CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

PHOSPHORUS TOTAL DAILY MAXIMUM LOAD FOR LOMA ALTA SLOUGH, OCEANSIDE, CALIFORNIA

DRAFT MAY 2014

Phosphorus Total Daily Maximum Load Loma Alta Slough, Oceanside, California

Cover Photograph by Barry Pulver

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Friends of Loma Alta Creek
MACTEC
Tetra Tech, Inc.
Southern California Coastal Water Research Project
United States Environmental Protection Agency

EXECUTIVE SUMMARY

Water Body	Loma Alta Slough
Impaired Uses	Contact Water Recreation Non-Contact Water Recreation Estuarine Habitat Wildlife Habitat Rare, Threatened, or Endangered Species Marine Habitat
Clean Water Act 303(d) Listing	Eutrophic Conditions
Causative Pollutant	Phosphorus
Sources	Non-storm water and illicit flows into the MS4.
Total Maximum Daily Load	31.5 grams per month of phosphorus
Numeric Targets: Apply during the summer dry season only	*Surface Water Macroalgal Biomass:* Less than 90 grams dry weight per cubic meter. *Surface Water Macroalgal Cover:* Less than 50 percent.
Load and Waste Load Allocations for Phosphorus	Load Allocation: 19.7 grams per month Waste Load: 11.8 grams per month Margin of Safety: implicit
Implementation Mechanisms	Implementation of existing effluent-based discharge limitations and prohibitions, including those in the Regional MS4 Permit (Order No. R9-2013-0001
Estimated Attainment of Numeric Targets and Beneficial Uses	2023

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1 INTRODUCTION

Excessive eutrophic conditions within the Loma Alta Slough (Slough) restrict the ability of its water to support the beneficial uses designated in the *Water Quality Control Plan for the San Diego Basin (9)* (Basin Plan). As a result, the Slough was placed on the 1996 Clean Water Act (CWA) section 303(d) list of impaired water bodies. The impairment is limited to the summer-dry weather season when natural sand accretion at the ocean inlet restricts the mixing of freshwater and saltwater/ocean water, non-storm water and illicit discharges add nutrients to the Slough, and weather conditions foster excessive algal growth.

In accordance with CWA section 303(d) and State Water Board Resolution 2005-0050, "*Water Quality Control Policy for Addressing Impaired Waters: Regulatory Structure and Options*," the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board), the United States Environmental Protection Agency (USEPA), and local stakeholders investigated the conditions, sources of pollutants, loading capacity, and existing control requirements affecting the eutrophic conditions with the purpose of developing the Total Maximum Daily Load (TMDL) for the pollutants affecting the eutrophic conditions in the Slough and an implementation plan to achieve the TMDL.

The purpose of the TMDL and implementation plan is to restore water quality in the Slough so that it supports its beneficial uses as defined in the Basin Plan. After these beneficial uses are restored the Slough can be removed from the CWA 303(d) list for eutrophication.

The pollutant driver for the eutrophication is phosphorus. Sources of phosphorus into the Slough include non-storm water flows and groundwater. This Report presents the TMDL for phosphorus. The TMDL is the maximum amount of phosphorus that the Slough can assimilate and maintain water quality sufficient to meet its beneficial uses. The implementation plan to achieve the TMDL is for the City of Oceanside (City) to comply with existing permits that prohibit the discharge of non-storm water and illicit discharges into the City's municipal separate storm sewer system (MS4).

2 THE TMDL PROCESS

The purpose of a TMDL is to attain Water Quality Objectives (WQOs) that support beneficial uses in the water body. A TMDL is the maximum amount of a pollutant that a water body can assimilate and maintain water quality sufficient to meet its beneficial uses. The TMDL load is allocated to point sources as wasteload allocations (WLA), to non-point sources as load allocations (LA), and to a margin of safety (MOS) to account for uncertainties and unknowns. Mathematically, the TMDL can be expressed as:

$$TMDL = WLA + LA + MOS.$$

The TMDL also includes a strategy for meeting WQOs by allocating quantitative limits for point and nonpoint pollution sources. Once the total maximum pollutant load has been calculated, it is allocated among contributing sources in the watershed.

The TMDL process begins with the development of a technical analysis which includes the following seven components:

1) *Problem Statement* – generally describes impairment (Section 4)

2) *Numeric Targets* – identifies the numeric target(s) which when achieved will result in attainment of the WQOs and protection of beneficial uses (Section 5)

3) *Source Assessment* – identifies all of the known point sources and nonpoint sources of the impairing pollutant in the watershed (Section 6)

4) *Linkage Analysis* – establishes the relationship between pollutant sources and receiving water conditions and calculates the loading capacity of the waterbody, which is the maximum load of the pollutant that may be discharged to the water body without causing exceedances of WQOs and impairment of beneficial uses (Section 7)

5) *Margin of Safety (MOS)* – accounts for uncertainties in the analysis (Section 8)

6) *Seasonal Variation and Critical Conditions* – describes how these factors are accounted for in the TMDL determination (Section 9)

7) *Allocation of the TMDL* – division of the TMDL among each of the contributing sources in the watershed; wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint and background sources (Section 10)

The USEPA provides additional guidance regarding the statutory and regulatory requirements for establishing TMDLs.[1] Table 1 lists these requirements and locations where the information is provided.

TABLE 1
USEPA TMDL ELEMENTS

USEPA TMDL ELEMENT	SECTION/COMMENTS
The name and geographic location of the impaired waterbody for which the TMDL is being established and the names and geographic locations of the waterbodies upstream of the impaired waterbody that contribute significant amounts of the pollutant for which the TMDL is being established.	Section 3
Identification of the pollutant for which the TMDL is being established and quantification of the pollutant load that may be present in the waterbody and still ensure attainment and maintenance of water quality standards.	Sections 4.3 and 5
Identification of the amount, or degree, by which the current pollutant load in the waterbody deviates from the pollutant load needed to attain or maintain water quality standards.	Section 4 and 5
Identification of the source categories, source subcategories, or individual sources of the pollutant for which the wasteload allocations and load allocations are being established.	Section 4
Wasteload allocations to each industrial and municipal point source permitted under § 402 of the Clean Water Act discharging the pollutant for which the TMDL is being established; wasteload allocations for storm water, combined sewer overflows, abandoned mines, combined animal feeding operations, or any other discharges subject to a general permit may be allocated to categories of sources, subcategories of sources or individual sources; pollutant loads that do not need to be allocated to attain or maintain water quality standards may be included within a category of sources, subcategory of sources or considered as part of background loads; and supporting technical analyses demonstrating that wasteload allocations when implemented, will attain and maintain water quality standards.	Sections 6 and 10

[1] http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/TMDL-ch3.cfm

USEPA TMDL ELEMENT	SECTION/COMMENTS
Load allocations, ranging from reasonable accurate estimates to gross allotments, to nonpoint sources of a pollutant, including atmospheric deposition or natural background sources; if possible, a separate load allocation must be allocated to each source of natural background or atmospheric deposition; load allocations may be allocated to categories of sources, subcategories of sources or individual sources; pollutant loads that do not need to be allocated may be included within a category of sources, subcategory of sources or considered as part of background loads; and supporting technical analyses demonstrating that load allocations, when implemented, will attain and maintain water quality standards.	Section 10
A margin of safety expressed as unallocated assimilative capacity or conservative analytical assumptions used in establishing the TMDL; e.g., derivation of numeric targets, modeling assumptions, or effectiveness of proposed management actions which ensures attainment and maintenance of water quality standards for the allocated pollutant.	Section 8
Consideration of seasonal variation such that water quality standards for the allocated pollutant will be met during all seasons of the year.	Section 9
An allowance for future growth which accounts for reasonably foreseeable increases in pollutant loads.	Section 8.1
An implementation plan.	Section 11

The USEPA has also provided guidance on the requirements for a TMDL implementation plan. Table 2 presents the Implementation Plan Elements and where they can be found.

TABLE 2
USEPA IMPLEMENTATION PLAN ELEMENTS

USEPA IMPLEMENTATION PLAN ELEMENT	SECTION/COMMENTS
A description of the control actions and/or management measures which will be implemented to achieve the wasteload allocations and load allocations, and a demonstration that the control actions and/or management measures are expected to achieve the required pollutant loads	Section 11.1
A time line, including interim milestones, for implementing the control actions and/or management measures, including when source-specific activities will be undertaken for categories and subcategories of individual sources and a schedule for revising NPDES permits.	Section 11.2
A discussion of your reasonable assurances that wasteload allocations and load allocations will be implemented.	Section 11.1
A description of the legal authorities under which the control actions will be carried out.	Section 11.1
An estimate of the time required to attain and maintain water quality standards and discussion of the basis for that estimate.	Section 11.2
A monitoring and/or modeling plan designed to determine the effectiveness of the control actions and/or management measures and whether allocations are being met.	Section 11.3
A description of measurable, incremental milestones for the pollutant for which the TMDL is being established for determining whether the control actions and/or management measures are being implemented and whether water quality standards are being attained.	Section 12
A description of the process for revising TMDLs if the milestones are not being met and projected progress toward attaining water quality standards is not demonstrated.	Section 11.1.3

3 BACKGROUND INFORMATION

3.1 Description of the Loma Alta Slough

The Loma Alta Slough (Figure 1) is a relatively small (approximately 3 acres) and highly modified coastal estuarine wetland located within the City of Oceanside. The Slough is considered small in comparison to other regional coastal wetlands. The Slough is approximately 1,600 feet in length and extends from the Pacific Coast Highway to Buccaneer Beach at the Pacific Ocean.

FIGURE 1
AERIAL VIEW OF LOMA ALTA SLOUGH AND LOWER LOMA ALTA CREEK

Development has encroached upon on all sides of the Slough, with the open water portions experiencing fill, straightening, and conversion to hardened bed and/or banks. The historic terminus of Loma Alta Creek and the beginning of the Slough was at the current location of Interstate 5, with wetlands spanning much of the valley bottom (Grossinger et al. 2011). Commercial, industrial, and residential development resulted in significant infill of former estuary areas, and modification of the estuarine system from a coastal lagoon and wetland to a straightened river-mouth lagoon with a hardened bank system. Concrete bed and banks now extend from Interstate 5 west through the former estuary, transitioning to hardened banks with partial bed armoring upstream of the Pacific Coast Highway. Bank armoring extends to where the Slough meets the ocean at the beach (Figures 2, 3, and 4).

FIGURE 2
VIEW OF CONCRETE LINED SECTION OF LOMA ALTA CREEK
View to east (upstream). Photograph taken at Pacific Coast Highway.

FIGURE 3
VIEW OF SHOTCRETE-LINED SECTION OF LOMA ALTA CREEK
View to east (upstream). Photograph taken south of Pacific Coast Highway.

