City of Long Beach

Draft Watershed Management Program for the Nearshore Watersheds

October 28, 2015

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EXECUTIVE SUMMARY

The National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer system (MS4) Permit issued by the California Regional Water Quality Control Board (Regional Board) to the City of Long Beach requires a reduction in the level of many pollutants being discharged to downstream waterbodies. The Permit specifically regulates discharges that are conveyed through the MS4 system more commonly referred to as the storm drains or flood control channels. The MS4 Permit allows the City of Long Beach to select from several compliance options, one of which is the development of a Watershed Management Program (WMP). The WMP is an ambitious path to achieve pollutant reductions in the city's waterbodies, and includes:

- A list of water quality priorities,
- Existing and planned watershed control measures,
- A Reasonable Assurance Analysis (RAA) based upon the Watershed Management Modeling System
- A compliance schedule to implement the watershed control measures, and
- An Integrated Monitoring Program (IMP).

The City of Long Beach is California's seventh largest city, having extensive and complex waterbodies and watersheds. These include:

- Dominguez Channel Estuary,
- Inner Long Beach Harbor and Outer Long Beach Harbor,
- Long Angeles River and Estuary,
- Los Cerritos Channel and Estuary,
- San Gabriel River and Estuary,
- Alamitos Bay and multiple sub-waterbodies,
- Colorado Lagoon,
- Shoreline beaches, and
- Eastern San Pedro Bay.

This is the fourth WMP to be developed covering the watersheds of the City of Long Beach. The City of Long Beach voluntarily participated in the development of the previous three WMPs: the Lower Los Angeles River (Lower LAR), the Lower San Gabriel River (Lower SGR) and the Los Cerritos Channel (LCC). All three of which were submitted to the Regional Board in June 2014. This WMP builds upon and is structurally similarly to the previous WMPs and covers the remaining portions of the City of Long Beach. The areas covered in this WMP are collectively referred to as the "Nearshore Watersheds."

The city has a unique geographical location with beaches, harbors and a port and is the only city in Los Angeles County to have obtained an individual MS4 Permit. Although it operates under an individual MS4 Permit, the City of Long Beach has been working cooperatively with other watershed groups towards the goal of cleaner watersheds for several years.

In addition to the efforts to improve the water quality in storm water runoff as previously reported in the Lower LAR, Lower SGR, and LCC WMPs, in the Nearshore watersheds the City has:

- Made a significant effort to improve Colorado Lagoon, investing over $35 million since 2010 in treatment systems, diversions and sediment clean-up,
- Installed AbTech filter baskets with anti-bacterial sponges in approximately 3,000 catch basins throughout Long Beach, primarily in areas tributary to Alamitos Bay,
- Constructed two Low Flow Diversion Systems with three more planned in the near future to reduce the level of shoreline bacteria, to achieve compliance with the Long Beach City Beaches and Los Angeles River Estuary Indicator Bacteria TMDL. (The final compliance date for the dry weather Beaches Bacteria TMDL is March 28, 2019. For dry weather in the Estuary, the WMP follows the compliance plan and schedule listed in the Lower Los Angeles River WMP. For wet weather bacteria, the final compliance deadline is March 23, 2037, to correspond with the neighboring Los Angeles River Bacteria TMDL.) Monitoring data for the City beaches has shown a marked improvement over recent years in compliance with bacterial criteria, achieving a compliance level of 98.7% this past dry weather season, and a marked improvement during the wet weather season,
- Developed and fully implemented a Water Resources Action Plan (WRAP) for the Port of Long Beach area. The plan includes targeted structural and nonstructural controls, as well as a mechanism to add new treatment technologies. Since its adoption in 2009, over 150 structural controls have been installed.

Prior MS4 Permits required cities and agencies to implement a series of Best Management Practices (BMPs) such as street sweeping and catch basin cleaning to demonstrate compliance. With the adoption of the fourth term Permit by the Regional Board, effective March 28, 2014, 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 Nearshore Watershed areas, including its land uses, MS4 system, existing and planned control measures (both structural and nonstructural), existing stormwater treatment systems, historical monitoring data and the various waterbodies that have been identified as impaired. Using that data, the Watershed Management Modeling System—one of the three modeling system authorized by the MS4 Permit—is used to generate the Reasonable Assurance Analysis (RAA) which identifies an optimal combination of structural treatment systems and construction timelines to achieve the goals of the Permit. The RAA distributes the need for treatment systems amongst sub-watershed areas.

The RAA identified wet weather zinc as the limiting pollutant. By designing treatment systems and other non-structural controls measures for zinc, the targets for other pollutants of concern will also be met.

Phased targets have been established through 2032 for implementation of various watershed control measures. To improve habitat, water and sediment quality, and community interaction with Colorado Lagoon, the City has been actively supporting the Colorado Lagoon Restoration Master Plan and expects

the program to be complete within the next few years. Additional nonstructural control measures are in the process of being implemented. The RAA predicts that through 2019, the current efforts and implementation of nonstructural controls (a 10 percent reduction) will be sufficient to attain interim milestones, although this will not preclude the City from pursuing structural solutions. The next target (a 20 percent reduction) will occur in 2024 when 14.3 acre feet must be captured or equivalently treated. Cumulatively, the RAA establishes a final (2032) goal of capturing and treating 348.4 acre feet. The treatment volumes recommended by the RAA are estimates based on current land use data, historical monitoring and assumed treatment system efficiencies.

These interim and final targets present unique challenges to the City where there are considerable areas less than 10 feet above groundwater level, rendering infiltration as a non-viable option. Creative solutions will be needed in order to meet these challenges, requiring cooperation by the City and the Regional Board. The ultimate cost will vary considerably depending on the availability and configuration of suitable treatment locations and effectiveness of nonstructural watershed control measures. Currently, the cost of compliance is estimated to be in the range of $300 million to $370 million. The WMP also incorporates an adaptive management strategy to adjust and modify the various control measures as necessary.

An Integrated Monitoring Program (IMP) has been developed as a part of this WMP to measure the overall effectiveness of the control measures being implementing by the City. The IMP includes:

- An expansion of the current level of water quality monitoring,
- Colorado Lagoon TMDL monitoring plan,
- New wet-weather sampling will begin at the furthest downstream area of the San Gabriel River Estuary, and
- Additional (one water column and one sediment) Receiving Water stations and a new outfall monitor location in Alamitos Bay.

Together, the elements of the WMP outline a path to achieve improved water quality in the Nearshore Watershed. The city can follow the adaptive management strategy described in Chapter 9 to adjust the number, locations and sizes of future treatment systems. While this WMP is developed for the city to implement the recommended volume reduction goals on a subwatershed-by-subwatershed basis, it does not preclude the City from developing creative strategies in collaboration with the Regional Board for potentially more cost effective regional and local runoff treatment systems.

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 No. R4-2014-0024 (National Pollutant Discharge Elimination System (NPDES) Permit No.CAS004003) on a watershed scale. The WMPs will ensure that discharges from the MS4: (i) achieve applicable water quality-based effluent limitations in Part V.A.2 and VIII.G-Q, (ii) do not cause or contribute to exceedances of receiving water limitations in Parts VI.A and VIII, and (iii) do not include non-stormwater discharges that are effectively prohibited pursuant to Part IV.B. The programs will also ensure that controls are implemented to reduce the discharge of pollutants to the Maximum Extent Practicable (MEP) pursuant to Part V.A.1.[1] The ultimate goals of the WMPs are listed in Section 1.2.3.

1.1.1 PARTICIPANTS

As listed in Table 1-1, the Long Beach NPDES MS4 Permit addressed by this WMP is issued exclusively to the City of Long Beach. However, the distinct land use and operations of the City's Harbor Department warrant special designation. Unless stated otherwise, the City of Long Beach—including the Harbor Department—is referred to as *the City* and the Harbor Department is referred to as *the Port*.

Table 1-1: Permit Addressed by the WMP

Agency	Permit Order	Permit Name
City of Long Beach	R4-2014-0024	Long Beach NPDES MS4 Permit (MS4 Permit)

1.1.2 WATERSHEDS COVERED

The jurisdictional boundary of the City spans the MS4 Permit Watershed Management Areas of the Los Angeles River, Dominguez Channel, Los Cerritos Channel, and the San Gabriel River. The City is currently participating in multi-jurisdictional WMPs for those subwatershed areas that are shared with neighboring municipalities. These are the Lower Los Angeles River, Los Cerritos Channel, and Lower San Gabriel River WMPs, which are incorporated by reference in this document—see Chapter 11 for additional information. Figure 1-1 is a map of the WMP areas.

This WMP covers applicable waterbodies as identified within the MS4 Permit, focusing on the remaining disjunct subwatershed areas that receive flow exclusively from the City. These areas are the Dominguez Channel Estuary, the Port of Long Beach, the Long Beach City Beaches, Colorado Lagoon, the Alamitos Bay Area[2], and the San Gabriel River Estuary. For the purposes of this WMP, the area defined by the boundaries of the City and these subwatersheds is referred to as the Nearshore Watersheds. Figure 1-2 is

[1] Part VII.C.1.d, pp.36-37.

[2] This area includes Alamitos Bay and its tributaries, Sims Pond, Los Cerritos Channel Estuary, Marine Stadium, and the Long Beach Marina.

a map of the boundaries of Nearshore Watersheds, as well as the boundaries of the WMPs that address the remaining areas of the City.

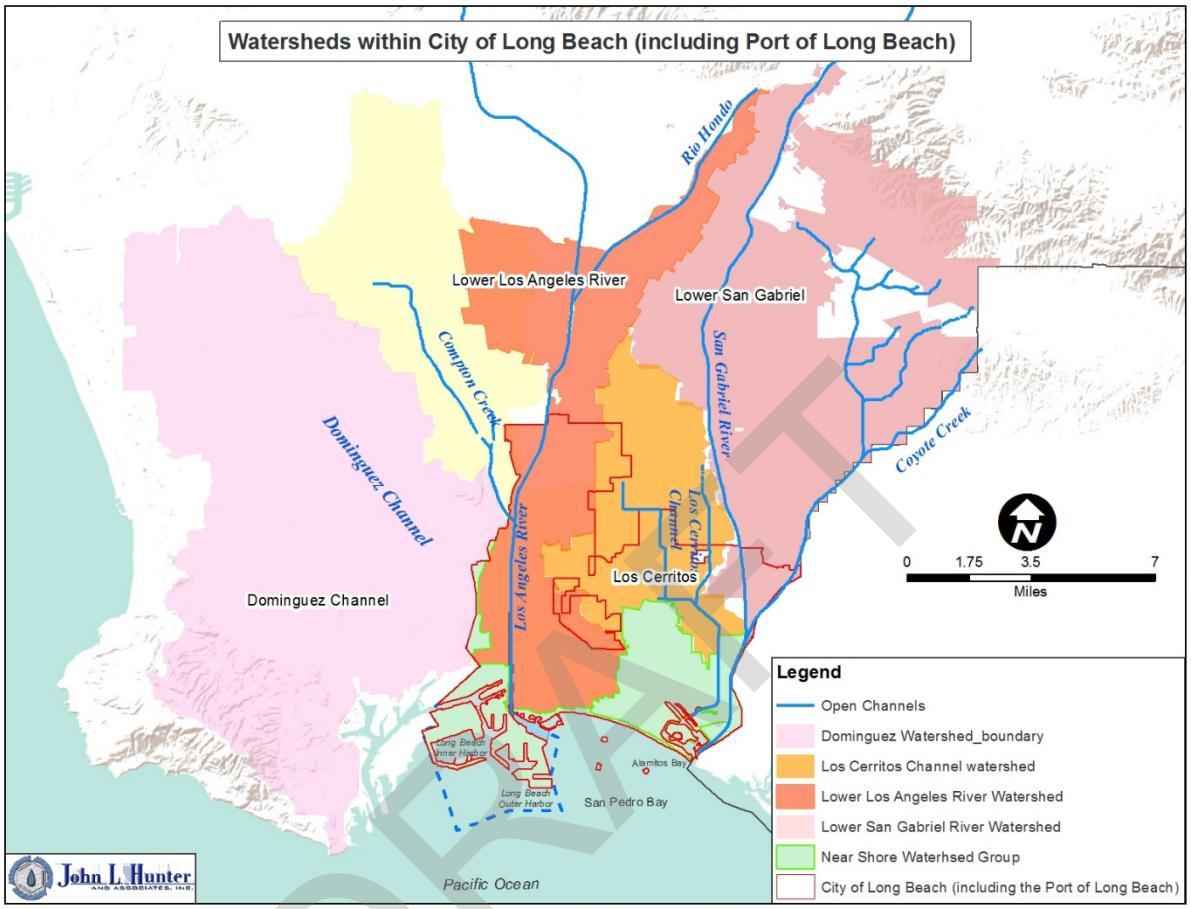

Figure 1-1: Areas Covered by the Lower LA River, Los Cerritos Channel and Lower SG River WMPs

WATER BODIES

The water bodies located within the Nearshore Watershed are the Dominguez Channel Estuary, Long Beach Harbor (including the Outer Harbor, Marinas, Public Beach Areas, and all other Inner Areas), San Pedro Bay, Colorado Lagoon, Alamitos Bay, Sims Pond, Los Cerritos Wetlands, Los Cerritos Channel Estuary, San Gabriel River Estuary, Long Beach Marina, and the Marine Stadium.

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 Los Angeles County Flood Control District (LACFCD) found that many of the HUC boundaries within the Los Angeles Basin were based on pre-development topography and developed more accurate "HUC-12 equivalents" that more accurately reflect current drainage patterns. The subwatersheds are given a HUC-12 designation with a 12-digit number. 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.

Following the HUC equivalent system, Lower Dominguez Channel is within 180701060102, San Gabriel River Estuary is within subwatershed 18070160606, and Alamitos Bay is within subwatershed 180701060702. Table 1-2 and Figure 1-3 define the HUC-12 equivalent subwatersheds.

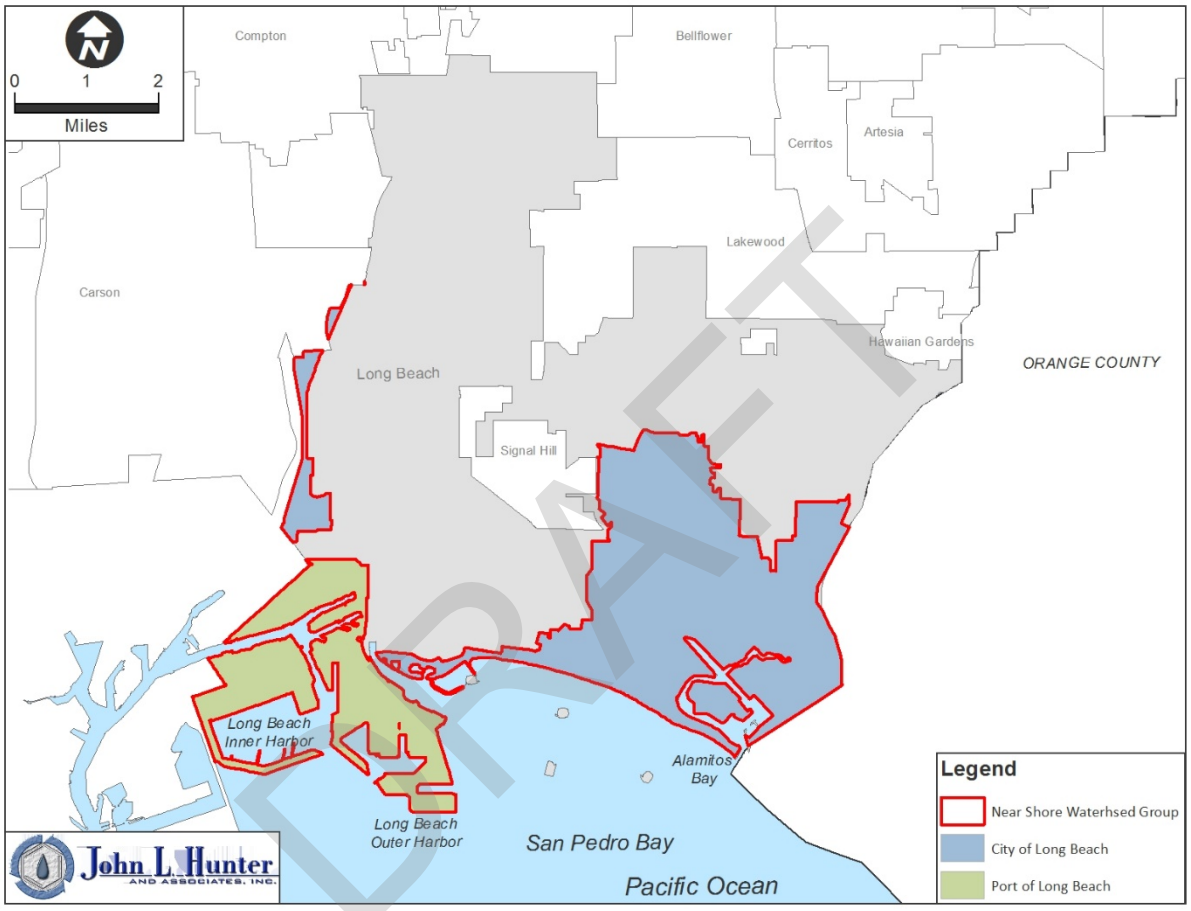

Figure 1-2: Nearshore Watersheds Map

Table 1-2: Subwatersheds within the City

Watershed Management Area	HUC 12 Equivalent	HUC Name	Area in City (mi^2)
Dominguez Channel	180701060701	Long Beach Harbor	1.45
Dominguez Channel	180701050402	Compton Creek - LA River	3.22
San Gabriel River	180701060702	Alamitos Bay	9.91
San Gabriel River	180701060606	Coyote Creek - San Gabriel River	0.77
Dominguez Channel	180701060102	Lower Dominguez Channel	0.69
San Pedro Bay	180701060703	San Pedro Bay	0.61

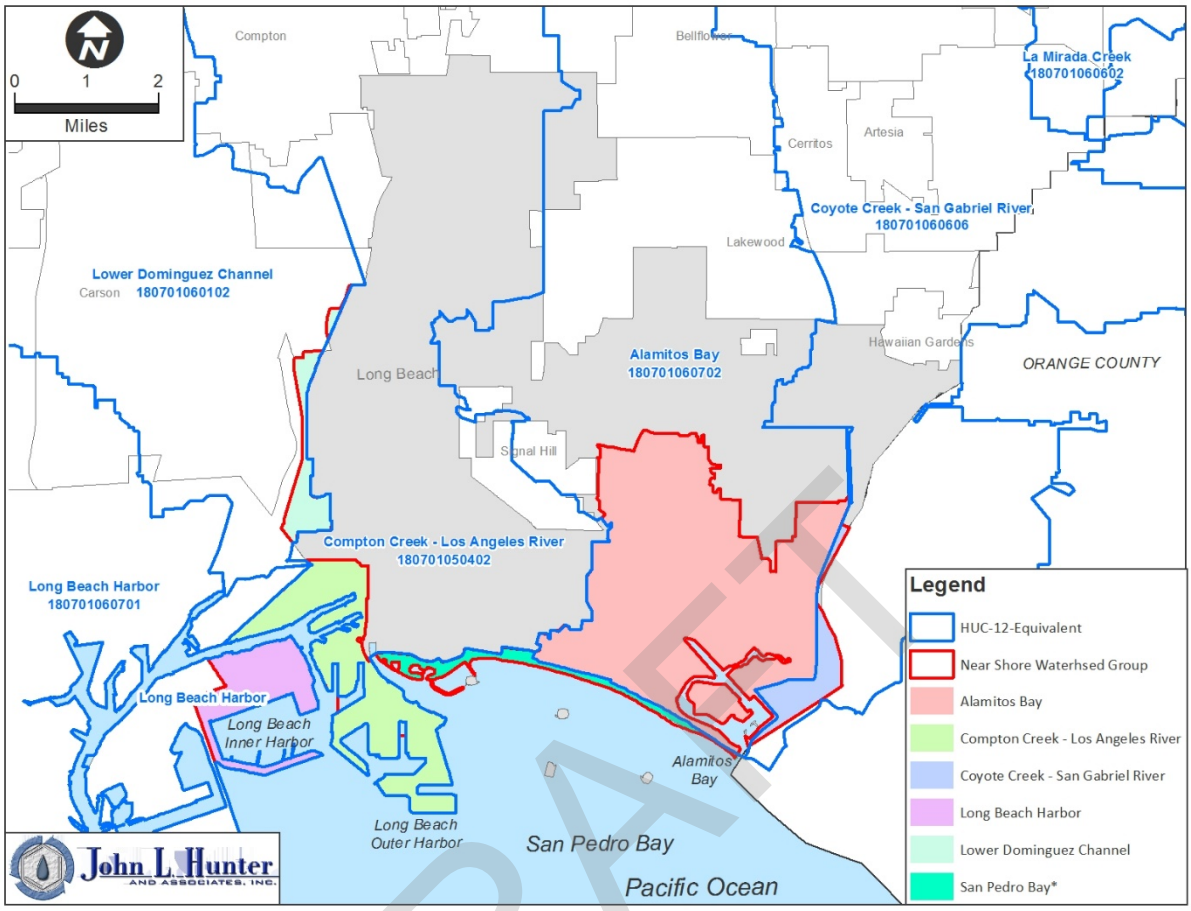

Figure 1-3: Watershed Map with HUC-12 Equivalent Subwatersheds

1.1.3 NON-PARTICIPATING AGENCIES

All other NPDES MS4 Permitted agencies within the Nearshore Watersheds have developed either individual or collaborative WMPs or EWMPs separately and are not participating in this WMP. Non-participating agencies include the County of Los Angeles (unincorporated areas), the LACFCD, and the California Department of Transportation (Caltrans).

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[3], groundwater and natural flow. As the discharges flow over the urban landscape, they are likely to pick up pollutants

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

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.[4]

1.2.2 WATERSHED MANAGEMENT EMPHASIS

The watershed management approach to permit implementation—described in the current MS4 Permit as a voluntary approach to compliance—is a departure from previous permit structures. The previous MS4 Permit (Order No. 99-060) addressed implementation through the Long Beach Storm Water Management Programs (LBSWMPs). The LBSWMPs—one of which was prepared separately by and for the Port—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.

The emphasis of the prior LBSWMP 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 watersheds. The Regional Board outlines several reasons for this shift in emphasis. 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.

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.[5] The conditions of the receiving waters drive management actions, which in turn focus on measures to address pollutant contributions from MS4 discharges. The ultimate goals of the Watershed Management Programs is to ensure that MS4 discharges:

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[6]

[4] MS4 Permit Fact Sheet

[5] 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.

[6] Pursuant to Part V.D

  - Do not cause or contribute to exceedances of receiving water limitation[7]
  - Do not include non-stormwater discharges that are effectively prohibited[8]
  - Ensure that controls are implemented to reduce the discharge of pollutants to the maximum extent practicable[9]
- Execute an integrated monitoring program and assessment program[10] 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.

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 Quality Act (CEQA). The City intends 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

[7] Pursuant to Parts IV.A and Part V.D
[8] Pursuant to Part III.A of the Permit
[9] Pursuant to Part V.A.1 and Attachment D of the Permit
[10] Pursuant to Attachment E – MRP, Part VI of the Permit

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 THE NEARSHORE WATERSHEDS

The Nearshore Watersheds includes the sub-drainage areas of the Dominguez Channel Estuary, the Port of Long Beach, Long Beach City Beaches, Colorado Lagoon, Alamitos Bay, San Gabriel River Estuary and the El Dorado Lakes. The Los Angeles River Estuary subwatershed is included and accounted for in the Lower Los Angeles River WMP, with the exception of direct drainage to the Queensway Bay.

1.3.1 OVERVIEW OF THE SUBWATERSHEDS

DOMINGUEZ CHANNEL ESTUARY

The Dominguez Channel Estuary is a densely urbanized drainage area that empties into the inner LA Harbor. It is the unlined portion between Vernon Avenue and the LA River Estuary. The Dominguez Channel Estuary is listed on the State of California's 303(d) list as an impaired by cadmium in sediment, copper in sediment and tissue, lead in sediment, tissue, and dissolved, zinc in sediment and dissolved, DDT in tissue and sediment, PCBs in sediment, chlordane in tissues and sediment, dieldrin in tissues and sediment, PAHs in sediment, benthic community effects, sediment toxicity, ammonia, and coliform bacteria.

THE PORT OF LONG BEACH

The Port of Long Beach, also known as the Harbor District, is a highly industrialized area, with minimal open space. The Harbor District incorporates Port facilities, tenant facilities, and privately owned company facilities. It encompasses approximately 3,200 acres of land, 4,600 acres of water and contains 80 deepwater berths, 10 piers, 22 shipping terminals and 66 cranes. Of the 22 shipping terminals, five are break bulk, six are bulk, six are container, and five are liquid bulk.[11] The Port's stormwater system includes approximately 463,000 linear feet of pipe, 1,150 catch basins, and 142 stormwater outfalls. These outfalls discharge to Long Beach Inner and Outer Harbor. The bedded sediments of these waterbodies are

[11] Port of Long Beach website: Facts at a Glance.

included in the State's 303(d) list as impaired by DDT, PCBs, copper, zinc, lead, benzo(a)pyrene, chrysene, benthic community effects, chlordane, and sediment toxicity.

LONG BEACH CITY BEACHES AND LOS ANGELES RIVER ESTUARY

Long Beach City Beaches are located along the San Pedro Bay, between the LA River Estuary and the San Gabriel River Estuary. This area includes the Shoreline Marina. There are five storm drain basins that collect, convey and discharge runoff to the Long Beach City Beaches, and are situated 100-200 feet above the water's edge. The Long Beach City Beaches are impaired by indicator bacteria. The impairment affects 13 beaches, and extends 4.7 miles. Direct drainage area to the Long Beach City Beaches is approximately 505 acres.[12] In addition, the Toxics TMDL includes Alamitos Bay as part of the nearshore zone which drains to the Easter San Pedro Bay. As such, the Alamitos Bay Area is also listed as impaired by the Harbor Toxics TMDL pollutants.

The Los Angeles River Estuary is primarily addressed in the Lower Los Angeles River WMP. However drainage within the Queensway Bay area of the Estuary is within the Nearshore Watersheds, and as such is addressed accordingly within this WMP.

COLORADO LAGOON

Colorado Lagoon is a 15-acre tidal lagoon, connected to Alamitos Bay and the ocean via a box culvert to Marine Stadium. The watershed is approximately 1,172 acres divided into five sub-basins. It receives both dry-weather flows and wet-weather overflows. There are 11 storm drains that discharge directly into the Lagoon. Colorado Lagoon has a TMDL listing impaired for sediment toxicity, PAHs, lead, zinc in sediment; DDT, Dieldrin, and PCBs in fish tissue; chlordane in fish tissue and sediment, and indicator bacteria in water.[13]

ALAMITOS BAY AREA

Alamitos Bay is located in the southeastern corner of the City, just west of the San Gabriel River Estuary. Alamitos Bay water area encompasses 258.25 acres and includes the Los Cerritos Channel Estuary (24.31 acres), Naples Canals (7 acres), the entrance channel (31.43 acres), and the Alamitos Bay Marina. The bay is protected by the Long Beach Breakwater and a spit of sand known as the Long Beach Peninsula. A group of three islands in the center of Alamitos Bay are known collectively as Naples Island. The Alamitos Bay is impaired by indicator bacteria. The Los Cerritos Channel Estuary as part of the Alamitos Bay Area is impaired by chlordane contaminated sediment (see Table 2-20 for additional information). In addition, the Toxics TMDL includes Alamitos Bay as part of the nearshore zone which drains to the Easter San Pedro Bay. As such, the Alamitos Bay Area is also listed as impaired by the Harbor Toxics TMDL pollutants.

SAN GABRIEL RIVER ESTUARY

The San Gabriel River Estuary is approximately 3.4 miles in length with a soft-bottom and riprap sides that empties into San Pedro Bay adjacent to the Alamitos Bay entrance. The Estuary is located on the border between Los Angeles and Orange Counties. The San Gabriel River Estuary is part of the LARWQCB Los

[12] LBCB + LAR Estuary Bacteria TMDL.
[13] Colorado Lagoon Toxics TMDL Staff Report.

Cerritos/Alamitos Bay Watershed Management Area. Discharges to the Estuary include the San Gabriel River Watershed, Coyote Creek, cooling water from two power plants, and local runoff. The San Gabriel River Estuary is impaired by copper, dioxin, dissolved oxygen and nickel.

1.3.2 REGIONAL CHARACTERISTICS OF THE NEARSHORE WATERSHEDS

REGIONAL AND LOCAL SETTING

The Nearshore Watersheds encompass 16.8 square miles (10,738 acres), 4.8 square miles (3,058 acres) of which are under the Port's jurisdiction. The boundaries of the watershed are shown in Figure 1-2 and are further explained in Section 1.1.

REGIONAL 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 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.[14]

The highly developed conditions within the watershed facilitates most stormwater flows generated by the rainfall to be routed through curbs, gutters, catch basins, and storm drains to the subwatersheds, and eventually to the Pacific Ocean.

RAINFALL AND FLOW CHARACTERISTICS

Historical rainfall records for an existing rain gauge located at Long Beach Daugherty Field was obtained and utilized in this analysis. The gauge was chosen due to its active status and the duration of available data. Its location is shown in Figure 1-4 with detailed location information provided in Table 1-3.

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

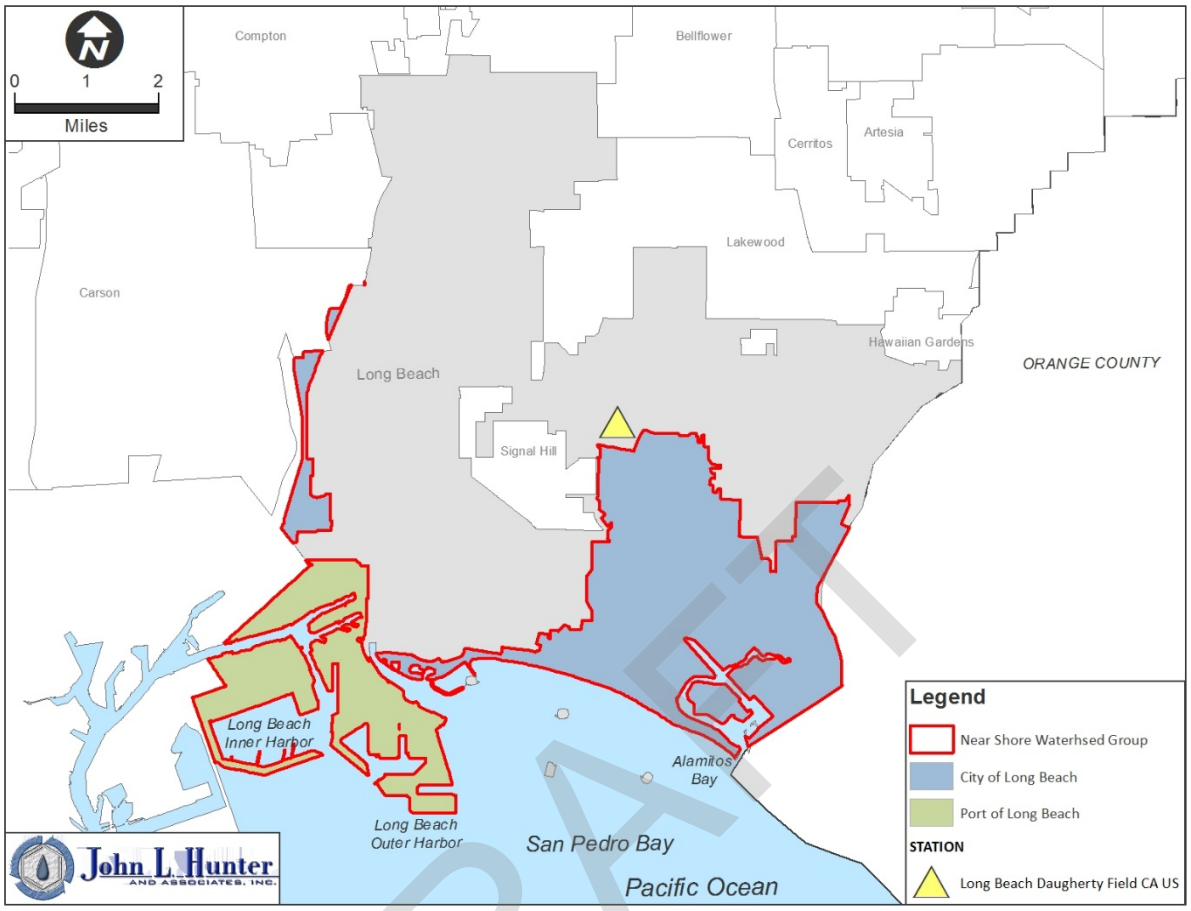

Figure 1-4: Rainfall Gauge Stations in Downey and Long Beach (Yellow Triangle)

Table 1-3: Rainfall Data Summary

Station ID	Station	Period	Latitude	Longitude	Elevation (ft)	Mean Annual Precipitation (in)
USW00023129	Long Beach Daugherty Field	1949-2014	33.811	-118.146	30.84	11.20

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.

DRY WEATHER FLOWS TO THE NEARSHORE WATERSHED

Dry weather flow in the Nearshore Watershed comes predominantly from non-stormwater discharges and groundwater inflow. Sources of non-stormwater discharges include generating stations, urban runoff such as irrigation overflows and car wash water, and various industrial discharges. The two power

generation station (AES Alamitos, L.L.C, and the Haynes Generating Station) discharge into the San Gabriel River Estuary and constitute the majority of the flow and metals loadings during dry weather.[15]

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

Month	Long Beach Daugherty Field
January	2.6
February	2.9
March	1.8
April	0.7
May	0.2
June	0.1
July	<0.1
August	0.1
September	0.2
October	0.4
November	1.2
December	1.8
Total Average Monthly Rainfall	**1.0**

WATERSHED CATCHMENT HYDROLOGIC CONNECTIVITY

The Nearshore watersheds discharge to the Long Beach Harbor, the San Pedro Bay (including the Long Beach City Beaches), and the Estuaries of the Dominguez Channel, Los Cerritos Channel, and San Gabriel River.

- The Dominguez Channel Estuary subwatershed has a total drainage of approximately 0.69 square miles that flows directly to the Los Angeles/Long Beach Harbors.
- The Port of Long Beach subwatershed has a total drainage of approximately 4.54 square miles that drains directly to the Los Angeles/Long Beach Harbor.
- The Long Beach City Beaches subwatershed has a total area of approximately 0.59 square miles that discharges to San Pedro Bay.
- The Alamitos Bay subwatershed has a total drainage area of approximately 5.7 square miles. This area includes Sims Pond which is situated north of Alamitos Bay near the intersection of Pacific Coast Highway and Loynes Drive. The Colorado Lagoon subwatershed is approximately 1.8 square miles. Alamitos Bay and Colorado Lagoon are hydraulically connected via an underground culvert which connects Colorado Lagoon to the Marine Stadium portion of Alamitos Bay. The Los Cerritos Channel Estuary is approximately 1.5 miles long and extends from just south of Atherton St. to the Alamitos Bay.
- The San Gabriel River Estuary has a total drainage area of 0.77 square miles.

[15] San Gabriel River Metals TMDL, Basin Plan Amendment 2007

The Los Angeles County Department of Public Works provided the delineation of the catchments within each subwatershed. Approximately 22 catchments are located within this watershed.[16] These delineations are based on a combination of contour information and existing underground storm sewer systems.

The watershed is predominately served by storm drain systems, extending throughout the City of Long Beach, connecting drainage in urbanized areas with the main tributaries. Figure 1-5 shows the storm drains within the watershed.

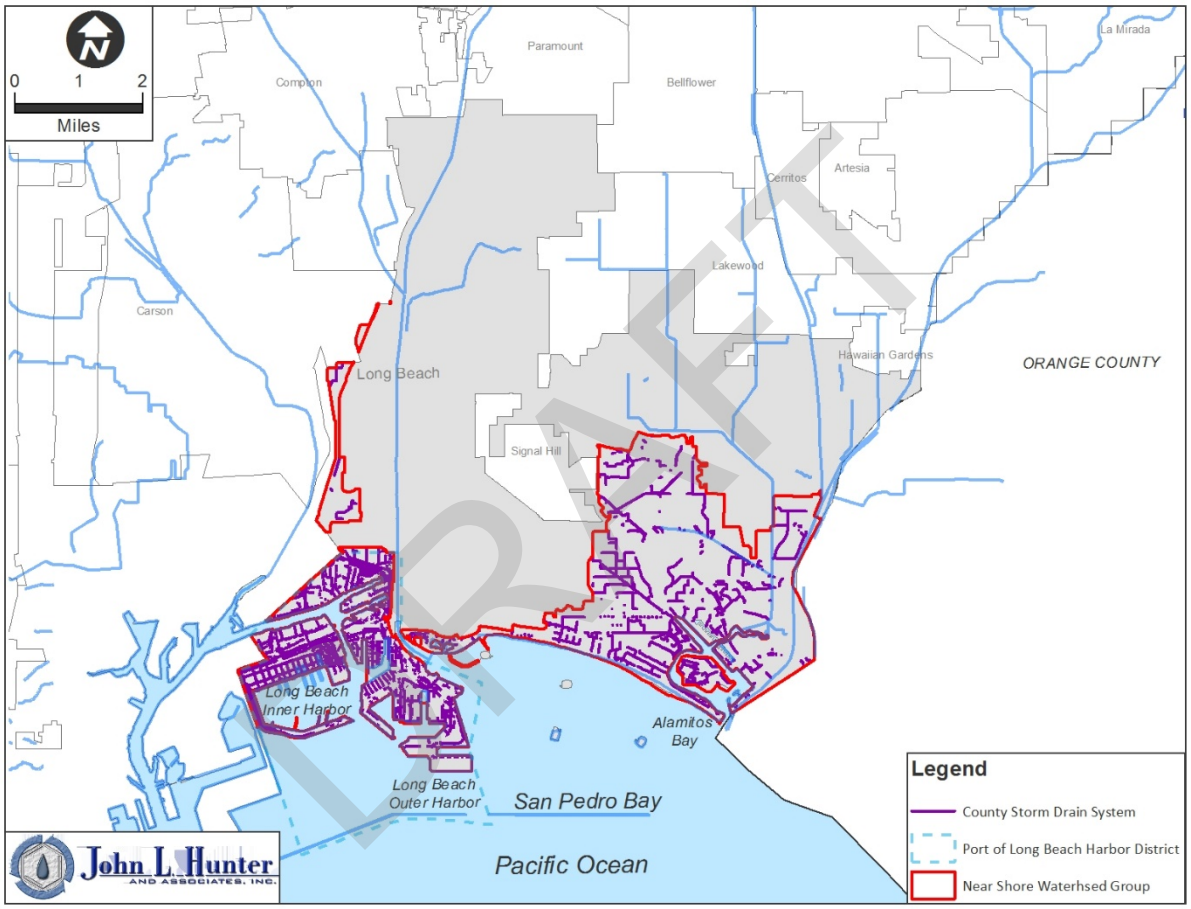

Figure 1-5: LACFCD Storm Drains

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,

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

and therefore should not be analyzed independently when evaluating locations for structural stormwater controls.

