiveness to date along with future WQBEL compliance dates.

3.4.1.3 LOS ANGELES RIVER METALS TMDL

The Los Angeles River Metals TMDL was adopted by the Regional Board on June 2, 2005 and became effective on October 29, 2008. The TMDL establishes WQBELs for copper, lead and zinc. Separate WQBELs are established for each waterbody segment in the Los Angeles River and tributaries, but the TMDL does not extend to the Los Angeles River Estuary.

There are two reaches within the Lower LAR Watershed (Reach 1 and 2) and two tributaries (Compton Creek and the Rio Hondo) with WLAs under this TMDL. Responsible Agencies within the Lower LAR Watershed are listed in Table 3-6 along with the applicable segment to which they discharge or contribute runoff.

Table 3-6: Lower LAR Agencies and LAR Waterbody Segment

Agency	LAR Reach 1	LAR Reach 2	Compton Creek	Rio Hondo Reach 1
Downey		×		×
Lakewood	×			
Long Beach	×	×	×	
Lynwood			×	
Paramount		×		
Pico Rivera				×
Signal Hill	×			
South Gate			×	×
LACFCD	×	×	×	×

CONTROL MEASURES AND IMPLEMENTATION

The Los Angeles River metals TMDL established compliance goals by waterbody segment. The cities draining to Reach 1 of the Los Angeles River and Compton Creek joined to form Jurisdiction Group 1. Similarly, many agencies of Reach 2 of the Los Angeles River and the Rio Hondo joined to form Jurisdictional Group 2. The Lower LAR WMP encompasses parts of both Jurisdictional Groups.

On October 11, 2010 both of these Jurisdictional Groups submitted separate Implementation Plans to the Regional Board[8]. These implementation plans took slightly differing approaches to attaining compliance. Jurisdiction Group 1 focused on Source Control as a means of achieving WQBELs. In addition to Source Control Strategies, the Jurisdictional Group 1 Metals TMDL Implementation Plan took advantage of existing flood control basins and wetlands, which were and still are, receiving runoff from tributary areas along the lower portions of the LAR. Additionally, Structural Controls were discussed as potential BMPs to address metals if other control measures did not address the water quality issues.

The Jurisdictional Group 2 Metals TMDL Implementation Plan categorizes BMP implementation into three key areas:

- New Development and Significant Redevelopment – Water quality benefits to be obtained through ongoing implementation of new development and significant redevelopment activities;
- Non-structural BMPs – Identifying new or enhanced existing non-structural BMP activities that will result in reductions of metals in urban runoff; and
- Structural BMPs – Identifying and implementing the necessary structural BMPs to fill expected water quality gaps not addressed by any of the above.

The BMPs are discussed in these Implementation Plans are discussed in detail in Section 3.2 Minimum Control Measures, Section 3.3 Nonstormwater Discharge Measures, and Section 3.4 Targeted Control Measures and Section 3.4.2 Structural Targeted Control Measures.

MONITORING

In order to measure the progress toward achieving the Metals TMDL WQBELs, the two Jurisdictional Groups commenced a Coordinated Monitoring Program (CMP) beginning in October of 2008. This monitoring program consists of wet and dry weather sampling at two sampling stations in the Lower LAR Watershed (Wardlow Blvd. and Del Amo Blvd).

SUMMARY

The Participating Agencies have been and will continue to implement a multi-faceted approach towards achieving the Water Quality Based Effluent Limitations. The CMP monitoring that has been conducted to date indicates that the Lower LAR Watershed is meeting the TMDL dry weather targets. Specifically, the Reach 2 Implementation Plan indicates that the 2012 dry weather targets are currently being met and analyses of the Reach 2 watershed (which includes the Rio Hondo Spreading Grounds) indicates that the

8 Jurisdiction Group 1. Metals TMDL Implementation Plan Reach 1 of the Los Angeles River and Compton Creek for the Cities of Carson, Compton, Huntington Park, Lakewood, Long Beach, Lynwood, Signal Hill, and South Gate, and the California Department of Transportation (Caltrans). Prepared by John L. Hunter and Associates, Inc., Richard Watson and Associates, Inc., California Watershed Engineering, Inc., and Kinnetic Laboratories, Inc. October 11, 2010; and Los Angeles River and Tributaries Total Maximum Daily Loads for Metals Final Implementation Plan for Reach 2 Participating Jurisdictions. Prepared by CDM. October 11, 2010.

2012 wet weather target is currently being met.[9] With recent existing Reach 1 Regional Projects and the continued implementation of SUSMP/LID projects and nonstructural controls, the Group considers that the 2012 targets for Reach 1 have also been met.

Wet weather targets will be achieved through the Watershed Control Measures described in the rest of this Chapter and demonstrated by the Reasonable Assurance Analysis (Chapter 4).

3.4.1.4 LOWER LOS ANGELES RIVER BACTERIA TMDL

The Los Angeles River Bacteria TMDL (Resolution R1-007) was adopted by the Regional Board on July 9, 2010 and subsequently went into effect on March 23, 2012. The TMDL establishes WLAs for E.Coli in wet and dry weather and determines an allowable number of exceedances days of these objectives.

CONTROL MEASURES AND IMPLEMENTATION

For compliance purposes, the main stem of the river was broken down into segments, each with its own allocations and compliance schedule. During dry weather, the segments are phased into compliance through the development and implementation of a Load Reduction Strategy (LRS).

> *A LRS is "both [1] a suite of actions performed by MS4 Permittees along a Los Angeles River segment or tributary and [2] a document submitted to the Regional Board Executive Officer for approval. The document must describe the suite of actions that will be performed and demonstrate reasonable assurance of interim and final WLA attainment. A LRS may include 1) outfall methods such as structural methods like dry weather diversions, 2) source control and, in appropriate circumstances, 3) downstream methods to treat waters at the end of tributaries[10].*

Tables 3-7 summarizes the first compliance deadline and the submittal of the Load Reduction Strategy for the Agencies within the Lower LAR Watershed during dry weather. During wet weather there is not a phased implementation schedule similar to dry-weather. The final wet weather WQBELs go into effect on March 23, 2037.

[9] Los Angeles River and Tributaries Total Maximum Daily Loads for Metals Final Implementation Plan for Reach 2 Participating Jurisdictions. Prepared by CDM. October 11, 2010.

[10] Los Angeles Regional Water Quality Control Board. Los Angeles River Watershed Bacteria TDML Staff Report. Attachment A to Resolution No. R10-007. July 15, 2010.

Table 3-7: Lower LAR Load Reduction Strategy Submittal Deadline

Segment B, 2014-2022: Lower LAR Agencies discharging to Los Angeles River (main channel) Between Rosecrans Avenue and Patata Street RR Bridge)		
Agencies	Implementation Action	Deadline
South Gate, Downey, Lynwood, Paramount, LACFCD, and Caltrans	Submit Load Reduction Strategy (LRS) to Regional Board	September 23, 2014
Segment A, 2014-2024: Lower LAR Agencies discharging to Segment A of the Los Angeles River (main channel) Between Estuary (Willow Avenue) and Rosecrans Avenue		
Agencies	Implementation Action	Deadline
Lakewood, Long Beach, Lynwood, Paramount, Signal Hill, LACFCD, and Caltrans	Submit Load Reduction Strategy (LRS) to Regional Board	September 23, 2016
Rio Hondo 2014-2023:Lower LAR Agencies discharging to Rio Hondo		
Agencies	Implementation Action	Deadline*
Pico Rivera, South Gate, Downey, LACFCD, and Caltrans	Submit Load Reduction Strategy (LRS) to Regional Board	March 23, 2016
Compton Creek 2014-2025:Lower LAR Agencies with discharges entering Compton Creek		
Agencies	Implementation Action	Deadline*
Long Beach, Lynwood, South Gate, LACFCD, and Caltrans	Submit Load Reduction Strategy (LRS) to Regional Board	March 23, 2018

*If compliance targets are not being met, submit new LRS by September 23, 2026 to begin second phase

SUMMARY

The Agencies within the Lower LAR Watershed Group will submit a LRS in accordance with the deadlines in Table 3-7. The Control Measures discussed in the remainder of this Chapter will address bacteria loads and provide reasonable assurance of meeting WQBELs, however the LRS will outline a more targeted approach to address bacteria in the Lower LAR Watershed.

3.4.1.5 LOS ANGELES RIVER ESTUARY BACTERIA TMDL

On March 26, 2012, the US EPA adopted the Long Beach City Beaches and Los Angeles River Estuary Bacteria TMDL. This TMDL establishes numeric WLAs for E.Coli (freshwater), fecal coliform, enterococcus, and total coliform (marine) in the Los Angeles River Estuary (LARE) and the Long Beach shoreline beaches and determines an allowable number of exceedances days of these objectives.

This Watershed Management Program incorporates the LARE which extends from Willow Ave to the mouth of the Estuary (Queensway Bay near the site of the Queen Mary). The portion of this TMDL dealing with the Long Beach Shoreline beaches will be addressed in a separate watershed management program to be submitted by the City of Long Beach.

CONTROL MEASURES AND IMPLEMENTATION

In contrast to TMDLs adopted by the Regional Board, US EPA TMDLs do not contain an Implementation Plan or Schedule. The Regional Board has the option of adopting a separate implementation plan through a Basin Plan amendment or issuing a compliance schedule in a separate enforcement order. As the

Regional Board has not adopted either of these alternatives, and given the limited amount of time to comply with this TMDL, the Regional Board has determined that:

> *…numeric water quality based effluent limitation for these USEPA established TMDLS are infeasible at the present time. The Regional Board may at its discretion revisit this decision within the term of the [MS4 Permit] or in a future permit, as more information is developed to support the inclusion of numeric water quality based effluent limitations*[11].

In lieu of the inclusion of numerical limits in the MS4 Permit, the Agencies subject to this TMDL are required to propose and implement Best Management Practices (BMPs) in the Watershed Management Program to meet WLAs.

Table 3-8 summarizes the proposed timeline for submittal of the LRS for Agencies discharging to the LAR Estuary.

Table 3-8 Lower LAR Estuary Load Reduction Strategy Submittal Deadline

Lower LAR Permittees	Implementation Action	Deadline*
Long Beach, Signal Hill, and LACFCD	Submit Load Reduction Strategy (LRS) to Regional Board	April 28, 2017
	Complete Implementation of LRS	October 28, 2021
	Achieve interim (dry-weather) WQBEL and submit report to Regional Board	October 28, 2024
	Achieve final WQBELS or demonstrate that noncompliance is due to upstream contributions and submit report to Regional Water Board	September 23, 2030

*If compliance targets are not being met, a new LRS to begin the second phase will be submitted by October 28, 2025, with complete implementation of this LRS by April 28, 2029, and final WQBELs achieved by April 28, 2031.

The Lower LAR Agencies discharging to the LAR Estuary have already taken some early action steps towards low flow diversion projects to address bacteria loading. Table 3-9 summarizes the status of Control Measures that are currently in progress.

Table 3-9: Status of Lower LAR Dry-Weather Diversion Projects (as of June 1, 2014)

Agency	Conceptual Design	Approved Project	Design Plans	Constructed
Signal Hill	10% design complete	--	--	--
Long Beach	--	x	--	--

SUMMARY

In order to meet the LAR Estuary Bacteria TDML WLA, a LRS or equivalent will be developed and submitted to the Regional Board in accordance with the schedule outlined in Table 3-8. The Control Measures discussed in the remainder of this Chapter will address bacteria loads and provide reasonable assurance of meeting WQBELs, however the LRS will outline a more targeted approach to address bacteria in the

[11] California Regional Water Quality Control Board, Los Angeles Region Los Angele County MS4 Permit Response to Comments on the Tentative Order TMDL (General) Matrix.

Lower LAR Estuary Watershed. The CIMP is proposing initiating quarterly monitoring of the estuary for bacteria beginning in 2015.

3.4.1.6 DOMINGUEZ CHANNEL AND GREATER LOS ANGELES AND LONG BEACH HARBOR WATERS TOXIC POLLUTANTS TMDL

This TMDL was adopted by the Regional Board on May 5, 2011 and became effective on March 23, 2012. It establishes WQBELs for Copper, Lead, Zinc, PAHs, DDT, and PCBs. This TMDL effectively divides the Lower LAR into two compliance areas: (1) those areas tributary to the LAR above the estuary; and (2) those areas tributary directly to the estuary. The areas under this TMDL discharging directly to the Los Angeles and Long Beach Harbors will be addressed separately in the Long Beach individual WMP tentatively scheduled for submittal in March 2015.

CONTROL MEASURES AND IMPLEMENTATION

This TMDL does not assign a WLAs or WQBELs for agencies with discharges above the estuary. All of the Lower LAR Agencies subject to this TMDL (Cities of Signal Hill, Long Beach, Caltrans, and the LACFCD[12]) discharge to the LAR above the Estuary (which begins at Willow Street). For these agencies, The TMDL requires:

- Monitoring (which will be addressed separately in the CIMP) and
- A Report of Implementation, to be submitted on December 15, 2013 and annually thereafter to describe how current activities support the downstream TMDL. The MS4 Annual Report with the inclusion of data gathered from the CIMP will constitute reporting of activities in support of the downstream monitoring TMDL.

In addition, the Cities of Signal Hill and Long Beach, and the LACSD developed a Contaminated Sediment Management Plan to support the long-term recovery of sediment and water quality in the Long Beach Harbor, Eastern San Pedro Bay, and the LAR Estuary. This Plan outlines an approach to sediment contamination reduction. This approach summarizes a process for identifying and designating areas for remediation and determining the appropriate management alternatives to implement. The approach considers the following sediment management alternatives:

- Source Control
- Monitored Natural Recovery
- Enhanced Natural Recovery
- Capping
- In Situ Treatment
- Dredging

[12] Paramount and Lakewood are incorrectly included in MS4 Permit Table K-5. The TMDL does not list Paramount or Lakewood and being subject to the Estuary provisions of the TMDL. Lakewood and Paramount are listed in Table K-7 under the Los Cerritos Channel Watershed area. These two cities will not be further addressed under this section.

SUMMARY

The Watershed Control Measures described in this chapter will provide reasonable assurance that the Lower LAR Agencies are addressing the TMDL pollutants of concern in their discharges and conducting activities to support the achievement of WQBELs. Monitoring conducted through the CIMP along with an Annual Report of Implementation will document the Lower LAR Watershed Group's progress. In addition, the sediment management efforts in the LAR Estuary will likely achieve significant contaminant reduction.

As recognized by the footnote in Attachment K of the Permit, the Participating Agencies have entered into an Amended Consent Decree with the United States and the State of California, including the Regional Board. The footnote specifically states: "The requirements of this Order to implement the obligations of [the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL] do not apply to a Permittee to the extent that it is determined that the Permittee has been released from that obligation pursuant to the Amended Consent Decree entered in *United States v. Montrose Chemical Corp.*, Case No. 90-3122 AAH (JRx)." The submission of this WMP and its associated CIMP and any action or implementation taken pursuant to it shall not constitute a waiver of any such release of obligations established by that Amended Consent Decree.

3.4.2 NONSTRUCTURAL TARGETED CONTROL MEASURES

3.4.2.1 TOTAL SUSPENDED SOLIDS REDUCTION

As explained in the introduction to this chapter, emphasis is placed on source control as a cost-effective measure to reduce pollutant loads. In this WMP, the chief approach is controlling Total Suspended Solids (TSS) at the source, as explained in the following section. Combining this approach with true source control, low impact development, green streets, and the MCMs constitutes a strong and effective initial implementation of the WMP, providing time for funding measures to be put in place to pay for the design, construction, and operation of stormwater capture and low flow diversion facilities and to develop working relationships with water and wastewater agencies.

BACKGROUND

TSS is the governing pollutant for metals. This is consistent with that found within the USEPA approved *Los Angeles River Metals TMDL* which represents metals (copper, lead, and zinc) through their associations with sediment. Reducing TSS in the receiving waters is anticipated to result in a significant reduction of metals in the receiving waters since both pollutant groups adhere to sediment; therefore initial implementation will focus on TSS reduction. Initial emphasis on TSS reduction should reduce the volume of water that ultimately needs to be captured and infiltrated or used to achieve standards for the Category 1 pollutants being addressed by the WMP – namely metals. This would make implementation of the WMP more cost-efficient.

Documentation is not available for the Lower LAR watershed; however it is available for the adjacent Los Cerritos Channel (LCC) Watershed, of which many Lower LAR watershed Cities drain to in part. For that

watershed, Table 3-10 provides a summary of TSS concentrations at the Stearns Street monitoring site over a 13-year period based on 74 wet-weather observations and 25 dry-weather observations.

Table 3-10: TSS statistics measured at LCC TMDL Monitoring Site

Statistic	Wet weather (mg/L)	Dry weather (mg/L)
No. of observations	74	25
Minimum	17	2
Maximum	1700	128
1st Quartile	96	7.5
Median	155	13
3rd Quartile	260	41
Mean	227	27
Standard deviation (n-1)	256	30

Although the RAA is only assuming a 5% pollutant load reduction through implementation of the TSS Reduction Strategy, the Watershed Group is targeting greater reductions. In an analysis performed by the Los Cerritos Channel WMP Group, it was determined that the expected reduction in the mean concentration of TSS at Stearns Street from 227 mg/l to 150 mg/l, which would be a 34% reduction in the mean concentration of TSS. The reduced value is consistent with those found in other watersheds with similar land uses. A quantification of the program's potential effectiveness is included in Section 4.3.1.

TSS REDUCTION STRATEGY

The core of the TSS Reduction Strategy is the Group's soil stabilization/sediment control. Two key components of this strategy are implementation of enhanced erosion and sediment control at construction sites, in accordance with each city's Development Construction Program, and stabilization of exposed soil not associated with construction sites. Initial assessments conducted by the LCC Watershed Group have indicated that vacant lots, Caltrans rights-of-way and transmission line rights-of-way are the primary areas of exposed soil not associated with construction sites. Specific control measures for these areas are explained in the following section.

3.4.2.2 LIST OF NONSTRUCTURAL TARGETED CONTROL MEASURES

Table 3-11 lists planned and potential nonstructural TCMs for each participating agency. The BMP effectiveness from Table 3-2 is based on similar BMPs listed in Tetra Tech's CLRP for Chollas Creek Watershed in San Diego County, 2012. The correlation of BMP effectiveness with WQPs is based on Table 3-1. The pages following Table 3-11 describe each of the listed controls.

The responses for each agency under Table 3-11 are defined as follows:

- ✗ *Planned TCM*. Under the presumption that 1) the TCM will likely not require approval of the governing body and 2) the governing body approves adequate staff/budget (if necessary), the TCM will be implemented.

P *Potential TCM*. The TCM is under consideration by the agency, however implementation is contingent upon yet to be determined factors. These factors include approval by the governing body, additional time needed to inform the governing body and/or relevant staff and approval of service contracts. As such implementation cannot be assured at this time. If the Potential TCM is not adopted by the agency within the first two years of the implementation of the WMP, it will be reconsidered through the adaptive management process.

C *Completed TCM*. The TCM is preexisting (has been in effect for several years or more).

It is important to note that Caltrans and the LACFCD are operating regional stormwater programs and consequently incorporating localized institutional TCMs may not be feasible. As such their exclusion from such TCMs is justified.

The schedule of implementation for the TCMs is provided in Chapter 5.

Table 3-11 Nonstructural TCMs

#	WCM Category/ID	WCM	BMP effectiveness with respect to WQPs					Agency									
			Category I	Category II	Category III	Sediment reduction	Volume or flow reduction	Downey	LACFCD	Lakewood	Long Beach	Lynwood	Paramount	Pico Rivera	Signal Hill	South Gate
		Planning and Land Development															
1	TCM-PLD-1	Train staff/councils to facilitate LID and Green Streets implementation	◈	◈	◈	◈	◈	X	N/A	X	X	X	X	X	X	X
2	TCM-PLD-2	Ordinance requires LID BMPs for projects below MS4 Permit thresholds	◆	◆	◈	◆	◆	X	N/A		X				X	X
		Existing Development															
3	TCM-ICF-1 (MCM-ICF-3)	Prioritize facilities/inspections based on water quality priorities	◈	◈	◈	◈	◈	X	N/A	X	X	X	X	X	X	X
4	TCM-TSS-1	Exposed soil ordinance	◈	◈	◈	◆	◇		N/A		P		P	P	X	X
5	TCM-TSS-2	Erosion repair and slope stabilization on private property	◈	◈	◈	◆	◇		N/A		P		P	P	X	
6	TCM-TSS-3	Private parking lot sweeping ordinance	◆	◆	◆	◆	◇	X	N/A		P		P		X	
7	TCM-TSS-4	Sweeping of private roads and parking lots	◆	◆	◆	◆	◇	X	N/A		P		P		X	

Table 3-11 Nonstructural TCMs

#	WCM Category/ID	WCM	BMP effectiveness with respect to WQPs					Agency									
			Category I	Category II	Category III	Sediment reduction	Volume or flow reduction	Downey	LACFCD	Lakewood	Long Beach	Lynwood	Paramount	Pico Rivera	Signal Hill	South Gate
8	TCM-TSS-5	Negotiations with regulated utilities for erosion control within R.O.W.	◈	◈	◈	◆	◇				**Watershed Group**					
9	TCM-RET-1	Encourage retrofitting of downspouts (downspout disconnect)	◈	◈	◈	◈	◆	X	N/A		P	X	P	X		X
		Dry weather runoff reduction														
10	TCM-NSWD-1	Incentives for irrigation reduction practices	◆	◆	◈	◆	◆	X	N/A	X	X	X	X	X	X	X
		Public Information and Participation														
11	TCM-PIP-1	Refocused outreach to target audiences and water quality priorities	◆	◆	◆	◆	◆				**Watershed Group**					
		Public Agency Activities														
12	TCM-PAA-1	Upgraded sweeping equipment (e.g. regenerative)	◆	◆	◆	◆	◇	X	N/A	C	P	C	C	C	C	C
13	TCM-PAA-2	Adopt Sewer System Management Plan (SSMP)	◆	◆	◇	◇	◇	X	N/A	X	X	X	X	X	X	X
14	TCM-PAA-3	Increased street sweeping frequency or routes	◆	◆	◆	◆	◇	P	N/A			P	X			

Table 3-11 Nonstructural TCMs

#	WCM Category/ID	WCM	BMP effectiveness with respect to WQPs					Agency								
			Category I	Category II	Category III	Sediment reduction	Volume or flow reduction	Downey	LACFCD	Lakewood	Long Beach	Lynwood	Paramount	Pico Rivera	Signal Hill	South Gate
15	TCM-TSS-6	Erosion repair and slope stabilization on public property and right of way	◈	◈	◈	◆	◇	X	N/A		X		P		X	
		Reporting/Adaptive Management														
16	TCM-MRP-1	Enhanced tracking through use of online GIS MS4 Permit database	◈	◈	◈	◈	◈	X		X	P	X	X	P	X	X
		Jurisdictional SW Management														
17	TCM-SWM-1	Prepare guidance documents to aid in implementation of MS4 Permit MCMs	◈	◈	◈	◈	◈	X	X	X	X	X	X	X	X	X
		Initiatives														
18	TCM-INI-1	Copper reduction through implementation of SB 346	◆	◆	◆	◇	◇	X	X	X	X	X	X	X	X	X
19	TCM-INI-2	Lead reduction through implementation of SB 757	◆	◆	◆	◇	◇	X	X	X	X	X	X	X	X	X
20	TCM-INI-3	Support zinc reduction in tires through safer consumer product regs	◆	◆	◆	◇	◇				**Watershed Group**					
21	TCM-INI-4	Apply for grant funding for stormwater quality/capture projects	◆	◆	◈	◆	◆	X	X		X	X	X	X	X	X

X – Planned TCM. **P** – Potential TCM. **C** – Completed/implemented TCM. ◆ Primary pollutant reduction ◈ Secondary pollutant reduction ◇ Pollutant not addressed

BMP effectiveness ratings based on similar BMPs listed in Tetra Tech's CLRP for Chollas Creek Watershed in San Diego County, 2012.

ENHANCED TRACKING THROUGH USE OF ONLINE GIS MS4 PERMIT DATABASE

TCM-MRP-1

Measures:

- Enter the enhanced tracking requirements of the fourth term MS4 Permit on an online GIS database management system dedicated to Phase I MS4 Permit compliance. Program elements addressed include all the MCMs (Development Construction, Planning and Land Development, Industrial/Commercial Facilities, Public Agency Activities, Public Information and Participation and Illicit Connection/Discharge Elimination) and the Monitoring and Reporting Program.
- Use the consolidated tracking data to:
    - Improve the effectiveness of the JSWMP (e.g. examine geospatial trends in IC/IDs, which could be used to strategically distribute public education materials) and WMP.
    - Assess the JSWMP and improve the annual reporting process.
    - Guide the adaptive management process through this assessment.

Many of the cities are implementing the measures through the use of *MS4Front*, a propriety online GIS MS4 Permit database management system.

TRAIN STAFF TO FACILITATE LID AND GREEN STREETS IMPLEMENTATION

TCM-PLD-1

Measures:

- Conduct training for relevant staff in LID and Green Streets implementation prior to the onset of the programs. The elements of the training follow the provisions listed in MS4 Permit §VI.D.7.
- Educate governing bodies in LID and Green Streets implementation (optional).

Several cities have already accomplished these measures, which facilitate LID implementation and address WQPs.

ORDINANCE REQUIRES LID BMPS FOR PROJECTS BELOW MS4 PERMIT THRESHOLDS

TCM-PLD-2

Measures:

- Adopt an ordinance requiring LID BMPs for smaller development projects that are below the thresholds for inclusion under the Planning and Land Development MCM Program.

Downey, South Gate and Signal Hill have already accomplished this measure, which facilitates LID and addresses WQPs.

PRIORITIZE FACILITIES/INSPECTIONS BASED ON WATER QUALITY PRIORITIES

TCM-ICF-1 (MCM-ICF-3)

MS4 Permit: Modified MCM (replaces §VI.D.6.d, §VI.D.6.e)

A program has been developed to prioritize industrial/commercial facilities based on their potential to adversely impact WQPs. The resulting prioritization scheme determines the inspection frequency, replacing the uniform inspection frequency provided in the MS4 Permit. This allows Cities to concentrate efforts on WQPs.

The complete program is detailed in the Minimum Control Measures section of this chapter – see MCM-ICF-3.