FIGURE 4
VIEW OF RIP-RAP ARMORED BANKS OF LOMA ALTA SLOUGH
View to east (upstream). Photograph taken at Slough near S. Pacific Street.

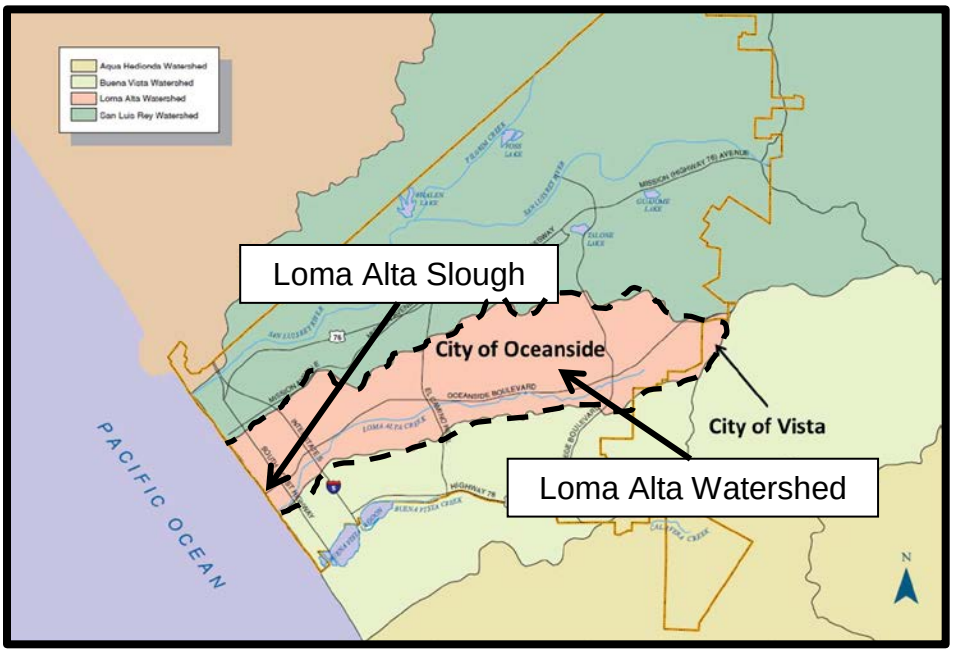
During the summer season, natural processes result in the development of a sand berm that, except for periods of high tide, separates the Slough from the ocean. During this time period the Slough is no longer connected to the Pacific Ocean and all flow to the ocean and tidal flushing ceases.

The City operates the Loma Alta Slough Ultraviolet Treatment Facility (FETD) during the summer-dry season to treat water in the Slough to meet contact bacteria standards before it is returned to the beach. This eliminates beach closures at Buccaneer Beach due to bacterial contamination from Loma Alta Creek during the summer months (Hammond 2010). The FETD extracts water at an inlet near the western edge of the Slough at a rate ranging between 300 to 700 gallons per minute (432,000 to 1,008,000 gallons per day), treats the water using an ultraviolet light, and discharges the treated water to the ocean (Hammond 2010, CMA and SCCWRP 2013). The extraction of water by the FETD maintains the water level in the Slough at an elevation to prevent flooding of adjacent properties.

3.2 Description of the Loma Alta Watershed

The Loma Alta Watershed is a small coastal drainage, with an area of approximately 6,400 acres and peak watershed elevation of 492 feet above mean sea level (Figure 5). The watershed is heavily urbanized, with over 70 percent of the watershed consisting of developed lands (City of Oceanside et al. 2011, Tetra Tech 2013). Development is predominantly residential, with smaller portions of commercial and industrial developments, utilities, and public facilities.

FIGURE 5
REGIONAL MAP SHOWING THE LOCATION OF THE LOMA ALTA WATERSHED



The majority (95 percent) of the Loma Alta Watershed is within the City of Oceanside. The remaining area lies within the City of Vista and the County of San Diego. Special districts also have jurisdiction in the watershed; most notably the North County Transit District (NCTD) which has right-of-ways and rail facilities adjacent to Loma Alta Creek and other facilities that cross the Slough.

Based on a review of data in the Geotracker database,[2] groundwater generally occurs at a depth of approximately seven feet below ground surface along Oceanside Boulevard between the Coast Highway and Melrose Drive. Oceanside Boulevard is typically adjacent and parallel to Loma Alta Creek for much of the watershed.

3.3 Water Quality Standards

CWA section 303 and section 13240 of the California Water Code (Water Code) require the San Diego Water Board to establish water quality standards for each water body within its region. Water quality standards include beneficial uses, water quality objectives (WQOs), and the antidegradation policy. The water quality standards applicable for the Loma Alta Slough are presented in the Basin Plan and the Water Quality Control Plan for Ocean Waters of California (Ocean Plan). The Basin Plan contains implementation programs to achieve water quality standards.

[2] https://geotracker.waterboards.ca.gov/

3.3.1 Beneficial Uses

The Loma Alta Slough is located within the Loma Alta Hydrologic Area (901.41) of the Carlsbad Hydrologic Unit (904.00). The Basin Plan designates the following existing beneficial uses for the Slough:

i. *Contact Water Recreation (REC 1):* Waters that support recreational activities where ingestion of water is possible. REC 1 activities include swimming, wading, water-skiing, skin and SCUBA diving, surfing, and fishing.

ii. *Non-Contact Water Recreation (REC 2):* Waters that support recreational activities not normally involving water contact or ingestion of water. REC 2 activities include sightseeing, aesthetic enjoyment of the water body alone or in conjunction with other activities such as bird watching, picnicking, sunbathing and hiking.

iii. *Estuarine Habitat (EST):* Waters that support estuarine ecosystems.

iv. *Wildlife Habitat (WILD):* Waters that support terrestrial ecosystems.

v. *Rare, Threatened, or Endangered Species (RARE):* Waters that support habitats.

vi. *Marine Habitat (MAR):* Waters that support marine ecosystems.

3.3.2 Water Quality Objectives

The Basin Plan contains WQOs developed to protect the most sensitive beneficial uses designated for a water body. The WQO for biostimulatory substances includes both a narrative WQO and a numeric interpretation.

i. Narrative WQO: The narrative WQO for biostimulatory substances for inland surface waters, enclosed bays and estuaries, and coastal lagoons is:

Inland surface waters, bays and estuaries and coastal lagoon waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growths cause nuisance or adversely affect beneficial uses.

ii. Numeric Interpretation of the WQO: The numeric interpretation of the WQO for biostimulatory substances for inland surface waters, enclosed bays and estuaries, and coastal lagoons is:

Concentrations of nitrogen and phosphorus, by themselves or in combination with other nutrients, shall be maintained at levels below those which stimulate algae and emergent plant growth. Threshold phosphorus (P) concentrations shall not exceed 0.05 milligrams per liter (mg/l) in any stream at the point where it enters any standing body of water, nor 0.025 mg/l in any standing body of water. A desired goal in order to prevent plant nuisance in streams and other flowing waters appears to be 0.1 mg/l total P. These values are not to be exceeded more than 10% of the time unless studies of the specific water body in question clearly show that water quality objective changes are permissible and changes are approved by the San Diego Water Board.

Analogous threshold values have not been set for nitrogen compounds; however, natural ratios of nitrogen to phosphorus are to be determined by surveillance and monitoring and upheld. If data are lacking, a ratio of N:P = 10:1, on a weight to weight basis shall be used.

4 PROBLEM STATEMENT

Eutrophic conditions at the Slough occur during the summer-dry season. Excessive eutrophication causes adverse ecological effects and creates a condition of public nuisance. This condition results in an impairment of water quality and limits the ability of the Slough to support the REC-1, REC-2, EST, WILD, MAR, and RARE beneficial uses. As a result, the Slough was placed on the 1996 CWA section 303(d) list of impaired water bodies. The impairment was confirmed during investigations conducted between 2007 and 2012 through funding by the State Water Resources Control Board, USEPA, and under San Diego Water Board Order No. R9-2006-0076 (see MACTEC 2009, McLaughlin et al. 2011, CMA & SCCWRP 2013).

4.1 Impairment of EST, WILD, MAR, and RARE Beneficial Uses

Eutrophication in the Slough is the result of the restriction of tidal flushing and continued watershed loading of non-storm water flows during the summer-dry season. The loading of nutrients to the Slough, combined with elimination of tidal flushing due to the buildup of a sand berm at the mouth of the Slough, higher water temperatures, lower salinity, and longer daylight promote excessive algal growth. The decay of the algae is an aerobic bacterial process which reduces the oxygen content of the Slough. A healthy aquatic habitat cannot be supported when dissolved oxygen is reduced to below 2 milligrams per liter (mg/l), a condition called hypoxia, and the Basin Plan requires much higher levels of dissolved oxygen be present to protect beneficial uses (Baird et al. 2004, San Diego Water Board).

4.2 Impairment of REC-1 and REC-2 Beneficial Uses

The Slough's wetland includes freshwater, marsh, mule fat scrub, and southern willow scrub and provides refuge, foraging areas, and breeding grounds for several threatened and endangered species as well as coastal marine species. The Slough and Creek also serve as habitats for approximately 100 species of wildlife including the federally listed as threatened California gnatcatcher, migratory birds, and raptors (City of Oceanside, 2013). Extensive urbanization along the coast has reduced these habitats and the public's ability to enjoy.

As shown in Figure 6, during the critical summer dry-weather period, the Slough experiences excess growth of algal mats, sometime stretching from bank to bank. At these times the Slough does not present a pleasant visual area and severely limits the public's ability to enjoy the activities such as sightseeing, aesthetic enjoyment of the water body, bird watching, picnicking, sunbathing and hiking.

FIGURE 6
VIEW OF LOMA ALTA SLOUGH DURING THE SUMMER DRY-WEATHER PERIOD
View to north. Photograph taken between the railroad bridge and Pacific Coast Highway.

4.3 Causes of the Impairment

The loading of nutrients associated with non-storm water dry weather flows into the Slough, the effect of urban development and physical modification of the Slough, and the closing the mouth of the Slough due to sand accretion and berm buildup are the driving components in the eutrophication of the Slough. Phosphorus is the limiting factor in algal growth within the Slough (McLaughlin et al. 2011, CMA and SCCWRP 2013). While additional pollutants may be associated with the discharge of phosphorus, the TMDL addresses phosphorus as the causative pollutant for eutrophication.

The environmental processes that support estuarine and wetland habitats have been altered by urban development with an increase in volume of freshwater, an increase in runoff due to increased impervious cover, non-storm water flows, and an increase in nutrient loading. In addition, the ability of the Slough and Loma Alta Creek to assimilate nutrient loading is greatly diminished by the concrete lining and straightening of Loma Alta Creek to control flooding of urban properties within the Loma Alta Creek floodplain.