SOILS

The Nearshore 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. For the Port however, the soil types depicted in the Figure are inaccurate—much of this area consists of man-made fill.

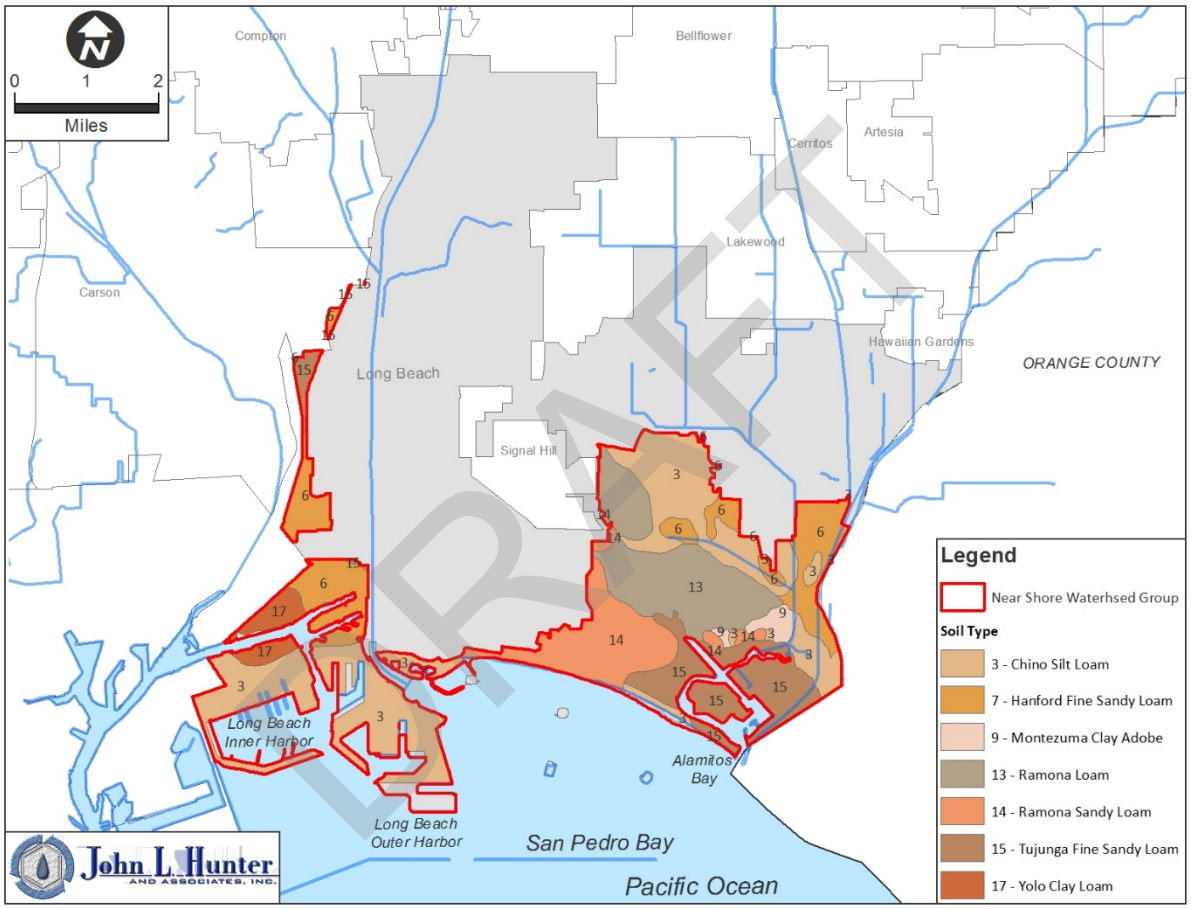

Figure 1-6: Soil Types[17]

GROUNDWATER

Groundwater flow in the Nearshore Watersheds generally mimics surface topography. Depth to groundwater in the City varies from 3 feet to greater than 30 feet. Depth to groundwater by the Port is typically less than ten feet. Figure 1-7 shows the groundwater basin for the Nearshore Watershed.

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

WATERSHED LAND AREA

Table 1-5 lists the percent land area within the Nearshore Watersheds.

LAND USES

The Port is a public agency managed and operated by the City of Long Beach Harbor Department. Table 1-6 lists and Figure 1-8 shows the developed and undeveloped land within the Nearshore Watersheds.

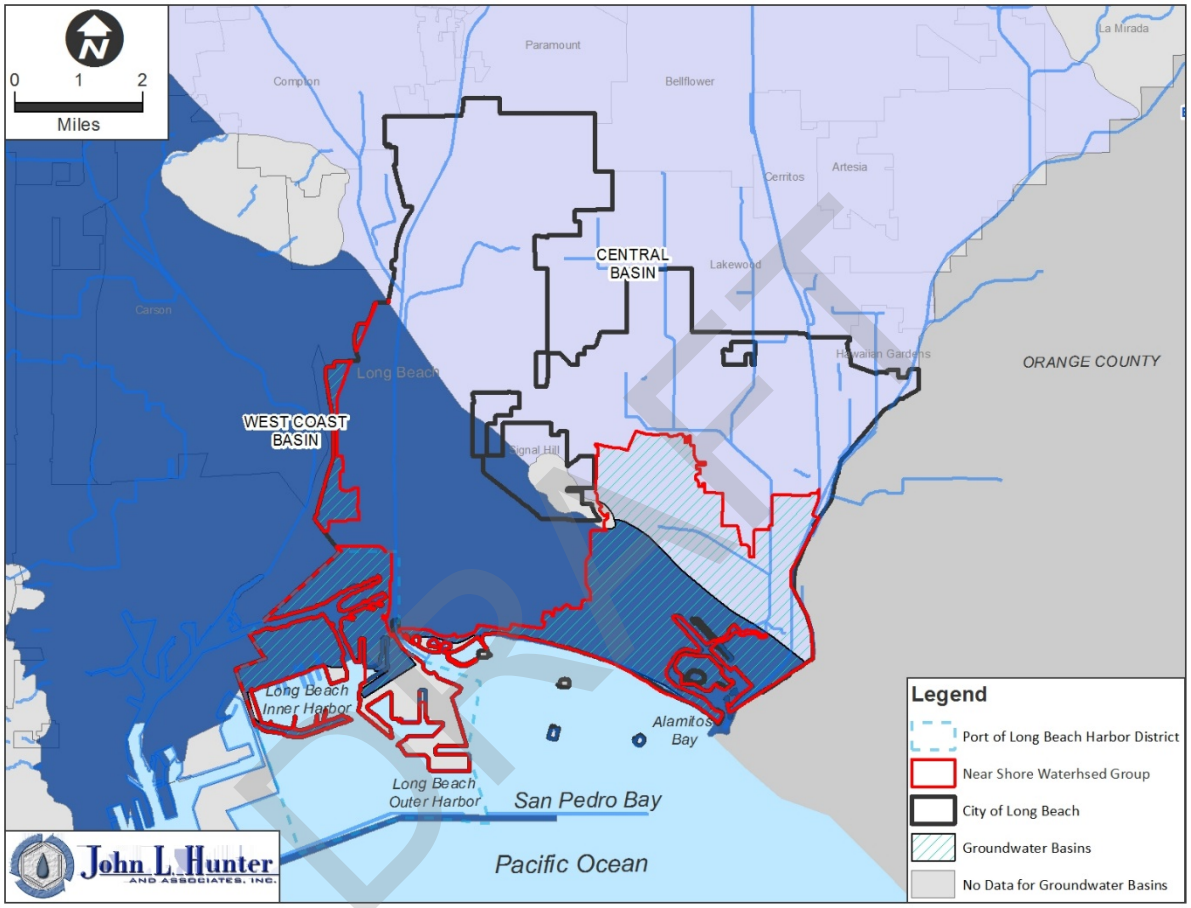

Figure 1-7: Groundwater Basins

Table 1-5: Watershed Land Area

Participating Agency	Land area (Acres)	Percent of total area (%)
City of Long Beach	7,680	72
Port of Long Beach	3,209	28
Total	10,739	100

Table 1-6: Developed and Undeveloped Land

Participating Agency	Acres developed	Acres undeveloped	Developed lands
City of Long Beach	7,231	449	94%
Port of Long Beach	3,205	4	99.8%

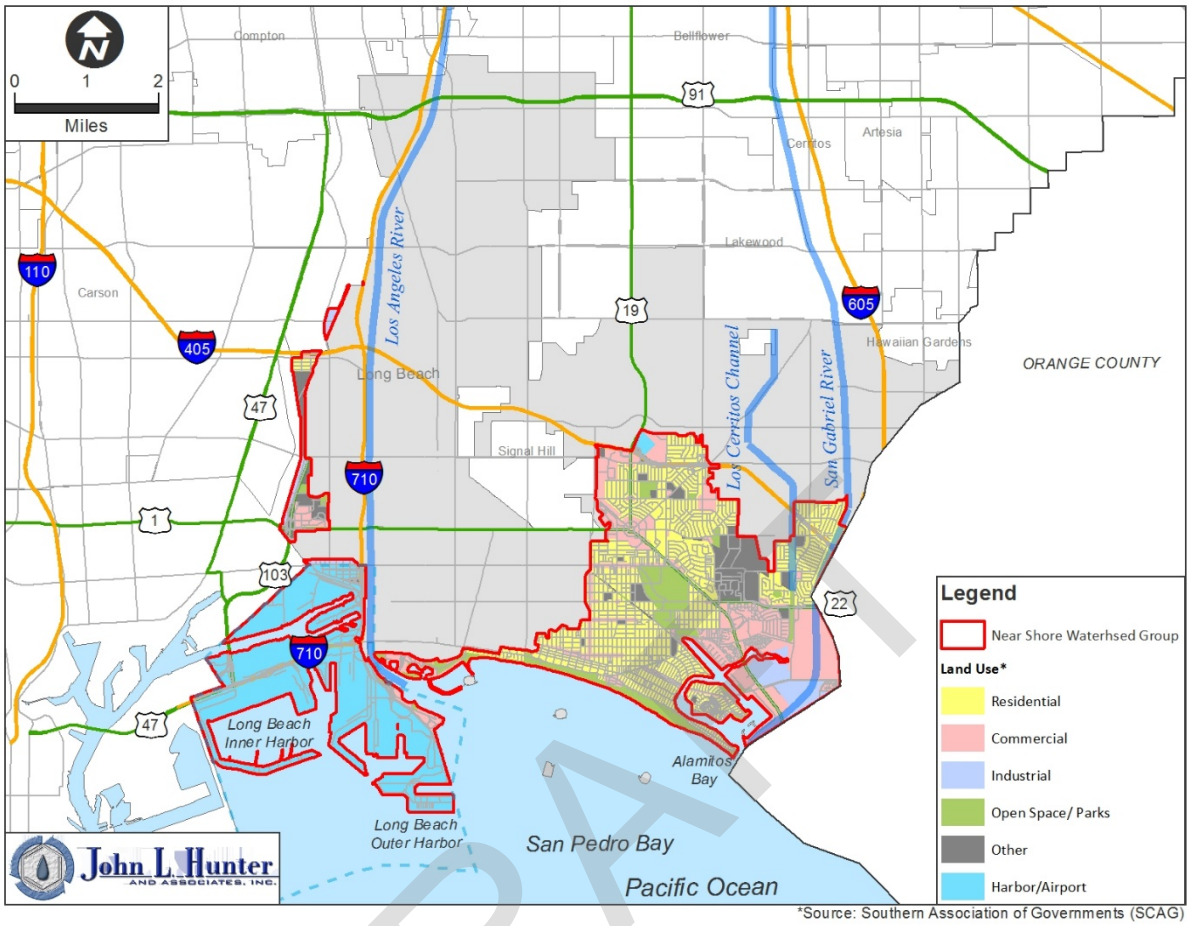

Figure 1-8: Land Use Map

DISADVANTAGED COMMUNITY

Areas of the Nearshore Watersheds are economically disadvantaged. To be considered a disadvantaged community by the State, the median income levels in the community as a whole must be less than 80% of the state's median household income ($48,706).[18] Table 1-7 lists the income statistics for the City and Figure 1-9 is a map of the disadvantaged communities within the Nearshore Watersheds.

Table 1-7: DAC Percentage by City

City	DAC Percentage[1]
City of Long Beach	28%
Port of Long Beach	N/A*

* There are no residential areas categorized in the Port

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

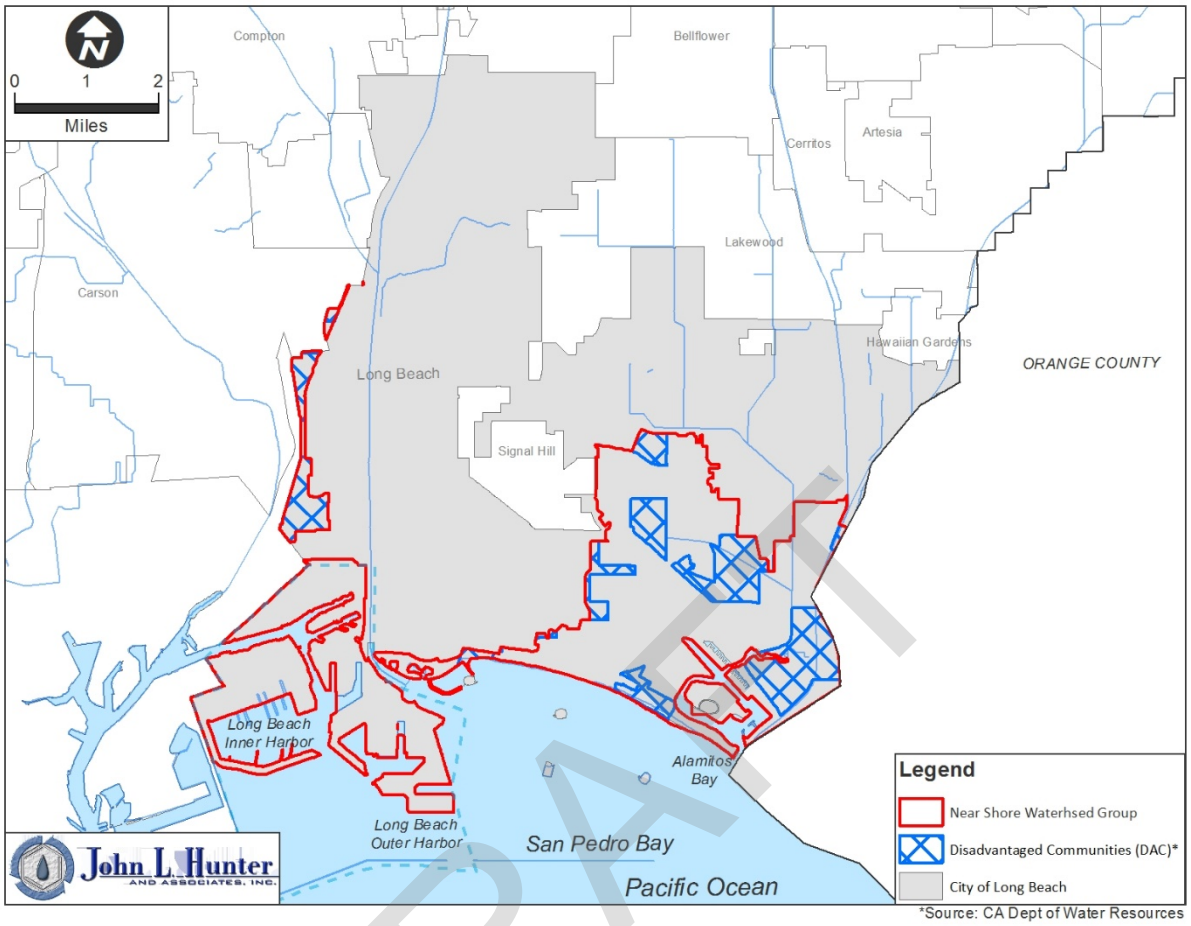

Figure 1-9: Disadvantaged Community Map

1.3.3 History of Impairments in the Nearshore Watersheds

Waterbodies within the Nearshore Watersheds 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, toxics, and historic pesticides. Beneficial uses impaired by pollutants in the Nearshore Watershed are IND, NAV, COMM, EST, MAR, WILD, RARE, MIGR, SPWN, SHELL, MUN, WARM, WET, REC1 and REC2.

1.4 Water Quality Issues and the History of Water Quality Regulations

1.4.1 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

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 Nearshore 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.

Adoption of a TMDL by the Regional Board 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).

1.4.2 MS4 PERMIT HISTORY

The Los Angeles Regional Water Quality Control Board (Regional Board) issued the first municipal MS4 permit to Los Angeles County and 85 cities, which included the City of Long Beach, in 1990. It was structured to phase the cities into implementation of the permit provisions. On June 30, 1999, the City of Long Beach was issued a separate MS4 Permit. The City subsequently developed and implemented

programs to manage urban and storm water runoff for the area within its boundaries. The Fourth Term MS4 Permit (Order No. R4-2014-0024) was adopted on February 6, 2014.

1.4.3 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[19]. 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.

1.5 MS4 PERMIT REQUIREMENTS

The development of this WMP is a compliance option of the MS4 permits held by the City. 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 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:

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

- 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 City's 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 March 28, 2014 and March 28, 2019. Monday morning would also work.
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.

1.5.1 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 Participating Agency within its jurisdiction and for those that will be implemented 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.

1.5.2 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 the WMP is to identify and address water quality priorities of the Nearshore Watersheds. In order to begin prioritizing water quality issues, an evaluation of existing water quality conditions, including characterization of stormwater and non-stormwater discharges from the Municipal Separate Storm Sewer System (MS4) and receiving waters has been completed per section VII.C.1.f.i of the MS4 Permit.

The existing water quality conditions of the Nearshore Watersheds 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 in Table 2-1.

Table 2-1: Categories for Waterbody-Pollutant Combinations

Category	Description
1	Pollutants for which water quality-based effluent limitations and/or receiving water limitations are established in the TMDL Provisions of the MS4 Permit.
1A	Final deadlines within Permit term (after approval of WMP and prior to March 28, 2019)
1B	Interim deadlines within Permit term (after approval of WMP and prior to March 28, 2019)
1C	Final deadlines between March 29, 2019 - March 28, 2024
1D	Interim deadlines between March 29, 2019 - March 28, 2024
1E	Interim & final deadlines after March 28, 2024
1F	Past final deadlines (final deadlines due prior to approval of WMP)
1G	USEPA established TMDLs with no implementation schedule
2	Pollutants for which data indicate water quality impairment in the receiving water according to the State Board's Water Quality Control Policy (Listing Policy) for Developing California's CWA Section 303(d) List and for which MS4 discharges may be causing or contributing to the impairment.
2A	Non-legacy pollutants
2B	Bacterial indicators
2C	Legacy pollutants
2D	Water quality indicators
3	Pollutants for which there are insufficient data to indicate water quality impairment in the receiving water according to the Listing Policy, but which exceed applicable receiving water limitations in the MS4 Permit and for which MS4 discharges may be causing or contributing to the exceedance.
3A	Non-legacy pollutants
3B	Bacterial indicators
3C	Legacy pollutants
3D	Water quality indicators

The Nearshore Watersheds encompass: (1) a small area draining to the Dominguez Channel Estuary, (2) the Port of Long Beach and San Pedro Bay, (3) the shoreline area stretching between the Los Angeles River Estuary and the Alamitos Bay inlet, (4) the Colorado Lagoon, (5) Marine Stadium, Alamitos Bay and Los Cerritos Channel and (6) the San Gabriel River Estuary. The pollutant categories for the Nearshore

Watersheds are summarized in the following sections, including the weather condition for which impairment was determined. If there is no weather condition determination, the categorization is applicable to both wet and dry weather conditions.

2.1.1 DOMINGUEZ CHANNEL ESTUARY

A small area of the City of Long Beach is tributary to the Dominguez Channel Estuary. Water Quality Priorities have been established by the draft Dominguez Channel Enhanced Watershed Management Plan for the Estuary. The pollutants are categorized in Table 2-2.

Table 2-2: Pollutant Categories for the Dominguez Channel Estuary

Pollutant	Category	Medium
Cadmium	1A	Sediment
Copper	1A	Dissolved, Sediment
Lead	1A	Dissolved, Sediment, Tissue
Zinc	1A	Dissolved, Sediment
DDT	1A	Sediment, Tissue
PCBs	1A	Sediment
PAHs	1A	Sediment
Chlordane	1A	Sediment, Tissue
Dieldrin	1A	Sediment, Tissue
Sediment Toxicity	1D	Sediment
Benthic Community Effects	1D	Sediment
Ammonia	2C	Water (dry)
Coliform Bacteria	2A	Water
Arsenic	3A	Sediment
Chromium	3A	Sediment
Silver	3C/3A	Dissolved (dry)/Sediment
Nickel	3C	Dissolved
Thallium	3C	Dissolved
Mercury	3C/3A	Dissolved (dry)/Sediment

The interim WQBEL daily maximums for the freshwater portion (during wet weather) of the Dominguez Channel Estuary are 207.51 µg/L for total copper, 122.88 µg/L for total lead, and 898.87 µg/L for total zinc. The interim WQBEL daily maximums for sediment are 220.0 mg/kg for copper, 510.0 mg/kg for lead, 789 mg/kg for zinc, 1.727 mg/kg for DDT, 31.60 mg/kg for PAHs, and 1.490 mg/kg for PCBs.

The final WQBELs for fresh water (during wet weather) is 1,300.3 g/day of total copper, 5,733.7 g/day of total lead, 9,355.5 g/day of total zinc. These limitations are to be met by March 23, 2032.

The final Water Quality-Based Effluent Limitations (WQBELs) for sediment to be met by March 23, 2032, are listed in Table 2-3.

Table 2-3: Dominguez Channel Estuary Final WQBELs

Pollutant	WQBEL	Units
Total Copper	0.6	Annual (kg/yr)
Total Lead	1.52	Annual (kg/yr)
Total Zinc	7.6	Annual (kg/yr)
Total PAHs	0.0038	Annual (kg/yr)
Total Cadmium	1.2	Daily maximum (mg/kg dry sediment)
Total DDTs	0.007	Annual (g/yr)
Total PCBs	0.006	Annual (g/yr)

2.1.2 INNER AND OUTER LONG BEACH HARBOR AND EASTERN SAN PEDRO BAY

The WMP includes the Port of Long Beach, consisting of the Inner Harbor and Outer Harbor waters, and eastern San Pedro Bay, inclusive of the Los Angeles River Estuary Queensway Bay section. Data from the last 10 years (2005 through 2014) were compiled to assess historical quality for water, sediment, and fish tissues in these waterbodies (summarized in Tables 2-7 through 2-9). From this data, pollutant category classifications are determined (based on the reasoning discussed in Section 2.1). The summary of pollutant category classifications for the three areas in the Port are displayed in Table 2-4.

Table 2-4: Pollutant Categories for the Inner Harbor, Outer Harbor, and Eastern San Pedro Bay

Pollutant	Waterbody	Category	Media
Dissolved Copper	IH	3A	Water
Total Copper	IH, OH, ESPB	1B	Sediment
Total Lead	IH, OH, ESPB	1B	Sediment
Dissolved Zinc	IH	3A	Water
Total Zinc	IH, OH, ESPB	1B	Sediment
Total PAHs	IH, OH, ESPB	1B	Sediment
Total DDTs	IH, OH, ESPB	1B	Sediment
	IH, OH, ESPB	1E	Fish Tissue
Total PCBs	IH, OH, ESPB	1B	Sediment
	IH, OH, ESPB	1E	Fish Tissue
Pyrene	IH, OH	2A**	Water
	ESPB	3A	Water
Chrysene	IH	3A	Water
Bis(2-ethylhexyl)phthalate (DEHP)*	IH, OH, ESPB	3A	Water
Total Chlordanes	IH, OH	2C**	Fish Tissue
Mercury	IH	2C**	Sediment
Dissolved Mercury	IH	3A	Water
Total Coliforms	IH	3A	Water
Enterococci	IH	3A	Water
pH	IH	3D	Water
Nickel	OH	3C	Sediment
Benthic Community Effects	IH	1B	Sediment
Sediment Toxicity	IH, OH, ESPB	1B	Sediment

*DEHP should not be considered a Category 2 pollutant since it is likely these exceedances were due to laboratory contamination.

**Classified as Category 2 based on exceedances meeting the 303(d) listing criteria

IH, the Inner Harbor; OH, Outer Harbor; ESPB, Eastern San Pedro Bay

BASIS FOR CATEGORIZATION

Based on Part VIII of the Permit, Category 1 waterbody-pollutant combinations are TMDL-established WQBELs in the TMDL provision of the Permit (Part VIII), which combine the Inner Harbor, Outer Harbor, and Eastern San Pedro Bay with total copper, total lead, total zinc, and total PAHs (in sediment only) and total DDTs and total PCBs in both sediment and fish tissue. These waterbody-pollutant combinations can be further classified as Category 1B, where the TMDL interim deadline is within the permit term. Total DDTs and total PCBs in fish tissue can be classified as Category 1E, where the TMDL final deadline is after 2028. Table 2-5 lists the interim Water Quality-Based Effluent Limitations.

Table 2-5: Interim Mass-based WQBELs for the Inner Harbor, Outer Harbor, and Eastern San Pedro Bay

	WQBELs			
Pollutant	Inner Harbor	Outer Harbor	San Pedro Bay	Units
Total Copper	142.3	67.3	76.9	Daily maximum (mg/kg sediment)
Total Lead	50.4	46.7	66.6	
Total Zinc	240.6	150	263.1	
Total PAHs	0.07	0.075	0.057	
Total DDTs	4.58	4.022	4.022	
Total PCBs	0.06	0.248	0.193	

Table 2-6 lists the final Water Quality-Based Effluent Limitations to be met by March 23, 2032.

Table 2-6: Final Mass-based WQBELs for the Inner Harbor, Outer Harbor, and Eastern San Pedro Bay

	WQBELs			
Pollutant	Inner Harbor	Outer Harbor	San Pedro Bay	Units
Total Copper	0.463	0.63	137.9	Annual (kg/yr)
Total Lead	9.31	18.1	372.2	
Total Zinc	31.71	56.4	1449.7	
Total PAHs	0.024	0.073	12.0	
Total DDTs*	0.014	0.004	0.333	Annual (g/yr)
Total PCBs*	0.016	0.014	3.01	

*Sediment WQBELs to achieve fish tissue targets

Following Section 2.1, Category 2 pollutants are determined using the 303(d) listing and the historical records of exceedances for the area. Table 2-7 lists the 303(d)-listed pollutants for the Port areas. A discussion on Category 2 pollutants in the Port areas follows Table 2-7. The names and waterbodies in the table are as listed on the State Board's 303(d) list.

Table 2-7: 2010 303(d) List for the Inner Harbor, Outer Harbor, and Eastern San Pedro Bay

Waterbody	Pollutant
Los Angeles/Long Beach Inner Harbor	Beach Closures
	Benthic Community Effects
	Benzo(a)pyrene (3,4-Benzopyrene -7-d)
	Chrysene (C1-C4)
	Copper
	DDT (Dichlorodiphenyltrichloroethane)
	PCBs (Polychlorinated biphenyls)
	Sediment Toxicity
	Zinc
Los Angeles/Long Beach Outer Harbor (inside breakwater)	DDT (Dichlorodiphenyltrichloroethane)
	PCBs (Polychlorinated biphenyls)
	Sediment Toxicity
San Pedro Bay Near/Offshore Zones	Chlordane
	DDT (tissue & sediment)
	PCBs (Polychlorinated biphenyls)
	Sediment Toxicity

Although the 303(d) list shows Los Angeles/Long Beach Inner Harbor listed for beach closures due to bacteria, only the Port of Los Angeles Inner Harbor (specifically Inner Cabrillo Beach) and Main Ship Channel were named in the associated bacteria TMDL, and thus are not classified as Category 2 pollutants in the Port area. Similarly, the Harbor Toxics TMDL was developed for all the remaining pollutants that were listed for the Inner Harbor, Outer Harbor, and eastern San Pedro Bay, and therefore they are also not included on the Category 2 list for the Port area.

Historical water quality assessments (further discussed in Section 2.2.3) show that DEHP, dissolved copper, dissolved mercury, dissolved zinc, chrysene, pyrene, pH, total coliforms, and enterococci in Inner Harbor and pyrene and bis(2-ethylhexyl)phthalate in both the Outer Harbor and eastern San Pedro Bay are pollutants that exceeded thresholds, and thus should be listed as Category 2 pollutants. However, there are some exceptions to those pollutants that show historical water quality assessment exceedances, and therefore should not be included in the Category 2 pollutant list. Among these pollutants, DEHP exceedances were likely due to laboratory contamination and not due to water quality conditions; therefore, DEHP should not be classified as a Category 2 pollutant. Further, 5 of 11 exceedances of mercury in the Inner Harbor occurred on September 17, 2009, during the Station Fire, which is the largest wildfire in the modern history of Los Angeles County. Thus, the exceedances occurring during that event were likely a result of atmospheric deposition and directly contributed to the wildfire and not representative of water quality conditions within the Inner Harbor. Considering this event, only 6 exceedances from the 90 samples could possibly be attributed to water quality conditions in the Inner Harbor; therefore, mercury should not be classified as a Category 2 pollutant. Further discussion on the sources of these compounds is provided in Section 2.3. All historical water quality assessment exceedances for water column samples are shown in Table 2-8.

Table 2-8: Historical Water Quality Assessment for the Inner Harbor, Outer Harbor, and Eastern San Pedro Bay

Waterbody	Pollutants exceeding water quality thresholds (No. samples exceeded/No. total sample)
Long Beach Inner Harbor	Bis(2-ethylhexyl)phthalate[A] (26/71), dissolved copper (6/101), dissolved mercury[B] (11/90), chrysene (1/71), pyrene (25/71), dissolved zinc (2/101), pH (1/2427), total coliforms (1/5), enterococci (1/5)
Long Beach Outer Harbor	Bis(2-ethylhexyl)phthalate[A] (4/20), pyrene (2/20),
Eastern San Pedro Bay	Bis(2-ethylhexyl)phthalate[A] (3/10), pyrene (1/10),

[A] Di(2-ethylhexyl)phthalate (DEHP) is a widely used plasticizer known to be ubiquitous in environment. Detection of this compound in water is likely due to laboratory contamination. See Section 2.3 for sources of this compound.

[B] Five of eleven exceedances occurred on September 17, 2009, during the Station Fire, which is the largest wildfire in the modern history of Los Angeles County. Detection of this compound in water during this event is likely due to atmospheric deposition and directly contributed to the wildfire. See Section 2.3 for discussion on wildfire's contribution to mercury in the environment.

Mercury and nickel in sediment of the Inner Harbor and Outer Harbor respectively are the only pollutants that showed any exceedances and were not included in the Harbor Toxics TMDL (Table 2-9). According to Table 3.1 in the 303(d) listing policy, mercury meets the listing policy criteria, but nickel does not (Table 2-11). Therefore, Inner Harbor-mercury for sediment may be placed into Category 2.

Table 2-9: Historical Sediment Quality Assessment for the Inner and Outer Harbor and Eastern San Pedro Bay

Waterbody	Pollutants exceeding sediment quality thresholds, ERMs (No. samples exceeded/No. total sample)
Long Beach Inner Harbor	Mercury (2/16), dibenzo(a,h)anthracene (1/7), total DDTs[A] (3/16), 4,4'-DDE (4/16)
Long Beach Outer Harbor	Nickel (1/9), total DDTs (2/17), 4,4'-DDE (4/17)
Eastern San Pedro Bay	Total DDTs (2/10), 4,4'-DDE (3/10)

[A] Including DDDs, DDEs, and DDTs

Fish tissue data from both the Inner and Outer Harbor waters exceeded for total DDTs, total PCBs, and total chlordanes as presented in Table 2-10. However these waterbody-total DDTs and total PCBs were already included in Category 1 because TMDL WQBELs for sediment associated with fish tissue targets were already developed for the total DDTs and total PCBs in the Port's waterbodies. While total chlordanes in fish tissue from Inner and Outer Harbor waters are not in Category 1 and meet the 303(d) listing policy (Table 2-11). Thus the Inner-Harbor and Outer Harbor waters for chlordane in fish tissue are placed in Category 2.

Table 2-10: Historical Fish Tissue Quality Assessment in the Inner and Outer Long Beach Harbor and Eastern San Pedro Bay

Waterbody	Pollutants exceeding fish tissue thresholds, OEHHA FCGs (No. samples exceeded/No. total sample)
Long Beach Inner Harbor	Total DDTs[A] (52/54), total PCBs (53/54), total chlordanes (7/33)
Long Beach Outer Harbor	Total DDTs (50/57), total PCBs (54/56), total chlordanes (16/43)
Eastern San Pedro Bay	No fish tissue data available

[A] Including DDDs, DDEs, and DDTs

Conclusively, there are no Category 2 pollutants from the current 303(d) list or from historical assessments for sediment or fish tissue that should be included in the Category 2 pollutants for the Port areas. For

historical assessments, Table 2-11 summarizes waterbodies and pollutants that meet the Listing Policy. Considering the previous discussion and the data presented in Table 2-11, pyrene in the Inner Harbor and Outer Harbor is the only pollutant that meets the historical Listing Policy in water. The Harbor Toxics TMDL was already developed to address PAHs in water, sediment, and fish tissue. Category 2 pollutants are listed in Table 2-4 at the beginning of this section.

For the Category 3 classification, water column, sediment, and fish tissue data were compared to the State Water Board's water quality-based assessment thresholds and the Los Angeles Basin Plan as discussed in Section 2.1.

Based on the water quality assessment, an exceedance to any of the thresholds occurring in water, sediment, and fish tissue in any of the waterbodies where there was insufficient data available for the 303(d) listing determination are summarized in Table 2-12 and classified as a Category 3 waterbody-pollutant.

Only mercury in sediment samples from the Inner Harbor and nickel in Outer Harbor show any exceedances and are not included in the Harbor Toxics TMDL. Thus mercury in the Inner Harbor and nickel in the Outer Harbor are Category 3 waterbody-pollutants for sediment. No pollutants in fish tissue fall in Category 3.

Table 2-11: Water, Sediment, and Fish Tissue Quality
Relative to the Listing Policy for the Inner and Outer Long Beach Harbor and Eastern San Pedro Bay

Waterbody	Pollutant	Water*, Sediment or Fish Tissue	Total samples	Exceedances	Exceedance threshold**		Meets 303(d) listing standard
					Table 3.1	Table 3.2	
Eastern San Pedro Bay	Pyrene	Water, CTR Toxicant	10	1	2		No
	bis(2-ethylhexyl)phthalate	Water, CTR Toxicant	10	3	2		No[A]
Inner Harbor	pH	Water, Non-CTR	2427	1		208	No
	Dissolved copper	Water, CTR Toxicant	101	6	9		No
	Dissolved mercury	Water, CTR Toxicant	90	6(11)[B]	8		No[B]
	Dissolved zinc	Water, CTR Toxicant	101	2	9		No
	Chrysene	Water, CTR Toxicant	71	1	6		No
	Pyrene	Water, CTR Toxicant	71	25	6		Yes
	Total coliforms	Water, Non-CTR	5	1		5	No
	Enterococci	Water, Non-CTR	5	1		5	No
	bis(2-ethylhexyl)phthalate	Water, CTR Toxicant	71	26	6		No[A]
	Mercury	Sediment	16	2	2		Yes
	Total DDTs	Fish Tissue	54	52	5		Yes
	Total PCBs	Fish Tissue	54	53	5		Yes
	Total chlordanes	Fish Tissue	33	7	3		Yes
Outer Harbor	Pyrene	Water, CTR Toxicant	20	2	2		Yes
	bis(2-ethylhexyl)phthalate	Water, CTR Toxicant	20	4	2		No[A]
	Nickel	Sediment	9	1	2		No
	Total DDTs	Fish Tissue	57	50	5		Yes
	Total PCBs	Fish Tissue	56	54	5		Yes
	Total chlordanes	Fish Tissue	43	16	4		Yes

[A] Exceedances likely due to laboratory contamination and not representative of water quality conditions.
[B] Five of eleven exceedances occurred on September 17, 2009, during the Station Fire, which is the largest wildfire in the modern history of Los Angeles County. Detection of this compound in water during this event is likely due to atmospheric deposition and directly contributed to the wildfire and is not representative of water quality conditions in the Inner Harbor.
* If CTR/NTR Toxicant, Table 3.1, otherwise, Table 3.2 in CA Listing Policy applies
** If exceedances are equal to or greater than the value listed in the column, than it meets the 303(d) listing standard

Table 2-12: Category 3 Pollutant Classification for the Inner Harbor, Outer Harbor, and Eastern San Pedro Bay

Waterbody	Category 3		
	Water column*	Sediment	Fish tissue
Long Beach Inner Harbor	Bis(2-ethylhexyl)phthalate[A] (26/71), dissolved copper (6/101), dissolved mercury (11[B]/90), dissolved zinc (2/101), chrysene (1/71), pH (1[C]/2427), total coliforms (1/5), enterococci (1/5)	-	-
Long Beach Outer Harbor	Bis(2-ethylhexyl)phthalate[A] (4/20)	Nickel (1/9)	-
Eastern San Pedro Bay	Pyrene (1/10), bis(2-ethylhexyl)phthalate[A] (3/10)	-	-

* Values in parentheses indicate (No. of sample exceeding a threshold/No. of total samples)

[A] Di(2-ethylhexyl)phthalate (DEHP) is a widely used plasticizer known to be ubiquitous in the environment. Detection of this compound in water is highly likely due to laboratory contamination. See Section 2.3 for sources of this compound.

[B] Five of eleven exceedances occurred on September 17, 2009, during the Station Fire, which is the largest wildfire in the modern history of Los Angeles County. Detection of this compound in water during this event is likely due to atmospheric deposition and directly contributed to the wildfire and is not representative of water quality conditions in the Inner Harbor. See Section 2.3 for discussion on wildfire's contribution to mercury in the environment.

[C] The pH value for this sample was 8.62; note that the pH threshold is between 6.5 and 8.5.

2.1.3 SHORELINE

The Shoreline area includes the City Beaches, the Rainbow Marina and the Shoreline Marinas, and the Los Angeles River Estuary. The beach areas are at 3rd Pl., 5th Pl., 10th Pl., 16th Pl., 36th Pl., 72nd Pl., Coronado Avenue, Molino Avenue, and the east side and west side of Belmont Pier. This category generally extends only to the wave wash; beyond is considered the Eastern San Pedro Bay and is addressed in Section 2.1.2. The USEPA TMDL for Beach City Beaches and Los Angeles River Estuary for Indicator Bacteria is issued for both the Los Angeles River Estuary and the City of Long Beach City Beaches. While the majority of the Los Angeles River Estuary is accounted for the in the Lower Los Angeles River WMP, a small portion – the Queensway Bay – is included in this Nearshore WMP. Tables 2-13 categorizes the pollutants for the shoreline.

Table 2-13: Pollutant Categories for the Shoreline

Pollutant	Category
Total Coliform	
Fecal Coliform	
Enterococcus	1G
Harbor Toxics TMDL Pollutants*	1B
Chlordane	
Trash	2A
Sediment Toxicity	2D

*The shoreline is part of the nearshore zone as defined in the Toxics TMDL, which drains to the San Pedro Bay. See the Eastern San Pedro Bay column of Tables 2-4 to 2-6 for the complete list of pollutants and associated WQBELs.