EXPOSED SOIL ORDINANCE

TCM-TSS-1

This TCM is an element of the TSS Reduction Strategy.

- Adopt ordinances that require landscaping, erosion control, and sediment control on vacant lots and other significant sources of exposed dirt.
- These efforts are distinct from construction activity control measures, which are addressed under the Development Construction MCM program.

Within the neighboring Lower San Gabriel River Watershed, the City of Whittier has successfully adopted and implemented such an ordinance. The ordinance also requires drought tolerant landscaping/xeriscaping. The ordinance language may be used as a template to develop similar ordinances for the other participating agencies, and as such is included in Appendix A-3.2.

Due to the considerable amount of exposed dirt within their jurisdiction, the City of Signal Hill has agreed to develop and adopt a similar ordinance. This ordinance may also be used as a template for the remaining Watershed Group Cities.

EROSION REPAIR AND SLOPE STABILIZATION ON PRIVATE PROPERTY

TCM-TSS-2

This TCM is an element of the TSS Reduction Strategy. Measures include:

- If adopted, enforce the ordinances from TCM-TSS-1.
- Proactively enforce the existing stormwater ordinance regarding TSS-laden stormwater discharges (or potential discharges) from significant sources of exposed dirt and follow the Progressive Enforcement Policy. This may include observing site conditions prior to rain events and visual monitoring of stormwater discharges.

Within the neighboring Lower San Gabriel River Watershed, the City of Whittier has successfully implemented an ordinance that conforms to TCM-TSS-1. The following are pictures of some of the landscaped lots.

Wardman St and Philadelphia St, NW corner (1)


Wardman St and Philadelphia St, NW corner (2)


Greenleaf Ave and Philadelphia St, east side

Bailey St and Comstock Ave, NW corner

A similar effort will be undertaken by the City of Signal Hill. Pending adoption, the City of Signal Hill's Exposed Soil Ordinance (see the description for TCM-TSS-1) will also be implemented and enforced.

PRIVATE PARKING LOT SWEEPING ORDINANCE ***TCM-TSS-3***

This TCM is an element of the TSS Reduction Strategy.

- Adopt an ordinance that requires sweeping of private parking lots. Example Municipal Code language from the City of Signal Hill is included in Appendix A-3.3.

SWEEPING OF PRIVATE ROADS AND PARKING LOTS ***TCM-TSS-4***

This TCM is an element of the TSS Reduction Strategy.

- If adopted, enforce the ordinance from TCM-TSS-3.
- Proactively enforce the existing stormwater ordinance regarding TSS-laden stormwater discharges (or potential discharges) for private roads and parking lots and follow the Progressive Enforcement Policy. This may include observing site conditions prior to rain events and visual monitoring of stormwater discharges.

NEGOTIATIONS WITH REGULATED UTILITIES FOR EROSION CONTROL WITHIN R.O.W. ***TCM-TSS-5***

This TCM is an element of the TSS Reduction Strategy.

- As a Watershed Group, pursue agreements between cities and utilities regarding erosion and sediment control in rights-of-way.

Since Caltrans is a participant in the Watershed Group, the cities will work with Caltrans to ensure that its rights-of-way are stabilized in a timely manner. However, since the public and private utilities whose rights-of-way must be stabilized are not members of the Watershed Group, negotiations with the utilities on how best to keep sediment from their rights-of-way out of the storm drain system will be necessary.

EROSION REPAIR AND SLOPE STABILIZATION ON PUBLIC PROPERTY ***TCM-TSS-6***

This TCM is an element of the TSS Reduction Strategy.

- Implement landscaping, erosion control, and sediment control on significant sources of exposed dirt on public property.

ENCOURAGE RETROFITTING OF DOWNSPOUTS (DOWNSPOUT DISCONNECT) ***TCM-RET-1***

Measures:

- Encourage owners/operators of existing developments to disconnect existing downspouts from the MS4.

INCENTIVES FOR IRRIGATION REDUCTION PRACTICES ***TCM-NSWD-1***

Measures:

- Provide incentives such as rebates for irrigation reduction (i.e. runoff reduction) practices such as xeriscaping and turf conversion.
- Incentive programs include:
    - Metropolitan Water District of Southern California's "On-site Retrofit Pilot Program Incentives for Recycled Water Use". This program provides financial incentives to public or private owners to convert potable water irrigation or industrial water systems to recycled water service.
    - Metropolitan Water District of Southern California's "Water Savings Incentive Program". This program provides financial incentives for commercial, industrial, institutional, agricultural or large landscape customers to customize was efficiency projects that include installation of high-efficiency equipment, process improvements, water efficiency improvements, and water management services
    - Metropolitan Water District's "Turf Rebate Program." The program offers at least $2.00 per square foot of turf removed or replace by California-friendly drought-resistant plants.

- Metropolitan Water District's "Rain Barrel" rebate program. This program offers at least $75 per barrel installed on location. The purpose is to collect rainwater from gutters and downspouts for lawn and garden irrigation purposes.
- Metropolitan Water District's "Soil Moisture Sensor System." This program offers a rebate for installation of a Soil Moisture Sensor System or a Weather Based Irrigation Controller.
- Metropolitan Water District's "Rotating Nozzles" program. This program offers rebates to both residential and commercial entities to switch to high-efficiency nozzles.

All cities are currently involved in this effort through the Metropolitan Water District's water conservation rebate program. There are two cities in this Watershed Management Group that have incentive programs beyond the programs offered by Metropolitan Water District. The following City programs are supplemental to MWD rebate programs:

- **Lakewood** has rebate programs for turf removal and water-wise re-landscaping and for installing water-wise irrigation devices (while funds last).
  http://www.lakewoodcity.org/services/request/water/rebates.asp

- **Long Beach** has the "Lawn-to-Garden" program, which provides financial incentives while funds last for converting water-thirsty lawns to water-smart lawns.
  http://www.lblawntogarden.com/.

  In addition, the Synthetic Turf Pilot Program that offers an incentive for removing grass lawns and replacing them with synthetic turf (while funds last).
  http://www.lbwater.org/sites/default/files/file_attach/pdf/STPP%20Flyer%20FINAL_online.pdf

REFOCUSED OUTREACH TO TARGET AUDIENCES AND WATER QUALITY PRIORITIES ***TCM-PIP-1***

Measures:

- Within the Public Information and Education Program, elements such as material use/development and advertisements will address WQPs. The development of this effort will be ongoing throughout the MS4 Permit term, and may be regarded as a Watershed Group effort.

UPGRADED SWEEPING EQUIPMENT (E.G. REGENERATIVE) ***TCM-PAA-1***

Measures:

- Upgrade street sweeping equipment to regenerative or other high-efficiency new technology.

Most of the Cities contract street sweeping to private companies. These companies have already phased in regenerative sweepers. The City of Whittier has been phasing in regenerative sweepers and expects to be 100% regenerative by the end of the MS4 Permit term. The City of Long Beach operates vacuum sweepers over regenerative due to maintenance concerns. However the City is considering contracting

this service in the near future. If this occurs, the vacuum sweepers will likely be replaced with regenerative sweepers provided by the contractor.

ADOPT SEWER SYSTEM MANAGEMENT PLAN (SSMP): *TCM-PAA-2*

All agencies are enrolled in the statewide Waste Discharge Requirements for Sanitary Sewer Systems, which required the development and implementation of a SSMP in mid 2009. The goal of the SSMP is to reduce and prevent sanitary sewer overflows (SSOs), as well as mitigate any SSOs that do occur. This goal also addresses WQPs. Elements of the SSMP include:

- Sanitary sewer system operation and maintenance program
- Design and performance provisions
- Overflow emergency response plan
- FOG Control Program
- System Evaluation and Capacity Assurance Plan

Following these SSMP elements will address WQPs.

INCREASED STREET SWEEPING FREQUENCY OR ROUTES *TCM-PAA-3*

Measures:

- Increase the street sweeping frequency, jurisdiction-wide or in high trash-generating areas and/or include additional routes (e.g. center medians and intersections).

PREPARE GUIDANCE DOCUMENTS TO AID IMPLEMENTATION OF MS4 PERMIT MCMS *TCM-SWM-1*

This WMP includes in Appendix A-3-1 guidance documents and template forms to aid the Agencies in implementation of the MS4 Permit MCMs. These documents were developed to address two issues: 1) the MS4 Permit introduces many new and enhanced MCM provisions that do not have preexisting guidance documentation and 2) the model Stormwater Quality Management Program (SQMP) – which was required in the prior LA MS4 Permit and served as a guide to permit implementation – is now obsolete. Unlike the SQMP, the Agencies are not bound to the guidance and forms provided. They are provided as a resource to improve the effectiveness of the JSWMPs.

COPPER REDUCTION THROUGH IMPLEMENTATION OF SB 346 *TCM-INI-1*

This initiative TCM has been completed recently. The impact of the TCM over time has been incorporated into the RAA.

LEAD REDUCTION THROUGH IMPLEMENTATION OF SB 757 *TCM-INI-2*

This initiative TCM has been completed recently.

SUPPORT ZINC REDUCTION IN TIRES THROUGH SAFER CONSUMER PRODUCT REGULATIONS *TCM-INI-3*

Measures:

- As a Watershed Group, plan to work with others to use the Department of Toxic Substances Control's Safer Consumer Product Regulations to reduce the zinc in tires, which one of the greatest sources of zinc in urban areas.

APPLY FOR GRANT FUNDING FOR STORMWATER CAPTURE PROJECTS ***TCM-INI-4***

Measures:

- Initiate Individual or multi-jurisdictional efforts to apply for grant funding for stormwater quality/capture projects.

In April 2014, The Gateway Water Management Authority received grant funding of $1.3 million for LID projects in the Cities of Downey, Lynwood, Paramount, Pico Rivera, Signal Hill and South Gate (as well as Norwalk, Santa Fe Springs and Whittier).

3.4.3 STRUCTURAL TARGETED CONTROL MEASURES

Structural TCMs are Structural BMPs, in addition to MCMs, designed with the objective to achieve interim and final water quality-based effluent limitations and/or receiving water limitations. Structural TCMs are an important component of the Watershed Group's load reduction strategy. These BMPs are constructed to capture runoff and filter, infiltrate, or treat it. If properly maintained, these BMPs can have high pollutant removal efficiencies (see the *Performance Evaluation of Structural BMPs* element of this section); however, they tend to be more expensive than nonstructural BMPs. The two prevailing approaches for implementing Structural BMPs are regional and distributed approaches. Both serve important purposes and should be considered in combination to determine the best possible implementation strategy to meet the Watershed Group's water quality goals.

DISTRIBUTED BMPS

Distributed Structural BMPs are generally built at the site-scale. They are intended to treat stormwater runoff at the source and usually capture runoff from a single parcel or site.

Figure 3-1: Distributed BMP Schematic

REGIONAL BMPS

Regional BMPs refer to large structural BMPs that receive flows from neighborhoods or large areas and may serve dual purposes for flood control or groundwater recharge[13].

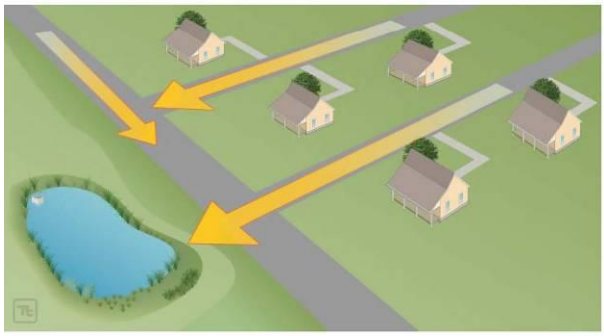


Figure 3-2: Regional BMP Schematic

3.4.3.1 STRUCTURAL BMP SUBCATEGORIES

Structural BMPs fall under a variety of subcategories that correspond to their function and water quality benefit. Some of the most common of these subcategories are described below. These subcategories will be used throughout the WMP to describe existing, planned, and potential regional and distributed BMPs.

INFILTRATION BMPS

Infiltration BMPs allow for stormwater to percolate through the native soils and recharge the underlying groundwater table, subsequently decreasing the volume of water discharged to the downstream waterbodies. These BMPs must be constructed in areas where the native soils have percolation rates and groundwater levels sufficient for infiltration.

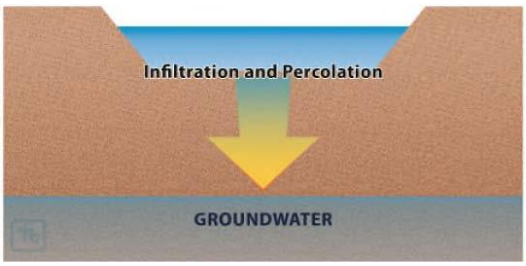


Figure 3-3: Infiltration BMP Schematic

INFILTRATION BASIN

An infiltration basin consists of an earthen basin with a flat bottom. An infiltration basin retains stormwater runoff in the basin and allows the retained runoff to percolate into the underlying soils. The bottom of an infiltration basin is typically vegetated with dryland grasses or irrigated turf grass.

[13] San Diego River Watershed Comprehensive Load Reduction Plan (2012)

Infiltration Trench

An infiltration trench is a long, narrow, rock-filled trench with no outlet other than for overflow. Runoff is stored in the void space between stones and infiltrates through the bottom and sides of the trench. Infiltration trenches provide the majority of their pollutant removal benefits through volume reduction. Pretreatment is important for limiting amounts of coarse sediment entering the trench which can clog and render the trench ineffective.

Bioretention with no Underdrain

Bioretention facilities with no underdrain are landscaped shallow depressions that capture and infiltrate stormwater runoff. These facilities function as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. The facilities normally consist of a ponding area, mulch layer, engineered media, and vegetation. As stormwater passes down through the media, pollutants are filtered, adsorbed, and biodegraded by the soil and vegetation.

Figure 3-4: Bioretention without underdrain schematic

Drywell

Drywells are similar to infiltration trenches in their design and function; however, drywells generally have a greater depth to footprint area ratio and can be installed at relatively deep depths. A drywell is a subsurface storage facility designed to temporarily store and infiltrate runoff. A drywell may be either a small excavated pit filled with aggregate or a prefabricated storage chamber or pipe segment.

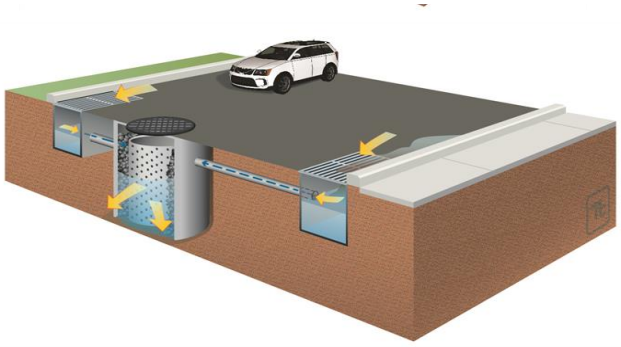


Figure 3-5: Drywell schematic

POROUS PAVEMENT

Porous pavement (concrete, asphalt, and pavers) contain small voids that allow water to pass through to a gravel base. They come in a variety of forms; they may be a modular paving system (concrete pavers, grass-pave, or gravel-pave) or poured in place pavement (porous concrete, permeable asphalt). Porous pavements treat stormwater and remove sediments and metals within the pavement pore space and gravel base. While conventional pavement results in increased rates and volumes of surface runoff, properly constructed and maintained porous pavements allow stormwater to percolate through the pavement and enter the soil below. This facilitates groundwater recharge while providing the structural and functional features needed for the roadway, parking lot, or sidewalk. The paving surface, subgrade, and installation requirements of porous pavements are more complex than those for conventional asphalt or concrete surfaces.

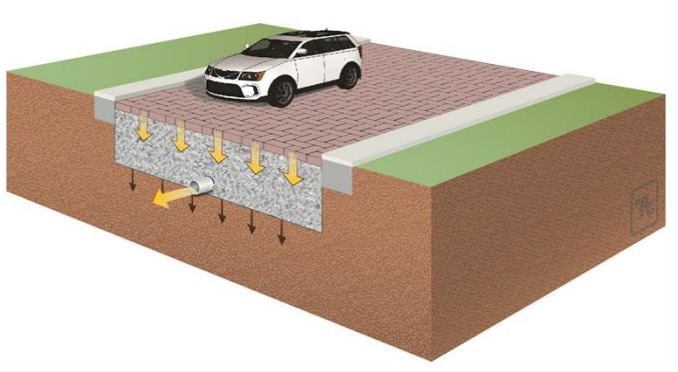


Figure 3-6: Porous pavement schematic

BIOTREATMENT BMPS

Biotreatment BMPs treat stormwater through a variety of physical, chemical, and biological processes prior to being discharged to the MS4 system. These BMPs should be considered where Infiltration BMPs are infeasible.

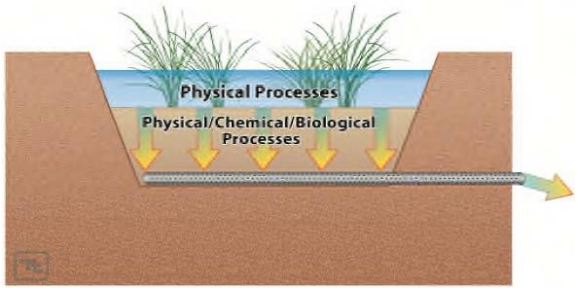


Figure 3-7: Biotreatment BMP schematic

BIORETENTION WITH UNDERDRAINS

Bioretention stormwater treatment facilities are landscaped shallow depressions that capture and filter stormwater runoff. These facilities function as a soil and plant-based filtration device that removes

pollutants through a variety of physical, biological, and chemical treatment processes. The facilities normally consist of a ponding area, mulch layer, engineered media, and vegetation. As stormwater passes down through the media, pollutants are filtered, adsorbed, biodegraded, and sequestered by the soil and vegetation. Bioretention with underdrain systems are utilized for areas containing native soils with low permeability or steep slopes, where the underdrain system routes the treated runoff to the storm drain system.

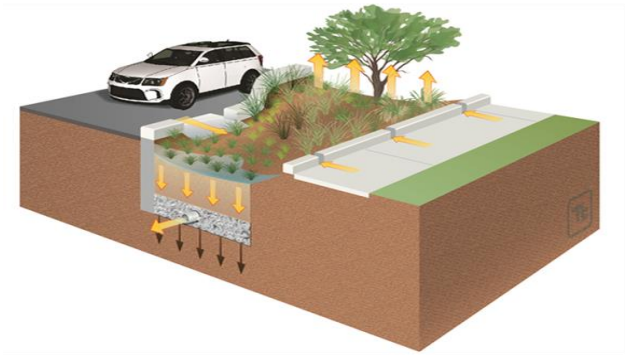


Figure 3-8: Bioretention with Underdrains schematic

VEGETATED SWALES

Vegetated swales are open, shallow channels with low-lying vegetation covering the side slopes and bottom that collect and slowly convey runoff flow to downstream discharge points. Vegetated swales provide pollutant removal through settling and filtration in the vegetation (usually grasses) lining the channels. In addition, although it is not their primary purpose, vegetated swales also provide the opportunity for volume reduction through subsequent infiltration and evapotranspiration and reduce the flow velocity. Where soil conditions allow, volume reduction in vegetated swales can be enhanced by adding a gravel drainage layer underneath the swale allowing additional flows to be retained and infiltrated. Where slopes are shallow and soil conditions limit or prohibit infiltration, an underdrain system or low flow channel for dry weather flows may be required to minimize ponding and convey treated and/or dry weather flows to an acceptable discharge point. An effective vegetated swale achieves uniform sheet flow through a densely vegetated area for a period of several minutes (depending on design standard used).

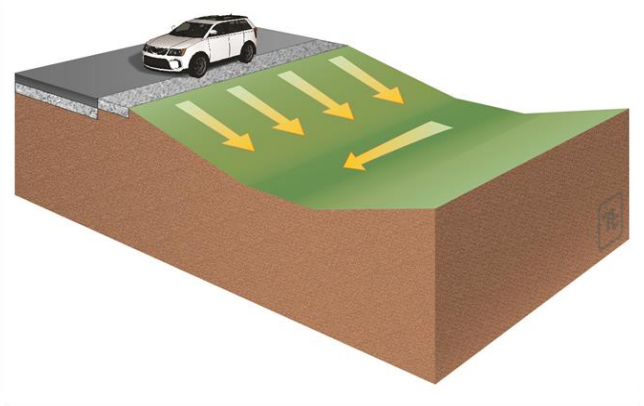


Figure 3-9: Vegetated swale schematic

WET DETENTION BASIN

Wet detention basins are constructed, naturalistic ponds with a permanent or seasonal pool of water (also called a "wet pool" or "dead storage"). Aquascape facilities, such as artificial lakes, are a special form of wet pool facility that can incorporate innovative design elements to allow them to function as a stormwater treatment facility in addition to an aesthetic water feature. Wet ponds require base flows to exceed or match losses through evaporation and/or infiltration, and they must be designed with the outlet positioned and/or operated in such a way as to maintain a permanent pool. Wet ponds can be designed to provide extended detention of incoming flows using the volume above the permanent pool surface.

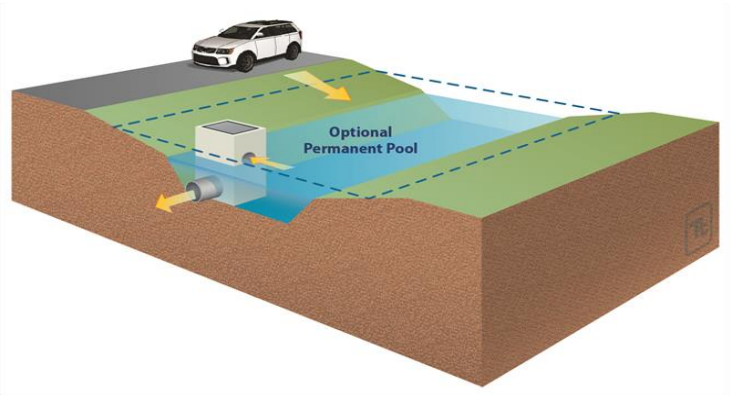


Figure 3-10: Wet detention basin schematic

Dry Extended Detention Basin

Dry extended detention basins are basins whose outlets have been designed to detain the stormwater runoff to allow particulates and associated pollutants to settle out. Dry extended detention basins do not have a permanent pool; they are designed to drain completely between storm events. They can also be used to provide hydromodification and/or flood control by modifying the outlet control structure and providing additional detention storage. The slopes, bottom, and forebay of Dry extended detention basins are typically vegetated.

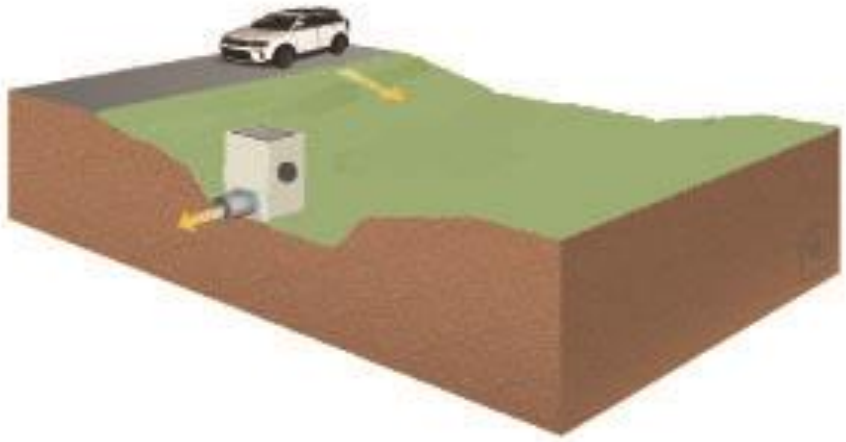


Figure 3-11: Dry extended detention basin schematic

PRE TREATMENT BMPS

Pre-treatment BMPs are typically not used as primary treatment; however, they are highly recommended for preliminary treatment in order to prolong the life and prevent clogging of the downstream system in a treatment train.

MEDIA FILTERS

Media filters are usually designed as multi-chambered stormwater practices; the first is a settling chamber, and the second is a filter bed filled with sand or another filtering media. As stormwater flows into the first chamber, large particles settle out, and then finer particles and other pollutants are removed as stormwater flows through the filtering medium. They can also be used as pre-treatment, with their location prior to any infiltration or biotreatment BMP.

CATCH BASIN INSERTS

Catch basins inserts typically include a grate or curb inlet and a sump to capture sediment, debris, and pollutants. Filter fabric can also be included to provide additional filtering of particles. The effectiveness of catch basins, their ability to remove sediments and other pollutants, depends on its design and maintenance. Some inserts are designed to drop directly into existing catch basins, while others may require retrofit construction. Similar to media filters, catch basin filters can also be used as a pre-treatment BMP for infiltration and biotreatment BMPs.

Figure 3-12: Pre-treatment BMP schematic

RAINFALL HARVEST

Rainfall Harvest BMPs capture rainwater to be reused in lieu of discharging directly to the MS4.

ABOVE GROUND CISTERNS

Cisterns are large above ground tanks that store stormwater collected from impervious surfaces for domestic consumption. Above ground cisterns are used to capture runoff. Mesh screens are typically used to filter large debris before the stormwater enters the cistern. The collected stormwater could potentially be used for landscape irrigation and some interior uses, such as toilets and washing machines. The collection and consumption of the stormwater results in pollution control, volume reduction, and peak flow reduction from the site.

