Draft Staff Report for the Implementation Plans and Schedules for the Los Cerritos Channel and San Gabriel River Metals TMDLs

Los Angeles Regional Water Quality Control Board
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1. Introduction

This report presents the required implementation plans and schedules for the Total Maximum Daily Loads (TMDLs) for metals in Los Cerritos Channel and San Gabriel River that were previously established by the United States Environmental Protection Agency, Region 9 (USEPA).

Los Cerritos Channel was included on the 1998, 2002, 2006, and 2010 California Clean Water Act (CWA) Section 303(d) lists as an impaired waterbody for copper, zinc, and lead. (Regional Board, 1998 and California State Water Resources Control Board, 2002, 2006, and 2010.) San Gabriel River was included on the 1998, 2002, 2006, and 2010 California CWA Section 303(d) lists as an impaired waterbody for copper, zinc, lead and selenium. The CWA requires TMDLs to be developed to reduce pollutant loadings in order to achieve water quality standards in the San Gabriel River and Los Cerritos Channel. The USEPA established the San Gabriel River Total Maximum Daily Load for Metals on March 26, 2007, and the Los Cerritos Channel Total Maximum Daily Load for Metals on March 17, 2010. The USEPA-established TMDLs include the Problem Statements, Numeric Targets, Source Analysis, Loading Capacities, Load Allocations, Waste Load Allocations, and Margins of Safety. Because an implementation plan, including a schedule of implementation, is not considered a required element of a TMDL established by USEPA, these TMDLs do not include implementation plans, or schedules, to achieve the load allocations and waste load allocations assigned to discharges to these waterbodies. The following report includes summaries of the existing TMDLs, including environmental settings, source assessments, and allocations and then describes the Implementation Plans and Implementation Schedules for the San Gabriel River and Los Cerritos Channel Metals TMDLs that are proposed for adoption by the Los Angeles Regional Water Quality Control Board (Regional Board).

2. Summary of Existing TMDLs

2.1. Environmental Setting: Los Cerritos Channel

Los Cerritos Channel is an open channel; the cities of Long Beach, Lakewood, Bellflower, Paramount, Downey, Signal Hill, and Cerritos as well as a small portion of Los Angeles County are located within the area draining to the freshwater portion of Los Cerritos Channel. The Channel is a concrete-lined conduit for freshwater until approximately Anaheim Road, where the Channel's tidal prism[1] begins. From there it connects with Alamitos Bay through the Marine Stadium. Wetlands connect to the Channel a short distance from its lower end.

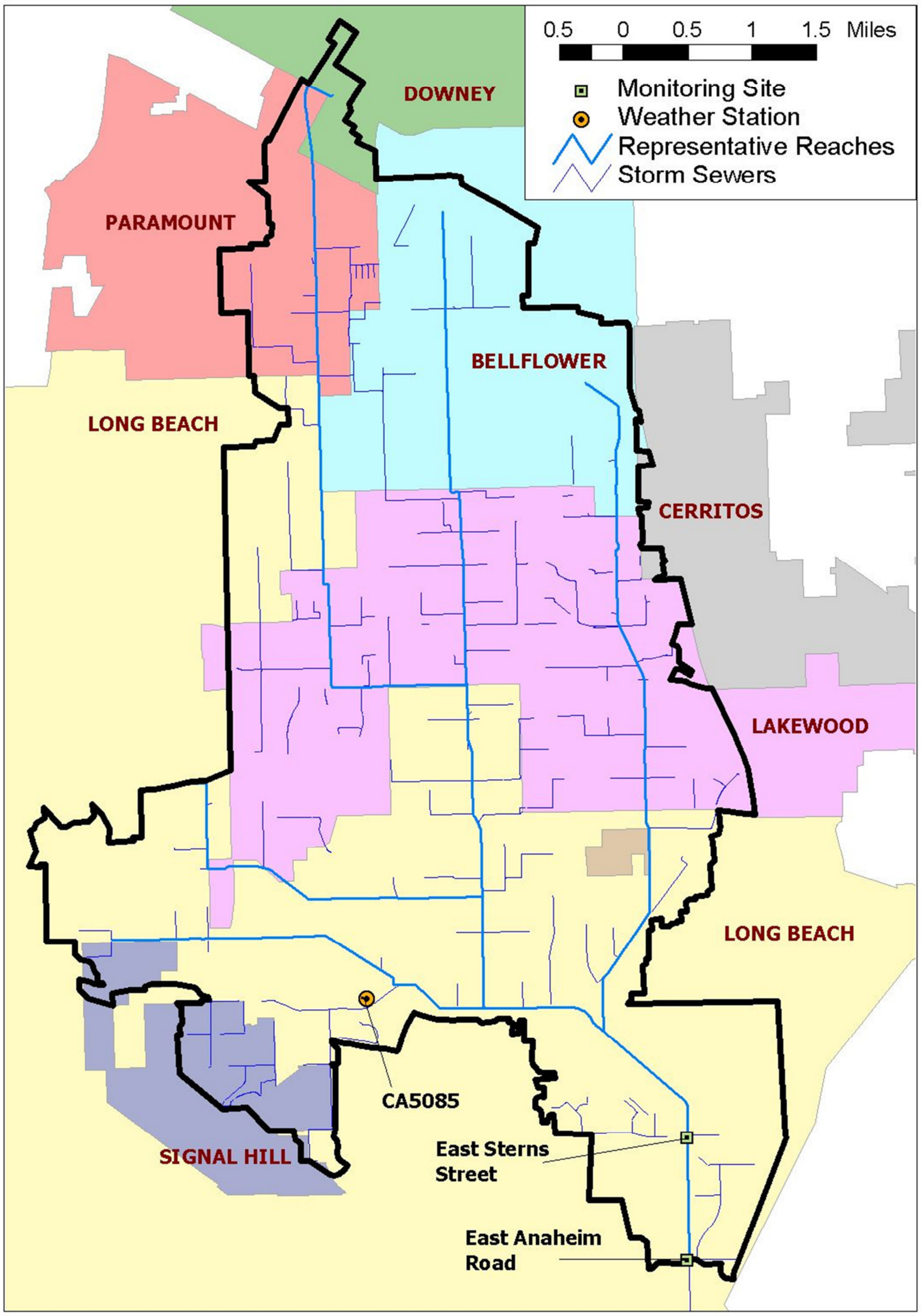
The portion of Los Cerritos Channel listed as impaired for metals that these TMDLs address is the freshwater portion above the tidal prism, 2.1 miles in length (shown in Figure 3). The Los Cerritos Channel above the tidal prism drains a relatively small

[1] Tidal prism is the volume of water drawn into the channel from the ocean through tides.

(17,725 acre) densely urbanized area, hereafter referred to as the Los Cerritos Channel Freshwater Watershed (Figure 1).

Approximately 45 percent of the watershed is located in east Long Beach while 55 percent is located outside the City of Long Beach, in the cities of Lakewood, Bellflower, Paramount, Downey, Signal Hill, and Cerritos. (See Figure 1.)

Figure 1. Los Cerritos Channel Freshwater Watershed



Land use within the Los Cerritos Channel Freshwater Watershed is 93% urban (approximately 59% residential, 4% mixed urban, 22% commercial, and 8% industrial). Open space accounts for 6% of land use and agriculture is <1% of land use. Table 1 shows the estimated number of acres for seven land use categories in the watershed.

Table 1. Land use types and acreage in the Los Cerritos Channel Freshwater Watershed.