Following the MS4 Permit, Table 2-14 lists the respective waste load allocations (WLAs).

Table 2-14: Long Beach City Beaches Final Waste Load Allocations (WLAs)

Constituent	WLA (MPN of cfu)	
	Daily Maximum	Geometric Mean
Total Coliform	10,000/100 mL	1,000/100 mL
Fecal Coliform	400/100 mL	200/100 mL
Enterococcus	104/100 mL	35/100 mL

The geometric mean receiving water limitations for all compliance monitoring stations are listed in Table 2-15 and the allowable single sample exceedances are listed in Table 2-16.

Table 2-15: Long Beach City Beaches Receiving Water Limitations

Constituent	Geometric Mean (MPN or cfu)
Total Coliform	1,000/100 mL
Fecal Coliform	200/100 mL
Enterococcus	35/100 mL

Following MS4 Permit §VIII.G, the compliance schedule for the USEPA Beaches Bacteria TMDL is included in Chapter 5.

Table 2-16: Allowable Exceedance Days of Single Sample Maximum for Daily and Weekly Sampling

Site ID	Monitoring Location	Summer Dry		Winter Dry		Wet	
		Daily	Weekly	Daily	Weekly	Daily	Weekly
LARE	LA River Estuary	0	0	9	2	17	3
B63	LBCB 3rd Pl	0	0	9	2	17	3
B5	LBCB projection of 5th Pl	0	0	9	2	17	3
B56	LBCB projection of 10th Pl	0	0	9	2	17	3
B6	LBCB projection of 16th Pl	0	0	9	2	17	3
B60	LBCB projection of Molino Ave	0	0	9	2	17	3
B7	LBCB projection of Coronado Ave	0	0	9	2	17	3
B62	LBCB projection 36th Pl	0	0	9	2	17	3
B8	LBCB – Westside of Belmont Pier	0	0	9	2	17	3
B3	LBCB – Eastside of Belmont Pier	0	0	9	2	17	3
B9	LBCB projection of Prospect Ave	0	0	9	2	17	3
B64	LBCB projection of Granada Ave	0	0	7	1	17	3
B65	LBCB projection of 54th Pl	0	0	6	1	17	3
B10	LBCB projection of 55th Pl	0	0	5	1	17	3
B66	LBCB projection of 62nd Pl	0	0	7	1	17	3
B11	LBCB projection of 72nd Pl	0	0	9	2	17	3

2.1.4 COLORADO LAGOON

The historical record of impairments to the Colorado Lagoon is extensive and is summarized in Table 2-17. Colorado Lagoon is 303(d) listed for indicator bacteria and sediment toxicity in in the 2010 303(d) list[1] and summarized in the same table. Sediment monitoring was conducted in summer 2013 in Colorado

[1] The 2010 303(d) list includes chlordane (fish tissue & sediment), DDT (fish tissue), dieldrin (fish tissue), indicator bacteria (water), lead (sediment), PAHs (sediment), PCBs (fish tissue), sediment toxicity, and zinc (sediment) for Colorado Lagoon.

Lagoon. Cadmium, copper, and mercury exceeded sediment effect range low (ERL) thresholds. No other Category 3 pollutant applies to Colorado Lagoon.

Table 2-17: Categorical Designation of Pollutants

Pollutant	Category	Media
Chlordane	1A	Tissue, Sediment
Dieldrin		Tissue
Lead		Sediment
Zinc		Sediment
PAHs		Sediment
PCBs		Tissue
DDT		Tissue
Sediment Toxicity		Sediment
Indicator Bacteria	2B	Water

Interim WQBELs for Category 1 pollutants are 129.65 ug/dry kg for chlordane, 26.20 ug/dry kg for dieldrin, 399,500 ug/dry kg for lead, 565,000 ug/dry kg for zinc, 4,022 ug/dry kg for PAHs, 89.90 ug/dry kg for PCBs, and 149.80 ug/dry kg for DDT. The City of Long Beach must be in compliance with these limits as of the effective date of the Permit (March 26, 2014.)

Following the MS4 Permit, the final Water Quality-Based Effluent Limitations for Category 1 pollutants are in Table 2-18. Annual mass-based effluent limitations assigned to five major storm drain outfalls are displayed in Table 2-19. The City must comply no later than July 28, 2018.

Table 2-18: Final Concentration-based WQBELs for the Colorado Lagoon

Constituent	Monthly Average (ug/dry kg)
Chlordane	0.50
Dieldrin	0.02
Lead	46,700
Zinc	150,000
PAHs	4,022
PCBs	22.70
DDT	1.58

Table 2-19: Colorado Lagoon Annual Mass-Based Effluent Limitations

	Annual Mass-Based Effluent Limitations (mg/yr)				
Constituent	Project 452	Line I	Termino Ave	Line K	Line M
Chlordane	5.10	3.65	12.15	1.94	0.73
Dieldrin	0.20	0.15	0.49	0.08	0.03
Lead	476,646.68	340,455.99	1,134,867.12	181,573.76	68,116.09
Zinc	1,530,985.05	1,093,541.72	3,645,183.47	583,213.37	218,788.29
PAHs	41,050.81	29,321.50	97,739.52	15,637.89	5,866.44
PCBs	231.69	165.49	551.64	88.26	33.11
DDT	16.13	11.52	38.40	6.14	2.30

It is important to note that since 2010 there has been extensive mitigation as the ongoing Colorado Lagoon Restoration Master Plan has included reconstructing the Termino Avenue Drain to bypass Colorado

Lagoon and discharge into Marine Stadium, installing trash separation devices and low-flow diversions, installing bioswales to capture surface runoff from the adjacent golf course, and cleaning and repairing the existing tidal culvert that connects Colorado Lagoon to Marine Stadium. This level of remediation limits the usefulness of the historical data for establishing additional Water Quality Priorities. However the adaptive management process provides a mechanism to modify (i.e., add or remove) Water Quality Priorities. All further remediation efforts are expected to be completed by 2018. Monitoring efforts have been suspended until at least January 2016 to allow for continued remediation and restoration of the Lagoon. Additional cleanup dredging and capping will be conducted to restore surface sediment conditions to levels that support targeted beneficial uses. More information on the remediation of the Colorado Lagoon can be found in Chapter 3.

2.1.5 ALAMITOS BAY

The Alamitos Bay area (as defined in this document) includes Marine Stadium, Los Cerritos Wetlands, Sims Pond, Los Cerritos Channel Estuary, and the Long Beach Marina. This area does not have Category 1 pollutants. Sims Pond has no categorical pollutants listed, and can be excluded from the pollutant designations in Table 2-20. Although Los Cerritos Channel does have a TMDL for metals, the TMDL does not apply to the whole watershed, only the freshwater portion above the estuary. The rest of the categorical pollutants that affect this area are listed in Table 2-20.

Table 2-20: Pollutant Categories for the Alamitos Bay

Pollutant*	Category	Media
Harbor Toxics TMDL Pollutants**	1B	Sediment
Indicator Bacteria	2B	Water
Total Chlordane‡	2C	Sediment
Copper (dry)	3A	Water, Sediment
Enterococcus	3A	Water
Fecal coliform	3A	Water
Total coliform	3A	Water
4,4-DDT	3C	Sediment
4,4-DDD	3C	Sediment
Lead	3C	Sediment
Zinc	3C	Sediment
Dieldrin (wet)	3C	Water
Malathion (wet)	3C	Water
Toxaphene (wet)	3C	Water

*Specific criteria exceeded is included in Table 3-1 in the Alamitos Bay IMP

** The Alamitos Bay is part of the nearshore zone as defined in the Toxics TMDL, which drains to the Eastern San Pedro Bay. See the Eastern San Pedro Bay column of Tables 2-4 to 2-6 for the complete list of pollutants and associated WQBELs.

‡While total chlordane is not listed on the State's 303(d) list, data from SCCWRP Bight 2008 data, City of Long Beach Stormwater Monitoring Reports 2002-2014, and Regional Water Board 4 Dominguez Channel Watershed Monitoring 2003-2005 show that, due to the number of exceedances criteria, it should be considered as a category 2 pollutant

2.1.6 SAN GABRIEL RIVER ESTUARY

The Water Quality Priorities for the San Gabriel River Estuary were established in the 2014 draft Upper San Gabriel River Coordinated Integrated Monitoring Program. The categorical priorities for pollutants of

the San Gabriel River Estuary are listed in Table 2-21. The dry weather Waste Load Allocation of copper for the San Gabriel River Estuary is 3.7 micrograms of copper per liter per day.

Table 2-21: Pollutant Categories for the San Gabriel River Estuary

Pollutant	Category	Medium
Copper	1G	Water (dry)
Dioxin*	2C	Water
Nickel*	2C	Water
Dissolved Oxygen	2D	Water
Selenium*	3C	Water
Lead*	3C	Water
Zinc*	3C	Water
Arsenic**	3C	Water

*Without exceedances within the past 5 years
**delisted within past 10 years

2.1.7 EL DORADO LAKES

El Dorado Lakes are a chain of six small lakes in the El Dorado Regional Park. The lakes do not have hydraulic connectivity to the San Gabriel River. The lakes are under USEPA TMDLs for mercury and nutrients and a Clean-Up and Abatement for copper (Order R4-2012-003, issued January 10, 2012). There are no MS4 discharges to the lakes and as such the TMDLs are not incorporated into the MS4 Permit. Since the lakes' impairments are not related to MS4 discharges, they are not addressed in this WMP.

2.1.8 SUMMARY

Table 2-22 summarizes all waterbody-pollutant combinations for the Nearshore Watersheds.

Table 2-22: Summary of Pollutant Categorization for all Subwatersheds

Pollutant	DCE	IH	OH	ESPB	LBCB	CL	AB	LARE	SGRE
Cadmium	1A[s]								
Copper	1A[s,d]	1B[s]/3A[d]	1B[s]	1B[s]	1B[s]		1B[s]/3A[d]	1B[s]	1G[o]
Lead	1A[s,d,t]	1B[s]	1B[s]	1B[s]	1B[s]	1A[s]	1B[s]	1B[s]	3C
Zinc	1A[s,d]	1B[s]/3A[d]	1B[s]	1B[s]	1B[s]	1A[s]	1B[s]	1B[s]	3C
DDT	1A[s,t]	1B[s]/1E[t]	1B[s]/1E[t]	1B[s]/1E[t]	1B[s]/1E[t]	1A[t]	1B[s]/1E[t]	1B[s]/1E[t]	
PCBs	1A[s]	1B[s]/1E[t]	1B[s]/1E[t]	1B[s]/1E[t]	1B[s]/1E[t]	1A[t]	1B[s]/1E[t]	1B[s]/1E[t]	
PAHs	1A[s]	1B[s]	1B[s]	1B[s]	1B[s]	1A[s]	1B[s]	1B[s]	
Chlordane	1A[s,t]	2C[t]	2C[t]			1A[s,t]	2C[s]	2A[s]	
Dieldrin	1A[s,t]					1A[t]	3C		
Sediment Toxicity	1D[s]	1B[s]	1B[s]	1B[s]		1A[s]		2D	
Benthic Community Effects	1D[s]	1B[s]							
Ammonia	2C[o]								
Trash								2A	
Total Coliforms	2A	3A			1G		3A	1G	
Arsenic	3A[s]								3C
Chromium	3A[s]								
Silver	3C[d,o]/3A[s]								
Nickel	3C[d]		3C[s]						2C
Thallium	3C[d]								
Mercury	3C[d,o]/3A[s]	2C[s]/3A[d]							
DEHP*		3A	3A	3A					
Chrysene		3A							
Pyrene		2A	2A	3A					
pH		3D							
Enterococcus		3A			1G		3A	1G	
Fecal Coliform					1G		3A	1G	
Indicator Bacteria						2B	2B		
Malathion (wet)							3C		
Toxaphene (wet)							3C		
DDD							3C		
Dioxin									2C
Dissolved Oxygen									2D
Selenium									3C

*DEHP should not be considered a Category 2 pollutant since it is likely these exceedances were due to laboratory contamination.

[s]Sediment

[d]Dissolved

[t]Fish Tissue

[o]Dry only

2.1.9 POLLUTANT CLASSIFICATION

In order to determine the prioritization of addressing pollutants of concern more efficiently, 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. 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. Table 2-23 lists the seven pollutant classes, and each pollutant within that class that is pertinent to the Nearshore Watersheds.

Table 2-23: Pollutants by Class

Pollutant Class	Pollutants
Metals	Cadmium, Copper, Lead, Zinc, Arsenic, Chromium, Silver, Nickel, Thallium, Mercury, Aluminum, Selenium
Pesticides	DDT, Chlordane, Dieldrin, 4-4'-DDE, Malathion
Water Quality Indicators/General	Benthic Community Effects, TSS, Dissolved Oxygen, pH, Sediment Toxicity, Toxicity
Trash	Trash (not a Water Quality Priority)
Nutrients	Ammonia
Bacteria	Total Coliform, Enterococcus, Fecal Coliform, Indicator Bacteria
Semivolatile Organic Compounds	PCBs, PAHs (Benzo(a)pyrene, Chrysene, Pyrene, Dibenzo(a,h)anthracene), Dioxin

2.2 WATER QUALITY CHARACTERIZATION

In order to characterize existing water quality conditions in the Nearshore Watersheds and to identify pollutants of concern for prioritization, available monitoring data collected during the previous ten years were analyzed. The following sections summarize these monitoring efforts and relevant findings. 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 Nearshore Watersheds. The pollutant classification in Section 2.1 are determined as a result of the monitoring efforts and relevant findings described in this section. Since the Port has a distinct set of stormwater management characteristics and water quality conditions, it is extensively described separate from the other waterbodies and subwatersheds within the Nearshore Watersheds. Sections 2.2.2 through 2.2.4 are dedicated to the Port. Water quality characterization for the Los Angeles River Estuary is described in the City's WMP for the Lower Los Angeles River. Category 2 and 3 water quality objectives are included in the Appendices of the Integrated Monitoring Program (IMP).

2.2.1 WATER QUALITY ASSESSMENT THRESHOLDS FOR NON-PORT AREAS

Regional data sources for the shoreline, Alamitos Bay, and San Gabriel River Estuary are listed and mapped in Section 8.2 of the IMP (Appendix G). The lowest applicable water quality thresholds used to assess these data sources are also listed in Section 8.2 of the IMP (Appendix I). The assessment was used to categorize pollutants following the definitions in Table 2-1. The complete list of categorized pollutants are found in Table 2-22.

LOS CERRITOS CHANNEL ESTUARY AND ALAMITOS BAY

City of Long Beach NPDES Stormwater Monitoring Program and Beach Bacteria Monitoring. Data from three monitoring sites in the estuary (LCC1 at Stearns, Bouton Creek, and the Belmont Pump Station) are available for flow, chemical concentrations, toxicity, and contaminant load data for the past fourteen years of monitoring (Kinnetic Laboratories, 2000-2014). Of particular interest are results of a special study that tracked the freshwater plume from rain events through the estuary. Bioassay tests using the sea urchin fertilization test indicated that toxicity in these receiving waters was minimal during storm events.

Another special study sampled and tested sediments within the Los Cerritos Channel Estuary and identified chlordane in sediments that exceeded Effects Range Median (ERM) screening values and a few other compounds such as metals and DDTs that exceeded the Effects Range Low (ERL) level (Long et al, 1995).

Another special study on bacterial sources along the City's main beach in San Pedro Bay (Kinnetic Laboratories, 2009) implicated the Los Angeles River plume driven by predominant diurnal winds from the west in periodic bacteria exceedances on this beach. Water quality surveys conducted to screen for potential human sources showed no evidence of human contributions using very low sample limits of detection (SLOD). Universal *Bacteriodales* measurements showed concentrations were low and comparable to numbers currently found in San Pablo Bay and San Francisco Bay (S. Wuertz, pers. comm.) In addition, no markers for adenoviruses or enterovirus were detected.

Finally, continuing analyses of the City of Long Beach's ongoing bacterial monitoring data for all of the City beaches (Kinnetic Laboratories, 2014a and214b) has shown a marked improvement (Table 1-2) over recent years in compliance with bacterial criteria, achieving high compliance during the summer dry season up to a maximum of 98.7% this past summer, and also marked improvement during the winter period which also is influenced by the number of winter storms. For the West Main Beach, summer 2014 compliance was 97.4 percent, and 90.0 percent overall compliance for the year including both wet and dry weather. These improvements have been directly related to dry weather (summer and winter) diversions of the Belmont and Appian Way Pump Stations, and major improvements to Colorado Lagoon that included bypassing the Termino Drain from the lagoon to Marine Stadium along with a dry weather diversion and a trash trap included in the project design. Three more dry weather diversions of drains to the main beach are being designed, including diversion of a 78-inch drain to the pump station at the mouth of the Los Angeles River.

Southern California Bight Studies (2003 and 2008). Sediment data from sampling stations in the Los Cerritos Channel Estuary and in Alamitos Bay have shown chlordane to exceed ERM levels and DDTs and some metals (copper, lead, and zinc) were shown to generally exceed ERL levels in sediments. Low sediment toxicity was found in Alamitos Bay and moderate toxicity in the Los Cerritos Channel Estuary as evaluated by Sediment Quality Objective (SQO) testing.

California Environmental Data Exchange Network (CEDEN) Database. Sediment data from a Regional Water Board special study indicated one station in the upper Los Cerritos Channel exceeded ERMs for chlordane, DDTs, zinc, and total PCBs and four metals above ERLs. The Statewide Stream Pollution Trends

Study in the upper San Gabriel River Estuary (Site RA2) showed chlordane exceeded the ERM and metals (copper, zinc) and total DDTs exceeded ERLs.

SAN GABRIEL RIVER ESTUARY

San Gabriel River Regional Monitoring Program. The Council for Watershed Health and Aquatic Bioassay & Consulting Laboratories have conducted an ongoing monitoring program since 2007 and this program is to be continued by Aquatic Bioassay and Consulting Laboratories. This San Gabriel River Regional Monitoring Program has produced a dataset of Sediment Quality Objective (SQO) data for sediments in the estuary which includes toxicity using *Eohaustorius* (amphipod) and *Mytilus* (mussel) as test organisms. Sediment chemistry and benthic infauna are also part of the program. Water chemistry in the estuary is limited to conventional parameters by electronic probes along with bacterial analyses. Except for Site RA2 near the top of the estuary, results for sediments show metals along with total DDTs exceeding ERL values. Sediment bioassays showed no toxicity for all years except for 2012 when toxicity was characterized as low to moderate. SQO evaluations showed unimpacted or likely unimpacted conclusions. SQOs reported in a Stream Pollution Trends Program Technical Report (2014), shows a five year average of moderate toxicity for Site RA2 and associated sediment chemistry tends to confirm this result. It also needs to be noted that water chemistry as required by the new MRP has not been part of this program.

Southern California Bight Studies (2003 and 2008). Sediment chemistry reported from seven sites along the San Gabriel River Estuary in 2003 showed only nickel (one site) and total DDTs above ERL levels and no toxicity was measured with *Eohaustorius* (amphipod). In 2008, no toxicity was measured using the amphipod test and low toxicity was measured for *Mytilus* (mussel) test.

CEDEN Database. DDTs and PCBs exceeded ERM levels at only one station located near the power plant.

DOMINGUEZ CHANNEL ESTUARY

Water quality characterization for the Dominguez Channel Estuary is described in the draft Enhanced Watershed Management Plan (EWMP) submitted to the Regional Board by the Dominguez Channel Watershed Management Area Group. This description can be found on page 2-7 of the draft EWMP:

- *During the 2003 SWAMP, the Dominguez Channel samples had high levels of bacteria and pH values exceeding Basin Plan objectives. The estuarine portion of the Channel showed adverse impacts to benthic communities with 3 of 5 stations classified as being in poor condition. For Machado Lake, it was found that the stations at the northern end of the Lake, most likely influenced by Wilmington Drain, had more fine grained sediment, dissolved oxygen below the Basin Plan objective of 5 mg/L, low pH, and high ammonia and nitrate. Chlorophyll-a was highest in the southern end and lowest in the northern end. No acute or chronic toxicity was detected throughout the lake. The station closest to the Wilmington Drain in the north had the highest sediment concentrations of metals. Organic pollutants such as PAHs were highest at the southern stations. Harbor sampling sites had elevated copper and silver concentrations in water samples at all stations and exceedances of silver CTR water*

quality objectives at six of 30 stations located within both the Inner and Outer Harbor areas. Other metals were well below water quality objectives.

- *During various studies of estuary and harbor sediments, exceedances of the Effects Range Medium (ERM) and/or Effects Range Low (ERL) thresholds were observed for DDT, DDD, DDE, PCBs, chlordane, Dieldrin, metals (arsenic, cadmium, chromium, copper, lead, zinc, mercury, nickel, and silver), and/or PAHs were observed.*

COLORADO LAGOON

Since 2010 there has been extensive mitigation as the Colorado Lagoon Restoration Master Plan which is ongoing and has included reconstructing the Termino Avenue Drain to bypass Colorado Lagoon and discharge into Marine Stadium, installing trash separation devices and low-flow diversions, installing bioswales to capture surface runoff from the adjacent golf course, and cleaning and repairing the existing tidal culvert that connects Colorado Lagoon to Marine Stadium. This level of remediation limits the usefulness of the historical data for establishing current Water Quality Priorities. Therefore these will be developed as Adaptive Management provisions of this WMP are implemented. All further remediation efforts are expected to be completed by 2018. Monitoring efforts have been suspended until at least January 2016 to allow for continued remediation and restoration of the Lagoon. Additional cleanup dredging and capping will be conducted to restore surface sediment conditions to levels that support targeted beneficial uses. Chapter 8 contains more extensive information on the remediation efforts and monitoring efforts in Colorado Lagoon.

2.2.2 WATER QUALITY ASSESSMENT THRESHOLDS FOR THE PORT WATERBODIES

WATER CHEMISTRY

The lowest applicable water quality thresholds were used to assess historical water quality in Long Beach's Inner Harbor, Outer Harbor, and eastern San Pedro Bay (including Los Angeles River Estuary Queensway Bay section). These water quality-based assessment thresholds were recommended by the State Water Resources Control Board (State Water Board) in order to assess water quality in waterbodies of the state (hereafter referred to as water quality assessment thresholds).[2] The Inner Harbor, Outer Harbor, and eastern San Pedro Bay are defined as enclosed bays[3] (LARWQCB 2014). The lowest water quality assessment thresholds applicable to an estuary or a bay in the State Water Board's threshold table were selected for all water quality constituents. One exception to the selection of water quality thresholds was

[2] CalEPA (California Environmental Protection Agency). 2011. Water Quality-Based Assessment Thresholds. CalEPA State Water Resources Control Board, Sacramento, CA.
http://www.waterboards.ca.gov/water_issues/programs/water_quality_goals/#thresholds

[3] From Appendix A of the Permit: "Enclosed Bays means indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays include, but are not limited to, Humboldt Bay, Bodega Harbor, Tomales Bay, Drake's Estero, San Francisco Bay, Morro Bay, Los Angeles-Long Beach Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay. Enclosed bays do not include inland surface waters or ocean waters."

arsenic. The USEPA National Recommended Water Quality Criteria for Human Health Criteria (via fish consumption) of 0.14 µg/l is recommended for arsenic in the State Water Board's water quality assessment threshold table. However, this criterion is only applicable to the inorganic form of arsenic and the criterion is currently under USEPA's own review for revision.[4] Inorganic concentrations for arsenic are not available in the existing database. Therefore, the California Toxics Rule (CTR) 4-day average (dissolved) criterion for the protection of marine aquatic life of 36 µg/L was selected.

SEDIMENT

As recommended in the Water Quality Control Policy for developing California's Clean Water Act Section 303(d) List (State Water Board 2004), effects-range median (ERM) values, or those values predictive of sediment toxicity in 50 percent or more of the samples analyzed, were used as thresholds for the assessment of sediment data. The ERM values were developed by Long et al. (1995)[5] and are helpful in assessing the potential significance of elevated sediment-associated contaminants of concern and their potential for adverse biological effects. The ERM values were developed from a large dataset where results of both benthic organism effects (e.g., toxicity tests and benthic assessments) and chemical concentrations were available for individual samples. To derive these guidelines, chemical values for paired data demonstrating benthic impairment were sorted in ascending chemical concentration. The 50th percentile of this rank order distribution was identified as the ERM value. Although the ERM values are useful for identifying elevated sediment-associated contaminants, they should not be used to infer causality because of the inherent variability and uncertainty of the approach.

FISH TISSUE

The Office of Environmental Health Hazard Assessment (OEHHA) developed Fish Contaminant Goals (FCGs) in order to provide estimates of contaminant levels in fish that will pose no significant health risks to humans if consumed at a rate of 32 g/day or 8 ounces of fish per week. Chemicals of concern for FCGs include methylmercury, chlordane, DDTs, dieldrin, PCBs, selenium, and toxaphene. FCGs were developed by evaluating the cancer and non-cancer health effects associated with the chemicals examined based on a 70 kg individual.[6]

2.2.3 ASSESSMENT OF WATER, SEDIMENT, AND FISH TISSUE QUALITY IN THE PORT WATERBODIES

Pollutants that exceeded the lowest applicable thresholds are summarized for water, sediment, and fish tissue data in Tables 2-24, 2-25, and 2-26, respectively. The concentrations of these pollutants from all samples collected from 2005 to 2014 relative to their respective lowest applicable threshold are listed in Figures 2-1 and 2-2.

[4] USEPA (U.S. Environmental Protection Agency). 2014. Human Health Criteria Table. U.S. Environmental Protection Agency, Sacrament, CA. http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm#A

[5] Long, E.R., D.D. MacDonald, S.L. Smith, and F.D. Calder, 1995. Incidence of Adverse Biological Effects within Ranges of Chemical Concentrations in Marine and Estuarine Sediments. Environmental Management 19:81-97.

[6] Susan Klasing and Robert Brodberg. "Development of fish Contaminant Goals and Advisory Tissue Levels for Common Contaminants in California Sport Fish: Chlordane, DDTs, Dieldrin, Methylmercury, PCBs, Selenium, and Toxaphene." June 2008

Table 2-24: Historical Water Quality Assessment in the Inner and Outer Long Beach Harbor and Eastern San Pedro Bay

Waterbody	Pollutants exceeding water quality thresholds (No. samples exceeded/No. total sample)
Long Beach Inner Harbor	Bis(2-ethylhexyl)phthalate[A] (26/71), dissolved copper (6/101), dissolved mercury[B] (11/90), chrysene (1/71), pyrene (25/71), dissolved zinc (2/101), pH (1/2427), total coliforms (1/5), enterococci (1/5)
Long Beach Outer Harbor	Bis(2-ethylhexyl)phthalate[A] (4/20), pyrene (2/20),
Eastern San Pedro Bay	Bis(2-ethylhexyl)phthalate[A] (3/10), pyrene (1/10),

[A] Di(2-ethylhexyl)phthalate (DEHP) is a widely used plasticizer known to be ubiquitous in environment. Detection of this compound in water is likely due to laboratory contamination. See Section 2.3 for sources of this compound.
[B] Five of eleven exceedances occurred on September 17, 2009, during the Station Fire, which is the largest wildfire in the modern history of Los Angeles County. Detection of this compound in water during this event is likely due to atmospheric deposition and directly contributed to the wildfire. See Section 2.3 for discussion on wildfire's contribution to mercury in the environment.

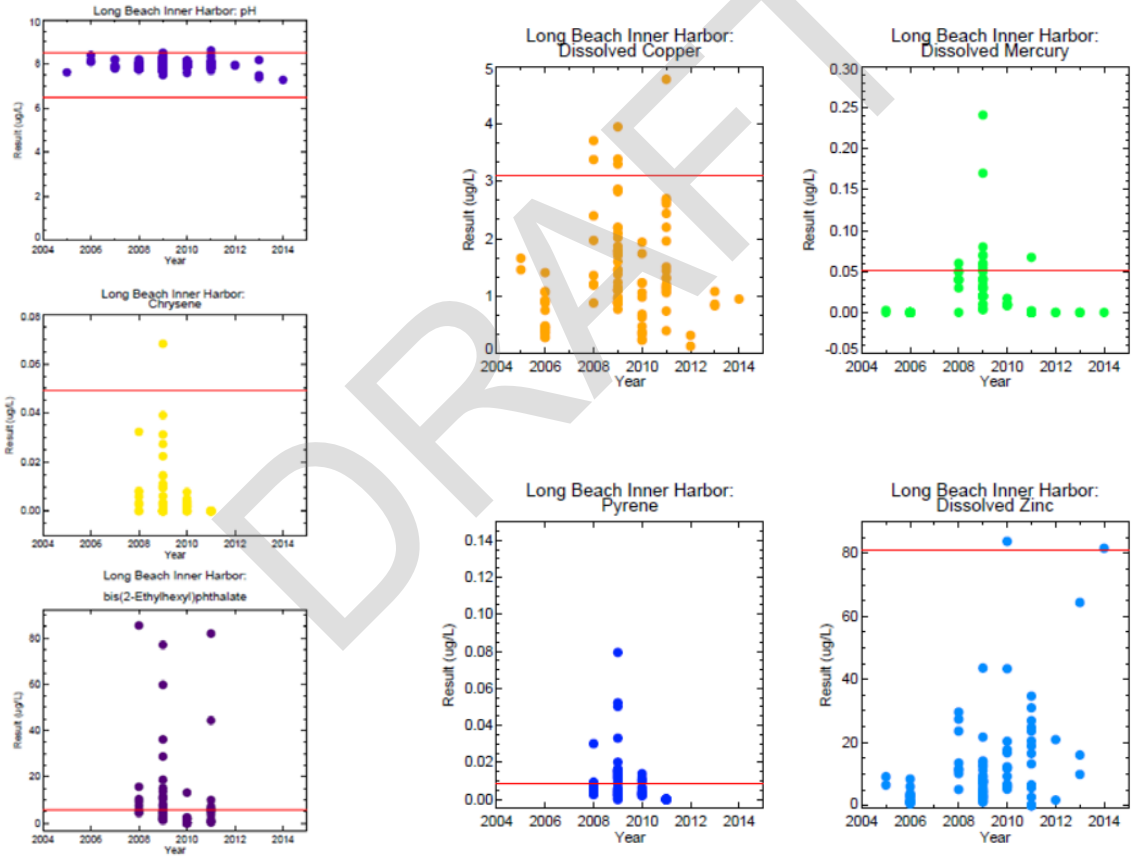

Figure 2-1: Pollutants in water exceeding water quality assessment thresholds

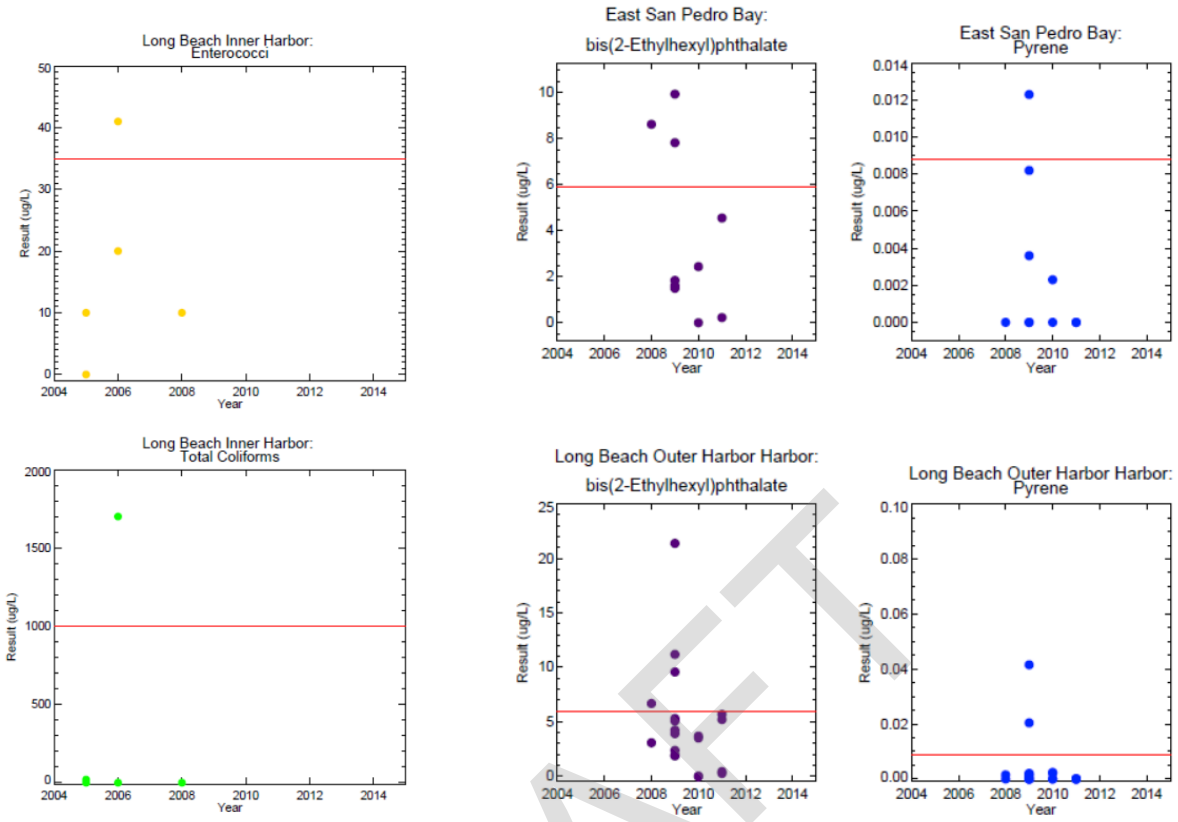

Figure 2-2: Pollutants in water exceeding water quality assessment thresholds

Note that 5 of 11 exceedances of dissolved mercury in water samples collected from the Inner Harbor (Table 2-24) occurred on September 17, 2009, during the Station Fire, which is the largest wildfire in the modern history of Los Angeles County. It is likely these elevated concentrations of dissolved mercury were a result of atmospheric deposition and directly contributed to the wildfire. See Section 2.3 for discussion on a wildfire's contribution to mercury in the environment.

Bis(2-ethylhexyl)phthalate, also known as di(2-ethylhexyl)phthalate (DEHP), was observed higher than the threshold in the Inner Harbor, Outer Harbor, and eastern San Pedro Bay. DEHP is a widely used plasticizer, and its sources are ubiquitous in urban environments. Due to its wide use, it is often falsely detected in environmental samples due to laboratory contamination. It is possible these elevated concentrations of DEHP were due to laboratory contamination. See Section 2.3 for further discussion on sources of this compound.

Copper, zinc, and chrysene and pyrene (both PAH compounds) exceeded thresholds for water quality in one or more samples from the Inner Harbor, Outer Harbor, and eastern San Pedro Bay. Although no chemicals are listed in water in the Harbor Toxics TMDL, the TMDL has waste load allocations for copper, zinc, chrysene, and pyrene) to control upstream and sediment-based sources.

Table 2-25: Historical Sediment Quality Assessment in the Inner and Outer Long Beach Harbor and Eastern San Pedro Bay

Waterbody	Pollutants exceeding sediment quality thresholds, ERMs (No. samples exceeded/No. total sample)
Long Beach Inner Harbor	Mercury (2/16), dibenzo(a,h)anthracene (1/7), total DDTs[A] (3/16), 4,4'-DDE (4/16)
Long Beach Outer Harbor	Nickel (1/9), total DDTs (2/17), 4,4'-DDE (4/17)
Eastern San Pedro Bay	Total DDTs (2/10), 4,4'-DDE (3/10)

[A] Including DDDs, DDEs, and DDTs

Table 2-26: Historical Fish Tissue Quality Assessment in the Inner and Outer Long Beach Harbor and Eastern San Pedro Bay

Waterbody	Pollutants exceeding fish tissue thresholds, OEHHA FCGs (No. samples exceeded/No. total sample)
Long Beach Inner Harbor	Total DDTs[A] (52/54), total PCBs (53/54), total chlordanes (7/33)
Long Beach Outer Harbor	Total DDTs (50/57), total PCBs (54/56), total chlordanes (16/43)
Eastern San Pedro Bay	No fish tissue data available

[A] Including DDDs, DDEs, and DDTs

2.2.4 WATER QUALITY DATA SOURCES

Data sources for the assessment for each matrix (water, sediment, and fish) are listed in Tables 2-27 through 2-29, respectively.

Table 2-27: Sources of Water Chemistry Data

Reference	Waterbody	Sample Location	Type*	Year	Citation
POLB (unpublished) POLB pre-2007	Long Beach Harbor	On land (in conveyance prior to outfall discharge)	SW	1995 to 2007	POLB, unpublished. 1994-2006 stormwater monitoring data. Provided by POLB.
POLB (2007 – 2014)	Long Beach Harbor	Along shorelines (wharves)	RW and SW	2006 to 2014	POLB, 2007 – 2014. 2007 – 2014 Annual Report Storm Water Discharge Monitoring POLB. Prepared by MBC Applied Environmental Sciences for POLB Planning Division. June 2007 (-2014).
POLB (2008)	Long Beach Harbor	Open Water	WC	2005 to 2008	POLA, 2008. Chem Summary Final v4 12Mar08: May 2005, September 2005, January 2006, March 2006, February 2008. Provided to Everest International and Anchor QEA by POLA. Excel file.
Weston (2007)	Long Beach Harbor	Open water	WC	2006	Weston (Weston Solutions, Inc.), 2007. Final Report Characterization of Sediment Contaminant Flux for the Inner Harbor and Outer Harbor Water bodies to Support Sediment TMDL Implementation Ports of Los Angeles and Long Beach, California. Prepared for POLA and POLB. May 2007.
MBC (2008 – 2011)	Long Beach Harbor/LAR Estuary	Open water, one station at mouth of LARE	WC	2008 to 2011	MBC. POLB Ambient Water Quality Results 2008- 2011. Distributed by POLB. Excel file.
Weston (2012)	Long Beach Harbor	Open water	WC	2011	Weston Solutions, Inc., 2012. POLA POLB SQO Part II data from 2011. Excel Files. Provided to Anchor QEA on behalf of the Ports of Los Angeles and Long Beach.
SWAMP RWB4 Monitoring (2005)	Los Angeles River Estuary	River mouth, nearshore	WC	2005	Surface Water Ambient Monitoring Program (SWAMP) 2005. RWB4 Monitoring Year 2005 data. Text file. Data Downloaded from the California Environmental Data Exchange Network (CEDEN). Available from: http://www.ceden.us/AdvancedQueryTool.

* SW – stormwater, RW – receiving water, WC – water column

Table 2-28: Sources of Sediment Data

Reference	Waterbody	Location	Type	Year	Citation
SCCWRP (2012b)	East San Pedro Bay, Long Beach Harbor	Open water	Sediment	2008	SCCWRP, 2012b. Southern California Bight 2008 Regional Monitoring Program. Excel File. Sediment Chemistry Data from the Southern California Bight. Provided to Anchor QEA, LLC, by SCCWRP.
Bight (2013, unpublished)	Long Beach Harbor	Open water	Sediment	2013	Southern California Bight 2013 Regional Monitoring Program. Excel File. Sediment Chemistry Data from the Southern California Bight. Provided to Anchor QEA, LLC, on behalf of the POLA.
EMAP (2008)	Long Beach Harbor	Open water	Sediment	2005	EMAP (Environmental Monitoring and Assessment Program), 2008. EMAP 2005 Sediment Chemistry. Excel File. Provided to the Ports from SCCWRP.