The management of both bacteria and eutrophication in the Slough can lead to opposing decisions to remedy each problem. Buccaneer Beach, which is adjacent to the mouth of Loma Alta Slough, is a popular swimming beach. The mouth of the Slough is typically closed during the swimming season which prevents bacterial contamination of the beach from the Slough and watershed. This management plan is detrimental to the Slough because the standing water does not circulate, and additional freshwater inflows, especially non-storm water flows during the critical summer months, from the watershed provide increased loading of nutrients. These conditions lead to excessive algae growth and biomass and low dissolved oxygen in the Slough. Reducing the non-storm water dry weather flows, which contain both bacteria and nutrients, from the watershed will reduce the management conflict within the mouth of the Slough as both concerns will be addressed.

The effect of an open berm on water levels and algal growth within the Slough and the Creek is shown on Figures 7a, 7b, 8a, and 8c. Figures 7a and 7b were taken at the same approximate location in July 2013 and October 2013, respectively. Figure 7a was taken when the berm was in place. Figure 7b was taken after the berm was open. Comparison of these two figures illustrates how water levels decreased. They also illustrate that the excessive algal growth occurs during the summer dry-weather period.

FIGURE 7A
LOMA ALTA CREEK IN JULY 2013
View to east (upstream). Photograph taken near Pacific Coast Highway

FIGURE 7B
LOMA ALTA CREEK IN OCTOBER 2013
View to east (upstream). Photograph taken at same approximate location as Figure 7A.

Figures 8a and 8b not only illustrate the effect of an open berm on the Slough but also how beneficial uses improve when the algal growth is reduced. Figures 8a and 8b were taken at the approximate same location in July 2013 and October 2013, respectively. Figure 8a shows the condition of the Slough when the berm is closed during the summer. The water level is high due to the closure of the Slough and algal mats cover most of the water area. Only one bird is seen in this photograph.

FIGURE 8A
LOMA ALTA SLOUGH IN JULY 2013
View to north. Photograph taken on the east side of the railroad bridge.

FIGURE 8B
LOMA ALTA SLOUGH IN OCTOBER 2013
View to north. Photograph taken at same approximate location as Figure 8A.

Figure 8b shows the condition when the berm is open. Water levels are lower and algal mats are not visible. Additionally, several birds, representing three species can be seen in the water. This condition also allows the public to enjoy the beneficial uses of the Slough.

5 NUMERIC TARGETS AND THE TOTAL MAXIMUM DAILY LOAD

A numeric target is an interpretation of existing water quality standards; it is not a water quality standard, and therefore, the process required when adopting such standards, including application of Water Code section 13241, does not apply (OCC, 2002). The Basin Plan's biostimulatory WQO is a narrative objective with a numeric interpretation. This TMDL uses a numeric target to translate that narrative objective.

5.1 Total Daily Maximum Load

The TMDL for Loma Alta Slough is the mass of phosphorus per month that the Slough is able to assimilate and still meet the numeric targets. Because phosphorus is the limiting pollutant for algal production within the Slough, the Slough TMDL is specific to phosphorus loading. Once those numeric targets are achieved the water quality of the Slough will be sufficient to support all designated beneficial uses. At that point the impairment due to eutrophic conditions will no longer exist and the Slough may be removed from the 303(d) list.

The phosphorus load that the Slough can assimilate is calculated by the San Diego Water Board to be 31.5 grams of phosphorus per month during the impairment period (May through October). The basis for this calculation is as follows:

1. Modeling conducted by Coastal Monitoring Associates and Southern California Coastal Waters Research Project (CMA and SCCWRP 2013) indicates that a 96.1 percent load reduction is needed to meet the numeric targets.

2. During the impairment period, flow into the Slough averaged 0.55 cubic feet per second (355,100 gallons per day) and the concentration of phosphorus entering the Slough averaged 0.02 mg/l (see MACTEC 2009, CMA and SCCWRP 2013). Using the flow and concentration data, the estimated existing phosphorus load into the Slough during the impairment period is 807 grams per month.

3. The TMDL is 31.5 grams per month. The TMDL was derived from the following calculation.

   (0.961 reduction) x (807 g/month) = 776 g/m reduction
   (807 g/month) – (776 g/month) = 31.5 g/month maximum load

5.2 Numeric Targets

The numeric targets were selected through a stakeholder process (see Section 5.2.3).

5.2.1 Potential Numeric Targets

There are several potential numeric targets applicable for eutrophication impairment, for example:

- The Basin Plan's WQO for dissolved oxygen can be a numeric target because it is a frequent symptom of eutrophication.
- The Basin Plan's WQOs for nitrogen and phosphorus can be potential numeric targets because they represent nutrients needed for macroalgae and phytoplankton growth, whose blooms often drive eutrophication.
- Macroalgae biomass and cover and phytoplankton biomass themselves are measurable biological symptoms of eutrophication that can be appropriate numeric targets.

The numeric biostimulatory WQOs in the Basin Plan are based upon the hydrologic status of the surface water. For standing bodies of water, the objective is 0.05 mg/l of total phosphorus and 0.5 mg/l of total nitrogen. For flowing bodies of water, the objective is 0.1 mg/l of total phosphorus and 1.0 mg/l of total nitrogen. The hydrological status of the Slough is variable and dependent upon precipitation events and the status of the sand berm at the beach.

5.2.2 Selection of Numeric Targets

The stakeholders selected macroalgal biomass and percent surface algal cover (also referred to as macroalgal mats) as numeric targets (Table 3). These numeric targets are a valid interpretation of the Basin Plan's WQOs for biostimulatory substances. These numeric targets are a function of the growth of macroalgae and their responses as primary producers to nutrient loading of the Slough and the resultant eutrophic condition.

These numeric targets represent alternative numeric targets to Basin Plan WQOs. The inclusion of alternative numeric targets is supported by the USEPA (Creager et al. 2006). Macroalgal blooms are well documented in the literature as primary indicators of eutrophic conditions and drive subsequent habitat type changes within estuaries (Valiela et al. 1997).

TABLE 3
NUMERIC TARGETS FOR LOMA ALTA SLOUGH EUTROPHICATION TMDL

Metric	Target	Season
Surface Water Macroalgal Biomass	Less than 90 grams dry weight per cubic meter	May through October
Surface Water Macroalgal Cover	Less than 50 percent	May through October

Macroalgal biomass and percent cover are ecological-based numeric targets suitable for coastal sloughs (Creager et al. 2006 and Sutula et al. 2007). The numeric targets of benthic biomass of less than 90 grams dry weight per cubic meter (g dw/m^3) and percent cover of less than 50 percent were the consensus of stakeholders through a process that included responsible parties, interested parties including non-governmental organizations, the USEPA, and the San Diego Water Board.

These values are scientifically founded in research conducted by the European Union Water Framework Directive[3] and by research documenting reference conditions and lowest observed adverse effects (see Sutula et al. 2012) for various ecological conditions. A moderate ecological condition was used for this analysis.

Ecological conditions represent a qualitative spectrum from very high to very low (see Table 4). The selection of a "Moderate Ecological Condition" is appropriate as it recognizes that due to historic hydromodification of the Loma Alta Creek and Slough pristine conditions of a "Very High Ecological Condition" could not be achieved, and there is a reasonable expectation that the Slough can attain a "Moderate Ecological Condition" and still support the designated beneficial uses.

TABLE 4
ECOLOGICAL CONDITIONS

Very High	Good	Moderate	Low	Very Low
Non-Eutrophic Nearly Undisturbed	Non-Eutrophic Slight Change in Composition and Biomass	Non- to Eutrophic Moderate Change in Composition and Biomass	Eutrophic Major Change in Biological Communities	Non-Eutrophic Severe Change in Biological Communities

[3] See CMA and SCCWP 2013 (Appendix 1) section 6.1.2 for a full discussion

While some level of uncertainty is present, the initial threshold of adverse effects is expected to lie between 30-90 grams dry weight per square meter (g dw/m^2), which has been converted to a volumetric value for the Slough. Table 5 presents the ecological condition classification,[4] expressed as a function of percent cover and biomass, used during the stakeholder process.

TABLE 5
MACROALGAL CONDITIONAL CLASSIFICATION
(SCANLAN ET AL. 2007, CMA AND SCCWRP 2013)

Biomass ($g\ dw\ m^{-3}$)	Percent Cover				
	<5%	5% to 15%	15% to 25%	25% to 75%	> 75 %
>530	Moderate	Low	Very Low	Very Low	Very Low
175-530	Moderate	Moderate	Low	Very Low	Very Low
90-175	Good	Moderate	Moderate	Low	Low
10-90	Very High	Good	Good	Moderate	Low
<10	Very High	Good	Good	Moderate	Moderate

As specified in CMA and SCCWRP (2013), when levels of percent cover reach 50-80 percent cover, studies have found recreational activities to be undesirable. These multiple lines of evidence were discussed by the stakeholder group, which determined a worst case scenario of 90 g dw/m^3 and a percent cover of less than 50 percent would attain both a sufficient ecological condition and protect beneficial uses associated with recreation.

Nutrient concentrations were dismissed as numeric targets for the TMDL. Nutrient concentrations were modeled to determine if load reductions would be needed to meet the Basin Plan's numeric interpretation of the biostimulatory WQO. While nutrient concentrations and loading are critical indicators of eutrophication, they can be misleading when the samples are collected where, or downstream of where, algae are actively consuming nutrients. This condition was evident in the Slough during the summer of 2008 when some of the highest algal biomass levels found in the Southern California Bight was recorded in the Slough while surface water nutrient concentrations generally met the Basin Plan's numeric interpretation of the biostimulatory WQO (McLaughlin et al. 2011, CMA and SCCWRP 2013). Modeling confirmed this, finding no reduction in total phosphorus was needed for Slough waters to meet the Basin Plan's numeric interpretation of the biostimulatory WQO (CMA and SCCWRP 2013).

[4] Ecological conditions presented in Table 4 ranges from Very High to Very Low. Very High results in near pristine water quality conditions with the water body supports its beneficial uses and Very Low indicates a severely stressed water body that fails to support its beneficial uses.

Dissolved oxygen was also dismissed by the Stakeholder Group due to the following reasons.

1. The complexity of bar-built estuaries presents challenges of where, when, and how to measure dissolved oxygen to provide a reliable evaluation of estuary condition. For example:

    a. High macroalgal abundance can result in high levels of dissolved oxygen during peak periods of photosynthesis (D'Avanzo et al 1996).

    b. Relatively unimpacted bar-built estuaries will experience low dissolved oxygen levels in deeper areas due to gradients from residual saline waters (Largier et al. 1997, Sutula et al. 2012). As a result, where, when, and how to sample dissolved oxygen to best represent eutrophic conditions for the purpose of the Slough model is complex and would require additional assumptions.