Land Cover Type	No. of Acres	Percentage of Watershed
Agriculture	137.1	0.8%
Commercial	3,857.4	21.8%
High Density Residential	9,311.1	52.5%
Industrial	1,383.9	7.8%
Low Density Residential	1,205.2	6.8%
Mixed Urban	713.4	4%
Open Space	1,098	6.2%
Water	18.9	0.1%
Total	**17,724.9**	**100%**

Average dry-weather flows in Los Cerritos Channel are 2.98 cubic feet per second (cfs). Storm event flows can be as high as 1,460 cfs (historical maximum). Los Cerritos Channel was structured to quickly convey storm water to its terminus in Alamitos Bay. Therefore, the relationship between rain events in the watershed and increased flow in the channel is strong and immediate.

2.2. Environmental Setting: San Gabriel River

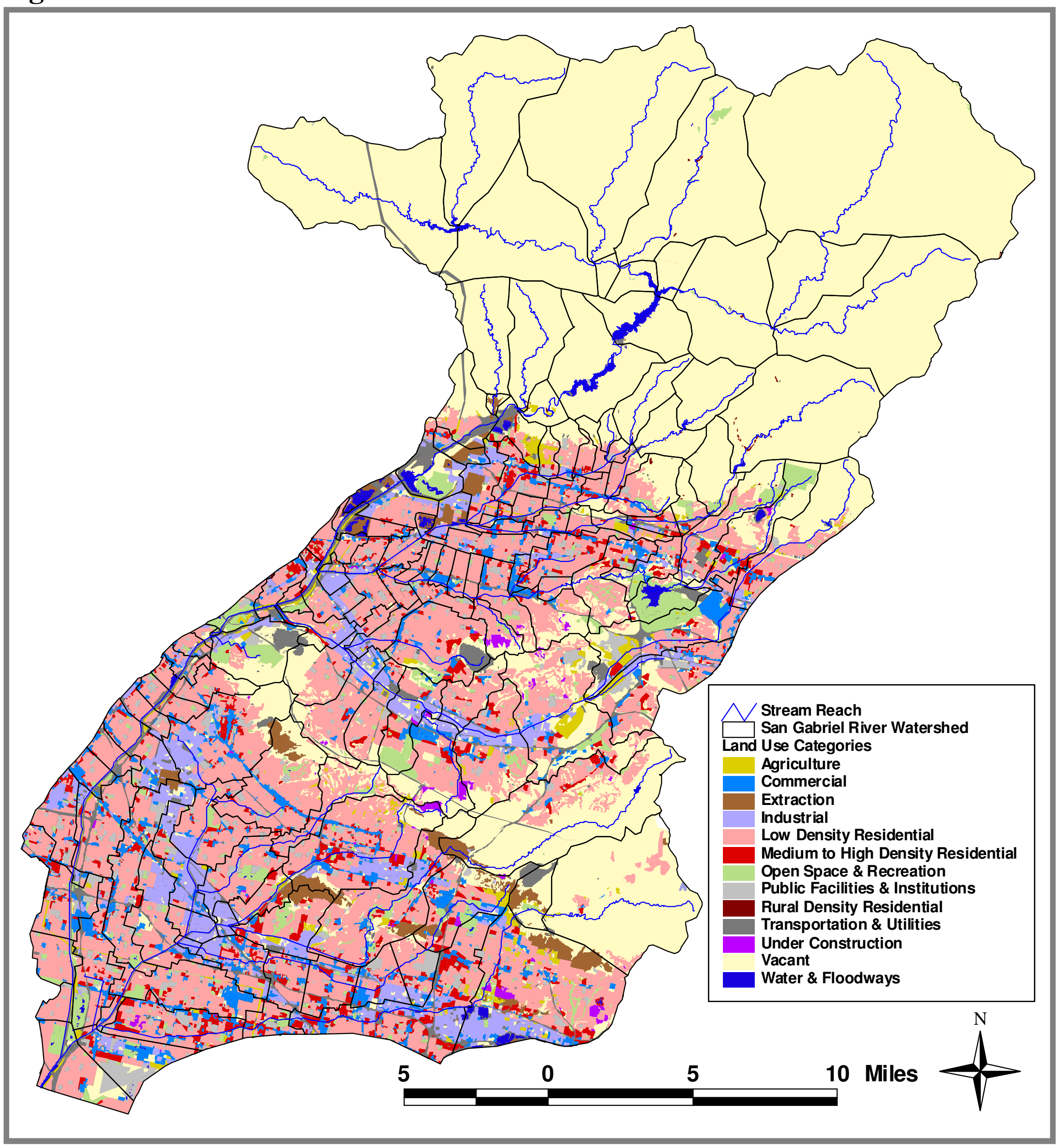
The San Gabriel River receives drainage from a 682 square mile area of eastern Los Angeles County and has a main channel length of approximately 58 miles. Its headwaters originate in the San Gabriel Mountains with the East, West, and North Forks. The river flows through a heavily developed commercial and industrial area before emptying into the Pacific Ocean in Long Beach. The main tributaries of the river are Walnut Creek, San Jose Creek, and Coyote Creek. San Jose Creek enters San Gabriel River Reach 3 below Walnut Creek. San Jose Creek Reach 1 is concrete lined in its upper portion and soft bottomed just before it joins the San Gabriel River. The San Jose Creek Water Reclamation Plant (WRP) discharges to the soft-bottomed portion of the reach. Tributaries to San Jose Creek Reach 1 include the South Fork, Diamond Bar Creek, and Puente Creek. The Pomona WRP discharges to the South Fork. (LARWQCB, 2000). A map of the watershed is presented in Figure 2.

The Whittier Narrows Dam is located at the base of Reach 3; it collects upstream runoff and dam releases for flood control and water conservation. If the inflow to the reservoir exceeds capacity, water is released into the San Gabriel River Reach 2. In Reach 2, groundwater is recharged either by percolation through the unlined bottom of the river or by the diversion of water to the San Gabriel Coastal Basin Spreading Grounds by way of rubber dams. Water that is not captured in these spreading facilities flows to the ocean.

Coyote Creek joins the San Gabriel River above the Estuary in Long Beach. Coyote Creek is a concrete-lined channel that flows along the Los Angeles/Orange County border. The upper portion of Coyote Creek is located in Orange County and is under the jurisdiction of the Santa Ana Regional Water Quality Control Board (Santa Ana Regional Board).

The Estuary is approximately 3.4 miles long with a soft bottom and concrete and riprap sides. The Estuary receives flow from San Gabriel Reach 1 and Coyote Creek, tidal exchange, and cooling water discharged from two power plants.

Figure 2. San Gabriel River Watershed



Land use within the San Gabriel River Watershed is 50% developed (approximately 30% residential, 4% mixed urban, 10% commercial, and 4% industrial). Open space accounts for approximately 50% of the land use.

2.3. Source Assessment

This section discusses both point source and nonpoint source contributions to metals loading in Los Cerritos Channel and the San Gabriel River. Point sources include discharges from a discrete human-engineered outfall. These discharges are regulated through National Pollutant Discharge Elimination System (NPDES) permits. Nonpoint sources, by definition, include pollutants that reach surface waters from a number of diffuse land uses and activities that are not regulated through NPDES permits.

2.3.1. Los Cerritos Channel Point Sources

The total point source loading of metals reflects the sum of inputs from urban runoff and multiple NPDES permits within the Los Cerritos Channel Freshwater Watershed (Table 2). In the Watershed, municipal separate storm sewer system (MS4) discharges of storm water and non-storm water are regulated under the Los Angeles County municipal separate storm sewer system (MS4) permit, the Long Beach MS4 permit, and the California Department of Transportation (Caltrans) statewide MS4 permit. Discharges of storm water and non-storm water from industrial activities and construction and land disturbance activities are regulated under the State's general industrial storm water permit and general construction storm water permit. There is one minor NPDES permit with the potential to contribute loadings to the system. There are also seven facilities with non-storm water general NPDES permits that have low individual potential to contribute significant loadings to the system but may in the aggregate contribute significantly.