Table 2-29: Sources of Fish Tissue Data

Reference	Waterbody	General Location	Type	Year	Citation
Weston (2012)	Long Beach Harbor	Open water	Biological fish tissue	2011	Weston, 2012. POLA Port SQO Part II data from 2011. Excel Files. Provided to Anchor QEA, LLC, on behalf of the POLA and POLB.

2.3 SOURCE ASSESSMENT

This section identifies the potential sources of pollutants within the Nearshore Watersheds for the waterbody-pollutants classified in Section 2.1. 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. These studies were used to identify known and suspected stormwater and non-stormwater pollutants sources to and from the Municipal Separate Storm Sewer System (MS4).

Pollutant sources are divided into 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. 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, among others.

To generally describe the potential sources in the Nearshore Watersheds, pollutant sources have been divided into the following categories: Port of Long Beach-specific sources, sources from infrastructure, air deposition, existing programs, and sources based on category pollutants.

2.3.1 OVERALL ASSESSMENT OF SOURCES OF POLLUTANTS IN THE PORT WATERBODIES

Sources of pollutants to water, sediment, and fish tissues as well as control measures that have been implemented by the Port are summarized. This is based on the Port's Water Resources Action Plan (WRAP) Final Report (August 2009), which was developed together with the Port of Los Angeles, Los Angeles Regional Water Quality Control Board, and USEPA and has been implemented to protect and improve water quality in the harbor.

SOURCES OF WATER POLLUTANTS

Water quality in the Inner Harbor, Outer Harbor, and eastern San Pedro Bay waters is influenced via various pathways. One of the obvious influences on water quality is landside runoff, consisting of stormwater, normal and nuisance dry weather flows, and other point source discharges. Urban stormwater is a substantial source of pollutants to downstream receiving waters, primarily because the pollutants generated by urban activities collect on land and are washed into storm drains by rain storms.[7] This emphasizes the importance of minimizing the accumulation of pollutants on land areas, whether through source control or physical removal. Contaminated soil and groundwater from landside activities may also enter these waterbodies.

Direct discharges from ships, harbor crafts, recreational vessels, and in-water structures are also thought to contribute to harbor water pollution. Modern maritime operations involve large vessels that use a

[7] Stein, ED, LL Tiefenthaler, and K.C. Schiff. 2007. Sources, patterns and mechanisms of storm water pollutant loading from watersheds and land uses in the greater Los Angeles area, California, USA. Southern California Coastal Water Research Project Technical Report 510.

variety of potentially toxic materials, such as petroleum products, and metallic, organic anti-fouling and anti-corrosion substances and paints. Large vessels also discharge particulates into the air. These maritime operations are concentrated in the Inner Harbor; however, ships transit through the Outer Harbor and eastern San Pedro Bay. Recreational vessels produce similar discharges that, although individually small, may be collectively of concern. Recreational vessel traffic is typically confined to the Outer Harbor and eastern San Pedro Bay where recreational vessels are concentrated in numbers that can reach the thousands.

Another influence on water quality is direct discharges from industrial and municipal uses, (i.e., outfalls). In the Inner Harbor, Outer Harbor, and eastern San Pedro Bay, such influences are relatively minor, consisting of a small number of industrial facilities.

The last major influence on water quality is regional. In particular, coastal circulation, via tidal exchange and wind driven currents, brings ocean water, including particulate-bound pollutants either suspended in the water column or as part of the sediment bed load, into the Outer Harbor and eastern San Pedro Bay, and vice versa.

SOURCES OF SEDIMENT POLLUTANTS

In past decades, a variety of activities in the harbor and surrounding areas contributed to sediment contamination. Before the CWA, land uses such as manufacturing, military facilities, fish processing plants, wastewater treatment plants, oil production facilities, and shipbuilding/repair yards in the Port discharged untreated or partially treated wastes into harbor waters. Those effluents resulted in sediment contamination. Stormwater and wastewater discharges from upstream brought a wide range of pollutants to the harbor, including large quantities of metals, PAHs, DDT, and PCBs, that tended to settle in sediments. As a result, much of the sediment pollution in the harbor is “legacy contamination” left over from those past activities. Current activities can also contribute pollutants to harbor sediments. In particular, stormwater runoff from Port lands and from upstream areas can bring contamination into harbor sediments. Potential sources of sediment contamination include municipal storm drains, industrial outfalls, stormwater runoff from port facilities, commercial vessels (ocean going vessels and harbor craft), recreational vessels, and aerial deposition.

SOURCES OF FISH TISSUE POLLUTANTS

DDTs and PCBs are the pollutants of greatest concern in organisms inhabiting the Port’s waters. DDTs and PCBs are very persistent in the environment, as a consequence of their insolubility in water and low degradation rates in the environment. These pollutants can be found in the tissues of aquatic organisms at concentrations a million times greater than the concentration in the surrounding water. Large quantities of DDTs, most of which emanated from the Montrose Chemical Corporation located in Torrance, California, were historically discharged into coastal waters of Los Angeles through the sanitary sewer system ocean outfall off of Palos Verdes and through storm drains into the Dominguez Channel. Since 1972, when the use of DDT was banned and Montrose halted production, discharges from the ocean outfalls have dramatically decreased.

As with DDTs, the commercial production of PCBs commenced in the early 20th century and continued until the 1970s, when it was determined that PCBs were widely dispersed and could accumulate causing detrimental effects in wildlife. As a consequence of the 1976 Toxic Substances Control Act (TSCA), PCB production was banned in the United States, and regulations concerning the presence of PCBs in the environment were promulgated. These legacy contaminants are still observed at elevated concentrations in sediment, water, and biota throughout Southern California coastal waters (SCCWRP 2007[8]).

Four basic types of sources are addressed by the WRAP's control measures. Most of the control measures address sources, rather than specific pollutants, because a given measure is likely to be effective for more than one pollutant.

- Land-use Discharges: Land-based uses, such as cargo and passenger terminals, industrial facilities, roads and rail lines, and shops, restaurants, fishing piers, beaches, and marinas. These uses include cargo-handling areas, maintenance and fueling areas; various landscaping and area maintenance activities; roads, parking lots, and other public access areas; construction sites; railroad facilities; commercial fishery facilities; auto repair/dismantling businesses; visitor-serving areas such as restaurants and boat launches; and port-owned properties outside the harbor districts.
- On-Water Discharges: Cargo and passenger vessels, harbor craft, fishing vessels, and in-water structures.
- Sediments: Contaminated sediments, which serve as a repository for and a potential source of contaminants into the water.
- Watershed Discharges: Inputs of stormwater and wastewater originating outside the harbors (and beyond the jurisdiction of the Ports), and conveyed into the harbors by the Dominguez Channel, the Los Angeles River, and storm drains.

Tables 2-30 through 2-32 summarize sources and activities that could be contributing to key pollutants, and control measures as identified in the Port's WRAP.

[8] SCCWRP. 2007. Southern California Bight 2003 Regional Monitoring Program. Prepared by the Southern California Coastal Water Research Project, Costa Mesa, CA. report. Available at ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/BightPlanningDocuments/Bight03/B03ES_final.pdf.

Table 2-30: Water Quality – Land-Use Sources, Activities and Control Measures

SOURCES	ACTIVITIES	KEY POLLUTANTS	MEASURES*
Port-WIDE SOURCES			
Vehicle & Equipment Maintenance and Landside Fueling	Maintenance areas in terminals, other tenant facilities, and POLA/Port maintenance yards; Hazardous materials storage and use, outdoor parts storage; Land-based mobile fueling operations	Metals, organics, TSS, trash	LU-1, LU-2, LU-3, LU-5
Grounds and Facility Maintenance	Landscape, building exteriors, and miscellaneous structures in terminals and other leased areas; Vacant/unleased areas and natural areas; Parks, beaches, promenades, marinas, research facilities, aquaculture, other uses; Landscaping along roads and other right-of-ways (ROWs)	Pesticides/ herbicides, nutrients, metals, organics, TSS, trash, pathogens	LU-1, LU-2, LU-3, LU-4, LU-5, LU-6
Roads and Parking Lots	Designated parking areas in tenant facilities (longshore, staff, visitor); Public roads	TSS, trash, metals, organics	LU-5, LU-6
Construction Sites	Materials storage; Ground disturbance	TSS, metals, organics, trash	LU-7
OTHER NON-PUBLIC FACILITIES			
Cargo-handling Areas	Paved areas for storage of packaged cargo (including containers, break bulk, and vehicles) and use of cargo-handling equipment; Tank farms, piping, loading/unloading points for petroleum, fuels, petroleum-based products, chemicals, rocket fuels, and other oils and liquids; Conveyors, barns and silos, paved areas, and truck and rail loading/unloading points for coke, sulfur, salt, gypsum, cement, recycled metals, aggregate, etc.	Metals, organics, TSS, trash	LU-1, LU-2, LU-3, LU-5
Rail Facilities	Locomotive and railcar maintenance; ROW maintenance	TSS, trash, metals, organics	LU-1, LU-2, LU-5
Auto Repair/Dismantling & Boat Repair	Operational discharges from commercial facilities within the harbor districts; Sandblast grit, hazardous materials storage and use, outdoor parts storage	Metals, organics, TSS, trash	LU-1, LU-2
VISITOR-SERVING SOURCES			
Restaurants, Boat Launches	Operational discharges from various locations throughout both harbors under city and county jurisdiction; Washdown discharges	Pathogens, nutrients, TSS, trash, metals, organics	LU-2, LU-5

*: Land-use control measures described in detail below

LU-1. Enhance and expand housekeeping BMPs in maintenance and fueling areas, general cargo-handling areas, certain dry bulk cargo-handling areas, automobile dismantling/boat repair facilities, oil production facilities, and building maintenance and landscaping areas

LU-2. Develop port-wide guidance manual for design of new and redeveloped facilities, including design criteria and structural BMPs

LU-3. Evaluate the need for structural BMPs for key discharges and targeted pollutants at existing facilities and install where necessary to ensure compliance

LU-4. Continue and expand upon existing stormwater/dust control programs for vacant/undeveloped property

LU-5. Enhance/expand litter control programs

LU-6. Enhance/expand street and parking area sweeping and cleaning programs

LU-7. Evaluate existing construction permit compliance procedures and enhance as necessary

LU-8. Evaluate Port-owned properties outside the harbor districts and implement additional stormwater controls as necessary

Table 2-31: Water Quality – On-Water Sources, Activities, and Control Measures

SOURCES	ACTIVITIES	KEY POLLUTANTS	MEASURES (*)
Vessel Discharges and On-Water Vessel Maintenance/Fueling	Commercial and recreational vessels Black water (sewage), gray water (showers, sinks, laundry, kitchen), bilge and ballast water Fuel transfer over water, accidental releases (spills), and jettisoning of solids (trash) Sanding, painting, mechanical repairs while underway or at anchor Miscellaneous discharges Anti-fouling coatings and cathodic protection Fishing wastes	Organics Metals (including Cu/Zn) Trash Pathogens Nutrients	OW-1
Contaminant Leaching	Pilings, anodes	Zinc, organics	OW-2, OW-3

* On-water control measures descried in detail below

OW-1. Develop guidance manual for on-water activities (e.g., allowable and prohibited vessel maintenance activities and discharges)

OW-2. Develop BMPs and Port standards for maintenance, in-kind replacement, and eventual phasing out of treated piles

OW-3. Develop BMPs and Port standards for the use of zinc-based cathodic protection in Port vessels and structures.

Table 2-32: Water Quality – Watershed Sources and Issues

SOURCES	ISSUES	KEY POLLUTANTS	MEASURE
Stormwater and Dry Weather Runoff, Ocean Inputs, Aerial Deposition	Dominguez Channel and Los Angeles River input Storm drain input from outside the harbors Publicly Owned Treatment Works (POTWs) and industry Hydrodynamic connection between harbors and eastern San Pedro Bay and the ocean discharges	All constituents	WS-1
Legacy and Current Contamination	Past watershed inputs and historical port activities Current port activities and watershed inputs Resuspension and redistribution	All constituents	WS-1

WS-1: Employ all available means to support efforts to reduce upstream pollutant loadings that adversely affect harbor water and sediment quality.

2.3.2 INFRASTRUCTURE SOURCES

ROAD INFRASTRUCTURE

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.[9] 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

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

loads.[10] Vehicle brake pads constitute the single largest source of copper.[11] 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.[12] Table 2-33 summarizes the road infrastructure sources that contribute to certain pollutant loadings.

Table 2-33: Typical Sources of Pollutants from Road Infrastructure[13]

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	✗		✗	✗	✗		✗		✗	✗

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 which contributes to concentrations of metals in urban runoff. Motor oil and automotive coolant spills are another potential source of metals. Pesticides, algaecides, wood preservatives, galvanized metals, and paints used across the watersheds can also contain these metals. 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.[14] The Port provides a steady flow of semi-trucks and cargo ships which constantly exchange metal shipping crates via cranes and other industrial equipment. All of the

[10] Schueler, T., and H.K. Holland. 2000. The Practice of Watershed Protection. Center for Watershed Protection, Ellicott City.
[11] TDC Environmental 2004, Copper Sources in Urban and Shoreline Activities. San Francisco, CA.
[12] Davis A.P., M. Shokouhian, and S. Ni. 2001. Loading estimates of lead, copper, cadmium, and zinc in urban runoff from specific sources. Chemosphere.
[13] 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.
[14] City of San Diego and Caltrans. 2012. Tecolote Watershed Comprehensive Load Reduction Plan. Final Report. San Diego, CA

pollutant source concerns that apply to the automotive industry apply to the Port (e.g., cleaning, repair, spills, wear and tear, etc.), on a much larger scale.

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.[15]

TRASH

According to the Draft Amendments to Statewide Water Quality Control Plans to Control Trash released in June 2014, "studies show that trash is predominantly generated on land and then transported to a receiving water body, with the main transport mechanism being stormwater." 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.[16]

2.3.3 ATMOSPHERIC DEPOSITION

Atmospheric deposition is the direct and indirect transfer of pollutants from the air to land and surface waters and can be a large source of contamination. Pollutants in the atmosphere deposit onto solid surfaces and then are washed off by rain, becoming part of the stormwater runoff that reaches the watershed. 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 2-34.

In addition to the trace metals, nutrients are also atmospherically deposited. The annual loading of nitrogen through atmospheric deposition in the San Gabriel Watershed is 4,711.4 tons per year, with 495.8 tons per year in the Dominguez Channel Watershed, and 5559.2 tons per year in the neighboring Los Angeles River Watershed.[17]

[15] 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.
[16] LARWQCB. 2007. Trash Total Maximum Daily Loads for the Los Angeles River Watershed. Los Angeles, CA.
[17] Lu, R., K. Schiff, S. Stolzenbach, 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.

Table 2-34: 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 NPDES MS4 PROGRAM SUMMARY

SANITARY SEWER OVERFLOWS (SSOS)

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, and oil and grease. Particularly, the most concerning pollutants SSOs are known to release are high concentrations of bacteria and nutrients.[18] SSOs can occur during dry or wet weather and at any point in the collection system, including overflows from manholes.

According to the Sanitary Sewer Overflow (SSO) database in the California Integrated Water Quality System (CIWQS), for the entire City of Long Beach 134,638 gallons of sewage have been released from a total of 172 recorded SSOs within the watershed since 2005.[19]

INDUSTRIAL GENERAL PERMIT FACILITIES

The types of facilities covered under the Industrial General Permit (IGP) have the potential for metal loading. In particular, metal plating, transportation, scrap yards and recycling and manufacturing facilities are common potential sources for metal pollution from IGP sites.

According to the Stormwater Multiple Application and Report Tracking System (SMARTS) database, there are approximately 29 current active industrial permits within the watershed. Approximately 61 violations were recorded on the SMARTS database for inspections conducted from 2004-2014.[20] No further data is available to determine the kind of violations or the kind of pollutants these facilities contributed to.

[18] SWRCB (State Water Resources Control Board). 2014. Sanitary Sewer Overflow (SSO) Reduction Program. http://www.waterboards.ca.gov/wate_issues/programs/sso/.
[19] 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
[20] SWRCB (State Water Resources Control Board). 2014. Storm Water Multiple Application and Report Tracking System (SMARTS). https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.jsp?logMessage=2

Table 2-35: Active IGP Facilities as of February 2015[21]

Agency	Total
Nearshore Watersheds	12
Port of Long Beach	17
Total	29

CONSTRUCTION GENERAL PERMIT FACILITIES

Discharges covered under the Construction General Permit (CGP) also have the potential to contribute metals loading from construction sites. Sediment delivered from construction sites can contain metals from construction materials, heavy equipment, and metals naturally occurring in sediment. Additionally, metals can leach out of building materials and construction waste exposed to stormwater.[22]

According to the SMARTS database from 2005-2015, for the entire City of Long Beach there have been approximately 179 active/inactive combined construction permits. Of those permits, 45 of them are currently active.[23] Approximately 10 violations were recorded on the SMARTS database for inspections conducted from 2004-2014. No further data is available to determine the kind of violations or the kind of pollutants these facilities contributed to.

ILLICIT CONNECTIONS AND ILLICIT DISCHARGES

Past City annual reports were reviewed to evaluate sources of illicit discharges. The review did not result in substantive information for this source assessment.

2.3.5 SOURCES SPECIFIC TO CATEGORIZED POLLUTANTS

The following sections describe the sources of pollutants to each subwatershed within the Nearshore Watersheds as they relate to each categorization of pollutants.

CATEGORY 1

In the following sections, metals, toxics, bacteria and other Category 1 pollutants are described as they apply to each subwatershed. Additional detail is provided to those subwatersheds that have a TMDL and modeling results that describe the possible sources with more specificity.

METALS

COPPER, LEAD, AND ZINC

Copper sources in urban runoff include vehicle brake pads, architectural copper (e.g., roofs, gutters, flashing), copper pesticides (e.g., landscaping, wood preservatives, pool, spa, and fountain algaecides), vehicle fluid leaks and dumping, and deposition of copper air emissions (from diesel and gasoline fuel

[21] SWRCB (State Water Resources Control Board). 2014. Storm Water Multiple Application and Report Tracking System (SMARTS). https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.jsp?logMessage=2

[22] 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.

[23] SWRCB (State Water Resources Control Board). 2014. Storm Water Multiple Application and Report Tracking System (SMARTS). https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.jsp?logMessage=2

combustion, industrial facilities, residential wood burning, and forest fires).[24] Also, paints applied to boats and ships to control unwanted "fouling" growth of marine invertebrates on their hulls often contain copper-based biocides.

Lead sources include automobile exhaust and peeling house paint. These lead particles can settle into soil near roadways and homes, which later are resuspended into urban runoff. Additionally, lead can be transported downwards into the soil profile through natural and anthropogenic processes. [25]

Zinc sources include transportation and utility infrastructure (e.g., hot-dip galvanized guiderail, sign supports, light, telephone, and electric poles, bridges, rail stations/power supports), agriculture (e.g., additive to fertilizer, grain storage bins, barbed wire/chain link fencing, water/grain troughs, barns, milking stations, tillage implements), and industrial products (e.g., semi-trailers, automobile/truck body panels, boat trailers, tires, batteries, and alloys [brass & die-casting]).[26]

Dry Weather Copper in the San Gabriel River Estuary

The Nearshore Watersheds contain the San Gabriel River Estuary which has a US EPA TMDL for metals and selenium. The main sources of flow to the estuary are upstream inputs from Reach 1 and Coyote Creek, the two generating stations, and tidal exchange with the ocean. During dry weather, the two generating stations account for the majority of flow and metal loadings.

The two major non-MS4 NPDES dischargers are the Haynes generating station (operated by LADWP) and the AES Alamitos, L.L.C generating station. The Alamitos plant draws water in from the Los Cerritos Channel and is permitted to discharge up to 1,238 Million Gallons per Day (MGD) into the estuary, contributing an estimated of 4,473 kg of copper per year. The Haynes plant draws in water from Alamitos Bay and is permitted to discharge up to 1,014 MGD to the estuary, contributing an estimated 15,475 kg/year of copper.[27] The most recent NPDES Permits for these facilities follow the Ocean Plan Objectives for effluent limitations, which are less stringent than the Basin Plan Objectives that the Nearshore Watersheds follow. According to the TMDL, "metals loadings from the power plants are approximately ten times greater than the metals loading from POTWs that discharge to Coyote Creek and Reach 1." [28]

In 2006, the California Ocean Protection Council (created under the 2004 California Ocean Protection Act) adopted the resolution "Regarding the Use of Once-Through Cooling Technologies in Coastal Waters." This resolution urges state agencies to analyze the cost constraints involved with the conversion of once-through cooling systems to an alternative technology that would allow facilities to "implement the most

[24] Clean Estuary Project. 2004. Copper Sources in Urban Runoff and Shoreline Activities. TDC Environmental, LLC., San Mateo, CA. http://www.cdpr.ca.gov/docs/emon/surfwtr/copper1104.pdf

[25] Pitt, R., Williamson, D., Bannerman, R., Clark, S. Date Unknown. Sources of Pollutants in Urban Areas. University of Alabama, Tuscaloosa, AL., Wisconsin Departmnet of Natural Resources, Madison, WI., Penn State Harrisburg, Middleton, PA. http://dnr.wi.gov/topic/stormwater/documents/sources_urban.pdf

[26] Golding, S. 2008. Suggested Practices to Reduce Zinc Concentrations in Industrial Stormwater Discharges. State of Washington Department of Ecology. http://www.ecy.wa.gov/biblio/0810025.html

[27] LARWQCB (Los Angeles Regional Water Quality Control Board). 2013. Draft Staff Report for the Implementation Plans and Schedules for the Los Cerritos Channel and San Gabriel River Metals TMDLs. California Regional Water Quality Control Board, Los Angeles Region, Los Angeles, CA.

[28] USEPA Region 9 (U.S. Environmental Protection Agency Region 9). 2007. Total Maximum Daily Loads for Metals and Selenium San Gabriel River and Impaired Tributaries. U.S. Environmental Protection Agency Region 9, San Francisco, CA.

protective controls to achieve a 90-95 percent reduction in [impingement and entrainment] impacts." The feasibility and cost-effectiveness of control technologies that could attain this percent reduction in impingement and entrainment impacts are evaluated on an individual power-plant basis in a report titled, "California's Coastal Power Plants: Alternative Cooling System Analysis" prepared by Tetra Tech, Inc. Both the Alamitos generating station and the Haynes generating station were included in this report. The study shows that retrofitting the once-through cooling systems with the ideal closed-cycle wet cooling design is technically and logistically feasible at both of these power plants, and will reach the reduction goals put established in the resolution.

Wet cooling systems reduce the volume of water withdrawn from a source by as much as 97%. So if the water withdrawn from a source is dramatically reduced, then the water discharged to a source will also be dramatically reduced, thus achieving significant reductions in the amount of metals discharged to the San Gabriel River Estuary. While the purpose of this resolution is to minimize environmental impacts generated by impingement and entrainment, the accomplishment of reaching a 90-95% reduction in these impacts will collaterally reduce the amount of metals that are being discharged into the San Gabriel Estuary via the installation of the closed-cycle wet cooling design.[29] According to both the AES website[30] and the LADWP website,[31] there are current plans to move both plants towards a more sustainable, air-cooling system in the coming year.

TOXICS

PAHs

PAHs are formed by incomplete combustion of carbon-containing materials, such as fuels (e.g., gasoline, diesel, coal), domestic matter (e.g., tobacco, residential wood) and other area source matter (e.g., agricultural wastes, municipal waste, discharges originating from landfills, and use of creosoted pilings for docks and other shoreline structures). Major anthropogenic sources of PAHs in urban runoffs include deterioration of asphalt pavement surfaces and car tires, leading to leaching of the compounds to runoff waters; vehicular emissions leading to atmospheric fallout; and stormwater runoff. Incomplete combustion of organic matter at high temperature is one of the major anthropogenic sources of environmental PAHs. Natural sources are natural oil seeps, forest fires, and volcanic activity.[32]

[29] California Ocean Protection Council. 2008. California's Coastal Power Plants: Alternative Cooling System Analysis. Tetra Tech, Inc., Pasadena, CA.
[30] AES Alamitos. 2013. More Info, "Frequently Asked Questions." AES Alamitos, Long Beach, CA. http://www.aescalifornia.com/new-projects/alamitos
[31] LADWP (Los Angeles Department of Water and Power). 2013. Transformation of L.A. Power Takes a Major Step Forward. LADWP, Los Angeles, CA. https://ladwp.com/ladwp/faces/wcnav_externalId/c_cs_ladwpwork_Apr2012TransPower.
[32] Bobak, D. 2010. Polycyclic aromatic hydrocarbon characterization in Otter Creek, Northwest Ohio. The University of Toledo Digital Repository, Toledo, OH. http://utdr.utoledo.edu/cgi/viewcontent.cgi?article=1816&context=theses-dissertations

DDTs

Dichloro-diphenyl-trichloroethane (DDT) was first produced as a pesticide in the 1940s. It was an effective means for insect control, as well as preventing insect-borne diseases, such as malaria and typhus.[33]

The Montrose Chemical Corporation (the world's largest manufacturer of DDT) released DDT into the Los Angeles County sewer system from the 1940s until DDT was banned in 1972. The DDT was released on the Palos Verdes shelf through the effluent outfall at White Point.[34] A portion of the DDT was routed through to the Torrance lateral via stormwater drainage ditches, where it ultimately entered the Consolidated Slip in the POLA. Production and use of DDT was banned in 1972; however, because DDT has low biodegradability, it has persisted in sediments since the ban of the chemical.

PCBs

Polychlorinated biphenyls (PCBs) are a group of over 200 compounds. PCB production stopped in 1977. Sources of PCBs include sediment contaminated by past industrial waste discharges, landfill leachate, spills, and waste incineration.

Colorado Lagoon

The Colorado Lagoon Watershed is approximately 1,172 acres and is connected to Alamitos Bay and the Pacific Ocean via a box culvert to Marine Stadium. Major contributors of metals and toxic pollutants to the Colorado Lagoon are stormwater-conducting point sources (NPDES-regulated sources). Metals and toxics contaminants are associated with fine particles and suspended solids in stormwater runoff. Based on the TMDL report, wet-weather runoff is the highest source contributor of pollutants. Minimal vegetation and impermeable soils contribute to runoff flowing directly into the Colorado Lagoon.[35]

Dominguez Channel, Greater Los Angeles and Long Beach Harbor Waters

The Dominguez Channel, Greater Los Angeles and Long Beach Harbor Watershed (DC/LA/LB Harbor) Toxics Pollutants TMDL covers a large portion of highly industrialized and urbanized land. The Dominguez Channel drains approximately 133 square miles that eventually discharges to the San Pedro Bay. The Los Angeles and Long Beach Harbors occupy over 10,500 acres of land and water and also discharge to the San Pedro Bay. Although the Greater Los Angeles Harbor is not included in this WMP and the entirety of the Dominguez Channel is not included in this WMP (only the Dominguez Channel Estuary), it is important to note the fluid connectivity between the three waterbodies included in the TMDL.

The DC/LA/LB Harbor Watershed contains the Port of Long Beach and has a high percentage of industrial and construction sites. There is a Terminal Island Water Reclamation Plant (TIWRP) that discharges tertiary-treated effluent to the Outer Harbor. The Harbor Generating Station and Long Beach Generating Station discharge to the Inner Harbor area. There are several oil refineries that discharge to the

[33] USEPA (U.S. Environmental Protection Agency). 2015. DDT—A Brief History and Status. U.S. Environmental Protection Agency, Washington, D.C. (http://www2.epa.gov/ingredients-used-pesticide-products/ddt-brief-history-and-status).
[34] Schmidt TT, Risebrough RW, Gress F. 1971. Input of polychlorinated biphenyls into California coastal waters from urban sewage outfalls. Bulletin of Environmental Contamination and Toxicology 6:235-243.
[35] LARWQCB (Los Angeles Regional Water Quality Control Board). 2009. Draft Staff Report Colorado Lagoon OC Pesticides, PCBs, Sediment Toxicity, PAHs, and Metals TMDL. California Regional Water Quality Control Board, Los Angeles Region, Los Angeles, CA.

Dominguez Channel Estuary, and an Exxon Mobil plant that discharges to the Torrance Lateral (which is just above the Dominguez Channel Estuary). These are potential sources of toxic pollutants to the Nearshore Watersheds.

There are thirteen (13) facilities covered under the Dischargers of Groundwater from Potable Water Supply Wells to Surface Water NPDES Permit, one facility covered under the Dischargers of Low Heat Hydrostatic Test Water to Surface Waters NPDES Permit, and one facility covered under the Discharges of Groundwater from Construction and Project Dewatering to Surface Water NPDES Permit that discharge to the Dominguez Channel. All of these facilities are potential sources of metals and toxics pollutants to the Nearshore Watersheds. Furthermore, there are two Superfund sites that discharge into the Torrance Lateral, which is directly above the Dominguez Channel Estuary. These Superfund sites are known to release DDT. This is a likely mechanism for the contribution of "persistent legacy pesticides" and other legacy toxics of the TMDL (i.e., toxics and metals are deposited into sediment, which gets washed through runoff into the sewer system and is discharged into the waterbody, where it persists in the sediment and slowly leaches into the water).[36]

BACTERIA

BACTERIA FROM PORT SOURCES

Sources of bacterial total coliforms include sediments, microbial growth, urban runoff, marsh sediments, and marine vegetation.[37] Sources of fecal coliforms include human and animal feces and urban runoff.[38]

LA RIVER ESTUARY AND LONG BEACH CITY BEACHES

The LA River Estuary and the Long Beach City Beaches are often evaluated in conjunction with one another because of their proximity to each other. The Long Beach City Beaches and Los Angeles River Estuary TMDL supports this: "flow from the LAR contributes significant concentrations of bacteria to the estuary and, ultimately, the LBC beaches."[39] Furthermore, the TMDL states that the Long Beach City Beaches are affected by the San Gabriel River, the LA River and the Alamitos Bay watersheds (also known as the "adjacent drainages"). While the source assessment of these watersheds are not discussed in detail in this WMP, any potential sources of bacteria affecting these watersheds would also have some effect on the Nearshore watersheds.

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. There is a designated "dog zone" or dog friendly beach area within the Long Beach City Beaches. Because

[36] LARWQCB (Los Angeles Regional Water Quality Control Board) and U.S. Environmental Protection Agency Region 9. 2011. Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants Total Maximum Daily Loads. California Regional Water Quality Control Board, Los Angeles Region, Los Angeles, CA.

[37] EPA 2006 Causes of Total Coliform-Positive Occurrences in Distribution Systems. http://www.epa.gov/ogwdw/disinfection/tcr/pdfs/issuepaper_tcr_causes.pdf

[38] USEPA (U.S. Environmental Protection Agency). 2012. 5.11 Fecal Bacteria. U.S. Environmental Protection Agency, Washington, D.C. http://water.epa.gov/type/rsl/monitoring/vms511.cfm

[39] USEPA Region 9 (U.S. Environmental Protection Agency Region 9). 2012. Long Beach City Beaches and Los Angeles River Estuary Total Maximum Daily Loads for Indicator Bacteria. U.S. Environmental Protection Agency Region 9, San Francisco, CA.

this area is not fenced, it is likely this stretch of the beach is a potential source of bacteria due to improper pet-waste management.[40]

Additionally, waterfowl birds are considered a potential source of bacterial pollution. In particular, the LA River Estuary is noted as one of the most important shorebird stopover sites in southern California, and as such there is a nine-acre marine biological reserve that is commonly visited by the bird-watching community.[41] Due to the proximity of this area to the Long Beach City Beaches, it is likely that the waste from the waterfowl that frequents this area is a source of bacterial pollution. Additionally, there has been documented research that "ponds fronting storm drains along the impaired LBC beaches were found to be heavily utilized by birds which contributed to significant increase in concentrations of enterococcus bacteria. Accordingly, waterfowl are a potential source of bacteria to the LBC beaches; however, natural sources (such as waterfowl) of bacteria are accounted for under the reference system approach for bacteria."[42]

OTHER SOURCES

Urban runoff has been found to carry high levels of bacteria and is 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. Additionally, the Long Beach City Beaches are used for recreational purposes, so direct human contact, improperly discarded or mismanaged trash, overflows or negligent care of restroom facilities can be a source of elevated levels of total coliform bacteria. The Long Beach Shoreline Marina (located immediately west of the Long Beach City Beaches) has activities associated with the marina (such as boat deck and slip washing and direct waste disposal) which is considered a source of bacteria.[43]

CATEGORY 2 AND 3

The following source assessments are for Category 2 and 3 pollutants not previously discussed in the source assessment for Category 1.

[41] USEPA Region 9 (U.S. Environmental Protection Agency Region 9). 2012. Long Beach City Beaches and Los Angeles River Estuary Total Maximum Daily Loads for Indicator Bacteria. U.S. Environmental Protection Agency Region 9, San Francisco, CA.
[41] USEPA Region 9 (U.S. Environmental Protection Agency Region 9). 2012. Long Beach City Beaches and Los Angeles River Estuary Total Maximum Daily Loads for Indicator Bacteria. U.S. Environmental Protection Agency Region 9, San Francisco, CA.
[42] City of Long Beach, 2009
[43] USEPA Region 9 (U.S. Environmental Protection Agency Region 9). 2012. Long Beach City Beaches and Los Angeles River Estuary Total Maximum Daily Loads for Indicator Bacteria. U.S. Environmental Protection Agency Region 9, San Francisco, CA.

BIS(2-ETHYLHEXYL)PHTHALATE (DEHP)

DEHP is a colorless liquid used in the production of polyvinyl chloride (PVC). Its sources are ubiquitous in the urban environment (e.g., PVC pipes, additives in sealants, adhesives, paints and lacquers, shoe and textile wear, toys, paper and packaging, coil coating building materials, and vehicles).[44]

Due to its wide use, DEHP is often falsely detected in samples as a result of laboratory contamination.[45] DEHP is present in almost all laboratory equipment and reagents. Plastics, glassware, aluminum foil, cork, rubber, glass wool, Teflon sheets, and solvents have all been found to be contaminated with DEHP. While efforts have been made to reduce laboratory contamination, DEHP is still reported in laboratory blanks, even with thorough cleaning methods. USEPA (1988a) reports that DEHP cannot generally be accurately or precisely measured at concentrations below about 2 ppb (e.g., 2 µg/L), due to blank contamination.[46]

MERCURY IN THE PORT OF LONG BEACH CONTRIBUTED BY WILDFIRE

Mercury occurs naturally within the environment as elemental (Hg^0) or divalent mercury (Hg^{2+}). Natural mercury sources include land and ocean degassing.[47] Anthropogenic mercury sources include mining, fossil fuel, combustion, industrial manufacturing, sewage sludge, and municipal wastes.[48]

Elemental mercury can oxidize in the atmosphere to form divalent mercury, which can leave the atmosphere in either wet (dissolved in precipitation) or dry form (settling out with particulate matter). Mercury is then able to accumulate in plant matter and litterfall. Mercury can also be transformed into inorganic mercury (MeHg) by microorganisms and is readily bioaccumulated in organisms. Increased concentrations of particle bound mercury have been observed during wildfires.[49] [50] [51] Additionally it has been suggested that elevated concentrations in particulate-bound mercury in Nevada may have been due to wildfire plumes.[52] Mercury concentration in waterbodies often exceeds TMDLs, suggesting that atmospheric deposition is largely contributing to the system.

[44] USEPA (U.S. Environmental Protection Agency). 2013. Bis(2-ethylhexyl)phthalate (DEHP). U.S. Environmental Protection Agency, Washington, D.C. http://www.epa.gov/ttnatw01/hlthef/eth-phth.html

[45] http://dnr.wi.gov/files/PDF/pubs/wa/wa1011.pdf

[46] http://www.atsdr.cdc.gov/toxprofiles/tp9-c7.pdf

[47] GESAMP 1988. GESAMP: Aresenic, mercury and selenium in the rmarine environment. UNEP Regional Seas Reports and Studies No. 92. GESAMP Reports and Studies No.28.

[48] Lamborg CH, Hammerschmidt CR, Bowman KL, Swarr GJ, Munson KM, Ohnemus DC, Lam PJ, Heimburger LE, Rijkenberg MJA, and MA Saito 2014. A global ocean inventory of anthropogenic mercury based on water column measurements. Nature 512, 65-68.

[49] Friedli, H. R., Radke, L. F., Lu, J. Y., Banic, C. M., Leaitch, W. R., and MacPherson, J. I.: Mercury emissions from burning of biomass from temperate North American forests: Laboratory and airborne measurements, Atmos. Environ., 37, 253–267, doi:10.1016/s1352-2310(02)00819-1, 2003a.

[50] Friedli, H. R., Radke, L. F., Prescott, R., Hobbs, P. V., and Sinha, P.: Mercury emissions from the August 2001 wildfires in Washington State and an agricultural waste fire in Oregon and atmospheric mercury budget estimates, Glob. Biogeochem. Cy, 17, 1039, doi:10.1029/2002GB001972, 2003b.

[51] Finley, B. D., Swartzendruber, P. C., and Jaffe, D. A.: Particulate mercury emissions in regional wildfire plumes observed at the Mount Bachelor Observatory, Atmos. Environ., 43, 6074–6083, doi:10.1016/j.atmosenv.2009.08.046, 2009.

[52] Lyman, S. N. and Gustin, M. S.: Determinants of atmospheric mercury concentrations in Reno, Nevada, USA, Sci. Total Environ., 408, 431–438, doi:10.1016/j.scitotenv.2009.09.045, 2009.

Mercury (Hg) stored in vegetation and soils are known to be released to the atmosphere during wildfires, increasing atmospheric stores and altering terrestrial budgets. Increased erosion and transport of sediments is well documented in burned watersheds, both immediately post-fire and as the watershed recovers. The accelerated accumulation of mercury observed in the burned soils, along with the elevated risk of erosion, could result in increased delivery of organic- or particulate-bound mercury to surface waters in post-fire systems.[53]

The Station Fire, which lasted from August 26 to October 16, 2009, burned 160,577 acres (251 sq mi; 650 km^2), and destroyed 209 structures, including 89 homes. The Station Fire is the 10th largest in modern California history and the largest wildfire in the modern history of Los Angeles County. The fire started in the Angeles National Forest near the U.S. Forest Service ranger station on the Angeles Crest Highway (State Highway 2). The blaze threatened 12,000 structures in the national forest and the nearby communities of La Cañada Flintridge, Glendale, Acton, La Crescenta, Littlerock and Altadena, as well as the Sunland and Tujunga neighborhoods of the City of Los Angeles.

CHLORDANE IN FISH TISSUE

Total chlordanes (the sum of chlordane-alpha, chlordane-gamma, cis-nonachlor, trans-nonachlor, and oxychlordane) are organchlorine pesticides. Although its use was completely banned in 1988 in U.S., chlordanes are persistent in the environment because they do not easily break down and bioaccumulate in animals.