2. No reference study for bar-built river mouth estuaries in southern California exists to determine appropriate parameters spatially and temporally by which to accurately model eutrophic conditions using dissolved oxygen.

5.2.3 Summary of Stakeholder Process in Development of the Numeric Targets

Numeric targets were developed through a collaborative stakeholder process that considered conditions specific to the Loma Alta watershed coupled with the latest scientific research. Between 2010 and 2012 discussions were held during stakeholder meetings where scientific information regarding the proposed numeric targets was presented.

Stakeholder meetings first focused on the analysis of historic and on-going monitoring data for the Loma Alta Slough related to all potential numeric targets, and how they might be applied or used as biostimulatory indicators in a TMDL setting. For example, at the June 22, 2010 meeting chlorophyll a data was discussed, and monitoring results showed chlorophyll a was an unlikely candidate due to a lack of phytoplankton within the system during impairment.

Analysis of Slough data showed that nutrients might not be a useful candidate in the context of the Basin Plan Objectives, and that a more refined target, such as macroalgae, was needed. Potential numeric targets considered at that point included nutrients, dissolved oxygen, and macroalgae.

The watershed and Slough models were validated for nutrients and eutrophication in 2012. Further stakeholder discussion was required to determine how to set and evaluate numeric targets for the purpose of the TMDL for model runs and scenario development. During the March 6, 2012 stakeholder meeting a consensus was reached on the macroalgal numeric targets used in this TMDL.

It was agreed that macroalgae constitutes a valid numeric target for the Slough, and further discussion and agreement was reached on specific macroalgal metrics, including weight/volume expression, sampling design for the target, and timing. Discussions were also held on the use, and issues, for dissolved oxygen and nutrients as numeric targets. While dissolved oxygen and nutrients were identified as numeric targets to run in the applicable models, several issues in their interpretation were identified for future discussion. Dissolved oxygen was also identified as having poor validation for watershed and Slough models. Table 6 presents the names of the Stakeholders and Participants present at the March 6, 2012 Stakeholder Meeting.

TABLE 6
STAKEHOLDERS AND PARTICIPANTS PRESENT
AT THE MARCH 6, 2012 STAKEHOLDER MEETING

Name	Organization
Alison Witheridge	City of Oceanside
Alyssa Muto	NCTD (BRG Consulting)
Anthony Cotts	Weston Solutions
Chad Loflen	San Diego Water Board
Cindy Lin	USEPA Region 9
Con Contaxis	CalTrans
Cynthia Gorham	San Diego Water Board
David Pohl	Weston Solutions
JoAnn Weber	County of San Diego
Martha Sutula	SCCWRP
Mo Lahsaiezadeh	City of Oceanside
Paul Harman	City of Vista
Pei-Fang Wang	Coastal Monitoring Associates
Roshan Sirimanne	MACTEC
Scott Norris	County of San Diego

The use of dissolved oxygen and nutrients and numeric targets in the Slough model was discussed during the March 27, 2012 stakeholder meeting. The Stakeholders agreed that dissolved oxygen not be used as a primary numeric target, but be used in some format as a secondary indicator for Slough condition and improvement, pending improved understanding of reference condition and/or further model refinement. It was also agreed that nutrients be uses as numeric targets for compare with modeling done using macroalgal numeric targets.

The stakeholder group discussed the model results on August 29, 2012. For the macroalgae targets, phosphorus load reductions of over 90 percent were required to meet the numeric targets of macroalgal biomass and percent cover. In contrast, models showed that no load reduction was needed to meet a numeric target of phosphorus concentration in the Slough, as the numeric interpretation of the biostimulatory WQO was already being met.

Following the presentation of these results, the San Diego Water Board received a letter, dated September 13, 2012, from the City of Oceanside regarding the August 29, 2012 Stakeholder Meeting. The letter states that it represents the following Stakeholders: Cities of Oceanside and Vista, County of San Diego, and Caltrans (City of Oceanside 2012). The letter requests that that macroalgae not be used as a numeric target for TMDL development due to the level of uncertainty and lack of adoption or vetting of the State of California's Nutrient Numeric Endpoint process. The letter requests that the existing numerical interpretation of the Basin Plan's WQO for biostimulatory substances be used as numeric targets for the Slough.

While it would be convenient to rely on the numeric interpretations of the biostimulatory substances WQO, the science and evidence informing the original stakeholder agreement to use a biological indicator outweighs any uncertainty with the precision of the selected macroalgae numeric targets. Therefore, the numeric targets selected through the Stakeholder process are used in this TMDL. The rationale for this decision is as follows:

1. The science supporting the numeric targets was thoroughly reviewed and agreed upon by the Stakeholders.

2. The macroalgal condition used to set the numeric targets is reasonable. It represents "moderate conditions." The numeric targets do not require actions to restore the Slough to pristine conditions.

3. The consensus on the numeric targets was made based on the science and the outcome of reaching a moderate condition. It is improper to question the science and/or the expected outcome because of the required reductions in phosphorus loading.

4. The implementation plan for the TMDL requires the City to comply with existing Order No. R9-2013-0001, *National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region* (Regional MS4 Permit) and effectively eliminate all non-storm water and illicit flows into the MS4. There should be no loading of phosphorus into the Slough during the summer dry season, and therefore the reductions would be required regardless of the selected numeric targets.

6 SOURCE ANALYSIS

Both point and non-point sources of phosphorus have been identified. Data analysis, modeling, and conclusions from the following references were used to make to make and support this conclusion.

- Investigative Order No. R9-2006-0076, *Owners and Operators of Municipal Separate Storm Sewer Systems, California Department of Transportation, Hale Avenue Resource Recovery Facility, and North County Transit District Responsible for the Discharge of Bacteria, Nutrients, Sediment, and Total Dissolved Solids into Impaired Lagoons, Adjacent Beaches, and Agua Hedionda Creek* (Lagoon Order);

- MACTEC 2009: *Carlsbad Hydrologic Unit Lagoon Monitoring Report. Prepared for the City of Carlsbad, City of Encinitas, City of Oceanside, City of San Marcos, City of Solana Beach, City of Vista, County of San Diego, California Department of Transportation, and the Hale Avenue Resource Recovery Facility;*

- City of Oceanside et al. 2011, *Technical Memorandum: Loma Alta Creek Watershed Wet Weather Definition;*

- McLaughlin et al. 2011: *Eutrophication and Nutrient Cycling in Loma Alta Slough, Oceanside, California. Technical Report 630*;

- CMA and SCCWRP 2013: *Watershed Loading, Hydrodynamic, and Water Quality Modeling in Support of the Loma Alta Slough Bacteria and Nutrient TMDL, Technical Report 666*; and,

- Tetra Tech 2013: *Loma Alta Creek DO Study Final Technical Memorandum May 2013.*

Additional data reviewed during the TMDL development included non-storm water MS4 outfall monitoring results collected by the City pursuant to Order Nos. R9-2009-0002, R9-2010-0016, and R9-2013-0001.

6.1 Point Sources

Point sources typically discharge at a specific location from pipes, outfalls, and conveyance channels from, for example, municipal wastewater treatment plants or MS4s. Current point source loading during the impairment period is estimated to be 787 grams per month of phosphorus (or 97.6 percent of the total load).

Point sources include non-storm water discharges from MS4 systems within the watershed (Figure 9). Monitoring data collected by the City under Order No. R9-2007-0001, shows that MS4 outfalls in the watershed are a significant source of flow and phosphorus to Loma Alta Creek. More recent inspections conducted by the San Diego Water Board also have confirmed dry season discharges of nutrient-enriched flows in the City's MS4 (San Diego Water Board, August 2, 2013).

Figure 9
Loma Alta MS4 Outfall with Non-Storm Water Discharge
Photograph Taken August 2013

The monitoring data collected by the City is also consistent with data analyzed under San Diego Water Board Order Nos. R9-2009-0002, R9-2010-0016, and R9-2013-0001, which found non-storm water discharges, specifically associated with inefficient landscape irrigation application, to be significant sources of pollutants to waters of the State. This is also consistent with a study conducted in an area of similar population and land uses in Orange County that measured nutrient discharges from landscaped areas (MWDOC 2008).

Other sources of irrigation runoff include areas where recycled water is discharged for landscape irrigation purposes. State Water Board Order No. 2009-0006-DWQ finds that nutrients are a pollutant of concern in recycled water and requires application that does not exceed the ability of landscape plants to use the nutrients, or discharge from the area of application. Runoff of landscape irrigation into the City's MS4 system is prohibited by Order No. R9-2013-0001, the Regional MS4 Permit.[5] And, discharges of irrigation runoff at Caltrans sites are prohibited by State Board Order No. 2012-0011-DWQ.

6.2 Non-Point Sources

Studies by the Cities of Oceanside and Vista have suggested that groundwater may be infiltrating into sections of the MS4 system. Concentrations of phosphorus detected in the suspected groundwater were reported to be below that found in MS4 discharges and below the numeric interpretation of the biostimulatory substances WQO (Tetra Tech 2013).

Order No. R9-2013-0001 requires the City to address groundwater infiltration into the MS4 system. To date, no source analysis for suspected groundwater discharges has been conducted near the Slough or upstream of the mass loading station.

Studies by the City of Oceanside[6] (see Tetra Tech 2013) stated that suspected groundwater discharges accounted for 20 percent of the total flow in a tributary downstream of the mass emission station. The suspected groundwater was reported to have an average phosphorus concentration of 0.038 mg/l, well below the Basin Plan's numeric interpretation of the Biostimulatory WQO of 0.1 mg/l. Non-storm water MS4 discharges from the City's storm drains and Loma Alta Creek receiving waters have shown phosphorus levels consistently between 0.1 and 0.5 mg/l, with some concentrations over 1.0 mg/L (City of Oceanside 2010, City of Oceanside 2012). That concentration level is at least one order of magnitude higher than that observed in suspected groundwater. The levels of phosphorus loading at the mass emission station are also over an order of magnitude higher than that found in potential groundwater sources Tetra Tech (2013).

Evidence to date fails to confirm that groundwater-based phosphorus has a significant impact, if any at all, on the eutrophication impairment of Loma Alta Slough.

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5 http://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/docs/updates052313/2013-0523_Order_No._R9-2013-0001_COMPLETE.pdf

6 The submitted groundwater studies were limited in scope and were not sufficient to meet the minimum requirements needed to determine the magnitude and extent of nutrients loading to the MS4 via groundwater. Additionally, the reports were not conducted under the direct supervision of a licensed Professional Engineer or Professional Geologist as required by the California Business and Professions Code. The raw data presented in these reports were used to calculate the TMDL and TMDL Allocations.