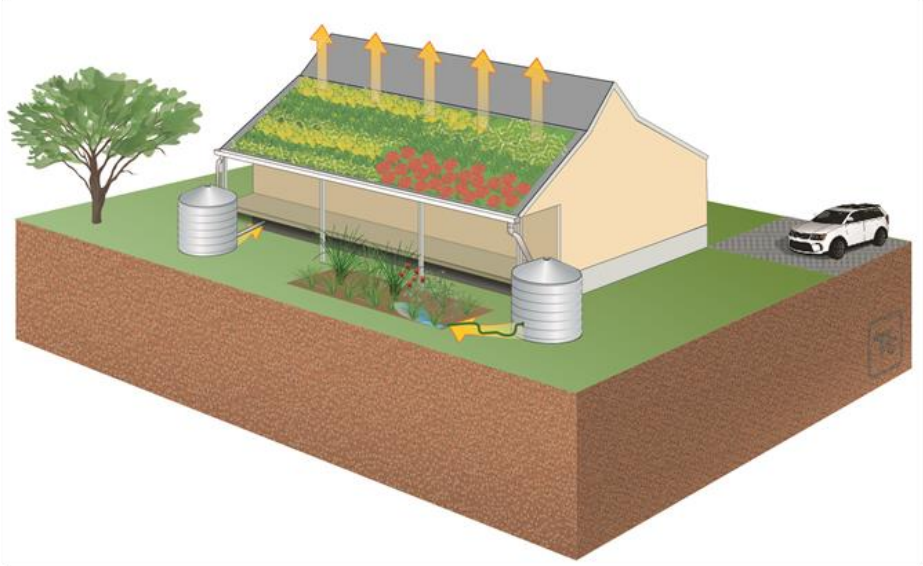


Figure 3-13: Above ground cisterns schematic

UNDERGROUND DETENTION

Underground detention systems function similarly to above ground cisterns in that they collect and use stormwater from impervious surfaces. These systems are concealed underground and can allow for larger stormwater storage and capture additional impervious surfaces not easily captured in an above ground system (e.g. parking lots and sidewalks).

Figure 3-14: Underground detention schematic

DIVERSION SYSTEMS

LOW FLOW DIVERSION

Flow diversion systems collect and divert runoff. Flow diversion structures can primarily be used in two ways. First, flow diversion structures may be used to direct dry weather flows to a treatment facility, preventing the runoff from reaching a receiving water body. This is typically done with low flow runoff, which occurs during periods of dry weather. Second, flow diversion structures can also be modified by incorporating them into other BMPs. For example, diverted flow can be fed into a regional BMP. Properly designed stormwater diversion systems are very effective for preventing stormwater from being contaminated and for routing contaminated flows to a proper treatment facility.

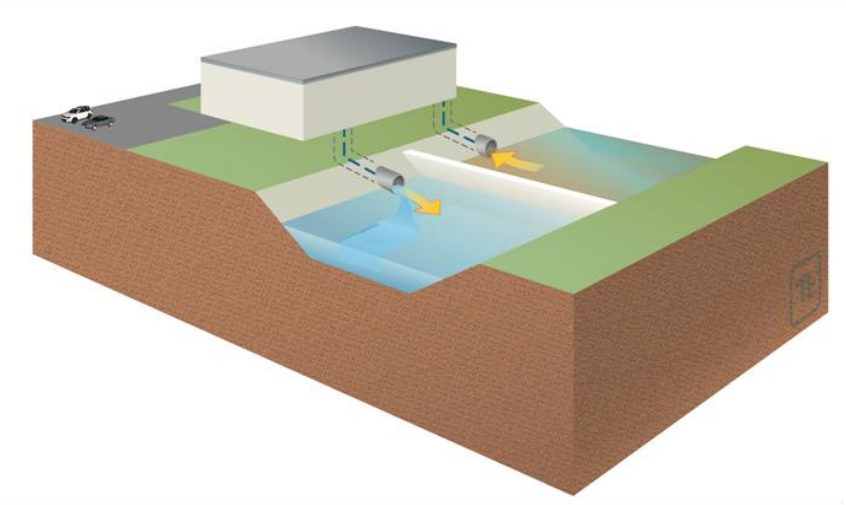


Figure 3-15: Low flow diversion schematic

3.4.3.2 PERFORMANCE EVALUATION OF STRUCTURAL BMPS

It is important to take the performance of stormwater BMPs into consideration during the planning and implementation process. This section provides an analysis of specific BMPs to determine the pollutant removal effectiveness of those BMPs. The International Stormwater BMP Database[14] (BMP Database) project website was used to analyze different BMP types for their effectiveness in removing specific pollutants. The website features a database of over 530 BMP studies, performance analysis results, BMP performance tools, monitoring guidance and other study-related publications. Performance studies relevant to BMPs matching the criteria for an effective regional or distributed application were analyzed to include the following:

- Bioretention
- Bioswale
- Detention Basin
- Grass Strip
- Porous Pavement
- Retention Pond
- Wetland Basin
- Wetland Channel

The average influent and effluent concentrations for the 95th percentile confidence interval were analyzed for pollutants of concern for the Lower LAR watershed available through the BMP Database. The following pollutants were analyzed:

- Cadmium (Dissolved)
- Cadmium (Total)
- Copper (Dissolved)
- Copper (Total)
- E. coli
- Enterococcus
- Fecal Coliform
- Kjeldahl Nitrogen (Total)
- Lead (Dissolved)
- Lead (Total)
- Nickel (Dissolved)
- Nickel (Total)
- Nitrogen (Total)
- NOx as Nitrogen
- TSS
- Zinc (Dissolved)
- Zinc (Total)

The majority of the BMPs analyzed by the BMP Database project are located in major transportation corridors. Land use categories such as residential, commercial, and industrial are not heavily represented in the analysis. The BMP effectiveness may also vary with regional conditions. Many BMPs were monitored in areas where a higher intensity and volume of rainfall than LA County is observed. Additionally, some of the BMPs monitored were designed in the 1990s, 1980s, or earlier. These are expected to have been designed with less stringent guidelines resulting in a more conservative analysis. Although the conditions

[14] Geosyntec Consultants, Wright Water Engineers. International Stormwater Best Management Practices (BMP) Database Pollutant Category Summary Statistical Addendum: TSS, Bacteria, Nutrients, and Metals. July 2012.

noted above may result in a slight variance in BMP effectiveness, the pollutant removal efficiencies are considered to be applicable.

It is important to note that the majority of pollutant load reduction is achieved using infiltration BMPs which result in an overall volume reduction. The analysis emphasizes reduction in concentrations of constituents, rather than volume or load reduction. Flow reduction analyses were not performed due to the dependence on rainfall intensity, soil types, and other site-specific conditions. The RAA has determined the volume reduction needed to meet compliance goals.

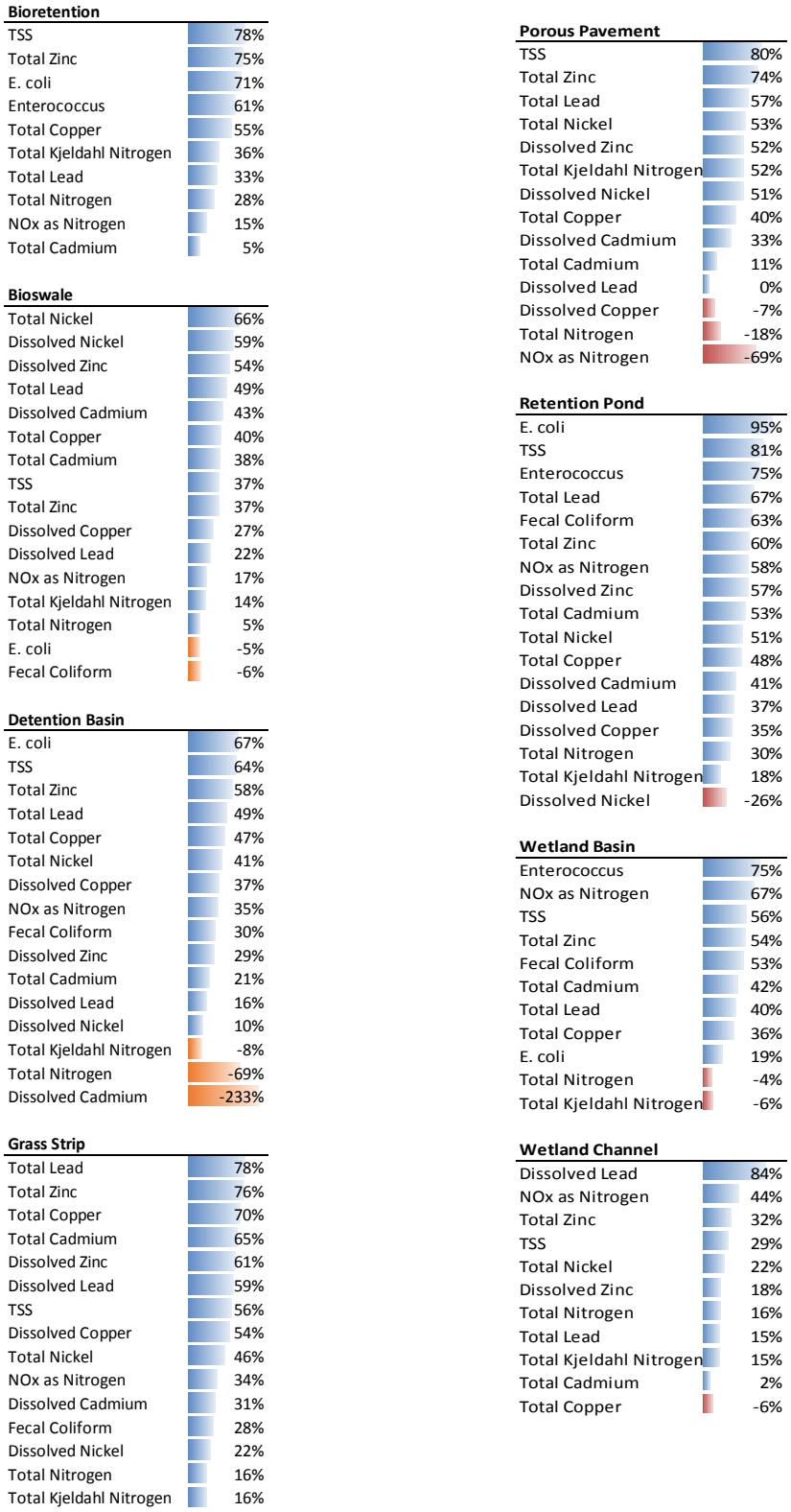
RESULTS

The analysis can be used to evaluate BMPs and support assumptions made in the RAA regarding effluent concentrations from specific BMPs. The required pollutant reductions determined through the RAA will be used to prioritize the BMPs to maximize effectiveness. The results of the BMP Database analysis are presented in a comparison format to easily visualize the pollutant removal efficiencies of each BMP type.

Each pollutant analyzed is a pollutant of concern for the Lower Los Angeles WMP watershed, with the exception of Total Suspended Solids (TSS). The reason for its inclusion is that studies have shown that there is a direct correlation between sediment concentration and various pollutants for which the watersheds are impaired. The data compiled from the BMP Database was used to determine the percent removal of each BMP for each pollutant. Each BMP was ranked in terms of pollutant removal efficiency for each pollutant type (see the following *BMP Pollutant Removal Effectiveness Comparison Charts*). Data for specific pollutants was not available for each BMP; therefore, only available data is presented.

The next analysis included taking the data and grouping the removal efficiencies under each BMP type. The pollutants were then ranked in terms of pollutant removal efficiency for each BMP type (see the *BMP Type Comparison Charts for Pollutant Removal* below). Data for specific pollutants was not available for each BMP; therefore, only available data is presented.

BMP Pollutant Removal Effectiveness Comparison Charts



BMP Type Comparison Charts for Pollutant Removal

Influent/Effluent Summary Statistics for Dissolved Cadmium (ug/L)

BMP Type	In	Out	Percent Removal
Bioswale	0.21	0.12	43%
Retention Pond	0.17	0.1	41%
Porous Pavement	0.06	0.04	33%
Grass Strip	0.13	0.09	31%
Detention Basin	0.15	0.5	-233%

Influent/Effluent Summary Statistics for Total Cadmium (µg/L)

BMP Type	In	Out	Percent Removal
Grass Strip	0.52	0.18	65%
Retention Pond	0.49	0.23	53%
Wetland Basin	0.31	0.18	42%
Bioswale	0.5	0.31	38%
Detention Basin	0.39	0.31	21%
Porous Pavement	0.28	0.25	11%
Bioretention	0.99	0.94	5%
Wetland Channel	0.5	0.49	2%

Influent/Effluent Summary Statistics for Dissolved Copper (µg/L)

BMP Type	In	Out	Percent Removal
Grass Strip	11.66	5.4	54%
Detention Basin	5.56	3.52	37%
Retention Pond	6.57	4.24	35%
Bioswale	11.01	8.02	27%
Porous Pavement	5.37	5.75	-7%

Influent/Effluent Summary Statistics for Total Copper (µg/L)

BMP Type	In	Out	Percent Removal
Grass Strip	24.52	7.3	70%
Bioretention	17	7.67	55%
Retention Pond	9.57	4.99	48%
Detention Basin	10.62	5.67	47%
Porous Pavement	13.07	7.83	40%
Bioswale	10.86	6.54	40%
Wetland Basin	5.61	3.57	36%
Wetland Channel	4.52	4.81	-6%

Influent/Effluent Summary Statistics for E. coli (#/100 mL)

BMP Type	In	Out	Percent Removal
Retention Pond	2800	150	95%
Bioretention	150	44	71%
Detention Basin	1300	429	67%
Wetland Basin	785	632	19%
Bioswale	3990	4190	-5%

Influent/Effluent Summary Statistics for Enterococcus (#/100 mL)

BMP Type	In	Out	Percent Removal
Retention Pond	615	153	75%
Wetland Basin	615	153	75%
Bioretention	605	234	61%

Influent/Effluent Summary Statistics for Fecal Coliform (#/100 mL)

BMP Type	In	Out	Percent Removal
Retention Pond	1920	707	63%
Wetland Basin	13000	6140	53%
Detention Basin	1480	1030	30%
Grass Strip	32000	23200	28%
Bioswale	4720	5000	-6%

Influent/Effluent Summary Statistics for Total Kjeldahl Nitrogen (mg/L)

BMP Type	In	Out	Percent Removal
Porous Pavement	1.66	0.8	52%
Bioretention	0.94	0.6	36%
Retention Pond	1.28	1.05	18%
Grass Strip	1.29	1.09	16%
Wetland Channel	1.45	1.23	15%
Bioswale	0.72	0.62	14%
Wetland Basin	0.95	1.01	-6%
Detention Basin	1.49	1.61	-8%

Influent/Effluent Summary Statistics for Dissolved Lead (µg/L)

BMP Type	In	Out	Percent Removal
Wetland Channel	3.26	0.52	84%
Grass Strip	0.64	0.26	59%
Retention Pond	0.76	0.48	37%
Bioswale	1.39	1.08	22%
Detention Basin	0.79	0.66	16%
Porous Pavement	0.5	0.5	0%

Influent/Effluent Summary Statistics for Total Lead (µg/L)

BMP Type	In	Out	Percent Removal
Grass Strip	8.83	1.96	78%
Retention Pond	8.48	2.76	67%
Porous Pavement	4.3	1.83	57%
Detention Basin	6.08	3.1	49%
Bioswale	3.93	2.02	49%
Wetland Basin	2.03	1.21	40%
Bioretention	3.76	2.53	33%
Wetland Channel	2.94	2.49	15%

Influent/Effluent Summary Statistics for Dissolved Nickel (µg/L)

BMP Type	In	Out	Percent Removal
Bioswale	4.93	2.04	59%
Porous Pavement****	0.88	0.43	51%
Grass Strip	2.68	2.09	22%
Detention Basin	2.82	2.55	10%
Retention Pond	1.68	2.11	-26%

Influent/Effluent Summary Statistics for Total Nickel (µg/L)

BMP Type	In	Out	Percent Removal
Bioswale	9.26	3.16	66%
Porous Pavement	3.64	1.71	53%
Retention Pond	4.46	2.19	51%
Grass Strip	5.41	2.92	46%
Detention Basin	5.64	3.35	41%
Wetland Channel	2.8	2.18	22%

Influent/Effluent Summary Statistics for Total Nitrogen (mg/L)

BMP Type	In	Out	Percent Removal
Retention Pond	1.83	1.28	30%
Bioretention	1.25	0.9	28%
Wetland Channel	1.59	1.33	16%
Grass Strip	1.34	1.13	16%
Bioswale	0.75	0.71	5%
Wetland Basin	1.14	1.19	-4%
Porous Pavement	1.26	1.49	-18%
Detention Basin	1.4	2.37	-69%

Influent/Effluent Summary Statistics for NOx as Nitrogen (mg/L)

BMP Type	In	Out	Percent Removal
Wetland Basin	0.24	0.08	67%
Retention Pond	0.43	0.18	58%
Wetland Channel	0.34	0.19	44%
Detention Basin	0.55	0.36	35%
Grass Strip	0.41	0.27	34%
Bioswale	0.3	0.25	17%
Bioretention	0.26	0.22	15%
Porous Pavement	0.42	0.71	-69%

Influent/Effluent Summary Statistics for TSS (mg/L)

BMP Type	In	Out	Percent Removal
Retention Pond	70.7	13.5	81%
Porous Pavement	65.3	13.2	80%
Bioretention	37.5	8.3	78%
Detention Basin	66.8	24.2	64%
Grass Strip	43.1	19.1	56%
Wetland Basin	20.4	9.06	56%
Bioswale	21.7	13.6	37%
Wetland Channel	20	14.3	29%

Influent/Effluent Summary Statistics for Dissolved Zinc (µg/L)

BMP Type	In	Out	Percent Removal
Grass Strip	36.1	14	61%
Retention Pond	22.5	9.6	57%
Bioswale	52.7	24.5	54%
Porous Pavement	13.5	6.5	52%
Detention Basin	15.6	11.08	29%
Wetland Channel	11.6	9.5	18%

Influent/Effluent Summary Statistics for Total Zinc (µg/L)

BMP Type	In	Out	Percent Removal
Grass Strip	103.3	24.3	76%
Bioretention	73.8	18.3	75%
Porous Pavement	57.6	15	74%
Retention Pond	53.6	21.2	60%
Detention Basin	70	29.7	58%
Wetland Basin	48	22	54%
Bioswale	36.2	22.9	37%
Wetland Channel	23	15.6	32%

RESULTS ANALYSIS SUMMARY

The statistical analysis presented has many applications, including supporting BMP prioritization and the RAA analysis. As future applications are undertaken, the results can be analyzed in more detail. For this analysis, the following observations were discovered:

- Overall, the retention pond returned the best results in terms of pollutant removal efficiency for several pollutants, with more than 60% removal for E. coli, TSS, Enterococcus, total lead, fecal coliform and total zinc.
- Among the constituents analyzed, the percent removals were often the highest for metals, lead and zinc in particular.
- The poorest performance was often observed for nutrients and bacteria, with concentrations increasing for some BMP types. Leaching of nutrients from soils/planting media and resuspension of captured pollutants may be a cause of the increases observed in these BMPs[15].

It is important to note that the majority of pollutant removal associated with stormwater BMPs will be due to infiltration and overall volume reduction. Although this is the case, a small component may be associated with inflow to outflow pollution concentration reduction and the analysis focuses on this percent reduction. Percent reduction is easily understandable and convenient for reporting; therefore, the method seems to be appropriate for this analysis. Refer to the article "Voodoo Hydrology" in the July 2006 article of Stormwater Magazine[16] for further information on caveats to this method. Although the analysis does not cover volume reduction, the RAA analysis has estimated the pollutant reduction necessary to meet compliance.

3.4.3.3 EXISTING TARGETED STRUCTURAL BMPS

The existing structural BMPs in place within the Watershed Group area, with the exception of the Hollydale Regional and Circle Parks project, have been included in the RAA model. Figure 3-16 indicates the locations of existing BMPs. Refer to Chapter 4 for more details.

[15] Stormwater: BMP Effectiveness for Nutrients, Bacteria, Solids, Metals, and Runoff Volume (2012). Retrieved online at: http://www.stormh2o.com/

[16] http://www.stormh2o.com/SW/Editorial/Voodoo_Hydrology_37.aspx

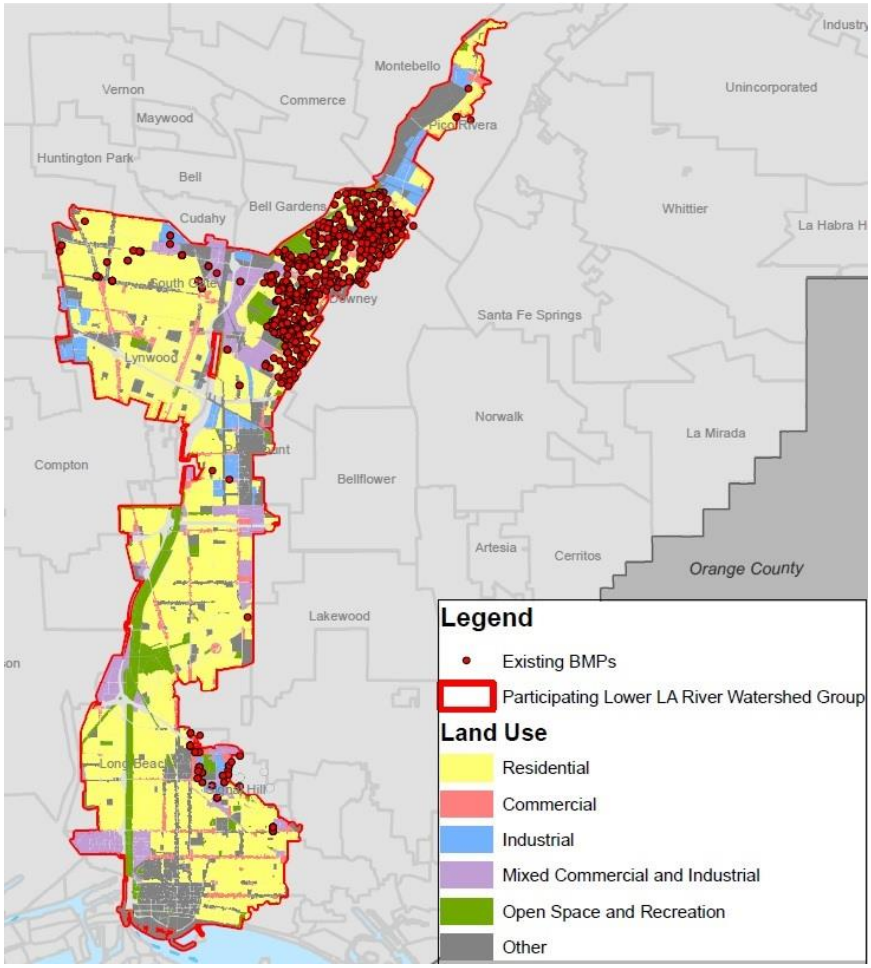


Figure 3-16: Locations of Existing Structural BMPs

A summary of the Hollydale Regional and Circle Parks project is as follows:

HOLLYDALE REGIONAL AND CIRCLE PARKS – STATUS: COMPLETED IN 2013

The Hollydale Regional and Circle Parks were developed adjacent to the Los Angeles River in the city of South Gate in 2013. The parks include vegetated swales which treat stormwater runoff and runon. Since the project was recently completed in 2013, it is expected that the environmental benefits for this project have not yet been observed in past monitoring.

3.4.3.4 PLANNED TARGETED CONTROL MEASURES

The projects listed below have been planned to some extent by the Participating Agencies. A literature review was conducted of existing TMDL Implementation Plans, the existing IRWMP, and other planning documents to collect data. The extent of planning of these projects ranges from a roundtable discussion to being in preliminary phases of design.

CHITTICK FIELD PARK - STATUS: TRASH CAPTURE SYSTEMS INSTALLED

This park is located in the city of Long Beach at 1900 Walnut Avenue. The site is already equipped with a large number of full-capture trash systems. The park is located in a relatively flat area with a large surrounding developed area. The site is approximately 19.9 acres and in periods of heavy rainfall, it already functions as a detention basin.

Additional features under consideration, according to the IRWMP, include replacing the concrete lined "low flow" swales with vegetated swales for biofiltration, construction of a new underground "low flow" pipe network to convey treated water to the basin pump station, and replacing the existing pump station with a new low flow pump station.

Although not yet planned, this location is also seen to have potential for a future regional BMP. Assuming the entire site were enhanced to incorporate infiltration, the maximum area for which stormwater runoff could be diverted to the park is 289 acres, totaling the maximum potential design capture volume to be 23.8 acre-feet. Alternatively, the operations of the pump station will be investigated to determine if the site could be used for enhanced detention (enabling particular pollutants additional time to settle out).

MULTI-AGENCY, MULTI-WATERSHED PROJECT TO INCORPORATE LOW IMPACT DEVELOPMENT (LID) BMPS INTO MAJOR TRANSPORTATION CORRIDORS IN THE GATEWAY REGION OF LOS ANGELES

(GATEWAY PROP 84 PROJECT - **GRANT APPLICATION APPROVED**)

This project is a planned regional project within multiple cities to include the cities of Bell Gardens, Downey, Pico Rivera, Paramount, South Gate, and Lynwood. The Gateway Water Management Authority (GWMA) applied for funds through the Prop 84 Grant Round 2 program to put towards this project, which was approved in May 2014. The project is in the design phase.

The project seeks to prevent stormwater contamination of surface waters in three watersheds, to include the Los Angeles River. This will be accomplished by installing LID BMPs to treat stormwater runoff, and its associated pollutants. Table 3-12 lists the BMPs to be implemented within the Cities and Figures 3-17 to 3-23 show the project locations within each city.