PH

Ocean pH and the pH in other natural bodies of water can be altered by the phytoplankton community, the discharge of organic matter, and carbon dioxide.[54]

NICKEL IN SEDIMENT

Nickel is a naturally occurring metal and a natural background range of nickel in California Coastal Shelf sediment is from 0.9 to 84.7 µg/g (Schiff and Weisberg 1999). [55] Since 1998, 45 sediment samples from the surface sediment (less than 5 cm depth) were collected in all of the Los Angeles and Long Beach Harbors. Only one sample from Long Beach Outer Harbor exceeded the ERM of nickel (51.6 µg/g).

2.3.6 EXISTING WATERSHED MODEL RESULTS

Model results are discussed in each section as they pertain to individual TMDLs.

[53] Burke, M. P., Hogue, T. S., Ferreira, M., Mendez, C. B., Navarro, B., Lopez, S., & Jay, J. A. (2010). The effect of wildfire on soil mercury concentrations in Southern California watersheds. *Water, Air, & Soil Pollution*, *212*(1-4), 369-385.

[54] Hinga, K. R. (1992). Co-occurrence of dinoflagellate blooms and high pH in marine enclosures. *Marine Ecology Progress Series*, *86*, 181-181.

[55] Schiff, K.C. and Weisberg, S.B. (1999). Iron As a Reference Element for Determining Trace Metal Enrichment in California Coastal Shelf Sediments. *Marine Env. Research*, 48(2), 161-176.

2.4 PRIORITIZATION OF WATER QUALITY ISSUES

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 Nearshore Watershed. Based on the source assessment analysis, Water Quality Priorities (WQPs) within the watershed are determined based on the following:

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: March 28, 2014—March 28, 2019
- Pollutants that are in the same class as a TMDL pollutant

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 IMP).

Table 2-36 summarizes the WQPs for the watershed based on the criteria described above. The designation of an "H" in the table indicates that waterbody-pollutant combination is of "highest priority", "h" is "high priority", and "m" is medium priority.

2.4.1 REMARKS REGARDING WATER QUALITY ISSUES IN THE PORT WATERBODIES

The following section provides additional detail on water quality issues in the Port area.

HIGHEST PRIORITY

The highest priority water quality issues include all Category 1 waterbody-pollutant combinations due to their listing in the Harbor Toxics TMDL. These waterbody-pollutant combinations include copper, lead, zinc, total PAHs, total DDTs, and total PCBs in sediment for Inner Harbor, Outer Harbor, and Eastern San Pedro Bay.

These highest priority water quality issues are currently being addressed through the Harbor Toxics TMDL-required implementation plan. As defined in the Harbor Toxics TMDL, there are three phases of implementation activities to meet the required waste load allocations:

- Phase I, completed 5 years after effective date of the Harbor Toxics TMDL (March 2017)
- Phase II, completed 10 years after effective date of the Harbor Toxics TMDL (March 2022)
- Phase III, completed 20 years after effective date

Table 2-36: Water Quality Prioritization

Pollutant	DCE	IH	OH	ESPB	LBCB	CL	AB	LARE	SGRE
Cadmium	H[s]								
Copper	H[s,d]	H[s]/m[d]	H[s]	H[s]	H[s]		H[s]/m[d]	H[s]	H[o]
Lead	H[s,d,t]	H[s]	H[s]	H[s]	H[s]	H[s]	H[s]	H[s]	m
Zinc	H[s,d]	H[s]/m[d]	H[s]	H[s]	H[s]	H[s]	H[s]	H[s]	m
DDT	H[s,t]	H[s,t]	H[s,t]	H[s,t]	H[s,t]	H[t]	H[s]	H[s,t]	
PCBs	H[s]	H[s,t]	H[s,t]	H[s,t]	H[s,t]	H[t]	H[s]	H[s,t]	
PAHs	H[s]	H[s]	H[s]	H[s]	H[s]	H[s]	H[s]	H[s]	
Chlordane	H[s,t]	h[t]	h[t]			H[s,t]	h[s]	h[s]	
Dieldrin	H[s,t]					H[t]	m		
Sediment Toxicity	H[s]	H[s]	H[s]	H[s]		H[s]		h	
Benthic Community Effects	H[s]	H[s]							
Ammonia	h[o]								
Trash								h	
Total Coliforms	h	m			H		m	H	
Arsenic	m[s]								m
Chromium	m[s]								
Silver	m[d,o]/m[s]								
Nickel	m[C]		m[s]						h
Thallium	m[d]								
Mercury	m[d,o]/m[s]	h[s]/m[d]							
Bis(2-ethylhexyl)phthalate		m	m	m					
Chrysene		m							
Pyrene		h	h	m					
Enterococcus		m			H		m	H	
Fecal Coliform					H		m	H	
Indicator Bacteria						h	h		
Malathion (wet)							m		
Toxaphene (wet)							m		
DDD							m		
Dioxin									h
Dissolved Oxygen									h
Selenium									m

[s] Sediment
[d] Dissolved
[t] Tissue
[o] Dry only

During Phase I, responsible parties in the Los Angeles River and San Gabriel River watersheds will be implementing other TMDLs, which will directly or indirectly support the goals of the Harbor Toxics TMDL. For example, TMDLs aimed at reducing point source discharges into these waterbodies will directly affect future harbor conditions. During Phases II and III, implementation actions within the Los Angeles River and San Gabriel River watersheds may be required as necessary to meet the numeric targets in the Greater Los Angeles/Long Beach Harbor Waters. TMDLs to allocate contaminant loads between dischargers in the Los Angeles and San Gabriel River watersheds may also be developed, if necessary.

One of the recommended implementation actions is the development of a Contaminated Sediment Management Plan. The City of Long Beach's CSMP for Long Beach Harbor, Eastern San Pedro Bay, and Los Angeles River Estuary was submitted in March 2014. The objective of the CSMP is to identify, prioritize, and manage chemically impacted sediments where necessary to protect and improve benthic community condition and human health from fish consumption. The CSMP outlines an approach consistent with federal guidance (USEPA 2005) that includes a five-step process to assess and evaluate potential management actions consisting of:

1. Monitoring and Data Collection
2. Identification of Potential Management Areas
3. Identification of Potential Management Alternatives
4. Selection of Management Alternatives
5. Commencement of Management Action

HIGH PRIORITY

None of the waterbody-pollutant combinations for Inner Harbor, Outer Harbor, or eastern San Pedro are classified as High Priority.

MEDIUM PRIORITY

Medium priority water quality issues include all Category 2 and Category 3 waterbody-pollutant combinations (see Table 2-22). Bacterial exceedances (1/5) and pH exceedance (1/2427) in water of the Inner Harbor (classified as Category 3) do not appear to be persistent water quality issues as presented in Figures 2-1 and 2-2. Thus they were not prioritized.

3 SELECTION OF WATERSHED CONTROL MEASURES

This chapter identifies Watershed Control Measures (WCMs) to implement through the City's jurisdictional stormwater management program, 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.

3.1.1 PORT OF LONG BEACH WATER RESOURCES ACTION PLAN

In 2005 the Port adopted a Green Port Policy. The purpose of the policy is to provide a framework to protect and improve the Long Beach Harbor environment with respect to air, water, and sediment quality as well as wildlife. Addressing the Green Port Program's commitment to water and sediment quality, the Port developed a Water Resources Action Plan (WRAP) jointly with the Port of Los Angeles. The WRAP was approved in 2009 with the guidance and participation of the EPA, the Los Angeles RWQCB, and a public stakeholder group of regulatory agencies, non-governmental organizations, and community representatives.

The WRAP is a living document, updated and modified as circumstances warrant. Such circumstances may include programs and controls to comply with TMDLs and the MS4 Permit. Annual progress reports posted on the Port's website include the implementation status of WRAP programs as well as a determination on the need for revisions to the WRAP document. In these respects the WRAP is similar to the WMP. However

the current iteration of the WRAP is a voluntary effort and is not intended to meet the obligations of a watershed management program as defined in the 2014 MS4 Permit.

The relationship between the WMP and WRAP may evolve over time as the documents are updated. For example, to eliminate redundancy, the water quality elements of the WRAP could serve as a port-specific MS4 Permit-based watershed management program. Presently similarities and differences between the two documents are resolved as follows:

- The current implementation status of WRAP programs related to water quality are outlined in the WMP. Control measures that exceed the MCMs of the MS4 Permit are listed under Section 3.4, Targeted Control Measures. Recent technology advancement studies are listed under Section 3.1.2.
- Future WRAP modifications that align with the objectives of the WMP will be integrated into the WMP through the adaptive management process. `

3.1.2 STRATEGY FOR SELECTION AND IMPLEMENTATION OF WATERSHED CONTROL MEASURES

Pursuant to Part VII.C.1.a of the MS4 Permit, the City 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 City 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 City has concluded that the most cost-effective and long-lasting way to address WQPs is to develop and support statewide 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 legislative requirements and 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 implementation of 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 eventually apply to many consumer products placed into the stream of commerce in California. It specifically applies to adverse human health and environmental impacts, including adverse water quality impacts, and it contains a petition process for identification and prioritization of chemicals and projects. CASQA, supported by City, 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 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 as noted in Chapter 4 (the RAA) following the schedules provided in Chapter 5 (Compliance Schedules).

PORT OF LONG BEACH TECHNOLOGY ADVANCEMENT PLAN

Through the WRAP, the Port has developed a technology advancement plan to test emerging control measure technologies. Technologies that prove successful and feasible through pilot studies are incorporated into the WRAP as appropriate. The goal of the program is to protect and improve water and sediment quality in the harbor complex.

[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."

Program implementation has included pilot studies of several stormwater control measures, such as automatic retractable screens, trash cans designed for truckers, solar powered compacting trash cans, marina trash skimmers, covered trash cans with litter control outreach messaging, and catch basin inserts equipped with filter media targeting metals. The automatic retractable screens—which prevent trash, litter, and debris from entering catch basins—have been installed at all curb-inlet style catch basins throughout the Port. Additional detail is provided in the WRAP and its associated progress reports.

3.2 MINIMUM CONTROL MEASURES

The Minimum Control Measures (MCMs) are baseline WCMs required by and defined within the MS4 Permit. (Excluding modifications set forth in an approved WMP.) 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 City and included in the WMP to specifically address WQPs. The Port implements many of these MCMs independently.

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 the City 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 City 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 §VII.D.1.ii.

3.2.1 ASSESSMENT OF MINIMUM CONTROL MEASURES

Pursuant to MS4 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.

3.2.1.1 DEVELOPMENT CONSTRUCTION PROGRAM

ASSESSMENT

The reduction of sediment through an effective Development Construction Program will address WQPs. This is because sediment mobilizes other pollutants, including metals and organics. As such the Development Construction Program is an integral component of the 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 City will implement the MCMs as defined in §VII.K of the MS4 Permit. To assist the City in the development and implementation of a jurisdictional program, a guidance document is included in Appendix A-3-1.

3.2.1.2 INDUSTRIAL/COMMERCIAL FACILITIES PROGRAM

ASSESSMENT

CITY

The MS4 Permit provisions for the Industrial/Commercial Facilities Program provide opportunities for customization to address WQPs. Specifically, §VII.G.5.i.4 of the MS4 Permit states that industrial inspection frequencies may be modified through the WMP development process. The City proposes 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.

PORT

Due to the industrial nature of the port area, the Port's existing stormwater program emphasizes the Industrial/Commercial Facilities Program. The Program has historically exceeded MS4 Permit provisions and continues to evolve through the development of the WRAP. As such, no modifications to the provisions of the Industrial/Commercial Facilities Program have been identified.

DETERMINATION

Sections VII.G.4 and VII.G.5 of the MS4 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. The modified language will not conflict with the Port's separate inspection program, which is currently based on an annual cycle.

In order to provide clarity to the City, 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 City in the development and implementation of a jurisdictional program.

3.2.1.3 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. An apparent modification to §VII.M of the MS4 Permit would be the inclusion of a proactive approach to detecting illicit discharges of WQP pollutants. However, such an approach will already be addressed through nonstormwater outfall based screening prescribed in the MRP. As such there is no need to modify the base provisions of the program.

DETERMINATION

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

3.2.1.4 PLANNING AND LAND DEVELOPMENT PROGRAM

ASSESSMENT

The City adopted a Low Impact Development (LID) ordinance in 2010 (Ordinance No. 10-0035), amended in 2013. Following MS4 Permit §VII.J.5.i, the existing Planning and Land Development Program adopted by the City was assessed and the alternative requirements in the local ordinance were deemed to provide at least an equal reduction in stormwater discharge pollutant loading and volume.

DETERMINATION

A local ordinance equivalency determination was submitted to the Regional Board on October 28, 2015. As stated in the Permit, in lieu of requirements in Part VII.J the city requests to be allowed to implement Ordinance No. 10-0035. The City will condition projects in Part VII.J.2 and Part VII.J.3 to include a retention requirement numerically equal to 0.75-inch, 24-hour rain event or the 85th percentile, 24-hour rain event, whichever is greater. The city will continue to implement the alternative requirements provisions of the existing LID ordinance. The LID guidance manuals for both the City and Port will continue to be used to assist the City in the implementation of this program element.

3.2.1.5 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 overall 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 City will implement the MCMs as defined in §VII.L of the MS4 Permit. To assist the City in the development and implementation of a jurisdictional program, a guidance document is included in Appendix A-3-1.

3.2.1.6 PUBLIC INFORMATION AND PARTICIPATION PROGRAM

ASSESSMENT

The MS4 Permit allows the 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 City 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. This allows the City 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
§VII.F.4 Residential Outreach Program	The 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 the 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 City, 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 City in the development and implementation of a jurisdictional program.

It is important to note that the Port area does not include residential zoning. As such, the Port generally does not interact with the public and will not participate in the PIPP. The Port does however implement an outreach campaign to truckers, laborers, and terminal workers, consisting of banners in high visibility areas, messages on trash cans, and anti-litter signage in high litter generating areas.

3.2.1.7 PROGRESSIVE ENFORCEMENT AND INTERAGENCY COORDINATION

ASSESSMENT

Following MS4 Permit §VII.C.5.h.i, the Progressive Enforcement and Interagency Coordination Program was not assessed for potential modifications.

DETERMINATION

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

3.2.2 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 City. 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 revisions of the third term MCMs or entirely new provisions. These new and enhanced fourth term MCMs are described in the following section.

3.2.3 NEW FOURTH TERM MS4 PERMIT MINIMUM CONTROL MEASURES

It is important to note that the City's existing Stormwater Management Programs (SWMPs) were developed at the outset to comply with the prior 1999 MS4 Permit. From 1999 to 2014, the MCM provisions of many Phase I MS4 Permits expanded considerably—the 2014 Long Beach MS4 Permit is no exception. Notwithstanding the existing SWMP elements that meet or exceed current MS4 Permit provisions (notably the LID Program and the Port's Industrial Facilities Program), Part VII.D of the MS4 Permit introduces many new provisions and program elements to be developed and implemented. This section briefly describes the changes in the MCMs from the prior MS4 Permit. An MCM is considered new if it was not required by the prior MS4 Permit and is considered revised if it is a revision 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.

3.2.3.1 STRUCTURAL CONTROLS

The new and revised MCMs consist primarily of nonstructural control measures—with the marked exception of the Planning and Land Development provisions. The structural control MCMs are described as follows.

LOW IMPACT DEVELOPMENT

MS4 Permit §VII.J

The new LID provisions of the Planning and Land Development program may be the most significant change from the prior MS4 Permit. The implementation of structural LID BMPs at new development and redevelopment projects will appreciably decrease the effective impervious area, reducing flow and, consequently, pollutant loads. The program is unique in that it increases in effectiveness over time as more and more existing developments are redeveloped and bound to the LID requirements.

The framework for implementation of LID in the MS4 Permit provisions is already in place. With the stated purpose of reducing runoff, improving water quality, increasing groundwater recharge, and enhancing recreational values, the City adopted a LID ordinance in 2010 (amended in 2013). Guidance manuals were developed by the City (2013, Port excluded) and the Port (2013) to aid in the implementation of the existing LID ordinance.

TRASH EXCLUDER INSTALLATION

MS4 Permit §VII.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 area catch basins or outfalls (see MS4 Permit §VII.L.8. iii.(1) for the definition of Priority A) to prevent the discharge of trash to the MS4. The deadline is no later than four years after the effective date of the MS4 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.

3.2.3.2 NONSTRUCTURAL CONTROLS

Table 3-2 lists the new and enhanced nonstructural City MCMs as well as the new and enhanced NSWD measures. The WCM effectiveness ratings from Table 3-2 are based on similar ratings in Tetra Tech's Comprehensive Load Reduction Plan (CLRP) for Chollas Creek Watershed in San Diego County, 2012. The correlation of WCM 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
Category 1	✗	✗	✗		✗	
Category 2	✗	✗	✗		✗	✗
Category 3	✗	✗	✗	✗	✗	

Table 3-2: New and Revised Fourth Term MS4 Permit Nonstructural MCMs and NSWDs

#	WCM Category/ID	WCM	Effectiveness toward WQPs					Agency	
			Category I	Category II	Category III	Sediment reduction	Volume or flow reduction	City (Port excluded)	Port
		Planning and Land Development							
1	MCM-PLD-1	Amend development regulations to facilitate LID implementation	◆	◆	◈	◆	◆	**E**	**E**
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	◈	◈	◈	◈	◈	✗	**E**
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	Revised plan review program	◈	◈	◈	◆	◈	✗	✗
7	MCM-DC-2	Revised inspection standards and BMP requirements	◈	◈	◈	◆	◈	✗	✗
8	MCM-DC-3	Increased inspection frequencies	◈	◈	◈	◆	◈	✗	✗
9	MCM-TRA-1	Revised staff training program	◈	◈	◈	◆	◈	✗	✗
		Illicit Discharge Detection/Elimination							
10	MCM-ICID-1	Revised IC/ID enforcement and written procedures	◈	◈	◈	◈	◈	✗	✗
11	NSWD-1	Outfall screening and source investigations	◈	◈	◈	◈	◆	✗	✗
12	MCM-TRA-1	Revised staff/contractor training	◈	◈	◈	◈	◈	✗	✗
		Dry weather runoff reduction							
13	NSWD-1	Outfall screening and source investigations	◈	◈	◈	◈	◆	✗	✗

Table 3-2: New and Revised Fourth Term MS4 Permit Nonstructural MCMs and NSWDs

#	WCM Category/ID	WCM	Effectiveness toward WQPs					Agency	
			Category I	Category II	Category III	Sediment reduction	Volume or flow reduction	City (Port excluded)	Port
14	NSWD-2	Revised conditions for NSWDs, including irrigation reduction	◆	◆	◈	◆	◆	✗	✗
		Public Agency Activities							
16	MCM-PAA-1	Revised 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	Revised measures to control infiltration from sanitary sewers	◆	◆	◇	◇	◇	✗	✗
20	MCM-PAA-5	Inspection and maintenance of Permittee owned treatment controls	◈	◈	◈	◈	◈	✗	✗
21	MCM-TRA-1	Revised inspector/staff training	◈	◈	◈	◈	◈	✗	✗

◆ ◈ ◇ Respectively: Primary pollutant reduction, secondary pollutant reduction, pollutant not addressed. BMP effectiveness based on Tetra Tech's CLRP for Chollas Creek Watershed in San Diego County, 2012.

MCM Minimum Control Measure.

NSWD Nonstormwater discharge measure.

✗ New/revised 2014 MS4 Permit MCM to be implemented upon WMP approval (unless specified otherwise).

E Existing agency program meets new/revised 2014 MS4 Permit MCM.

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

MS4 Permit §VII.J.5.iv.(b), §VII.K.xiv, §VII.L.11, §VII.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 revised provisions will increase the overall effectiveness of the jurisdictional SWMPs.

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

MS4 Permit §VII.C.4.c.i, §VII.J.5.i

The City has developed and adopted a LID ordinance and has a Green Street Policy. The local ordinance equivalency determination was submitted to the Regional Board on October 28, 2015. These measures will facilitate LID implementation. See Section 3.2.3.1, Structural Controls, for more information.

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

MS4 Permit §VII.J.5.iv

The City must track post-construction BMPs, conduct BMP verification inspections, ensure proper maintenance 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 §VII.G.4, §VII.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 revised measures will increase the effectiveness of the Industrial/Commercial Facilities Program for the City. However the existing Port Industrial Facilities Program is currently meeting or exceeding related MS4 Permit requirements, as described in Section 3.4.

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

MS4 Permit §VII.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.

These new and revised measures will increase the effectiveness of the Industrial/Commercial Facilities Program for the City. However the existing Port Industrial Facilities Program is currently meeting or exceeding related MS4 Permit requirements, as described in Section 3.4.

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

MS4 Permit modified MCM (replaces §VII.G.4, §VII.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 provides the City the opportunity to concentrate efforts on WQPs (the existing Port Industrial/Commercial Facilities Program is currently meeting or exceeding related MS4 Permit requirements, as described in Section 3.4). Sections VII.G.4 and VII.G.5 of the MS4 Permit will be replaced with the language presented in Table 3-3.

TABLE 3-3

REPLACES §VII.G.4 AND §VII.G.5 OF THE MS4 PERMIT

VII.G.4 Prioritize Critical Industrial/Commercial Sources

VII.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 VII.G.2.i provide information that allows for such a facility prioritization. Based on these fields, Figure ICF-1 establishes a method for the City to prioritize industrial/commercial facilities into three tiers—High, Medium and Low. The City may follow an alternative prioritization method provided it is based on water quality impact and results in a similar three-tiered scheme.

Figure ICF-1: Industrial/Commercial Facility Prioritization Scheme

Step 3 in Figure ICF-1 may also be expressed by the relationships $A \cdot B + C \geq 1 \rightarrow$ High, $1 > A \cdot B + C > 0 \rightarrow$ Medium and $A \cdot B + C = 0 \rightarrow$ 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

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

TABLE 3-3

REPLACES §VII.G.4 AND §VII.G.5 OF THE MS4 PERMIT

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.

VII.G.4.i.(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 VII.G.5.i.

VII.G.4.i.(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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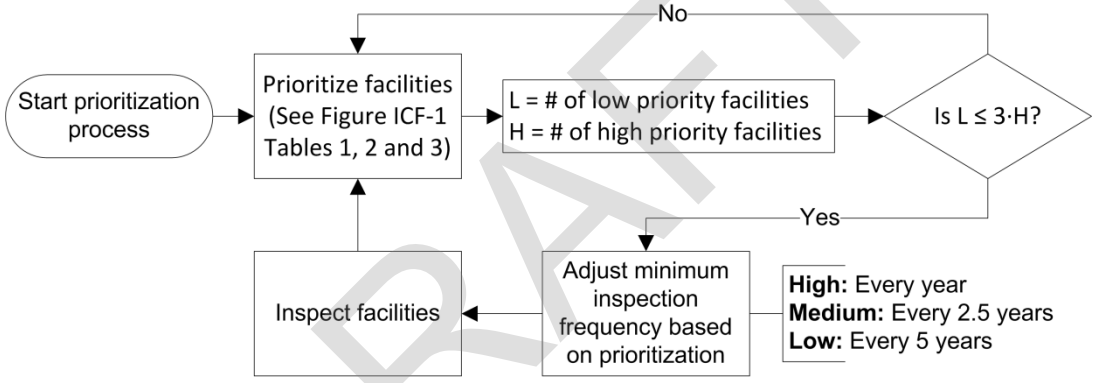

Figure ICF-2

VII.G.5 Inspect Critical Industrial/Commercial Sources

VII.G.5.i Frequency of Industrial/Commercial Inspections

Following the facility prioritization method in Part VII.G.5.i, the 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 VII.G.5.i.(1). The condition in Part VII.G.4.(1) ensures at least the same average number of inspections conducted per year as the semi-quinquennial frequency defined in the MS4 Permit.

The 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.

VII.G.5.i.(1) Exclusions to the Frequency of Industrial Inspections

VII.G.5.i.(1).(a) Exclusion of Facilities Previously Inspected by the Regional Water Board

The 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.

TABLE 3-3

REPLACES §VII.G.4 AND §VII.G.5 OF THE MS4 PERMIT

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.

VII.G.5.i.(1).(b) No Exposure Verification

As a component of the first mandatory inspection, the 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, the 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.

VII.G.5.ii Scope of Industrial/Commercial Inspections

VII.G.5.ii.(1) Scope of Commercial Inspections

The 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. The 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.

VII.G.5.ii.(2) Scope of Industrial Inspections

The 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 City 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, the 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 VII.D.2 of the MS4 Permit.

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

MS4 Permit §VII.K.x-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 City must provide these standards.
- Develop procedures and checklists to review and approve relevant construction plans.

These new and revised 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.

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

MS4 Permit §VII.K.vi, §VII.K.xi-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 revised 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 §VII.K.xii

The inspection frequency for construction sites one acre or more has significantly increased. The prior 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 revised 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.

REVISED IC/ID ENFORCEMENT AND WRITTEN PROGRAM PROCEDURES

MCM-ICID-1

MS4 Permit: §VII.2 , §VII.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 2001 MS4 Permit issued to Los Angeles County and is a new requirement for the City.
- Maintain written procedures for receiving complaints, conducting investigations and responding to spills.

These new and revised 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.

REVISED BMP REQUIREMENTS FOR FIXED FACILITY/FIELD ACTIVITIES

MCM-PAA-1

MS4 Permit §VII.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 revised measures will increase the effectiveness of the Public Agency Activities program.

REPRIORITIZATION OF CATCH BASINS AND CLEAN-OUT FREQUENCIES

MCM-PAA-2

MS4 Permit §VII.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 revised measures will increase the effectiveness of the Public Agency Activities program.

INTEGRATED PEST MANAGEMENT PROGRAM

MCM-PAA-3

MS4 Permit §VII.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.

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

MS4 Permit §VII.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 §VII.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 City will require dischargers that drain to their respective MS4s to implement the Nonstormwater Discharge (NSWD) Measures as defined in §IV.B of the MS4 Permit. If the City identifies 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 §IV.B and §VII.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 IV.B and VII.B (MRP IX) of the MS4 Permit introduce new provisions and program elements that address NSWDs. This section briefly describes these new and revised NSWD measures. A NSWD measure is considered new if it was not required by the prior MS4 Permit and is considered revised if it is a revision of a related provision of the prior MS4 Permit.

Table 3-2 from the previous section lists the new and revised nonstructural NSWD measures as well as MCMs. The correlation of WCM effectiveness with WQPs is based on Table 3-1. The following pages describe each of the listed measures. 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 §IV.B (MRP §IX)

The outfall screening and source investigation provisions of the MS4 Permit constitute a new, expansive addition to the City's stormwater management program. Implementing these new provisions will aid in the control of unauthorized nonstormwater discharges.

REVISED CONDITIONS FOR EXEMPT NONSTORMWATER DISCHARGES *NSWD-2*

MS4 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 MS4 Permit. Measures introduced include the following:

- Require the implementation of BMPs following established BMP manuals for discharges from non-emergency firefighting 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 revised provisions will aid in 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 City'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 City is a vital component of the WMP planning process.

The City has 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 City. 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 City.

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 AND LOS ANGELES RIVER ESTUARY TMDLS

The Los Angeles River TMDLs for trash, metals, nutrients, and bacteria and the majority of the Los Angeles River Estuary TMDL for bacteria are addressed in the WMP for the Lower Los Angeles River.

Direct drainage to the Queensway Bay area of the estuary is covered by this WMP. The watershed control measures described in this chapter and the corresponding compliance schedule described in Chapter 5 (and based on the RAA) address required wet weather pollutant load reductions in this area. To maintain consistency between the City's WMPs, the approach to dry weather bacteria will follow the existing compliance plan approved for the estuary in the Lower LA River WMP. This consists of the development and implementation of a Load Reduction Strategy (LRS). This milestones for the LRS are included in Chapter 5. Also see Section 3.4.1.4 for information on a low flow diversion scheduled for construction in the estuary within the MS4 Permit term.

3.4.1.2 LOS CERRITOS CHANNEL METALS TMDL

The Los Cerritos Channel Metals TMDL is addressed in the WMP for the Los Cerritos Channel.

3.4.1.3 SAN GABRIEL RIVER METALS TMDL

The San Gabriel River Metals TMDL was established on March 26, 2007 by the U.S. EPA. Specific to the Nearshore Watersheds, the San Gabriel River Estuary has a dry-weather TMDL for copper, with a waste-load allocation for 3.7 micrograms/L. Reach 1 of the San Gabriel River is addressed in the Lower San

Gabriel River WMP. According to the TMDL, there are indirect sources (such as upstream WRPs) and direct sources that contribute to the dry-weather TMDL pollutant loading. The direct sources are the two power plants that discharge into the Estuary. In fact the TMDL Staff Report states, "flow from the power plants is sufficient to displace all ocean water in the estuary."[3] Detailed information on the effect of the power plants as a pollutant source is provided in the Source Assessment Section of Chapter 2.

CONTROL MEASURES IDENTIFIED IN TMDLS/IMPLEMENTATION PLANS

The State Water Resources Control Board suggested that the City may attain WLAs assigned in the TMDL using any lawful means. Examples provided include pollution prevention, runoff reduction through LID or regional retention facilities, and/or tiered treatment control.[4]

3.4.1.4 LONG BEACH CITY BEACHES BACTERIA TMDL

The Long Beach City Beaches Bacteria TMDL was written in conjunction with the Los Angeles River Estuary TMDL. It was established by the U.S. EPA on March 26, 2012. The WLAs established in this TMDL are based on an allotment of exceedance days during three seasons (summer dry, winter dry, and winter wet).[5]

CONTROL MEASURES IDENTIFIED IN TMDLS/IMPLEMENTATION PLANS

Part of the area under the jurisdiction of this TMDL includes a dog-park zone. It is an unfenced stretch along the beach that does not require dogs to be on a leash. According to the source assessment (Chapter 2), the dog zone is considered a highly probable source of bacterial contamination. The U.S. EPA recommends that dogs be kept on leashes and enclosing the dog zone.[6]

It is worth noting that bacteria concentrations along the beach are impacted by *adjacent drainages*—a term defined in the TMDL as the Los Angeles River, San Gabriel River, and Alamitos Bay watersheds. The watershed management programs for these regions include control measures and implementation schedules to achieve bacteria water quality objectives.

PLANNED CONTROL MEASURES TO ADDRESS DRY WEATHER LOADING

The City understands that prompt actions are needed to meet the dry weather bacteria TMDL targets by 2019. When combined with reductions expected through the implementation of the planned area wide watershed control measures listed throughout this chapter, the following controls are expected to achieve the dry weather WLAs.

STRUCTURAL CONTROLS

Notably the City was awarded a Clean Beaches Initiative Grant to construct two vortex separators and three low flow diversions of storm drains discharging to San Pedro Beaches, which are expected to significantly decrease the concentrations of bacteria in dry weather. The structural controls were

[3] Page 39 of the San Gabriel River Metals TMDL Staff Report

[4] Amendment to the Water Quality Control Plan to Incorporate into the Implementation Plan for TMDL

[5] LA River Estuary and Long Beach City Beaches Bacteria TMDL

specifically chosen and located to address the TMDL. The Preliminary Funding Commitment for the grant states:

> The proposed structural BMPs will be constructed in the storm drain mains that discharge to the following beach outfalls:
>
> 1. Shoreline Ave at Golden Ave—construct 1 low flow diversion (LFD)
> 2. 9th Place south of Ocean—construct 1 LFD, 1 vortex separator system
> 3. Redondo Ave south of Ocean—construct 1 LFD, 1 vortex separator system
>
> These locations were selected based on the requirement of the TMDL mentioned above having highest levels of bacteria among the City's beach outfalls and the LA River Estuary. The previous outfalls selected were found to have Los Angeles County Flood Control District (LACFCD) storm drain mains upstream of the outfalls. These outfalls will be addressed in future projects with LACFCD. The finding of the LA County mainlines allow the project to address two outfalls on the San Pedro Bay Beach and an outfall at the LA River Estuary. These three outfalls are addressed in the TMDL mentioned above have a minimal change in the original estimated cost. [6]

A schedule for construction is included in Chapter 5. The low flow diversion at Shoreline Ave will be within the Los Angeles River Estuary. However, depending on wind and tidal influences (and wet weather events), direct discharges from the estuary can impact bacteria concentrations along the beaches.[7] As such the diversion is expected to reduce bacteria concentrations along the City beaches.

The City also is planning on applying for the seventh round of the Clean Beaches Initiative grant, with the goal of receiving adequate funding to construct additional LFDs at beach outfalls.

NONSTORMWATER OUTFALL SCREENING AND MONITORING

Following the provisions of the MS4 Permit Monitoring and Reporting Program, the Integrated Monitoring Program (see Chapter 8) includes a process to screen and monitor outfalls for nonstormwater discharges. The process will identify outfalls with significant nonstormwater flows. These outfalls will trigger source investigations. If it is determined that the discharges are comprised of either unknown or conditionally exempt non-essential discharges, or illicit discharges that cannot be abated, the outfall will be monitored.

Screening surveys are scheduled for completion in 2016. Source investigations for 25% of the outfalls with significant nonstormwater discharges are scheduled for completion by March 28, 2017, with 100% completed by March 28, 2019. Monitoring will commence within 90 days of completing the source investigations. These efforts will result in the identification and elimination of bacteria loading sources along the shoreline, which will in turn aid in the timely achievement of dry weather bacteria WLAs.

[6] Preliminary Funding Commitment, 2012
http://www.swrcb.ca.gov/water_issues/programs/beaches/cbi_projects/docs/pfc/24663_long_bch.pdf

[7] LA River Estuary and Long Beach City Beaches Bacteria TMDL, Page 21

3.4.1.5 COLORADO LAGOON TOXICS TMDL

Colorado Lagoon was 303(d)-listed as an impaired waterbody for sediment toxicity, PAHs, lead, and zinc in sediment; DDT, Dieldrin, and PCBs in fish tissue; and chlordane in fish tissue and sediment by the Regional Water Quality Control Board (RWQCB) in 2006. The Los Angeles RWQCB adopted Total Maximum Daily Load for Organochlorine (OC) Pesticides, Polychlorinated Biphenyls (PCBs), Sediment Toxicity, Polycyclic Aromatic Hydrocarbons (PAHs), and Metals for Colorado Lagoon (Colorado Lagoon Toxics TMDL) on October 1, 2009, and the TMDL went into effect on July 28, 2011.[8] The Colorado Lagoon TMDL establishes stormwater WLAs for organochlorine pesticides (chlordane: 0.5 micrograms/dry kg; dieldrin: 0.02 micrograms/dry kg; DDT: 0.71 microgram/dry kg), polychlorinated biphenyls (22.7 micrograms/ dry kg), sediment toxicity, polycyclic aromatic hydrocarbons (4,022 micrograms/dry kg), and metals (lead: 46,700 micrograms/dry kg; zinc: 150,000 micrograms/dry kg). TMDL compliance is required within 7 years from implementation (2018). A key element of the TMDL implementation plan is the City's proposed Colorado Lagoon Restoration Master Plan. The City is in the middle of carrying out the plan to improve habitat, water and sediment quality, and community interaction with the Lagoon.

CONTROL MEASURES AND IMPLEMENTATION

Table 3-4 summarizes the control measures listed in the TMDL Staff Report, as well as their current implementation status. This TMDL Implementation Strategy has been adapted by the City as the Colorado Lagoon Restoration Master Plan. The TMDL's Waste Load Allocation (WLA) limits were incorporated into the restoration design elements and detailed in the EIR (Draft Environmental Impact Report Colorado Lagoon Restoration Project, 2008). The stormwater diversion and source control elements of the restoration program have been completed with exception of the complete removal of contaminated sediment and the completion of the vegetated bioswale that captures flow from the adjacent golf course. Those source reduction measures will be completed in Phase 2. In addition, hydrologic analysis was prepared for the County of Los Angeles Termino Avenue Drain Project (TADP) EIR to characterize the existing conditions of the Lagoon and after implementation of the TADP. The hydrologic analysis included information on all the drains entering the Lagoon and Marine Stadium. Please see EIR for further information.

The City of Long Beach has implemented the actions as provided in Section 7 of the TMDL. In the Staff Report those implementation actions (scenarios) were put into the EFDC model to estimate the effectiveness of those actions in meeting the TMDL allocations. The water quality model results demonstrate that the implemented restoration scenarios would result in the attainment and maintenance of the sediment concentrations below the numeric targets after remedial dredging and connectivity to Marine Stadium is complete. See Section 4.5 for more information. Since the City is near completion of this implementation strategy, reasonable assurance of compliance at the Colorado Lagoon drainage area was not the focus of the RAA conducted for this WMP. If future monitoring suggests that the implementation strategy may not meet the TMDL allocations, the strategy will be modified accordingly through the adaptive management process.

[8] Colorado Lagoon Toxics TMDL

Table 3-4: Colorado Lagoon Restoration Master Plan Action Status

BMP Compliance Strategy	Status
Modification of the Termino Avenue Drain so that it no longer discharges into the Lagoon (one major drain system)	Completed December 2011
Diversion of low storm drain flows (three major drain systems)	Completed December 2010
Installation of trash separation devices (traps trash prior to entering the wet well) (three major drain systems)	Completed December 2010
Treatment of stormwater by vegetated bioswale (four local drains)	Partially completed December 2010; Remainder to be completed January 2016
Maintenance and cleansing of the tidal culvert that connects the Lagoon to Marine Stadium.	Completed in December 2010
Replacement of the concrete box culvert that connects the Lagoon to Marine Stadium with an open channel that would run from the Lagoon to Marine Stadium through Marina Vista Park	Anticipated completion January 2017
Removal of contaminated sediment in the Western Arm, Central Arm, and Northern Arm of the Lagoon.	Partially completed August 2012; Remainder to be completed January 2016

Total funds spent on mitigation efforts for Colorado Lagoon thus far are $35,171,484.[9] This does not include the proposed improvement of hydraulic connection between the Lagoon and Marine Stadium and re-grading shoreline to improve habitat quality. Further details of the implementation actions are as follows.

Modification of Termino Avenue drain

Modification of the Termino Drain included the removal of three existing City storm drains that outlet to the west side of Colorado Lagoon. This project includes construction of 15,250 of reinforced concrete and 117 catch basins to convey stormwater flow directly to Marine Stadium such that they bypass Colorado Lagoon. This project also included construction of a low-flow diversion system at Roswell Avenue between 7th and 8th Streets, which diverts dry weather flows into the sanitary sewer system. In addition, a number of structural BMPs to benefit water quality at Colorado Lagoon were implemented:

- 104 connector pipe screens,
- 92 automatic retractable screens
- 30 Abtech Filters (antimicrobial storm water treatment)

Low flow diversion and trash separation devices

The low-flow diversion was installed at 6th Street and Park Avenue. Trash separation devices were installed at 6th Street and Nieto Avenue, and 4th Street and Monrovia Avenue. The low flow diversion and the trash separation devices are part of the overall Colorado Lagoon Restoration Master Plan. The low flow diversion system diverts dry weather urban runoff into the sanitation system and prevents it from entering Colorado Lagoon.

Vegetated bioswale installation

[9] City of Long Beach, July 25, 2013, Biannual progress report for the Colorado Lagoon OC pesticides, PCB, sedimen toxicity, PAH, and metals total maximum daily loads. A letter for Samuel Unger prepared by Eric O. Lopez.