Table 2. Summary of NPDES Permits in the Los Cerritos Channel Freshwater Watershed.

Type of NPDES Permit	Number of Permits
Municipal Stormwater	2
California Department of Transportation Stormwater	1
General Construction Stormwater	23
General Industrial Stormwater	33
Individual NPDES Permits (Minor)	1
General NPDES Permits:	7
Construction and Project Dewatering	2
Petroleum Fuel Cleanup Sites	1
Potable Water	2
Non-Process Wastewater	1
Hydrostatic Test Water	1
Total	**67**

2.3.2. San Gabriel River Point Sources

The NPDES permits in the San Gabriel River Watershed include the Los Angeles County, Long Beach, Orange County, and Caltrans MS4permits, general construction storm water permits, general industrial storm water permits, major NPDES permits (including publicly owned treatment works (POTWs) and power plants), minor NPDES permits, and general NPDES permits. The permits under the jurisdiction of the Los Angeles Regional Board are presented in Table 3.

Table 3. Summary of NPDES permits within the jurisdiction of the Los Angeles Regional Board in the San Gabriel River watershed.

Type of Discharge	Estuary	Reach 1	Coyote Creek	Reach 2	San Jose Creek	Reach 3 and Above	Total Permits
Municipal Storm Water	*	*	*	*	*	*	2
Caltrans Storm Water	*	*	*	*	*	*	1
Industrial Storm Water	-	45	203	8	177	166	599
Construction Storm Water	2	20	36	18	136	132	344
Publicly Owned Treatment Works	--	1	1	--	2	1	5
Power Plants	2	--	--	--	--	--	2
Minor NPDES Discharges	--	--	5	1	3	2	11
General NPDES Discharges	5	7	22	4	11	7	56
Construction Dewatering	1	2	4	--	8	1	16
Petroleum Fuel Cleanup Sites	--	--	4	1	--	--	5
VOC Cleanup Sites	--	1	2	--	--	1	4
Hydrostatic Test Water	2	--	1	--	1	--	4
Non-Process Wastewater	--	--	3	--	--	--	3
Potable Water	2	4	8	3	2	5	24

*Municipal and Caltrans permits discharge to all reaches.

The upper portion of Coyote Creek and a portion of the watershed draining to the Estuary are located in Orange County and are under the jurisdiction of the Santa Ana Regional Board. The permits under the jurisdiction of the Santa Ana Regional Board are presented in Table 4.

Table 4. Summary of NPDES permits within the jurisdiction of the Santa Ana Regional Board in the Coyote Creek and Estuary subwatersheds.

Type of Discharge	No. of Permits
Municipal Storm Water	1
Caltrans Storm Water	1
Industrial Storm Water	207
Construction Storm Water	184
Publicly Owned Treatment Works	0
Major NDPES Discharges	0
Minor NPDES Discharges	2
General NPDES Discharges	
De Minimus Discharges	2
Petroleum and Solvents Cleanup Sites	3

Storm water runoff in the San Gabriel River Watershed is regulated through the Los Angeles County MS4 permit, the Long Beach MS4 permit, the Orange County MS4 permit, the statewide storm water permit issued to Caltrans, the statewide Construction Activities Storm Water General Permit and the statewide Industrial Activities Storm Water General Permit.

The five POTWs (Whittier Narrows, Pomona, Long Beach, Los Coyotes, and San Jose Creek Water Reclamation Plants) in the San Gabriel River Watershed are connected to the Joint Water Pollution Control Plant (JWPCP), which discharges off of the Palos Verdes Peninsula. This system allows for the diversion of desired flows into or around each "upstream" plant. The Pomona plant has a design capacity of 15 million gallons per day (MGD) and discharges to the South Fork of San Jose Creek. The San Jose Creek plant has a design capacity of 1000 MGD and discharges to San Gabriel River Reach 1, San Jose Creek, San Gabriel River Reach 3, and the Rio Hondo and San Gabriel Coastal Spreading Grounds. The Whittier Narrows plant has a design capacity of 15 MGD and discharges to the river upstream of the Whittier Narrows Dam. The Los Coyotes plant has a design capacity of 37.5 MGD and discharges into the San Gabriel River Reach 1. The Long Beach plant has a design capacity of 25 MGD and discharges to Coyote Creek.

In addition to the POTWs, there are two major discharges in the watershed, the Haynes generating station, operated by the City of Los Angeles Department of Water and Power and the generating station operated by AES Alamitos, L.L.C. Both plants draw in water from the nearby Los Cerritos Watershed Management Area and discharge into the Estuary. The Alamitos plant draws in water from Los Cerritos Channel and is permitted to discharge up to 1,283 MGD. The Haynes plant draws in water from Alamitos Bay and is permitted to discharge up to 1,014 MGD.

2.3.3. Sources of Metals in Stormwater

Sources of metals in stormwater include automobile brake pads, vehicle wear, building materials, pesticides, erosion of paint and deposition of air emissions from fuel combustion and industrial facilities.

A Southern California stormwater study conducted between 2001-2005 found that industrial land use sites contributed substantially higher fluxes[2] and event mean concentrations (EMCs)[3] of copper and zinc relative to other land use site categories (e.g., residential, commercial, etc.) (Tiefenthaler et al., 2007, pp. 13-29.) In contrast, the highest fluxes for lead were associated with agriculture, high density residential, and recreational land use sites, while the highest EMCs for lead related to high density residential and industrial land use sites. Industrial sites typically have >70% impervious cover as well as on-site sources of metals which may explain the higher loadings of copper and zinc from industrial land use sites observed in the study. In addition, industrial land use sites were found to contribute substantially higher fluxes of Total Suspended Solids (TSS) relative to other land uses (along with agriculture land use sites). In the Los Cerritos Channel Freshwater Watershed and San Gabriel River Watershed, industrial land use only constitutes 8% and 4% of total land use, respectively.

The contribution of automobile brake pads to copper levels in Los Cerritos Channel and the San Gabriel River could be significant. Deposited onto roads by vehicles, copper from brake pad use is transported by stormwater into water bodies. The Brake Pad Partnership, a multi-stakeholder effort to understand the environmental impacts that may arise from brake pad wear debris from passenger vehicles, conducted a watershed modeling study of copper from brake pads affecting water quality in South San Francisco Bay, as an example area. The study determined that copper from brake pads accounts for up to half of the anthropogenic copper discharged from highly urbanized areas to the San Francisco Bay (Brake Pad Partnership Update, 2007). It is likely that brake pads are a major contributor to copper in stormwater runoff from urbanized areas.

2.3.4. Nonpoint Sources

Nonpoint source loading in the San Gabriel River and Los Cerritos Channel Freshwater watersheds is due to atmospheric deposition and open space. Direct deposition of metals is insignificant relative to the annual dry-weather loading or the total annual loading. Small load allocations are established for direct air deposition in the dry and wet weather TMDLs. Indirect atmospheric deposition is accounted for in the estimates of stormwater loading to Los Cerritos Channel and the San Gabriel River. Discharges from open space areas drain to the storm drain system before reaching the Channel, and are also addressed in the WLAs for MS4 permittees.

2.4. Allocations: Los Cerritos Channel

The TMDLs' allocations were derived based on the numeric targets established in the TMDLs. The numeric targets were calculated based on the numeric objectives in the California Toxics Rule (40 CFR section 131.38). Separate numeric targets were developed for dry and wet weather because hardness values and flow conditions in the waterbodies differ significantly between these conditions. Therefore, allocations are established separately for dry weather and wet weather, below.

