Salt and Nutrient Management Plan

Malibu Valley Groundwater Basin

October 2015

CITY OF MALIBU

Incorporated March 28, 1991

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Prepared by:

RMC water and environment

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List of Abbreviations

AB	Assembly Bill
AFY	acre-feet per year
BMO	basin management objective
btoc	below top of casing
CCR	California Code of Regulations
CCWTF	City of Malibu Civic Center Wastewater Treatment Facility
CDPH	California Department of Public Health
CEC	constituents of emerging concern
cfs	cubic feet per second
Cl	chloride
DWR	California Department of Water Resources
ET	evapotranspiration
ft^3/day	cubic feet per day
gpd	gallons per day
gpm	gallons per minute
GWMP	Groundwater Management Plan
in/yr	inches per year
LADPH	Los Angeles County Department of Public Health
LADPW	Los Angeles County Department of Public Works
LARWQCB	Los Angeles Regional Water Quality Control Board
lbs	pounds
LCP	Local Coastal Program
LID	Low Impact Development
LIP	Local Implementation Plan
LVMWD	Las Virgenes Municipal Water District
mgd	million gallons per day
mg/L	milligram per liter
MOU	Memorandum of Understanding
MS4	municipal separate storm sewer system
NADP	National Atmospheric Deposition Program
NO_3	nitrate

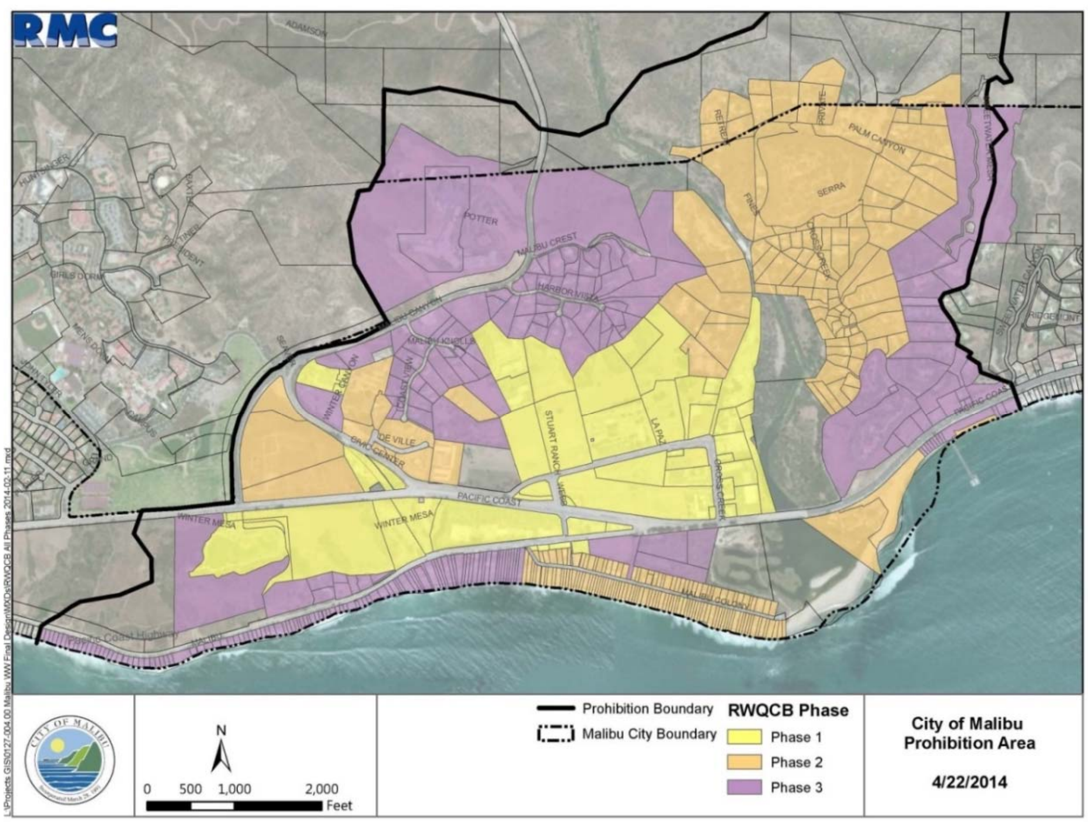
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
OWDS	onsite wastewater disposal systems
PMCL	Primary Maximum Contaminant Level
SB	Senate Bill
SED	substitute environmental document
SMQDv	Storm Water Quality Design Volume
SNMP	Salt and Nutrient Management Plan
SMCL	Secondary Maximum Contaminant Level
SO_4	sulfate
SWRCB	State Water Resources Control Board
SWTP	Stormwater Treatment Facility
TAC	Technical Advisory Committee
TDS	Total Dissolved Solid
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	underground storage tank
UWMP	Urban Water Management Plan
WQO	Water Quality Objective
WRR-WDR	Water Reclamation Requirements – Waste Discharge Requirements

Chapter 1 Introduction

On-site wastewater disposal systems (OWDS) have allegedly contributed to the non-point source pollution of Malibu Creek and Lagoon, resulting in the Los Angeles Regional Water Quality Control Board (LARWQCB) adopting Resolution R4-2009-007 in November 2009. This resolution approved an amendment to Chapter IV of the *Water Quality Control Plan for the Coastal Watersheds of Los Angeles and Ventura Counties* (Basin Plan) prohibiting new OWDS and OWDS discharges from existing systems in the Malibu Civic Center Area. In 2010, the State Water Resources Control Board (SWRCB) adopted Resolution 2010-0045 approving the Basin Plan Amendment and establishing a phased schedule for compliance.

The Phase 1 and 2 OWDS systems were defined in the Basin Plan Amendment and have become known as "The Prohibition Area." An August 2011 Memorandum of Understanding (MOU), signed by both the City of Malibu (City) and the LARWQCB and updated in December of 2014, memorializes the requirements of the Basin Plan Amendment, requires a coordinated implementation of a wastewater treatment plant in the Civic Center Area, defines the Prohibition Area, and establishes a schedule for compliance. Under this MOU, all commercial properties are considered Phase 1 systems and all discharges from these systems must cease by June 30, 2017. Phase 2 systems, which are residential properties, must cease discharges by November 5, 2022. A third phase may be implemented, if necessary, following operation of Phase 1 and 2, and upon completion of a water quality sampling program to determine if implementation of Phases 1 and 2 have resulted in a meaningful decrease in Bacteria and Nitrogen in Malibu Lagoon. Figure 1-1 shows the project phasing required in the MOU.

Figure 1-1: MOU Prohibition Area Phasing



Following execution of the MOU, the City embarked on a program to design and construct a centralized wastewater collection, treatment and disposal system for the Civic Center area of the City and a small portion of unincorporated Los Angeles County. This program includes the construction of the Civic Center Wastewater Treatment Facility (CCWTF), where wastewater from the Prohibition Area will be collected and treated to a standard set forth in Title 22 of the California Code of Regulations (CCR) for unrestricted reuse of disinfected tertiary recycled water. The resultant recycled water will be used for landscape irrigation within the Civic Center and surrounding areas to the maximum extent possible; however, current and anticipated future irrigation demands are not expected to utilize all recycled water generated by the CCWTF. Recycled water not used for landscape irrigation will be injected into the underlying Malibu Valley Groundwater Basin near its boundary with the Pacific Ocean for disposal or it will be percolated into the aquifer in Winter Canyon through percolation ponds at the treatment facility.

It is important to note that, with complete implementation of the CCWTF, the CCWTF Project will be the only recycled water project overlying the Malibu Valley Groundwater Basin. As such, this SNMP evaluates the various phases of CCWTF implementation, as the collection system and treatment plant's connections increase and as OWDS-related discharges cease.

1.1 Purpose of Basin Management Planning

This Salt and Nutrient Management Plan (SNMP) has been prepared conjunctively with a Groundwater Management Plan (GWMP) for the Malibu Valley Groundwater Basin. The SNMP is intended to work jointly with the GWMP to provide a framework to manage, protect and enhance the groundwater basin in order to sustain the beneficial uses of this local groundwater resource. In developing these plans (the SNMP and GWMP), the City and basin stakeholders aim to achieve the following objectives:

- Improve the technical understanding of the groundwater basin's hydrogeology, the implications of the overlying land uses on the underlying groundwater quality, and groundwater-surface water interactions.
- Develop a forum and collaborative process for defining issues and identifying and implementing actions to manage the groundwater resource (both quality and supply).
- Define implementation measures as necessary to ensure the long-term sustainability of the groundwater resource.
- Develop a groundwater monitoring program to coordinate ongoing and future data collection efforts and to facilitate analysis of water quality trends into the future.
- Provide a framework for adaptively managing the groundwater basin and implementing future management actions.

The CCWTF Project will provide significant benefits to the Malibu Valley Groundwater Basin through the introduction of recycled water injection into the underlying Civic Center Gravels and the removal of the existing OWDS discharges. In implementing the CCWTF Project, the City is charged with ensuring that the beneficial uses of the Malibu Valley Groundwater Basin remain intact. This will be accomplished through a program of monitoring for groundwater elevation and water quality changes resulting from the implementation and operation of the project over a 20+ year period. At present, the groundwater basin is designated as having a potential future use as a municipal supply. Analyses conducted for the CCWTF Project have shown that, following implementation, the groundwater basin designated use will be protected; however, additional measures must be taken to ensure that potential future use and protection of basin groundwater quality. These management measures are documented in a new groundwater management ordinance passed by the City of Malibu that establishes prohibition and consultation zones around the proposed injection well system in order to protect human health and ensure the designed performance of the injection system. The City has a certified Local Coastal Program (LCP) and is the approving agency for all Coastal Development Permits (CDPs) required by the LCP. Under these programs and in coordination with the new ordinance, any new groundwater extraction wells or the operation of existing wells within the groundwater basin shall require City approval. Furthermore, all new well construction within the City shall require a CDP; therefore, the City becomes, by default, the implementing agency for groundwater basin management.

This SNMP-GWMP is being prepared for the Malibu Valley Groundwater Basin in Los Angeles County, California.

1.2 Regulatory Framework

1.2.1 Regulatory Requirements Related to Groundwater Management

Groundwater is a resource shared by numerous users; it does not recognize or adhere to jurisdictional boundaries and cannot be identified for use by specific consumers. Groundwater rights in California have evolved through case law since the late 1800s. Currently, four basic methods are available for managing groundwater resources in the State:

- Local agency management under authority granted by the California Water Code;
- Local agency management granted under other applicable state statutes (such as through a GWMP);
- Local government groundwater ordinances or joint powers agreements (JPA);
- Court adjudication

No law requires that any of these forms be applied within a basin. As such, management is often instituted after local agencies or landowners recognize specific issues in groundwater conditions. The level of groundwater management in any basin or subbasin is often dependent on water availability and demand, as well as groundwater quality.

In an effort to standardize groundwater management, the California Legislature passed Assembly Bill (AB) 255 (Stats. 1991, Ch. 903) in 1991. This legislation authorized local agencies overlying basins subject to critical overdraft conditions, as defined in the California Department of Water Resources' (DWR's) Bulletin 118-80 (DWR, 1980), to establish programs for groundwater management within their service areas. Water Code §10750 *et seq*. provided these agencies with the powers of a water replenishment district to raise revenue for facilities to manage the basin for the purposes of extraction, recharge, conveyance, and water quality management. Seven local agencies adopted plans under this authority. The Malibu Valley Groundwater Basin has been critically overdrafted in the past. Seawater intrusion occurred through the 1950's and 1960's when seawater advanced over ½ mile inland (DWR, 2004). In response to this situation, Los Angeles County Waterworks District 29 (WD29) was established as a special district in 1959 by a public election that authorized the formation of the district (reference http://dpw.lacounty.gov/wwd/web/About/Overview.aspx). Once established, WD29 constructed water distribution systems in Malibu between 1962 and 1970 and started distribution of imported potable water into the basin. All known private and commercial potable supply wells were subsequently abandoned.

The provisions of AB 255 were repealed in 1992 with the passage of AB 3030 (Stats. 1992, Ch. 947). This legislation greatly increased the number of local agencies authorized to develop a GWMP and set forth a common management framework for local agencies throughout California. AB 3030, codified in California Water Code § 10750 *et seq*., provides a systematic procedure for developing a groundwater management plan by local agencies overlying the groundwater basins defined by DWR's Bulletin 118 (DWR, 1975) and updates (DWR, 1980, 2003). Upon adoption of a plan, the authorizing agency(ies) identified in the GWMP could possess the same authority as a water replenishment district to "fix and collect fees and assessments for groundwater management" (Water Code, §10754). However, the authority to fix and collect these fees and assessments is contingent on receiving a majority of votes in favor of the proposal in a local election (Water Code, §10754.3)

In 2002, the California Legislature passed Senate Bill (SB) 1938 (Stats. 2002, ch. 603) providing local agencies with incentives for improved groundwater management. While not providing a new vehicle for groundwater management, SB 1938 modified the Water Code by requiring specific elements be included in a GWMP for an agency to be eligible for certain funding administered by DWR for groundwater projects. Through AB 3030 and SB 1938, local agencies can now develop GWMPs that guide the sustainable use of the groundwater resource while also providing access to certain State funding sources.

1.2.2 Regulatory Requirements Related to Salt and Nutrient Management

In February 2009, the State Water Resources Control Board (SWRCB) adopted Resolution No. 2009-0011 establishing a statewide Recycled Water Policy. The policy encourages increased use of recycled water and local stormwater capture and reuse. It also requires local water and wastewater entities, together with local salt and nutrient-contributing stakeholders to develop an SNMP for each groundwater basin or subbasin in California. The Malibu Valley SNMP was developed through a collaborative process initiated in December 2013.

As outlined in the Recycled Water Policy, the required elements of an SNMP are the following:

- A basin/sub-basin wide monitoring plan that includes an appropriate network of monitoring locations.
- A provision for annual monitoring of constituents of emerging concern (CECs) consistent with recommendations by California Department of Public Health (now the Division of Drinking Water under the SWRCB) and SWRCB.
- Water recycling and stormwater recharge/use goals and objectives.
- Salt and nutrient source identification, basin/sub-basin assimilative capacity and loading estimates, together with fate and transport of salts and nutrients.
- Implementation measures to manage salt and nutrient loading in the basin on a sustainable basis.
- An anti-degradation analysis demonstrating that the projects included within the plan will, collectively, satisfy the requirements of Resolution No. 68-16.

The degree of specificity of the SNMP is dependent on the complexity of the groundwater basin, source water quality, stormwater recharge, and other factors. The SNMP should be tailored toward local water conditions, and may address other constituents beyond salts and nutrients that adversely affect groundwater quality.

1.3 Groundwater Basin Management Objectives

At a December 11, 2013 stakeholder meeting, and again at the December 12, 2013 Technical Advisory Committee (TAC) meeting, RMC, in conjunction with stakeholders, identified preferred basin management objectives (BMOs) and goals that the SNMP and GWMP will aim to achieve. This process identified specific goals and objectives for future groundwater use, water recycling, and the reuse of stormwater that will align with anticipated future development overlying the Basin. A critical element of goal setting was development of goals and objectives for both the SNMP and GWMP that did not conflict with those of other plans, studies and projects, and that presented a comprehensive picture of regional groundwater management and current and projected future groundwater use.

Basin management goals and objectives will result in a more reliable supply for the long-term protection of the groundwater basin and will depend on the needs seen by area stakeholders. This chapter also discusses the goals for using recycled water and stormwater in the basin as required for the SNMP.

1.3.1 Basin Management Goals and Objectives

Basin management objectives that were identified and discussed with stakeholders during the December meetings include:

- **BMO-1**: Avoidance of groundwater overdraft and associated undesirable effects (such as seawater intrusion)
- **BMO-2**: Protection of surface water resources
- **BMO-3**: Minimize impacts on local water supply
- **BMO-4**: Minimize impacts on groundwater quality

These qualitative BMOs address issues related to groundwater levels, groundwater quality, subsidence, and the interaction of groundwater with surface water. The BMOs will be further developed throughout the plan development process and will be stated quantitatively with triggers and actions to be considered when thresholds are crossed. Additionally, the BMOs will be supported by management actions such as:

- Monitoring;
- Integration of recycled water resources;
- Public education and conservation programs;
- Well ordinances including construction, abandonment, and destruction policies; and
- Identification and mitigation of soil and groundwater contamination.