The San Diego Water Board also considers the groundwater investigation reported in Tetra Tech 2013 to be insufficient to demonstrate that significant amount of the phosphorus loading from the MS4 is from uncontrollable groundwater sources. The San Diego Water Board expects that the City will conduct future groundwater studies to determine the impact of phosphorus loading via groundwater infiltration to the MS4.

The Tetra Tech 2013 investigation did not cover the entire tributary of Loma Alta Slough, did not attempt to identify whether the sampled "groundwater" was groundwater infiltrating into the MS4 system or surface water entering the MS4 system, and did not account for all observed flows within the channel. In addition, no groundwater source investigations have been conducted for flows at or above the mass emission station. Furthermore, as required by the California Professions Code[7], the study was not done under the direct supervision of a licensed Professional Engineer or Professional Geologist.

While the groundwater data is considered by the San Diego Water Board to be highly limited in scope and duration, it is the only data available for non-point sources. Consequently, the following conservative assumptions were used when estimating the load allocation:

- The lower tributary is representative of the entire watershed's groundwater source loading and concentration; and

- All observed groundwater flows are naturally occurring.

Using an estimate of groundwater contributing 20 percent of the flow at 10 percent of the point source concentration level of monitored MS4 discharges, the existing non-point source loading is estimated as no greater than 2 percent of the existing total load, or 16.4 grams per month, of phosphorus during the impairment period.

Lastly, in its letter dated September 13, 2012, the City recommends using an implicit margin of safety to account for potential groundwater sources while further running models with the addition of groundwater sources. The letter also acknowledges that additional data collection on groundwater is needed. Indeed, there is a lack of groundwater data and further need for identification of contributions in a future modeling scenario. The model could be re-run in the future after additional groundwater data is collected.

[7] California Business and Professions Code sections 6730, 6730.2, 6735, and 7835.

6.3 Other Sources

TMDL-related source investigations identified the MS4 system and potentially groundwater as the only two sources of nutrients into the Slough during the dry-weather season. There are a number of other potential sources, including ones with NPDES permits and others with discharge prohibitions. None of the permitted discharges are considered to be significant sources of phosphorus in the dry season impairment period. Similarly, none of the prohibited discharges, other than ones from the MS4 system, are considered significant sources at this time. The following sections describe how existing permits have adequate requirements and effluent limitations to achieve water quality objectives that support the beneficial uses of the Slough.

6.3.1 Existing Permits with Effluent Limitations and/or Prohibitions

The following is a list of the water board permits that regulate potentially significant sources of phosphorus in the watershed. Each of these permits includes control limits sufficient to protect water quality within Loma Alta Slough.

1. *Municipal Storm Water Permit (Order No. R9-2013-0001)*

   Order No. R9-2013-0001 prohibits non-storm water discharges into the MS4s. Pursuant to CWA 402(p)(3)(B)(ii), MS4 permits must include a requirement to effectively prohibit non-storm water discharges into the MS4s unless specifically exempted and not a source of pollutants. Non-storm water discharges resulting from over-irrigation have been found to be a source of several types of pollutants (e.g., nutrients, bacteria, pesticides, sediment) in receiving waters. Under Order No. R9-2013-0001, the San Diego Water Board and the MS4 Copermittees have identified categories of non-storm water discharges associated with over-irrigation as a source of nutrients, including phosphorus and nitrogen, to the MS4 and waters of the United States. Over-irrigation discharges are no longer considered conditionally-exempted municipal storm water discharges. Dry weather flows from the MS4 into Loma Alta Creek and the Slough are prohibited unless specifically exempted, and not a source of pollutants.

2. *Caltrans Storm Water Permit (Order No. 2012-0011-DWQ)*

   This NPDES permit includes a requirement to effectively prohibit non-storm water discharges into the MS4s. In addition, this Order requires Caltrans to design all landscapes to comply with the California Department of Water Resources Water Efficient Landscape Ordinance. Where the California Department of Water Resources Water Efficient Landscape Ordinance conflicts with a local water conservation ordinance, the Department shall comply with the local ordinance (see section 6.3.2 for a summary of local ordinances).

3. *WDRs for the Use of Reclaimed Water by the City of Oceanside (Order No. 93-07)*

   This order regulates use of recycled water by the City of Oceanside. Provision D.i prohibits reclaimed water used for irrigation from leaving the property on which it is applied.

4. *WDRs for Use of Recycled Water (Order No. 2009-0006-DWQ)*

   This order regulates the use of recycled water in the watershed, which includes use for irrigation at sites such as certain Caltrans facilities. This Order prohibits non-incidental discharges of recycled water.

5. *Hydrostatic Testing and Potable Water (Order No. R9-2010-0003)*

   This NPDES permit regulates discharges of hydrostatic test water and potable water to surface waters and storm drains or other conveyance systems within the San Diego region. Potable water is not a suspected significant source of phosphorus.

6. *Groundwater Extraction (Order No. R9-2008-0002)*

   This NPDES permit regulates groundwater extraction and similar discharges to surface waters within the San Diego region except for San Diego Bay. It requires effluent to comply with the discharge limits that are protective of water quality. Enrollees are typically temporary construction sites that require excavation and dewatering. There are no permanent dewatering discharges regulated by this permit in the Loma Alta watershed. Since 1996, there has only been one discharge that has violated the permit's discharge criteria by more than 40 percent.

7. *Construction Storm Water Permit (Order No. R9-2009-0009-DWQ)*

   This is the NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities. Non-storm water discharges, other than potable water line flushing are generally prohibited. Potable water is not a suspected significant source of phosphorus. Potable water line flushing is subject to technology-based BMP requirements to meet water quality standards.

8. *Sanitary Sewer Collection Systems (State Water Board Order No. 2006-0003-DWQ and San Diego Water Board Order No.R9-2007-0005)*

   These orders establish waste discharge requirements for sanitary sewer collection systems. Both prohibit the discharge of untreated sewage to waters of the State. The San Diego Water Board Order further prohibits the discharge of untreated sewage at any point upstream of a sewage treatment plant. Records of spills in the Loma Alta Slough watershed are available on-line at:

   http://www.waterboards.ca.gov/water_issues/programs/ciwqs/publicreports.shtml#sso

Aside from dischargers regulated by the MS4 permit, none were identified as a significant source of phosphorus to the Slough during the summer impairment period. Most other discharges are of infrequent duration (e.g., sewage spills) or occur outside of and do not affect the seasonal impairment (e.g., storm water).

Furthermore, no evidence has been provided to the San Diego Water Board to indicate that there are any other point sources in Loma Alta Watershed, permitted or otherwise, that are discharging significant loads of nutrients during the impairment period.

6.3.2 City of Oceanside's Water Efficient Landscape Regulation

The City's Ordinance No. 10-OR0412-1 (adopted in May 2010)[8] amends Chapter 37 of the Oceanside City Code by including Article VII – Water Efficient Landscape Regulation. This Ordinance includes specific water saving requirements for new construction, and prohibits irrigation runoff from entering the City's MS4.[9]

7 LINKAGE ANALYSIS

The elimination of anthropogenic loading of nutrients, consistent with existing permit requirements, will encourage the restoration of degraded areas, prevention of excessive algae buildup, and the resulting eutrophication within the Slough. The linkage between source contributions and receiving water response was documented by, models that simulate source loadings and transport of nutrients into the Slough and associated algal response (CMA and SCCWRP 2013). The models provide an important tool to evaluate algal response in multiple scenarios and to calculate TMDL load reductions. This provides the linkage between pollutant loading from identified sources and the response of the water body. Modeling demonstrating the linkage can be found in CMA and SCCWRP 2013.

[8] http://www.waterconservationsummit.com/Oceanside_Water_Efficient_Landscaping_Ordinance_10-OR0412-1.pdf

[9] Section 37.137.a, states that "no person shall use water for irrigation that due to runoff, low head discharge, overspray or other similar condition, water flows onto adjacent property, non-irrigated areas, structures, walkways, roadways or other paved areas."

The Slough has been altered into a confined river mouth estuarine system that cannot assimilate current anthropogenic loading. The Slough exhibits classic symptoms of channel modification (see Avoine 1986, Kennish 2002, Zaikowski et al. 2008), which include a lack of sedimentation, reduced freshwater residence time, and seaward migration of salinity.

7.1 Wet Weather Loading of Phosphorus is not a Primary Contributor to the Summer-Dry Season Eutrophic Conditions in the Slough

McLaughlin et al. (2011) determined that wet weather accumulation and deposition of organic material and sediment is not a potential contribution as a "source" of phosphorus for dry weather algal blooms. This is critical to develop management strategies because organic matter and sediment deposited during the wet weather period can, in other systems, provide additional nutrient loading and promote low dissolved oxygen conditions during impairment periods.

To determine the significance of benthic contributions to the dry weather impairment, McLaughlin et al. (2011) examined sediment bulk characteristics, solid phase and pore water nutrients, and Berylium-7 radioisotope on a seasonal basis. Results found wet weather benthic contributions of nutrients to be low, as was sediment percent fines and organic carbon. Sediment oxygen demand was low during all seasons. Despite some of the highest biomass of macroalgae documented in southern California, this biomass did not accumulate in Slough sediments from season to season.

The historic conversion of the Slough to a river mouth estuary reduces sediment retention and organic deposition within the Slough during storm events, actually making the Slough **less** (emphasis added) susceptible to eutrophication than prior to development when the berm is not in place (McLaughlin et al. 2011). Slough eutrophication and co-occurring hypoxia were found to be driven primarily by "new" nutrients rather than "recycled" nutrient efflux from the sediments. The closing of the mouth Slough during the dry season prevents tidal flushing, and coupled with the existing dry weather loading, creates the condition that promotes algal growth and the resulting eutrophic condition.
Modeling has determined that reducing point source watershed loads will provide an appropriate hydrologic balance for the Slough (CMA and SCCWRP 2013). Reduction of dry weather loading will reduce the amounts of nutrients entering the Slough which will reduce algal biomass and cover, and increase the trophic productivity of the Slough.

7.2 Phosphorus Loading from Non-Storm Water Discharges to the MS4 is the Primary Contributor to the Summer-Dry Season Eutrophic Conditions in the Slough

Phosphorus is the limiting factor for macroalgal production, and watershed loads are the primary source of phosphorus loading.[10] The dominant source of phosphorus loading from the watershed to the Slough is non-storm water discharges from the City's MS4 system. The City's monitoring effort has found non-storm water discharges to contain high concentrations and loads of phosphorus, with some discharges containing orthophosphate-P concentrations over 2.4 mg/L (City of Oceanside 2010, 2012). Non-storm water discharges from the MS4 into receiving waters, including discharges causing eutrophic conditions, were observed during an August 2013 inspection by the San Diego Water. The San Diego Water Board has not received any data that shows other NPDES and/or Waste Discharge Requirement point sources in the watershed are violating permit requirements and contributing to the impairment of the Slough.