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[2] Flux = the total mass loading of a storm divided by the total catchment size.

[3] EMC = the total mass load of a contaminant divided by the total runoff water volume discharged during a storm.

The USEPA-established TMDL assigns dry-weather allocations for copper and wet-weather allocations for copper, lead, and zinc in the Los Cerritos Channel Freshwater Watershed.

2.4.1. Dry-weather Allocations: Los Cerritos Channel

A dry-weather load allocation for direct atmospheric deposition of copper, expressed as total recoverable copper is 0.14 grams/day.

A zero waste load allocation has been assigned to all general industrial and construction storm water discharges during dry weather. The dry-weather waste load allocations for MS4 discharges are presented in Table 5.

Table 5. Dry-weather mass-based waste load allocations for Caltrans and MS4 discharges in the Los Cerritos Channel Freshwater Watershed expressed as total recoverable metals (grams/day).

Pollutant	**Caltrans**	**Los Angeles County MS4 Permittees**	**City of Long Beach MS4 Permittee**
Copper	1.0	67.2	41.4

Concentration-based dry-weather waste load allocations have been established for the minor NPDES permits and general non-storm water NPDES permits equal to 19.1 µg/L.

2.4.2. Wet-weather Allocations: Los Cerritos Channel

Identification of metal-specific TMDLs and allocations was based on a comparison of the existing loads with the loading capacity. For lead, where existing loads were less than the loading capacity, the TMDL and allocations were set at the existing load level. The wet-weather allocations for copper lead and zinc for direct atmospheric deposition and stormwater permittees are presented in Table 6.

Table 6. Wet-weather allocations in the Los Cerritos Channel Freshwater Watershed (total recoverable metals).

Metal	**Direct Atmospheric Deposition (g/day)**	**General Construction permittees (g/day)**	**General Industrial permittees (g/day)**	**Caltrans (g/day)**	**City of Long Beach MS4 Permittee (g/day)**	**Los Angeles County MS4 Permittees (g/day)**
Copper	0.0097 µg/L * daily storm volume (L) * 10^{-6}	0.250 * daily storm volume (L) * 10^{-6}	0.865 * daily storm volume (L) * 10^{-6}	0.070 * daily storm volume (L) * 10^{-6}	2.904 * daily storm volume (L) * 10^{-6}	4.709 * daily storm volume (L) * 10^{-6}
Lead	0.0552 µg/L * daily storm volume (L) * 10^{-6}	1.423 * daily storm volume (L) * 10^{-6}	4.933 * daily storm volume (L) * 10^{-6}	0.397 * daily storm volume (L) * 10^{-6}	16.560 * daily storm volume (L) * 10^{-6}	26.852 * daily storm volume (L) * 10^{-6}
Zinc	0.0947 µg/L * daily storm volume (L) * 10^{-6}	2.440 * daily storm volume (L) * 10^{-6}	8.455 * daily storm volume (L) * 10^{-6}	0.680 * daily storm volume (L) * 10^{-6}	28.385 * daily storm volume (L) * 10^{-6}	46.027 * daily storm volume (L) * 10^{-6}

Concentration-based wet-weather waste load allocations have been established for the minor NPDES permittees and general non-storm water NPDES permittees that discharge to Los Cerritos Channel equal to 9.8 μg/l total recoverable copper, 55.8 μg/L total recoverable lead, and 95.6 μg/L total recoverable zinc.

2.5. Allocations: San Gabriel River

The TMDLs' allocations were derived based on the numeric targets established in the TMDLs. The numeric targets were calculated based on the numeric objectives in the California Toxics Rule (40 CFR section 131.38). Separate numeric targets were developed for dry and wet weather because hardness values and flow conditions in the waterbodies differ significantly between these conditions. Therefore, allocations are established separately for dry weather and wet weather, below.

The USEPA-established TMDL assigns dry-weather allocations for copper in the Estuary and selenium in San Jose Creek and wet-weather allocations for copper, lead, and zinc in San Gabriel River Reach 2 and Coyote Creek.

2.5.1. Dry-weather Allocations: San Gabriel River

Dry-weather allocations have been assigned to sources that discharge directly to the estuary (Table 7) and to upstream sources that discharge indirectly to the estuary via San Gabriel River Reach 1 and Coyote Creek (Table 8).

Table 7. Dry-weather copper waste load and load allocations for the Estuary (total recoverable metals).

Source	Allocation
Power Plants	3.1 μg/l
Other NPDES	3.7 μg/l
Municipal Stormwater	3.7 μg/l
Industrial Stormwater	0
Construction Stormwater	0
Open Space	0 kg/d
Air Deposition	<0.001 kg/d

Table 8. Dry-weather copper waste load and load allocations for San Gabriel River Reach 1 and Coyote Creek (total recoverable metals).

Allocations	San Gabriel River Reach 1	Coyote Creek
Power Plants	18 μg/l	20 μg/l
Other NPDES	18 μg/l	20 μg/l
Municipal Stormwater	18 μg/l	0.941 kg/d
Industrial Stormwater	0	0
Construction Stormwater	0	0
Open Space	0 kg/d	0 kg/d

Air Deposition	0.0027 kg/d	0.002 kg/d

Dry-weather concentration-based selenium allocations have been assigned to point and nonpoint sources in San Jose Creek Reach 1 and Reach 2 (Table 9).

Table 9. Dry-weather selenium waste load and load allocations for San Jose Creek (total recoverable metals).

Source	Allocation
POTWs	5 µg/l
Other NPDES	5 µg/l
Municipal Stormwater	5 µg/l
Industrial Stormwater	5 µg/l
Construction Stormwater	5 µg/l
Open Space	5 µg/l
Air Deposition	0

2.5.2. Wet-weather Allocations: San Gabriel River

Wet-weather allocations have been assigned to all upstream reaches and tributaries of San Gabriel River Reach 2 and Coyote Creek. Allocations have been assigned to both point and nonpoint sources. Concentration-based waste load allocations apply for the POTWs and other non-storm water point sources. Mass-based load allocations apply for open space and direct atmospheric deposition. A grouped mass-based waste load allocation was calculated for storm water permittees (MS4s, Caltrans, General Industrial, and General Construction) by subtracting the load allocations from the total loading capacity. The wet-weather allocations for lead in San Gabriel River Reach 2 are presented in Table 10.

Table 10. Wet-weather allocations for lead in San Gabriel River Reach 2. Concentration-based allocations apply to non-stormwater NPDES discharges. Stormwater allocations are expressed as a percent of load duration curve (kg/d).

Source	Allocation
POTWs	166 ug/l
Other NPDES	166 ug/l
Municipal Stormwater	49% * 166 ug/l * Daily Storm Volume
Industrial Stormwater	2.2% * 166 ug/l * Daily Storm Volume
Construction Stormwater	0.7 *166 ug/l * Daily Storm Volume
Open Space	48% * 166 ug/l * Daily Storm Volume
Air Deposition	0.4% * 166 ug/l * Daily Storm Volume

The wet-weather allocations for copper, lead, and zinc in Coyote Creek are presented in Table 11.

Table 11. Wet-weather allocations for copper lead and zinc in Coyote Creek. Concentration-based allocations apply to non-stormwater NPDES discharges. Stormwater allocations are expressed as a percent of load duration curve(kg/d).