BMO-1: Avoid Groundwater Overdraft

At present, there are no production wells within the Malibu Valley Groundwater Basin, and there are limited extractions occurring for non-potable water use. The City will work to meet this BMO by managing in the installation of future groundwater extraction wells and through groundwater quality monitoring. The City will use its new groundwater management ordinance as the primary vehicle for ensuring that groundwater overdraft does not occur. Achievement of this objective will be measured via water quality monitoring programs in the groundwater basin. These monitoring programs will be implemented by both the City and private parties; however, the City will coordinate data collection and reporting to ensure that all data are located in a central location and to ensure regular analysis of water quality data. Additionally, the City will be providing disinfected tertiary-treated recycle water to users overlying the groundwater basin and will promote the use of recycled water as an alternative non-potable water supply. This recycled water distribution will act as a means of offsetting existing limited groundwater pumping and will help to avoid groundwater overdraft conditions in the future. Achievement of this objective will be measured by maintaining and/or improving chloride and TDS concentrations in monitoring wells near the ocean.

BMO-2: Protect Surface Water Resources

Key to protection surface water resources is protecting the groundwater-surface water interactions. This includes minimizing impacts on flow rates to/from Malibu Creek and Lagoon, and ensuring that groundwater quality to the Creek and Lagoon limit nutrient and bacteria loading. The CCWTF Project, once fully implemented, will provide great strides towards improving surface water quality by removing a key source of nutrient and bacterial loading to the groundwater basin. The success of this project, and this BMO, will be measured via groundwater and surface water monitoring to be conducted as part of the

CCWTF. Successful achievement of this objective will be measured by the metrics set forth in the Total Maximum Daily Loads (TMDLs) set forth by the United States Environmental Protection Agency (USEPA) and the State for Malibu Creek and Lagoon.

BMO-3: Minimize Impacts on Local Water Supply

At present, all potable water supplies in the City areas overlying the Malibu Valley Groundwater Basin are imported and distributed by WD29. WD29 has indicated in its Urban Water Management Plans that it has the ability to meet the City's potable water demands through build-out. As previously noted, there are no production wells within the Malibu Valley Groundwater Basin, and limited extractions are assumed to be occurring for non-potable water use. As part of the CCWTF, the City will begin distributing disinfected tertiary-treated recycle water to users overlying the groundwater basin. The City will promote the use of recycled water as an alternative non-potable water supply and as a means of offsetting existing limited groundwater pumping. This recycled water production and distribution will help to minimize impacts on local water supplies resulting from limiting groundwater extractions. Achievement of this BMO will be measured by the volume of recycled water distributed for non-potable water uses relative to groundwater extractions occurring for the same purpose.

BMO-4: Minimize Impacts on Groundwater Quality

Groundwater quality will be protected by ensuring that groundwater limitations set forth in discharge permits issued by the LARWQCB are being met. This includes, but is not limited to, project-specific permits and meeting the Water Quality Objectives set forth in the Basin Plan for the Malibu Valley Groundwater Plan. The City will use its new groundwater management ordinance as the primary vehicle for ensuring that groundwater quality is protected. Achievement of this objective will be measured via water quality monitoring programs in the groundwater basin. These monitoring programs will be implemented by both the City and private parties; however, the City will coordinate data collection and reporting to ensure that all data are located in a central location and to ensure regular analysis of water quality data.

1.3.2 SNMP-Specific Goals

In addition to the basin management goals, which are pertinent to both the GWMP and SNMP, goals for recycling and stormwater capture and use were developed with stakeholder input and based on information contained in relative Urban Water Management Plans (UWMPs) and other planning documents. Additionally, water conservation programs and ordinances will provide a useful basis for understanding and assessing recycling activities. The City and WD29 have implemented extensive water conservation programs, including for residential, commercial, industrial and municipal users. The City has also implemented a stormwater capture and program through development and implementation of its Legacy Park project.

Recycled Water Goals

Recycled water goals were based on information provided in WD29's 2010 UWMP and current and projected future recycled water usage data. Existing recycled water use is presented in Table 1-1, and is based on current recycled water usage data provided by the City. These values represent present recycled water use within the basin, which is currently used for recharge only. Future plans for the City's recycled water system include providing recycled water to areas of the City for irrigation plus additional groundwater recharge.

Table 1-1 also presents the projected 2035 recycled water use in the basin. These future estimates represent the recycled water goals for the basin.

Table 1-1: Current Use and Future Goals for Recycled Water

Provider	Current Use (AFY)	2035 Use (AFY)
WD29	0	0
City of Malibu (Irrigation)	0	140
City of Malibu (Recharge)	30	2,750

Stormwater Recharge Goals

The City and stakeholders in the Malibu Valley Groundwater Basin are actively working to increase the ability to put stormwater to beneficial use through irrigation and other non-potable uses. The City is engaged in several scientific studies and engineering projects to improve water quality in nearby surface water bodies which include a significant stormwater treatment element. For example in 2007, the City began operating its Civic Center Stormwater Treatment Facility (SWTF), which processes up to 1,400 gallons per minute (gpm) of stormwater runoff from the Civic Center area to remove trash, suspended solids, metals, and indicator bacteria.

In 2010, the Legacy Park Project was completed; this project included developing the Legacy Park site into a public amenity providing education, passive recreation and habitat improvements, in addition to providing stormwater treatment to remove pathogens. Treated stormwater flows are then reused to the maximum extent possible as an irrigation supply for Legacy Park and other landscaping. Dry-and wet-weather flows that exceed the irrigation demand are directed to a 33,000 gallons per day (gpd) dispersal field in the southeast corner of the Legacy Park Site. The project also includes Low Impact Development (LID) features such as bioswales and permeable pavement that increase recharge of stormwater.

The City also recently constructed the Malibu Civic Center Linear Park, which incorporates LID features including stormwater capture and treatment. The linear park includes a 0.5 acre greenbelt planted with native trees and plants and irrigated with either treated stormwater or recycled water.

In addition to the stormwater treatment improvements provided by the SWTF and Legacy Park project, the City has also begun to incorporate stormwater treatment and runoff solutions into their other municipal projects. The recently completed Cross Creek Road Improvement Project provides an excellent example of street improvement projects that protect against water quality degradation from stormwater runoff and maximizes the potential for water reuse. This environmentally superior project provides several benefits, including:

- Minimizes stormwater runoff with:
    - Permeable pavers on street angled vehicle parking
    - Permeable pavement on sidewalk areas
- An enhanced landscaping plan that allows for increased stormwater infiltration
- Connections for an irrigation supply that uses treated stormwater or recycled wastewater that has been treated to Title 22 standards

While these efforts and others are continuing in the basin, the benefit of recharging stormwater (which is likely to be low in TDS) is not included in the groundwater quality analyses in this SNMP-GWMP due to uncertainties in the projected quantity and volumes of stormwater recharge at this time and limited storage volume in the groundwater basin. Not including stormwater in the future water quality analysis at this point is a conservative approach as stormwater would likely decrease TDS and nitrate concentrations in the groundwater basin. Future updates to the SNMP-GWMP may consider these efforts as they continue to be developed and implemented. Future updates to the SNMP-GWMP could also include quantitative goals for stormwater recharge as they are established through these planned efforts. Stormwater recharge and/or reuse will, however, be addressed in the SNMP-GWMP in a qualitative manner.

Chapter 2 Stakeholder Efforts to Develop the SNMP

The primary stakeholders involved in the management of the Malibu Valley Groundwater Basin are:

- The City of Malibu as the Local Coastal Program implementing agency and land use planning agency;
- The Los Angeles County Department of Public Health (LADPH), Environmental Health Division, Drinking Water Program as the entity primarily responsible for well construction and destruction permits and the regulation of small community systems; and
- The LARWQCB as the entity primarily responsible for protecting the quality of groundwater within the State.

At the local level, the City has engaged two stakeholder groups during the development of this SNMP and the accompanying GWMP. The first stakeholder group is a Technical Advisory Committee (TAC) that was originally convened for the Malibu Civic Center Wastewater Treatment Facility Project. The second is a public stakeholder group that was also convened for the CCWTF and has now been broadened to include the SNMP and corresponding GWMP. Additional information regarding these two stakeholder groups is discussed below.

In addition to the afore-mentioned stakeholder groups, the City regularly coordinates with several federal, state and local agencies in addition to numerous public and non-profit organizations. Local agencies working within the basin are the City of Malibu, the, Resource Conservation District of the Santa Monica Mountains, Las Virgenes Municipal Water District, and Malibu Coastal Land Conservancy. Public and non-profit organizations the City routinely coordinates with include Heal the Bay, Surfriders and BayKeepers.

2.1 Advisory Committee

The Technical Advisory Committee originally convened for the Malibu CCWTF project is a primary stakeholder group for the SNMP. It has served in an advisory role for surface water and groundwater management activities within the Malibu Valley Groundwater Basin for the development of this SNMP. Additional committees may be formed as needed and the composition of the TAC may change as this SNMP is implemented. The TAC typically meets one to four times per year at City Hall. TAC meetings have been held on September 12, 2011, August 6, 2013, December 12, 2013, February 20, 2014 and January 8, 2015.

2.2 Public Involvement

The City of Malibu holds public meetings and hearings for projects and programs within the City limits. Development of this SNMP has been presented at several public workshops and stakeholder meetings. These meetings/presentations will continue, as needed, with implementation of the groundwater basin management activities identified herein. Stakeholder meetings are held approximately on a monthly basis.

2.3 Relationships with Local, State and Federal Agencies

Through its City management and implementation of the Local Coastal Program, the City of Malibu has developed relationships with many federal and state agencies, including the LARWQCB, SWRCB, California Coastal Commission, National Park Service (for Malibu State Beach), and the Los Angeles County Departments of Public Works and Public Health. The City will continue to maintain these relations and will be expanding and utilizing them, as needed, to identify and implement groundwater basin management activities.

The Malibu Valley Groundwater Basin underlies the Civic Center Area of the City of Malibu, although the basin does underlie a small portion of unincorporated Los Angeles County in northern end of the groundwater basin. Local agencies overlying the groundwater basin or having jurisdictional authority in the groundwater basin include the following (in addition to those previously mentioned):

- Resource Conservation District of the Santa Monica Mountains
- California State Coastal Conservancy
- Las Virgenes Municipal Water District
- Malibu Coastal Land Conservancy

Chapter 3 Groundwater Basin Characteristics

3.1 Groundwater Basin Overview

The Malibu Valley Groundwater Basin (DWR groundwater basin no. 4-22) is a small alluvial basin, approximately 613 acres in size, located along the Los Angeles County coastline (Figure 3-1). The basin is bounded by the Pacific Ocean on the south, and by the Santa Monica Mountains, composed of non-water-bearing Tertiary age rocks, on all remaining sides. The valley is typified by steep canyons that generally run north to south, and is drained by Malibu Creek to the Pacific Ocean (DWR, 2003).

The Malibu Valley Groundwater Basin is located in a Mediterranean climate, characterized by cool wet winters and warm dry summers, with the majority of precipitation occurring between November and April. This area lies in the semi-permanent high-pressure zone of the eastern pacific; as a result, the climate is mild, tempered by cool sea breezes, and occasionally interrupted by infrequent periods of extremely hot weather, winter storms or Santa Ana winds. Average annual rainfall is about 12 inches (Jones and Stokes, 2009).

Figure 3-1: Malibu Valley Groundwater Basin

3.2 Land and Water Use

Development overlying the groundwater basin is predominantly urban in nature, and includes a significant amount of residential development and undeveloped land. The basin is flanked on both sides by canyons - the Sweetwater Canyon to the east, and the Winter Canyon to the west. The Malibu Coast Fault is mapped across the basin in an east-west direction and is aligned approximately along Civic Center Way (Leighton, 1994); however, this fault is not a groundwater barrier (DWR, 1975) and is not classified as an active fault under the Aquist-Priolo Act.

In general, there are four hydrostratigraphic units within the Malibu Valley Groundwater Basin (from shallowest to deepest): shallow alluvium, a low permeability zone that covers most of the groundwater basin, Civic Center Gravels, and bedrock. Bedrock is at or near land surface in the upland areas, and beneath the unconsolidated sediments that are present in the Civic Center Area along Malibu Creek and Lagoon. Historical groundwater use has been from the shallower alluvium, which has been shown to be in hydraulic connection with the adjacent Malibu Creek and the ocean. At present, all potable water demands are met by imported water delivered by Los Angeles County Waterworks District 29, and the groundwater basin, while designated as Municipal under the LARWQCB's *Water Quality Control Plan: Los Angeles Region* (Basin Plan), is not presently used for local water supplies.

3.3 Groundwater Resources

3.3.1 Hydrogeology

Water-bearing formations in the Malibu Valley Groundwater Basin are composed of Holocene alluvium, consisting of clays, silts, sands and gravels, overlying impermeable bedrock. Alluvial sediments deposited in the Civic Center Area by Malibu Creek and other small drainages are estimated to range in thickness from a feather edge near the valley walls to around 170 feet in the central part of the main body of alluvium, and can be generally subdivided into three categories or strata (layers): (1) a shallow zone of permeable alluvial sediments, (2) underlain by a sequence of fine-grained estuarine deposits, with (3) an underlying coarse-grained stratum commonly referred to as the "Civic Center Gravels" (GeoSoils, 1989; Leighton, 1994; ECI, 2000; Ambrose and Orme, 2000; Fugro West, Inc., 2005; Geosyntec Consultants, 2007). Depth to the water table is typically on the order of 5 to 13 feet below ground surface and is deeper in upland canyon areas (such as Winter Canyon).

<u>Alluvium</u>

The shallow alluvial zone is capped by modern floodplain deposits and, in some locations, with artificial fill. This zone generally consists of silts and sands, and is underlain by a very fine grained, low-permeability zone containing clay and silt layers, especially in the central part of the alluvium. The shallow alluvium deposits tend to be coarser grained near the valley walls, along the northern edge of the alluvium, and to the east along the present day course of Malibu Creek and Lagoon. This zone appears to be in connection with Malibu Creek and Lagoon.

<u>Low Permeability Zone</u>

The low-permeability zone underlying the shallow alluvium consists of very fine grained clay and silt deposits that have been interpreted as extending from just north of Civic Center Way, south to Malibu Colony Road, and from the western edge of the groundwater basin (west of Stuart Ranch Road), to the west side of Cross Creek Road. This zone retards the downward movement of groundwater from the shallow alluvium to the underlying Civic Center Gravels, and appears to be deeper and somewhat thicker on the southeastern side of the basin.

<u>Civic Center Gravels</u>

The Civic Center Gravels underlie the shallow estuarine deposits and low permeability zone over much of the Civic Center area. These deposits are described (Leighton, 1994) and confirmed with subsequent borings in 2011 and 2013 as consisting of predominantly sands with gravel and cobbles. The top of the Civic Center Gravels is relatively flat, dipping slightly to the south and west. The Civic Center Gravels are interpreted to extend from just north of Civic Center Way, south to Malibu Road on the west side of the basin, and from just north of Civic Center Way to the Pacific Coast Highway near the eastern edge of Legacy Park. The full thickness and horizontal extent of the Civic Center Gravels is not known because of a lack of deep borings at the northern and western ends of the groundwater basin but they are estimated to be on the order of 10 to 140 feet thick.

In the summer of 2013, an electrical resistivity survey was conducted along the Malibu shoreline and immediately offshore of the Civic Center area. This survey used electrical current to identify high and low resistivity materials, indicating either the types of soils through which the current traveled (with clays and silts being less resistive than sands and gravels) and/or the type of water contained in the soils (with saltier water being less resistive than fresher water). The survey identified the Civic Center Gravels as a higher resistivity zone (i.e., consisting of sands and gravels) present below a shallow zone consisting of low resistivity material. This low resistivity material layer is thought to consist of clay-rich unconsolidated material (Cardno Entrix, 2013), similar to materials identified in onshore borings, and correlates with the low permeability zone previously identified. The resistivity of the Civic Center Gravels was higher on the west side of the groundwater basin than on the east, suggesting that the aquifer contains fresher water and is more permeable on the west side of the basin, correlating with one of the identified ancient Malibu Creek channels (McDonald Morrissey Associates, 2014). The resistivity of the Civic Center Gravels zone was lower by about an order of magnitude on the east side, suggesting that the groundwater in this area is brackish or the aquifer contains more silt and clay, or both. Based on the survey results, the fresh to brackish water zone appears to rise towards the sea floor offshore and south of the beach on the western side of the groundwater basin, suggesting that groundwater is discharging through the sea floor offshore and that the Civic Center Gravels continue offshore beneath the sea floor.

Bedrock

A large bedrock valley lies beneath the City of Malibu and is overlain by unconsolidated materials containing zones of permeable sand and gravel deposits as previously described. Bedrock mapping shows that the lowest bedrock elevations occur in the western and central part of the basin, to the west of the current location of Malibu Creek and Lagoon. Onshore geophysical surveys conducted in 2009 show the bedrock layer dropping in elevation from -20 feet below the ground surface level at the foot of the hills on the north side of the Civic Center Area, to an elevation of -120 to -140 feet from Legacy Park to Malibu Road (Cardno Entrix, 2013). The shape and characteristics of the bedrock layer are consistent with two ancient water courses carved by Malibu Creek approximately 60,000 and 20,000 years ago, leading to the ocean.