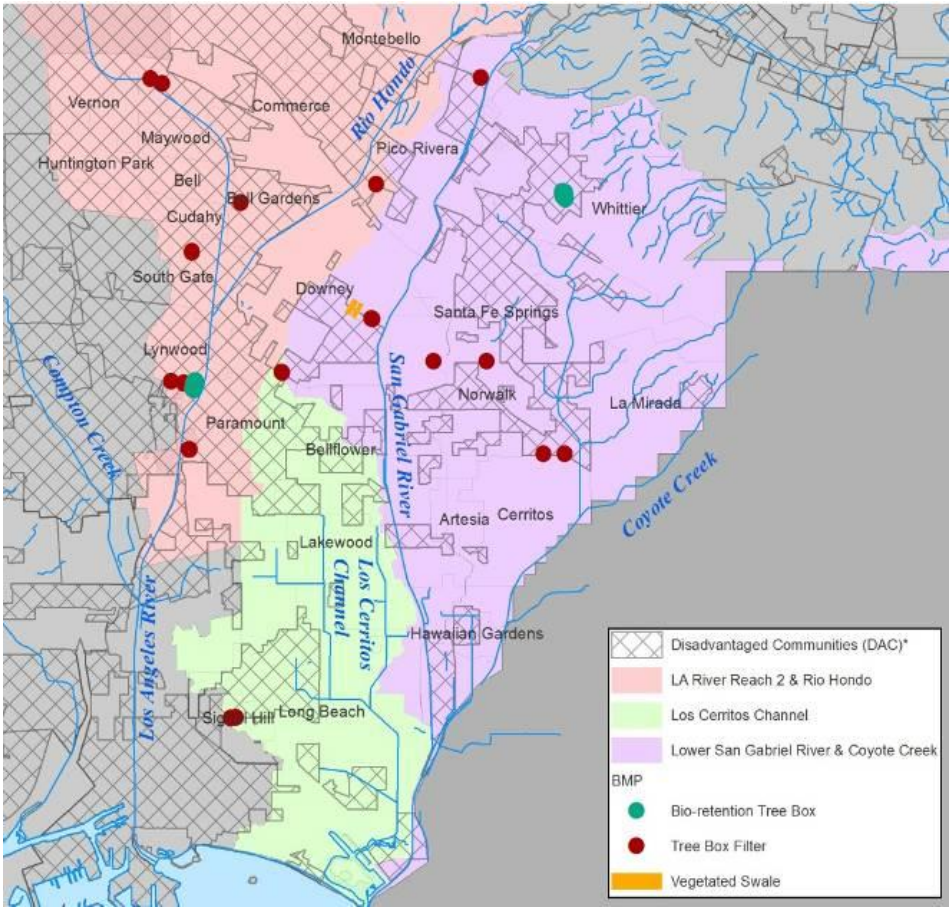


Figure 3-17: BMP Locations within the Gateway Prop 84 Project

Table 3-12: Proposed BMPs within the Gateway Prop 84 Project

City	LID BMPs	Location	Anticipated Treatment Volume[17]
Bell Gardens	(10) Bioretention Tree Wells	Locations to be determined	5,870 cf
	(3) Tree box filters	(1) Clark Street at Atlantic Avenue, (2) Clark Street at Wright Road	21,774 cf
Downey	(2) Tree box filters	(2) Alondra Boulevard west of Hunsaker Avenue	14,516 cf
Pico Rivera	(1) Tree box filters	(1) Slauson Avenue and Paramount Boulevard	7,258 cf
Paramount	(2) Tree box filters	(2) Alondra Boulevard west of Hunsaker Avenue	14,516 cf
South Gate	(2) Tree box filters	(2) Firestone Boulevard and Atlantic Avenue	14,516 cf
Lynwood	(2) Tree box filters	(2) Firestone Boulevard and Atlantic Avenue	14,516 cf

[17] Treatment volume calculations based on a 24-hour, 0.75 in storm, 6x6 tree box filter units and a 1200 LF swale.

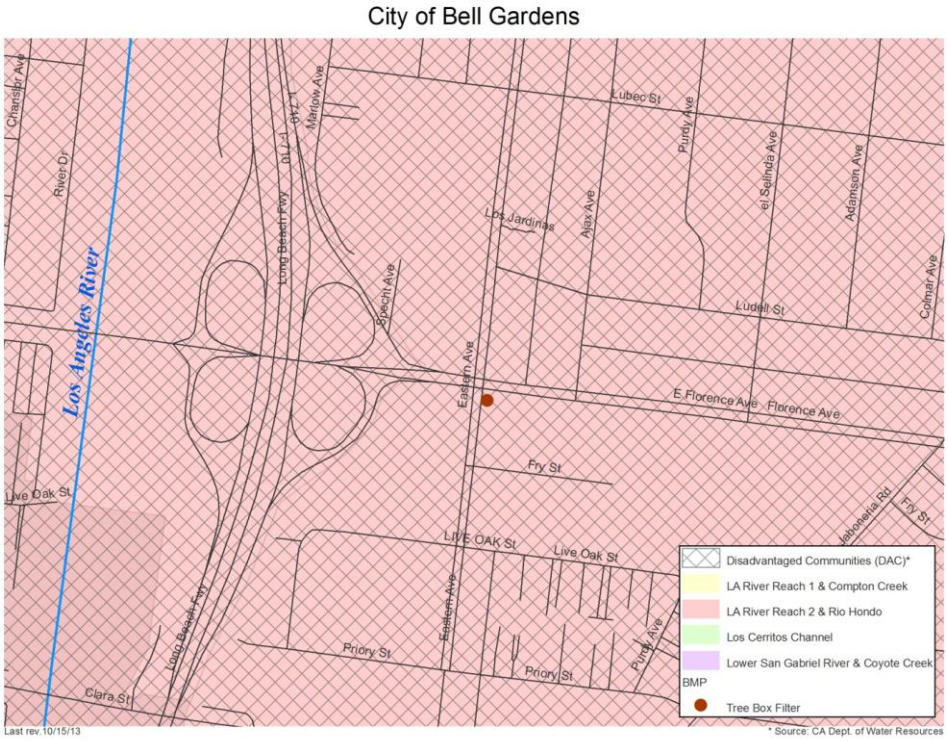


Figure 3-18: Gateway Prop 84 Project BMP locations proposed for the city of Bell Gardens

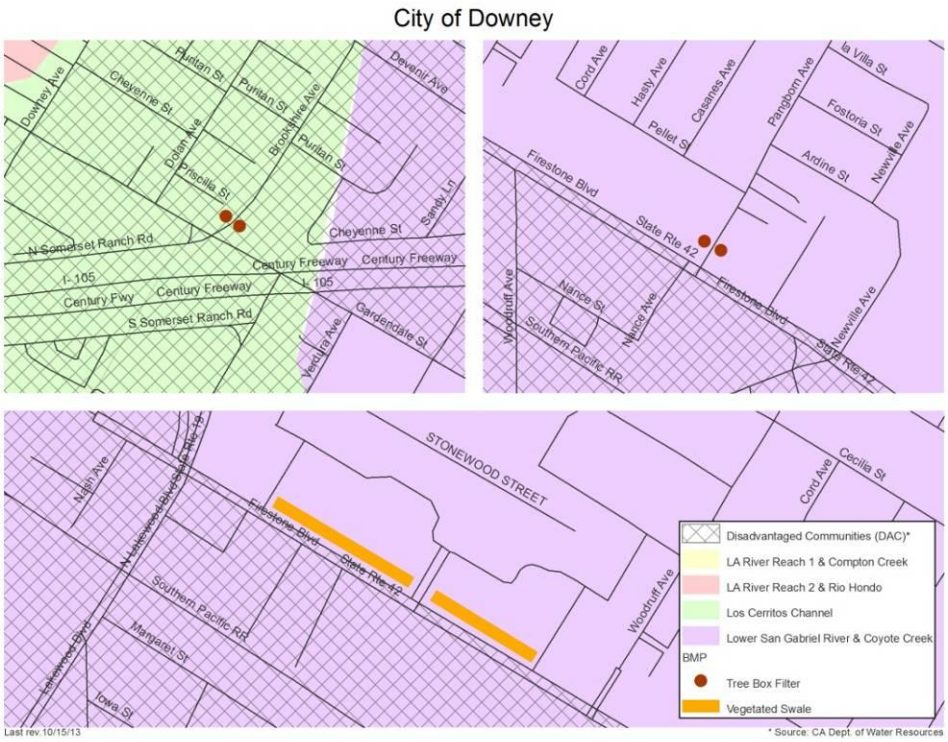


Figure 3-19: Gateway Prop 84 Project BMP locations proposed for the city of Downey

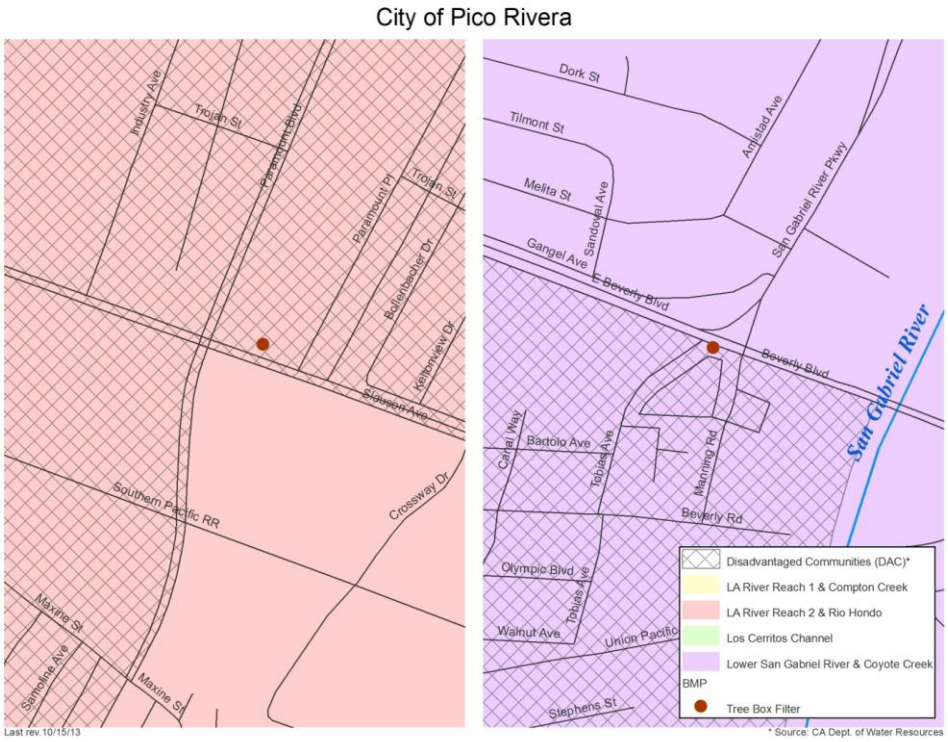


Figure 3-20: Gateway Prop 84 Project BMP locations proposed for the city of Pico Rivera

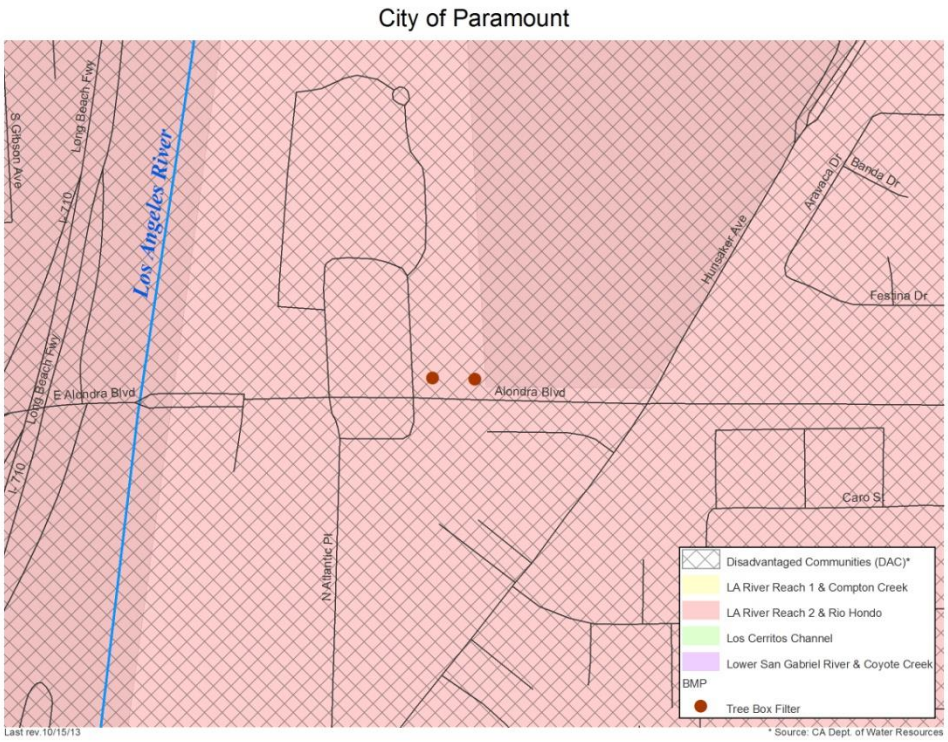


Figure 3-21: Gateway Prop 84 Project BMP locations proposed for the city of Paramount

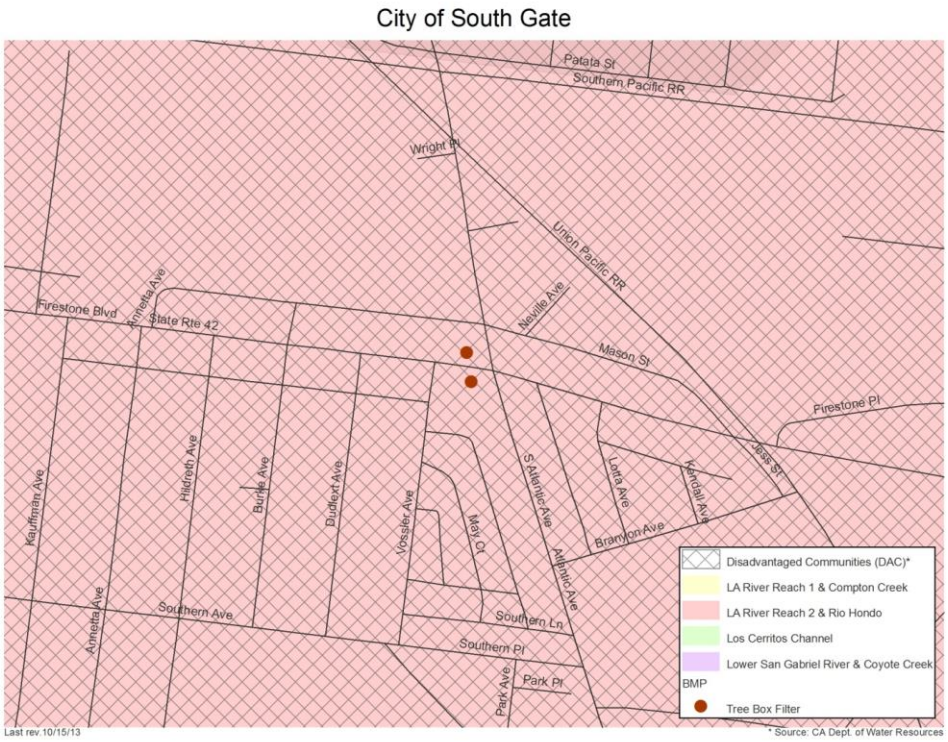


Figure 3-22: Gateway Prop 84 Project BMP locations proposed for the city of South Gate

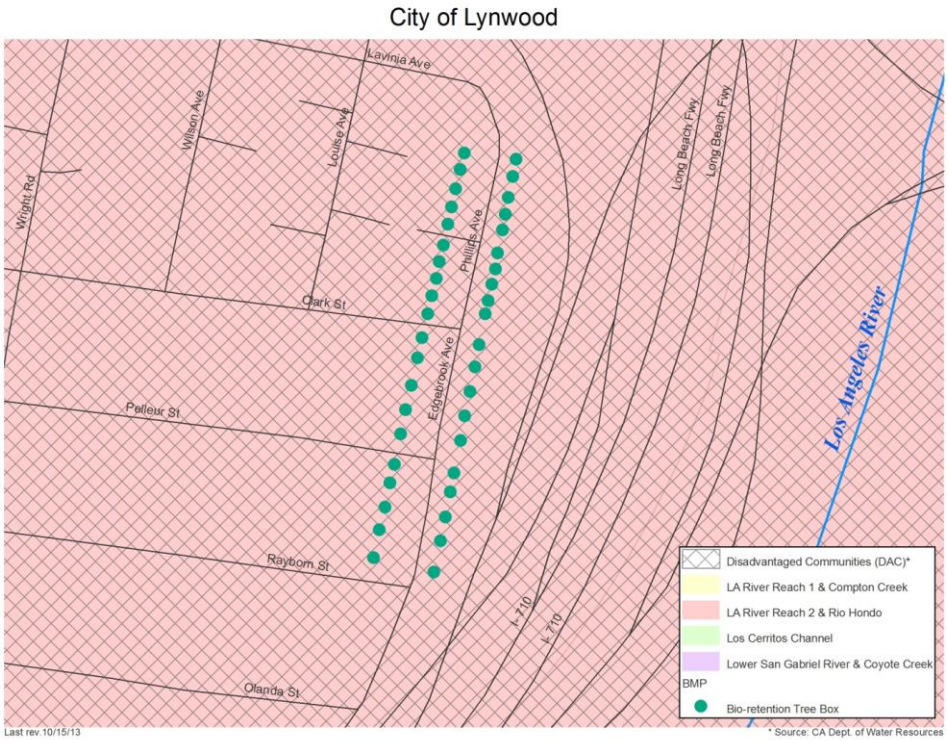


Figure 3-23: Gateway Prop 84 Project BMP locations proposed for the city of Lynwood

IRWMP PROJECTS

The following project descriptions are from the Gateway Integrated Regional Watershed Management Plan (IRWMP). These projects have been discussed in detail with the Gateway Water Management Authority (GWMA) and are likely to be implemented once the required funding is acquired. Further details about each project can be found in the Gateway IRWMP documents.

LONG BEACH MUNICIPAL URBAN STORMWATER TREATMENT (MUST)FACILITY

This project would intercept and treat nonstormwater and initial stormwater (first flush) runoff flows for the cities of Long Beach, Signal Hill, Lynwood, and South Gate. After treatment, water would be recycled for irrigation use along the 710 Freeway and parks along the vicinity of the 710 Freewaywill serve the cities of . The facility will be located along the Drake-Chavez Greenbelt, southeast of the Shoemaker Bridge. The project proposes to treat water from 2,956 drainage acres from Major Basins No 2 & No 4 during Phase 1, 3,770 drainage acres from Major Basin No 3 during Phase 2, and possible additional drainage acres from Major Basin 10 in future expansions. The project would have the capacity to treat approximately 436,000 gallons of nonstormwater per day and store an additional 500,000 gallons. It is possible that further expansion could include capacity to treat and store stormwater from other regional areas. This project will contribute to improving water quality in the Lower Los Angeles River.

FERNWOOD WATER IMPROVEMENT PARK

The Fernwood Water Improvement Park is a multi-benefit project that serves disadvantaged communities in the city of Lynwood while meeting IRWMP water management objectives. The project site is currently an empty 6.5 acre lot owned by the city of Lynwood located on a long stretch along Fernwood Avenue, between Atlantic Avenue and Long Beach Boulevard. The park will feature stormwater improvement elements such as infiltration areas and vegetated swales. The project also includes native shrubs and trees that will increase habitat for birds, butterfly species and mammals.

CONSTRUCT BIOSWALES/LANDSCAPING IN VARIOUS LOCATIONS IN LONG BEACH

This project will construct and/or reconstruct new and existing medians within the city of Long Beach to capture and treat stormwater runoff. The specific locations have not yet been identified; therefore, as this project progresses the RAA results will be taken into consideration in order to place the BMPs in locations with the highest potential for pollutant reduction.

FIRESTONE BOULEVARD MEDIAN PROJECT

This project is located in the city of South Gate and will enhance the Firestone corridor by installing a landscaped median that will utilize recycled water to irrigate the landscape. A reverse swale would also allow for stormwater runoff capture.

TREE WELL DRY WEATHER RUNOFF AND FIRST FLOW STORMWATER CAPTURE/TMDL PROJECT

This project will be located within the city of South Gate and will consist of the installation of tree wells designed to capture dry weather flows and first storm flows in tree wells along the curb before the flow reaches the storm drain.

PILOT PLANT FOR TREATMENT OF LOS ANGELES RIVER WATER

This project is proposed in the city of Long Beach. This project will provide a skid mounted treatment train capable of treating 20 GPM of water within the Los Angeles River and the engineering support to confirm the effluent will be suitable for potable use. The Pilot Plant is to be installed near West Del Amo Boulevard and Oregon Avenue. The pilot plant will be in operation for 4 months with the option to increase the time of study to 24 months after review of initial data.

LAR Estuary Bacteria TMDL - Southwest Area Low Flow Diversion

This project will construct a system that will divert low stormwater flows from an existing storm drain outfall that services approximately 40% the Los Angeles River watershed located within the city of Signal Hill's boundaries directly into the Alamitos Sanitary Sewer Lift Station for eventual treatment by the Los Angeles County Sanitation District. This project will prevent nonstormwater flows and "first flush" storm flows from ultimately being emptied into the Hamilton Bowl Stormwater Retention facility and ultimately pumped into the Los Angeles River Estuary. This project contributes to the Gateway IRWMP Goal and Objective of protecting and enhancing water quality through the attainment of required TMDL levels in accordance with State Water Quality Control Board MS4 Permit requirements. This project is anticipated to cost approximately $1.7 million with an annual operations and maintenance cost of $200,000 per year.

LAR Estuary Bacteria TMDL - Southeast Area Low Flow Diversion

This project will construct a system that will divert low stormwater flows from an existing storm drain outfall that services approximately 50% the Los Angeles River watershed located within the city of Signal Hill's boundaries directly into the sanitary collection main for eventual treatment by the Los Angeles County Sanitation District. This project will prevent summer nonstormwater flows and "first flush" storm low flows from being emptied into the Hamilton Bowl Stormwater Retention facility and ultimately pumped into the Los Angeles River Estuary. This project contributes to the Gateway IRWMP Goal and Objective of protecting and enhancing water quality through the attainment of required TMDL levels in accordance with State Water Quality Control Board MS4 Permit requirements. This project is anticipated to cost approximately $1.7 million with an annual operations and maintenance cost of $200,000 per year.

Cha'wot Open Space Preservation and Stormwater Runoff Reduction

Located in the city of Signal Hill, this project proposes the purchase of available open space in the northerly hilltop area of Signal Hill to preserve existing nature and wildlife; provide walking, hiking, and recreational opportunities; naturally reduce stormwater runoff by preserving undeveloped open space; reduce the demand for potable water by reducing the amount of land available for development.

The details of this project do not currently incorporate water quality improvement strategies; however, it is recognized as a potential location for regional BMPs.

3.4.3.5 POTENTIAL SITES FOR FUTURE TARGETED CONTROL MEASURES

A preliminary assessment has been performed for the Lower LAR Watershed to determine potential areas to locate regional BMPs. This was done with a preliminary GIS approach by screening areas within 660 feet (1/8 mile) of a waterbody and currently designated as open space as well as other potentially useful zoning designations. The overall size of each site was used to calculate the maximum amount of volume which could be stored at the site and the maximum amount of area that could be diverted to the site assuming the entire site were redeveloped to incorporate infiltration.

The equations used were derived from the Orange County Technical Guidance Document (OC TGD)[18] and can be found below:

$$\mathbf{DCV = CdA_{TRIBUTARY} \times \left(\frac{43560}{12}\right)}$$

Driving Equation No. 1

$$D_{MAX} = K_{DESIGN} T \times \left(\frac{1}{12}\right)$$

Assume K_{DESIGN} = 0.3 in/hr

0.3 in/hr is the lowest infiltration rate where infiltration is deemed feasible per the MS4 Permit.

$$D_{MAX} = 0.3 \times 48 \times \frac{1}{12} = 1.2 \text{ feet}$$

$$A_{BMP} = \frac{DCV}{D_{MAX}}$$

$$\mathbf{A_{TRIBUTARY} = \frac{A_{BMP} \times 1.2}{Cd \times \left(\frac{43560}{12}\right)}}$$

Driving Equation No. 2

$$C = (0.75 \times IMP) + 0.15 = 0.9$$

Assume 100% imperviousness

Assume d=1.1

1.1 inches is the highest depth on the LA County 85th Percentile Isohyetal Map for the watershed.

$$\mathbf{A_{TRIBUTARY} = \frac{A_{BMP} \times 1.2}{0.9 \times 1.1 \times \left(\frac{43560}{12}\right)}}$$

Final Equation No. 1

$$\mathbf{DCV = A_{BMP} \times 1.2}$$

Final Equation No. 2

A_{BMP} has been assumed to be the total site area to determine the maximum tributary area that can be diverted to the site and the maximum volume the site can treat.

Where:

DCV:	Design Capture Volume	$A_{TRIBUTARY}$:	Area Tributary to BMP	T:	Drawdown Time
C:	Runoff Coefficient	D_{MAX}:	Maximum Effective Depth	A_{BMP}:	Footprint Area of BMP
d:	Rainfall Depth	K_{DESIGN}:	Design Infiltration Rate	IMP:	Percent Impervious

[18] Orange County. Technical Guidance Document for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs). May 19, 2011.

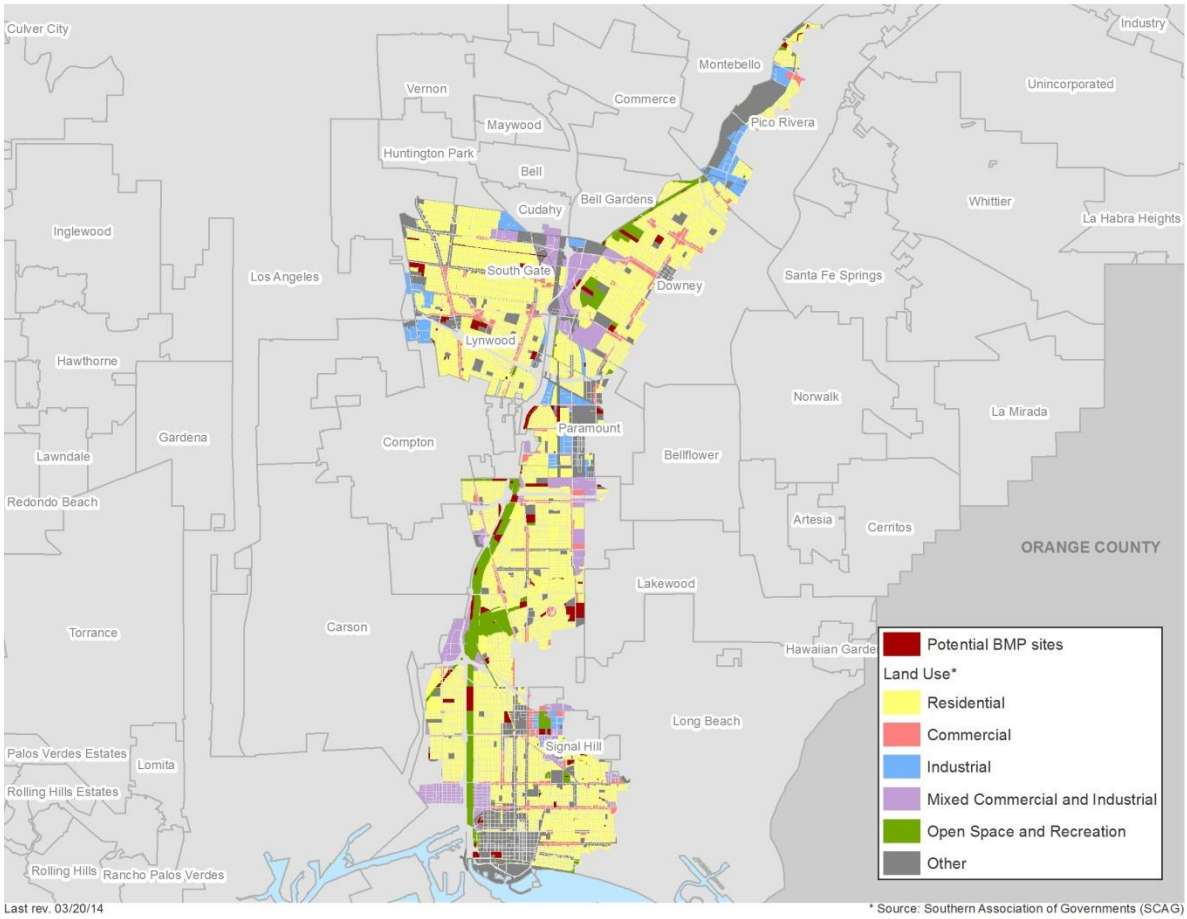


Figure 3-24: Potential Sites for Future Structural BMPs

Figure 3-24 and Table 3-13 indicate the locations of sites potentially available for future regional BMPs. These locations can serve as a starting point during the implementation phase of the WMP. They have been grouped by jurisdiction and listed in order by land use. The land use with the highest accessibility is listed first. Within each land use designation, the sites have been listed from largest to smallest. Note that with regional BMPs there are opportunities for multiple agencies to benefit from the same site. The land uses are ranked as follows:

OPEN SPACE AND RECREATION: Sites designated for open space, parks, and recreational activities were ranked with the highest potential for future regional BMPs. The reasoning being that these types of areas have the highest likeliness to be publically owned and not require land acquisition, generally have a high percentage of landscaped area available, and have a high opportunity for multiple benefits.