Vegetated bioswales have been created along Park Avenue in the vicinity of the Western Arm of the Lagoon to treat stormwater and dry weather runoff through natural filtration of sediment and pollutants prior to discharging into Colorado Lagoon. Flow from the remaining four local drains is treated through these bioswales prior to discharging into Colorado Lagoon. An additional bioswale will be created on the north and central shores of the site between Colorado Lagoon and the Recreational Park Golf Course to capture and treat surface runoff from the golf-course. The new bioswale will connect with the existing swale to provide a complete vegetated buffer between the golf course and the Lagoon with two discharge points into western and northern arms of the Lagoon.

CLEAN CULVERT, REPAIR TIDAL GATES, AND REMOVE SILL AND STRUCTURAL IMPEDANCES

To increase tidal range, tidal flushing and water circulation, and improve water and sediment quality, various cleaning and repair activities were conducted. The tidal culvert between Colorado Lagoon and Marine Stadium was cleaned and repaired, the trash racks were cleaned, the tidal gates were repaired, and the sill and structural impedances within and around the existing culvert were removed. This project is also part of the Colorado Lagoon Restoration Master Plan.

REMOVE CONTAMINATED SEDIMENT IN THE WESTERN ARM, CENTRAL BASIN, AND NORTHERN ARM OF THE LAGOON

Sediment remediation in the Lagoon was initiated under a phase 1 that including dredging approximately 72,000 cubic yards of contaminated material from the western, central and northern arms of the Lagoon. Sediment removal depths ranged from 3 to 10 feet through the Lagoon and the material disposed of offsite. By removing the sediment, a large source of contaminants to the water column was also removed, paving the way for improved habitat quality and water quality. Sediment removal during phase 1 was conducted using mechanical means which frequently results in a small percentage of material that falls back into the water and creates what is known as dredge residuals. A second removal effort is planned for Phase 2 where additional dredging and filling will occur within the Lagoon to improve surface sediment conditions and raise the bottom elevations to depths that will support improved habitat quality. Additionally, shoreline grading will occur to improve subtidal and intertidal habitat zones and allow for eelgrass to be planted as a mitigation measure for other construction projects within the City.

IMPROVE HYDRAULIC CONNECTION BETWEEN THE LAGOON AND THE MARINE STADIUM

This project is proposed to replace the existing concrete box culvert with an open channel that would run from Colorado Lagoon through Marina Vista Park to Marine Stadium in a location generally parallel to the existing culvert. This modification is anticipated to improve tidal flushing through an increase in tidal range, and water and sediment quality. Additionally, it would provide improved flood flow conveyance.

RE-GRADE SHORELINE TO IMPROVE HABITAT QUALITY

Restoration activities as part of Phase 2 construction will include re-grading the shoreline to convert upland habitat into intertidal mudflat and nearshore marsh zones. Soils removed during re-grading will be used to fill the northern arm and portions of the western arm to raise bottom elevations and allow eelgrass and other vegetation to be planted to create a mitigation bank for the City to use to compensate for unavoidable losses on other capital development projects.

Currently the following work is in development:

- Prospectus document to describe the proposed project and anticipated habitat improvements
- Regulatory approvals for the proposed construction activities
- Engineering design for the Phase 2 restoration activities

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 in the Dominguez Channel Estuary and Greater Los Angeles and Long Beach Harbor Waters.

CONTROL MEASURES AND IMPLEMENTATION

The TMDL Staff Report does not provide detail on potential control measures. However it does suggest a combined effort of remediation actions and stormwater controls in order to meet sediment targets.

In conjunction with the City of Signal Hill and the LACSD, the City 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

SUMMARY

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

As recognized in the MS4 Permit, the City has 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 IMP 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 3-5 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 3-5: 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 City 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 Chapter 4.

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 the 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 3-6 lists planned and potential nonstructural TCMs. The WCM effectiveness from Table 3-2 is based on similar ratings 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 3-6 describe each of the listed controls.

The responses 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.

- **E** *Existing TCM*. The TCM is a part of the City's existing program. Some of these measures are recent additions to the SWMP, others may have taken—or will take—several years to fully develop. For such measures it is assumed that their impact on water quality is not reflected in historical monitoring data, and as such contribute to the 10% non-modeled load reduction in the Reasonable Assurance Analysis (see Chapter 4 for more information).

- **W** *Watershed Group TCM*. The TCM is a part of wider Watershed Group effort with the agencies participating in the Lower Los Angeles River, Lower San Gabriel River, and Los Cerritos Channel WMPs.

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

Table 3-6: Nonstructural TCMs

#	WCM Category/ID	WCM	Effectiveness toward WQPs					Agency	
			Category I	Category II	Category III	Sediment reduction	Volume or flow reduction	City (Port Excluded)	Port
		Planning and Land Development							
1	TCM-PLD-1	Train staff/councils to facilitate LID and Green Streets implementation	◈	◈	◈	◈	◈	✗	✗
2	TCM-PLD-2	Ordinance requires LID BMPs for projects below MS4 Permit thresholds	◆	◆	◈	◆	◆	E	
		Existing Development							
3	TCM-ICF-1 (MCM-ICF-3)	Prioritize facilities/inspections based on water quality priorities	◈	◈	◈	◈	◈	✗	E
4	TCM-ICF-2 (WRAP LU-1)	Enhanced housekeeping BMPs at industrial facilities	◈	◈	◈	◈	◈		E
5	TCM-TSS-1	Exposed soil ordinance	◈	◈	◈	◆	◇	P	N/A
6	TCM-TSS-2	Erosion repair and slope stabilization on private property/vacant lots	◈	◈	◈	◆	◇	P	E
7	TCM-TSS-3	Private parking lot sweeping ordinance	◆	◆	◆	◆	◇	P	N/A
8	TCM-TSS-4 (WRAP LU-1)	Sweeping of private/tenant roads and parking lots	◆	◆	◆	◆	◇	P	E
9	TCM-TSS-5	Negotiations with regulated utilities for erosion control within R.O.W.	◈	◈	◈	◆	◇	W	
10	TCM-RET-1	Encourage retrofitting of downspouts (downspout disconnect)	◈	◈	◈	◈	◆	P	
		Dry weather runoff reduction							
11	TCM-NSWD-1	Incentives for irrigation reduction practices	◆	◆	◈	◆	◆	E	
		Public Information and Participation							
12	TCM-PIP-1 (WRAP LU-5)	Refocused outreach to target audiences and water quality priorities	◆	◆	◆	◆	◆	W	W
		Public Agency Activities							

Table 3-6: Nonstructural TCMs

#	WCM Category/ID	WCM	Effectiveness toward WQPs					Agency	
			Category I	Category II	Category III	Sediment reduction	Volume or flow reduction	City (Port Excluded)	Port
13	TCM-PAA-1 (WRAP LU-6)	Upgraded sweeping equipment (e.g. regenerative)	◆	◆	◆	◆	◇	✗	E
14	TCM-PAA-2	Adopt Sewer System Management Plan (SSMP)	◆	◆	◇	◇	◇	✗	✗
15	TCM-PAA-3 (WRAP LU-6)	Increased street sweeping frequency or routes	◆	◆	◆	◆	◇	E	✗
16	TCM-TSS-6 (WRAP LU-4)	Erosion repair and slope stabilization on public property and right of way	◈	◈	◈	◆	◇	✗	E
		Reporting/Adaptive Management							
17	TCM-MRP-1	Enhanced tracking through use of online GIS MS4 Permit database	◈	◈	◈	◈	◈	✗	✗
		Jurisdictional SW Management							
18	TCM-SWM-1	Prepare guidance documents to aid in implementation of MS4 Permit MCMs	◈	◈	◈	◈	◈	✗	✗
		Initiatives							
19	TCM-INI-1	Copper reduction through implementation of SB 346	◆	◆	◆	◇	◇	E	E
20	TCM-INI-2	Lead reduction through implementation of SB 757	◆	◆	◆	◇	◇	E	E
21	TCM-INI-3	Support zinc reduction in tires through safer consumer product regulations	◆	◆	◆	◇	◇	W	W
22	TCM-INI-4	Apply for grant funding for stormwater quality/capture projects	◆	◆	◈	◆	◆	✗	✗

◆ ◈ ◇ Respectively: Primary pollutant reduction, secondary pollutant reduction, pollutant not addressed.

TCM Targeted Control Measure.

✗ Planned TCM.

P Potential TCM.

E Existing TCM.

W TCM is a Watershed Group effort with the agencies participating in the Lower Los Angeles River, Los Cerritos Channel, and San Gabriel River WMPs.

ENHANCED TRACKING THROUGH USE OF AN 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 SWMPs (e.g. examine geospatial trends in IC/IDs, which could be used to strategically distribute public education materials) and WMP.
    - Assess the SWMPs and improve the annual reporting process.
    - Guide the adaptive management process through this assessment.

The City will implement 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 MS4 Permit Programs. The elements of the training follow the provisions listed in the MS4 Permit.
- Educate governing bodies in LID and Green Streets implementation (optional).

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.

The City has accomplished this measure with their current LID ordinance (adopted in 2010, amended in 2013), 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 §VII.G.4, §VII.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. This allows the City to concentrate efforts on WQPs. (The existing Port Industrial/Commercial Facilities Program is currently meeting or exceeding related MS4 Permit requirements, as described in Section 3.4.)

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

ENHANCED HOUSEKEEPING BMPS AT INDUSTRIAL FACILITIES

TCM-ICF-2 (WRAP LU-1)

This ongoing TCM is taken from the Port's 2009 WRAP (labeled LU-1 in the document). The control measure consists of requiring enhanced housekeeping controls at industrial facilities based on findings form the Port's inspections. Implementation began in 2009. Since then, the Port has required several industrial facilities to

- Increase sweeping frequencies and areas swept (with an emphasis on metal fabrication locations),
- Pressure wash surfaces with built-up oil, grease, and debris prior to the rainy season (with zero discharge allowed to the MS4).
- Cover trash cans and bins (a port-wide effort).

The program is ongoing and continues to be effective. Most recently in Winter 2014/2015, three facilities began zero-discharge pressure washing, one facility increased its sweeping frequency, and the initiative to cover trash bins port-wide neared completion. See the WRAP document and associated progress reports for additional information.

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 Lower San Gabriel River Watershed Group—of which the City is a Participating Agency—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 a similar ordinance within the City, and as such is included in Appendix A-3.2. Within the Lower Los Angeles River Watershed Group—of which the City is also a Participating Agency—the adjoining City of Signal Hill is currently developing a similar ordinance to address the considerable amount of exposed dirt within their jurisdiction. This ordinance may also be used as a template for the City.

The Port owns most of the property in the Port area, and as such has the ability to control erosion on vacant lots without the need for an ordinance. The Port's efforts to date in this regard are summarized in the description for TCM-TSS-6.

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 Group, the City of Whittier has successfully implemented an ordinance that conforms to TCM-TSS-1.

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 adjoining 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.

As a part of the Port's industrial facility inspection program, the Port sometimes requires increased sweeping of facility parking lots and other exposed areas. See TCM-ICF-2 "Enhanced housekeeping BMPs at industrial facilities" for additional information.

NEGOTIATIONS WITH REGULATED UTILITIES FOR EROSION CONTROL WITHIN R.O.W.

TCM-TSS-5

This TCM is an element of the TSS Reduction Strategy.

- Pursue agreements between cities and utilities regarding erosion and sediment control in rights-of-way.

The City 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 participating in this WMP, 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 (WRAP LU-4)

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. (Note that the Port owns most of the land in the Port area.)

This TCM is related to the Port's 2009 WRAP (labeled LU-4 in the document, entitled "Dust control at vacant sites"). The program was initiated prior to WRAP development in 2005, however the initial

implementation phase was not completed until 2012. The purpose of the program is to stabilize vacant lots to prevent soil loss. Stabilization is achieved through the application of a combination of controls, including hydroseeding, gravel, bioswales, erosion control mats, and improved catch basins. The following are pictures of some of the landscaped lots.

Navy Mole area

Pico Ave

The initial phase of the program was effective. Currently sixteen acres of vacant lots are covered by vegetation, not including those sites stabilized by other methods (e.g., erosion control mats). Without stabilization, stormwater would carry soil—as well as metals and organics adsorbed to the soil—to the MS4. As such the program addresses WQPs.

The program is ongoing. See the WRAP document and associated progress reports for additional information.

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.

The City is currently involved in this effort through the Metropolitan Water District's water conservation rebate program.

REFOCUSED OUTREACH TO TARGET AUDIENCES AND WQPS ***TCM-PIP-1 (WRAP LU-5)***

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-based effort with the Lower Los Angeles River, Los Cerritos Channel, and San Gabriel River Watershed Groups.

This TCM is related to the Port's 2009 WRAP (labeled LU-5 in the document, the Litter Control Program). Implementation of this control included a targeted outreach campaign to truckers, laborers, and terminal workers, consisting of banners in high visibility areas, messages on trash cans, and anti-litter signage in high litter generating areas. See the WRAP document and associated progress reports for additional information.

UPGRADED SWEEPING EQUIPMENT (E.G. REGENERATIVE) ***TCM-PAA-1 (WRAP LU-6)***

Measures:

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

On June 16, 2015, city council unanimously approved a resolution to purchase four CNG-powered Schwarze Model A7000 Regenerative Air Sweepers in an amount not to exceed $1,277,528. This measure is also related to the Port's 2009 WRAP (labeled LU-6 in the document). In 2013 the Port acquired a 2011 Tymco 600 regenerative sweeper. (The Port uses this sweeper in conjunction with a 2013 Elgin Pelican NP mechanical sweeper—the mechanical sweeper is used in locations not accessible to the regenerative sweeper and to collect larger debris.) The Port has committed to a 67% increase in the frequency of use of their existing regenerative sweeper. The compliance schedule for both of these measures is included in Chapter 5 and is within the current MS4 Permit term. See the WRAP document and its associated progress reports for additional information on sweeping measures within the Port.

Regenerative sweepers are designed to pick up dirt and fine particulates, to which organics and metals adhere. As such their use will address the City's WQPs.

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 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

INCREASED STREET SWEEPING FREQUENCY OR ROUTES ***TCM-PAA-3 (WRAP LU-6)***

Measure:

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

This TCM is related to the Port's 2009 WRAP (labeled LU-6 in the document). The Port has swept pubic parking lots (e.g., the Pier J fishing area) weekly since 2009. The streets are swept on average once a week, with variations based on traffic volume. As stated for the description of TCM-PAA-1, The Port has committed to a 67% increase in the frequency of use of their existing regenerative sweeper. The compliance schedule for this measure is included in Chapter 5 and is within the current MS4 Permit term. See the WRAP document and associated progress reports for additional information on sweeping measures.

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 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 SWMPs—which were required in the prior MS4 Permit and served as a guide to permit implementation—are now outdated. Unlike the prior SWMPs, the City is not bound to the guidance and forms provided. They are provided as a resource to improve program effectiveness.

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***

Measure:

- 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 is a primary source of zinc in urban areas.

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

Measure:

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

Currently the City is applying for grants related to their Municipal Urban Stormwater Treatment project as described in the Lower Los Angeles River WMP.

3.4.3 STRUCTURAL TARGETED CONTROL MEASURES

Structural Targeted Control Measures (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 City'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, 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 City'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.

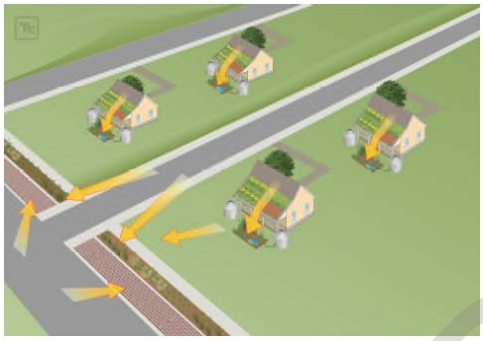

Figure 3-1: Distributed BMP Schematic

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[10].

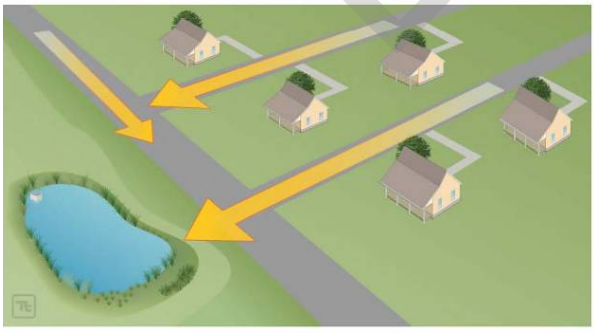

Figure 3-2: Regional BMP Schematic

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

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.

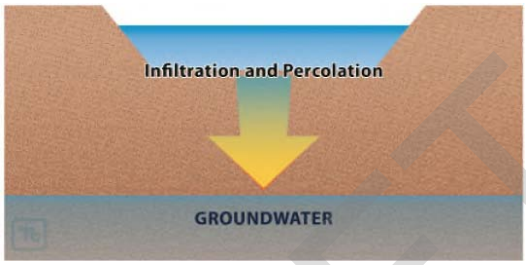

Figure 3-3: Infiltration BMP Schematic

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.

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.

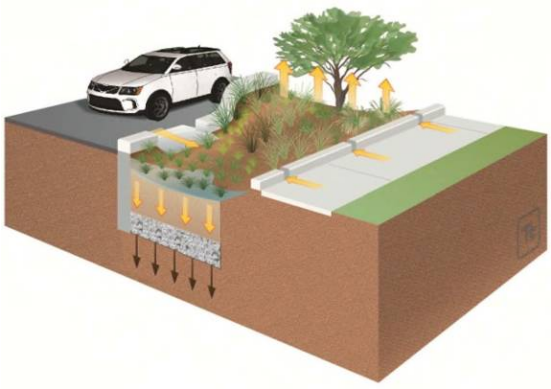

Figure 3-4: Bioretention without underdrain schematic

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.

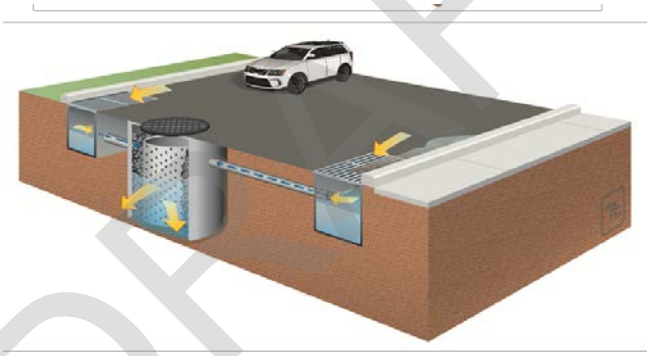

Figure 3-5: Drywell schematic

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.

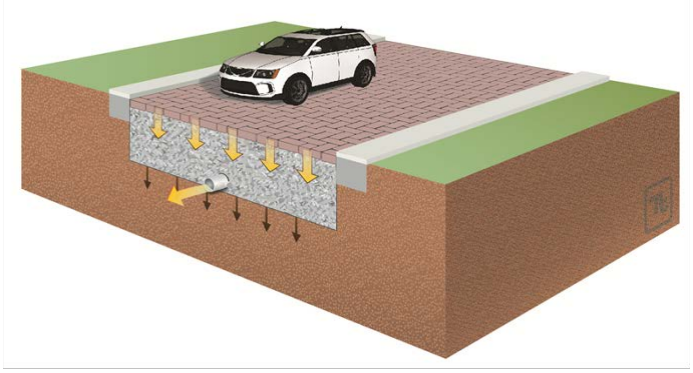

Figure 3-6: Porous pavement schematic

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.

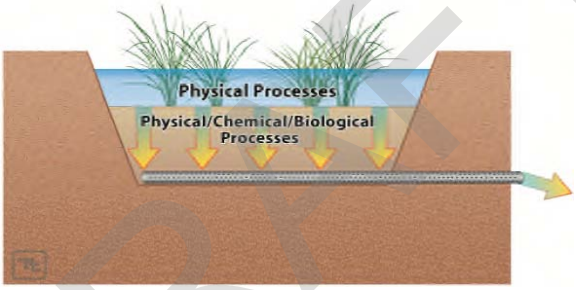

Figure 3-7: Biotreatment BMP schematic

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.

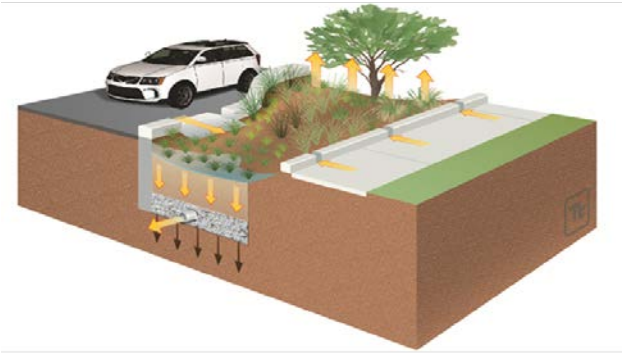

Figure 3-8: Bioretention with Underdrains schematic

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.

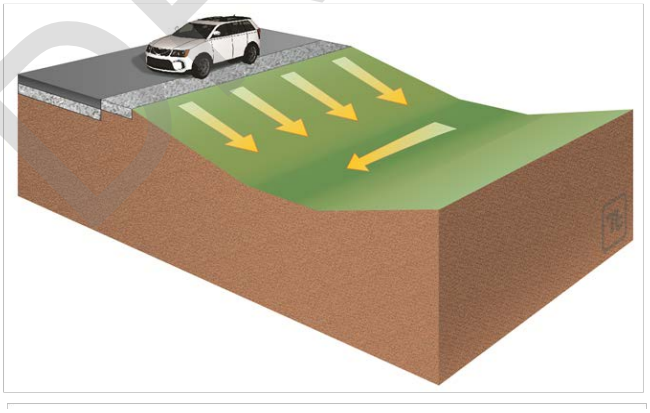

Figure 3-9: Vegetated swale schematic

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.

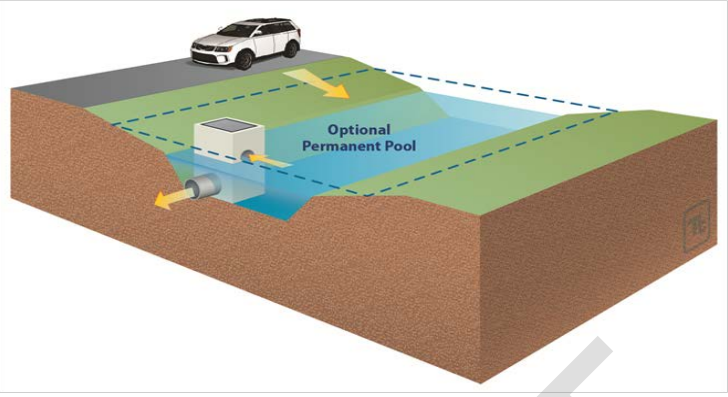

Figure 3-10: Wet detention basin schematic

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.

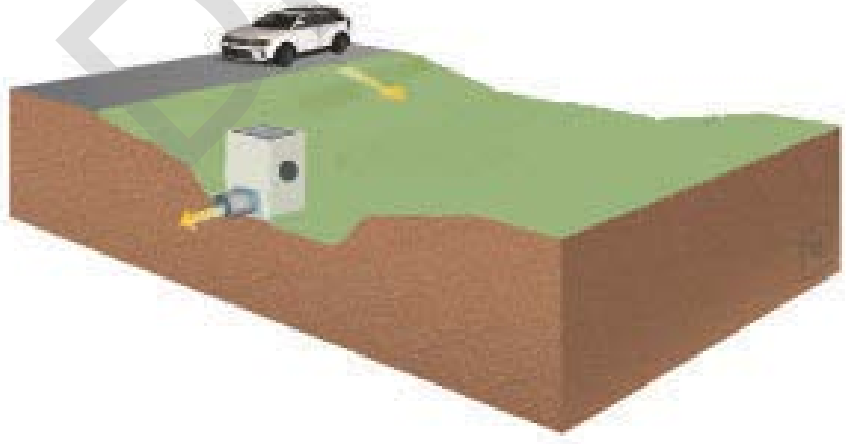

Figure 3-11: Dry extended detention basin schematic

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.

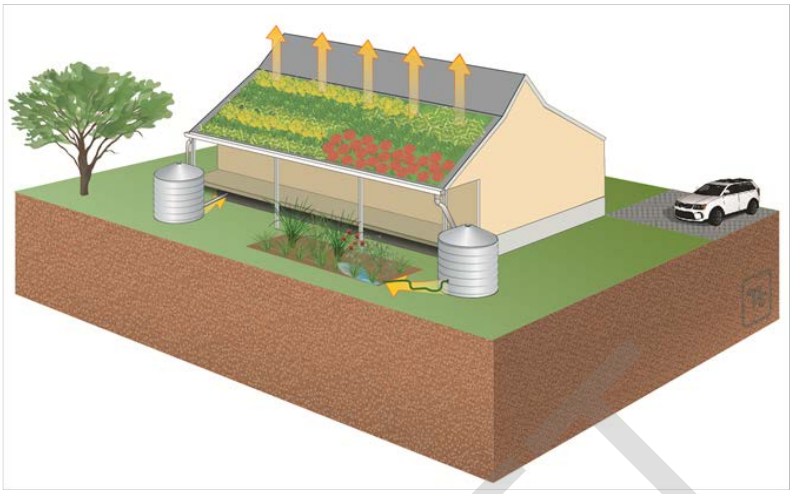

Figure 3-13: Above ground cisterns schematic

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).

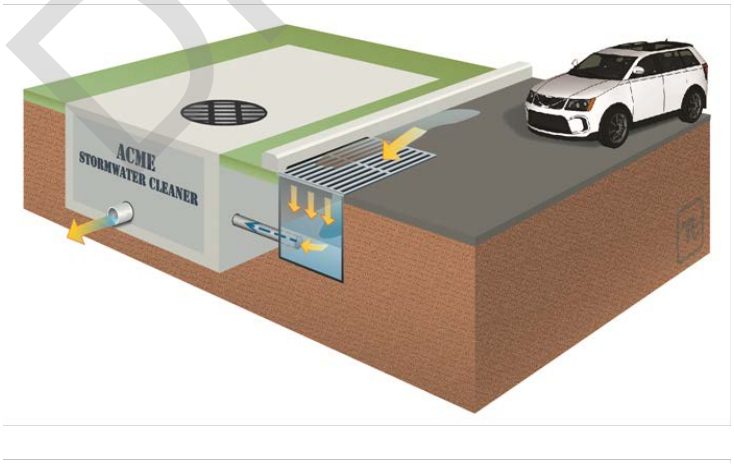

Figure 3-14: Underground detention schematic

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.

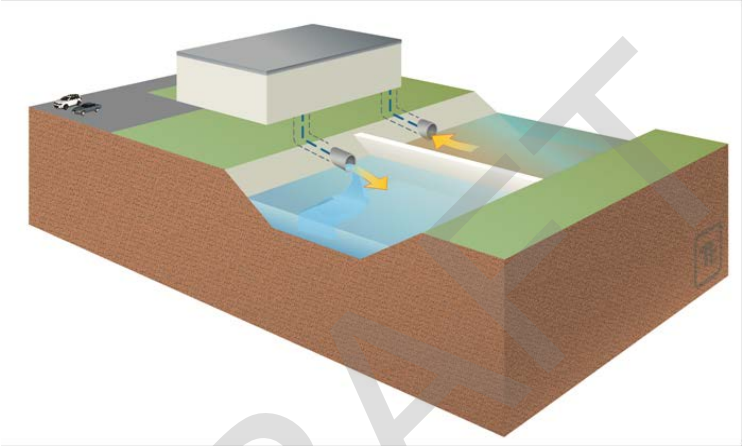

Figure 3-15: Low flow diversion schematic

3.4.3.2 EXISTING TARGETED STRUCTURAL BMPS

The existing structural BMPs in place within the WMP area, with the exception of the Low Flow Diversion project, have been included in the RAA model. Figure 3-16 indicates the locations of existing BMPs. Refer to Chapter 4 for more details.

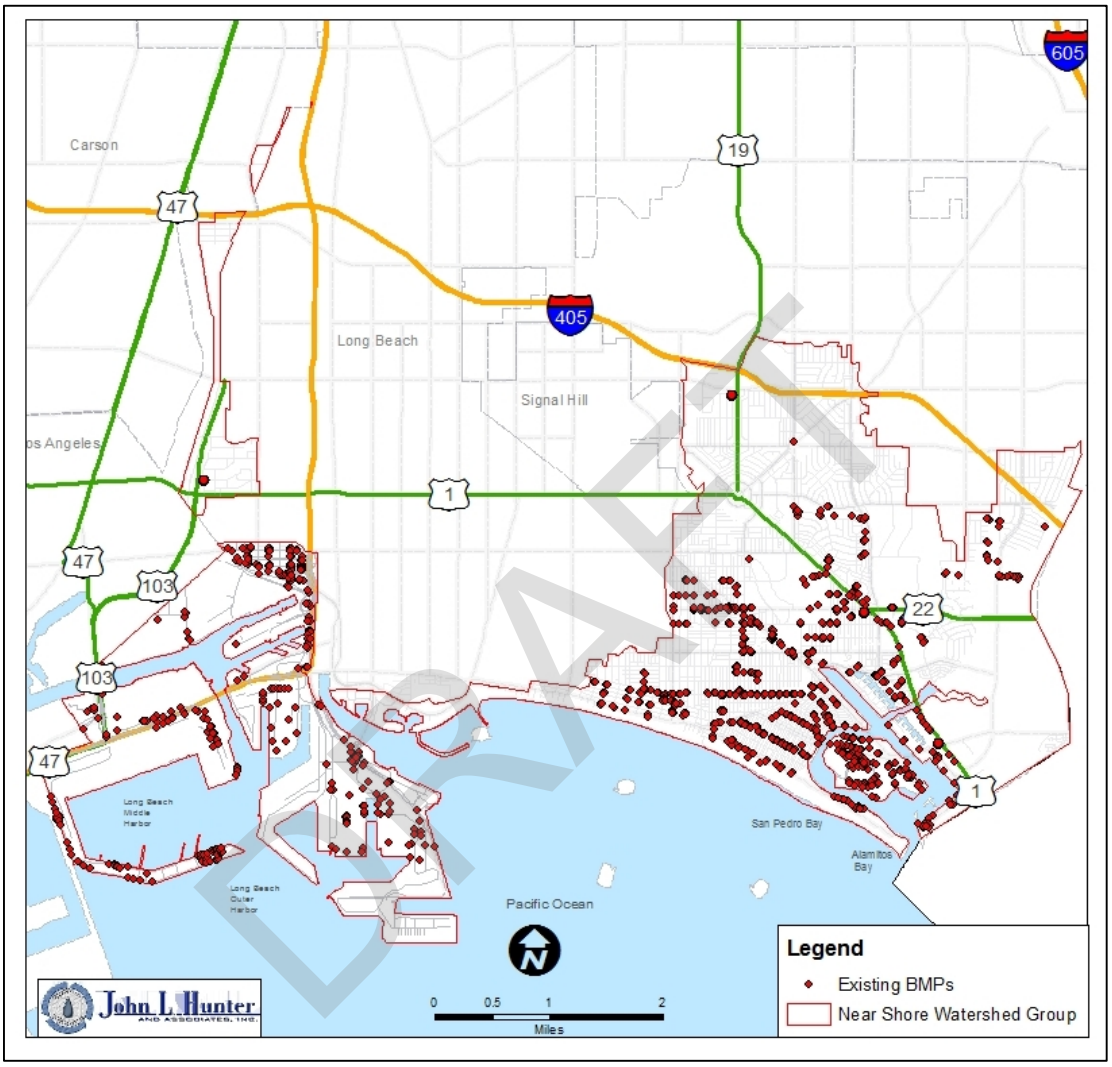

Figure 3-16: Locations of Existing Structural BMPs

LOW FLOW DIVERSIONS IN THE ALAMITOS BAY

These projects consisted of constructing low flow diversion systems to divert dry weather and low stormwater MS4 discharges directly into the sanitary collection main for eventual treatment by the Sanitation Districts of Los Angeles County. Specifically, nonstormwater flows and "first flush" storm low flows from the Appian Way and Belmont Pump Stations have been diverted and no longer drain into the Alamitos Bay. This has protected and enhanced water quality by reducing bacteria loads to target applicable limitations of the TMDL.

STRUCTURAL BMPS AT EXISTING PORT FACILITIES (DISTRIBUTED THROUGHOUT THE PORT)

This ongoing TCM is taken from the Port's 2009 WRAP (labeled LU-3 in the document). When nonstructural control measure TCM-ICF-2 proves inadequate at Port industrial facilities, structural controls are evaluated. Structural controls include, but are not limited to CDS® (hydrodynamic treatment) units, automatic retractable screens (ARS), biofilters, berms, covers (e.g., awnings), sewer diversions (e.g., from wash areas), and drain capping.

To date, this effort has resulted in the installation of approximately 150 unique structural controls since WRAP adoption (2009), including:

- 118 ARS systems installed throughout the Port's right-of-ways,
- 33 CDS® units installed throughout the Port area, with additional installations planned,
- Several awnings built by Port tenants to cover hazardous materials stored outdoors,
- The installation of bioswales and Filterra® systems on Anaheim Street.

The program remains active—currently the Port plans to install additional CDS® units. See the WRAP document and associated progress reports for additional information.

3.4.3.3 PLANNED TARGETED CONTROL MEASURES

The project listed below has been planned to some extent by the City. A literature review was conducted of existing TMDL Implementation Plans, the existing IRWMP, and other planning documents to collect data.

CONSTRUCT BIOSWALES/LANDSCAPING IN VARIOUS LOCATIONS

This project will construct and/or reconstruct new and existing medians within the City 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. This project has been discussed in detail with the Gateway Water Management Authority (GWMA) and is likely to be implemented once the required funding is acquired. Further details about this project can be found in the Gateway IRWMP document.

INSTALL VORTEX SEPARATORS AND CONSTRUCT LOW FLOW DIVERSIONS

The City was recently awarded a grant to install two vortex separators and construct three low flow diversions of storm drains discharging to San Pedro Beaches, which are expected to reduce the dry weather loading of bacteria. The City also plans to pursue additional grants to install additional low flow diversions. As this project addresses the Bacteria TMDL, it is described in detail in Section 3.4.1.4.

STRUCTURAL BMPS AT EXISTING PORT FACILITIES (DISTRIBUTED THROUGHOUT THE PORT)

As described in the previous section, the Port plans to install additional Continuous Deflection Separation® units within the current MS4 Permit term. This includes 12 CDS units through the redevelopment of the middle harbor, and 2 infiltration trenches, 5 biofiltration swales, and 1 media filter through the redevelopment of the Gerald Desmond Bridge. The compliance schedule is provided in Section 5.7.

TRASH AMENDMENT COMPLIANCE PROJECT IN THE PORT

Beyond structural controls installed for new developments and redevelopments in the Port (see Section 5.7), the City is planning to install, operate, and maintain additional CDS units or other full capture equivalent devices within the Harbor District in order to comply with the Statewide Trash Amendments. Independent of the compliance track the City will choose to implement to comply with the amendments, the Harbor District is planning on a Track 1 approach. This approach will consist of installing the necessary number of CDS units or other full capture equivalent devices in applicable priority land uses (i.e., industrial). The compliance schedule will include interim milestones (such as an average of 10% of the CDS units or equivalent full capture devices installed every year).

In addition to trash reduction, this project will also address the Dominguez Channel and Greater Los Angeles and Long Beach Greater Harbor Waters TMDL for Toxics. CDS units are designed to capture total suspended solids (TSS) and other sedimentitious materials as well as trash. As stated in to the Toxics TMDL, TSS is a major vehicle for toxics and metals to enter the waterways. By capturing TSS the devices will also be capturing toxics and metals, thereby contributing to the achievement of the necessary Toxic TMDL load reductions.

STRUCTURAL CONTROLS IN THE COLORADO LAGOON

Section 3.4.1.5 describes structural control measures in the Colorado Lagoon drainage area that are planned for construction within the MS4 Permit term.

3.4.3.4 POTENTIAL SITES FOR FUTURE TARGETED CONTROL MEASURES

A preliminary assessment has been performed for the Near-Shore 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)[11] 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

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

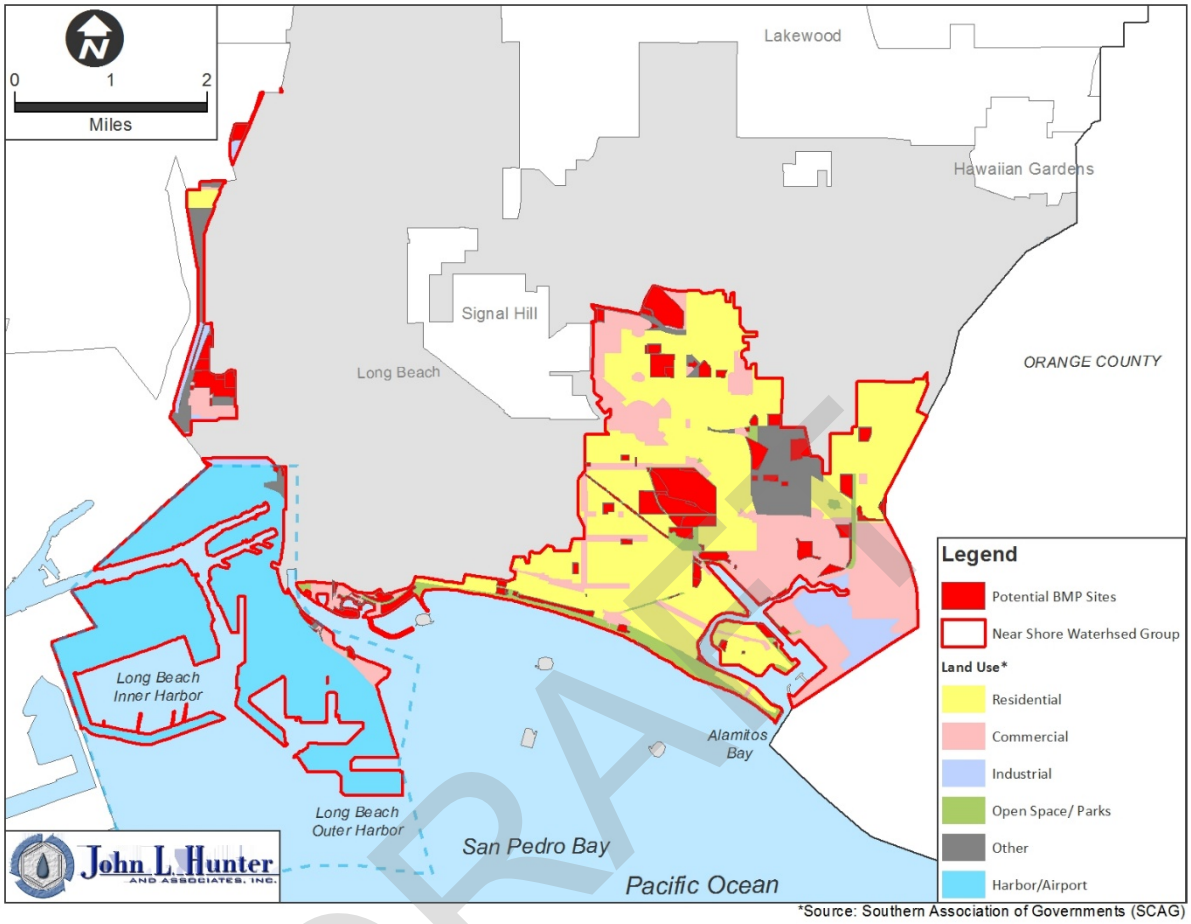

Figure 3-17: Potential Sites for Future Structural BMPs

Figure 3-17 and Table 3-7 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 listed in order by land use. A full list of both potential Regional BMP project sites and potential locations for LID on public parcels is located in Appendix 3-4. The land use with the highest accessibility is listed first. Within each land use designation, the sites have been listed from largest to smallest. 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[12]: 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[13]: 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 City. 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

[12] 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.
[13] 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.