3.3.2 Groundwater Balance Components

McDonald Morrissey and Associates (2014) estimated that the total average annual inflow to the Malibu Valley Groundwater Basin is approximately 168,000 cubic feet per day (ft^3/d) or 1.25 million gallons per day (mgd). Sources of recharge to the system include infiltration from Malibu Creek, infiltration from OWDSs, irrigation return, upland runoff, and infiltration of precipitation.

Groundwater recharge to the Malibu Valley Groundwater Basin occurs by several different processes as follows:

- Surface water and groundwater runoff from upland areas recharges alluvial deposits as it flows from the upland areas to the edges of the alluvial deposits on the valley floor. Surface water infiltration is especially evident in the western part of the alluvium at the artificial wetland near the intersection of Civic Center Way and Stuart Ranch Road, on what is typically referred to as the Smith Parcel.

- Direct recharge of groundwater from subsurface wastewater dispersal (onsite wastewater disposal systems or OWDS) occurs within the shallow alluvium at each dispersal bed. Dispersal systems in upland areas adjacent to the alluvium can also provide indirect recharge to the basin in the form of groundwater runoff.

- Infiltration of precipitation directly into the alluvium can occur where land is not covered with impervious surfaces. Additionally, infiltration of precipitation from upland areas in the form of groundwater recharge at the basin's margins.

- Recharge from infiltration of Malibu Creek into underlying alluvial deposits occurs when surface water flow infiltrates into permeable alluvium in the upper reaches of the creek.

- Excess irrigation required to flush root zones for maintenance of turf and other vegetation results in groundwater recharge. Irrigation in upland areas also can cause groundwater recharge to the alluvium via ground and surface water runoff.

The degree to which each of these various mechanisms of recharge can be quantified is variable. Recharge caused by the infiltration of subsurface wastewater dispersal may be easiest to quantify because recharge rates are directly related to water use and water use data are available for the basin. Recharge from infiltration of Malibu Creek along the upper reaches of alluvial deposits may be estimated from stream gaging data. Recharge from infiltration of precipitation and upland runoff cannot be directly measured and therefore must be estimated.

Groundwater sinks are areas where groundwater discharges out of the alluvial groundwater flow system. Potential groundwater sinks include natural discharge to surface waters and the ocean, evapotranspiration from riparian vegetation, and pumping wells used for irrigation or other water uses in the study area. The magnitude of these sinks was estimated as follows:

- Discharges to the Ocean and Malibu Lagoon were estimated using water table maps to identify what portions of the groundwater basin discharge to the Lagoon versus which discharge to ocean and the approximate flux rate of these discharges (which varies over time).

- Evapotranspiration from groundwater can occur where the root zone of vegetation is at or below the water table. The most likely place for this to occur in the study area is along Malibu Creek and Lagoon where there is riparian vegetation and shallow depths to groundwater. The Las Virgenes Municipal Water District estimated the water demand of riparian vegetation along Malibu Creek downstream of the Tapia Water Reclamation Facility using a method that takes into account vegetation species type and density along with microclimatic characteristics. Results of this study estimated that riparian vegetation consumes approximately 1.2 cubic feet per second (cfs) of water in the reach below the treatment plant and Cross Creek Road, a distance of about 4 miles, which is approximately 0.3 cfs per mile

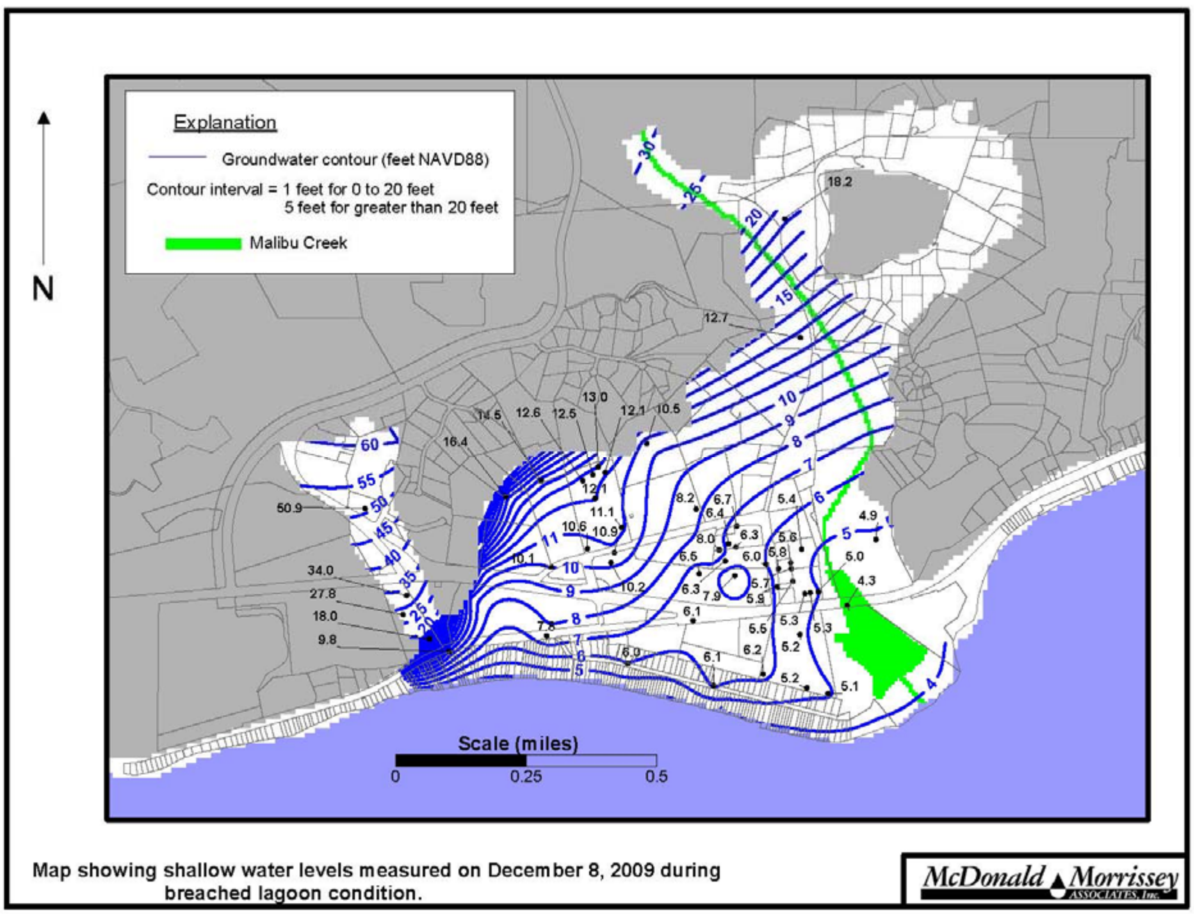
- The County of Los Angeles Department of Health Services – Environmental Health Division regulates water supply wells in Malibu. All water wells require permits issued by the County of Los Angeles Environmental Health Division. At present, there is no documentation of any pumping wells in the study area, however, observations made during field studies indicate that there may be a few private domestic wells in the study area that are being used for irrigation. The amount of pumping that occurs from such wells is considered to be negligible.

Because the Malibu Valley Groundwater Basin is not actively used as a potable water supply, the groundwater basin is presently in steady-state, with total discharges approximately equal to total recharge.

Groundwater flow directions are generally from upland areas to the south and southeast toward the Pacific Ocean and Malibu Lagoon (Figure 3-2). Groundwater elevations are influenced by tidal fluctuations and by lagoon stage elevation (as determined by breached or open conditions). In general, groundwater level variations in Winter Canyon, and on the west side of the alluvium, are most closely related to variations in precipitation. Groundwater levels at wells in the vicinity of the lagoon, especially east of Cross Creek Road, are closely related to variations in lagoon stage. Groundwater levels in wells completed in the Civic Center Gravels also exhibit water-level variations that are affected by lagoon stage. Groundwater levels in wells closest to the coast, especially those wells south of the Pacific Coast Highway, are most directly influenced by tidal variations.

Average groundwater travel times to Malibu Creek and Lagoon in the shallow alluvium are generally faster than to the ocean because of the high hydraulic conductivity of subsurface materials near the Creek and Lagoon. McDonald Morrissey and Associates estimated that groundwater discharges to Malibu Creek and Lagoon at an annual average rate of approximately 36,000 ft^3/d. Analysis under both Lagoon conditions (breached or open lagoon) revealed a very-slow-moving groundwater flow system, with as great as a 50-year travel time from the upstream OWDSs to the Lagoon and/or ocean (RMC, 2013).

Figure 3-2: Groundwater Flow Direction



3.3.3 Groundwater Quality

While there are many groundwater monitoring wells screened in the shallow alluvium of the Malibu Valley Groundwater Basin, there are limited groundwater quality data related to parameters other than nitrogen (total nitrogen, nitrate, nitrite and/or ammonia) and bacteria. In general, shallow groundwater in the basin appears to be affected by tidal influences in Malibu Lagoon and along the shoreline. Groundwater samples collected from wells adjacent to Malibu Lagoon indicate elevated sodium and chloride concentrations, with concentrations decreasing with distance from the tidal channel. Groundwater samples also indicate elevated levels of magnesium and sulfate, commensurate with, but somewhat lower than, the concentrations observed in the deeper groundwater.

Little data exist regarding the deeper groundwater quality of the Civic Center Gravels. Overall, groundwater quality in the Civic Center Gravels is of good quality with near neutral pH, high silica, low iron and relatively low manganese concentrations. Geochemical analyses of samples from the Civic Center Gravels indicate that there is generally little difference in the major ionic composition of groundwater in this zone. On the whole, groundwater in the basin meets primary and secondary drinking water standards for all constituents except total dissolved solids, sulfate, and chloride. Additionally, manganese concentrations, while generally low, are at or above the current aesthetic drinking water standard of 0.050 mg/L. Finally, groundwater in the Civic Center Gravels contains nutrient parameters at concentrations less than their detection limits. These parameters include Total Kjeldahl Nitrogen (TKN), ammonia, nitrate, total phosphorus and orthophosphate

Differences in Civic Center Gravel groundwater do exist, predominantly in regards to the sulfate-bicarbonate percentages. Groundwater in the central and eastern side of the basin (as observed at either end of Legacy Park) are typically of either a sodium-magnesium-calcium-sulfate water chemistry type (MCWP-MW01) or sodium-calcium-sulfate chloride water chemistry type (MCWP-MW02), with increasing concentrations of manganese, sulfate and TDS as one moves to the west and south. Groundwater in the southern part of the basin, as measured at MCWP-MW03 on Malibu Road, is an unusual magnesium-sodium-sulfate water chemistry type containing the highest concentrations of sulfate and TDS measured in the basin. Groundwater in the eastern side of the basin, near Malibu Lagoon and Creek, generally contains a minor seawater component, while groundwater south of Pacific Coast Highway appears to be more affected by seawater than at other locations in the groundwater basin.

Data collected from the GAMA Geotracker database demonstrate that there are areas within the groundwater basin in which groundwater quality exceeds the secondary maximum contaminant levels (SMCLs) for chloride, sulfate, and TDS; these data are summarized in Table 3-1 (SWRCB, 2015). The locations of the exceedances are shown in Figure 3-3, Figure 3-4, and Figure 3-5.

Table 3-1: SMCL Exceedances

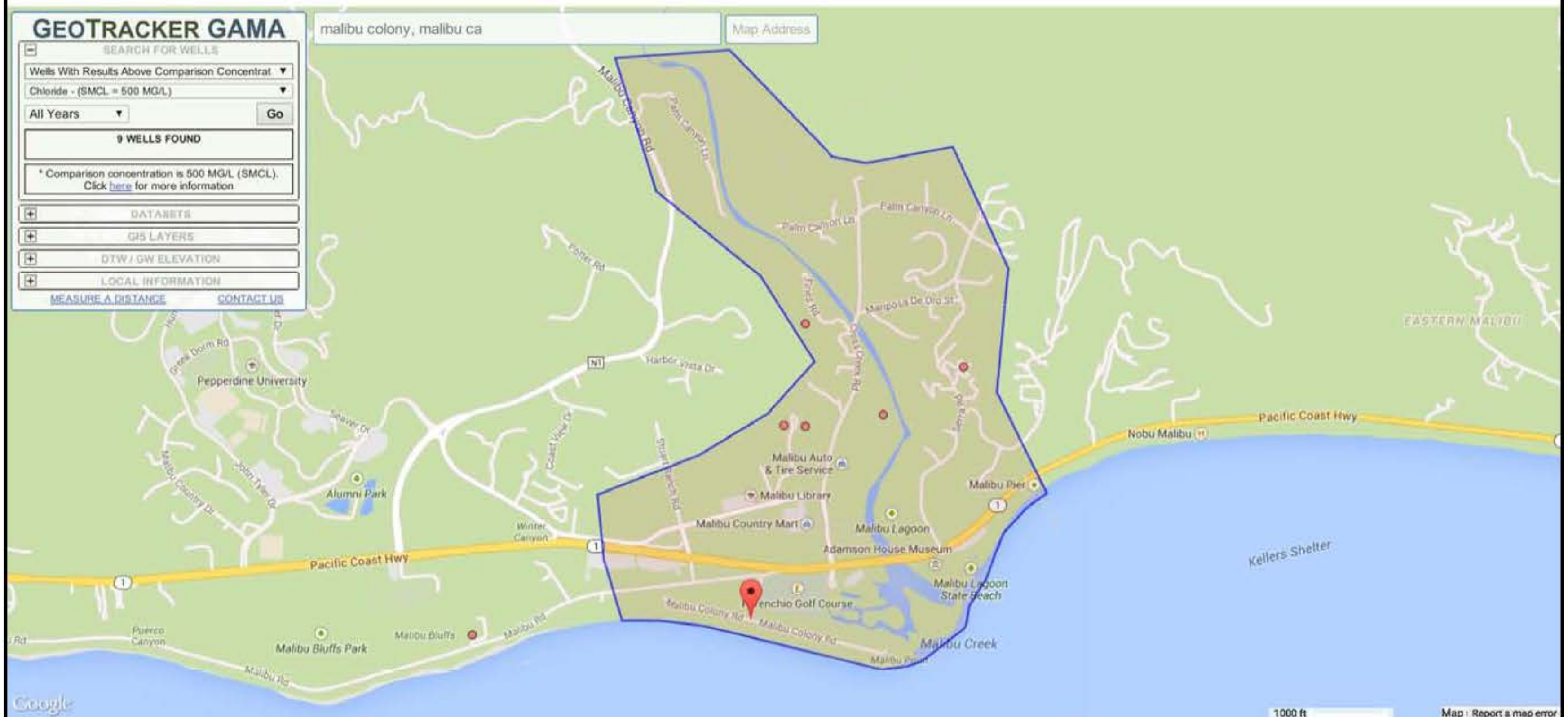
Constituent	SMCL	Total Data Points	Number of Exceedances	% Exceedances
Chloride	2,000 mg/L	76	24	32%
Sulfate	500 mg/L	132	81	61%
TDS	500 mg/L	98	32	33%

Source: SWRCB, 2015.

TDS includes any organic and inorganic substance in water that can pass through a 2-micron filter and generally includes ions and ionic compounds such as carbonate, biocarbonate, chloride, fluoride, sulfate, phosphate, nitrate, calcium, magnesium, sodium, and potassium. Given what is known about the groundwater quality of the Malibu Valley Groundwater Basin, it is assumed, as TDS data include chlorides and sulfates and these two constituents have been detected in the local groundwater, that there is a correlation between the concentration trends and exceedances for those three constituents.