EDUCATIONAL USE: Sites designated for educational use were ranked with the second highest potential for future regional BMPs. The reasoning being that these types of areas although not city-

owned could have an easier land acquisition process than privately owned land, generally have a high percentage of landscaped area available, and have a high opportunity for multiple benefits.

GOVERNMENT INSTITUTION[19]: Sites designated for educational use were ranked with the third highest potential for future regional BMPs. This is due to the institution being government owned presenting a higher chance of collaboration than a privately owned facility. Although this may be the case, many government institutions may not be willing to take on maintenance responsibilities which would result in the necessity of land acquisition or maintenance agreements.

GOLF COURSES/COUNTRY CLUBS: Sites designated for golf courses or country clubs were ranked with the fourth highest potential for future regional BMPs. The reasoning being that these types of areas generally have a high percentage of landscaped area available and have a high opportunity for multiple benefits. Although this may be the case, land acquisition for these sites is expected to be a difficult accomplishment.

COMMERCIAL USE: Sites designated for commercial areas were ranked with the fifth highest potential for future regional BMPs. The reasoning being that these types of areas generally have a high percentage of parking area available which could potentially be retrofitted for infiltration opportunities. Although this may be the case, land acquisition for these sites is expected to be a difficult accomplishment.

The available sites will be further assessed to determine the best location for a regional BMP. Note that the sites presented do not represent the only sites available for the Watershed Group. The ultimate site selection process should take into account the following characteristics:

LOCATION IN RELATION TO RAA RESULTS: The RAA provides an estimation of runoff reduction to be provided in each area in order to meet the water quality objectives. The sites should be selected taking this into consideration.

GIS DATA: GIS data should be further analyzed to screen projects based on criteria such as land use, topography, hydrologic features, streets and roads, existing storm drain infrastructure, and storm drain invert depth.

PROJECT BENEFITS: It is preferred that a project contains multiple benefits in order to increase the overall benefit and support for the project. Benefits to take into consideration include, but are not limited to, the following:

- Water quality benefits
- Water supply benefits
- Recreational use
- Multi-agency benefits

[19] This land use is not in the current potential site list; however, it was included for future reference in the case that additional locations are gathered during the implementation or adaptive management process.

- Publically owned
- Storage availability
- Funding available
- Project readiness
- Flood control benefits
- Proximity to pollutant sources or impaired waters
- Adjacent to existing storm drain

PROJECT CONSTRAINTS: Not every project will be feasible; therefore, it is important to take into consideration any constraints that may result in project infeasibility. These constraints include, but are not limited to, the following:

- High groundwater
- Low infiltration rates
- Existing soil contamination/proximity to existing soil contamination
- Brownfields[20]
- Existing groundwater contamination/proximity to existing groundwater contamination
- Potential for soil instability (liquefaction zones, hillside areas)
- Existing private ownership (requires land acquisition)
- Cost Effectiveness
- Historical landmarks

[20] With certain legal exclusions and additions, the term "brownfield site" means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant (*Environmental Protection Agency*).

Table 3-13: Potential site list

City Name	Land Use Designation	Site Name	Site Address	Latitude	Longitude	Approximate Site Area (Acres) [21]	Calculated Max Tributary Area ($A_{TRIBUTARY}$, Acres)	Max Design Capture Volume (DCV, Ac-ft)
Downey	Open Space & Recreation	Furman Park	10419 Rives Ave.	33.9534	-118.1375	13.8	200	16.5
		open space	Guatemala Ave.	33.9681	-118.1283	13.4	195	16.1
		Apollo Park	12544 Rives Ave.	33.9267	-118.1546	11.0	160	13.2
		open space	Guatemala Ave.	33.9622	-118.1401	9.1	133	10.9
		open space	Sherry Ave.	33.9592	-118.1459	4.2	62	5.1
		Crawford Park	7000 Dinwiddie St.	33.9523	-118.1575	2.2	32	2.6
	Educational Use	Middle School	Excluded for privacy			22.0	320	26.4
		High School	Excluded for privacy			17.5	254	21.0
		Middle School	Excluded for privacy			14.9	217	17.9
		Elementary School	Excluded for privacy			7.2	105	8.7
		Elementary School	Excluded for privacy			6.4	93	7.7
		Elementary School	Excluded for privacy			6.1	89	7.3
		Elementary School	Excluded for privacy			5.8	85	7.0
		Elementary School	Excluded for privacy			4.8	70	5.8
		Elementary School	Excluded for privacy			2.1	30	2.5

[21] These numbers were generated using the Los Angeles County GIS Data Portal website (http://egis3.lacounty.gov/dataportal/) and the LA County Department of Public Works Spatial Information Library website (http://dpw.lacounty.gov/general/spatiallibrary/index.cfm?agree=agree). All areas may not be usable space for BMP retrofits.

Table 3-13: Potential site list

City Name	Land Use Designation	Site Name	Site Address	Latitude	Longitude	Approximate Site Area (Acres) [21]	Calculated Max Tributary Area ($A_{TRIBUTARY}$, Acres)	Max Design Capture Volume (DCV, Ac-ft)
	Golf Courses/ Country Clubs	Golf Course	Excluded for privacy			121.4	1,765	146
		Golf Club	Excluded for privacy			100.0	1,455	120
Lakewood	Open Space & Recreation	Cherry Cove Park	5159 Meadow Wood Ave.	33.8502	-118.1657	3.0	43	3.5
Long Beach	Open Space & Recreation	open space	710 Fwy	33.8669	-118.1958	46.3	674	55.6
		open space	710 Fwy	33.8536	-118.2036	40.9	595	49.1
		Houghton Park	6301 Myrtle Ave.	33.8695	-118.1838	23.3	338	27.9
		Scherer Park	4600 Long Beach Blvd.	33.8436	-118.1865	21.5	313	25.8
		open space	S. Sportsman Dr.	33.8804	-118.1906	16.3	237	19.5
		Veterans Memorial Park	101 E. 28th St.	33.8096	-118.1922	14.3	208	17.2
		open space	E. 208th St.	33.8425	-118.2049	14.2	206	17.0
		open space	Harbor St.	33.8193	-118.2168	14.1	205	16.9
		Hudson Park	2335 Webster Ave.	33.798	-118.2202	12.5	182	15.0
		Admiral Kidd Park	2125 Santa Fe Ave.	33.7958	-118.2156	11.0	160	13.2
		Silverado Park	1545 W. 31st St.	33.8146	-118.2132	10.5	153	12.6

Table 3-13: Potential site list

City Name	Land Use Designation	Site Name	Site Address	Latitude	Longitude	Approximate Site Area (Acres) [21]	Calculated Max Tributary Area ($A_{TRIBUTARY}$, Acres)	Max Design Capture Volume (DCV, Ac-ft)
Long Beach	Open Space & Recreation	Wrigley Greenbelt	DeForest Ave. (Willow to 34th)	33.8153	-118.2055	10.0	145	11.9
		Cherry Park	1901 East 45th St.	33.8395	-118.1688	9.9	145	11.9
		open space	Inez St.	33.8796	-118.1796	9.5	138	11.4
		open space	Oregon Ave.	33.842	-118.2007	9.5	138	11.4
		open space	Lime Ave.	33.8796	-118.1836	8.3	120	9.9
		Coolidge Park	352 E. Neece St.	33.8722	-118.195	7.2	104	8.6
		Lincoln Park (Civic Center)	Pacific Ave. & Broadway St.	33.7684	-118.1955	7.0	101	8.4
		Martin Luther King Jr. Park	1950 Lemon Ave.	33.7926	-118.1769	6.8	98	8.1
	Open Space & Recreation	Santa Cruz Park	Cedar Ave. to Golden Ave.	33.7683	-118.2032	6.4	92	7.6
		Los Cerritos Park	3750 Del Mar Ave.	33.8267	-118.1994	6.2	90	7.4
		Drake Park	951 Maine Ave.	33.7785	-118.2018	6.0	87	7.1
		open space	E. 69th St.	33.8795	-118.1592	5.7	83	6.9
		Golden Park	Shoreline Dr.	33.7713	-118.2035	5.7	83	6.8
		open space	Baltic Ave.	33.8224	-118.2138	5.7	82	6.8
		Atlantic Plaza Park	1000 Via Wanda	33.8501	-118.1832	5.4	78	6.4

Table 3-13: Potential site list

City Name	Land Use Designation	Site Name	Site Address	Latitude	Longitude	Approximate Site Area (Acres) [21]	Calculated Max Tributary Area ($A_{TRIBUTARY}$, Acres)	Max Design Capture Volume (DCV, Ac-ft)
Long Beach		Bixby Knolls Park	1101 San Antonio Dr.	33.8406	-118.1791	4.3	62	5.1
		Camp	Excluded for privacy	3.6	53	4.4		
		MacArthur Park	1321 Anaheim St.	33.7835	-118.1747	3.3	48	3.9
		open space	E. 72nd St.	33.8842	-118.1871	3.1	45	3.7
		Orizaba Park	1435 Orizaba Ave.	33.7851	-118.1579	2.7	39	3.2
		Jackson Park	1432 Jackson St.	33.8515	-118.1723	2.1	31	2.5
		open space	Caspian Ave.	33.8236	-118.2123	1.6	24	2.0
		Tanaka Park	1400 W. Wardlow Rd.	33.8235	-118.2134	1.4	20	1.7
		open space	Arlington St.	33.821	-118.215	1.2	17	1.4
		McBride Park (Cal Rec Center)	1550 Martin Luther King Ave.	33.7867	-118.1803	1.0	15	1.2
		Rose Park	8th St. & Orizaba Ave.	33.7772	-118.1568	0.8	11	0.9
		High School	Excluded for privacy			16.6	241	19.9
		High School	Excluded for privacy			14.0	204	16.8
		Middle School	Excluded for privacy			10.3	150	12.4
		Middle School	Excluded for privacy			10.2	148	12.2

Table 3-13: Potential site list

City Name	Land Use Designation	Site Name	Site Address	Latitude	Longitude	Approximate Site Area (Acres) [21]	Calculated Max Tributary Area ($A_{TRIBUTARY}$, Acres)	Max Design Capture Volume (DCV, Ac-ft)
Long Beach	Educational Use	High School	Excluded for privacy			9.3	135	11.1
		Elementary School	Excluded for privacy			8.2	119	9.8
		Middle School	Excluded for privacy			8.0	116	9.6
		Elementary School	Excluded for privacy			6.4	92	7.6
		Elementary School	Excluded for privacy			6.3	91	7.5
		Middle School	Excluded for privacy			6.2	90	7.4
		School	Excluded for privacy			5.2	76	6.3
		Elementary School	Excluded for privacy			5.0	73	6.0
		School	Excluded for privacy			4.8	71	5.8
		Elementary School	Excluded for privacy			4.5	66	5.4
		Elementary School	Excluded for privacy			4.1	60	5.0
		Elementary School	Excluded for privacy			3.8	55	4.5
		Elementary School	Excluded for privacy			3.7	54	4.5
		Elementary School	Excluded for privacy			3.6	52	4.3
		Elementary School	Excluded for privacy			3.4	50	4.1
		Middle School	Excluded for privacy			3.1	45	3.8
		School	Excluded for privacy			3.1	45	3.7
	Educational Use	Elementary School	Excluded for privacy			2.9	42	3.5
		Elementary School	Excluded for privacy			2.6	37	3.1

Table 3-13: Potential site list

City Name	Land Use Designation	Site Name	Site Address	Latitude	Longitude	Approximate Site Area (Acres) [21]	Calculated Max Tributary Area ($A_{TRIBUTARY}$, Acres)	Max Design Capture Volume (DCV, Ac-ft)
Long Beach		Elementary School	Excluded for privacy			2.6	37	3.1
		Elementary School	Excluded for privacy			2.4	35	2.9
		Elementary School	Excluded for privacy			2.1	30	2.5
		Middle School	Excluded for privacy			2.0	29	2.4
		Elementary School	Excluded for privacy			1.9	28	2.3
		Elementary School	Excluded for privacy			1.8	26	2.1
		School	Excluded for privacy			1.7	25	2.1
		Elementary School	Excluded for privacy			1.7	25	2.0
		Elementary School	Excluded for privacy			1.5	22	1.8
		Elementary School	Excluded for privacy			1.5	22	1.8
		Elementary School	Excluded for privacy			1.2	18	1.5
		High School	Excluded for privacy			1.1	15	1.3
		Academy	Excluded for privacy			0.7	10	0.8
	Golf Course/ Country Club	Country Club	Excluded for privacy			178.9	2,603	215
Lynwood	Open Space & Recreation	Lynwood City Park	11301 Bullis Rd.	33.9276	-118.203	10.0	145	12.0
		Yvonne Burke-John D. Ham Park	11832 Atlantic Ave.	33.9137	-118.1901	8.7	127	10.4
		Lynwood Meadows Park	State St. & Cedar Ave.	33.9227	-118.2189	1.5	21	1.8

Table 3-13: Potential site list

City Name	Land Use Designation	Site Name	Site Address	Latitude	Longitude	Approximate Site Area (Acres) [21]	Calculated Max Tributary Area ($A_{TRIBUTARY}$, Acres)	Max Design Capture Volume (DCV, Ac-ft)
Lynwood		Rose Park	Flower St. & State St.	33.9263	-118.2178	1.5	21	1.7
		park	El Segundo Blvd.	33.9176	-118.2149	1.3	19	1.6
		Carnation Park	Los Flores Blvd. & State St.	33.9322	-118.2162	1.2	18	1.5
		open space	Atlantic Ave.	33.9134	-118.191	0.9	13	1.1
		park	El Segundo Blvd.	33.9177	-118.2135	0.8	12	1.0
	Educational Use	Lugo Park	Cortland St.	33.9185	-118.1828	5.1	74	6.1
		Lynwood High	Excluded for privacy			14.8	215	17.7
		Lynwood Middle	Excluded for privacy			7.6	111	9.1
		Marco Antonio Firebaugh High	Excluded for privacy			6.3	91	7.5
		Chavez Middle	Excluded for privacy			4.1	60	4.9
		Mark Twain Elementary	Excluded for privacy			3.8	55	4.5
		Lindbergh Elementary	Excluded for privacy			3.4	50	4.1
		Abbott Elementary	Excluded for privacy			3.1	46	3.8
		Will Rogers Elementary	Excluded for privacy			3.1	44	3.7
		Rosa Parks Elementary	Excluded for privacy			2.8	40	3.3
		Roosevelt Elementary	Excluded for privacy			2.7	39	3.2

Table 3-13: Potential site list

City Name	Land Use Designation	Site Name	Site Address	Latitude	Longitude	Approximate Site Area (Acres) [21]	Calculated Max Tributary Area ($A_{TRIBUTARY}$, Acres)	Max Design Capture Volume (DCV, Ac-ft)
Lynwood	Educational Use	Hosler Middle	Excluded for privacy			2.5	37	3.0
		Wilson Elementary	Excluded for privacy			2.2	32	2.6
		Marshall Elementary	Excluded for privacy			2.1	31	2.5
		Helen Keller Elementary	Excluded for privacy			2.1	30	2.5
		Vista High	Excluded for privacy			1.9	28	2.3
		Washington Elementary	Excluded for privacy			1.5	21	1.8
		Lugo Elementary	Excluded for privacy			1.3	18	1.5
		Lincoln Elementary	Excluded for privacy			0.9	14	1.1
		Lynwood Community Adult	Excluded for privacy			0.9	13	1.1
	Commercial Use	Plaza	Excluded for privacy			11.89	173	12
Paramount	Open Space & Recreation	Ralph C. Dills Park	6500 San Juan St.	33.9001	-118.1843	14.9	217	17.9
		Paramount Park	14400 Paramount Blvd.	33.9018	-118.159	12.5	182	15.0
		Spane Park	14400 Gundry Ave.	33.9029	-118.1759	4.4	64	5.3
		Village Skate Park	7718 Somerset Blvd.	33.8959	-118.1649	0.7	10	0.9
		Meadows Park	15753 Gundry Ave.	33.8895	-118.1751	0.7	9	0.8

Table 3-13: Potential site list

City Name	Land Use Designation	Site Name	Site Address	Latitude	Longitude	Approximate Site Area (Acres) [21]	Calculated Max Tributary Area ($A_{TRIBUTARY}$, Acres)	Max Design Capture Volume (DCV, Ac-ft)
Paramount		open space	Somerset Blvd.	33.8965	-118.1837	0.4	5	0.4
	Educational Use	Elementary School	Excluded for privacy			8.1	117	9.7
		School	Excluded for privacy			4.3	62	5.1
		Elementary School	Excluded for privacy			3.3	49	4.0
		Elementary School	Excluded for privacy			3.2	46	3.8
		School	Excluded for privacy			2.8	41	3.4
		School	Excluded for privacy			2.0	30	2.5
	Educational Use	High School	Excluded for privacy			1.8	27	2.2
		Elementary School	Excluded for privacy			1.7	25	2.1
		Elementary School	Excluded for privacy			1.5	21	1.8
Pico Rivera	Open Space & Recreation	Rio Hondo Park	8421 San Luis Potosi Pl.	34.0119	-118.0921	11.9	172	14.2
		park	Calico Ave.	34.0175	-118.084	1.4	21	1.7
	Educational Use	open space	Cope Dr.	34.0147	-118.087	3.1	45	3.8
		Elementary School	Excluded for privacy			2.0	29	2.4
Signal Hill	Open Space & Recreation	Signal Hill Park	2175 Cherry Ave.	33.7963	-118.1693	6.9	100	8.2
		Hillbrook Park	1865 Temple Ave.	33.7911	-118.1593	0.5	7	0.6

Table 3-13: Potential site list

City Name	Land Use Designation	Site Name	Site Address	Latitude	Longitude	Approximate Site Area (Acres) [21]	Calculated Max Tributary Area ($A_{TRIBUTARY}$, Acres)	Max Design Capture Volume (DCV, Ac-ft)
		Calibrisas Park	2451 California Ave.	33.8017	-118.1809	0.5	7	0.5
		Raymond Arbor Park	1881 Raymond Ave.	33.7912	-118.1647	0.3	5	0.4
	Educational Use	Middle School	Excluded for privacy			7.4	108	8.9
		Elementary School	Excluded for privacy			6.5	95	7.9
		Elementary School	Excluded for privacy			3.9	57	4.7
South Gate	Open Space & Recreation	South Gate Park	4900 Southern Ave.	33.9442	-118.1866	72.8	1,059	87.4
		Circle Park & open space	10129 Garfield Ave.	33.9398	-118.1672	32.3	469	38.7
		Cesar Chavez Park	2541 Southern Ave.	33.9535	-118.2265	4.0	58	4.8
		Hollydale Community Park	12221 Industrial Ave.	33.9158	-118.1642	1.3	19	1.6
		Triangle Park	Southern Ave. & Atlantic Blvd.	33.9459	-118.1805	0.8	11	0.9
		Stanford Park	2715 Illinois Ave.	33.9516	-118.2222	0.7	11	0.9

Table 3-13: Potential site list

City Name	Land Use Designation	Site Name	Site Address	Latitude	Longitude	Approximate Site Area (Acres) [21]	Calculated Max Tributary Area ($A_{TRIBUTARY}$, Acres)	Max Design Capture Volume (DCV, Ac-ft)
South Gate		Hollydale Regional Park	5400 Monroe Ave.	33.9216	-118.1748	29.7	431	35.6
	Educational Use	Middle School	Excluded for privacy			20.7	301	24.9
		Learning Center	Excluded for privacy			15.1	220	18.1
		High School	Excluded for privacy			11.2	163	13.4
		High School	Excluded for privacy			10.0	145	12.0
		Middle School	Excluded for privacy			7.3	106	8.7
		Middle School	Excluded for privacy			6.0	87	7.2
		Elementary School	Excluded for privacy			3.3	49	4.0
		Elementary School	Excluded for privacy			3.3	48	4.0
		Elementary School	Excluded for privacy			2.6	38	3.2
		Elementary School	Excluded for privacy			2.4	36	2.9
	Educational Use	Elementary School	Excluded for privacy			2.1	30	2.5
		Elementary School	Excluded for privacy			2.0	29	2.4
		Elementary School	Excluded for privacy			1.9	28	2.3
		Elementary School	Excluded for privacy			1.8	26	2.1
		Elementary School	Excluded for privacy			1.3	19	1.6

Table 3-13: Potential site list

City Name	Land Use Designation	Site Name	Site Address	Latitude	Longitude	Approximate Site Area (Acres) [21]	Calculated Max Tributary Area ($A_{TRIBUTARY}$, Acres)	Max Design Capture Volume (DCV, Ac-ft)
		Elementary School	Excluded for privacy			1.3	19	1.6
		Elementary School	Excluded for privacy			1.1	16	1.3
		Elementary School	Excluded for privacy			0.9	13	1.1
		Continuation School	Excluded for privacy			0.2	3	0.3

3.4.4 RIGHT-OF-WAY BEST MANAGEMENT PRACTICES

Right-of-way BMPs are systems of multiple distributed BMPs placed within a street right-of-way. These BMPs are designed to reduce the volume of stormwater discharge into the MS4 and treat stormwater runoff from adjacent streets and developments. Common right-of-way BMPs include bioretention, biofiltration, and permeable pavement. See Section 3.3.2 for BMP descriptions. These BMPs can be implemented alone or in conjunction with one another.

A preliminary assessment has been performed to assess areas potentially available for right-of-way BMPs. This was done with a preliminary GIS approach by screening highways, arterial roads, and secondary (collector) roads located in non-residential areas within 200 feet of a catch basin location. The potential locations are indicated with grey circles on Figure 3-25.

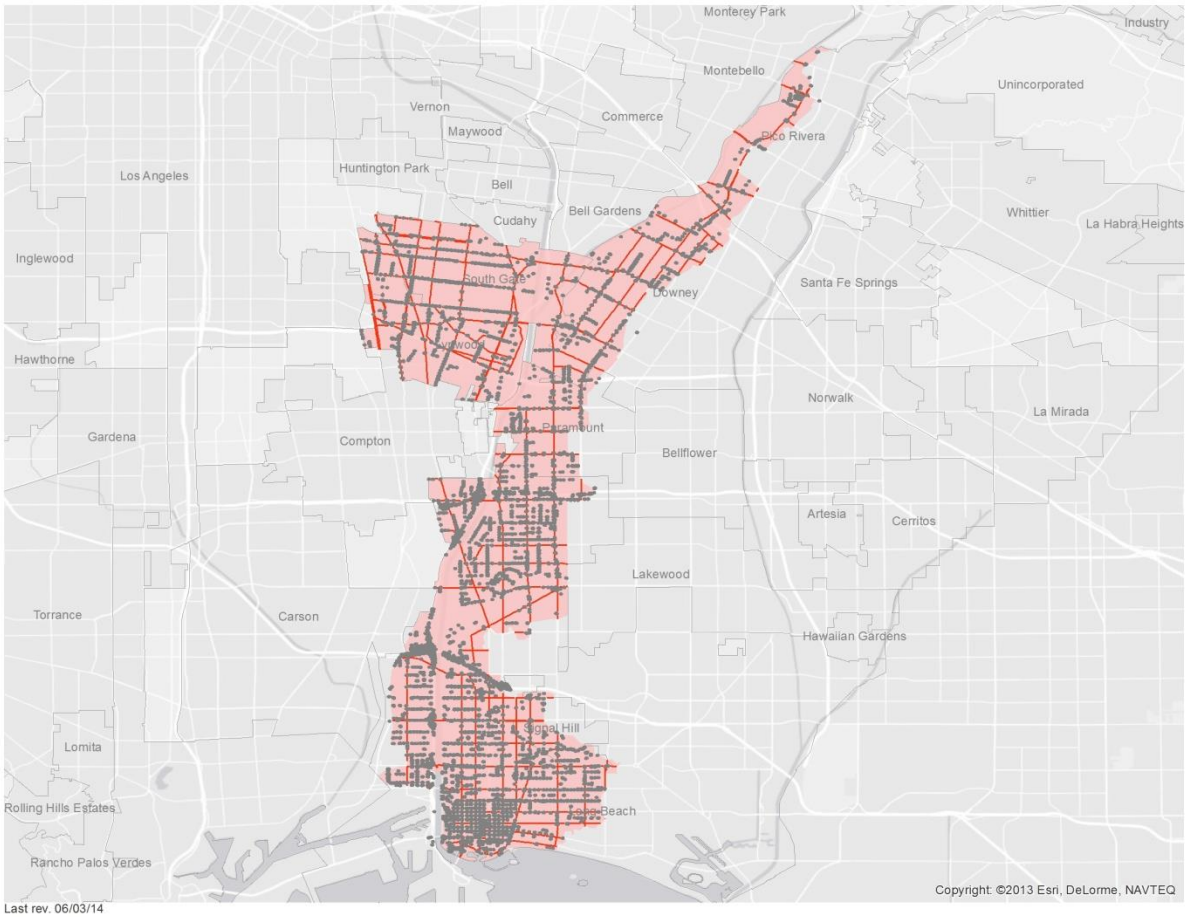


Figure 3-25: Areas potentially available for right-of-way BMPs

4 REASONABLE ASSURANCE ANALYSIS

4.1 EXECUTIVE SUMMARY

A required element the WMP is the Reasonable Assurance Analysis (RAA). The MS4 Permit specifies the RAA use a watershed based computer modeling system to demonstrate:

> *"that the activities and control measures…will achieve applicable WQBELs and/or RWLs with compliance deadlines during the Permit term".*

There are three computer modeling systems approved by the MS4 Permit and the Watershed Management Modeling System (WMMS) was selected to develop this RAA. The Los Angeles County Flood Control District (LACFCD), through a joint effort with U.S. Environmental Protection Agency (USEPA), developed WMMS specifically to support informed decisions associated with managing stormwater.