- Water supply benefits
- Recreational use
- Multi-agency benefits
- 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[14]
- 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

[14] 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 3-7: **P**otential **Regional** BMP **S**ite **L**ist

Land Use Designation	Site Name	Site Address	Latitude	Longitude	**Subwatershed** RAA ID #	Approximate Site Area (Acres) [15]	Calculated Max Tributary Area ($A_{TRIBUTARY}$, Acres)	Max Design Capture Volume (DCV, Ac-ft)
Open Space & Recreation	Recreation Park	4900 E. 7th St.	33.778	-118.136	Colorado Lagoon	58.43	850	70.12
	Stearns Champions Park	4520 E. 23rd St.	33.798	-118.139	550248	31.20	454	37.45
	E.B. Japanese Garden	1250 Bellflower Blvd.	33.785	-118.121	550148	26.16	380	31.39
	Marina Green	386 E. Shoreline Dr.	33.762	-118.186	800448	18.55	270	22.26
	Bluff Park	E. Ocean Blvd.	33.762	-118.157	553248	18.52	269	22.23
	Marina Vista	5355 Eliot St.	33.769	-118.129	549548	17.56	255	21.07
	Rainbow Lagoon Park	Pine Ave/Shoreline Dr	33.763	-118.189	800448	11.58	168	13.90
	Admiral Kidd Park	2125 Santa Fe Ave.	33.796	-118.217	200248	11.45	167	13.74
	Open space	Aquarium Way	33.760	-118.196	800548	10.67	155	12.80
	Open space	2335 Webster Ave.	33.798	-118.222	200248	9.95	145	11.94
	Rainbow Harbor Esplanade	Pine Ave.	33.762	-118.194	800548	8.22	120	9.87
	Marine Park	5839 Appian Way	33.758	-118.120	800148	7.85	114	9.42
	Park	4900 E. 7th St.	33.775	-118.136	Colorado Lagoon	7.43	108	8.91
	Open space	590 Queensway Dr.	33.760	-118.203	801699	5.79	84	6.95
	Open space	6201 2nd St.	33.758	-118.117	549548	5.24	76	6.29
	Open space	Palo Verde Ave.	33.771	-118.104	549948	5.15	75	6.18
	Belmont Pool Complex	4000 Olympic Ave.	33.758	-118.145	800248	4.66	68	5.59
	Harry Bridges Memorial Park	1126 Queens Hwy.	33.754	-118.195	801699	4.64	67	5.56
	Los Altos Park	5481 Stearns St.	33.797	-118.128	550148	4.63	67	5.55
	Whaley Park	5620 Atherton St.	33.790	-118.122	550148	4.50	65	5.40
	Bixby Park	130 Cherry Ave.	33.764	-118.167	800348	4.43	64	5.32
	Jack Nichol Park	E. Pacific Coast Hwy.	33.763	-118.117	549548	3.04	44	3.65

[15] 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 3-7: **P**otential **Regional** BMP **S**ite **L**ist

Land Use Designation	Site Name	Site Address	Latitude	Longitude	**Subwatershed** RAA ID #	Approximate Site Area (Acres) [15]	Calculated Max Tributary Area ($A_{TRIBUTARY}$, Acres)	Max Design Capture Volume (DCV, Ac-ft)
Open Space & Recreation	College Estates Park	Stevely Ave.	33.777	-118.099	549948	2.25	33	2.70
	Dog Beach	E. Ocean Blvd.	33.756	-118.142	800248	1.95	28	2.34
	Park	5201 E. 7th St.	33.777	-118.133	Colorado Lagoon	1.83	27	2.20
	Will Rogers Park	Appian Wy/Nieto Ave	33.768	-118.132	549548	1.77	26	2.12
	Bayshore Playground	5415 E. Ocean Blvd.	33.753	-118.132	553448	1.75	26	2.10
	Jack Dunster Marine Reserve	Boathouse Ln.	33.762	-118.119	549548	1.33	19	1.59
	Open space	2300 E. Ocean Ave.	33.763	-118.165	800348	1.27	19	1.53
	Open space	E. 4th St. and Park Ave.	33.778	-118.147	Colorado Lagoon	11.84	172	1.00
	Open Space by Aquarium	Aquarium Way/ Rainbow Harbor	33.762	-118.197	800548	0.81	12	0.97
	Marine Stadium	2nd St/Appian Way	33.768	-118.126	549548	0.80	12	0.96
	Park	4900 E. 7th St.	33.782	-118.141	Colorado Lagoon	0.69	10	0.83
	Open space	Ravenna Dr/Corinthian	33.755	-118.124	800148	0.37	5	0.45
	Open space	5437 E. Ocean Blvd.	33.753	-118.131	553448	0.26	4	0.31
Educational Use	High School	Excluded for privacy			200248	45.75	665	54.90
	High School	Excluded for privacy			Colorado Lagoon	39.24	571	47.09
	University	Excluded for privacy			550148	26.02	379	31.23
	Middle School	Excluded for privacy			550148	16.97	247	20.37
	Middle School	Excluded for privacy			200448	13.65	198	16.37
	Elementary School	Excluded for privacy			200248	13.18	192	15.81
	Elementary School	Excluded for privacy			550148	11.06	161	13.27
	Elementary School	Excluded for privacy			550048	10.48	152	12.58
	Elementary School	Excluded for privacy			549948	10.38	151	12.45
	Elementary School	Excluded for privacy			550148	10.20	148	12.24
	Middle School	Excluded for privacy			549548	8.15	119	9.78
	Elementary School	Excluded for privacy			550248	7.86	114	9.43

Table 3-7: **P**otential **Regional** BMP **S**ite **L**ist

Land Use Designation	Site Name	Site Address	Latitude	Longitude	**Subwatershed** RAA ID #	Approximate Site Area (Acres) [15]	Calculated Max Tributary Area ($A_{TRIBUTARY}$, Acres)	Max Design Capture Volume (DCV, Ac-ft)
Educational Use	High School	Excluded for privacy			Colorado Lagoon	7.74	113	9.29
	Middle School	Excluded for privacy			Colorado Lagoon	7.06	103	8.47
	Middle School	Excluded for privacy			550248	6.55	95	7.86
	High School	Excluded for privacy			550248	5.39	78	6.47
	Elementary School	Excluded for privacy			800148	4.38	64	5.25
	Elementary School	Excluded for privacy			553248	3.73	54	4.48
	Elementary School	Excluded for privacy			Colorado Lagoon	3.73	54	4.47
	Elementary School	Excluded for privacy			549548	3.67	53	4.41
	Elementary School	Excluded for privacy			Colorado Lagoon	3.07	45	3.68
	High School	Excluded for privacy			200248	2.97	43	3.56
	Elementary School	Excluded for privacy			550248	2.86	42	3.44
	High School	Excluded for privacy			Colorado Lagoon	2.40	35	2.87
	University	Excluded for privacy			550148	2.16	31	2.60
	Elementary School	Excluded for privacy			550248	1.10	16	1.32
	Elementary School	Excluded for privacy			200248	1.02	15	1.22
	High School	Excluded for privacy			Colorado Lagoon	0.95	14	1.14
	Elementary School	Excluded for privacy			550148	0.94	14	1.13
	Middle School	Excluded for privacy			Colorado Lagoon	0.72	10	0.86
Golf Courses	Golf Course	Excluded for privacy			Colorado Lagoon	117.18	1,704	140.61
	Golf Course	Excluded for privacy			549948	19.53	284	23.44
	Golf Course	Excluded for privacy			549548	14.51	211	17.42

ADDITIONAL SPECIFICITY FOR POTENTIAL REGIONAL BMP PROJECTS

To assist in the initial consideration of potential Regional BMPs, additional information for the projects in Table 3-7 is included in Appendix A-3-4. The sites are organized by the RAA subwatershed ID they are located in (along with the corresponding target BMP capacity for that subwatershed) as well as their limiting Toxics TMDL. The list indicates that there is sufficient BMP capacity to meet final milestones. It is important to note that a comprehensive compliance plan to implement these projects is described in Chapter 5.

POTENTIAL PUBLIC LID SITES

The RAA indicates that the interim 2024 load reduction milestone could be achieved through the implementation of LID on public parcels. That is, to meet this milestone it is not necessarily required that retrofitted public parcels serve as "regional" BMPs. To assist in the consideration of these potential Public LID projects, a complete list of sites is included in Appendix A-3-4. The sites are organized by the RAA subwatershed ID they are located in (along with the corresponding target BMP capacity for that subwatershed) as well as their limiting Toxics TMDL. The comprehensive compliance plan to implement these projects is described in Chapter 5.

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 (ROW). These BMPs are designed to reduce the volume of stormwater discharge into the MS4 and treat stormwater runoff from adjacent streets and developments. Implementing BMPs in the ROW provides an opportunity to meet water quality goals and avoid the cost of land acquisition by locating BMPs in areas owned or controlled by a municipality. Common right-of-way BMPs include bioretention, biofiltration, and permeable pavement.

Figure 3-18: Right-of-way BMP schematic

Not all publically owned land is suited for BMP retrofits; therefore, screening is required to eliminate areas where BMP retrofits are impractical or infeasible due to physical constraints. While BMP retrofits can be implemented in a variety of settings, the local physical characteristics such as road type, topography, and depth to groundwater can significantly influence the practicality of designing and constructing these features. A screening protocol was established to identify realistic opportunities for retrofits based on the best available GIS data. The opportunities identified during this process provide the foundation for future engineering analysis to determine the volume of stormwater that can be treated by public BMP retrofits in the watershed.

In addition to the screening of road types, opportunities were further screened to remove segments that have steep slopes. Streets with grades steeper than 10 percent can present engineering challenges that substantially reduce the cost effectiveness of the BMP retrofit opportunity. From the available slope information, roads with slopes less than 10 percent were considered as retrofit opportunities.

Figure 3-19 shows the potential roads available for retrofit (highlighted in green) versus all of the roads within the study area. A majority of roads and alley—approximately 224 miles—were identified as potential green street retrofits; the actual required length of green streets to meet the water quality targets will be determined during the Reasonable Assurance Analysis. It should be noted that due to the coarse nature of the road classification data, only freeways, highways, and major roads that were deemed infeasible for retrofit were eliminated in the classification screening process. Additional studies will be necessary to further refine the road classification data to more accurately identify roads suitable for ROW BMP retrofits.

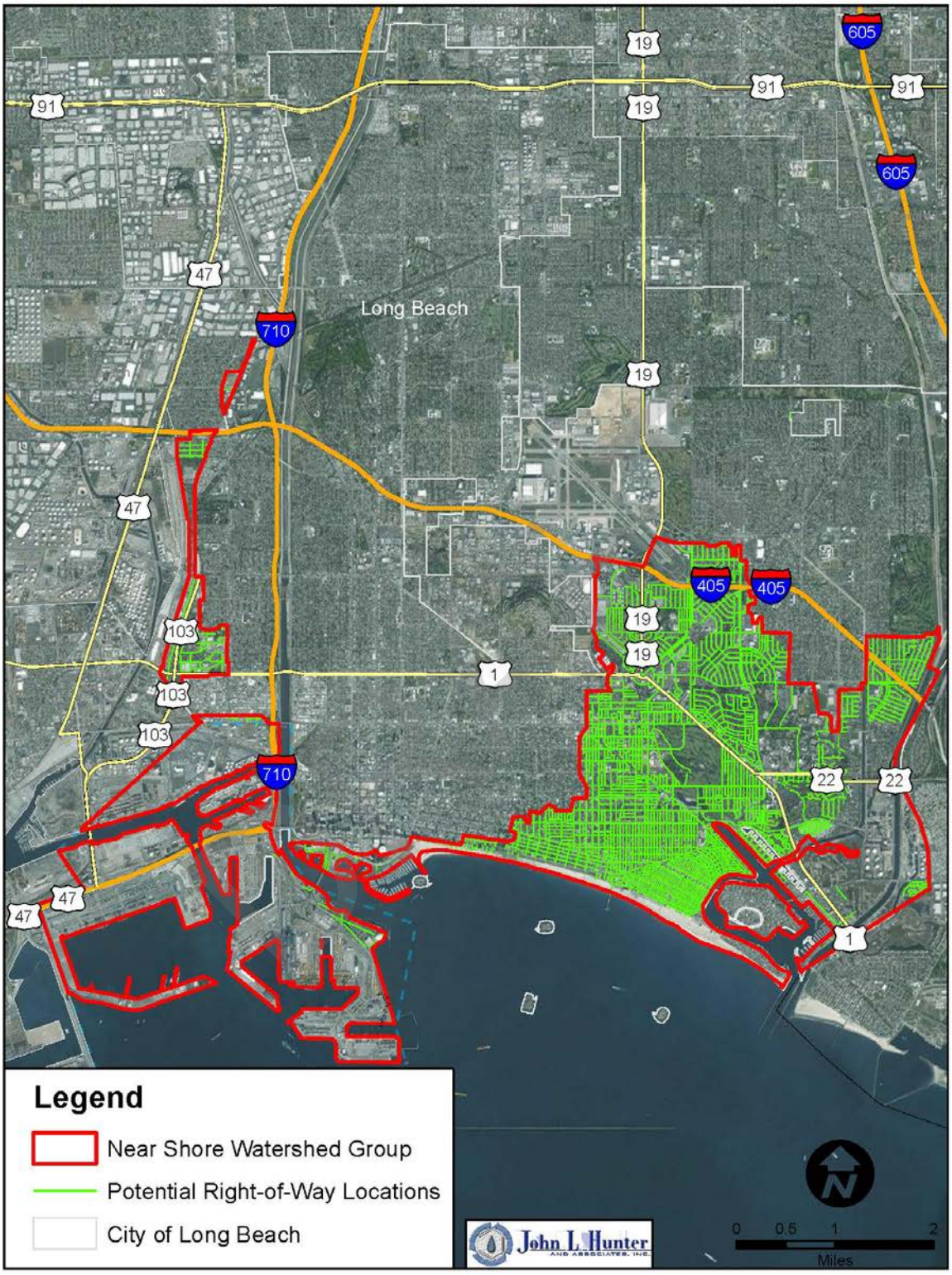

Figure 3-19: Areas potentially available for right-of-way BMPs

4 REASONABLE ASSURANCE ANALYSIS

4.1 EXECUTIVE SUMMARY

A required element of 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 MS4 Permit 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 during 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 the City 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 the City 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 in Section 5.3.1 of the RAA (Appendix 4-1). Over the entire Nearshore Watershed, the RAA projects a need for structural controls to be sized to capture and or treat 348.4 acre-feet.

4.2 REASONABLE ASSURANCE ANALYSIS

The Reasonable Assurance Analysis for the Nearshore 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 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 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 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

[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 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 City 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 reduction of irrigation water utilized in the RAA is considered reasonable and conservative. Following the adaptive management process, the City will evaluate these assumptions through 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 City 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 2014 MS4 Permit (Sections 3.2.3 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). 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 simplified 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 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. Extrapolating to the Nearshore Watershed,

$$M_{TSS} = fWA = (0.005 \cdot 10{,}739\ acres)\left(5.76\ \frac{tons}{acre\ year}\right)$$
$$M_{TSS} = 54\ acres\left(5.76\ \frac{tons}{acre\ year}\right)$$
$$M_{TSS} \approx 310\ \frac{tons}{year}$$

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

$$M_{Zn} \approx \left(\frac{1.8}{1{,}000}\right)M_{TSS}$$
$$M_{Zn} \approx \left(\frac{1.8}{1{,}000}\right)\left(310\ \frac{tons}{year}\right)\left(\frac{2{,}000\ lbs}{1\ ton}\right)$$

[6] http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml

$$M_{Zn} \approx 1{,}100\ \frac{lbs}{year}\ or\ 500\ \frac{kg}{year}.$$

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.

4.4 CATEGORY 2 AND 3 POLLUTANTS

The following section provides additional specificity to the RAA's limiting pollutant approach by addressing the achievement of water quality objectives for the nearshore watersheds' Category 2 and 3 pollutants as listed in Table 2-22 in Chapter 2. It is important to note that compliance plans for individual Category 2 and 3 pollutants may be refined through the adaptive management process. For example, if IMP monitoring indicates that the scheduled control measures in the WMP do not effectively address exceedances for a given pollutant, the WMP will be revised to incorporate modified scheduled strategies and watershed control measures designed to address the exceedances as soon as possible.

The RAA conducted in the nearshore watersheds regions predicts that the treatment capacity needed to achieve zinc TMDL load reduction milestones will result in the achievement of numeric targets for other metals and toxics, including copper, lead, DDT, PCBs, and PAHs. Thus Category 2 and 3 listings for these metals and toxics are accounted for in the RAA by meeting the required treatment capacity for zinc through the methods and timelines described in Chapters 3 and 5.

Other Category 2 toxics include pyrene, mercury, and chlordane. As a PAH in the Inner and Outer Harbor, pyrene is addressed by the Harbor Toxics TMDL, and as such is accounted for in the RAA. The argument is made in Section 2.3 that mercury exceedances triggered the 303(d) listing policy due to the 2009 Station Fire, and as such for compliance purposes is considered a medium priority as described below. Chlordane is a banned organochloride insecticide closely related to DDT. By addressing DDT through the RAA's limiting pollutant approach, chlordane will also be addressed.

Ammonia is a Category 2 pollutant in the Dominguez Channel Estuary due to its 2010 303(d), although the Federal EPA determined in 1999 the constituent was meeting water quality objectives, and the State may consider delisting it in the next 305(b)/303(d) Integrated Report. As such it is expected that monitoring of ammonia will indicate compliance with water quality objectives. If monitoring indicates otherwise, WMP control measures will be revised to address ammonia exceedances, with a compliance schedule set to achieve the objectives as soon as possible.

Dioxin and Nickel are Category 2 pollutants in the San Gabriel River Estuary. However, both pollutants have not exceeded water quality objectives within the last five years. This is also true for San Gabriel River Estuary Category 3 pollutants lead, zinc, arsenic, and selenium. Similar to Ammonia in the Dominguez Channel Estuary it is expected that monitoring of these pollutants will indicate compliance with water quality objectives. If monitoring indicates otherwise, WMP control measures will be revised accordingly, with a compliance schedule set to achieve the objectives as soon as possible.

Category 3 pollutants by definition have a frequency of exceedances below the 303(d) listing criteria. As such, for category 3 metal and toxic pollutants, it is expected that the aggressive compliance schedule in place to meet zinc load reductions throughout the nearshore watersheds will result in accelerated achievement of their respective water quality objectives. Category 3 metals and toxics include chromium, silver, nickel, thallium, mercury, chrysene, malathion, toxaphene, DEHP, and DDD.

The RAA also predicts that, within the Beaches and Los Angeles Estuary Bacteria TMDL drainage area, a comparatively minor additional treatment capacity would be necessary to meet wet weather bacteria reductions in 2037—five years after the final compliance date for the Toxics TMDL. This outcome is generalized to wet weather bacteria in the Dominguez Channel Estuary, Inner Harbor, and Alamitos Bay subwatersheds: Targeting the treatment capacity for zinc through the control measures and schedules provided in Chapters 3 and 5 will also target the treatment capacity for bacteria.

For dry weather bacteria in Alamitos Bay, low flow diversions have been installed recently at the Appian Way and Belmont Pump Stations. These LFDs divert nonstormwater flows from Alamitos Bay and into the sanitary sewer. As stated on page 96 of the Colorado Lagoon Toxics TMDL Staff Report, the existing Implementation Schedule for the lagoon was designed to consider the potential development of a Bacteria TMDL. As such, an accelerated compliance schedule for bacteria in the lagoon is in place. Category 2 and 3 listings for dry weather bacteria will also be addressed by the outfall screening program in the IMP. The program will help detect and eliminate dry weather flows that may be contributing to bacteria loading. As noted previously, if IMP monitoring indicates that these efforts do not result in the achievement of water quality objectives, WMP control measures will be revised accordingly, with a compliance schedule set to achieve the objectives as soon as possible.

4.5 COLORADO LAGOON

The Colorado Lagoon TMDL as adopted by the California Regional Water Quality Control Board, Los Angeles Region on October 1, 2009, includes an implementation plan. The City is near completion of this plan, which consists of the relocation of the Termino Drain (completed 12/2011), diversion of low storm drain flows (completed 12/2010), installation of trash separation devices (completed 12/2010), installation of vegetated bioswales (partially completed 12/2010, remainder scheduled for 1/2016), cleansing of the tidal culvert to Marine Stadium (completed 12/2010), replacement of the box culvert to Marine Stadium with an open channel (anticipated 1/2017), and removal of contaminated sediment (partially completed 8/2012, remainder scheduled for 1/2016). The plan is scheduled for completion prior to the final deadline of July 28, 2018. (See Section 3.4.1.5 for additional information on the implementation plan and Section 5.5 for the Compliance Schedule.)

After summarizing these implementation plan actions, the adopted TMDL states that, “implementation of the proposed actions should result in attainment of the TMDL allocations.” This assertion is based on a rigorous modeling analysis conducted as part of the TMDL development process. The technical details of the analysis are included in Chapter 9 of the TMDL Staff Report, “Evaluation of Implementation Plan and Allocations”. In short, the Environmental Fluid Dynamics Code (EFDC), which was selected to model the listed pollutants in the Colorado Lagoon, was also used to model the effects of the implementation plan.

In the concluding section on page 82, the Staff Report states: “Comparing the annual loads from proposed restoration scenarios, the annual loadings into Colorado Lagoon for the proposed scenarios are within the loading capacity (TMDL).”

As such, in place of discussing the estimated required reductions, proposed BMPs, and pollutant reduction milestones to achieve required final mass based WQBELs in Section 5 through 8 of the RAA, the introduction to the RAA refers to the existing modeling analysis conducted in conjunction with the TMDL development. Specifically, Chapter 9 of the Staff Report includes the estimated required pollutant reductions to achieve the final mass based WQBELs and demonstrates achievement of the final mass based WQBELs; the adopted TMDL reiterates the proposed implementation plan and its predicted effectiveness; and Sections 3 and 5 of the WMP describes the status of achieving the associated plan’s milestones (and thus the final mass based WQBELs).

The adopted TMDL also states that, “If the proposed actions…do not result in attainment of allocations, additional implementation actions shall be required.” The City understands that if monitoring shows that the WQBELs are not met by the implementation plan, additional actions will be required.

5 COMPLIANCE SCHEDULE

This chapter provides a compliance schedule 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 controls 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 City 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. Additional specificity for how the Category 2 and 3 pollutants within the nearshore subwatersheds are addressed is included in Section 4.4. (The complete list of pollutant categorizations is located in Table 2-22 in Chapter 2.)

5.1 NONSTRUCTURAL CONTROL MEASURE SCHEDULE

A 10% load reduction is assumed to result from the cumulative effect of nonstructural control measures. 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 MEASURE SCHEDULE

The MCMs will be implemented 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 nearly fifteen 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 complement the nonstructural TSS Reduction Strategy.

MCM provisions new to the City are described in WMP Section 3.2. Guidance documents have been prepared as an optional aid in MCM development/implementation—see Attachment 3.1.

5.1.2 NONSTORMWATER DISCHARGE MEASURE SCHEDULE

The NSWD measures will be implemented by the City 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 City are described in WMP Section 3.3.

5.1.3 NONSTRUCTURAL TARGETED CONTROL MEASURE SCHEDULE

Table 5-1 lists the nonstructural TCM compliance schedule. These controls are described in detail in Section 3.4. Table 3-5 in Chapter 3 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.

Uncertainties associated with the targeted nonstructural controls complicate establishment of specific implementation dates. Despite this uncertainty, the City 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 progress in attaining targeted load reductions.

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—a participating agency of the Lower San Gabriel River Watershed Group—is also included in this WMP as Appendix A-3-2. The City will consider this ordinance as a template for its 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.

Table 5-1: Nonstructural TCM Compliance Schedule

Nonstructural TCM	ID	Effort		Start date	Milestones
		City (Port Excluded)	Port		
Prioritize facility inspections based on WQPs	TCM-ICF-1	✗		1/1/2016	Reprioritize as new water quality data is collected.
Enhance tracking with online GIS MS4 Permit database	TCM-MRP-1	✗	✗	7/1/2015	Modify database to reflect MS4 Permit by 7/1/2016.
Increased street sweeping frequency or routes	TCM-PAA-3	✗	✗	7/1/2015	67% increase in Port use of regen sweeper by 1/1/2017.
Statewide Trash Amendments (nonstructural measures)**	TCM-PAA-4	✗	**See 5.7**	(Estimate) 7/1/2015	Estimate: 10-15 year schedule.
Apply for grant funding for stormwater quality projects	TCM-INI-4	**W***	✗	7/1/2014	Suitable grants are pursued when practicable.
Refocused outreach to target audiences and WQPs	TCM-PIP-1	✗		7/1/2015	Report on status with annual report submittal.
			✗	Ongoing	
Train staff to facilitate LID and Green Streets implementation	TCM-PLD-1	✗	✗	7/1/2015	Complete by 7/1/2016. Continue periodically.
LID ordinance for projects below MS4 Permit thresholds	TCM-PLD-2	✗		Ongoing	Ongoing; no interim or final milestones.
Encourage retrofitting of downspouts	TCM-RET-1	✗		1/1/2016	Report on status with annual report submittal.
Prepare guidance documents to aid MCM implementation	TCM-SWM-1	✗	✗	7/1/2015	Develop documents by 7/1/2015. Revise as needed.
Exposed soil ordinance	TCM-TSS-1	✗		7/1/2015	If practicable, adopt by 7/1/2017.
Erosion repair and stabilization on private/tenant property	TCM-TSS-2	✗		1/1/2016	Report on status with annual report submittal.
			✗	Ongoing	
Parking lot sweeping ordinance	TCM-TSS-3	✗		7/1/2015	If practicable, adopt by 7/1/2017.
Sweeping of private/tenant roads and parking lots	TCM-TSS-4	✗		1/1/2016	If practicable, enforce TCM-TSS-3 by 1/1/2018.
			✗	Ongoing	
Erosion repair and slope stabilization on public property	TCM-TSS-6	✗		1/1/2016	Report on status with annual report submittal.
			✗	Ongoing	
Enhanced housekeeping BMPs at industrial facilities	TCM-ICF-2		✗	Ongoing	Report on status with annual report submittal.
Copper reduction through implementation of SB 346	TCM-INI-1	**W**		Ongoing	Milestones are independent of City actions.
Lead reduction through implementation of SB 757	TCM-INI-2	**W**		Ongoing	Milestones are independent of City actions.
Support safer consumer product regs for zinc reduction	TCM-INI-3	**W**		Ongoing	Report on status with annual report submittal.
Incentives for irrigation reduction practices	TCM-NSW-1	✗		Ongoing	Ongoing; no interim or final milestones.
Upgraded sweeping equipment	TCM-PAA-1	✗		6/16/2015	Purchase 4 regenerative sweepers by 1/1/2017.
			✗	Ongoing	
(Sanitary) Sewer System Management Plan	TCM-PAA-2	✗	✗	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 – Combined effort with other Watershed Groups of which the City is a participant

** Contingent upon State Water Board's adoption of the Trash Amendments

5.2 STRUCTURAL CONTROL MEASURE SCHEDULE

Uncertainties associated with the structural controls complicate establishment of specific implementation dates. Despite this uncertainty the City 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.

5.2.1 STRUCTURAL MINIMUM CONTROL MEASURE SCHEDULE

Significant pollutant reductions are anticipated through the effective implementation of the City's current structural Low Impact Development (LID) Ordinance.

5.2.2 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 City 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 (10%, 20% and Final) show the combined total estimated BMP volume (acre-feet) for right-of-way (ROW) BMPs, regional LID BMPs, and structural treatment control BMPs on public or private parcels. Specific green streets projects were not investigated during this initial analysis for potential BMPs. As such the 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 City 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 10% and 20% milestones. Interim and final compliance dates identified in the RAA are the primary drivers for the structural targeted control measure schedule. 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 City understands that targeting interim and final load reductions demands that the process of implementing structural controls begin as soon as possible. This section describes these processes for the City, with the Port addressed separately.

INITIAL IMPLEMENTATION PROCESS FOR THE CITY (PORT EXCLUDED)

Right-of-Way BMPs (green street principles) - As the City prepares 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 - Potential Regional BMP locations have been identified and ranked—see Table 3-7 in Chapter 3. The locations are also organized by subwatershed ID in the RAA (mapped in Attachment C of the RAA document) in WMP Appendix A-3-4. 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, the City will conduct a preliminary site assessment at the highest ranked potential BMP. The preliminary site assessment will include reviewing available plans, and identifying nearby storm drain systems and drainage areas.

> **Schedule**: The preliminary site assessments and feasibility study will be completed prior to July 1, 2017. Field analysis at selected sites will begin prior to January 1, 2018.

Public LID - The RAA proposes that LID projects on public parcels could be used exclusively to achieve the BMP capacity for the March 28, 2024, 20% interim milestone (see RAA Table 8-1). The Public LID projects considered for each subwatershed ID in the RAA (mapped in Attachment C of the RAA document) have been identified and are listed in WMP Appendix A-3-4. In concert with the assessment and feasibility study conducted for the Regional BMPs, the City will consider the alternative (or complementary) approach of implementing LID on public parcels in priority subwatersheds.

> **Schedule:** The preliminary site assessments and feasibility study will be completed prior to July 1, 2017. If any projects are selected, field analyses will begin prior to January 1, 2018.

INITIAL IMPLEMENTATION PROCESS FOR THE PORT

Port Post-construction Guidance Manual - The Port area presents a unique development environment. Land—most of which is owned by the Port—is redeveloped at an accelerated rate. To illustrate, current major capital improvements planned at the Ports total 791 acres of land. This is almost 25% of the 3,200 acres of total Port land area, all of which will be treated following the Port's Post-construction Guidance Manual. As such, a cornerstone of the Port's strategy to meet interim and final load reductions is the implementation of the Post-construction Guidance Manual for new development and redevelopment projects.

The Port faces hydrologic constraints to LID BMPs. Following SUSMP standards set in the MS4 Permit, the Port's Post-construction Guidance Manual includes infiltration restrictions that are frequently encountered in the Port, such heavy industrial land use and minimum depth to high groundwater level (10 feet). This latter requirement is problematic in the Port, where depth to groundwater is typically less than ten feet. It is important to note however that suspended solids are the primary transport mechanism of zinc (as well as the other non-limiting Toxics TMDL pollutants) from Port land to the harbor waters. As such it is expected that combinations of flow-through treatment controls such as catch basin inserts equipped with filter media, biotreatment, or CDS units may serve as a feasible pathway to compliance.

Technology Advancement Program - Through the Water Resources Action Plan (WRAP), the Port has developed a Technology Advancement Plan (TAP) to test emerging control measure technologies. Technologies that prove successful and feasible through pilot studies are incorporated into the WRAP as appropriate. For example, automatic retractable screens have been evaluated and subsequently installed throughout Port right-of-ways (118 total currently). The TAP is currently testing a variety of filter media designed to target dissolved and total metals. Incorporated controls will aid in attaining interim and final load reductions.

Overcompensation – If through the adaptive management process it becomes evident that the scheduled approach to implementing control measures as detailed in this WMP may not attain interim and final load reductions, the Port will pursue the funding of regional projects outside of the harbor district that will provide a comparable improvement to water quality within the San Pedro Bay. This compliance approach may be necessary if constructing such projects within the Port proves technically infeasible due to infiltration and space constraints.

An example of overcompensation would be providing funds to overdesign a regional infiltration system scheduled for construction in the Dominguez Channel or the Lower Los Angeles River. The Port would then receive an equivalent credit toward load reductions required within the Port area. The Port understands that 1) this approach to compliance is reserved only in instances when more practical compliance routes prove infeasible, and 2) the specifics of compliance would require advanced consultation with the Regional Board.

COMMITMENT

Even though not all projects can be specified and scheduled at this time, the City is committed to constructing the necessary control measures 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.

5.3 LONG BEACH CITY BEACHES BACTERIA TMDL

Following MS4 Permit §VIII.G, this section provides compliance schedules for USEPA Long Beach City Beaches Bacteria TMDL incorporated into the MS4 Permit. As permitted in §VII.G.1 of the MS4 Permit, and in lieu of numeric WQBELs, the following sections list the controls that will be effective in achieving compliance with the numeric WLAs.

WET WEATHER

Incorporating recent monitoring data from the last ten years, the RAA predicted BMP capacities necessary to meet the wet weather bacteria Beaches TMDL allocations as well as other water quality objectives in the Nearshore Watersheds. Although this effort—as well as the RAA efforts conducted as part of the Lower Los Angeles River, Los Cerritos Channel, and Lower San Gabriel River WMPs—found zinc to be a limiting pollutant (set by the Toxics TMDL with a final deadline of 2032), an additional pollutant reduction for bacteria is necessary in the Beaches drainage area.

As described in the following sections, the BMP capacities necessary to meet interim and final milestones for zinc constitute an aggressive schedule. As such, additional time is necessary to meet the final WLAs for the wet weather bacteria TMDL as soon as possible. To correspond with the neighboring Los Angeles River/Los Angeles River Estuary Bacteria TMDLs, the final WLAs (as listed in Chapter 2 and in §VIII of the MS4 Permit) will be met by March 23, 2037. Interim WLAs and milestones follow the pollutant reduction plan in the following section.

DRY WEATHER

The City's May 2014 Recreational Beach Water Quality Report describes a clear trend over the last ten years of increased compliance with bacteria water quality standards. In fact the City's 2014 Summer Beach Water Quality Report states that in the summer single sample bacterial water quality standards were met 98.7% of the time. Considering these improvements, but anticipating the need for additional controls, Section 3.4.1.4 describes a BMP implementation plan of specific actions that will be effective in achieving compliance with the dry weather WLAs (as listed in Chapter 2 and in §VIII of the MS4 Permit).

Following §VIII.G.1.c.iv.(1) of the MS4 Permit, the time schedule to achieve the final dry weather WLAs is March 28, 2019. This is considered as soon as possible, since the implementation plan requires low flow diversions (LFDs) and vortex separator systems that are scheduled for construction in 2018. The City is also planning to apply for Round 7 CBI grant money to construct additional LFDs for beach outfalls, to be constructed within the Permit term if possible. Table 5-2 lists the deadline for construction, as well as interim and final compliance milestones for the outfall screening and source investigation measures.

In addition to the upcoming milestones listed in Table 5-2, the City has recently enacted citywide irrigation control measures for water conservation purposes. On May 11, 2015, landscape irrigation with potable water was limited to two days a week. On February 27, 2014, irrigating landscape with potable water was limited to 10 minutes per authorized day (if using sprinkler heads that emit one or more gallons per minute; 20 minutes if using stream rotator-type or gear driven sprinkler heads rated at emitting less than one gallon per minute.) These recent measures are in addition to an existing codified list of control measures that address over-watering, including prohibitions on irrigating landscape in a manner that results in water flowing onto adjacent property, non-irrigated areas, private and public walks, roadways, parking lots or other structures.

Enforcement of these new and existing prohibitions will help reduce nonstormwater discharges that may be a source of bacteria.

Table 5-2: Milestones for Dry Weather Bacteria TMDL

Milestone	Deadline
Apply for Round 7 CBI grant money to construct additional LFDs	TBD*
Screen outfalls	12/31/2016
Complete 25% of source investigations for outfalls with significant nonstormwater discharges	3/28/2017
Construct 3 LFDs	7/1/2018
Construct 2 vortex separator systems	7/1/2018
Complete 100% of source investigations for outfalls with significant nonstormwater discharges	3/28/2019
If Round 7 CBI grant money awarded, construct additional LFDs	TBD*

* Dependent on opening date for Round 7 of CBI grant.

5.4 LOS ANGELES RIVER ESTUARY BACTERIA TMDL

Direct drainage to the Queensway Bay area of the estuary is covered by this WMP. The watershed control measures described in this chapter and the corresponding compliance schedule described in Chapter 5 (and based on the RAA) address required wet weather pollutant load reductions in this area. To maintain consistency between the City's WMPs, the approach to dry weather bacteria will follow the existing compliance plan approved for the estuary in the Lower LA River WMP. This consists of the development and implementation of a Load Reduction Strategy (LRS). Table 5-3 lists the milestones for the LRS.

Table 5-3: LA River Estuary Load Reduction Strategy Submittal Deadline

Implementation Action	Deadline*
Submit LRS to Regional Board	TBD*
Complete Implementation of LRS	12/31/2016
Achieve interim (dry-weather) WQBEL and submit report to Regional Board	3/28/2017
Achieve final WQBELS or demonstrate that noncompliance is due to upstream contributions and submit report to Regional Water Board	7/1/2018

* 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.

In addition, one of the low flow diversions listed in Table 5-2 will be located in this region of the estuary.

5.5 COLORADO LAGOON TOXICS TMDL

A complete summary of the existing and planned controls measures for the Colorado Lagoon is included in Section 3.4.1.5. Table 5-4 summarizes the control measures listed in the adopted TMDL, as well as their current implementation status. This TMDL Implementation Strategy has been adapted by the City as the Colorado Lagoon Restoration Master Plan. The TMDL's WLA limits were incorporated into the restoration design elements and detailed in the EIR (Draft Environmental Impact Report Colorado Lagoon Restoration Project, 2008). The Staff Report also incorporated these implementation actions (scenarios) into the EFDC model to estimate the effectiveness of the actions in meeting the TMDL allocations. The water quality model results demonstrate that the implemented restoration scenarios would result in the attainment and maintenance of the sediment concentrations below the numeric targets after remedial dredging and connectivity to Marine Stadium is complete. Since the City is near completion of an implementation strategy based on a prior modeling analysis, the Colorado Lagoon drainage area was not the focus of the RAA conducted for this WMP (see Section 4.5 for more information). The deadline to complete this strategy is July 28, 2018. If future monitoring suggests that the implementation strategy may not meet the TMDL allocations, the strategy will be modified accordingly through the adaptive management process.