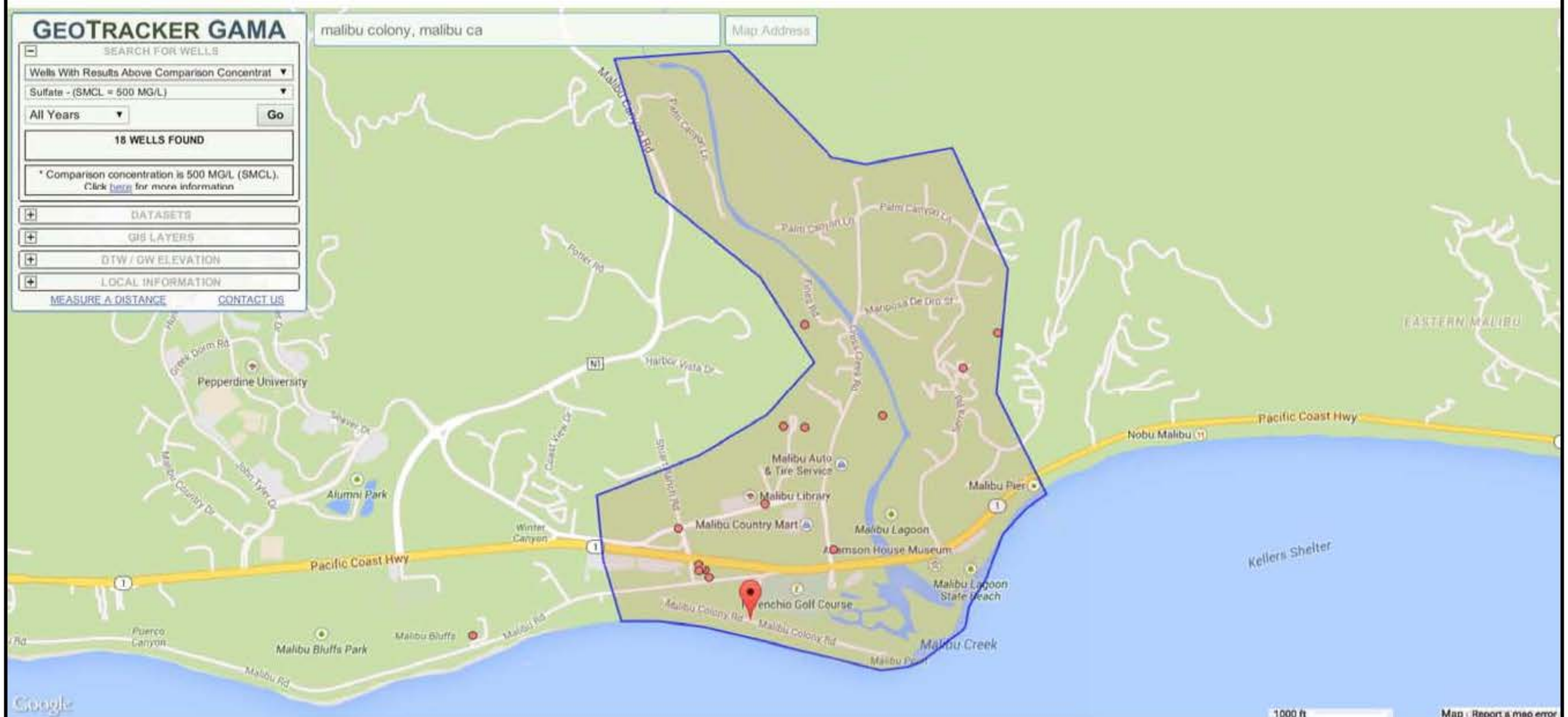
Chloride, TDS, and sulfate occur naturally in the groundwater basin. The Monterey/Modelo Formation is a predominant geologic formation in the northern Malibu Creek watershed, and is a natural source of these constituents to the groundwater basin (LVMWD, 2007). Additionally, the groundwater basin is in direct connection with both the Pacific Ocean and Malibu Creek and Lagoon, and therefore these saltwater-surface water interactions also contribute to groundwater quality. Records going back to the 1960s indicate that there have been groundwater quality issues in the area for decades, including incidences of saltwater intrusion resulting from basin overdraft, which was a primary driver for the formation of a public water district and the importation of State Water Project (SWP) water in the mid-1960s. The majority of the groundwater wells in the 1960s produced water with TDS concentrations higher than the current SMCLs and most were ultimately abandoned upon the arrival of imported potable water. High TDS, sulfate and chloride levels predate urban development and imported water supplies, and are likely intrinsic of native groundwater quality (LVMWD, 2007). As the primary source of the recycled water is influent sourced from imported water, the resultant treated effluent/recycled water will have chloride, sulfate, and TDS concentrations lower concentrations than those in the ambient groundwater, and therefore use and/or injection of this recycled water is anticipated to improve groundwater quality over time.

Figure 3-3: Chloride Secondary MCL Exceedances



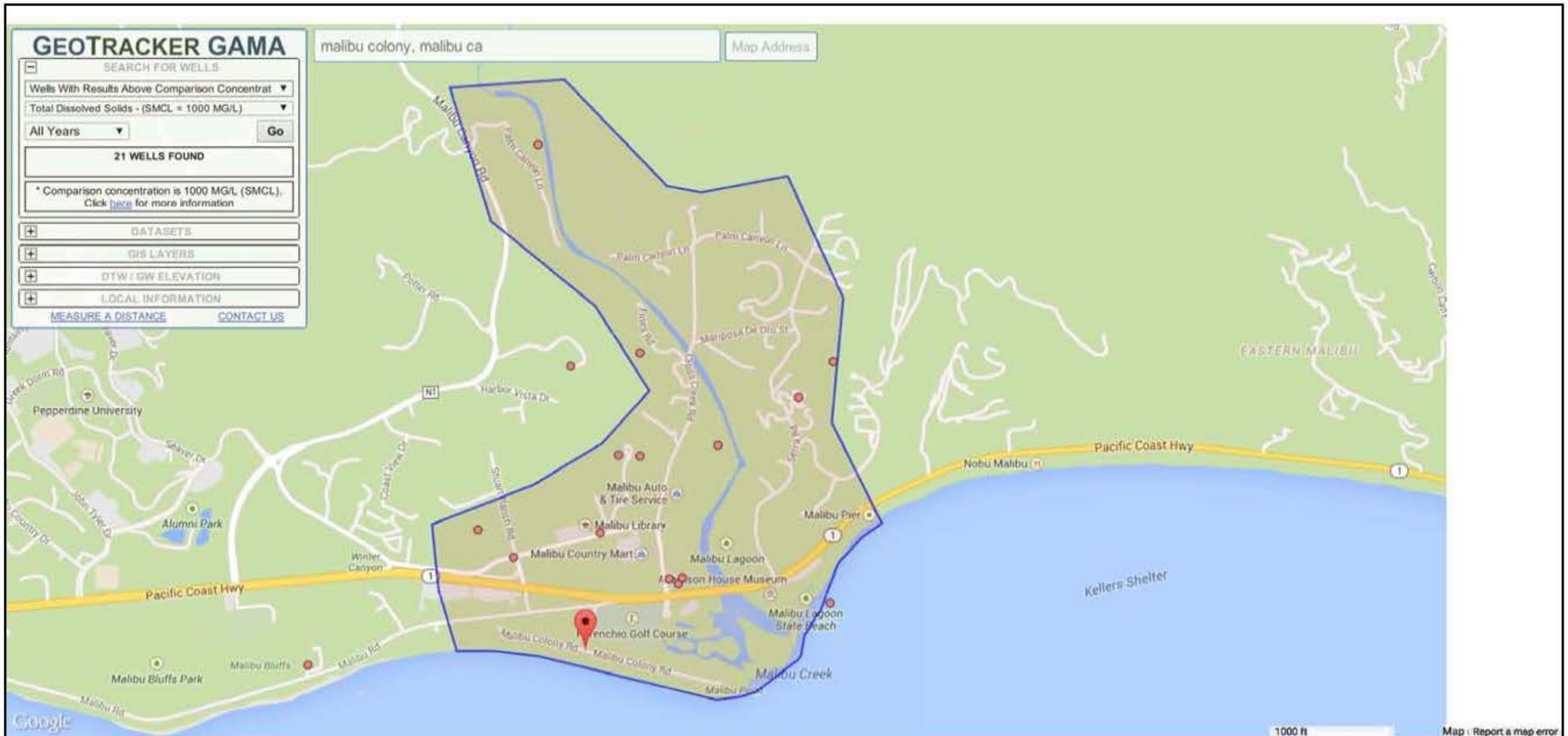
LOCATIONS FOUND	MAX VALUE		
4 WELL CLUSTER	5301	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	4440	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	1617	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	1200	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	780	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	626	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]

Figure 3-4: Sulfate Secondary MCL Exceedances



LOCATIONS FOUND	MAX VALUE		
1 WELL	3800	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	3000	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	2200	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	1300	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	1300	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	1030	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
4 WELL CLUSTER	954	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	950	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	805	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	727	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	641	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]

Figure 3-5: TDS Secondary MCL Exceedances



LOCATIONS FOUND	MAX VALUE		
5 WELL CLUSTER	13940	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	9080	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	8910	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
2 WELL CLUSTER	5366	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	2540	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	2460	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	1580	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	1520	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	1460	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	1400	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
1 WELL	1300	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]

3.4 Surface Water Resources

Infiltration of stream flow is a common source of recharge to alluvial aquifers. Recharge occurs as streams flow from steep upland areas, which are predominantly bedrock, onto more permeable, relatively flat, alluvial deposits. The rate of recharge is controlled by the difference in head between the stream and the underlying groundwater and the permeability of the streambed and underlying alluvial deposits.

Infiltration of stream flow has been observed as Malibu Creek exits the canyon and crosses onto the alluvial deposits along the coastal plain. Some of this water is lost to evapotranspiration and to infiltration along the stream channel above the main body of alluvium. But based upon available data, a significant amount recharges the alluvial deposits in the Civic Center area. These recharge rates are estimated to be on the order of 0.5 to 2 cubic feet per second (cfs) during low flows, and may be higher during flood conditions (Stone Environmental, Inc., 2004).

Malibu Creek stream flow data are collected at the County of Los Angeles Flood Control District continuous recording gage F130R, (formerly United States Geological Survey [USGS] gaging station 111055500), located 0.3 miles downstream of Cold Creek and approximately 3.5 miles upstream from the Cross Creek Bridge. The gaging station was installed in 1931 and operated cooperatively by the USGS and the County of Los Angeles until 1978. From 1979 until the present, the gage has been operated by County of Los Angeles. Flows recorded at the gage include releases from the Las Virgenes Municipal Water District Tapia Water Treatment Facility which was constructed in 1965.

The USGS has operated a stream gage near the bridge over Malibu Creek on Cross Creek Road since December 2007. Daily flow data at this USGS gage, and the County gage 3.5 miles upstream, are available for the period December 2007 to October 2009. During winter periods, when most of the precipitation and associated runoff occurs, stream flow is generally greater at the downstream gage. During the summer/fall period when there is very little precipitation, there is a consistent loss of flow between the two gages of about 1 to 10 cfs. During these periods, flow at the upstream gage is mostly from release of treated waste water at the Tapia Plant. By the time this flow reaches the downstream gage at Cross Creek Road much of the water has infiltrated into the alluvium along Malibu Creek.

In addition to the stream gage data from 2007-2009 described above, infiltration of stream flow has been observed as Malibu Creek exits the canyon and crosses onto the alluvial deposits along the coastal plain on several earlier occasions. On August 23, 1999, flow at the County gaging station was measured at 1.4 cfs and a similar flow was observed the following day about 4,000 feet above the mouth of the Canyon. Another 2,300 feet downstream, flow had decreased to about 1 cfs and 3,300 further downstream, just below Cross Creek Road, the stream was dry (Entrix, Inc., 1999). On September 10, 1998 a similar pattern was noticed. Flow near the mouth of the canyon was 8.2 cfs and 600 feet downstream of Cross Creek Road, it was 6.4 cfs, a decrease of 1.8 cfs (Entrix, Inc., 1999).

On September 24, 2003 Malibu Creek had an average daily flow of 3.0 cfs at the County gage (written comm., LADPW, April 2, 2004). Stream flow in the Creek was measured at 0.6 cfs 3,200 feet above Cross Creek Road/Arizona Crossing and the stream channel was dry just above the Cross Creek Road bridge (written comm., McDonald Morrissey Associates, Inc., 2003). Entrix (1999) also states that Las Virgenes Municipal Water District (LVMWD) staff observed that “the stream is almost always dry below Cross Creek Road in the late summer months.” Examination of streamflow records show that average daily flows during the late summer months are typically 2 to 4 cfs. Some of this water is lost to evapotranspiration and to infiltration along the stream channel above the main body of alluvium but, based upon available gaging data, a significant amount recharges the alluvial deposits in the Civic Center area. These recharge rates are estimated to be on the order of 0.5 to 2 cfs during low flows, and may be higher during flood conditions.

Stream flow that infiltrates to groundwater during dry periods may move as hyporheic flow through the coarse alluvium along the Malibu Creek channel and ultimately discharge to the upper reaches of the lagoon.

Water table maps constructed in order to determine general directions of groundwater flow in the alluvium and to differentiate between groundwater flow to the ocean and lagoon were prepared by Stone Environmental, Inc. (2004). Data used to construct those water table maps were collected on September 25, 2003 and on March 9, 2004. During the September 2003 measurements, the barrier beach was intact and the lagoon was flooded. During the March 2004 measurements, the barrier beach was breached and flow in Malibu Creek was discharging to the ocean. In addition, a synoptic water level measurement was conducted on December 8, 2009 during a condition when the lagoon was partially breached. During each of the three synoptic measurements mentioned above, groundwater levels and lagoon stage were measured during a relatively short period of time to minimize the effects that tidal variations had on groundwater elevations. Contour maps of observed water levels for the September 2003, March 2004 and December 2009 measurements are shown in Figures 3-6, 3-7 and 3-8, respectively.

During both the flooded and breached lagoon conditions, groundwater from the western side of the alluvial flow system and from Winter Canyon alluvium discharges to the ocean. Groundwater flow from the eastern side of the alluvial flow system discharges to Malibu Lagoon and Creek. The groundwater flow divide can shift slightly depending upon lagoon conditions but in general, available groundwater level maps show that groundwater in the alluvial deposits in Winter Canyon and the west side of the alluvial deposits discharges to the Ocean. Groundwater in the eastern parts of the basin discharges to the Lagoon, except along the eastern shoreline near Malibu Pier where groundwater discharges to the ocean.

In July of 2013, the USEPA issued Total Maximum Daily Loads (TMDLs) for Malibu Creek and Lagoon. These TMDLs are intended to reflect the maximum impairment this system can sustain while still maintaining ecosystem benefits such as habitat. The TMDLs set for the Creek and Lagoon include a 7 mg/L mean annual dissolved oxygen concentration, and targets of 1mg/L total nitrogen and 0.1 mg/L total phosphorus during the summer, and 8 mg/L total nitrogen for the winter. TMDLs have also been issued for bacteria in the Creek and Lagoon.

Figure 3-6: Water Levels Measured on September 25, 2003 during Flooded Lagoon Conditions

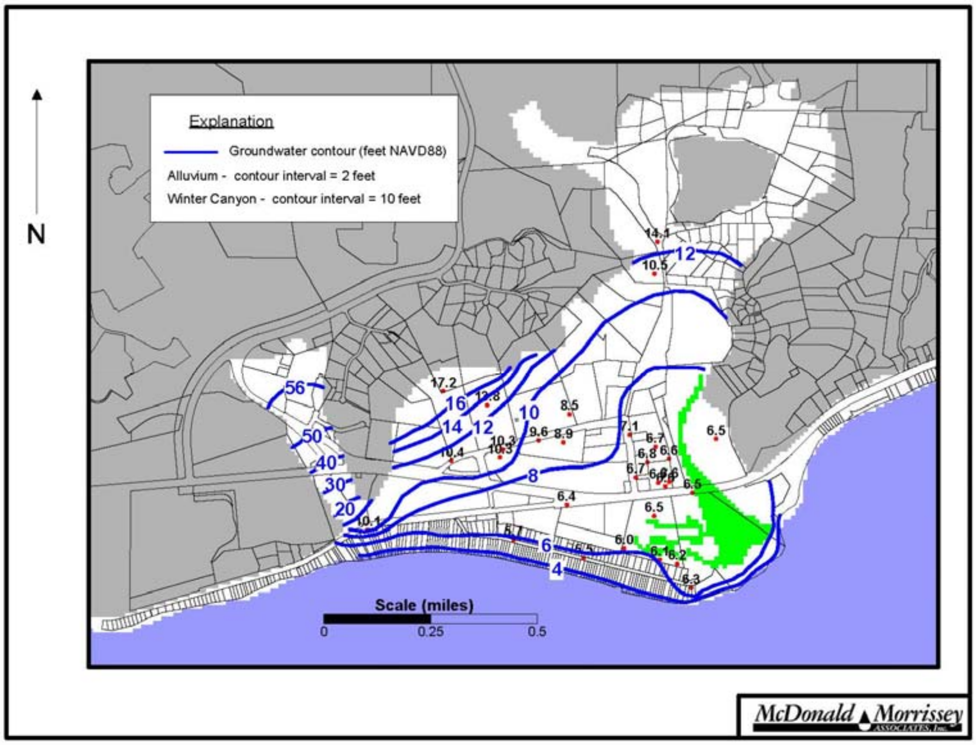


Figure 3-7: Water Levels Measured on March 9, 2004 during Breached Lagoon Conditions