Investigations conducted between 2007 and 2012, when the City's non-storm water discharges to the MS4 were regulated under NPDES Order No. R9-2007-0001 (2007 MS4 Permit), confirmed the impairment of the Slough. While the 2007 MS4 Permit required the City to effectively prohibit all types of non-storm water discharges, certain categories of non-storm water discharges were not prohibited unless identified by the Copermittee or the San Diego Water Board as a source of pollutants.

The 2007 MS4 Permit also required the City to have a non-storm water *Illicit Discharge/Illicit Connection Detection and Elimination Program* (IC/ID Program) to educate staff and the public, conduct non-storm water monitoring, and take necessary actions to prevent and stop unpermitted non-storm water MS4 discharges. Under this program the City found "the prevailing source of historical ponded and flowing water is from residential and commercial over-irrigation" (City of Oceanside 2010). The program found the majority of staff and public IC/ID Program complaints were related to irrigation. Figure 10 presents the distribution of these complaints.

[10] Microgalgae also is a primary producer that can contribute to the condition of eutrophication as does macroaglae. Because the Numeric Targets have been set using macroaglae as a biological indicator of the health of the waterbody the analysis presented is based on the growth of macroalgae.

Figure 10
City of Oceanside IC/ID Urban Runoff Hotline Calls 2009-10

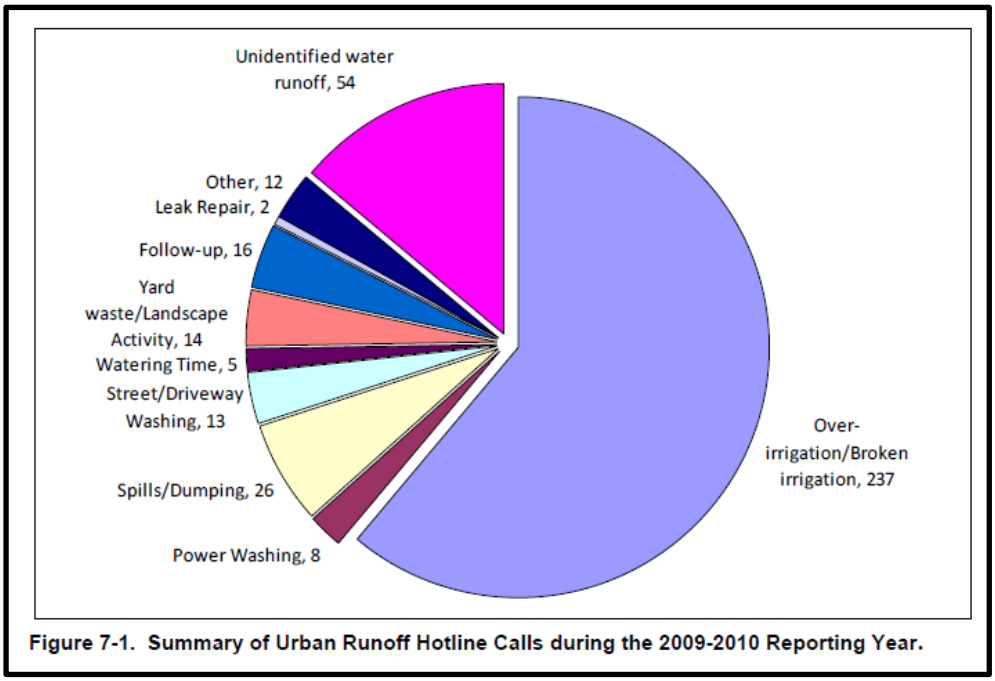

Figure 7-1. Summary of Urban Runoff Hotline Calls during the 2009-2010 Reporting Year.

7.3 The Regional MS4 Permit Provides Additional Prohibitions against Non-Storm Water Discharges to the MS4 and Provides the Mechanism for the City to Identify and Terminate Prohibited Discharges

Order No. 2013-0001 (Regional MS4 Permit) was adopted by the San Diego Water Board in May 2013 to replace the 2007 MS4 Permit. The Regional MS4 Permit removes several categories of non-storm water discharges, including landscape irrigation, irrigation water, and lawn watering, from prohibition exemptions. As described in the Regional MS4 Permit, the San Diego Water Board and MS4 Copermittees have identified these non-storm water discharges as sources of nutrients to receiving waters in the San Diego Region.[11] The Regional MS4 Permit states:

"Elevated dry-weather storm drain flows, composed primarily … of landscape irrigation water wasted as runoff, carry pollutants that impair recreational use and aquatic habitats all along Southern California's urbanized coastline. Storm drain systems carry the wasted water, along with landscape derived pollutants such as bacteria, nutrients and pesticides, to local creeks and the ocean. Given the local Mediterranean climate, excessive perennial dry season stream flows are an unnatural hydrologic pattern, causing species shifts in local riparian communities and warm, unseasonal contaminated freshwater plumes in the near-shore marine environment."

[11] See Attachment F, Section VIII.E of Order No. 2013-0001

The Regional MS4 Permit removes the prohibition exemption for these discharges, and requires more stringent non-storm water programs to investigate and eliminate non-storm water discharges. For example, under the 2007 MS4 Permit the City used an "action level" by which they would conduct follow-up investigation of non-storm water discharges. The 2007 MS4 Permit action level for orthophosphate-P was 2.0 mg/L, a level that well exceeds the Basin Plan's numeric interpretation of the WQO of total phosphorus of 0.1 mg/L. The Regional MS4 Permit's removal of exempted categories and its more explicit monitoring and response requirements provide a reasonable assurance that loading to the Slough will be reduced and the impairment restored.

The Regional MS4 Permit also requires the City to monitor non-storm water discharges and track reductions over time as part of its Water Quality Improvement Plans. The Regional MS4 Permit states:

> "The Copermittees must develop and conduct a program to monitor the discharges from the MS4 outfalls in each Watershed Management Area during dry weather and wet weather. Following San Diego Water Board acceptance of the Water Quality Improvement Plans for each Watershed Management Area, the Copermittees must conduct MS4 outfall discharge monitoring during implementation of the Water Quality Improvement Plan to assess the effectiveness of their jurisdictional runoff management programs toward effectively prohibiting non-storm water discharges into the MS4…"

The Water Quality Improvement Plan, which is required to be submitted to the San Diego Water Board by June 2015, requires Copermittees to develop Water Quality Improvement Goals, Strategies and Schedules to improve water quality. Numeric goals must be incorporated into the plan and used to assess progress. The Water Quality Improvement Plan must also provide a schedule with interim and final dates for achieving numeric goals, and serves as a mechanism for the City to demonstrate compliance with the Regional MS4 Permit and restoration of Slough's Beneficial Uses.

Lastly, section D.2.a of the Regional MS4 Permit requires the City to conduct Transitional MS4 Outfall Discharge Monitoring while the Water Quality Improvement Plan is being developed. The Transitional MS4 Outfall Discharge Monitoring requires the City to inventory its MS4 outfalls and conduct field screening and monitoring in order to begin the identification and prioritization process for non-storm water discharges in the Loma Alta Watershed. At the February 20, 2014, Loma Alta TMDL stakeholder meeting, City staff stated that the transitional monitoring was already underway and that new MS4 discharges and outfalls in the watershed had been identified.

8 MARGIN OF SAFETY

An implicit Margin of Safety (MOS) is used in the TMDL calculation. The use of an implicit MOS is acceptable because of the conservative assumption, the closed slough mouth due to the sand berm during the summer-dry season, used in the model to calculate load reductions. This is a worst-case condition because it allows for no flushing of the Slough with ocean water and continued loading of nutrients from non-storm water discharge into the Slough from the MS4 during the critical summer dry-

weather season. This is the critical season for algal growth and the resulting eutrophication when atmospheric conditions (i.e. length of day, sun angle, and air and water temperature) results in increased algal growth. Furthermore, using an alternative MOS would not affect the load allocations currently needed to meet the 96.1 percent reduction in phosphorus loading to the Slough.

8.1 Consideration of Future Development in the Loma Alta Watershed

Future development in the Loma Alta Watershed could result in changed conditions affecting the loading of nutrients into the MS4 and could be accounted for in the MOS. There are two existing regulatory instruments that contain prohibitions against non-storm water discharges from entering the MS4 System.

1. The Regional MS4 Permit requires new and re-development to include design plans to effectively eliminate non-storm water discharges, with associated nutrient loads, into the MS4.

2. The City's Ordinance No. 10-OR0412- Water Efficient Landscape Regulation requires all new developments be designed and constructed to minimize the use of irrigation water and pursuant to Sec. 37.137.a, prohibits the use of water for irrigation that due to runoff, low head drainage, overspray or other similar condition flows onto adjacent property, non-irrigated areas, structures, walkways, roadways or other paved areas, and prohibits the discharge if irrigation water from flowing.

Therefore, the MOS does not need to address future growth in the Loma Alta Watershed because future development would not have a significant effect on loading of nutrients in the MS4.

9 SEASONAL VARIATIONS AND CRITICAL CONDITIONS

Allocations and reductions are limited to the summer dry-season, May through October, seasonal time period as described in earlier sections. The TMDL can be exceeded during the wet season while the Slough and Ocean are exchanging water via natural hydrologic connections (i.e., tides, waves, and surface flows between the Slough and the Ocean). This does not affect existing permit limitations, nor imply that existing requirements should be relaxed during the wet season.

10 LOAD ALLOCATIONS AND REDUCTIONS

Load Allocations and necessary reductions were calculated using water quality data collected from 2008 – 2011 and the Slough modeling results (MACTEC 2009, CMA and SCCWRP 2013). The assimilative capacity and resulting allocations are based upon a modeled scenario featuring sand berm closure during the dry-weather season. This is a worst-case condition as it allows for no flushing of the Slough with ocean water and continued loading of nutrients from non-storm water discharge into the MS4.

Modeling under a scenario in which the berm was open would likely result in a higher TMDL for phosphorus during the dry-weather season. Therefore, a recalculation of the TMDL may be warranted in the future when the risk of pathogen effects to recreational beach users diminishes and if actions may be taken to maintain an open berm during the summer-dry season which would effectively increase tidal flushing of the Slough.

The phosphorus TMDL during the summer season is 31.5 grams per month. This value was calculated using water quality data collected in 2008 and 2011 and Slough monitoring. During the summer-dry season an estimated 807.46 grams of phosphorus enters the Slough each month. Modeling results indicate that a 96.1 percent reduction of existing flow, and thus existing loading, is needed to meet the Numeric Target during summer closure. Therefore, 3.9 percent of the existing mass load of phosphorus, 31.5 grams per month, is available for allocation to point and nonpoint sources. The allocation was derived by first giving the existing estimated natural groundwater loads a contribution. The remaining assimilative capacity was then assigned to waste load allocations.