Table 5-4: Colorado Lagoon Restoration Master Plan Action Status

BMP Compliance Strategy	Status
Modification of the Termino Avenue Drain so that it no longer discharges into the Lagoon (one major drain system)	Completed December 2011
Diversion of low storm drain flows (three major drain systems)	Completed December 2010
Installation of trash separation devices (traps trash prior to entering the wet well) (three major drain systems)	Completed December 2010
Treatment of stormwater by vegetated bioswale (four local drains)	Partially completed December 2010; Remainder to be completed January 2016
Maintenance and cleansing of the tidal culvert that connects the Lagoon to Marine Stadium.	Completed in December 2010
Replacement of the concrete box culvert that connects the Lagoon to Marine Stadium with an open channel that would run from the Lagoon to Marine Stadium through Marina Vista Park	Anticipated completion January 2017
Removal of contaminated sediment in the Western Arm, Central Arm, and Northern Arm of the Lagoon.	Partially completed August 2012; Remainder to be completed January 2016

5.6 TRASH AMENDMENT COMPLIANCE PROJECT IN THE PORT

Beyond structural controls installed for new developments and redevelopments in the Port (see Section 5.7), the City is planning to install, operate, and maintain additional Continuous Deflection Separation (CDS) units or other full capture equivalent devices within the Harbor District in order to comply with the Statewide Trash Amendments. Independent of the compliance track the City will choose to implement to comply with the amendments, the Harbor District is planning on a Track 1 approach. This approach will consist of installing the necessary number of CDS units or other full capture equivalent devices in

applicable priority land uses (i.e., industrial). The schedule for compliance will follow the amendments, which is within ten years of the first implementing permit and no later than fifteen years after the effective date of the amendments. With an estimated effective year of 2016, this would provide a final compliance date of 2026 to 2031, with the precise year depending upon the date the amendments are incorporated into the implementing permit. The compliance schedule will include interim milestones (such as an average of 10% of the CDS units or equivalent full capture devices installed every year).

In addition to trash reduction, this project will also address the Dominguez Channel and Greater Los Angeles and Long Beach Greater Harbor Waters TMDL for Toxics. CDS units are designed to capture total suspended solids (TSS) and other sedimentitious materials as well as trash. As stated in to the Toxics TMDL, TSS is a major vehicle for toxics and metals to enter the waterways. By capturing TSS the devices will also be capturing toxics and metals, thereby contributing to the achievement of the necessary Toxic TMDL load reductions by the interim and final milestones in 2024 and 2032.

5.7 POLLUTANT REDUCTION PLAN

The following describes the pollutant reduction plan for the City. Figure 5-1 is an illustration of the total structural BMP capacity needed to comply with final WQBELs/RWLs within the Nearshore Watersheds.

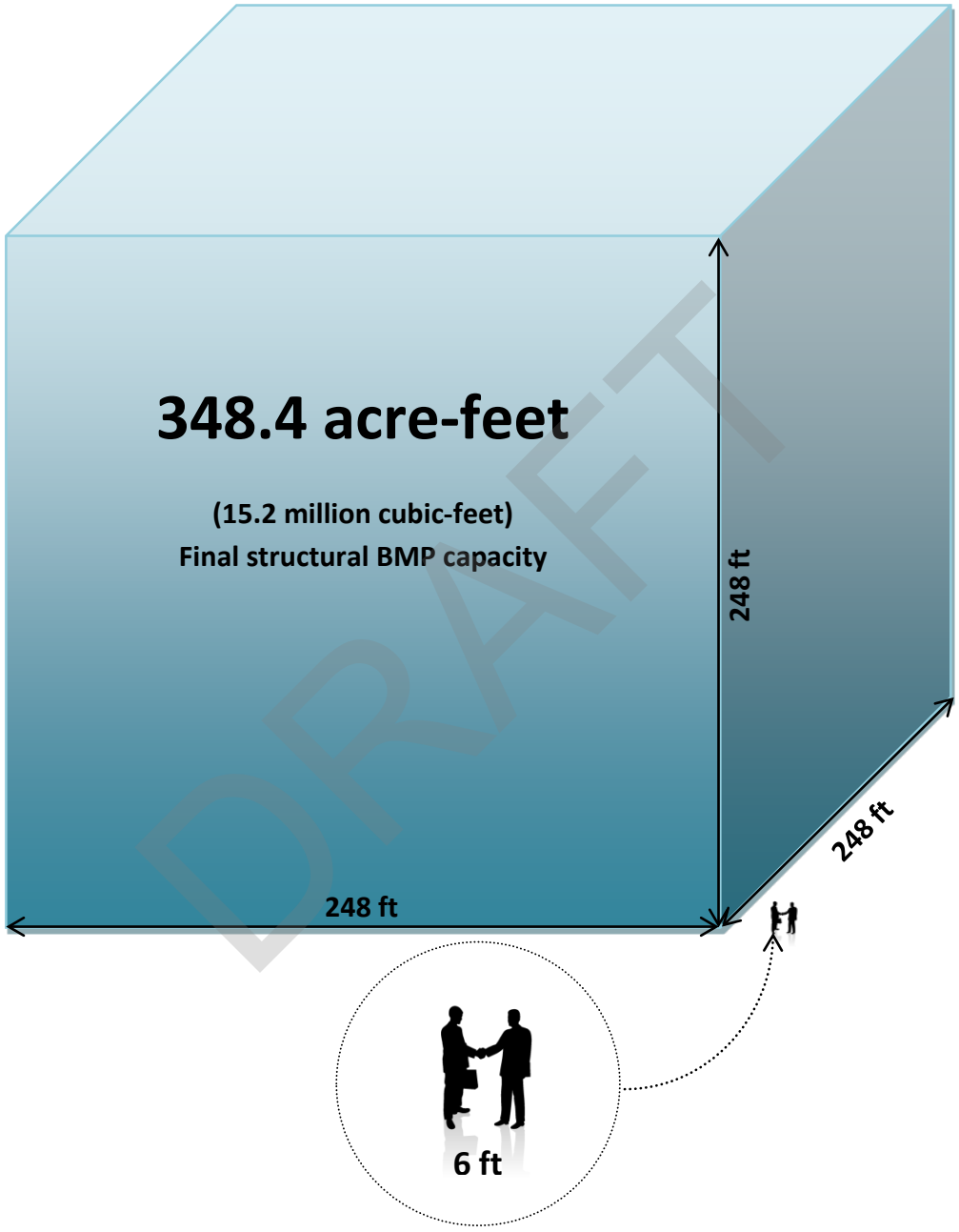

Figure 5-1: The Compliance Cube (total required BMP capacity)

Milestone	POLLUTANT REDUCTION PLAN	
	Total Estimated BMP Volume (acre-ft)	
	Incremental	Cumulative
10%	Non-modeled**	Non-modeled*
20%	14.3	14.3
Final	334.1	348.4

* Non-modeled practices achieve 10% milestone.

COMPLIANCE PLAN (PORT EXCLUDED)

Distinct compliance plans to address the Colorado Lagoon TMDL milestones and the dry weather Bacteria TMDL milestones are described in Sections 5.3-5.5. After accounting for the 10% non-modeled controls—which have a March 28, 2019 deadline—the RAA provides a spatially and temporally optimized stormwater volume capture plan to achieve required pollutant load reductions.

According to the RAA results the City will not need to capture and/or treat stormwater in order to meet the March 28, 2019, 10% interim milestone. The City will need to capture/treat stormwater to achieve the 20% interim milestone by March 28, 2024, and the final compliance milestone by March 23, 2032. The RAA indicates that an additional minimal volume of 2.3 acre-feet is required to be to captured and/or treated meet the Beaches Bacteria TMDL. A final compliance date of March 23, 2037, is provided for this milestone.

There are several options available to meet the 20% interim compliance milestone. Regional BMPs that cumulatively would capture and/or treat the required interim milestone (e.g., Admiral Kidd Park and Stearns Champions Park) or a combination of regional BMPs, Public LID BMPs, and right-of-way BMPs could also be used. Alternatively, the entire interim milestone could be addressed using Right-of-Way BMPs. The City will use the optimized approach provided in Appendix B and illustrated in Figure 8-1 of the RAA as a guide in the BMP selection process. Section 5.2.2 provides the interim deadlines and associated plan to select the specific structural controls to meet the March 28, 2024, milestone. The selection process will also be refined through the biennial adaptive management process.

Of the 14.3 acre-feet required to meet the 20% milestone, 6.6 acre-feet are planned or existing (see Attachment D and Table 8-1 of the RAA). The remaining 7.7 acre-feet are split between the drainage areas under the Dominguez Channel Toxics TMDL (2.1 acre-feet) and the Harbor Toxics TMDL (5.6 acre-feet). The RAA proposes that Public LID projects within the subwatersheds identified in Table B1.1 of RAA Attachment B are sufficient to achieve these targets. Following the analysis provided in Section 3.4.3.4 of the WMP, Public LID sites listed in Table 3-7 of Chapter 3 may have the capacity to serve as regional BMPs. Appendix A-3-4 also lists for each project the subwatershed ID it is located in (and its corresponding target BMP capacity), the calculated maximum BMP capacity for regional BMPs, and the limiting Toxics TMDL for each project. Using this information, a potential structural control compliance approach to the 20% milestone is provided in Table 5-5, with selected Public LID sites serving as regional BMPs. The feasibility of this approach will be analyzed through the study referenced in Section 5.2.2 and is subject to the Adaptive Management Process.

Table 5-5: Potential Compliance Approach to March 28, 2024, 20% Milestone (in acre-feet)

Limiting TMDL	BMP Capacity Needed	Potential Regional BMP	Subwatershed ID*	Potential Regional BMP Capacity
Dominguez Channel Toxics	2.1	Admiral Kidd Park	200248	13.74
		Webster Ave open space	200248	11.94
Harbor Toxics	5.6	Rainbow Harbor Esplanade	800548	9.87
		Stearns Champions Park	550248	37.45

* RAA Attachment C includes a map of subwatershed IDs.

Compliance Plan for the Port

After accounting for the 10% non-modeled controls, the RAA results indicate that the Port will not need to capture and/or treat stormwater in order to meet the March 28, 2019 10% interim milestone. The Port will need to capture/treat stormwater to achieve the 20% interim milestone by March 28, 2024, and the final compliance milestone by March 23, 2032.

To achieve the interim compliance milestone, the Planning and Land Development Ordinance (already in effect) will continue to be enforced on new development and redevelopment projects located in the Harbor District. The rationale of this approach is detailed in Section 5.2.2 of this Chapter. Upcoming redevelopment projects include major capital improvements totaling 791 acres of land: Pier G Redevelopment (259 acres), Middle Harbor Redevelopment Phases I and II (346 acres), and the Gerald Desmond Bridge (186 acres). See Figure 5-3. This is 25% of the 3,200 acres of total Port land area, all of which will be treated following the Port's Post-construction Guidance Manual. The projects are located within priority sub-drainage areas identified in Appendix B of the RAA. Notably, the Gerald Desmond Bridge project is within a sub-drainage area proposed for treatment for the interim March 28, 2024, 20% milestone (see Figure 8-1 of the RAA). Table 5-6 lists the upcoming milestones for the associated structural control measures for these projects.

Figure 5-2: Planned Major Capital Improvement Projects in the Port. From left to right, Pier G Redevelopment, Middle Harbor Redevelopment (Phases I and II), and the Gerald Desmond Bridge

Table 5-6: Structural Control Milestones for the Port within the Next Three Years

Project	Milestone	Schedule*
Middle Harbor Phase I	7 CDS units	5/1/2016
Middle Harbor Phase II	5 CDS units	6/1/2017
Gerald Desmond Bridge	2 infiltration trenches, 5 biofiltration swales, and 1 media filter	6/30/2018

*All projects are planned with completion dates in place, however unexpected construction delays could extend these deadlines by several months.

5.8 ESTIMATED COSTS OF STRUCTURAL CONTROLS

This section provides an order-of-magnitude estimate of the financial resources that may be required to attain compliance with water quality based effluent limits and receiving water limits. Costs associated with implementation of non-structural programs are not provided.

Estimated costs are presented as an aid and contain considerable uncertainties. Given the iterative and adaptive nature of the WMP and the many variables associated with the projects, the budget forecasts are estimates, and are subject to change based on BMP effectiveness assessments, results of outfall and receiving water monitoring, and additional studies.

COMPLIANCE COSTS FOR THE CITY (PORT EXCLUDED)

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.[1] Table 5-7 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.[2]

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 estimated:

- 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

[1] Multi-Pollutant TMDL Implementation for the Unincorporated County Area of Los Angeles River: Part 2
[2] ibid

Table 5-7: 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.

Compliance Costs for the Port

The conceptual treatment system consists of a pretreatment system (oil/water separator and clarifier) and enhanced sand media filtration system. To meet treatment flow rate capacities for systems currently available, storm water storage tanks would also be included as part of the system. The number of storage tanks necessary and the configuration/number of treatment units necessary were based on the volume and flow rate calculations for the specific design storms.

Cost estimates developed were based on publically available data, equipment vendors, and industry experience designing and installing storm water treatment systems in industrial applications[3]. Capital costs developed include costs to purchase the pretreatment, media filtration, storage tanks, and pump stations, as well and the engineering and installation costs of the systems. In addition to the capital costs, annual O&M cost estimates were developed that include the removal and replacement/regeneration of media. Average estimated land use costs associated with appropriating land for the construction and operation of the treatment systems and the potential lost rental value of the land were also incorporated.

To understand storm water discharge from the Port properties, the drainage areas and storm water discharge points for the Port was evaluated. The Port occupies approximately 3,200 acres and has 230 storm water discharge points. For cost estimating and conceptual treatment system design purposes, it was assumed that each storm water discharge point received flow from approximately 14.7 acres of impervious area and that BMPs would be sized for a 2 year 24-hour design storm[4].

[3] Technical Memorandum. AMEC. April 2011.

[4] ibid

Table 5-8: Potential estimated structural BMP cost[5]

Design Storm	Capital Cost	Annual Land Use Cost	Annual Operation and Maintenance Cost	Total Costs (during 5 year permit term)
85th Percentile	$150,000,000	$1,600,000	$15,180,000	$234,000,000
2-yr 24-Hr	$201,000,000	$3,200,000	$15,180,000	$293,000,000
5-yr 24-Hr	$283,000,000	$3,200,000	$15,180,000	$375,000,000
10-yr 24-Hr	$355,000,000	$3,200,000	$15,180,000	$447,000,000
25-yr 24-Hr	$451,000,000	$3,200,000	$15,180,000	$501,000,000
100-yr 24-Hr	$582,000,000	$8,000,000	$15,180,000	$698,000,000

5.8.1 TOTAL ESTIMATED COSTS OF STRUCTURAL CONTROLS

Table 5-9 includes the total estimated cost to construct or implement structural BMPs and associated annual O&M costs. In order to account for possible variations in BMP design, BMP configurations, and site-specific constraints, as well as for uncertainties in available BMP unit costs from literature or estimated BMP unit costs, a range of costs is presented.

Table 5-9: Structural BMP Cost Estimate

Milestone	POLLUTANT REDUCTION PLAN Total Estimated BMP Volume (acre-ft)		Total Estimated Cost
	Incremental	Cumulative	
10%	NS*	NS*	$300,000,000 - $370,000,000
20%	14.3	14.3	
Final	334.1	348.4	

* Nonstructural practices achieve 10% milestone

[5] ibid

6 FINANCIAL STRATEGY

This section outlines the financial strategy to implement the 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 WMP is the greatest challenge confronting the City. In the absence of stormwater utility fees, the City has no dedicated revenue stream to pay for implementation. 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 Nearshore Watersheds will be the interim milestones of 2019 and 2024. There will be a final compliance date of 2032 for the Dominguez Channel and Long Beach Harbor Toxics TMDL and a final compliance date of 2040 for the Long Beach City Beaches Bacteria TMDL. Thus, there will be many deadlines that must be met despite limited resources. The City will need to set priorities and seek funding in order to meet the various compliance deadlines.

Therefore, to address Water Quality Priorities (WQPs), the City will 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 City has coordinated the proposed compliance schedule (see Section 5) with the financial strategy.

The latest Long Beach MS4 permit has 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 City 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 be available until

[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.

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 City 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 City 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 Nearshore Watersheds indicates that the volume of water required to be captured to comply with RWLs and WQBELs is 416.9 acre-feet.

For cost estimation purposes, this WMP initially assumes that the Nearshore Watersheds could ultimately require the capacity to capture and infiltrate or use 416.9 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 $86 million and $160 million for construction of these facilities (refer to Section 5.5 for more a detailed cost analysis).

The City 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 City 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 City anticipates 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 City 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 City 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 City will 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 City 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 of the WMP 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

This section covers information such as documentation and references/links to water quality ordinances for the City that demonstrate adequate legal authority to implement and enforce Watershed Control Measures (WCMs) identified in this plan and as required in §VII.C.5.h.vi 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 the City's legal authority to implement the NPDES MS4 Permit.

A copy of the City'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 with a reference link.

Table 7-1 Water quality ordinance language

Water Quality Ordinance	Reference
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.*	

8 INTEGRATED MONITORING PROGRAM

The Participating Agencies have developed a customized Integrated Monitoring Program (IMP). The IMP, 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 IMP is included in Appendix A-8-1.

The City of Long Beach is the seventh largest city in California in land area encompassing multiple watersheds and sub-watersheds. Monitoring Programs (CIMPs) for three primary watersheds - the Lower Los Angeles River, the Los Cerritos channel and the Lower San Gabriel River have previously been prepared and submitted to the Regional Board. The monitoring of the remaining MS4 areas of Long Beach is addressed in this Section.

The Dominguez Channel Estuary

A relatively small area of the City of Long Beach (approximately 420 acres, of which 212 area are Cal Transor other utility) is tributary to the Dominguez Channel Estuary. The City land uses in this area are similar to those being monitored by other outfall and receiving water locations (see Section 8.2) and due in part to the minimal land area and significant comingling of runoff, separate outfall and receiving water monitoring is not being proposed for this area.

Colorado Lagoon

INTRODUCTION

Colorado Lagoon is a 15-acre, v-shaped tidal lagoon was constructed to retain and convey storm flows. It is connected to Alamitos Bay and the Pacific Ocean via a box culvert to Marine Stadium. The watershed that drains to Colorado Lagoon is approximately 1,172 acres and historically divided into five sub-basins (A through E).[1] The Lagoon serves three main functions: retaining and conveying storm water drainage, hosting estuarine habitat, and providing public recreation. The deteriorated ecological health of the

[1] Attachment A to Resolution No. R09-005 - 1 - Amendment to the Water Quality Control Plan – Los Angeles Region to Incorporate a Total Maximum Daily Load for Organochlorine (OC) Pesticides, Polychlorinated Biphenyls (PCBs), Sediment Toxicity, Polycyclic Aromatic Hydrocarbons (PAHs), and Metals for Colorado Lagoon Adopted by the California Regional Water Quality Control Board, Los Angeles Region on October 1, 2009

Lagoon has been established for the past several decades. The Lagoon receives inflow from 11 storm water drains. Because the Lagoon is a natural low point in the watershed, it accumulates pollutants deposited over the entire watershed that enter the storm drains by storm flows and dry weather runoff. Further, sediment deposition and marine growth have reduced the capacity of the culvert that connects the bay to the Lagoon, resulting in a lack of tidal flushing at low tides and increased degradation of water quality.

Colorado Lagoon was 303(d)-listed as an impaired waterbody for indicator bacteria, sediment toxicity, PAHs, lead, and zinc in sediment; DDT, Dieldrin, and PCBs in fish tissue; and chlordane in fish tissue and sediment by the Regional Water Quality Control Board (RWQCB) in 2006. The Los Angeles RWQCB adopted Total Maximum Daily Load for Organochlorine (OC) Pesticides, Polychlorinated Biphenyls (PCBs), Sediment Toxicity, Polycyclic Aromatic Hydrocarbons (PAHs), and Metals for Colorado Lagoon (Colorado Lagoon Toxics TMDL) on October 1, 2009, and the TMDL went into effect on July 28, 2011. TMDL compliance is required within 7 years from implementation (2018). A key element of the TMDL implementation plan is the City's proposed Colorado Lagoon Restoration Master Plan. The City is in the middle of carrying out the plan to improve habitat, water and sediment quality, and community interaction with the Lagoon. A status of the Colorado Lagoon Restoration Master Plan implementation actions is summarized in Table 8-1.

Table 8-1: Colorado Lagoon restoration master plan action status

Implementation Action	Status
Modification of the Termino Avenue Drain so that it no longer discharges into the Lagoon	Completed in December 2011
Diversion of low storm drain flows	Completed in December 2010
Installation of trash separation devices (traps trash prior to entering the wet well) (three major drain systems)	Completed in December 2010
Treatment of stormwater by vegetated bioswale (four remaining local drains)	Partially Completed in December 2010 – remainder to be completed in January 2016
Maintenance and cleaning of the tidal culvert that connects the Lagoon to Marine Stadium.	Completed in December 2010
Removal of contaminated sediment in the Western Arm, Central Basin, and Northern Arm of the Lagoon	Partially Completed in August 2012 with the remainder removed in January 2016
Improve hydraulic connection between the Lagoon and the Marine Stadium	Anticipated completion date: January 2017

Total funds spent on mitigation efforts for Colorado Lagoon thus far are $35,171,484.[2] This does not include the proposed improvement of hydraulic connection between the Lagoon and Marine Stadium and re-grading shoreline to improve habitat quality. Further details of the implementation actions are as follows.

[2] City of Long Beach, July 25, 2013, Biannual progress report for the Colorado Lagoon OC pesticides, PCB, sedimen toxicity, PAH, and metals total maximum daily loads. A letter for Samuel Unger prepared by Eric O. Lopez.

Modification of Termino Avenue drain

Modification of the Termino Drain included the removal of three existing City storm drains that outlet to the west side of Colorado Lagoon. This project includes construction of 15,250 of reinforced concrete and 117 catch basins to convey stormwater flow directly to Marine Stadium such that they bypass Colorado Lagoon. This project also included construction of a low-flow diversion system at Roswell Avenue between 7th and 8th Streets, which diverts dry weather flows into the sanitary sewer system. In addition, a number of structural BMPs to benefit water quality at Colorado Lagoon were implemented:

- 104 connector pipe screens,
- 92 automatic retractable screens
- 30 Abtech Filters (antimicrobial storm water treatment)

Low flow diversion and trash separation devices

The low-flow diversion was installed at 6th Street and Park Avenue. Trash separation devices were installed at 6th Street and Nieto Avenue, and 4th Street and Monrovia Avenue. The low flow diversion and the trash separation devices are part of the overall Colorado Lagoon Restoration Master Plan. The low flow diversion system diverts dry weather urban runoff into the sanitation system and prevents it from entering Colorado Lagoon.

Vegetated bioswale installation

Vegetated bioswales have been created along Park Avenue in the vicinity of the Western Arm of the Lagoon to treat stormwater and dry weather runoff through natural filtration of sediment and pollutants prior to discharging into Colorado Lagoon. Flow from the remaining four local drains is treated through these bioswales prior to discharging into Colorado Lagoon. An additional bioswale will be created on the north and central shores of the site between Colorado Lagoon and the Recreational Park Golf Course to capture and treat surface runoff from the golf-course. The new bioswale will connect with the existing swale to provide a complete vegetated buffer between the golf course and the Lagoon with two discharge points into western and northern arms of the Lagoon.

Clean culvert, repair tidal gates, and remove sill and structural impedances

To increase tidal range, tidal flushing and water circulation, and improve water and sediment quality, various cleaning and repair activities were conducted. The tidal culvert between Colorado Lagoon and Marine Stadium was cleaned and repaired, the trash racks were cleaned, the tidal gates were repaired, and the sill and structural impedances within and around the existing culvert were removed. This project is also part of the Colorado Lagoon Restoration Master Plan.

Remove contaminated sediment in the western arm, central basin, and northern arm of the Lagoon

Sediment remediation in the Lagoon was initiated under a phase 1 that including dredging approximately 72,000 cubic yards of contaminated material from the western, central and northern arms of the Lagoon. Sediment removal depths ranged from 3 to 10 feet through the Lagoon and the material disposed of offsite. By removing the sediment, a large source of contaminants to the water column was also removed, paving the way for improved habitat quality and water quality. Sediment removal during phase 1 was conducted using mechanical means which frequently results in a small percentage of material that falls back into the water and creates what is known as dredge residuals. A second removal effort is planned for Phase 2 where additional dredging and filling will occur within the Lagoon to improve surface sediment conditions and raise the bottom elevations to depths that will support improved habitat quality. Additionally, shoreline grading will occur to improve subtidal and intertidal habitat zones and allow for eelgrass to be planted as a mitigation measure for other construction projects within the City.

Improve hydraulic connection between the Lagoon and the Marine Stadium

This project is proposed to replace the existing concrete box culvert with an open channel that would run from Colorado Lagoon through Marina Vista Park to Marine Stadium in a location generally parallel to the existing culvert. This modification is anticipated to improve tidal flushing through an increase in tidal range, and water and sediment quality. Additionally, it would provide improved flood flow conveyance.

Re-grade shoreline to improve habitat quality

Restoration activities as part of Phase 2 construction will include re-grading the shoreline to convert upland habitat into intertidal mudflat and nearshore marsh zones. Soils removed during re-grading will be used to fill the northern arm and portions of the western arm to raise bottom elevations and allow eelgrass and other vegetation to be planted to create a mitigation bank for the City to use to compensate for unavoidable losses on other capital development projects.

Currently the following work is in development.

- Prospectus document to describe the proposed project and anticipated habitat improvements
- Regulatory approvals for the proposed construction activities
- Engineering design for the Phase 2 restoration activities

IDENTIFYING WATER QUALITY PRIORITIES

Category 1 (Highest Priority) is defined as "Waterbody-pollutant combinations for which water quality-based effluent limitations and/or receiving water limitations are established in Parts VI [Receiving Water Limitations] and VIII [Total Maximum Daily Loads] of this Order." The Colorado Lagoon Toxics TMDL is the only TMDL that applies to the Lagoon.

The interim and final Water Quality-Based Effluent Limitations (WQBELs) for Category 1 pollutants that the Participating Agencies must comply with is in Table 8-2. The Participating Agencies must comply with interim limitations as of the effective date of the Permit and the final limitations no later than July 28, 2018.

Table 8-2: Interim and final WQBELs for Colorado Lagoon

Pollutant	Interim Concentration-based Effluent Limitations: Monthly Average (µg/dry kg)	Final Concentration Based Effluent Limitations: Monthly Average (µg/dry kg)
Chlordane	129.65	0.50
Dieldrin	26.20	0.02
Lead	399,500	46,700
Zinc	565,000	150,000
PAHs	4,022	4,022
PCBs	89.90	22.70
DDT	149.80	1.58

Annual mass-based effluent limitations assigned to five major storm drain outfalls are displayed in Table 3. Both Tables 8-2 and 8-3 were recreated based on Part VIII.I in the Long Beach MS4 Permit.

Table 8-3: Annual Mass-Based Effluent Limitations assigned to major storm drain outfalls to Colorado Lagoon

Pollutant	**Annual Mass-Based Effluent Limitations (mg/yr)**				
	Outfall - Project 452 (Subbasin A)	Outfall – Line I (Subbasin B)	Outfall - Termino Ave (Subbasin E)	Outfall - Line K (Subbasin C)	Outfall - Line M (Subbasin D)
Chlordane	5.10	3.65	12.15	1.94	0.73
Dieldrin	0.20	0.15	0.49	0.08	0.03
Lead	476,646.68	340,455.99	1,134,867.12	181,573.76	68,116.09
Zinc	1,530,985.05	1,093,541.72	3,645,183.47	583,213.37	218,788.29
PAHs	41,050.81	29,321.50	97,739.52	15,637.89	5,866.44
PCBs	231.69	165.49	551.64	88.26	33.11
DDT	16.13	11.52	38.40	6.14	2.30

Based on Part VIII of the Permit, Category 1 waterbody-pollutant combinations are TMDL established WQBELs as summarized in Table 8-4.

Table 8-4. Categorical Priority Designation of Pollutants in Colorado Lagoon

Pollutant	Category	Medium
Chlordane	1	Fish tissue, sediment
Dieldrin	1	Fish tissue
Lead	1	Sediment
Zinc	1	Sediment
PAHs	1	Sediment
PCBs	1	Fish tissue
DDT	1	Fish tissue
Indicator Bacteria	2	Water
Sediment Toxicity	2	Sediment

At pages 44 and 45 of the Permit, Category 2 (High Priority) pollutants are defined as high priority pollutants if "[p]ollutants for which data indicate water quality impairment in the receiving water according to the State's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Listing Policy) and for which MS4 discharges may be causing or contributing to the impairment." Colorado Lagoon is 303(d) listed for indicator bacteria and sediment toxicity[3] in in the 2010 303(d) list[4] and summarized in Table 8-4.

At page 45 of the Permit, Category 3 (Medium Priority) pollutants are defined as "[p]ollutants 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." Sediment monitoring was conducted in summer 2013 in Colorado Lagoon. Cadmium, copper, and mercury exceeded sediment effect range low (ERL) thresholds. No other category 3 pollutant applies to Colorado Lagoon.

As discussed in the previous section, since 2010 there has been extensive mitigation as the Colorado Lagoon Restoration Master Plan which is ongoing and has included reconstructing the Termino Avenue Drain to bypass Colorado Lagoon and discharge into Marine Stadium, installing trash separation devices and low-flow diversions, installing bioswales to capture surface runoff from the adjacent golf course, and cleaning and repairing the existing tidal culvert that connects Colorado Lagoon to Marine Stadium. This level of remediation limits the usefulness of the historical data for establishing current Water Quality Priorities. Therefore these will be developed as Adaptive Management provisions of this IWMP are implemented. All further remediation efforts are expected to be completed by 2018. Monitoring efforts have been suspended until at least January 2016 to allow for continued remediation and restoration of the Lagoon. Additional cleanup dredging and capping will be conducted to restore surface sediment conditions to levels that support targeted beneficial uses.

SOURCES SPECIFIC TO CATEGORIZED POLLUTANTS

[3] Colorado Lagoon is listed as impaired for sediment toxicity but WLAs in the Colorado Lagoon Toxics TMDL were developed for toxic compounds and not specific to sediment toxicity.

[4] The 2010 303(d) list includes chlordane (tissue & sediment), DDT (tissue), dieldrin (tissue), indicator bacteria (water), lead (sediment), PAHs (sediment), PCBs (tissue), sediment toxicity, and zinc (sediment) for Colorado Lagoon.

The Colorado Lagoon Toxics TMDL (Attachment A to Resolution No. R09-005) identified urban runoff and stormwater discharges from the municipal separate storm sewer systems (MS4s) and California Department of Transportation (Caltrans) as point sources of OC pesticides, PCBs, PAHs, and metals discharged to Colorado Lagoon. The Colorado Lagoon Toxics TMDL also identified sediment loading in runoff from urban, recreational park areas including two golf courses and adjacent park areas, a right of-way greenbelt, and the picnic and park areas surrounding Colorado Lagoon, and atmospheric deposition as main non-point sources.

WATER QUALITY ISSUE PRIORITIZATION

The highest priority water quality issues include all Category 1 waterbody-pollutant combinations due to their listing in the Colorado Lagoon Toxics TMDL. The high priority water quality issue is Category 2 – 303 (d) listing for indicator bacteria. No medium priority water quality issue exists in Colorado Lagoon.

Table 8-5 summarizes water quality issue prioritization for Colorado Lagoon.

Table 8-5: Water quality issue prioritization for Colorado Lagoon.

Prioritization	Colorado Lagoon
Highest priority	chlordane (sediment & fish tissue), dieldrin (fish tissue), DDT (fish tissue), PAHs (sediment), PCBs (fish tissue), sediment toxicity (sediment), lead (sediment), zinc (sediment)
High priority	indicator bacteria
Medium priority	Cadimum (sediment), copper (sediment), and mercury (sediment)

MONITORING

Colorado Lagoon monitoring required complying with the provisions set forth in the TMDL are documented in the 2011 Colorado Lagoon TMDL Monitoring Plan (CLTMP) developed for the City of Long Beach by Kinnetic Laboratory and Moffat and Nichol Engineers. Quarterly monitoring has been required since implementation and includes water quality, sediment and fish tissue according to the following schedule.

Water quality samples are to be collected quarterly the first year and then semi-annually thereafter. If water quality objectives (numeric targets) are exceeded at any time, sampling frequency shall be accelerated to quarterly until water quality objectives are not exceeded. Once clean results are demonstrated for a period of four successive quarterly sampling efforts, sampling frequency will return to quarterly. Water quality testing during pre and post construction monitoring would suggest that quarterly sampling will not be necessary after the first year. Sampling is expected to be conducted during dry weather conditions. Sampling shall be deferred for at least 72 hours after any rainfall exceeding 0.1 inches.

Sediment samples are to be collected annually for analysis of target constituents and toxicity testing. Sampling is scheduled to be conducted during the summer months which should give almost a full year for the recovery process to progress. If sediment objectives (numeric targets) are exceeded or sediment toxicity is observed at any time, sampling frequency for both sediment and sediment toxicity will be

accelerated to semi-annually until sediment objectives are not exceeded for three consecutive surveys and sediment toxicity is not observed.

Fish tissue samples are to be collected annually. The same rationale used for establishing sampling frequency for sediments is used to establish fish tissue sample collection frequency. Tissues from resident bay mussels (*Mytilus galloprovincialis*) are to be collected annually and analyzed to further assess and track impairment. If fish and/or mussel tissue objectives (numeric targets) are exceeded at any time, sampling frequency will be accelerated to semi-annually until fish tissue objectives are not exceeded.

Benthic community analysis is an optional task and would not be initiated until after sediment remediation has been completed and sufficient time has been provided for initial colonization of the sediments to occur and successional development to progress sufficiently towards an equilibrium condition. This task will only be performed if deemed necessary in order to support a comprehensive re-evaluation using SQOs.

Reassessment of all monitoring tasks and sampling frequencies is recommended after completion of the first and third annual monitoring reports. Due to extensive efforts to eliminate both sources and sinks for contaminants, recovery is expected to be rapid. It is also anticipated that, once restoration activities are completed, the entire Lagoon will be dredged thus eliminating any concerns regarding contaminant concentrations present in surficial sediments.

To date, the City has completed four quarterly compliance monitoring events between the summer of 2013 and spring of 2014; since then sampling has been delayed as the City anticipated construction to begin on the next phase (phase 2) of the restoration effort at the Lagoon. That construction effort was delayed due to permitting delays but is now back on track and ready for construction. The City is close to receiving the final permits and the 100% engineering design was recently completed. At this time the City anticipates construction to begin later this summer and be completed around the beginning of 2016 at which time monitoring will resume.

The City has recently completed the Winter 2014/2015 monitoring event and those results will be available soon. The water quality monitoring during the previous events showed the listed contaminants are below water quality criteria or non-detect (with one exception in the winter 2014 sampling event). The sediment and fish tissue quality measurements continue to be elevated above TMDL targets.[5] The City does not expect to see any improvements in sediment quality until the next phase of the restoration effort is completed. Bacterial concentrations at Colorado Lagoon's beaches as measured by the City's beach monitoring program are minimal and have consistently met standards ever since completion of the low flow diversions and initial dredging.

As a reminder, the focus of the TMDL Compliance Monitoring Program is to monitor fish tissue and surface sediment chemical concentrations. At this time, the fish tissue and sediment data reflect the sediment condition during an interim phase of restoration efforts. For this reason, the City has requesting the TMDL

[5] Anchor QEA, November 6, 2013. Colorado Lagoon TMDL Monitoring Report: Summer 2013, Technical Memorandum to City of Long Beach.

Compliance Monitoring Program be delayed until the next phase of construction (Phase 2) is complete, which is estimated to be early 2016. The program pulls available funds that are better spent on improving the Colorado Lagoon habitat. As previously stated, the first year of monitoring data show the Lagoon is not currently in compliance with the TMDL. We are working as quickly as possible to continue the restoration efforts; however, we do not expect further monitoring to show compliance until the Phase 2B restoration efforts are complete, the RWQCB staff concurred.

In order to keep the Regional Water Quality Control Board staff up to date with progress at Colorado Lagoon, the City has committed to providing a quarterly letter that summarizes ongoing activities and expected completion dates for specific actions. These quarterly reports will be in lieu of collecting additional monitoring data until construction is completed.

Inner and Outer Long Beach Harbor and Eastern San Pedro Bay (Section 8.1)

This area covers the area of the Port of Long Beach (POLB), consisting of the Inner Harbor and Outer Harbor waters, and eastern San Pedro Bay, inclusive of the Los Angeles River Estuary Queensway Bay section. A 5-year Regional Monitoring Coalition monitoring effort in excess of $2 million is already underway in response to the Dominguez Channel and Harbor Toxics TMDL. This IMP has been customized to augment and take advantage of the existing TMDL monitoring effort.

City Beaches (Section 8.2)

This includes Rainbow and Shoreline Marinas beach areas facing eastern San Pedro Bay at 3rd pl., 5th pl., 10th pl., 16th pl., 36th pl., 72nd pl., Coronado avenue, Molino avenue, and the east side and west side of Belmont Pier. This category generally extends only to the wave wash; beyond is considered the East San Pedro Bay which is addressed separately.

Alamitos Bay (Section 8.2)

This is a complex watershed area which includes: the Marine Stadium, Los Cerritos Wetlands, Los Cerritos Channel Estuary, Long Beach (Alamitos) Marina and Sims Pond.

San Gabriel River Estuary (Section 8.2)

This area receives the majority of water from the upstream areas San Gabriel River system and the majority of runoff from within Long Beach from two Power Plants, both State ICP sites.[6] This IMP builds upon the dry weather sampling already being conducted by the Los Angeles County Sanitation Districts.

[6] 4 19I019059- Haynes Generating Station, 6801 East 2nd Street Long Beach ; AES planted listed on the State's Smarts Database as: Plains West Coast Terminals Alamitos Tank Farm 690 N Studebaker Long Beach - 4 19I021763

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 §VII.C.8. The process is implemented by the City 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 §VIII 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 City 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 §XVIII.A.6 of the MS4 Permit Monitoring and Reporting Program (No. CI-8052), 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 Board Executive Officer or within 60 days of submittal if the Executive Officer expresses no objections.

9.2 RECEIVING WATER LIMITATIONS

The adaptive management process fulfills the requirements in MS4 Permit §VI.A.4 to address continuing exceedances of receiving water limitations.

10 REPORTING PROGRAM & ASSESSMENT

10.1 ANNUAL REPORT

PERMIT MRP §XV.A

Each year on or before December 15th, the City will submit an annual report to the Regional 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:

- The City's participation in Watershed Management Programs.
- The impact of the City'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.

The Annual Report will identify data collected and strategies, control measures and assessments implemented for each watershed within the City'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
7) Supporting Data and Information - Monitoring data summary

[1] Annual reports will address the previous fiscal year beginning June 1st through July 30th.

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

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

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

The City will submit biennial watershed reports to the Regional 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 City 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 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

The City will submit an annual report to the Regional Water Board Executive Officer regarding progress of TMDL implementation within the watershed. The Regional Board is preparing a reporting format. Once available, the reporting form will be incorporated into the WMP as an appendix.

11 MASTER WATERSHED MANAGEMENT PROGRAM

In addition to the Nearshore Watersheds defined in Chapter 1, the City drains to the Los Angeles River and Estuary, the Los Cerritos Channel, and San Gabriel River Reach 1. As such the City implements Watershed Management Programs for the Lower Los Angeles River, Los Cerritos Channel and Lower San Gabriel River and participates in the respective Watershed Groups with fifteen neighboring municipalities and the Flood Control District. Because the WMPs are living documents, updated biennially through the adaptive management process described in Chapter 9, it is impractical to include watershed-specific content from the multi-jurisdictional Lower Los Angeles River, Los Cerritos Channel and Lower San Gabriel River WMPs within this document. Instead, these WMPs are incorporated by reference, together serving as the City's Master Watershed Management Program.