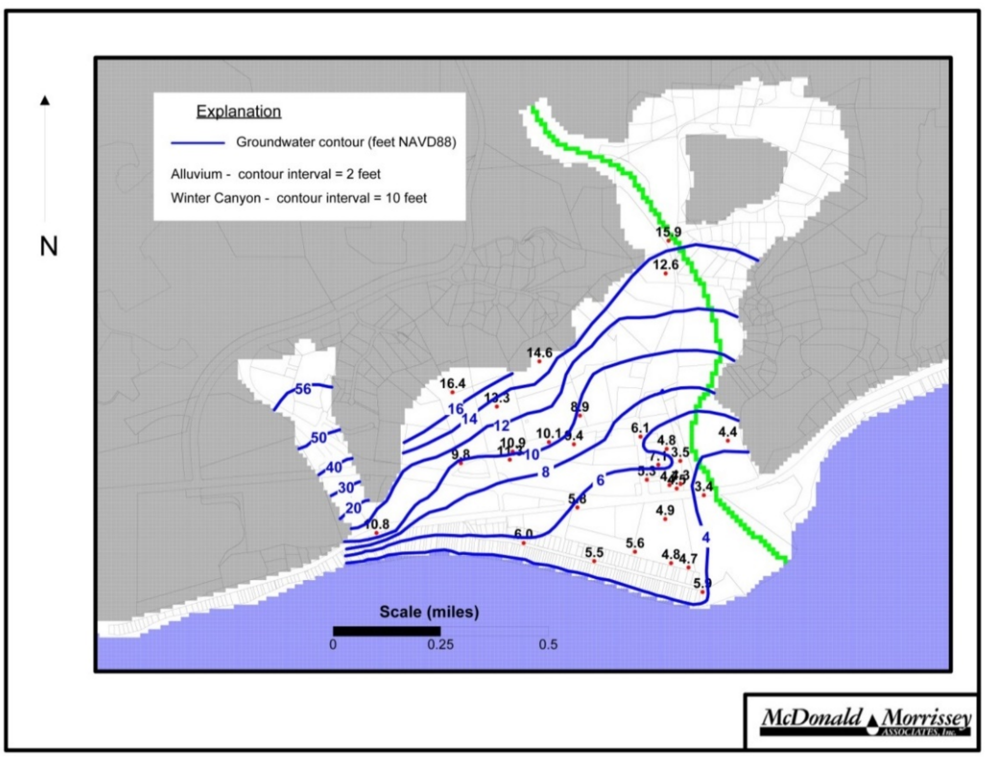
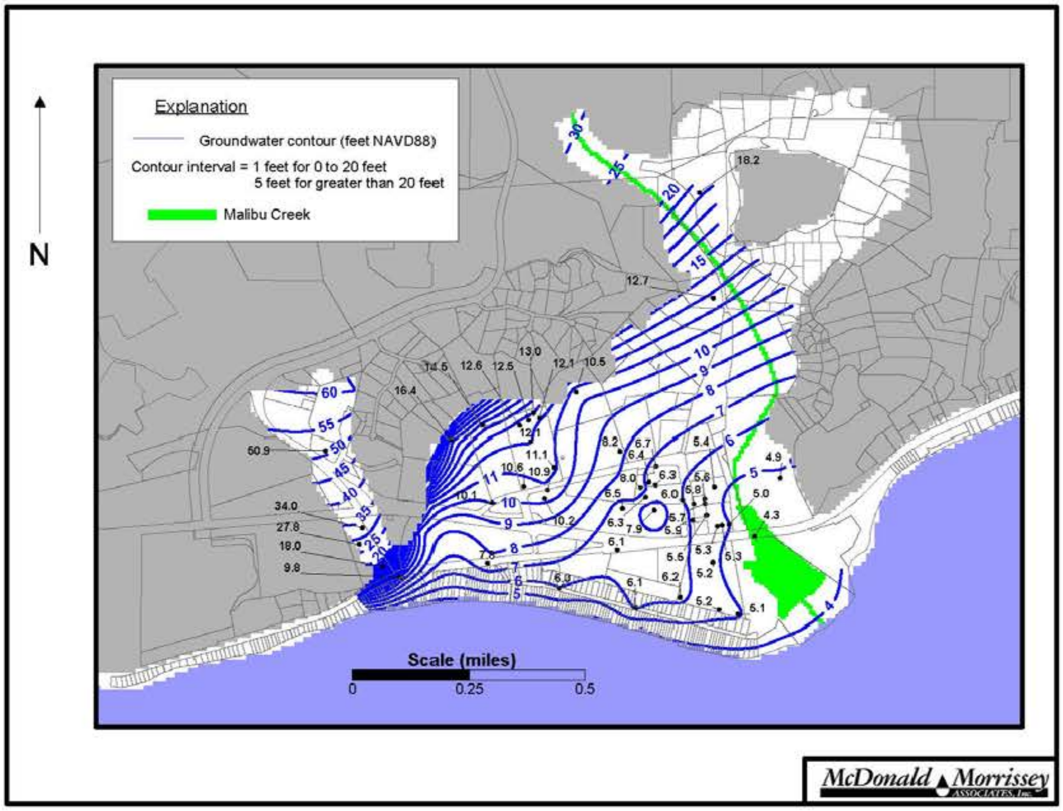


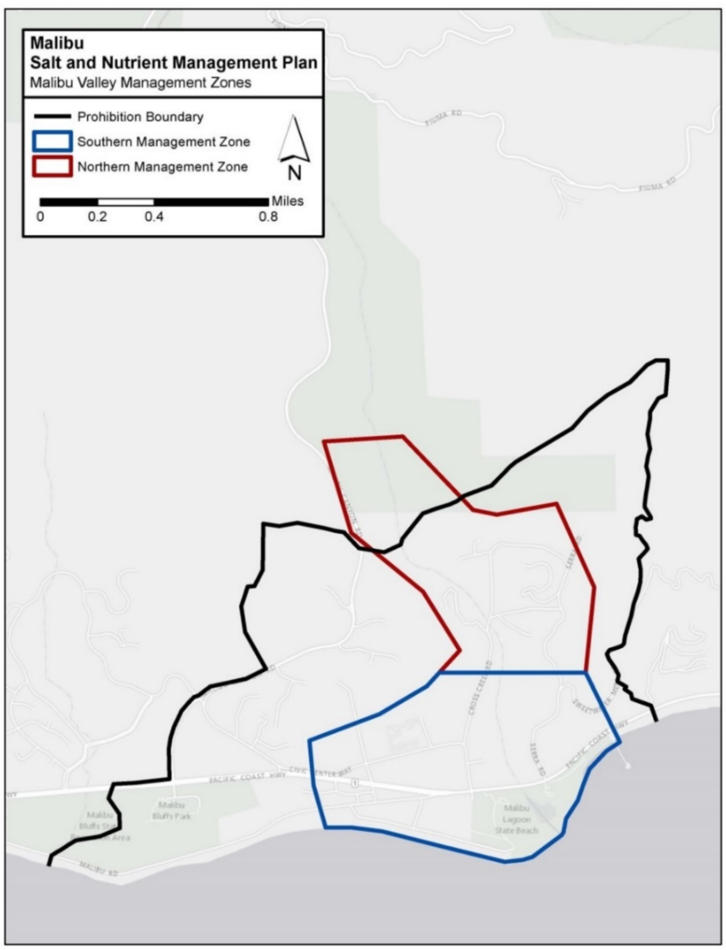
Figure 3-8: Water Levels Measured on December 8, 2009 during Breached Lagoon Conditions



Chapter 4 Baseline and Future Planning Period Evaluation

The initial evaluation of future impacts on the Malibu Valley Groundwater Basin groundwater quality considered the basin in its entirety. At the request of the LARWQCB and consistent with the State's Recycled Water Policy, the Malibu Valley Groundwater Basin was subdivided into two management zones for the purposes of this analysis (Figure 4-1). The Northern Management Zone includes approximately the northern half of the groundwater basin and contains primarily residential properties, while the Southern Management Zone covers the southern half of the basin and contains a combination of seaside residential properties, the Civic Center commercial area, and the proposed treated effluent injection wells of the proposed Civic Center Wastewater Treatment Facility. The line dividing the two management zones was determined based on a combination of groundwater quality data, current and future land use, and the grid elements contained in the MODFLOW groundwater flow model (which provide the water balance data necessary for the evaluation). The reader is referred to the report entitled *Groundwater Modeling analysis of Proposed Wastewater Dispersal – City of Malibu, Malibu, California* (McDonald Morrissey Associates, April 3, 2014) for details regarding the MODFLOW numerical groundwater flow model of the Malibu Valley Groundwater Basin

Figure 4-1: Summary of Available Water Quality Data



4.1 Indicator Parameters of Salts and Nutrients

The major dissolved ions potentially included in recycled water that reflect its salinity and nutrient content are many and varied, and include sulfate, chloride, nitrate, iron, boron and manganese. Simulation of each constituent is beyond the scope of this study; therefore, indicators of salt and nutrient loading to the Malibu Valley Groundwater Basin were selected for further study.

In choosing which constituents to consider in this analysis, the following criteria/questions were used to identify a select number of constituents for further consideration:

1. Is the constituent regularly monitored and detected in source waters?
2. Is the constituent representative of other salts and nutrients?
3. Is the constituent conservative and mobile in the environment?
4. Is the constituent found in source waters at concentrations above those found in ambient groundwater?
5. Does the constituent have high toxicity for human health or will it otherwise affect beneficial use?
6. Is the constituent a known contaminant in groundwater in the study area?
7. Have the concentrations of the constituents been shown to be increasing in the study area?
8. Is the constituent subject to a water quality objective (WQO) within the Basin Plan?

Each selected indicator constituent of salts and nutrients is not required to meet all the criteria, but as a group, at least one should meet each criterion.

Very little groundwater quality data current exist for the Civic Center Gravels; therefore, to a great extent, the selection of indicator constituents was driven by what data are presently available for use in establishing background water quality. To that end, total dissolved solids (TDS) and nitrate were selected as the indicator constituents for salts and nutrients, respectively, for the Malibu Valley Groundwater Basin. These selections are justifiable as total salinity is commonly expressed in terms of TDS in milligrams per liter (mg/L). TDS (and electrical conductivity data that can be converted to TDS) are available for source waters (both inflows and outflows) into and from the groundwater basin. While TDS can be an indicator of anthropogenic impacts, such as infiltration of runoff, soil leaching, saltwater intrusion and land use, there is also a natural background TDS concentration in groundwater. Furthermore, TDS includes ions and ionic compounds, including sulfate and chloride among others. Sulfate and chloride were not chosen as indicator parameters due to the lack of available data (and therefore associated difficulties in being able to establish current background concentrations and in simulating changes in concentrations resulting from recycled water use) and as the expected correlation between TDS concentrations in the Malibu Valley Groundwater Basin and sulfate and chloride concentrations (and therefore the base assumption that trends in TDS will reflect similar trends in sulfate and chloride concentrations as all three constituents are conservative; see Chapter 3.3.3).

Nitrate is a widespread contaminant in California groundwater. High levels of nitrate in groundwater are generally associated with agricultural activities, septic systems, landscape fertilization, and wastewater treatment facility discharges. Nitrate is the primary form of nitrogen detected in groundwater. Natural nitrate levels in groundwater are generally very low, with concentrations typically less than 10 mg/L for nitrate as nitrate (nitrate-NO_3) or 2 to 3 mg/L for nitrate as nitrogen (nitrate-N). Nitrate is commonly reported as either nitrate-NO_3 or nitrate-N; and one can be converted to the other. Nitrate-N is selected for the assessment of nutrients in this analysis.

4.2 Water Quality Objectives

Water quality objectives (WQOs) provide a reference for assessing groundwater quality in the Malibu Valley Groundwater Basin. The California Department of Public Health (CDPH) has adopted a Secondary Maximum Contaminant Level (SMCL) for TDS. SMCLs address aesthetic issues related to taste, odor, or appearance of the water and are not related to health effects, although elevated TDS concentrations in water can damage crops, affect plant growth, and damage municipal and industrial equipment. While the U.S. Environmental Protection Agency (USEPA) recommended SMCL for TDS is 500 mg/L, the SWRCB has established a Basin Plan WQO of 2,000 mg/L for TDS in the Malibu Valley Groundwater Basin. The USEPA has also set the SMCL for chloride at 250 mg/L and recommends a 400-500 mg/L MCL for sulfate. The WQOs for both constituents in the Malibu Valley Groundwater Basin is 500 mg/L.

The Primary Maximum Contaminant Level (PMCL) for nitrate-nitrogen plus nitrite-nitrogen (as N) is 10 mg/L. Unlike SMCLs, PMCLs are set to be protective of human health. The SWRCB has utilized the PMCL for nitrate-N as the numerical WQO for the Malibu Valley Groundwater Basin in its Basin Plan for groundwater. Water Quality Objectives for nitrate-N are not included in the California Ocean Plan; however, numeric limits for ammonia are included (600 micrograms per liter [μg/L] for a 6-month median, 2,400 μg/L for a daily maximum, and 6,000 μg/L as an instantaneous maximum). For the assimilative capacity analysis and subsequent anti-degradation analysis, a reference value of 10 mg/L of nitrate-N is used. Ammonia is not considered in this analysis as the recycled water is expected to contain little to no ammonia.

Table 4-1 summarizes the numerical WQOs for the Malibu Valley Groundwater Basin, designated as a Potential Municipal (MUN) supply in the LARWQCB Basin Plan.

Table 4-1: Basin Plan Objectives

Constituent	Units	WQOs
TDS	mg/L	2,000
Nitrate-N	mg/L	10
Chloride	mg/L	500
Sulfate	mg/L	500

Source: LARWQCB, 1994

4.3 TDS and Nitrate Fate and Transport

Salt and nutrient fate and transport describes the way salts and nutrients move and change through an environment or media. In groundwater, it is determined by groundwater flow directions and rate, the characteristics of individual salts and nutrients, and the characteristics of the aquifer media.

Water has the ability to naturally dissolve salts and nutrients along its journey in the hydrologic cycle. The types and quantity of salts and nutrients present determine whether the water is of suitable quality for its intended uses. Salts and nutrients present in natural water result from many different sources, including atmospheric gases and aerosols, weathering and erosion of soil and rocks, and from dissolution of existing minerals below the ground surface. Additional changes in concentrations can result from ion exchange, precipitation of minerals previously dissolved, and reactions resulting in conversion of some solutes from one form to another (such as the conversion of nitrate to gaseous nitrogen). In addition to naturally occurring salts and nutrients, anthropogenic activities can add salts and nutrients to groundwater.

TDS and nitrate are contained in source waters that recharge the Malibu Valley Groundwater Basin. Addition of new water supply sources, either through intentional or unintentional recharge, can change the groundwater quality either for the worse, by introducing contamination, or for the better, by diluting some existing contaminants in the aquifer. This effect can occur, for example, when irrigation water exceeds evaporation and plant needs and infiltrates into the aquifer (i.e., irrigation return flow). Irrigation return flows can carry fertilizers high in nitrogen and soil amendments high in salts from the yard or field into the aquifer. Similarly, recycled water used for irrigation also introduces salts and nutrients.

TDS is considered conservative in that it does not readily attenuate in the environment. Sulfate and chloride are also considered conservative, and the fate and transport of these constituents would be the same as for TDS. In contrast, processes that affect the fate and transport of nitrogen compounds are complex, with transformation, attenuation, uptake, and leaching in various environments. Nitrogen is relatively stable once in the saturated groundwater zone, and nitrate is the primary form of nitrogen detected in groundwater. It is soluble in water and can easily pass through soil to the groundwater table. Nitrate can be removed naturally from water through denitrification.