Allocation	Copper	Lead	Zinc
POTWs	27 ug/l	106 ug/l	158 ug/l
Other NPDES	27 ug/l	106 ug/l	158 ug/l
Municipal Stormwater	91.5% * 27 ug/l * Daily Storm Volume	91.5% * 106 ug/l * Daily Storm Volume	91.5% * 158 ug/l * Daily Storm Volume
Industrial Stormwater	3.5% * 27 ug/l * Daily Storm Volume	3.5% * 106 ug/l * Daily Storm Volume	3.5% * 158 ug/l * Daily Storm Volume
Construction Stormwater	5.0% * 27 ug/l * Daily Storm Volume	5.0% * 106 ug/l * Daily Storm Volume	5.0% * 158 ug/l * Daily Storm Volume
Open Space	0	0	0
Air Deposition	0.2% * 27 ug/l * Daily Storm Volume	0.2% * 106 ug/l * Daily Storm Volume	0.2% * 158 ug/l * Daily Storm Volume

In 2010, the listing for zinc in Coyote Creek was removed from the CWA 303(d) list because exceedances in the creek did not exceed the allowable frequency in the "Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List" (Listing Policy). Thus, the zinc allocations for Coyote Creek are likely being attained and can be considered as representing existing conditions. The allocations shall remain in place to ensure that water quality for this pollutant does not degrade below current levels.

3. Implementation

This section describes the regulatory mechanisms that will be used to implement the TMDL, how compliance with WLAs and LAs will be determined, implementation measures that could be used to attain WLAs and LAs, and an implementation schedule. This section also includes a discussion of monitoring requirements, special studies that may be conducted to evaluate assumptions in the TMDL, and a consideration of costs of the reasonably foreseeable methods of compliance with the TMDL.

3.1. Regulatory Mechanisms and Compliance Determination

3.1.1. Point Sources

The regulatory mechanisms used to implement the WLAs for the point sources in the Los Cerritos Channel and San Gabriel River metals TMDLs will NPDES permits that cover discharges from the Los Angeles County MS4, the City of Long Beach MS4, the County of Orange MS4, the Caltrans MS4, minor NPDES permits, general NPDES permits, general construction storm water NPDES permits, and general industrial storm water NPDES permits. Effluent limitations consistent with the assumptions and requirements of the WLAs shall be incorporated into each permit, at the time of permit issuance, modification, or renewal.

3.1.1.1. MS4 and Caltrans Storm Water Permits

MS4 and Caltrans stormwater NPDES permittees shall demonstrate a progressive reduction in pollutant loading according the schedule in Table 12. MS4 and Caltrans stormwater NPDES permittees must meet both the dry-weather and wet-weather WLAs for copper, lead, and zinc by June 30, 2026.

The WLAs for these discharges shall be incorporated into MS4 permits, including the statewide storm water permit for Caltrans, as water quality-based effluent limitations. These effluent limitations apply to Caltrans and all NPDES-regulated MS4 discharges in the San Gabriel River Watershed and Los Cerritos Channel Freshwater Watershed.

MS4 Permittees and Caltrans may be deemed in compliance with water-quality based effluent limitations if they demonstrate that (1) there are no violations of the water quality-based effluent limitations at the permittee's applicable MS4 outfall(s); (2) there are no exceedances of the receiving water limitations in the receiving water at, or downstream of, the permittee's outfalls; or (3) there is no direct or indirect discharge from the permittee's MS4 to the receiving water during the time period subject to the water quality-based effluent limitations.

If permittees provide a quantitative demonstration as part of a watershed management program plan that control measures and best management practices (BMPs) will achieve wet-weather water quality-based effluent limitations consistent with the schedules in Table 12, then compliance with wet-weather water quality-based effluent limitations may be demonstrated by implementation of those control measures and BMPs, subject to Executive Officer approval.

3.1.1.2. General Industrial and Construction Storm Water Permits

The dry-weather waste load allocations equal to zero apply to unauthorized non-storm water discharges, which are prohibited by the statewide General Permit for Discharges of Storm Water Associated with Construction Activity and the statewide Industrial Storm Water General Permit. Non-storm water discharges from construction or industrial activities authorized by Order No. 2009-0009-DWQ or Order No. 97-03-DWQ, respectively, or any successor order, are exempt from the dry-weather waste load allocation equal to zero. Instead, the reach-specific concentration-based waste load allocations assigned to the "other NPDES permits" shall apply to these non-storm water discharges. Dry-weather WLAs shall be incorporated into permits as effluent limitations or discharge prohibitions consistent with the assumptions and requirements of the WLAs. Compliance with dry-weather WLAs shall be assessed at a minimum by averaging the results of two grab samples. Dry-weather effluent limitations shall be expressed as instantaneous maximums.

Wet-weather mass-based waste load allocations for the general industrial and construction storm water permittees shall be incorporated into permits as effluent limitations and requirements consistent with the assumptions and requirements of the

TMDL WLAs. Wet-weather effluent limitations shall be expressed as event mean concentrations. Compliance with wet-weather WLAs shall be assessed at a minimum with one wet-weather sampling event.

If permittees provide a quantitative demonstration that control measures and BMPs will achieve wet-weather WLAs consistent with the schedules in Table 12, then compliance may be demonstrated by implementation of those control measures and BMPs, subject to Executive Officer approval.

3.1.1.3. Non-Storm Water NPDES Permits

Effluent limitations shall be consistent with the concentration-based WLAs established for non-storm water point sources in this TMDL. Permit writers may translate applicable waste load allocations into daily maximum and monthly average effluent limitations for the minor and general NPDES permits by applying the effluent limitation derivation procedures in Section 1.4 of the State Water Resources Control Board's Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California or other appropriate methodologies subject to Executive Officer approval.

3.1.2. Nonpoint Sources

Nonpoint sources will be regulated through the authority contained in sections 13263 and 13269 of the Water Code, in conformance with the State Water Resources Control Board's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program (May, 2004), and the Conditional Waiver for Discharges from Irrigated Lands (November, 2010).

3.1.3. Recommendations for Other Agencies

Other governmental agencies and organizations may implement and adopt regulations that reduce and eliminate the discharges of metals to the San Gabriel River watershed and the Los Cerritos Channel Freshwater Watershed. The Regional Board shall reconsider this TMDL in light of any revised regulations that may impact metals loading to these waterbodies.

3.2. Potential Implementation Strategies

3.2.1. MS4 Discharges: Los Cerritos Channel and San Gabriel River

Permittees may attain the WLAs assigned in the TMDL using any lawful means. Examples of attainment strategies include, but are not limited to: pollution prevention, runoff reduction through low impact development and regional retention facilities, and tiered treatment control. Cal. Water Code section 13263.3(b) defines pollution prevention as any action that causes a net reduction in the use or generation of a hazardous substance or other pollutant that is discharged into water. Pollution prevention includes input change, operational improvement, production process change, and product reformulation.

Pollution prevention can be a key strategy in reducing metals loading to Los Cerritos Channel and the San Gabriel River. Automobile brake pads are a source of copper to the San Gabriel River and Los Cerritos Freshwater watersheds that are regulated through SB 346, which was signed into law on September 25, 2010. SB 346 prohibits brake friction materials exceeding 5% copper by weight and 0.5% copper by weight by January 1, 2021, and January 1, 2025, respectively. A memorandum prepared for the MS4 permittees in the Los Cerritos Channel Freshwater Watershed (Moran, 2013) provides a range of urban runoff reduction estimates from 17% to 29% by 2020 and 55 to 61% by 2032 as a result of the anticipated phase out of copper in brake pads due to SB 346.

Zinc in automobile tires is a source of metals to the Los Cerritos Channel and the San Gabriel River. A similar change in tire composition could also reduce zinc contributions to the waterbodies over time.