TABLE 7

**ALLOWABLE PHOSPHORUS LOADING
FOR LOMA ALTA SLOUGH EUTROPHICATION
TMDL DURING THE DRY SEASON IMPAIRMENT
MAY THROUGH OCTOBER**

Allocation/Source	Year 2008 Monthly Loading (grams/month)	Percent Reduction Required	Allowable phosphorus Loading (grams/month)
Load Allocation - Groundwater	19.70	0	16.4
Waste Load Allocation -NPDES permits and WDRs	787.76	98.51	15.1
Margin of Safety	Implicit	Implicit	n/a
Total	**807.46**	**96.1**	**31.5**

10.1 Allowable Phosphorus Loading - Groundwater

The allowable phosphorus loading from groundwater is 16.4 grams/month. This represents the best estimate of current loading via groundwater to the Slough. Because rising groundwater can be a natural background source, load reductions are not required for natural uncontaminated rising groundwater within surface waters. These calculations are based upon the assumptions by the City that its monitored flows were groundwater (Tetra Tech 2013).

Because the estimates of natural sources of flow and nutrients from groundwater is based on limited information, additional investigations could help to better understand and quantify the amount of groundwater loading that can be included in the load allocation. Consistent with Regional MS4 Permit requirements to investigate persistently flowing storm drains, the City is expected to conduct additional and more robust groundwater investigations that could better quantify the load allocations assigned to groundwater.

10.2 Allowable Phosphorus Loading – NPDES Permits and WDRs

The allowable phosphorus loading from NPDES permits and WDRs is 15.1 grams/month. Existing NPDES permits and WDRs authorize the discharge of nutrients directly or indirectly into the Slough. These permits are protective during the impairment period, however, because they typically either prohibit the discharge of dry-weather (i.e., non-storm water) flows or require water quality-based numeric effluent limitations, generally derived from the California Toxics Rule. Other pollution control requirements effectively prohibit potential sources.

10.3 Load Reductions and Other Considerations

Compliance with current permit requirements will attain and maintain the allowable phosphorus loading. The existing load is well over the required 15.1 grams per month. The MS4 has been identified as the only significant point source of nutrients to the Slough during the dry season. Non-storm water dry weather discharges are generally prohibited by the existing MS4 Permit requirements (Order No. R9-2013-0001). However, other regulated potential discharges, should they occur during the seasonal impairment period, are subject to regulatory requirements stringent enough to address the impairment of the Slough.

The estimation of phosphorus loading into the Slough from groundwater, which impacts the WLA estimation, was based on a limited study. Additional source investigation, including the estimation of phosphorus loading from groundwater in the upper watershed, would be useful to refine the assumptions and verify the load allocation.

The Loma Alta watershed has been highly modified by development, with extensive losses of estuarine habitat during the 1950s and early 1960s through fill and channelization, and modification of the upstream riparian cover (Tetra Tech 2013). This partially influenced the stakeholder group's decision to establish a "moderate," rather than "good" or "very good," condition target. Nonetheless, the historic loss and modification of aquatic and floodplain habitat within the Loma Alta watershed may limit the Slough's assimilative capacity even when the load reductions are realized. Should that be demonstrated, then other measures, such as habitat restoration within the Slough and watershed or changes to the active management of the sand berm may be necessary to provide capacity to achieve the numeric target.

11 IMPLEMENTATION, MONITORING, AND COMPLIANCE

The source analyses identified the MS4 system and groundwater as the two sources contributing nutrients into the Slough. Because the current MS4 permit contains control limits adequate to achieve the WLA, no modifications to its discharge limits are necessary to meet the TMDL. The numeric targets should be met as soon as the City eliminates controllable dry-weather sources of phosphorus in its MS4. Once the numeric targets are met, the San Diego Water Board will take the necessary actions to delist the Slough from the 303(d) list for eutrophic conditions.

The Regional MS4 Permit provides the regulatory structure that allows the reclassification of 303(d) listed waterbodies from Category 5 (evidence shows at least one use not supported and a TMDL is needed) to Category 4b (evidence shows at least one use not supported, but a TMDL is not needed as an *existing regulatory program is expected to result in the attainment of the water quality standard within a reasonable, specified time frame [italic added for emphasis]*).

Impaired water bodies can be included in Category 4b if there are acceptable "pollution control requirements" required by a local, state or federal authority stringent enough to implement applicable water quality standards within a reasonable period of time (e.g., a compliance date is set). When evaluating whether a particular set of pollution controls are "requirements," the USEPA considers a number of factors, including:

a. The authority (local, state, and federal) under which the controls are required and will be implemented with respect to sources contributing to the water quality impairment (examples may include: self-executing state or local regulations, permits, and contracts and grant/funding agreements that require implementation of necessary controls).

c. Existing commitments made by the sources and completion or soon to be completed implementation of the controls (including an analysis of the amount of actual implementation that has already occurred).

d. The certainty of dedicated funding for the implementation of the controls.

e. Other relevant factors as determined by USEPA depending on case-specific circumstances.

Water Quality Improvement Plans require the implementation of pollution controls and water quality management actions which will result in the attainment of water quality standards in water bodies impaired by discharges from the Copermittees' MS4s. Water Quality Improvement Plans also include requirements that are expected to attain water quality standards in a reasonable period of time.

Water Quality Improvement Plans are a commitment by the *Copermittees to develop, plan, budget for, and implement pollution controls that will attain water quality standards in receiving waters in a reasonable period of time, or as soon as possible [italic added for emphasis]*. The results of the Copermittees' efforts in implementing the Water Quality Improvement Plans can be used to re-evaluate the condition of the impaired water bodies during the next update to the 303(d) List.

11.1 Implementation

The San Diego Water Board began development of a TMDL in 2006 for the eutrophication impairment in Loma Alta Slough. In May 2013, the Board reissued a revised municipal storm water permit, Order No. R9-2013-0001, which will result in the desired environmental outcome for Loma Alta Slough by 2023. Therefore, the Board will postpone concluding the TMDL in favor of the prohibitions and approach specified in Order No. R9-2013-0001.

The TMDL can be achieved by focusing on identifying and eliminating controllable and illicit dry-weather sources of phosphorus discharging into the City of Oceanside's MS4, which can include groundwater discharges into the MS4, and discharges from the MS4 to the Loma Alta Slough watershed. These actions are required by Order No. R9-2013-0001 (Regional MS4 Permit).

Provision II.A.1.b of the Regional MS4 Permit, states that "non-storm water discharges into the MS4s are to be effectively prohibited, through the implementation of Provision E.2, unless such discharges are authorized by a separate NPDES permit." Pursuant to Section II.E.2, the City must implement a program to actively detect and eliminate illicit discharges into the MS4. Provision II.E.2.a requires the City to address all non-storm water discharges as illicit discharges unless a non-storm water discharge is either identified as a discharge authorized by a separate NPDES permit, or identified as a category of non-storm water discharges or flows that must be addressed according to specific requirements.

Pursuant to Provision II.E.2.a.(3), groundwater infiltration into the MS4 must also be addressed as an illicit discharge if either the City, or the San Diego Water Board, identifies the discharge as a source of pollutants to receiving waters. Tetra Tech (May 2013) concluded that groundwater phosphorus loading via groundwater occurs. Therefore, groundwater discharges identified as a source of phosphorus into the MS4 may also need to be addressed as illicit discharges and eliminated.

Additional investigations by the City are necessary to determine the portion of flows discharging from its MS4 system that are uncontrollable and/or unpolluted groundwater sources. With that information, the City will be able to focus its illicit discharge and detection program on the sources driving eutrophication in Loma Alta Slough.

11.1.1 Means of Compliance – Compliance with Existing Permits

The Regional MS4 Permit includes several requirements for the City to comply with, including the prohibitions against non-storm water discharges and illicit discharges. Pursuant to Provision II.E.2 - Illicit Discharge Detection and Elimination, the City is required to implement a program to actively detect and eliminate illicit discharges into the MS4. Specific requirements include:

- Provision II.E.2.d.(2): The City must implement procedures to investigate and inspect portions of its MS4 that, based on reports or notifications, field screening, or other appropriate information, indicate a reasonable potential of receiving, containing, or discharging pollutants due to illicit discharges, illicit connections, or other sources of non-storm water.

- Provision II.E.2.d.(3): The City must initiate the implementation of procedures, in a timely matter, to eliminate all detected and identified illicit discharges and connections within its jurisdiction.

- Provision II.E.2.d.(3)(b): If the City identifies the source as a controllable source of non-storm water or illicit discharge or connection, the City must implement its Enforcement Response Plan pursuant to Provision E.6 of the Regional MS4 Permit and enforce its legal authority to prohibit and eliminate illicit discharges to its MS4.

  The Regional MS4 Permit also includes requirements for the City to participate in the development and implementation of a plan to improve water quality in its MS4 discharges and receiving waters within the Carlsbad Watershed Management Area. The mechanism for this action is the preparation of a Water Quality Improvement Plan (Provision II.B). The purpose of the Water Quality Improvement Plan is to further the Clean Water Act's objective to protect, preserve, enhance, and restore the water quality and designated beneficial uses of waters of the United States. Specific requirements include:

  - Provision II.B.2(d): The City must identify known and suspected sources of storm water and non-storm water pollutants and/or other stressors associated with MS4 discharges that cause or contribute to the highest priority water quality conditions identified in Provision B.2.c of the Regional MS4 Permit.

  - Provision II.B.3: The City must identify potential strategies that can result in improvements to water quality in MS4 discharges and/or receiving waters within the Watershed Management Area.

11.1.2 Means of Compliance – Loma Alta Slough Monitoring[12]

Development and implementation of a Loma Alta Slough Monitoring Program (Slough Monitoring Program) is needed to assess the attainment of the numeric targets and TMDL, and must be included in the Water Quality Improvement Plan. The Slough Monitoring Program must provide (1) documentation that the required loading reductions are achieved, and (2) confirmation that the numeric targets and TMDL are met. The Slough Monitoring Program must be designed to answer the following monitoring questions:

1. Are watershed flows and the loading of phosphorous to the Slough reduced to levels required to meet the macroalgal numeric targets?

2. Are the numeric targets for macroalgal cover and biomass in the Slough achieved?

The tasks needed to conduct the Monitoring Program will be developed by the City and submitted with the Water Quality Improvement Plan to the San Diego Water Board for review. A likely scope of work to answer the monitoring questions may include:

1. A Slough Monitoring Work Plan and Quality Assurance Project Plan.

2. A minimum of two 75 meter long transects to assess macroalgal cover.

3. Monitoring of watershed loading into the Slough.

4. Monitoring dissolved oxygen within the Slough.

5. Submittal of annual monitoring reports.

6. Conducting the Slough Monitoring Program for a minimum of seven years.

A cost estimate was developed based on the assumption presented above. The actual cost will be based on the scope of work developed by the City. Table 8 provides a summary of the anticipated costs.