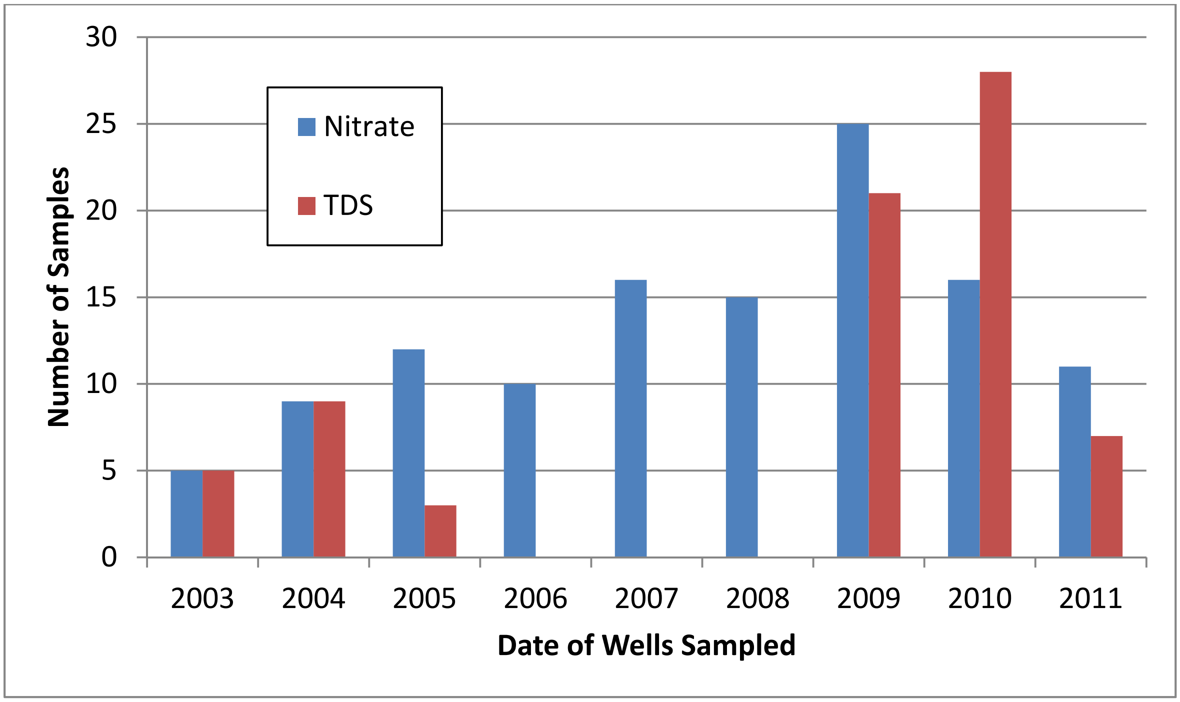
4.4 Indicator Parameter Analysis Methods

4.4.1 Groundwater Quality Averaging Period

Initial characteristics of ambient (existing) groundwater quality were developed though the analysis of historical salt and nutrient concentrations in the groundwater basin over the available historical record of data extending back to 2003. While the Statewide Recycled Water Policy requires existing conditions to be established using only the last five years of data, the baseline period for this analysis utilizes roughly the last ten years of data to provide a more robust data set given the lack of information available for the basin. Figure 4-2 shows the number of wells sampled over the history of sampling data available for the Malibu Valley Groundwater Basin. Water quality data were compiled from a variety of sources, primarily, but not limited to, monitoring and test wells installed as part of the conceptual feasibility testing for the CCWTF Project, monitoring wells at the commercial development commonly referred to as the “Lumber Yard,” wells sampled by the United States Geological Survey (USGS), and wells owned by private parties whose groundwater quality data were publicly available. A number of private, shallow wells are believed to exist within the groundwater basin for irrigation purposes, but data from these wells were unavailable for this analysis. In addition, a number of environmental remediation site monitoring wells exist; however, data from these wells were not used in the baseline water quality analysis as these wells are typically in place to monitor contaminant plumes and thus do not show average ambient conditions. Figures 4-3 through 4-6, shown in subsequent sections, depict the locations of wells (as black dots) whose data were used to determine baseline water quality.

While TDS and nitrate were evaluated as indicator constituents, sulfate and chloride were not carried forward into the subsequent water quality analyses due to a lack of data. For the purpose of this study, TDS is considered to be representative of chloride and sulfate as TDS concentrations include these constituents, as all three constituents are similarly conservative, and as data collected from GAMA/Geotracker indicates a correlation among the three constituents. Changes in TDS concentration in groundwater as a result of recycled water use/injection are therefore anticipated to be similarly reflected in sulfate and chloride concentration trends.

Figure 4-2: Summary of Available Water Quality Data



4.4.2 Evaluation of Existing Ambient Groundwater Quality

The median groundwater concentrations for both TDS and nitrate were developed by averaging concentrations from individual wells basin-wide (both shallow and deep wells), and then employing a spatial averaging and interpolation across the entire groundwater basin. The results of these analyses, shown below in Figures 4-3, 4-4, 4-5 and 4-6 for TDS, sulfate, chloride and nitrate, respectively, shows average basin-wide groundwater concentrations of approximately 2,100 mg/L for TDS, 520 mg/L for sulfate, 212 mg/L for chloride and 3.23 mg/L for nitrate-N. When divided into respective management zones, a differentiation of existing conditions arise. In the northern management zone, TDS, sulfate, chloride and nitrate concentrations average 2,000 mg/L (TDS), 394 mg/L (SO_4), 170 mg/L (Cl) and 2.78 mg/L (NO_3), respectively, while in the southern management zone, average concentrations increase to 2,200 mg/L (TDS), 619 mg/L (SO_4), 244 mg/L (Cl) and 3.29 mg/L (NO_3), respectively.

4.5 Existing Groundwater Quality

4.5.1 Total Dissolved Solids

Table 4-2 summarizes the average TDS concentration in the Malibu Valley Groundwater Basin and compares it against the Basin Plan WQO for that constituent. The difference between these two values, if the WQO is higher than the average groundwater quality concentration, is known as the assimilative capacity of the groundwater basin for that constituent (SWRCB, 2009). Assimilative capacity is the groundwater basin's ability to absorb constituents without exceeding WQOs. In this case, the average TDS concentration of groundwater in the Malibu Valley Groundwater Basin presently exceeds the Basin Plan WQO and therefore no assimilative capacity exists for TDS in the groundwater basin.

Figure 4-3 shows TDS concentration contours across the groundwater basin based on data from GeoTracker from 2000 to 2013 (SWRCB, 2015). Generally, relatively low TDS concentrations (less than 2,000 mg/L) are observed throughout most of the basin; however some areas of the groundwater basin do have elevated

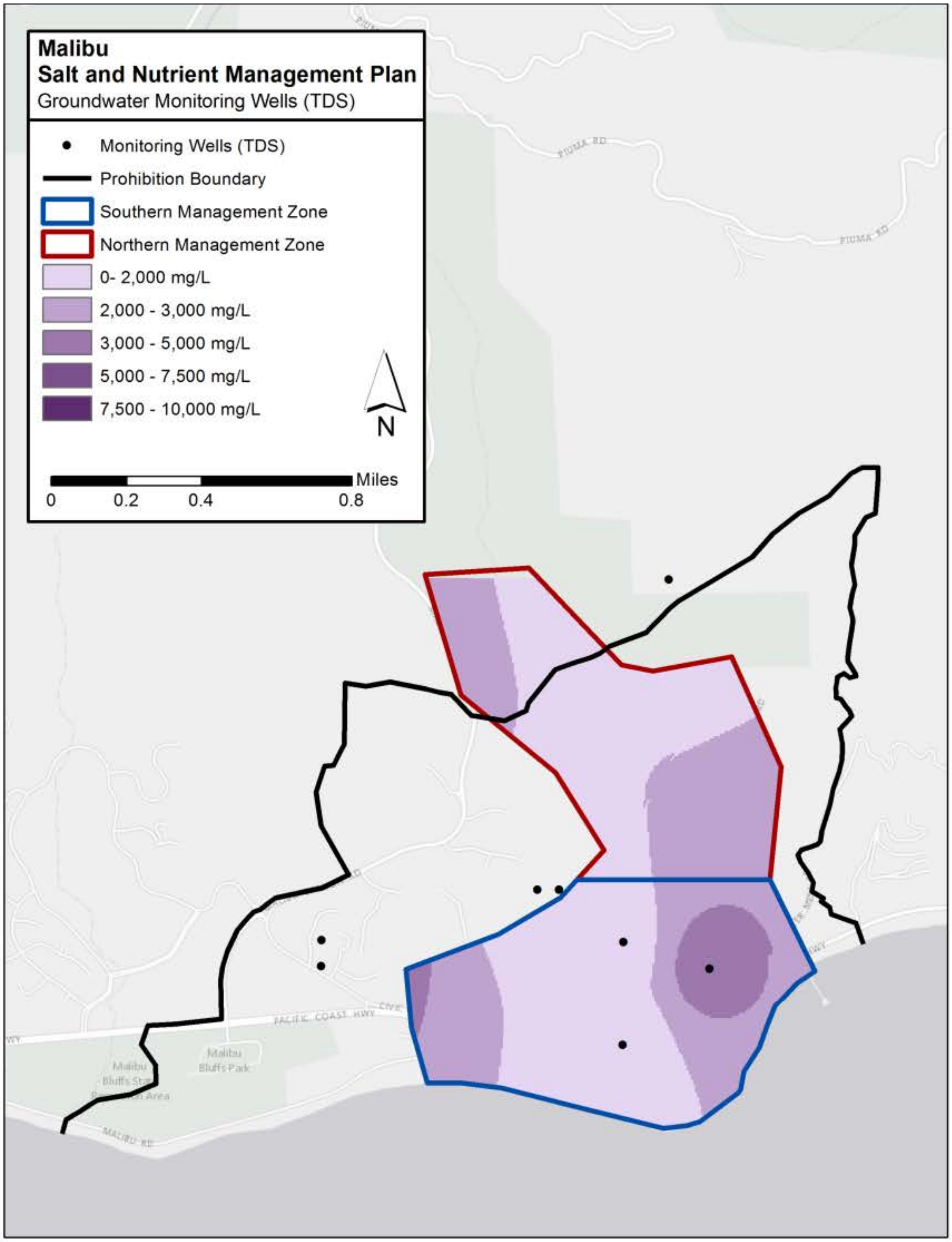
TDS levels, primarily as a result of either direct connection with ocean waters and/or as a result of historical sea water intrusion. One well in particular, on the east side of the basin shows elevated concentrations (above 4,000 mg/L) and results in a significant impact on the groundwater basin's spatial average.

Table 4-2: Average TDS Concentrations and Available Assimilative Capacity

Malibu Valley Groundwater Basin	
Water Quality Objective[1]	2,000
Northern Management Zone Concentration[2]	2,000
Southern Management Zone Concentration[2]	2,200
Basin-wide Concentration[2]	2,100
Northern Zone Available Assimilative Capacity	0
Southern Zone Available Assimilative Capacity	0
Basin-wide Assimilative Capacity	0

Note: All concentrations are in mg/L
1. Source: LARWQCB, 1994.
2. Based on data collected from 2000 to 2013 (SWRCB, 2015).

Figure 4-3: Total Dissolved Solids Concentrations in the Malibu Valley Groundwater Basin



4.5.2 Sulfate in Groundwater

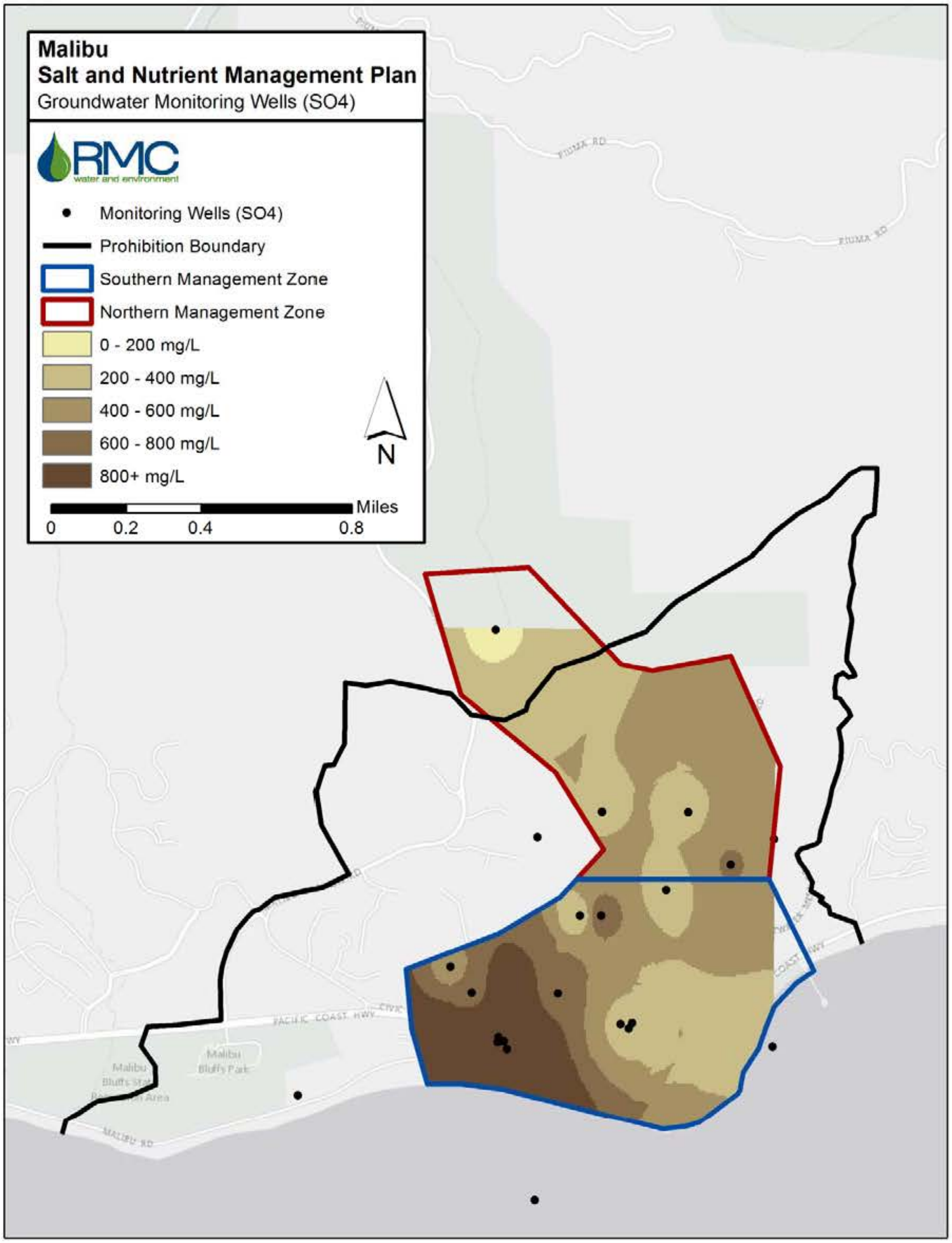
As shown in Table 4-3, sulfate concentrations in the southern management zone and on a basin-wide average exceed the WQO of 500 mg/L and therefore no assimilative capacity currently exists for sulfate. The average sulfate concentration in the northern management zone is 394 mg/L, resulting in an assimilative capacity of 196 mg/L. The mean concentrations for the northern management zone, southern management zone, and basin-wide are based on data from GeoTracker from 1953 to 1969 (SWRCB, 2015). More recent data were not available. The concentration contour map for sulfate is shown in Figure 4-4. As shown in this figure, there are areas of relatively low sulfate concentrations and concentrated areas of high concentrations exceeding 800 mg/L.

Table 4-3: Average Sulfate Concentrations and Available Assimilative Capacity

Malibu Valley Groundwater Basin	
Water Quality Objective[1]	500
Northern Management Zone Concentration[2]	394
Southern Management Zone Concentration[2]	619
Basin-wide Concentration[2]	520
Northern Zone Available Assimilative Capacity	106
Southern Zone Available Assimilative Capacity	0
Basin-wide Available Assimilative Capacity	0

Note: All concentrations are in mg/L
1. Source: LARWQCB, 1994.
2. Based on data collected from 1953 to 1969 (SWRCB, 2015).