While the Permits prescribes the RAA as a quantitative demonstration that control measures will be effective, the RAA also promotes a modeling process to identify and prioritize potential control measures to be implemented by the WMP. In other words, the RAA not only demonstrates the cumulative effectiveness of BMPs to be implemented, it also supports their selection. Furthermore, the RAA incorporates the applicable compliance dates and milestones for attainment of the WQBELs and RWLs, and therefore supports BMP scheduling. The ultimate goal of WMMS is to identify cost-effective water quality improvement projects through an integrated, watershed-based approach.

On March 25, 2014, the Los Angeles Regional Water Quality Control Board (Regional Board) issued "RAA Guidelines" (LARWQCB 2014) to provide information and guidance to assist Permittees in development of the RAA. Appendix A-4-1 provides appropriate documentation on the modeling assumptions that meet the RAA Guidelines.

The RAA describes the process for identifying milestones the current and next Permit periods, as well as final milestones to meet applicable TMDLs. Modeling was performed to quantify necessary load reductions to achieve the milestones. Based on these load reduction targets, a pollutant reduction plan was established that outlines the types and sequencing of BMPs for each jurisdiction to achieve milestones throughout the schedule. The RAA provides a detailed list of the capacities needed for BMPs over time, incorporating the existing BMPs and control measures identified in the WMP. These recommendations serve as goals for each jurisdiction to seek opportunities for implementation over time, but strategies may change as opportunities for more cost-effective BMPs are identified throughout the schedule.

The RAA has determined that the metal zinc will be the primary or "limiting" pollutant and that by implementing the structural and non-structural measures in Chapter 3 to reduce zinc, the remaining pollutant reduction targets will be achieved for the Water Quality Priorities defined in Chapter 2. The rationale for this modeling approach is included Section 5.3.1 of the RAA (Appendix 4-1). Over the entire

Lower Los Angeles River Watershed, the RAA projects a need for structural controls to be sized to capture and or treat 803.2 acre -feet.

4.2 REASONABLE ASSURANCE ANALYSIS

The Reasonable Assurance Analysis for the Lower Los Angeles River Watershed is included in Appendix A-4-1. As data is collected through the monitoring program the model will be re-calibrated during the adaptive management process, which will allow for improved simulation of physical processes such as flow volumes and volume retention BMPs.

4.2.1 IRRIGATION REDUCTION

There is sufficient information available to justify a 25% reduction in irrigation through specific controls.

- **"Landscape Water Conservation Programs: Evaluation of Water Budget Based Rate Structures" (1997).**[1] This study was prepared for The Metropolitan Water District of Southern California to evaluate the effects of customer outreach programs and adjustment of water-budget based rate structures on landscape water use. Communities that installed these water conservation programs saw landscape irrigation water use reduced 20-37%.
- **"The Residential Runoff Reduction Study" (2004).**[2] This study was produced for the Municipal Water District of Orange County to determine the effects of certain interventions on water savings. This study used a control or baseline site, an educational only site, and a retrofit site that installed weather-based controller technology and public education. The observed reduction at the retrofit site was 50% from pre- to post-intervention, and a reduction of 71% when comparing to the control group (which had no intervention). The education site also saw a reduction of 21% when compared to the control group.
- **"20x2020 Water Conservation Plan" (2010).**[3] This water conservation plan was prepared by a host of California agencies in response to the Californian Governor's Delta plan initiative that mandates California to have to achieve a 20 percent reduction per capita water use statewide by 2020. This study demonstrated that, for the South Coast specifically (which includes Greater Los Angeles, Long Beach and Orange County), potential conservation savings from current actions—basic measures, such as regulatory activities and reinforcing codes related to plumbing and appliance efficiency—are 3% per capita, or 6 gallons per capita per day (GPCD). Potential conservation savings for "cost effective measures" (such as BMPs and new technologies) are 7% per capita at 80% compliance (13 GPCD at 80% compliance and 17 GPCD at 100% compliance). Total "basic measure" savings are 24 GPCD. Baseline water use level for

[1] Pekelney, D., & Chestnutt, T. (1997). Landscape Water Conservation Programs: Evaluation of Water Budget Based Rate Structures. *The Metropolitan Water District of Southern California*. P vi of the Summary.

[2] The Municipal Water District of Orange County & The Irvine Ranch Water District. (2004). The Residential Runoff Reduction Study. *The Municipal Water District of Orange County.* P ES1 and ES6.

[3] California Department of Water Resources, State Water Resources Control Board, California Bay-Delta Authority, California Energy Commission, California Department of Public Health, California Public Utilities Commission, California Air Resources Board, California Urban Water Conservation Council, & U.S. Bureau of Reclamation. (2010). 20x2020 Water Conservation Plan.

the South Coast region is 180 GPCD, which means with basic measures in place there is potential for 13.3% conservation savings. The study further demonstrates that with additional measures (such as residential weather-based irrigation controllers, landscape practices, recycled water, etc.) potential conservation savings are 29 GPCD, or 16% for the South Coast Region. While this study evaluates the effects of interventions on a *per capita* basis, the results of this study have implications on water reductions and water savings for watersheds as a whole.

- **"Landscape Management for Water Savings" (1998).**[4] This study resulted in a "43% increase in landscape water efficiency (water savings) from 1990-1997" after instituting conservation pricing, financial incentives, and education programs for customers and landscape professionals. The author makes a strong conclusion that most irrigation systems need to be recalibrated to only provide the amount of water necessary for the plants within the landscape to grow. Furthermore, the author provides several specific cases that demonstrate that when water resources are mismanaged by outdated irrigation systems or uninformed landscape professionals, this wastes precious water resources and costs the landscape owners excess money.

In addition, on July 28, 2014, an emergency regulatory action went into effect in response to the ongoing drought conditions within California[5]. This emergency regulatory action prohibits: 1) The application of water to outdoor landscapes in a manner that causes runoff such that water flows onto adjacent property, non-irrigated areas, private and public walkways, roadways, parking lots or structures; 2) The use of a hose to wash a motor vehicle, except where the hose is fitted with a shut-off nozzle or similar; and 3) The application of water to driveways and sidewalks. These mandatory regulations are expected to reduce landscape and water runoff.

The study results show a strong nexus between public education (leading to an increased awareness of water conservation and usage) and a reduction in irrigation use. The Participating Agencies will develop an outreach and education program focusing on water conservation and landscape water use efficiency.

Based on study results and the initiation of regulations aimed to reduce irrigation water use, a 25% reduction of irrigation water utilized in the RAA is considered reasonable and conservative.

As part of the adaptive management process the Participating Agencies will evaluate these assumptions during Program implementation and develop alternate controls if it becomes apparent that the assumption is not supported.

[4] Ash, T. (1998). How to Profit from a Water Efficient Future. In *Landscape Management for Water Savings*. Tustin, CA: Municipal Water District of Orange County. P 8.

[5] Title 23, California Code of Regulations. Government Code Sections 11346.1 and 11349.6. OAL File No. 2014-0718-01 E.

4.3 NON-MODELED CONTROLS

Currently there is insufficient information to accurately model the implementation of the controls listed in Section 3.2.3 through 3.4.1. These non-modeled controls were instead assigned a modest fraction of 10% for their cumulative load reduction. As part of the adaptive management process the Participating Agencies will evaluate this assumption during Program implementation and develop alternate controls if it becomes apparent that the assumption is not supported. However, despite the uncertainty surrounding the specific load reductions for these controls, there is support to suggest that the assumption is in fact a modest one.

Chapter 3 provides qualitative assessments of potential pollutant reductions for new non-modeled, nonstructural and structural controls required by the 2012 MS4 Permit (Sections 3.2.4 and 3.3.1) as well as new non-modeled controls developed as part of this WMP (i.e., the "targeted" control measures of Section 3.4.1). The nonstructural measures are summarized in Tables 3-2 and 3-11. As explained in detail in Sections 3.2.4 and 3.3.1, the number and scope of the new and modified (i.e., enhanced) minimum provisions under the Permit is substantial. Of particular note are the Low Impact Development (LID) provisions—which replace prior SUSMP provisions—for new developments. Potential load reductions from future LID projects were not incorporated into the RAA and as such contribute to the 10% non-modeled assumption. Also, pollutant reductions may be expected from continued, preexisting minimum controls with an educational component, such as public education, inspections of industrial/commercial and construction sites, and illicit discharge detection and elimination. Such programs can benefit from a continued increase in behavior change over time. Finally, the TSS Reduction Program—one of the non-modeled targeted control—does allow for a rough estimate of potential load reductions, as outlined in the following subsection.

4.3.1 TSS REDUCTION PROGRAM QUANTIFICATION

Although expected pollutant reductions resulting from the TSS Reduction Strategy are not modeled empirically within WMMS, a rudimentary quantification of the program's potential effectiveness may be calculated through the application of the Revised Universal Soil Loss Equation (RUSLE). The RUSLE is defined as

$$A = RKLS$$

where

$A =$ Spatially and temporally averaged soil loss per unit area per unit time. The result is expressed in the units elected for K and R.
$R =$ Rainfall-runoff erosivity factor (per unit time, generally one year),
$K =$ Soil erodibility factor (mass per unit area – an area density – generally tons per acre),
$L =$ Slope length factor and
$S =$ Slope steepness factor.

Using local values of R, K and LS obtained through maps available on the State Water Resources Control Board's website for the Construction General Permit[6],

$$R \approx 40\ year^{-1}$$
$$K \approx 0.32\ \frac{tons}{acre}\ \text{and}$$
$$LS \approx 0.45$$

giving

$$A = (40\ year^{-1})\left(0.32\ \frac{tons}{acre}\right)0.45$$
$$A = 5.76\ \frac{tons}{acre\ year}.$$

Following the CGP Risk assessment procedures, 5.76 tons per acre year is within the "low sediment risk" designation.

During the cooperative preparation of the Lower San Gabriel River (SGR), Lower Los Angeles River and Los Cerritos Channel (LCC) WMPs, several participating agencies provided estimates of exposed soil within their jurisdiction that were not related to construction activities. The City of Bellflower, within the adjacent LCC and Lower SGR watersheds, field-verified these estimates which totaled approximately 18 acres or about 0.5% of the City. Following the calculated value for A, this equates to approximately 100 tons of soil loss per year. The City of Signal Hill determined that 104.37 acres of the 531 acres within the city that drain to the LA River consists of undeveloped vacant land (20%)—however this is an anomalous circumstance specific to the City. Applying the 104 acres to Signal Hill and extrapolating the 0.5% to the remaining area of the Lower LA River Watershed (27,194 acres), the soil loss tonnage is

$$M_{TSS} = fWA = (0.005 \cdot 27{,}194\ acres + 104\ acres)\left(5.76\ \frac{tons}{acre\ year}\right)$$
$$M_{TSS} = 240\ acres\left(5.76\ \frac{tons}{acre\ year}\right)$$
$$M_{TSS} \approx 1{,}400\ \frac{tons}{year}$$

where

$M_{TSS} =$ Estimated annual soil loss within the Lower LAR watershed in tons,
$f =$ Estimated fraction of exposed soil (non-construction) within a given urbanized area and
$W =$ Watershed area.

Historical monitoring results from the adjacent LCC Watershed suggest that approximately 1.8 grams of zinc adheres to every kilogram of TSS, so that the zinc discharge M_{Zn} associated with M_{TSS} is

[6] http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml

$$M_{Zn} \approx \left(\frac{1.8}{1{,}000}\right) M_{TSS}$$
$$M_{Zn} \approx \left(\frac{1.8}{1{,}000}\right)\left(1{,}400\ \frac{tons}{year}\right)\left(\frac{2{,}000\ lbs}{1\ ton}\right)$$
$$M_{Zn} \approx 5{,}000\ \frac{lbs}{year}\ or\ 2{,}300\ \frac{kg}{year}.$$

The RAA predicts an annual zinc loading of 8,878 kg for the average storm year. Assuming that within the term of the MS4 Permits the TSS Reduction Strategy approaches an effectiveness goal of 10% (230 kg/year), this would equate to a load reduction of **2.6%**. Reductions of this magnitude provide support for the 10% load reduction assumed for non-modeled controls. Further development of the TSS Reduction program is anticipated to meaningfully aid in the achievement of targeted load reductions.

5 COMPLIANCE SCHEDULE

This Chapter provides the compliance schedule for each Participating Agency. The compliance schedule will be used to measure progress toward addressing the highest WQPs and achieving interim and final WQBELs and RWLs. Where deadlines are not specified within the MS4 Permit term, interim milestones are provided. The schedule is expressed as the needed structural BMP capacities over space and time. The Reasonable Assurance Analysis (RAA, Chapter 4) refines the capacity over space to the subwatershed level. The BMP capacities assume a 10% reduction over the MS4 Permit term through implementation of the nonstructural BMPs described in Chapter 3. The following section of this chapter includes the nonstructural BMP schedule.

Meeting the load reductions determined by the RAA results in an aggressive compliance schedule in terms of the technological, operational, and economic factors that affect the design, development, and implementation of the necessary control measures. Notably, as described in Chapter 6, there is currently no funding source to pay for these controls. Assuming finances are available, conversion of available land into a regional BMP is a protracted process that can take several years (not accounting acquisition, when required). As such the Group considers the compliance schedule to be as short as possible.

This is true for all WQPs—by the nature of the limiting pollutant approach, it is expected that each of the remaining WQPs will be controlled at a faster rate than zinc. So the aggressive schedule in place to target zinc provides an equally aggressive schedule to target the remaining WQPs, and as such it is considered to be as short as possible for all WQPs.

5.1 NONSTRUCTURAL BEST MANAGEMENT PRACTICES SCHEDULE

A 10% load reduction is assumed to result from the cumulative effect of nonstructural BMPs. These nonstructural BMPs consist of Minimum Control Measures, Nonstormwater Discharge Measures and Targeted Control Measures (MCMs, NSWD measures and TCMs) as described in Chapter 3.

5.1.1 NONSTRUCTURAL MINIMUM CONTROL MEASURES SCHEDULE

The MCMs will be implemented by the Participating Agencies upon approval of the WMP by the Regional Board Executive Officer or by the implementation dates provided in the MS4 Permit, where applicable. The scope of the MCM programs has expanded significantly from the prior third term MS4 Permit. This change is not entirely unexpected as a period of over ten years separates the adoption of the third and fourth term permits. Consequently significant pollutant reductions are anticipated through effective implementation of the new nonstructural MCMs. In particular, effective implementation of the Development Construction program will compliment the nonstructural TSS Reduction Strategy.

MCM provisions new to the Cities are described in WMP Section 3.2. Guidance documents have been prepared as an optional aid to Cities in MCM development/implementation – see Attachment 3.1.

5.1.2 NONSTRUCTURAL NON STORMWATER DISCHARGE MEASURES SCHEDULE

The NSWD measures will be implemented by the Participating Agencies upon approval of the WMP by the Regional Board Executive Officer or by the implementation dates provided in the MS4 Permit, where applicable. The scope of the NSWD measures has expanded from the prior third term MS4 Permit. In particular, NSWD source investigations are now tied into a robust outfall screening program required by the MS4 Permit Monitoring and Reporting Program and additional conditions have been placed on common exempt NSWDs, such as potable water discharges and irrigation runoff. Consequently significant pollutant reductions are anticipated through the resulting reductions in NSWD flows.

NSWD measures new to the Participating Agencies are described in WMP Section 3.3.

5.1.3 NONSTRUCTURAL TARGETED CONTROL MEASURES SCHEDULE

The specific Participating Agencies implementing each TCM is included in Table 3-5 in Chapter 3. The table also lists whether the TCM is a *planned* or a *potential* control measure. Potential control measures are contingent upon unknown factors such as governing body approval and as such implementation within the MS4 Permit term cannot be guaranteed. Descriptions of each nonstructural TCM are included in WMP Section 3.4.

Uncertainties associated with the targeted nonstructural controls complicate establishment of specific implementation dates. Despite this uncertainty, the Group has made a diligent effort to provide a clear schedule of specific actions within the current and next permit terms in order to achieve target load reductions. In addition, the status of these controls will be included in the annual watershed reports as well as through the adaptive management process in order to assess their progress in attaining targeted load reductions. Table 5-1 lists the nonstructural TCM compliance schedule.

TSS REDUCTION STRATEGY

The expanded start-date ranges for the TSS Reduction Strategy (TCM-TSS-1 to 6) are set to accommodate the time needed to develop, adopt and implement model ordinances. A successfully implemented ordinance from the City of Whittier is also included in this WMP as Appendix A-3-2. The remaining Cities will consider this ordinance as a template for their own TSS Reduction Strategy.

Complete implementation of this Program throughout the watershed is not expected by the end of the MS4 Permit term. However, as discussed in WMP Section 3.4, appreciable pollutant reductions may be realized with only partial implementation.

In the following table, for the nonstructural targeted control measures designated as a "jurisdictional effort", the Permittees that are responsible for completion of each milestone in the compliance schedule are identified in Table 3-11.

Table 5-1: Nonstructural TCM Compliance Schedule

Nonstructural TCM	Chapter 3 ID	Effort	Start date	Milestones
Prioritize facility inspections based on WQPs	TCM-ICF-1	J*	7/1/2015	Reprioritize facilities as new water quality data is collected.
Enhance tracking through use of online GIS MS4 Permit database	TCM-MRP-1	J	7/1/2015	Modify database to reflect MS4 Permit provisions by 7/1/2016.
Increased street sweeping frequency or routes	TCM-PAA-3	J	7/1/2015	Report on status with annual report submittal.
Apply for grant funding for stormwater quality projects	TCM-INI-4	W/J	7/1/2014	Suitable grants are pursued when practicable.
Refocused outreach to target audiences and WQPs	TCM-PIP-1	W/J	7/1/2015	Report on status with annual report submittal.
Train staff to facilitate LID and Green Streets implementation	TCM-PLD-1	J	7/1/2014	Complete first round by 7/1/2016. Continue periodic staff training.
LID ordinance for projects below MS4 Permit thresholds	TCM-PLD-2	J	7/1/2014	Adopt ordinance by 12/28/2017.
Encourage retrofitting of downspouts	TCM-RET-1	J	7/1/2015	Develop educational material by 1/1/2016. Supply to builders or contractors by 7/1/2016. Report on status with annual report submittal.
Prepare guidance documents to aid implementation of MCMs	TCM-SWM-1	W/J	7/1/2014	Develop documents by 7/1/2015. Revise documents as needed.
Exposed soil ordinance	TCM-TSS-1	J	7/1/2015	Develop by 12/28/2015. Adopt by 7/1/2017.
Erosion repair and slope stabilization on private property	TCM-TSS-2	J	7/1/2015	Report on status with annual report submittal.
Private parking lot sweeping ordinance	TCM-TSS-3	J	7/1/2015	Adopt ordinance by 7/1/2017.
Sweeping of private roads and parking lots	TCM-TSS-4	J	7/1/2015	Enforce TCM-TSS-3 by 12/28/2017.
Erosion repair and slope stabilization on public property	TCM-TSS-6	J	7/1/2015	Report on status with annual report submittal.
Copper reduction through implementation of SB 346	TCM-INI-1	W*	Ongoing	Milestones are independent of participating agency actions.
Lead reduction through implementation of SB 757	TCM-INI-2	W	Ongoing	Milestones are independent of participating agency actions.

Support safer consumer product regs for zinc reduction in tires	TCM-INI-3	W	Ongoing	Report on status with annual report submittal.
Incentives for irrigation reduction practices	TCM-NSWD-1	J	Ongoing	Ongoing; no interim or final milestones.
Upgraded sweeping equipment	TCM-PAA-1	J	Ongoing	Report on status with annual report submittal.
(Sanitary) Sewer System Management Plan	TCM-PAA-2	J	Ongoing	Ongoing; no interim or final milestones.
Negotiate with utilities for erosion control within ROW	TCM-TSS-5	W	Ongoing	Report on status with annual report submittal.

* W – Watershed Group effort, J – Jurisdictional effort

5.2 PLANNED PROJECT - PROPOSITION 84 GRANT AWARD

The cities of Bell Gardens, Downey, Pico Rivera, Paramount, South Gate, and Lynwood are participating in a regional multi-watershed project through the Gateway Water Management Authority (GWMA). This project applied for and was awarded funding though the Proposition 84 Grant. Initiation of this project will begin as soon as the grant contracts and funding are finalized which is expected to be in the fall of 2014. The BMPs include: thirteen (13) tree box filters and ten (10) bioretention tree wells. The project will install LID BMPs along transportation corridors to treat stormwater runoff and its associated pollutants. Table 5-2 lists the responsible Permittees for each LID BMP in the Proposition 84 Grant project and Table 5-3 lists the deadlines and status for certain project milestones.

Table 5-2: Permittees Responsible for LID BMPs in the Proposition 84 Grant Project

City	LID BMPs	Anticipated Treatment Volume[1]
Bell Gardens	(1) Tree box filter	7,258 cf
Lynwood	(10) Bioretention Tree Wells	5,870 cf
	(3) Tree box filters	21,774 cf
Paramount	(2) Tree box filters	14,516 cf
Pico Rivera	(2) Tree box filters	14,516 cf
South Gate	(2) Tree box filters	14,516 cf
Vernon	(2) Tree box filters	14,516 cf

[1] Treatment volume calculations based on a 24-hour, 0.75-inch storm, 6x6 tree box filter units, and a 1200 LF swale. Additional details and calculations used to determine treatment volumes can be found in Attachment 6: Technical Report

Table 5-3: Deadlines and Status for Prop 84 Tasks

Milestone	Deadline	Status
CEQA	January 2015	Completed
Monitoring Plan, Project Plan and Assessment, and Quality Assurance Project Plan	March 2015	Pending Approval
Preliminary Plans and Specifications	March 2015	Completed
Final Plans and Specifications	June 2015	Pending Approval
Awarded Construction Contract	July 2015	In Progress
Construction and Implementation	August 2015 – August 2016	Expected
Operation and Maintenance Plan	August 2016	Expected
Monitoring and Reporting	October 2016 – April 2017	Expected
Project Completion	April 2017	Expected

With the installation of these LID BMPs, this project is expected to reduce pollutant loads throughout the watershed. The full benefits of this project as it ties into interim and final compliance milestones will be determined during the adaptive management process. The project is currently in the design phase. Project milestones and implementation timeframes are listed below.

Design, Environmental Documentation and Design and Bid Solicitation Process

The Project went through review to determine compliance with the environmental requirements such as those outlined in the California Environmental Quality Act (CEQA) in January 2015.

The Monitoring Plan, the Project Assessment and Evaluation Plan, and the Quality Assurance Project Plan were all submitted in March 2015. The Project Assessment and Evaluation Plan was approved, and the Monitoring Plan and the Quality Assurance Project Plan are expected to be approved May 2015. Preliminary plans and specifications were developed and submitted in March 2015. Comments were received and addressed, and final plans and specifications are expected to be approved by June 2015. All proposed BMPs will be located on public property in the public right of way and therefore, issues obtaining site access are not expected as well as obtaining access agreements and easement deeds will not be required.

During the Project design and bid process, a preliminary engineering analysis will be performed for proposed designs and locations, preparation and review of design drawings and technical specifications. The Participating Agencies will collaborate in reviewing the submitted proposals and construction documents. Once the review process is complete a construction contract will be awarded and finalized by the end of July 2015.

Construction and Implementation

The Project construction and implementation process is expected to begin in August 2015. Construction is anticipated to last for approximately twelve months and completion is expected in August 2016. Associated activities for construction will include mobilization and site preparation, excavation, installation of BMPs and proper coordination with contractors. An Operation and Maintenance Plan will be developed by end of the year 2016. Monitoring and reporting will be conducted beginning in October 2016. Community event materials, survey results, and school outreach materials will all be developed by end of the year 2016. All construction, monitoring and administration activities are expected to be completed by April 2017.

5.3 STRUCTURAL BEST MANAGEMENT PRACTICE SCHEDULE

Uncertainties associated with the structural controls complicate establishment of specific implementation dates. Despite this uncertainty the Group has made a diligent effort to provide a clear schedule of specific actions within the current and next permit terms in order to achieve target load reductions.

5.3.1 STRUCTURAL MINIMUM CONTROL MEASURE SCHEDULE

Significant pollutant reductions are anticipated through each City's effective implementation of the new structural LID BMP requirements of the Planning and Land Development Program. These new MCM provisions are described in WMP Section 3.2. Guidance documents have been prepared as an optional aid to Cities in MCM development/implementation – see Attachment 3.1.

The Planning and Land Development Program will be implemented no later than June 28, 2014.

5.3.2 STRUCTURAL TARGETED CONTROL MEASURE SCHEDULE

The RAA (see Chapter 4) demonstrates the cumulative effectiveness of BMPs to be implemented, supports BMP selection, and provides volume reduction goals optimized across the entire watershed. The results are summarized for volume reduction (represented in acre-feet) for interim and final compliance milestones.

The plan depicted in the RAA is considered a potential initial scenario. Through the adaptive management process, the participating agencies may select different types of BMPs (e.g. increase implementation of green streets and reduce implementation of regional BMPs) or substitute alternative BMPs altogether (e.g., implement dry wells instead of green streets).