[12] Further discussion on the Slough Monitoring Program is included in section 12.1

TABLE 8

ESTIMATED COSTS ASSOCIATED TO DEVELOP AND CONDUCT SLOUGH MONITORING

Task	Estimated Yearly Monitoring and Reporting Cost	Estimated Cost for Eight Years of Monitoring and Reporting
Prepare Workplan and QAPP	One Time Cost	$9,370
Field Work	$10,800	$86,400
Laboratory Analysis, Materials, Supplies	$5,319	$42,552
Report Preparation	$13,580	$108,640
Estimated Total	$29,699	$246,962

The information provided by the Slough Monitoring Program will be used by the City to evaluate the effectiveness of its efforts to eliminate non-storm water discharges into the MS4 during the summer-dry season, develop cost-effective plans to eliminate the prohibited flows into the MS4, and take any actions to achieve the numeric targets for the Slough.

11.1.3 Means of Compliance – Process for Revising the TMDL

The TMDL calculations and milestones may be revised following the San Diego Water Board's approval of amendments to the Water Quality Improvement Plan.

11.1.4 Means of Compliance – Other Considerations

Compliance with the existing conditions of Order No. R9-2013-0001 will restore the beneficial uses of the Slough through the elimination of non-storm water and illicit discharges into the MS4. However, the City could consider taking additional actions to restore the water quality within the Slough to allow the public to fully enjoy the designated beneficial uses. To this end, the City is encouraged to explore additional actions such as:

- Maintaining an open connection between the Slough and the ocean. This will allow for healthy flushing of the Slough and allowing nutrient laden water from flowing out of the Slough. This management action may be inconsistent with the City's action to address indicator bacteria in the Slough. To address the indicator bacteria the intake of the FETD could potentially be relocated to allow treated water to be discharged in the Slough and flow to the ocean.

- Restoring and/or creating wetlands to restore the natural assimilative capacity.

- Algae harvesting to reduce the macroalgal biomass and percent cover within the Slough.

12 Schedule

A detailed schedule for the implementation of the TMDL and attainment of the numeric targets has been developed by the San Diego Water Board using input from the City.[13] Additional specificity, including additional milestones will be provided in the Water Quality Improvement Plan to be submitted by the City. The schedule of activities needed to achieve the numeric targets by 2023 are presented on the following Table.

TABLE 9
SCHEDULE

Activity	***Year***
City continues implementation of current programs addressing non-storm water discharges under the MS4 Permit	2014
City develops Goals, Strategies, and Schedules for the Water Quality Improvement Plan that are aligned with the draft TMDL Report	
Submission of the Water Quality Improvement Plan goals, strategies, and schedules to the San Diego Water Board	2015
Updates to the City's Jurisdictional Runoff Management Program (JRMP) to implement Water Quality Improvement Plan Strategies	
Submission of Water Quality Improvement Plan, include the Loma Alta Slough Monitoring Plan	
San Diego Water Board approval of the Water Quality Improvement Plan	
City begins implementation of the strategies in the Water Quality Improvement Plan through revised JRMP	2016
City implements Monitoring Program for Slough – Year 1	
Submission of Water Quality Improvement Plan Annual Report for FY15-16 (includes the Annual Monitoring Report for Loma Alta Slough)	2017
City implements Monitoring Program for Slough – Year 2	
City implements JRMP in support of Water Quality Improvement Planning strategies	
Development and Submission of the Report of Waste Discharge under the MS4 Permit (all San Diego Copermittees)	
Submission of Water Quality Improvement Plan Annual Report for FY16-17 (includes the Annual Monitoring Report for Loma Alta Slough)	2018
Assessment of progress towards meeting the interim numeric goals developed in the Water Quality Improvement Plan	
City and San Diego Water Board assesses effectiveness of actions to date (including potential revisions to numeric goals (Table 1), strategies, responsible parties, and schedules)	
Renewal of Order R9-2013-0001	
City implements Monitoring Program for Slough – Year 3	

[13] Comment Letter – Tentative Investigative Order No. R9-2014-0020, prepared by the City of Oceanside, dated May 5, 2014.

Activity	***Year***
City implements JRMP in support of Water Quality Improvement Planning strategies	
City continues implementation of Monitoring Plan, Water Quality Improvement Plan Strategies, and JRMP	2019 – 2022
Continued Water Quality Improvement Plan Annual Reporting (including the Annual Monitoring Report for the Slough)	
Projected attainment of Final Numeric Goals under the Water Quality Improvement Plan	2023
City and San Diego Water Board assess effectiveness of actions to date (including potential revisions to numeric goals, strategies, and schedules)	

12.1 Compliance Monitoring

Compliance monitoring is required to assess progress towards achieving assigned waste load allocations and must be included in the Water Quality Improvement Plan. The following presents the minimum standards that must be in the design and implementation of a monitoring program to evaluate compliance with the dry-weather prohibition within the MS4 permit and demonstrate that the TMDL and numeric targets are achieved.

Numeric target monitoring will demonstrate whether the targets have been achieved by 2023. Monitoring may be suspended, lessened, or ceased by the San Diego Water Board if there is sufficient data to indicate that the efforts taken by the City to eliminate all illicit discharges to the MS4 and the Slough have worked and that the numeric targets will be reached sooner than 2023.

Numeric target monitoring requires the development of a Slough Monitoring Plan, with a minimum long term monitoring plan for eight years. Monitoring of the Slough is required to insure the Slough's numeric targets are being met and beneficial uses are restored commensurate with reduced watershed loading into the Slough. Long term monitoring will allow for documentation of macroalgal response to reduced load conditions. Appropriate macroalgal monitoring methodologies were agreed upon by the stakeholder group during the March 06, 2012, meeting. It was agreed upon that macroalgae would be assessed as follows:

1. Average of transect level macroalgal biomass and cover estimates.

2. Use two 75 meter transects to assess macroalgal cover (calculated separately and averaged).

3. Average of two consecutive sampling periods – July and August.

It was also agreed that transects should occur on the eastern and western side of the railroad crossing, since monitoring has documented higher levels of macroalgae in the eastern portion of the Slough.

The Slough Monitoring Plan requires continued monitoring of watershed loading into the Slough. The continued monitoring of macroalgal conditions and watershed loading will allow for the City to further refine algal modeling efforts, should it choose to do so. This will also allow for further exploration of the dissolved oxygen dynamics within the Slough in relation to loading.

Lastly, the Slough Monitoring Plan requires the monitoring of dissolved oxygen within the Slough. Dissolved oxygen modeling results were insufficient to estimate expected requirements to meet numeric targets. Concentrations were found to be highly diurnal, which implies a strong link to algal productivity when there is limited ocean interchange (CMA and SCCWRP 2013). As dissolved oxygen is a critical component of the eutrophication impairment, monitoring is required to determine how dissolved oxygen responds to load reduction and macroalgal target achievement. The stakeholders also agreed with the approach, recommending dissolved oxygen as a secondary target at the March 27, 2012 meeting.

13 OTHER CONSIDERATIONS

13.1 Incorporating the TMDL Into the Basin Plan is Not Required

In accordance with State Board Resolution 2005-0050 and the associated guidance document "*A Process for Addressing Impaired Waters in California*, (Impaired Waters Guidance Document)" the implementation plan developed to address the impairment (use of the prohibitions and requirements of the Regional MS4 Permit), does not require a Basin Plan Amendment.

13.2 Scientific Peer Review is Not Required

This TMDL does not require a scientific peer review because no rulemaking is occurring to adopt or implement it. Section 57004 of the California Health and Safety Code requires the submission of the scientific basis for any rulemaking to an external peer review for evaluation prior to taking an action on the proposed rule. Section 57004 defines a rule as a regulation or a policy adopted by the State Water Resources Control Board that has the effect of a regulation or adopted to implement or make effective a regulation. The TMDL implements an existing standard and relies on existing requirements for implementation. Therefore it does not meet the conditions that require a scientific peer review.

13.3 California Environmental Quality Act Requirements are Not Required

The California Environmental Quality Act (CEQA) is codified at Public Resources Code Section 21000 et seq. The CEQA Guidelines are codified at Title 14 California Code of Regulations section 15000 et seq.

The TMDL is an action to assure the restoration of beneficial uses in Loma Alta Slough by enforcing the laws, regulations, and standards administered by the San Diego Water Board.[14] As such, it is categorically exempt from the provisions of CEQA pursuant to Public Resources Code sections 15308 (for Class 8 exemptions) and 15321 (for Class 21 exemptions).

- Class 8 consists of actions taken by regulatory agencies, as authorized by state or local ordinance, to assure the maintenance, restoration, enhancement, or protection of the environment where the regulatory process involves procedures for protection of the environment. Construction activities and relaxation of standards allowing environmental degradation are not included in this exemption.

- Class 21(a) consists of actions by regulatory agencies to enforce or revoke a lease, permit, license, certificate, or other entitlement for use issued, adopted, or prescribed by the regulatory agency or enforcement of a law, general rule, standard, or objective, administered or adopted by the regulatory agency.

An exemption is justified because no standards will be relaxed to allow environmental degradation and there is no reasonable possibility that the investigative projects or activities will have a significant negative effect on the environment. Therefore, this action is also exempt from CEQA provisions in accordance with section 15061(b)(3) of Chapter 3, Title 14 of the California Code of Regulations because it can be seen with certainty that there is no possibility that the activity in question may have a significant negative effect on the environment. CEQA will be complied with as necessary when and if remedial actions are proposed.

13.4 Stakeholder and Public Participation

Opportunities for stakeholders and the public to participate in the TMDL process began in 2010 and continued through 2012. Multiple stakeholder meetings were held to discuss topics such as monitoring activities and the development of the modeling effort used to develop the TMDL. An additional stakeholder meeting was held in February 2014 to discuss the action to be taken by the San Diego Water Board to address the impairment of the Slough. A Public Workshop to discuss Tentative Investigative Order No. R9-2014-0020 and this TMDL Report was held on April 24, 2014. The public was provided with a 45-day comment period. All comments were considered by the San Diego Water Board. The public was provided the opportunity to give the San Diego

[14] State Water Board implementation regulations are in 23 CCR Chapter 27, §3720 et seq. and available at: http://www.waterboards.ca.gov/laws_regulations/docs/wrregs.pdf

Water Board oral testimony during the June 26, 2014 Public Hearing for consideration of adoption of Resolution No. R9-2014-0020.

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Appendix 1

Watershed Loading, Hydrodynamic, and Water Quality Modeling in Support of the Loma Alta Slough Bacteria and Nutrient TMDL

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