Runoff reduction through low impact development is another implementation strategy to reduce metals loading to Los Cerritos Channel and the San Gabriel River. This strategy works by increasing infiltration, and therefore reducing the volume of stormwater that reaches the waterbodies. Rooftop rain gardens, vegetated swales, infiltration trenches, filter strips, and regional retention and infiltration facilities are examples of BMPs that increase infiltration and reduce runoff.

Another strategy to reduce metals loading is through the implementation of nonstructural BMPs. There are several nonstructural BMPs and management strategies that can be applied, including but not limited to: smart gardening programs, improved street sweeping technology and an increase in street sweeping frequency, enhancement of commercial and industrial facility inspections, escalation of enforcement procedures, and reduction of irrigation return flow.

3.2.2. Other Point Source Discharges: San Gabriel River

Based on a review of permits, discharger monitoring reports, and reasonable potential analyses, it is expected that the WRPs and most other minor and general NPDES permits in the San Gabriel River Watershed will meet their waste load allocations and will not need to install pollution control equipment to comply with the TMDL. The Haynes and Alamitos power plants are not expected to meet their waste load allocations based on their existing effluent quality. One potential means of compliance would be to replace the copper condensers used in the power generating units, which would eliminate any additional copper added to the intake water during the once-through cooling process. For the Alamitos plant, which draws in once-through cooling water from Los Cerritos Channel, the intake water has an average copper concentration equals 2.1 µg/L. Three out of 22 samples of intake water (from 2000-2004) had copper concentrations greater than the waste load allocation of 3 µg/L. For the Haynes plant, which draws in once-through cooling water from Alamitos Bay, the concentration of copper in the intake water averaged 12.2 µg/L, with all samples (from 2001-2005) exceeding the waste load allocation of 3 µg/L. Both plants would likely need to install additional pollution control equipment or consider alternative treatment strategies, such as implementing dry-cooling technologies or relocating their discharge out of the Estuary.

3.3. Monitoring

The monitoring programs will be designed to measure improvement in water quality and pollutant load reductions. The monitoring program has several goals including:

- Determine attainment of numeric targets;
- Determine compliance with the waste load and load allocations;
- Monitor the effect of implementation actions on water quality.

The TMDL monitoring program will consist of two components 1) receiving water monitoring and 2) outfall monitoring. All monitoring requirements may be included in subsequent permits or other orders and are subject to Executive Officer approval.

3.3.1. Receiving Water Monitoring

Permittees are responsible for developing and implementing a comprehensive monitoring plan to assess numeric target attainment and measure in-channel metals concentrations. Permittees are encouraged to work together to submit a joint watershed-wide plan. The monitoring plan should outline a program to sample for total recoverable metals, dissolved metals, and hardness The monitoring procedures/methods, analysis, and quality assurance shall be SWAMP comparable where appropriate. The sampling frequency and locations must be adequate to assess attainment of numeric targets.

Existing receiving water monitoring conducted under other programs can be leveraged to assist in meeting these monitoring requirements. Permittees may build upon existing monitoring programs in the San Gabriel River or Los Cerritos Channel Freshwater watersheds when developing the receiving water quality monitoring plan for this TMDL. Receiving water monitoring requirements shall be incorporated into the permits upon issuance, renewal, or modification. The permittees may continue to coordinate a watershed-wide monitoring program to meet this requirement in order to fulfill permit requirements. Receiving water monitoring shall continue beyond the final implementation date of the TMDL unless the Executive Officer approves a reduction or elimination of such monitoring.

3.3.2. Outfall Monitoring

Outfall monitoring will assess attainment of the waste load allocations. Outfall monitoring shall be required through the permits and other orders used to implement the waste load and load allocations. The monitoring procedures/methods, analysis, and quality assurance shall be SWAMP comparable.

In response to an order issued by the Executive Officer, MS4 and Caltrans stormwater permittees must submit a coordinated monitoring plan, to be approved by the Executive Officer, which includes both outfall monitoring and receiving water monitoring. Effective monitoring will be necessary to assess the condition of the Los Cerritos Channel and San Gabriel River and to assess the on-going effectiveness of efforts by dischargers to reduce metals loading to the San Gabriel River and Los Cerritos Channel. Once the coordinated monitoring plan is approved by the Executive Officer, monitoring shall commence within six months. Alternatively, MS4 permittees may address TMDL monitoring requirements through an integrated monitoring program (IMP) or coordinated integrated monitoring program (CIMP) submitted in fulfillment of requirements in the Los Angeles County MS4 Permit and forthcoming City of Long Beach MS4 Permit.

3.4. Implementation Schedule

The implementation schedule is phased according to percent reductions of metals loading. The MS4 permittees must demonstrate that they have effectively met dry and wet-weather WLAs by June 30, 2026.

As mentioned in the environmental setting, the portion of the San Gabriel River and Los Cerritos Channel listed as impaired for metals that these TMDLs address drains a relatively small (212,193 and 17,725 acres, respectively) developed area. The sizes of these developed areas lend themselves towards shorter implementation schedules than for other metals TMDLs. It is feasible to implement the implementation strategies discussed in section 3.2 by June 30, 2026 in watersheds of this size.

Stakeholders have proposed an implementation schedule generally consistent with the implementation of SB 346, which prohibits the sale in California of motor vehicle brake friction materials containing more than 5% copper by weight after January 1, 2021 and prohibits the sale of such friction materials containing more than 0.5% copper by weight after January 1, 2025. This schedule will also allow the permittees and the California Stormwater Quality Association (CASQA) to develop and support the adoption of similar control measure for zinc in tires, and to begin its implementation. This control measure could be based on the Safer Consumer Product Alternatives regulations currently being developed by the California Department of Toxic Substances Control (DTSC).

Thus, based on the size of the San Gabriel River Watershed and the Los Cerritos Channel Freshwater Watershed, and the potential phase out of copper and zinc in the watershed due to pollution prevention, the 13-year implementation schedule is reasonable and as short as practicable (Table 12).

Table 12. Implementation Schedule

NON-STORM WATER PROGRAM NPDES PERMITS	
June 30, 2017	The Los Angeles Regional Board may reconsider this TMDL, including the WLAs, LAs and implementation schedule, if warranted based on the results of monitoring and special studies and/or other new information.
Upon permit issuance, renewal, or re-opener	The non-storm water point sources shall achieve WLAs, expressed as effluent limitations derived using procedures in Section 1.4 of the State Water Resources Control Board's Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California or other appropriate methodologies as approved by the Executive Officer.
GENERAL INDUSTRIAL AND CONSTRUCTION STORM WATER PERMITS	
Upon permit issuance, renewal, or re-opener	The general industrial and general construction storm water permittees shall achieve dry-weather WLAs.
June 30, 2017	The general industrial and construction storm water permittees shall achieve wet-weather WLAs.
MS4 AND CALTRANS STORM WATER PERMITS	
June, 2017	The MS4 and Caltrans stormwater permittees shall demonstrate that 30% of the total drainage area served by the storm drain system is effectively meeting the dry-weather WLAs and 10% of the total drainage area served by the storm drain system is effectively meeting the wet-weather WLAs. Alternatively, permittees shall attain a 30% reduction in the difference between the current loadings and the dry-weather WLAs and a 10% reduction in the difference between the current loadings and the wet-weather WLAs at storm drain outfalls.
June, 2020	The MS4 and Caltrans stormwater permittees shall demonstrate that 70% of the total drainage area served by the storm drain system is effectively meeting the dry-weather WLAs and 35% of the total drainage area served by the storm drain system is effectively meeting the wet-weather WLAs. Alternatively, permittees shall attain a 70% reduction in the difference between the current loadings and the dry-weather WLAs and a 35% reduction in the difference between the current loadings and the wet-weather WLAs at storm drain outfalls.
June, 2023	The MS4 and Caltrans stormwater permittees shall demonstrate that 100% of the total drainage area served by the storm drain system is effectively meeting the dry-weather WLAs and 65%

	of the total drainage area served by the storm drain system is effectively meeting the wet-weather WLAs. Alternatively, permittees shall attain a 65% reduction in the difference between the current loadings and the wet-weather WLAs at storm drain outfalls.
June, 2026	The MS4 and Caltrans stormwater permittees shall demonstrate that 100% of the total drainage area served by the storm drain system is effectively meeting both the dry-weather and wet-weather WLAs and attaining water quality standards for copper, lead, and zinc.