The wet weather volume reductions necessary for each milestone (31%, 50% and Final) for each City show the combined total estimated BMP volume (acre-feet) for right-of-way (ROW) BMPs and regional Low Impact Development (LID) BMPs on public or private parcels. Specific green streets projects were not investigated during this initial analysis for potential BMPs, therefore, the City-specific summary lists

potential regional LID BMPs that *could* be used to achieve the required interim milestones and targets. Since this WMP is a planning-level document, over time the Watershed Group will report and demonstrate that the summative effect of projects implemented add up to the required reductions for interim milestones and final targets.

Dry weather reductions are attained through a combination of non-structural practices and structural BMPs as they are implemented as part of the wet weather attainment of limits. As wet-weather BMPs are implemented, they serve to remove the dry-weather flows thus meeting the compliance set forth to achieve dry-weather reductions.

Where applicable, potential regional LID BMPs have been identified for the 31% and 50% milestones. Interim and final compliance dates identified in the RAA are the primary drivers for the structural targeted control measure schedule. As discussed in Section 3, several structural treatment project have already been completed and there are upcoming projects (e.g. Proposition 84 Grant). These projects constitute significant progress towards the 31% milestone by the 2017 target and the 50% milestone in 2024. Further implementation with feasibility studies of the projects identified within this WMP is subject to the financial strategy (See Chapter 6). Through implementation of the WMP and adaptive management there is the potential for the BMP capacity for the final compliance milestone to change, therefore, potential BMPs for final milestones were not identified.

APPROACH TO IMPLEMENTING STRUCTURAL CONTROLS

The Participating Agencies understand that targeting subsequent load reductions demands that the process of implementing structural controls begin as soon as possible. The initial phase of this process is as follows:

Right-of-Way BMPs (green street principles) - As the Participating Agencies prepare new capital improvement projects throughout their jurisdiction, a review to incorporate green street principles into the project will be done. Additionally, the Strategic Transportation Plan (STP), currently a draft document), prepared by the Gateway Water Management Authority, identifies major transportation corridors slated for significant redevelopment. The STP will require that structural stormwater BMPs be considered and incorporated into these projects where feasible. Implementation of the STP is expected to contribute to the achievement of the required metal reductions by the compliance deadlines.

Schedule: Every two years the adaptive management process will include an assessment of the effectiveness of both 1) right-of-way BMPs incorporated into CIP projects and 2) the STP in contributing toward targeted load reductions.

Regional BMPs - In each jurisdiction, potential Regional BMP locations have been identified and ranked. To maximize efficiency and resources, a feasibility study will be developed to aid in selection of the most effective BMPs. The study will provide criteria for selecting locations for regional BMPs, the process of

ground-truthing to concretely determine feasibility, and a schedule that demonstrates implementation of regional BMPs. In conjunction with development of the feasibility study, each Participating Agency will conduct a preliminary site assessment at the highest ranked potential BMP. The preliminary site assessment will include reviewing available plans, and identifying nearby stormdrain systems and drainage areas. Should information acquired during the preliminary assessment suggest the selected potential BMP to be infeasible, additional high ranked potential BMPs in that jurisdiction will be explored. By December 2016, each Participating Agency would have conducted sufficient preliminary site determinations to select a location sufficient for further exploration. Selected sites will be chosen for additional exploration to include field analysis.

Schedule: The preliminary site assessments and feasibility study will be completed by March 2016. Field analysis at selected sites will begin in December 2016.

Even though not all projects can be specified and scheduled at this time, the Participating Agencies are committed to constructing the necessary regional and right-of-way BMPs to meet the determined load reductions per applicable compliance schedules. Through implementation of the WMP and adaptive management there is the potential for the final compliance milestones to change.

Furthermore, the LACFCD will work with the Watershed group in their efforts to address source controls; assess, develop, and pursue funding for structural BMPs, and promote the use of water reuse and infiltration. As regional project scopes are further refined, the LACFCD will contribute to the WMP projects on a case-by-case basis, agreed upon with the Watershed Group.

5.4 POLLUTANT REDUCTION PLAN TO ATTAIN INTERIM & FINAL LIMITS

The following pages describe the pollutant reduction plans for each City for drainage areas within the Los Angeles River. Figure 5-1 is an illustration of the total structural BMP capacity needed to comply with final WQBELs/RWLs within the Lower LAR Watershed.

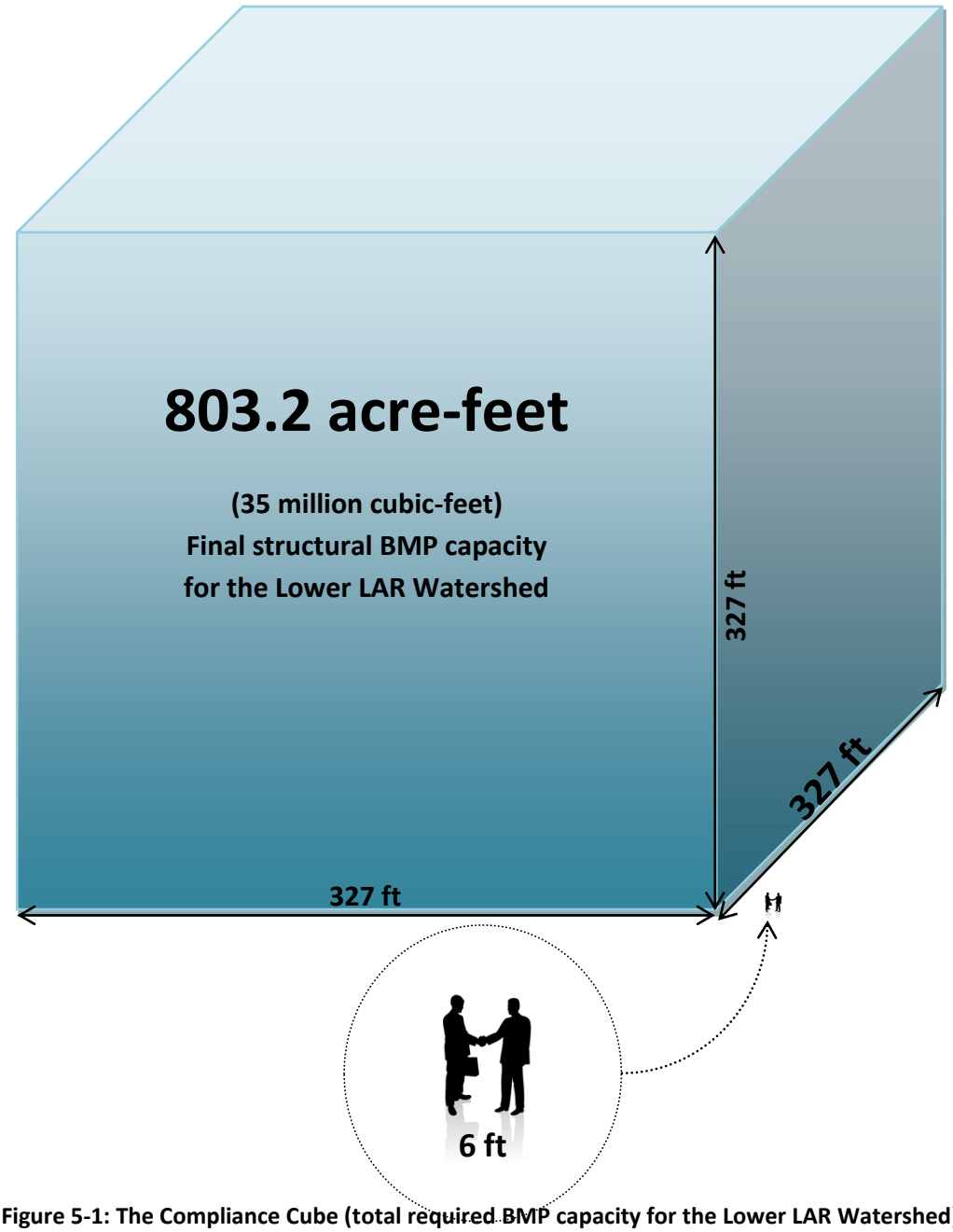


Figure 5-1: The Compliance Cube (total required BMP capacity for the Lower LAR Watershed)

5.4.1 CITY OF DOWNEY

Jurisdiction	Milestone	POLLUTANT REDUCTION PLAN*	
		Total Estimated BMP Volume (acre-ft)**	
		Incremental	Cumulative
Downey	31%	20	20
	50%	13.2	33.2
	Final	46.3	79.6

* Values taken directly from RAA. Differences between the sum of the incremental reduction volumes and the cumulative reduction volumes are attributed to rounding errors of the second decimal place.
** Values attained after the city's existing distributed BMP volumes totaling 1.9 acre-feet were incorporated.

According to the RAA results, the city of Downey will need to capture and/or treat 20 acre-feet of stormwater by September 30, 2017 to meet the 31% interim compliance milestone, 13.2 acre-feet by January 11, 2024 to meet the 50% interim compliance milestone, and 79.6 acre-feet by January 11, 2028 to meet the final compliance milestone.

If Furman Park were transformed into an infiltration BMP, the park would have the potential of retaining 16.5 acre-feet of stormwater. Right-of-Way BMPs could be used for the remaining 3.5 acre-feet to meet the 31% compliance milestone.

If Apollo Park were converted to an infiltration BMP, the park would have the potential of retaining 13.2 acre-feet of stormwater to meet the 50% compliance milestone.

31% Interim Compliance Milestone	
Potential BMP Site	Potential Design Capture Volume (ac-ft)
Furman Park	16.5
Right-of-Way BMPs	3.5
Total	20.0
50% Interim Compliance Milestone	
Potential BMP Site	Potential Design Capture Volume (ac-ft)
Apollo Park	13.2
Cumulative Total	33.2

TRASH TMDL COMPLIANCE[A,B]

Jurisdiction	Baseline lbs drip dry trash	10/1/2011-9/30/2012 target 70%	10/1/2013-9/30/2014 target 80%	10/1/2013-9/30/2014 target 90%	10/1/2014-9/30/2015 target 96.7%	10/1/2015-9/30/2016 target 100%
Downey	68,570	90%	90%	91.6%	---	---

[A] ARS partial capture systems are assigned 86% efficiency.
[B] Percentages are based on number of catch basins and number retrofitted.

5.4.2 CITY OF LAKEWOOD

Jurisdiction	Milestone	POLLUTANT REDUCTION PLAN	
		Total Estimated BMP Volume (acre-ft)	
		Incremental	Cumulative
Lakewood	31%	1.1	1.1
	50%	0.0	1.1
	Final	0.0	1.1

According to the RAA results, the city of Lakewood will need to capture and/or treat 1.1 acre-feet of stormwater by September 30, 2017 to meet the 31% and 50% interim compliance milestone as well as the final compliance milestone.

To achieve the 31% interim compliance milestone of 1.1 acre-feet, Right-of-Way BMPs could be used.

31% and 50% Interim Compliance Milestone	
Potential BMP Site	Potential Design Capture Volume (ac-ft)
Right-of-Way BMPs	1.1
Total	1.1

TRASH TMDL COMPLIANCE[A,B]

Jurisdiction	Baseline lbs drip dry trash	10/1/2011-9/30/2012 target 70%	10/1/2013-9/30/2014 target 80%	10/1/2013-9/30/2014 target 90%	10/1/2014-9/30/2015 target 96.7%	10/1/2015-9/30/2016 target 100%
Lakewood	N/A	67%[c]	67%[c]	100	---	---

[A] ARS partial capture systems are assigned 86% efficiency .

[B] Percentages are based on number of catch basins and number retrofitted.

[c] 67 percent reported due to limitations of the Regional Board's reporting format. Lakewood has 6 catch basins within the Los Angeles River watershed, 2 of the 6 catch basins have ARS and CPS units, the other 4 do not as they drain to a retention basin.

5.4.3 CITY OF LONG BEACH

Jurisdiction	Milestone	POLLUTANT REDUCTION PLAN* Total Estimated BMP Volume (acre-ft) Incremental	Cumulative
Long Beach	31%	1.0	1.0
	50%	72.5	73.5
	Final	245.7	319.1

* Values taken directly from RAA. Differences between the sum of the incremental reduction volumes and the cumulative reduction volumes are attributed to rounding errors of the second decimal place.

According to the RAA results, the city of Long Beach will need to capture and/or treat 1.0 acre-foot of stormwater by September 30, 2017 to meet the 31% interim compliance milestone, 73.5 acre-feet by January 11, 2024 to meet the 50% interim compliance milestone, and 319.1 acre-feet by January 11, 2028 to meet the final compliance milestone.

To achieve the 31% interim compliance milestone of 1.0 acre-feet, Right-of-Way BMPs could be used. If Houghton Park, Scherer, and Veterans Memorial Park were transformed into infiltration BMPs, the parks would have the potential of retaining 70.9 acre-feet of stormwater. Right-of-Way BMPs could be used for the remaining 1.6 acre-feet to meet the 50% compliance milestone. Alternatively, The city of Long Beach's Municipal Urban Stormwater Treatment (MUST) project, being designed to have a potential treatment capacity of approximately 4, 700 acres could be used to meet the 50% compliance milestone.

31% Interim Compliance Milestone	
Potential BMP Site	Potential Design Capture Volume (ac-ft)
Right-of-Way BMPs	1.0
Total	1.0
50% Interim Compliance Milestone	
Potential BMP Site	Potential Design Capture Volume (ac-ft)
Houghton Park	27.9
Scherer Park	25.8
Veterans Memorial Park	17.2
Right-of-Way BMPs	1.6
Cumulative Total	73.5

TRASH TMDL COMPLIANCE[A,B]

Jurisdiction	Baseline lbs drip dry trash	10/1/2011-9/30/2012 target 70%	10/1/2013-9/30/2014 target 80%	10/1/2013-9/30/2014 target 90%	10/1/2014-9/30/2015 target 96.7%	10/1/2015-9/30/2016 target 100%
Long Beach	149,759	NR[C]	NR[C]	92%	---	---

[A] ARS partial capture systems are assigned 86% efficiency. [B] Percentages are based on number of catch basins and number retrofitted. NR report was not required by the MS4 Permit in effect at that time.

5.4.4 CITY OF LYNWOOD

Jurisdiction	Milestone	POLLUTANT REDUCTION PLAN	
		Total Estimated BMP Volume (acre-ft)	
		Incremental	Cumulative
Lynwood	31%	34.2	34.2
	50%	16.7	50.9
	Final	44.5	95.4

According to the RAA results, the city of Lynwood will need to capture and/or treat 34.2 acre-feet of stormwater by September 30, 2017 to meet the 31% interim compliance milestone, 50.9 acre-feet by January 11, 2024 to meet the 50% interim compliance milestone, and 95.5 acre-feet by January 11, 2028 to meet the final compliance milestone.

If Lynwood City Park and Yvonne Burke-John D. Ham Park were transformed into infiltration BMPs, the parks would have the potential of retaining 22.4 acre-feet of stormwater. Right-of-Way BMPs could be used for the remaining 11.8 acre-feet to meet the 31% compliance milestone.

If Lynwood Meadows Park and Rose Park were transformed into infiltration BMPs, the parks would have the potential of retaining 2.5 acre-feet of stormwater. Right-of-Way BMPs could be used for the remaining 13.2 acre-feet to meet the 50% compliance milestone.

31% Interim Compliance Milestone	
Potential BMP Site	Potential Design Capture Volume (ac-ft)
Lynwood City Park	12.0
Yvonne Burke-John D. Ham Park	10.4
Right-of-Way BMPs	11.8
Total	34.2
50% Interim Compliance Milestone	
Potential BMP Site	Potential Design Capture Volume (ac-ft)
Lynwood Meadows Park	1.8
Rose Park	1.7
Right-of-Way BMPs	13.2
Cumulative Total	50.9

TRASH TMDL COMPLIANCE[A,B]

Jurisdiction	Baseline lbs drip dry trash	10/1/2011-9/30/2012 target 70%	10/1/2013-9/30/2014 target 80%	10/1/2013-9/30/2014 target 90%	10/1/2014-9/30/2015 target 96.7%	10/1/2015-9/30/2016 target 100%
Lynwood	46,467	92%	92%	96%	---	---

[A]ARS partial capture systems are assigned 86% efficiency .

[B]Percentages are based on number of catch basins and number retrofitted

5.4.5 CITY OF PARAMOUNT

Jurisdiction	Milestone	POLLUTANT REDUCTION PLAN*	
		Total Estimated BMP Volume (acre-ft)**	
		Incremental	Cumulative
Paramount	31%	20.9	20.9
	50%	8.5	29.3
	Final	47.2	76.5

* Values taken directly from RAA. Differences between the sum of the incremental reduction volumes and the cumulative reduction volumes are attributed to rounding errors of the second decimal place.
** Values attained after the city's existing distributed BMP volumes totaling 7.1 acre-ft were incorporated in the RAA

According to the RAA results, the city of Paramount will need to capture and/or treat 20.9 acre-feet of stormwater by September 30, 2017 to meet the 31% interim compliance milestone, 29.3 acre-feet by January 11, 2024 to meet the 50% interim compliance milestone, and 76.5 acre-feet by January 11, 2028 to meet the final compliance milestone.

If Ralph C. Dills Park was transformed into an infiltration BMP, the parks would have the potential of retaining 17.9 acre-feet of stormwater. Right-of-Way BMPs could be used for the remaining 3.0 acre-feet to meet the 31% compliance milestone.

If Spane Park was transformed into an infiltration BMP, the parks would have potential of retaining 5.3 acre-feet of stormwater. Right-of-Way BMPs could be used for the remaining 3.2 acre-feet to meet the 50% compliance milestone.

31% Interim Compliance Milestone	
Potential BMP Site	Potential Design Capture Volume (ac-ft)
Ralph C. Dills Park	17.9
Right-of-Way BMPs	3.0
Total	20.9
50% Interim Compliance Milestone	
Potential BMP Site	Potential Design Capture Volume (ac-ft)
Spane Park	5.3
Right-of-Way BMPs	3.2
Cumulative Total	29.3

TRASH TMDL COMPLIANCE[A,B]

Jurisdiction	Baseline lbs drip dry trash	10/1/2011-9/30/2012 target 70%	10/1/2013-9/30/2014 target 80%	10/1/2013-9/30/2014 target 90%	10/1/2014-9/30/2015 target 96.7%	10/1/2015-9/30/2016 target 100%
Paramount	44,490	94%	94%	94%	---	---

[A]ARS partial capture systems are assigned 86% efficiency. [B]Percentages are based on number of catch basins and number retrofitted.

5.4.6 CITY OF PICO RIVERA

Jurisdiction	Milestone	POLLUTANT REDUCTION PLAN	
		Total Estimated BMP Volume (acre-ft)	
		Incremental	Cumulative
Pico Rivera	31%	39.4	39.4
	50%	0.0	39.4
	Final	1.8	41.2

According to the RAA results, the city of Pico Rivera will need to capture and/or treat 39.4 acre-feet of stormwater by September 30, 2017 to meet the 31% and 50% interim compliance milestones, and 41.2 acre-feet by January 11, 2028 to meet the final compliance milestone.

If Rio Hondo Park was transformed into an infiltration BMP, the parks would have the potential of retaining 14.2 acre-feet of stormwater. Right-of-Way BMPs could be used for the remaining 25.2 acre-feet to meet the 31% and 50% compliance milestones.

31% & 50% Interim Compliance Milestones	
Potential BMP Site	Potential Design Capture Volume (ac-ft)
Rio Hondo Park	14.2
Right-of-Way BMPs	25.2
Cumulative Total	39.4

TRASH TMDL COMPLIANCE[A,B]

Jurisdiction	Baseline lbs drip dry trash	10/1/2011-9/30/2012 target 70%	10/1/2013-9/30/2014 target 80%	10/1/2013-9/30/2014 target 90%	10/1/2014-9/30/2015 target 96.7%	10/1/2015-9/30/2016 target 100%
Pico Rivera	22,549	84%	84%	93.7%	---	---

[A]ARS partial capture systems are assigned 86% efficiency .
[B]Percentages are based on number of catch basins and number retrofitted.

5.4.7 CITY OF SIGNAL HILL

Jurisdiction	Milestone	POLLUTANT REDUCTION PLAN	
		Total Estimated BMP Volume (acre-ft)*	
		Incremental	Cumulative
Signal Hill	31%	1.2	1.2
	50%	13.8	15.0
	Final	7.1	22.1

*Values attained after the city's existing distributed BMP volumes totaling 0.2 acre-ft were incorporated

According to the RAA results, the city of Signal Hill will need to capture and/or treat 1.2 acre-feet of stormwater by September 30, 2017 to meet the 31% interim compliance milestone, 15 acre-feet by January 11, 2024 to meet the 50% interim compliance milestone, and 22.1 acre-feet by January 11, 2028 to meet the final compliance milestone.

Right-of-Way BMPs could be used for the 1.2 acre-feet to meet the 31% compliance milestone. These BMPs could be located within any city-owned street in order to avoid land acquisition.

If Signal Hill Park were transformed into infiltration BMPs, the park would have the potential of retaining 8.2 acre-feet of stormwater. Right-of-Way BMPs could be used for the remaining 6.8 acre-feet to meet the 50% compliance milestone.

31% Interim Compliance Milestone	
Potential BMP Site	Potential Design Capture Volume (ac-ft)
Right-of-Way BMPs	1.2
Total	1.2
50% Interim Compliance Milestone	
Potential BMP Site	Potential Design Capture Volume (ac-ft)
Signal Hill Park	8.2
Right-of-Way BMPs	6.8
Cumulative Total	15.0

TRASH TMDL COMPLIANCE[A,B]

Jurisdiction	Baseline lbs drip dry trash	10/1/2011-9/30/2012 target 70%	10/1/2013-9/30/2014 target 80%	10/1/2013-9/30/2014 target 90%	10/1/2014-9/30/2015 target 96.7%	10/1/2015-9/30/2016 target 100%
Signal Hill	14,220	89%	89%	90.5%	---	---

[A]ARS partial capture systems are assigned 86% efficiency .
[B]Percentages are based on number of catch basins and number retrofitted.

5.4.8 CITY OF SOUTH GATE

Jurisdiction	Milestone	POLLUTANT REDUCTION PLAN*	
		Total Estimated BMP Volume (acre-ft)**	
		Incremental	Cumulative
South Gate	31%	30.6	30.6
	50%	28.4	59.1
	Final	109.1	168.1

* Values taken directly from RAA. Differences between the sum of the incremental reduction volumes and the cumulative reduction volumes are attributed to rounding errors of the second decimal place.
** Values attained after the city's existing distributed BMP volumes totaling 4.7 acre-ft were incorporated

According to the RAA results, the city of South Gate will need to capture and/or treat 30.6 acre-feet of stormwater by September 30, 2017 to meet the 31% interim compliance milestone, 59.1 acre-feet by January 11, 2024 to meet the 50% interim compliance milestone, and 168.1 acre-feet by January 11, 2028 to meet the final compliance milestone.

If Circle Park was transformed into an infiltration BMP, the park would have the potential of retaining 38.7 acre-feet of stormwater to meet the 31% compliance milestone.

If Cesar Chavez Park and Hollydale Community Park were transformed into infiltration BMPs, the parks would have potential of retaining 6.4 acre-feet of stormwater. Right-of-Way BMPs could be used for the remaining 14 acre-feet to meet the 50% compliance milestone.

31% Interim Compliance Milestone	
Potential BMP Site	Potential Design Capture Volume (ac-ft)
Circle Park	38.7
Total	38.7
50% Interim Compliance Milestone	
Potential BMP Site	Potential Design Capture Volume (ac-ft)
Cesar Chavez Park	4.8
Hollydale Community Park	1.6
Right-of-Way BMPs	14.0
Cumulative Total	59.1

TRASH TMDL COMPLIANCE[A,B]

Jurisdiction	Baseline lbs drip dry trash	10/1/2011-9/30/2012 target 70%	10/1/2013-9/30/2014 target 80%	10/1/2013-9/30/2014 target 90%	10/1/2014-9/30/2015 target 96.7%	10/1/2015-9/30/2016 target 100%
South Gate	72,333	86%	86%	92.5%	---	---

[A]ARS partial capture systems are assigned 86% efficiency .
[B]Percentages are based on number of catch basins and number retrofitted.

5.4.9 TRASH TMDL STRATEGY

The Participating Agencies have achieved greater than 90 percent compliance with the Trash TMDL by installing CPS (full capture) devices in catch basins throughout the Los Angeles River and tributaries watershed within their respective jurisdictions. The CPS installation program has been supplemented with automatic retractable screens and trash nets. The remaining catch basins not yet retrofitted with CPS devices are those that, due to physical restrictions, could not be retrofitted without major reconstruction of the catch basins.

The Participating Agencies will continue to implement watershed control measures (WCMs) to achieve the next two milestones of 96.7 and 100 percent and commit to working with the Regional Board in establishing an effective combination of: full capture, partial capture and WCMs that will meet the criteria of "deemed compliance" as will be established by the Executive Officer of the Regional Board or by the Regional Board itself.

5.4.10 LOS ANGELES RIVER ESTUARY BACTERIA TMDL

In order to meet the LAR Estuary Bacteria TDML WLA, a LRS will be developed and submitted to the Regional Board in accordance with the schedule outlined in Table 3-8 (restated here in Table 5-3). The Control Measures discussed in Chapter 3 address bacteria loads and provide reasonable assurance of meeting WQBELs, however the LRS will outline a more targeted approach to address bacteria in the Lower LAR Estuary Watershed.

Table 5-4 Lower LAR Estuary Load Reduction Strategy Submittal Deadline

Lower LAR Permittees	Implementation Action	Deadline*
Long Beach, Signal Hill, and LACFCD	Submit Load Reduction Strategy (LRS) to Regional Board	April 28, 2017
	Complete Implementation of LRS	October 28, 2021
	Achieve interim (dry-weather) WQBEL and submit report to Regional Board	October 24, 2024
	Achieve final WQBELS or demonstrate that noncompliance is due to upstream contributions and submit report to Regional Water Board	September 23, 2030

*If compliance targets are not being met, a new LRS to begin the second phase will be submitted by October 28, 2025, with complete implementation of this LRS by April 28, 2029, and final WQBELs achieved by April 28, 2031.

5.5 ESTIMATED COSTS OF STRUCTURAL BMPS

Future costs associated with regional and Right-of-Way BMPs were estimated by using costs associated with an existing regional project (Discovery Park) and estimated costs for potential regional projects. Potential regional project costs were obtained from Los Angeles County.[2] Table 5-2 includes the estimated total costs and cost per acre-foot for regional and Right-of-Way BMPs.