Figure 4-4: Sulfate Concentrations in the Malibu Valley Groundwater Basin



4.5.3 Chloride in Groundwater

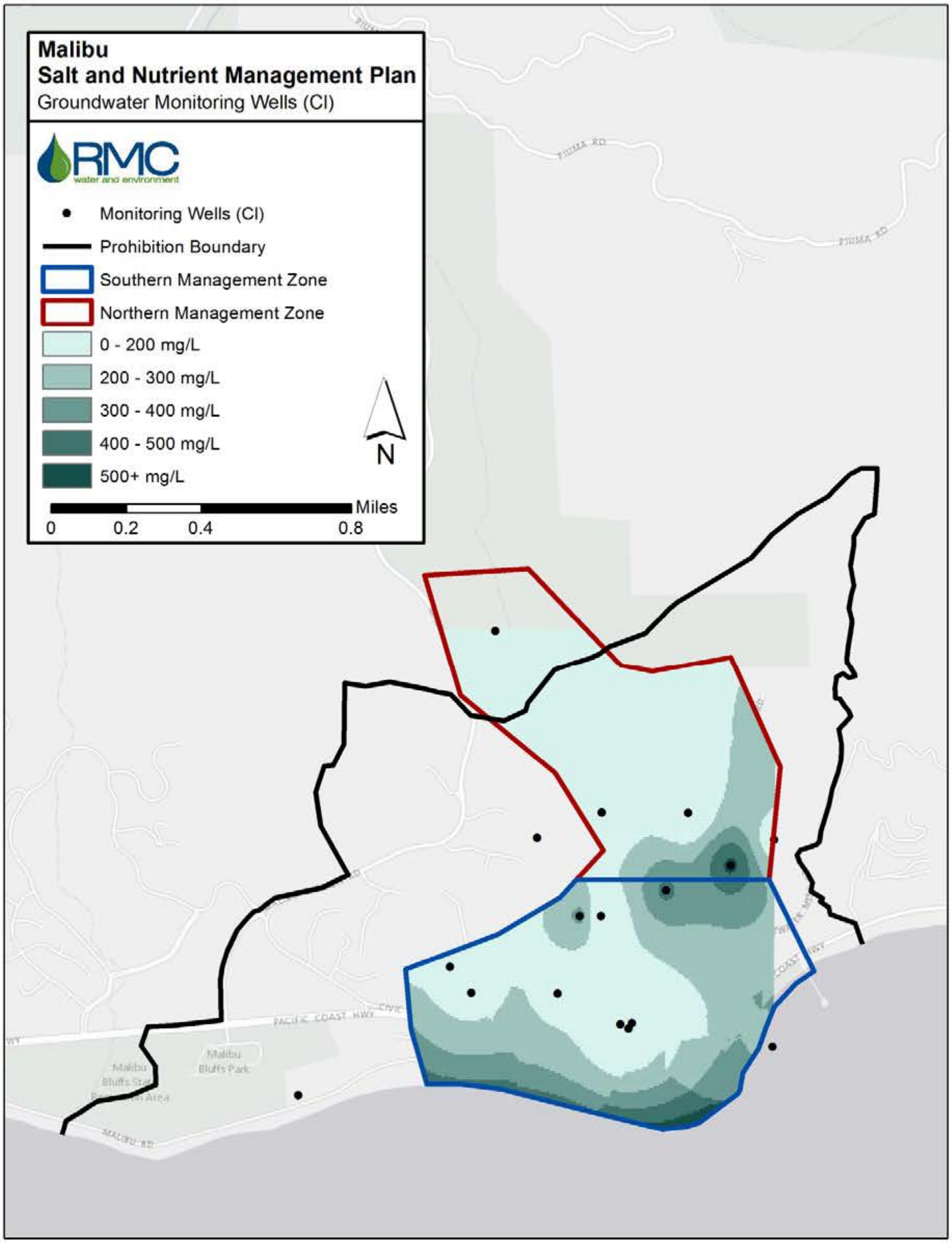
The mean chloride concentrations for the northern management zone, southern management zone, and basin-wide, as calculated using data from GeoTracker from 1953 to 1969 (SWRCB, 2015), are compared to the WQO for chloride in Table 4-4. More recent data were not available for use in this calculation. As shown in the table below, there is a basin-wide assimilative capacity of 288 mg/L. Figure 4-5 shows the chloride concentration contours in the groundwater basin. The higher concentrations tend to be near the ocean and lagoon indicating tidal and seawater influences on groundwater quality.

Table 4-4: Average Chloride Concentrations and Available Assimilative Capacity

Malibu Valley Groundwater Basin	
Water Quality Objective[1]	500
Northern Management Zone Concentration[2]	170
Southern Management Zone Concentration[2]	244
Basin-wide Concentration[2]	212
Northern Zone Available Assimilative Capacity	330
Southern Zone Available Assimilative Capacity	256
Basin-wide Available Assimilative Capacity	288

Note: All concentrations are in mg/L
1. Source: LARWQCB, 1994.
2. Based on data collected from 1953 to 1969 (SWRCB, 2015).

Figure 4-5: Chloride Concentrations in the Malibu Valley Groundwater Basin



4.5.4 Nitrate in Groundwater

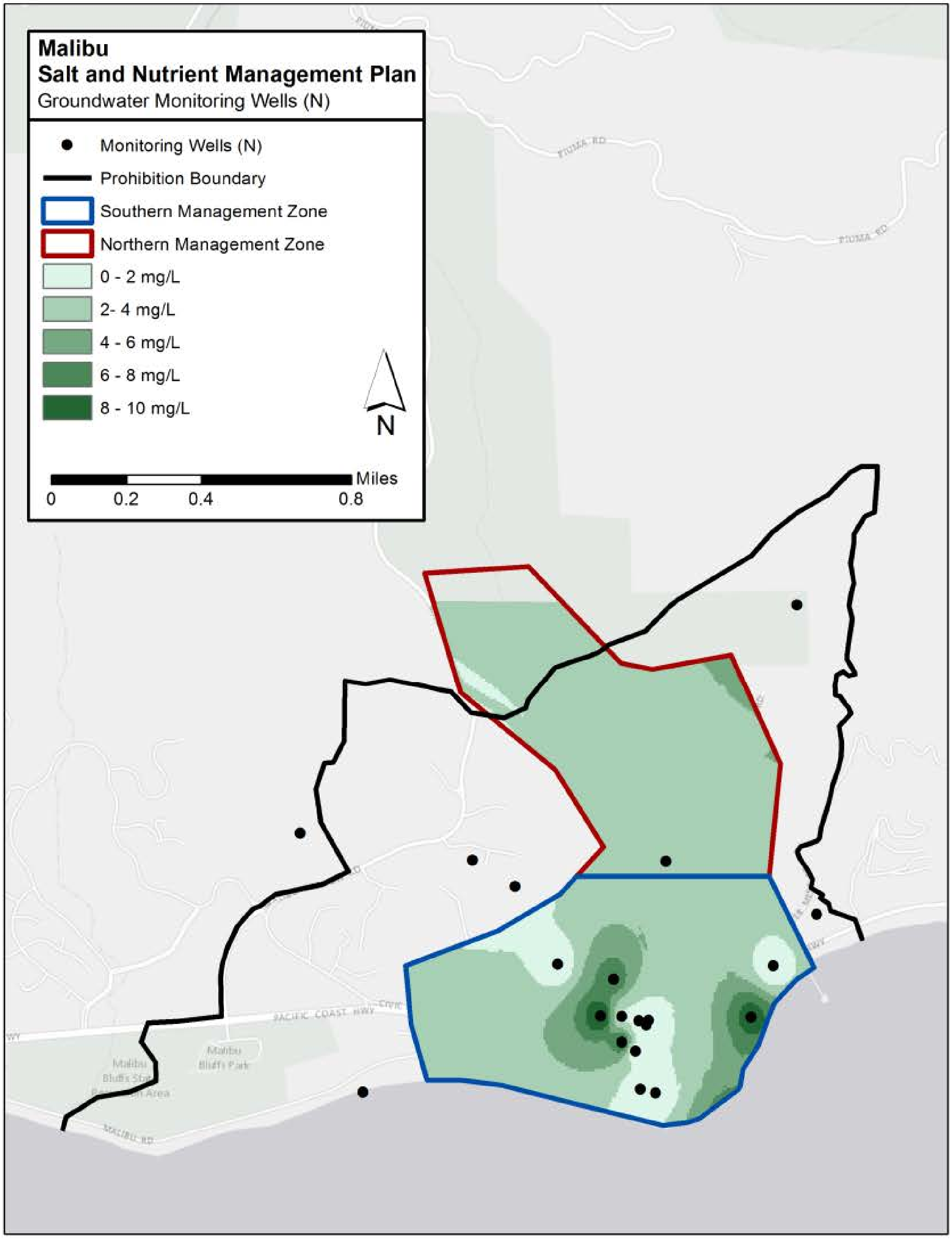
Table 4-5 summarizes the average nitrate-N concentration in the Malibu Valley Groundwater Basin based on data from GeoTracker from 2000 to 2013 (SWRCB, 2015) and compares it against the Basin Plan WQO for that constituent. Based on these concentrations, there is an assimilative capacity of 6.77 mg/L for nitrate in the groundwater basin. A nitrate concentration contour map is shown in Figure 4-6. Generally low nitrate concentrations are observed throughout most of the groundwater basin, with higher readings outside of the basin near the western boundary of the Prohibition Zone, and higher concentrations found in the shallow groundwater as compared to the deeper aquifer. Background data is limited, so time concentration plots could not be developed to determine if nitrate-N concentrations across the groundwater basin have been increasing, decreasing, or showing no significant change (stable).

Table 4-5: Average Nitrate-N Concentrations and Available Assimilative Capacity

Malibu Valley Groundwater Basin	
Water Quality Objective[1]	10
Northern Management Zone Concentration[2]	2.78
Southern Management Zone Concentration[2]	3.29
Basin-wide Concentration[2]	3.23
Northern Zone Available Assimilative Capacity	7.22
Southern Zone Available Assimilative Capacity	6.71
Basin-wide Available Assimilative Capacity	6.77

Note: All concentrations are in mg/L
1. Source: LARWQCB, 1994.
2. Based on data collected from 2000 to 2013 (SWRCB, 2015).

Figure 4-6: Nitrate-N Concentration in the Malibu Valley Groundwater Basin



4.6 Source Identification and Loading Analysis

An analysis of salt and nutrient loadings to the groundwater basin occurring as a result of surface activities is presented to identify sources of salt and nutrients, evaluate their linkages with the groundwater system, and estimate the mass of salts and nutrients loaded to the Malibu Valley Groundwater Basin as associated with those sources.

Salt and nutrient loading from land surface activities to the groundwater basin are due to a variety of sources, predominantly:

- Irrigation water (potable water, surface water and recycled water)
- Residential and commercial inputs (septic systems, fertilizer, soil amendments, and applied water)

Most of these sources, or "inputs," are associated with urban septic and turf irrigation in commercial and residential areas. Urban area salt and nutrient loads due to indoor water use are initially assumed to be primarily percolated though individual parcel-operated OWDSs; although future conditions will involve the centralized collection and treatment of wastewater with subsequent groundwater injection of disinfected tertiary-treated recycled water. Other surface inputs of salts and nutrients, such as atmospheric loading, are not considered a significant source contributing salts and nutrients and are not captured in the loading analysis. In addition to surface salinity loading, other potential inputs of salts and nutrients to the groundwater basin include precipitation, infiltration water from Malibu Creek/Lagoon, and seepage from the Pacific Ocean.

4.6.1 Loading Analysis Methodology

To better understand the significance of various surface loading factors to the concentrations of salts and nutrients in the groundwater basin, a GIS-based loading model was developed. The loading model is a simple, spatially-based mass balance tool that represents TDS and nitrogen loading on an annual-average basis. As previously described, as TDS is composed of ions and ionic compounds that include sulfate and chloride and due to a lack of sulfate and chloride groundwater data, these constituents were not modeled separately and were assumed to have resultant concentration trends comparable to those modeled for TDS.

Stakeholder coordination was performed to refine the parameters in the loading model, including land use, applied water, TDS and nitrogen application (in applied water, as well as fertilizers and amendments), and source water quality. Given these activities, the model is considered suitable for this analysis of basin groundwater quality conditions.

Primary inputs to the loading model are land use, source water volume and quality, septic system areas and loading, and soil characteristics. These datasets are described in the following sections. The general process used to arrive at the salt and nutrient loads was to:

- Identify the analysis units to be used in the model. In the case of the Malibu Valley Groundwater Basin, land use parcels from the City of Malibu are the analysis units.
- Categorize land use into discrete groups. These land use groups represent land uses that have similar water demands as well as salt and nutrient loading and uptake characteristics.
- Apply the land use group characteristics to the analysis units.
- Apply the irrigation water source to the analysis units. Each water source is assigned concentrations of TDS and nitrogen.
- Apply the septic system assumption to the analysis units.

- Estimate the water demand for the parcel based on the irrigated area of the parcel, the land use group, billed water data, and evapotranspiration (ET) requirements.
- Estimate the TDS load applied to each parcel based on the land use practices, irrigation water source and quantity, septic load, and infrastructure load. The loading model makes the conservative assumption that no salt is removed from the system once it enters the system. Other transport mechanisms (such as runoff draining to creeks exiting the basin) likely reduce the total quantity of salt in the groundwater basin; however, this methodology provides conservative results.
- Estimate the nitrogen load applied to each parcel based on the land use practices, irrigation water source and quantity, and septic load. The loading model assumes that a portion of the applied nitrogen is taken up by plants and (in some cases) removed from the system (through harvest of plant material). Additional nitrogen is converted to gaseous forms and lost to the atmosphere. Remaining nitrogen is assumed to convert to nitrate and to be subject to leaching. A basin-wide attenuation value is used to estimate and account for mobility of leaching water and the efficiency of nitrate transport through the root zone.

4.6.2 Data Inputs

Data inputs to the loading model include the spatial distribution of land uses (with associated loading factors), applied water sources (with associated water quality), septic inputs, and water use data. These inputs are summarized below.

Land Use

Land use data were obtained from the Los Angeles County Department of Regional Planning (2013). This dataset contains nearly 150 discrete land use categories. These categories are consolidated into the following land use groups for the Malibu Valley Groundwater Basin:

- Urban Commercial and Industrial – areas containing both commercial and industrial parcels
- Urban Residential (Low Water Use) – areas where parcels are smaller with much less landscaping than other residential areas (such as in Malibu Colony)
- Urban Residential – residential areas where parcels have a significant portion of lawn/turf (such as in Serra's Retreat)
- Urban Landscape – large irrigated turf areas such as parks and golf courses
- Vacant and Beaches – open space areas (upland), and beach areas

These land use classifications were updated and confirmed to be within the accuracy requirements of this type of analysis using aerial imagery. The spatial distribution of land uses is shown in Figure 4-7.

Each land use group is assigned characteristics including:

- Applied water
- Percent irrigated
- Applied nitrogen
- Used nitrogen
- Leachable nitrogen
- Applied TDS

An estimated loss of nitrogen in gaseous form in the soil is assumed to be approximately 10 percent for this analysis. This value was developed by an agronomist through an extensive nutrient loading study for a groundwater basin in Northern California with similar land uses, and is an appropriate proxy value for this planning-level analysis in-lieu of extensive site-specific soil chemistry information within the Malibu Valley Groundwater Basin. This estimated loss is based on a balance between application, gaseous loss (volatilization and denitrification) and uptake. Table 4-6 consists of a matrix of values for the land use categories and characteristics.

It can be seen in Table 4-4 that for the category of Urban Landscape, more irrigation water is applied in the southern management zone (71.6 inches/year) than in the northern management zone (47 inches/year). This is due to the types of urban landscaping included in each zone (i.e. Legacy Park is located in the southern management zone). Unless the landscaping type is otherwise known, it was assumed that the types of landscaping grown in urban residential and landscape areas were generally the same in type and nutrient requirements and that only the percent of land irrigated would vary across these categories.

Table 4-6: Land Use-Related Loading Factors

Northern Area Land Use Group	Total Area (acres)	Percent Irrigated[1]	Applied Water[2] (in/yr)	Applied Nitrogen[3] (lbs/ac-yr)	Nitrogen Uptake[4] (lbs/ac-yr)	Leachable Nitrogen[5] (lbs/ac-yr)	Applied TDS[6] (lbs/ac-yr)
Urban Commercial & Industrial	27	12%	47	44	35	8	245
Urban Residential (Low Water)	0	-	-	-	-	-	-
Urban Residential	113	22%	47	44	35	8	245
Urban Landscape	0	100%	47	44	35	8	245
Vacant/Beaches	131	-	-	-	-	-	-

Southern Area Land Use Group	Total Area (acres)	Percent Irrigated[1]	Applied Water[2] (in/yr)	Applied Nitrogen[3] (lbs/ac-yr)	Nitrogen Uptake[4] (lbs/ac-yr)	Leachable Nitrogen[5] (lbs/ac-yr)	Applied TDS[6] (lbs/ac-yr)
Urban Commercial & Industrial	67	2%	47	44	35	8	245
Urban Residential (Low Water)	26	-	-	-	-	-	-
Urban Residential	48	19%	47	44	35	8	245
Urban Landscape	10	100%	71.6	44	35	8	245
Vacant/Beaches	140	-	-	-	-	-	-

Notes:

1 Percent of land area assumed to be irrigated within each class is estimated based on review of aerial photography and professional judgment of a reasonable, broad average for each class.

2 Applied water values were calculated to reflect localized water billing data, and verified with 20-year averaged ET from CIMIS stations near the Malibu Valley Groundwater Basin.