3.5 Antidegradation Analysis

This amendment is consistent with the State Antidegradation Policy (State Water Resources Control Board Resolution No. 68-16), and the federal Antidegradation Policy (40 CFR § 131.12), in that it does not allow degradation of water quality, but requires restoration of water quality and attainment of water quality standards. The U.S. EPA-established TMDLs require compliance with CTR-based numeric targets and allocations for metals in waterbodies that are currently impaired due to metals. In the case of lead in Los Cerritos Channel, the U.S. EPA-established TMDL requires maintenance of existing conditions, which are on average better than necessary to achieve the applicable water quality standard for lead. Thus, the U.S. EPA-established TMDLs will require restoration or maintenance of water quality and are consistent with the State and federal antidegradation policies.

The proposed implementation plans establish reasonable timeframes to achieve the allocations assigned in the U.S. EPA-established TMDLs. The phased implementation schedule, which occurs over a 16-year period, is reasonable and as short as possible in order to set a path towards compliance with water quality standards. The proposed schedule is also consistent with other Regional Board-adopted metals TMDLs in the Region.

3.6 Conformance with the California Water Code Section 106.3

Effective January 1, 2013, Assembly Bill 685 (Stats. 2012, c. 524, § 1) added section 106.3 to the California Water Code. Section 106.3 states, in part:

(a) It is hereby declared to be the established policy of the state that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes.

(b) All relevant state agencies, including the department, the state board, and the State Department of Public Health, shall consider this state policy when revising, adopting, or establishing policies, regulations, and grant criteria when those policies, regulations, and criteria are pertinent to the uses of water described in this section.

The Regional Board has considered this State policy in amending the Basin Plan to include implementation plans for the U.S. EPA-established TMDLs. The TMDL numeric targets and allocations are based on CTR criteria for the protection of aquatic life, which are more stringent than the water quality criteria designed to protect municipal water supply beneficial uses. Thus, where there is a designated municipal water supply beneficial use, these Basin Plan amendments promote this policy by requiring, within a reasonable timeframe, restoration of water quality and attainment of water quality standards adequate to protect human health and ensure that water is safe for domestic use.

4. Cost Considerations

This section provides an overview of the potential costs associated with generalized discharge reduction, and takes into account a reasonable range of economic factors in estimating potential costs associated with this TMDL. An evaluation of the potential costs of implementing this TMDL amounts to evaluating the costs of preventing metals loading from the subwatershed from reaching the San Gabriel River and Los Cerritos Channel. This analysis, together with the other sections of this staff report, CEQA checklist, response to comments, Basin Plan amendment and supporting documents, were completed in fulfillment of the applicable provisions of the California Environmental Quality Act (Public Resources Code Section 21159.)[4]

The cost of implementing the TMDLs will range widely, depending on the methods that the responsible parties select to meet the waste load allocations. The MS4 permittees and power plants are the two types of permitted discharges reasonably expected to incur additional costs as a result of these TMDLs. The approaches for compliance can be categorized as stormwater management/treatment and replacing cooling technologies in power generating plants.

4.1. Stormwater Management and/or Treatment

MS4 and Caltrans permittees will likely implement a combination of structural and non-structural BMPs to achieve compliance with their waste load allocations. The 13-year

[4] Because this TMDL implements existing water quality objectives (namely, the numeric CTR criteria established by EPA), it does not "establish" water quality objectives and no further analysis of the factors identified in Water Code section 13241 is required. However, the staff notes that its CEQA analysis provides the necessary information to properly "consider" the factors specified in Water Code section 13241.

implementation schedules for the Los Cerritos Channel and San Gabriel River Metals TMDLs are generally consistent with the implementation of SB 346. It is expected that the phase out of copper in brake pads due to SB 346, as well as a potentially similar phase out of zinc in tires (see Section 3.4), may offset the need for structural controls to achieve compliance with final WLAs.

Due to the fact that some of the allocations in the Los Cerritos Channel and San Gabriel River Metals TMDLs are already being attained (in the case of the Los Cerritos Channel lead allocation, at the time of TMDL establishment, and in the case of the Coyote Creek zinc allocation, after TMDL establishment), it is not possible to estimate the extent and locations of any structural and non-structural BMPs that will need to be implemented after the phase out of copper in brake pads (and potentially zinc in tires) to attain the remaining allocations. Therefore, a total watershed-wide cost estimate for the two TMDLs is not provided here. Instead, costs are provided on a per acre (or curb-mile) basis so that permittees can estimate actual costs based on the locations at which they will ultimately implement BMPs to attain allocations.

Non-structural BMPs include source control, such as pollution prevention, increased catch basin cleanings, good housekeeping practices, and more frequent and efficient street sweeping. In their National Menu of Best Management Practices for Stormwater - Phase II, U.S. EPA reports that conventional mechanical street sweepers can reduce non-point source pollution by 5-30% (U.S. EPA, 1999a.) The removal efficiencies of sediment for conventional sweepers are dependent on the size of particles. Conventional sweepers, including mechanical broom sweepers and vacuum-assisted wet sweepers, have removal efficiencies of approximately 15 to 50% for particles less than 500 micrometers and up to approximately 65% for larger particles (Walker and Wong, 1999). U.S. EPA reports that vacuum-assisted dry street sweepers and regenerative street sweepers can remove significantly more pollution, including fine sediment and metals, before they are mobilized by rainwater. U.S. EPA reports a 50 - 88 percent overall reduction in annual sediment loading for residential areas by vacuum-assisted dry street sweepers. Sutherland and Jelen (1997) showed a total removal efficiency of 70% for fine particles and up to 96% for larger particles by vacuum-assisted dry sweepers (also known as small-micron surface sweepers.) Upgrading to vacuum-assisted dry sweeping would translate to a significant reduction of metals in the particulate phase.

In their 1999 Preliminary Data Summary of Urban Stormwater Best Management Practices, U.S. EPA estimated cost data for both standard mechanical and vacuum-assisted dry sweepers as shown in Table 15.

Table 15. Estimated costs for two types of street sweepers.

Sweeper Type	Life (Years)	Purchase Price ($)	O&M Cost ($/curb mile)
Mechanical	5	75,000	30
Vacuum-assisted	8	150,000	15

Source: U.S. EPA, 1999b

Table 15 illustrates that while the purchase price of vacuum-assisted dry sweepers is higher, the operation and maintenance costs are lower than for standard sweepers. Based on this information, U.S. EPA determined the total annualized cost of operating street sweepers per curb mile, for a variety of frequencies (in Table 16). In their estimates, U.S. EPA assumed that one sweeper serves 8,160 curb miles during a year and assumed an annual interest rate of 8 percent (U.S. EPA, 1999b). According to Table 16, permittees would save money in the long-term by switching to vacuum-assisted dry sweepers.

Table 16. Annualized sweeper costs, including purchase price and operation and maintenance costs ($/curb mile/year).