The cost estimates only represent permitting, material, construction, and operation and maintenance (O&M) cost - with the exception of Discovery Park which does not take into account O&M costs. The cost of land acquisition, which is estimated to be over $5,000,000 per acre, was not included since initial regional and Right-of-Way BMP projects are planned for public lands. Because of the preliminary nature of the projects, the estimates developed for the proposed BMPs on public property lie between the preliminary/order of magnitude and budget level estimates, with an expected accuracy of about minus 25 percent to plus 40 percent.[3]

Table 5-5 Existing or potential estimated structural BMP cost

Project Name	Total Estimated Cost	BMP Capacity (acre-feet)	Cost Per Acre Foot
Bethune Park	$570,000	0.9	$1,000,000
Enterprise Park	$1,240,000	3.9	$318,000
Reid Park	$1,400,000	0.6	$2,333,000
Belvedere Park	$3,700,000	13.8	$268,000
Discovery Park	$4,500,000 *	8.0	$562,500
Johnson Park	$5,060,000	20.0	$253,000
Charles White Park	$5,300,000	21.0	$252,380
Right-of Way BMPs**	-------	0.25	$250,000

* Cost does not include O&M.

** A specific project was not used for the cost estimate. Instead various projects were averaged.

Cost were derived by assuming approximately two-thirds of the projects implemented will be regional, with the remaining one-third being Right-of-Way projects. Using general assumptions for the projects above, the following costs are anticipated:

- A cost of $2,000,000 per acre foot is anticipated for projects treating less than 1 acre-foot
- A cost of $625,000 per acre foot is anticipated for projects treating between 1 and 10 acre-feet
- A cost of $260,000 per acre foot is anticipated for projects treating more than 10 acre-feet

[2] Multi-Pollutant TMDL Implementation for the Unincorporated County Area of Los Angeles River: Part 2

[3] Multi-Pollutant TMDL Implementation for the Unincorporated County Area of Los Angeles River: Part 2

5.5.1 TOTAL ESTIMATED COSTS OF STRUCTURAL BMPS

The following tables include the total estimated costs of structural BMPs for each City.

CITY OF DOWNEY STRUCTURAL BMP COST ESTIMATE

Watershed	Milestone	POLLUTANT REDUCTION PLAN Total Estimated BMP Volume (acre-ft) Incremental	Cumulative	Total Estimated Cost
Los Angeles River	31%	19.9	19.9	$15,400,000 - $28,830,000
	50%	13.2	33.1	
	Final	45.9	79.2	

CITY OF LAKEWOOD STRUCTURAL BMP COST ESTIMATE

Watershed	Milestone	POLLUTANT REDUCTION PLAN Total Estimated BMP Volume (acre-ft) Incremental	Cumulative	Total Estimated Cost
Los Angeles River	31%	1.1	1.1	$516,000 - $962,500
	50%	0.0	1.1	
	Final	0.0	1.1	

CITY OF LONG BEACH STRUCTURAL BMP COST ESTIMATE

Watershed	Milestone	POLLUTANT REDUCTION PLAN Total Estimated BMP Volume (acre-ft) Incremental	Cumulative	Total Estimated Cost
Los Angeles River	31%	1.0	1.0	$62,230,000 - $116,160,000
	50%	72.5	73.5	
	Final	245.7	319.1	

CITY OF LYNWOOD STRUCTURAL BMP COST ESTIMATE

Watershed	Milestone	POLLUTANT REDUCTION PLAN Total Estimated BMP Volume (acre-ft)		Total Estimated Cost
		Incremental	Cumulative	
Los Angeles River	31%	34.2	34.2	$18,600,000 - $34,770,000
	50%	16.7	50.9	
	Final	44.5	95.5	

CITY OF PARAMOUNT STRUCTURAL BMP COST ESTIMATE

Watershed	Milestone	POLLUTANT REDUCTION PLAN Total Estimated BMP Volume (acre-ft)		Total Estimated Cost
		Incremental	Cumulative	
Los Angeles River	31%	20.8	20.8	$14,900,000 - $27,850,000
	50%	8.5	29.3	
	Final	47.2	76.5	

CITY OF PICO RIVERA STRUCTURAL BMP COST ESTIMATE

Watershed	Milestone	POLLUTANT REDUCTION PLAN Total Estimated BMP Volume (acre-ft)		Total Estimated Cost
		Incremental	Cumulative	
Los Angeles River	31%	39.4	39.4	$8,030,000 - $15,000,000
	50%	0.0	39.4	
	Final	1.8	41.2	

CITY OF SIGNAL HILL STRUCTURAL BMP COST ESTIMATE

Watershed	Milestone	POLLUTANT REDUCTION PLAN Total Estimated BMP Volume (acre-ft)		Total Estimated Cost
		Incremental	Cumulative	
Los Angeles River	31%	1.2	1.2	$4,300,000 - $8,050,000
	50%	13.8	15.0	
	Final	7.1	22.1	

CITY OF SOUTH GATE STRUCTURAL BMP COST ESTIMATE

Watershed	Milestone	POLLUTANT REDUCTION PLAN Total Estimated BMP Volume (acre-ft)		Total Estimated Cost
		Incremental	Cumulative	
Los Angeles River	31%	30.6	30.7	$32,800,000 - $61,200,000
	50%	28.4	59.1	
	Final	109.1	168.1	

6 FINANCIAL STRATEGY

This section outlines the financial strategy to implement the Lower LAR WMP in accordance with the MS4 Permit. The cost estimates provided herein are preliminary and based on the best available information to date. The estimates are also subject to revision as new information becomes available, including as the Watershed Control Measures (WCMs) are refined over the implementation period.

Financing the implementation of the Lower LAR WMP is the greatest challenge confronting the Watershed Group. In the absence of stormwater utility fees, the Participating Agencies have no dedicated revenue stream to pay for implementation of the WMP. In addition to current uncertainties associated with costs and funding, there are multiple uncertainties associated with future risks. The first TMDL compliance dates for the Lower LAR Watershed Group will be the interim metals milestones of 2017, 2024, and the final compliance date of 2028. Thus, there will be many deadlines that must be met despite limited resources. The Watershed Group will need to set priorities and seek funding in order to meet the various compliance deadlines.

Therefore, to address the Lower LAR Water Quality Priorities (WQPs), the Watershed Group is going to pursue a multi-faceted financial strategy to match the multi-faceted Strategy for the Selection and Implementation of WCMs outlined in Chapter 3. In addition, the Watershed Group has coordinated the proposed compliance schedule (see Section 5) with the financial strategy.

The latest Los Angeles and Long Beach MS4 permits have greatly magnified the cost challenges associated with managing stormwater. The absence of a stable stormwater funding mechanism not tied to municipal General Funds is becoming ever more critical. For that reason, the City Manager Committees of the California Contract Cities Association and the League of California Cities, Los Angeles Division, formed a City Managers' Working Group (Working Group) to review stormwater funding options after the LA County proposed Clean Water, Clean Beaches funding initiative failed to move forward. The result was a Stormwater Funding Report that notes, "the Los Angeles region faces critical, very costly, and seriously underfunded stormwater and urban runoff water quality challenges." The Report found that funding stormwater programs is so complex and dynamic, and the water quality improvement measures so costly, that Permittees cannot depend on a single funding option at this time. The City Managers' report includes a variety of recommendations, including: organizational recommendations; education and outreach program recommendations; recommendations for legislation; Clean Water, Clean Beaches recommendations; local funding options; and recommendations for the Regional Water Board[1].

The Watershed Group has considered the recommendations in the Stormwater Funding Report in developing this financial strategy. A critical component of the report is the observation that moving forward with a regional stormwater fee vote (like the LA County Clean Water, Clean Beaches funding initiative) would likely not occur until after June 2015, which means that the first funds would likely not

[1]League of California Cities. (2014). Providing Sustainable Water Quality Funding in Los Angeles County. Prepared By City Managers Working Group. Los Angeles County Division May 21, 2014.

be available until property tax payments are received in 2017. Assuming revenues of approximately $6 million per year available from a funding source based on the proposed Clean Water, Clean Beaches funding initiative, the Watershed Group could expect approximately $60 million to be available over 10 years[2]. However, these amounts may not be sufficient to pay for and maintain expensive stormwater capture and dry-weather low flow diversions to the sanitary sewer if the Watershed Group had to depend on such projects to come into compliance with receiving water limitations (RWLs) and water quality-based effluent limitations (WQBELs) specified in the MS4 Permit.

The Reasonable Assurance Analysis (RAA) for the Lower LAR WMP, indicates that the volume of water required to be captured within the Watershed to comply with RWLs and WQBELs is 803.2 acre-feet.

For cost estimation purposes, this WMP initially assumes that the Lower LAR Watershed could ultimately require the capacity to capture and infiltrate or use 803.2 acre-feet of water. Based on cost estimates for constructing regional and Right-of-Way BMPs, as discussed in Section 5.5, such a requirement could cost the watershed between $157 and $293 million for construction of these facilities (refer to Section 5.5 for more a detailed cost analysis).

The Watershed Group has been involved in the development of the financial strategy recommendations, and proposes to consider the recommendations of the City Managers Working Group to develop long-term solutions to stormwater quality funding. In the meantime, the Watershed Group will focus on the local funding options presented in the Stormwater Funding Report to secure the needed funding for initial implementation of the WMP.

During the early years of implementation, the Permittees anticipate having to depend largely on local fees such as commercial/industrial inspection fees, General Fund expenditures and, potentially, Clean Water State Revolving Fund program financing agreements to fund the implementation of the WCMs. The Watershed Group will seek opportunities to leverage the limited funds available. It will do this by financially supporting the efforts of others, such as the California Stormwater Quality Association (CASQA), to seek State approval of true source control measures such as implementation of the Safer Consumer Product Regulations adopted by the Department of Toxic Substances Control in 2013. The Group will also support programs to increase water conservation, reduce dry-weather discharges to the storm drain system, and reduce TSS during wet weather. Successfully accomplishing these efforts could reduce the money needed in the long term to capture and/or treat stormwater discharges to comply with TMDLs and address other WQPs.

Concurrently, the Watershed Group proposes to work with the California Contract Cities, the Los Angeles Division of the League of California Cities, and others to educate elected officials and voters about the water quality problems facing the region and the need to develop an equitable financing mechanism to fund the programs and facilities necessary to come into compliance with water quality regulations.

[2] Based on numbers derived for Los Cerritos Channel (LCC) during the development of the LCC WMP using expected annual revenue from a pro rata distribution of funds allocated to the Cities in the LCC Watershed and a possible proportional allocation of funds from the Watershed Authority Groups.

Legislative solutions will be necessary to clarify the application of Proposition 218 to fees for the capture and use of stormwater in light of a recent 6th Appellate Court decision and to ensure that any State water bond put on the ballot in fall 2014 contains funding for stormwater quality projects. The Group will also support local and statewide efforts to amend Proposition 218 to have stormwater fees treated in the same manner as water, sewage, and refuse fees. The Watershed Group and/or the Participating Agencies will also seek grants to implement rainwater capture and reuse or capture and infiltrate projects on publicly owned property.

In the long term, financing the WCMs for the Lower LAR Watershed will require establishing dependable revenue streams for local water quality programs. Accomplishing this formidable task will require the cooperation of many entities, including business and environmental organizations and the Regional Board.

7 LEGAL AUTHORITY

MS4 Permit §VI.C.5.b.iv.6 (LA)/ §VII.C.5.h.vi (LB)

This section covers information such as documentation and references/links to water quality ordinances for each participating that demonstrates adequate legal authority to implement and enforce Watershed Control Measures (WCMs) identified in this plan and as required in Section VI.D.5.b.iv.6 of the MS4 Permit. The goal of these WCMs is to create an efficient program that focuses on the watershed priorities by meeting the following objectives:

- Prevent or eliminate non-storm water discharges to the MS4 that are a source of pollutants from the MS4 to receiving waters.
- Implement pollutant controls necessary to achieve all applicable interim and final water quality-based effluent limitations and/or receiving water limitations pursuant to corresponding compliance schedules.
- Ensure that discharges from the MS4 do not cause or contribute to exceedances of receiving water limitations.

The WCMs include the minimum control measures, nonstormwater discharge measures and targeted control measures (i.e. controls to address TMDL and 303(d) listings). As the requirement to incorporate these WCMs is an element of the MS4 Permits, the legal authority to implement them results from each agency's legal authority to implement the NPDES MS4 Permit.

A copy of each participating agency's legal authority certification from their chief legal counsel can be found in Appendix A-7-1. Table 7-1 includes the section that covers water quality ordinance for each agency with a reference link.

Table 7-1 Water quality ordinance language

City	Water Quality Ordinance	Reference
Downey	Article V- Sanitation, Chapter 7, Stormwater and Urban Runoff Pollution and Conveyance Controls	http://qcode.us/codes/downey/
Section 5701. Watershed Management Program - *Notwithstanding other provisions in the Downey Municipal Codes, the MS4 Permit requires the City of Downey to implement the Watershed Management Program (WMP), and any subsequent amendments, are hereby incorporated into this Ordinance by reference. (Added by Ord. 1142, adopted 02-11-03; amended by Ord. 1320, adopted 11-12-13).*		
Lakewood	Article 05 (V) - Sanitation-Health, Chapter 8, Stormwater and Urban Runoff Pollution Control	http://weblink.lakewoodcity.org/weblink8/
5800 - Adoption of the Los Angeles County Stormwater Runoff Pollution Control Ordinance - *Except as otherwise provided in this Chapter, the stormwater runoff pollution control ordinance of the County of Los Angeles contained in Chapter 12.80 of Title 12- Environmental Protection of the Los Angeles County Code relating to control of pollutants carried by stormwater and runoff adopted by the County of Los Angeles on June 9, 1998, is hereby adopted and made a part hereof as though set forth in full. The same shall hereafter constitute the Stormwater and Runoff Pollution Control Ordinance of the City of Lakewood relating to the control of pollutants carried by stormwater and runoff and discharging*		

into receiving water of the United Stated.		
Long Beach	Volume II-Title 18-Building and Construction, Chapter 18.61, NPDES and SUSMP Regulations	http://library.municode.com/index.aspx?clientId=16115
18.61.010 Purpose - *The purpose of this chapter is to provide regulations and give legal effect to certain requirements of the National Pollutant Discharge Elimination System (NPDES) permit issued to the City of Long Beach, and the subsequent requirements of the Standard Urban Storm Water Mitigation Plan (SUMSP), mandated by the California Regional Water Quality Control Board, Los Angeles Region (RWQCB). The intent of these regulations is to effectively prohibit non-storm water discharges into the storm drain systems or receiving waters and to require source control BMP to prevent or reduce the discharge of pollutants into storm water to the maximum extent practicable.* *The City of Long Beach is a participant member of this watershed group but is under a different MS4 Permit. Certification of legal authority will be in accordance with its MS4 Permit timeline.*		
LACFCD	Flood Control District Code, Chapter 21 - Stormwater and Runoff Pollution Control	https://library.municode.com/index.aspx?clientId=16274
21.01 - Purpose and Intent - *The purpose and intent of this chapter is to regulate the stormwater and non-stormwater discharges to the facilities of the Los Angeles County Flood Control District for the protection of those facilities, the water quality of the waters in and downstream of those facilities, and the quality of the water that is being stored in water-bearing zones underground.*		
Lynwood	Chapter 14- Water and Sewer, 14-12, Stormwater and Urban Runoff Pollution Control	http://www.codepublishing.com/ca/lynwood/
14-12.3 Purpose and Intent - (b) -*The intent of this Section is to protect and enhance the quality of watercourses, water bodies, and wetlands within the City in a manner consistent with the Federal Clean Water Act, the California Porter-Cologne Water Quality Control Act, and the Municipal NPDES Permit.* *(c) This Section is also intended to provide the legal authority necessary for the City to control discharges to and from those portions of the Municipal Stormwater System over which it has jurisdiction as required by the Municipal NPDES Permit, and thereby comply with the terms of the Municipal NPDES Permit while the CSWMP and the WMAP are being developed by the permittees under the Municipal NPDES Permit, and thereafter to implement the CSWMP and WMAP, or other programs, developed under the Municipal NPDES Permit. (Ord. #1443, §1)*		
Paramount	Chapter 48 - Urban Stormwater Management	http://www.paramountcity.com/code.cfm?task=detail2&ID=20
Sec. 48-2.1. Purpose and intent - *The purpose of this chapter is to protect the health and safety of the residents of the city by protecting the beneficial uses of receiving waters within the city from pollutants carried by storm water and non-storm water discharges. The intent of this chapter is to enhance and protect the water quality of the receiving waters of the city and the United States, consistent with the Act. (Ord. No. 892)* Sec. 48-2.2. Applicability of this chapter - *The provisions of this chapter shall apply to the discharge, deposit or disposal of any storm water and/or runoff to the storm drain system and/or receiving waters within any incorporated area covered by a NPDES municipal storm water permit. (Ord. No. 892)*		
Pico Rivera	Title 16- Environment, Chapter 16.04, Stormwater and Urban Runoff Pollution Prevention	http://qcode.us/codes/picoriver a

16.01.010 Purpose and Intent (4) - *Reducing pollutant loads in storm water and urban runoff, from land uses and activities identified in the municipal NPDES permit.* *The provisions of this chapter are adopted pursuant to the Federal Water Pollution Control Act, also known as the "Clean Water Act," codified and amended at 33 U.S.C 1251 et seq. The intent of this chapter is to enhance and protect the water quality of the receiving waters of the United States in a manner that is consistent with the Clean Water Act and acts amendatory thereof of supplementary thereto; applicable implementing regulations; the Municipal NPDES permit, and any amendment, revisions, or re-issuance thereof. (Ord. 989 § 1 (part), 2002).*		
Signal Hill	Chapter 12.16- Stormwater/ Urban Runoff	http://www.amlegal.com/library/ca/signalhill.shtml
12.16.020 Purpose and Intent - *The purpose of this chapter is to protect the public health, welfare and safety and to reduce the quantity of pollutants being discharged to the waters of the United States through: (D) The protection and enhancement of the quality of the waters of the United States in a manner consistent with the provisions of the Clean Water Act;*		
South Gate	Title 6 - Health and Sanitation, Section 6.67, Storm Drains	http://codepublishing.com/CA/southgate/
6.67.010 General Provisions, A- Purpose and Intent - *The purpose of this chapter is to protect the public health, welfare and safety and to reduce the quantity of pollutants being discharged to the waters of the United States. This chapter has the following objectives: 4. The protection and enhancement of the quality of the waters of the United States in a manner consistent with the provisions of the Clean Water Act (CWA);*		

8 COORDINATED INTEGRATED MONITORING PROGRAM

The Participating Agencies have developed a customized coordinated integrated monitoring program (CIMP). The CIMP, based on the provisions set forth in Part IV of the MRP (Attachment E) of the MS4 Permit, assesses progress toward achieving the water quality-based effluent limitations and receiving water limitations per the compliance schedules, and progress toward addressing water quality priorities. The customized monitoring program is designed to address the Primary Objectives detailed in Attachment E, Part II.A of the MS4 Permit and includes the following program elements:

- Receiving Water Monitoring
- Storm Water Outfall Monitoring
- Non-Storm Water Outfall Monitoring
- New Development/Re-Development Effectiveness Tracking
- Regional Studies

The CIMP is included in Appendix A-8-1.

9 ADAPTIVE MANAGEMENT PROCESS

Adaptive management is the process by which new information about the state of the watershed is incorporated into the WMP. The WMP is adaptively managed following the process described in Permit §IV.C.8. The process is implemented by the participating agencies every two years from the date of WMP approval by the Regional Water Board (or by the Executive Officer on behalf of the Regional Water Board). The purpose of the adaptive management process is to improve the effectiveness of the WMP based on – but not limited to – consideration of the following:

1. Progress toward achieving interim and/or final water quality-based effluent limitations and/or receiving water limitations in §VI.E and Attachments L through R of the MS4 Permit, according to established compliance schedules;
2. Progress toward achieving improved water quality in MS4 discharges and achieving receiving water limitations through implementation of the watershed control measures based on an evaluation of outfall-based monitoring data and receiving water monitoring data;
3. Achievement of interim milestones;
4. Re-evaluation of the water quality priorities identified for the Watershed Management Area (WMA) based on more recent water quality data for discharges from the MS4 and the receiving water(s) and a reassessment of sources of pollutants in MS4 discharges;
5. Availability of new information and data from sources other than the MS4 Permittees' monitoring program(s) within the WMA that informs the effectiveness of the actions implemented by the Permittees;
6. Regional Water Board recommendations; and
7. Recommendations for modifications to the Watershed Management Program solicited through a public participation process.

9.1 MODIFICATIONS

Based on the results of the adaptive management process, the participating agencies may find that modifications of the WMP are necessary to improve effectiveness. Modifications may include new compliance deadlines and interim milestones, with the exception of those compliance deadlines established in a TMDL.

9.1.1 REPORTING

Modifications are reported in the Annual Report, as required pursuant to Part XVIII.A.6 of the Permit Monitoring and Reporting Program (No. CI-6958), and as part of the Report of Waste Discharge (ROWD) required pursuant to Part II.B of Attachment D – Standard Provisions. The background and rational for these modifications are included by addressing the following points:

- Identify the most effective control measures and describe why the measures were effective and how other control measures will be optimized based on past experiences.

- Identify the least effective control measures and describe why the measures were deemed ineffective and how the control measures will be modified or terminated.
- Identify significant changes to control measures during the prior year and the rationale for the changes.
- Describe all significant changes to control measures anticipated to be made in the next year and the rationale for the changes. Those changes requiring approval of the Regional Water Board or its Executive Officer shall be clearly identified at the beginning of the Annual Report.
- Include a detailed description of control measures to be applied to New Development or Re-development projects disturbing more than 50 acres.
- Provide the status of all multi-year efforts that were not completed in the current year and will continue into the subsequent year(s).

9.1.2 IMPLEMENTATION

Modifications are implemented upon approval by the Regional Water Board Executive Officer or within 60 days of submittal if the Regional Water Board Executive Officer expresses no objections.

9.2 RECEIVING WATER LIMITATIONS

The adaptive management process fulfills the requirements in MS4 Permit §V.A.4 to address continuing exceedances of receiving water limitations.

10 REPORTING PROGRAM & ASSESSMENT

10.1 ANNUAL REPORT

PERMIT MRP §XV.A (LA/LB)

Each year on or before December 15th, the participating agencies will submit, either jointly or individually, an annual report to the Regional Water Board Executive Officer. The annual report will present a summary of information that will allow the Regional Board to assess implementation and effectiveness of the watershed management program[1].

The reporting process is intended to meet the following objectives:

- Each agency's participation in one or more Watershed Management Programs.
- The impact of each agency's storm water and non-storm water discharges on the receiving water.
- Compliance with receiving water limitations, numeric water quality-based effluent limitations, and non-storm water action levels.
- The effectiveness of control measures in reducing discharges of pollutants from the MS4 to receiving waters.
- Whether the quality of MS4 discharges and the health of receiving waters is improving, staying the same, or declining as a result watershed management program efforts, and/or TMDL implementation measures, or other Minimum Control Measures.
- Whether changes in water quality can be attributed to pollutant controls imposed on new development, re-development, or retrofit projects.

Annual Report will identify data collected and strategies, control measures and assessments implemented for each watershed within the participating agency's jurisdiction. The report will include summaries for each of the following seven sections as required by the MS4 Permit:

1) Stormwater Control Measures - Summary of New Development/Re-development Projects, actions to comply with TMDL provisions
2) Effectiveness Assessment of Stormwater Control Measures - Summary of rainfall data, provide assessment and compare water quality data, summary to whether or not water quality is improving
3) Non-Stormwater Control Measures - Summary of outfalls screening
4) Effectiveness Assessment of Non-Storm Water Control Measures - Summary of the effectiveness of control measures implemented
5) Integrated Monitoring Compliance Report - Report with summary of all identified exceedances of outfall-based stormwater monitoring data, we weather receiving water monitoring data, dry weather receiving water data and non-storm water outfall monitoring data
6) Adaptive Management Strategies - Summary of effective, less effective control measures

[1] Annual reports will cover summary from previous fiscal year beginning June 1st through July 30th.

7) Supporting Data and Information - Monitoring data summary

The participating agencies will submit annual reports as required by the MS4 Permit. The Regional Board is currently preparing a reporting format. Once available, the reporting form will be incorporated into the WMP as an appendix.

10.1.1 DATA REPORTING

PERMIT MRP §XIV.L (LA/LB)

Analytical data reports will be submitted on a semi-annual basis. Data will be sent electronically to the Regional Water Board's Storm Water site at MS4stormwaterRB4@waterboards.ca.gov. These data reports will summarize:

- Exceedances of applicable WQBELs, receiving water limitations, or any available interim action levels or other aquatic toxicity thresholds.
- Basic information regarding sampling dates, locations, or other pertinent documentation.

10.1.2 CHRONIC TOXICITY REPORTING

PERMIT MRP §XII.K (LA/LB)

Aquatic toxicity monitoring results will be submitted to the Regional Board on an annual basis as part of the integrated monitoring compliance report as well as in the semi-annual basis data report submittal.

10.2 WATERSHED REPORT

PERMIT MRP §XVII.A (LA/LB)

The participating agencies will submit biennial watershed reports as required by the MS4 Permit to the Regional Water Board Executive Officer. This biennial report, which will be included in the annual report in odd years, will include information related to the following sections:

- Watershed Management Area
- Subwatershed (HUC-12) Description
- Permittees Drainage Area within the Subwatershed

Per MS4 Permit § XVII.B, the participating agencies may reference the Watershed Management Program (WMP) in the odd-year report, when the required information is already included or addressed in this WMP, to satisfy baseline information requirements.

The Regional Board is currently preparing a reporting format. Once available, the reporting form will be incorporated into the WMP as an appendix.

10.3 TMDL REPORTING

PERMIT MRP §XIX (LA/LB)

The participating agencies will also submit an annual report to the Regional Water Board Executive Officer regarding progress of TMDL implementation within the watershed.

The TMDLs that will be addressed in the report are:

- Trash
- Nitrogen Compounds
- Metals
- Bacteria, and
- Harbor Toxics

The Regional Board is currently preparing a reporting format. Once available, the reporting form will be incorporated into the WMP as an appendix.