Sweeper Type	Sweeping Frequency					
	Weekly	Bi-weekly	Monthly	Quarterly	Twice/ year	Annually
Mechanical	1,680	840	388	129	65	32
Vacuum-Assisted	946	473	218	73	36	18

Currently, in the Los Cerritos Channel watershed, the cities of Downey, Long Beach, and Paramount use broom sweepers and/or vacuum sweepers, while the cities of Cerritos, Lakewood, and Signal Hill use regenerative sweepers. The cities employ street sweeping on a weekly basis, including municipal parking lots and some private parking lots. Under a phased implementation approach, the permittees could monitor compliance to determine the effectiveness of this first step of implementing non-structural BMPs. If monitoring showed non-compliance, permittees could adapt their approach by incorporating other non-structural BMPs.

If waste load allocations could still not be achieved through non-structural BMPs, permittees could incorporate structural BMPs. Two potential structural BMPs were analyzed in this cost analysis:

1. Infiltration trenches
2. Sand filters

These approaches are specifically designed to treat urban runoff and to accommodate high-density areas. They were chosen for this analysis because in addition to addressing metals loadings to the waterbodies, they have the additional positive impact of addressing the effects of development and increased impervious surfaces in the watersheds. Both approaches can be designed to capture and treat 0.5 to 1 inch of runoff. When flow exceeds the design capacity of each device, untreated runoff is allowed to bypass the device and enter storm drains or the waterbodies.

Both infiltration trenches and sand filters must be used in conjunction with some type of pretreatment device such as a biofiltration strip or gross solids removal device to remove sediment and trash in order to increase their efficiency and service life. This analysis provides an estimate of the additional costs associated with installing sand filters or infiltration trenches.

Costs were estimated using data provided by U.S. EPA (U.S. EPA, 1999a and 1999c) and the Federal Highway Administration (FHWA, 2003). U.S. EPA cost data were reported in 1997 dollars. FHWA costs were reported in 1996 dollars for infiltration trenches and 1994 dollars for sand filters. Where costs were reported as ranges, the highest reported cost was assumed. Costs were adjusted to 2013 dollars using U.S. Department of Labor, Bureau of Labor Statistics data (http://www.bls.gov/data/inflation_calculator.htm). An analysis of size constraints for each type of structural BMP considered is also included, which could be used to estimate land acquisition costs. To estimate land acquisition costs for individual projects in this cost analysis would be speculative.

4.1.1. Infiltration trenches

Infiltration trenches store and slowly filter runoff through the bottom of rock-filled trenches and then through the soil. Infiltration trenches can be designed to treat any amount of runoff, but are ideal for treating small urban drainage areas less than five to ten acres. Soils and topography are limiting factors in design and siting, as soils must have high percolation rates and groundwater must be of adequate depth. Potential impacts to groundwater by infiltration trenches could be avoided by proper design and siting. Infiltration trenches are reported to achieve 75 to 90% suspended solids removal and 75-90% metals removal by U.S. EPA and FHWA.

Table 17 presents estimated costs (in 2013 dollars) for infiltration trenches designed to treat 0.5 inches of runoff over a five-acre drainage area with a runoff coefficient equal to one using equations provided by FHWA and U.S. EPA. For FHWA calculations:

Cost = $\$1317\ V^{0.63}$ per device, 1996 dollars
Where V is storage volume in cubic meters

For the U.S. EPA estimates:
Cost = $\$5/ft^2$ of stormwater treated, 1997 dollars

Table 17. Estimated costs for infiltration trenches.

	Unit Costs	Maintenance Costs*
Based on U.S. EPA estimate (2013 dollars)	$84,691	$16,938/year
Based on FHWA estimate (2013 dollars)	$64,277	Not reported

* For U.S. EPA estimates, maintenance costs are assumed to be 20% of construction costs. FHWA did not estimate maintenance costs.

4.1.2. Sand Filters

Sand filters work by a combination of sedimentation and filtration. Runoff is temporarily stored in a pretreatment chamber or sedimentation basin, then flows by gravity or is pumped into a sand filter chamber. The filtered runoff is then discharged to a storm drain or natural channel. The costs of two types of sand filters were analyzed: 1) the Delaware sand filter, which is installed underground and suited to treat drainage areas of approximately one acre and 2) the Austin sand filter, which is installed at-grade and suited to larger drainage areas up to 50 acres. The underground sand filter is especially well adapted for applications with limited land area and is independent of soil conditions and depth to groundwater. However, both approaches must consider the imperviousness of the drainage areas in their design.

U.S. EPA estimated a 70% removal of total suspended solids and 45% removal of lead and zinc for both types of sand filters. FHWA reported high sediment, zinc and lead removal, but low copper removal for Austin sand filters and high sediment and moderate to high metals removal for Delaware sand filters.

U.S. EPA and FHWA reported costs per impervious acre to treat 0.5 inches of runoff for Austin ($18,500 and $3,400, respectively) and Delaware ($11,000 and $14,000, respectively) sand filters. U.S. EPA costs were reported in 1997 dollars and FHWA costs were in 1994 dollars. There are significant economies of scale for Austin filters. U.S. EPA reported that costs per acre decrease with increasing drainage area (i.e., $18,500 is at the high end of the range). FHWA reported two separate costs based on drainage area served ($3,400 for areas greater than five acres and $16,000 for areas less than two acres). Economies of scale are not a factor for Delaware filters, as they are limited to drainage areas of about one acre. Estimated costs (in 2013 dollars) are presented in Table 18.

Table 18. Estimated costs for Austin and Delaware sand filters.

	Austin Sand Filter Construction Cost/acre	Austin Sand Filter Maintenance Costs**	Delaware Sand Filter Construction Cost/acre	Delaware Sand Filter Maintenance Costs**
Based on U.S. EPA estimate (2013 dollars)	$26,761	$1,338	$15,912	$796
Based on FHWA estimate (2013 dollars)*	$5,326	Not reported	$21,932	Not reported

*FHWA cost estimate for Austin filters calculated assuming a drainage area greater than five acres.
** For U.S. EPA estimates, maintenance costs are assumed to be 5% of construction costs. FHWA did not estimate maintenance costs.

4.2. Replace Once Through Cooling with Alternative Cooling Technologies for Power Generating Plants

Based on recent effluent quality data, the Haynes and Alamitos power plants are not expected to meet their waste load allocations without implementing a compliance strategy.

On May 4, 2010, the State Water Resources Control Board adopted a policy regulating the use of seawater for cooling purposes at power plants in California. The 19 power plants that are regulated by the Policy can choose how they plan to comply with the Policy's required 93 percent reduction in their use of seawater. The compliance dates for Haynes Generating Station Units 5 & 6 and Alamitos Generating Station are December 31, 2013 and December 31, 2020, respectively.

The Haynes Generating Station is in the process of replacing two generating units (Haynes Units 5 and 6) that use ocean water cooling with six 100 megawatt fast start natural gas combustion turbines. The turbines will use "dry cooling," eliminating the use of ocean water for these units. These two generating units are expected to be in use by the end of 2013. The Haynes Repowering Project is the first of a series of repowering projects designed to eliminate the use of ocean water cooling at three coastal power plants. The Haynes Repowering Project will be completed in three phases, the last one being Haynes 8, which the Los Angeles Department of Water and Power has anticipated will be completed in 2035. The Haynes Repowering Project is estimated at $782 million, and has been planned for and included in the LADWP's Power System capital budget.

The Alamitos Generating Station is replacing six existing units at the facility in three separate phases with each phase involving the retirement of two units at the site. All replacement technology at the Alamitos Generating Station will be gas turbine based. AES-SL has proposed a schedule that completes the three phases in 2024, however, as part of AES-SL's plan, the largest units will voluntarily demonstrate compliance prior to the 2020 target date.

It is expected that when the power plants implement the State's once through cooling policy, they will attain their copper WLAs.

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