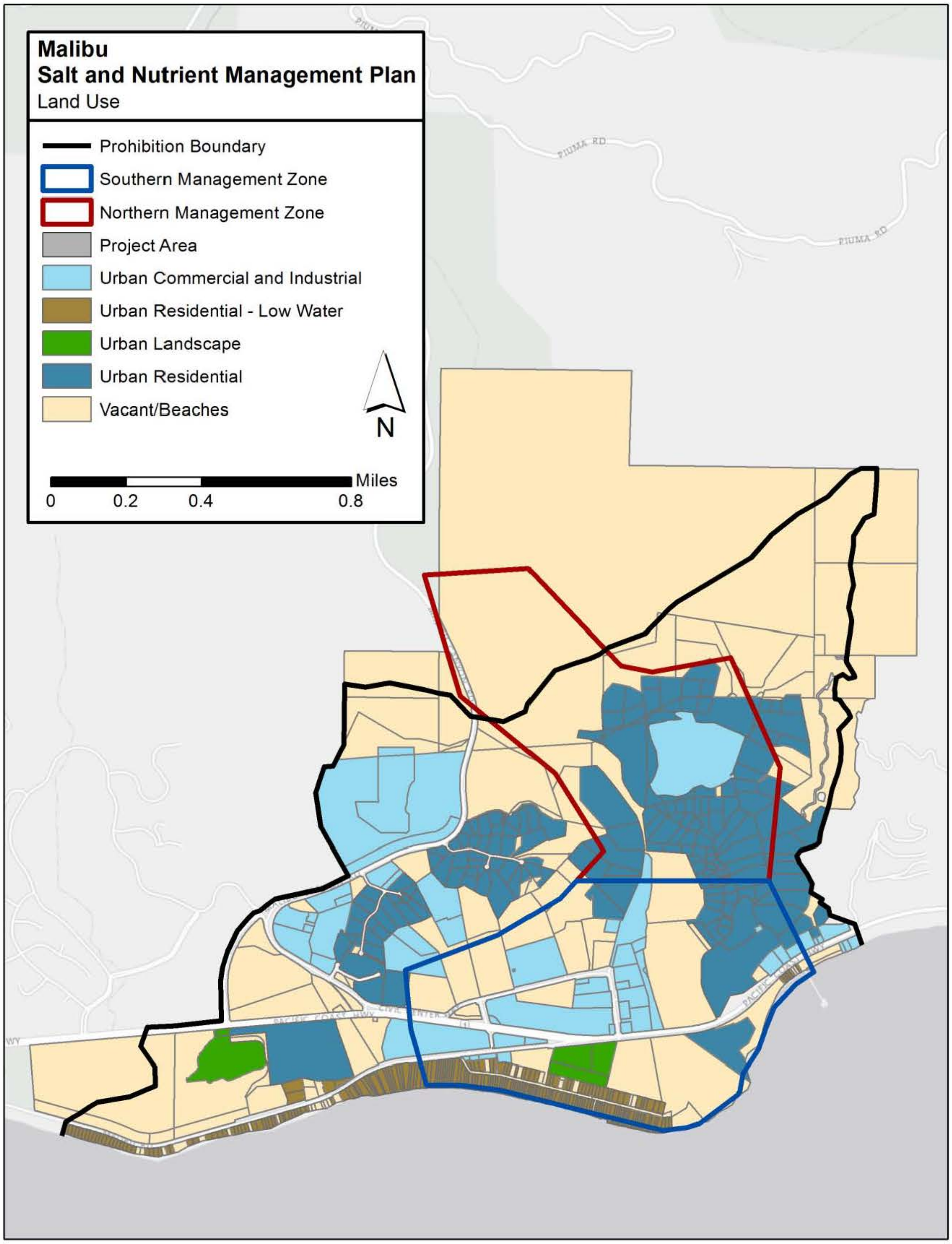
3 Applied nitrogen estimates are based on the literature review of the University of California's Publication 8065 *Practical Lawn Fertilization*

4 Uptake of nitrogen was estimated from available literature by multiplying reported yield figures by reported nitrogen concentrations for harvested plant parts.

5 Maximum nitrogen leaching calculations for each land cover unit were calculated based on the balance between application, gaseous loss (volatilization and denitrification), and uptake. The maximum was then reduced based on soil conditions mapped for the area.

6 Applied TDS estimates are based on literature review for individual land cover classes, verified by the U.S. Bureau of Reclamation (2003) *Central Arizona Salinity Study*, and professional judgment.

Figure 4-7: Land Use



Applied Water Source

Applied water sources form the basis for determining the TDS and nitrate loads that result from irrigation of the land uses described above. Parcels within the Malibu Valley Groundwater Basin are primarily supplied from potable municipal water sources (imported by WD29) and/or potentially, for future conditions, recycled water. Table 4-7 summarizes the water quality inputs used for each irrigation water source. Recycled water TDS concentration is estimated based on a potable water concentration approximately 290 mg/L, which is then concentrated through wastewater treatment processes resulting in the addition of approximately 200 mg/L of additional TDS; therefore, the resulting TDS of recycled water is estimated to be approximately 500 mg/L. The nitrate-N concentration for recycled water is estimated based on treatment process efficacy.

Table 4-7: Water Quality Parameters for Loading Model Water Sources

Source	TDS (mg/L)	Nitrate (as N) (mg/L)
Potable Water from WD29	290	0.5
Recycled Water	500	7 - 8

Ocean Water Quality

Ocean water quality was modeled using publically-available data from near-shore water quality sampling that has occurred in the Project area, and from published average concentrations. Ocean water is assumed to have a TDS concentration of 33,500 mg/L and a nitrate-N concentration of 1.50 mg/L (consistent with groundwater nitrate concentrations from the deeper Civic Center Gravels).

Septic Systems

Salt and nutrient loads due to septic systems were estimated based on typical wastewater production and TDS and nitrate concentrations. All developed parcels within the groundwater basin presently utilize either an individual or combined septic or treatment system. Each residential parcel with a septic system is assumed to produce up to 400 gallons per day (gpd), based on billed potable water data and landscaped area. Septic wastewater discharge is assumed to have TDS concentrations of 490 mg/L based on potable water quality plus an assumed household contribution of 200 mg/L (Metcalf & Eddy, 2003), with nitrate-N concentrations of 20 mg/L for residential and commercial. These nitrate-N concentrations are based on typical municipal (residential and commercial) wastewater concentrations for medium strength wastewater (Metcalf & Eddy, 2003) of 40 mg/L minus an assumed volatilization rate of 25 percent within the OWDS and another 15 percent for attenuation in the soils.

Wastewater/Recycled Water Infrastructure

Under current conditions, there are no centralized wastewater treatment facilities within the groundwater basin. However, with implementation of the CCWTF, existing septic loadings to the groundwater will cease over time with implementation of the centralized collection and treatment of wastewaters. The resulting treated effluent from the new wastewater treatment facility will meet Title 22 standards for disinfected tertiary-treated effluent and will be used for irrigation and other non-potable water uses in the groundwater basin to the maximum extent possible, with remaining, unused recycled water injected into the Civic Center Gravels. Project implementation will occur over three distinct phases with a delineated time series by parcel as required by the MOU. In the case of recycled injection, a recycled water treatment standard of 8 mg/L was evaluated.

Soil Textures

Soil textures were obtained from the National Resources Conservation Service (NRCS) Soil Survey (NRCS, 2013). Each soil texture was assigned a hydraulic conductivity (NRCS, 1993), with that value used to develop an adjustment factor with a basin-wide average of 0.15. The adjustment factor is used to represent the proportion of nitrate that will migrate to the aquifer as a result of the soil textures and permeability classes through which they will migrate relative to the other textural classes. Where conductivity is lower, it is reasoned (and observed) that nitrogen resides longer in the soil, increasing the proportion that is either taken up or lost through conversion to gaseous species. Similar logic is not applied to TDS as salts are conservative, mostly not subject to conversion to gaseous forms, and rapidly saturate soil capacity to absorb and retain them.

4.6.3 Loading Model Results

Based on the loading parameters and methodology described above, the loading model was used to develop TDS and nitrogen loading rates across the Malibu Valley Groundwater Basin. Table 4-8 summarizes the overall contribution of each land use group to total TDS and nitrogen loading under current (baseline). The spatial distribution of TDS and nitrogen loading rates are shown in Figure 4-8 and Figure 4-9, respectively. The highest levels of nitrogen and TDS loading, per area, occur in urban residential areas in the northern management zone, while urban commercial and industrial land uses have the highest percent TDS and nitrate loading in the southern management area.

Table 4-8: TDS and Nitrate Loading Results under Current (Baseline) Conditions

Northern Management Zone Land Use Group	Total Area (acres)	Percent of Total Area	Percentage of Total TDS Loading	Percentage of Nitrogen Loading
Urban Commercial & Industrial	27	10%	18%	23%
Urban Residential (Low Water)	0	0%	0%	0%
Urban Residential	113	42%	82%	77%
Urban Landscape	0	0%	0%	0%
Vacant/Beaches	131	48%	0%	0%

Southern Management Zone Land Use Group	Total Area (acres)	Percent of Total Area	Percentage of Total TDS Loading	Percentage of Nitrogen Loading
Urban Commercial & Industrial	67	23%	35%	53%
Urban Residential (Low Water)	26	9%	28%	28%
Urban Residential	48	17%	18%	17%
Urban Landscape	10	3%	18%	1%
Vacant/Beaches	140	48%	1%	1%

The relative proportion of the land uses by area, TDS loading, and nitrate-N loading are shown in Figures 4-10, 4-11 and 4-12, respectively.

Figure 4-8: TDS Loading in the Malibu Valley Groundwater Basin

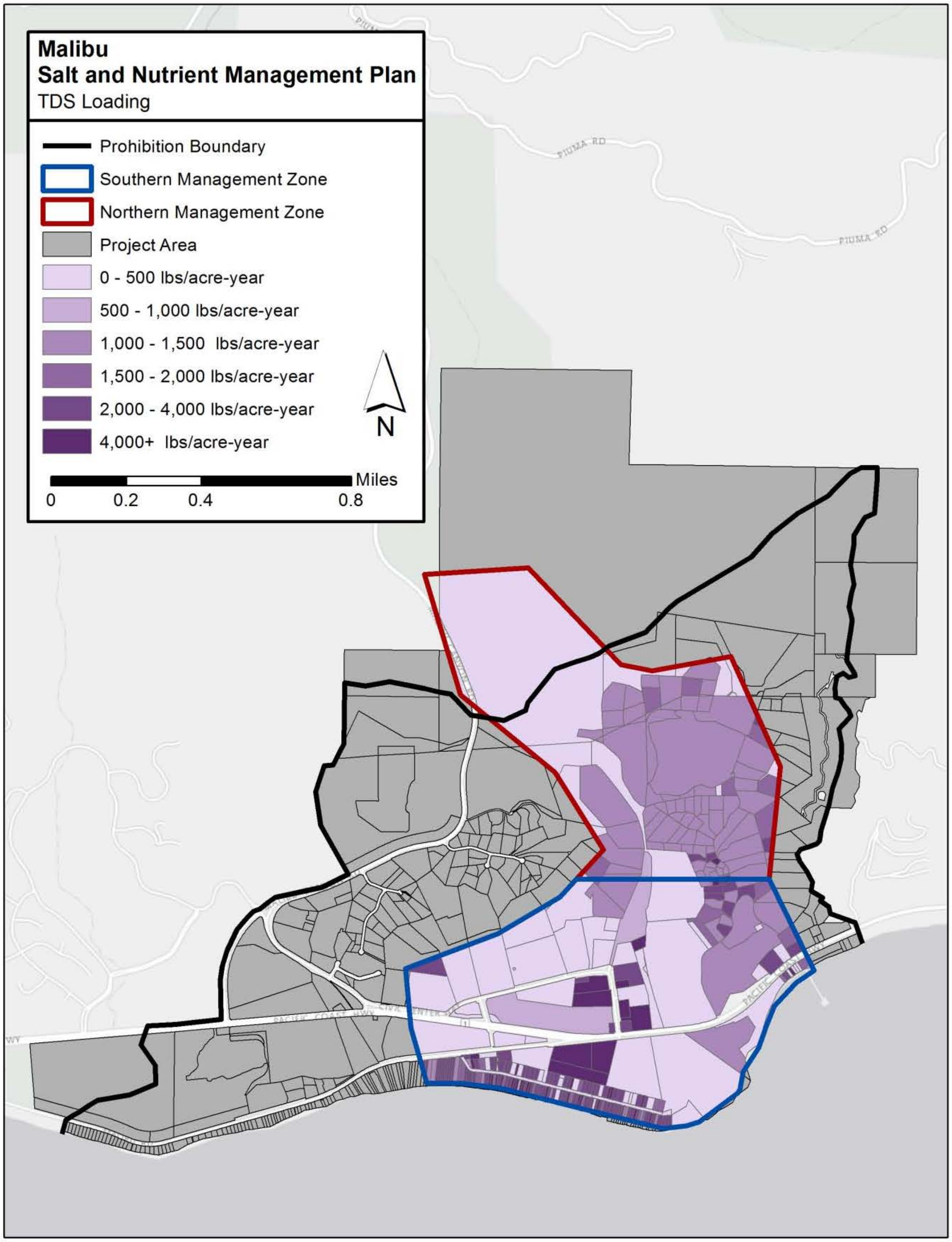


Figure 4-9: Nitrate-N Loading in the Malibu Valley Groundwater Basin

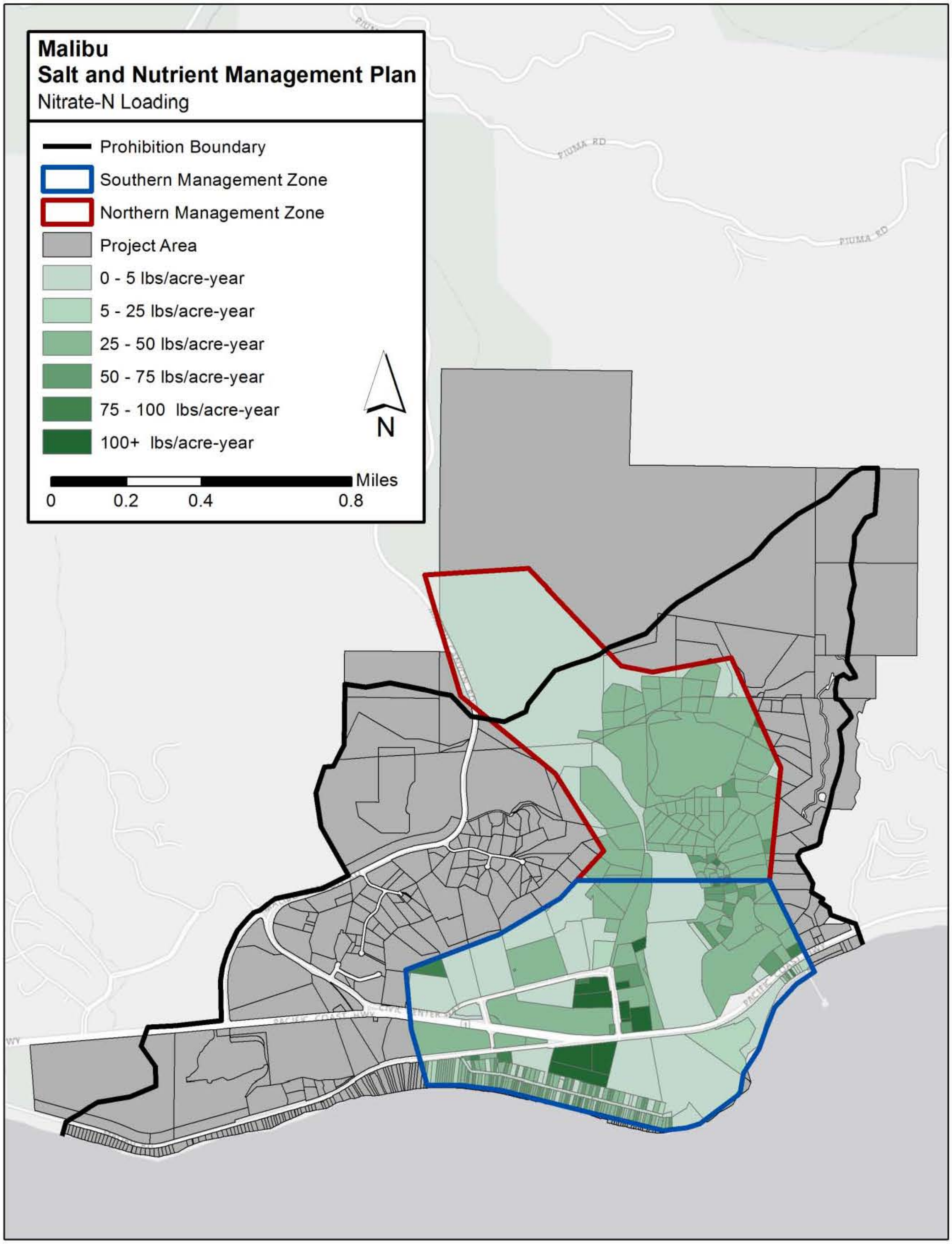
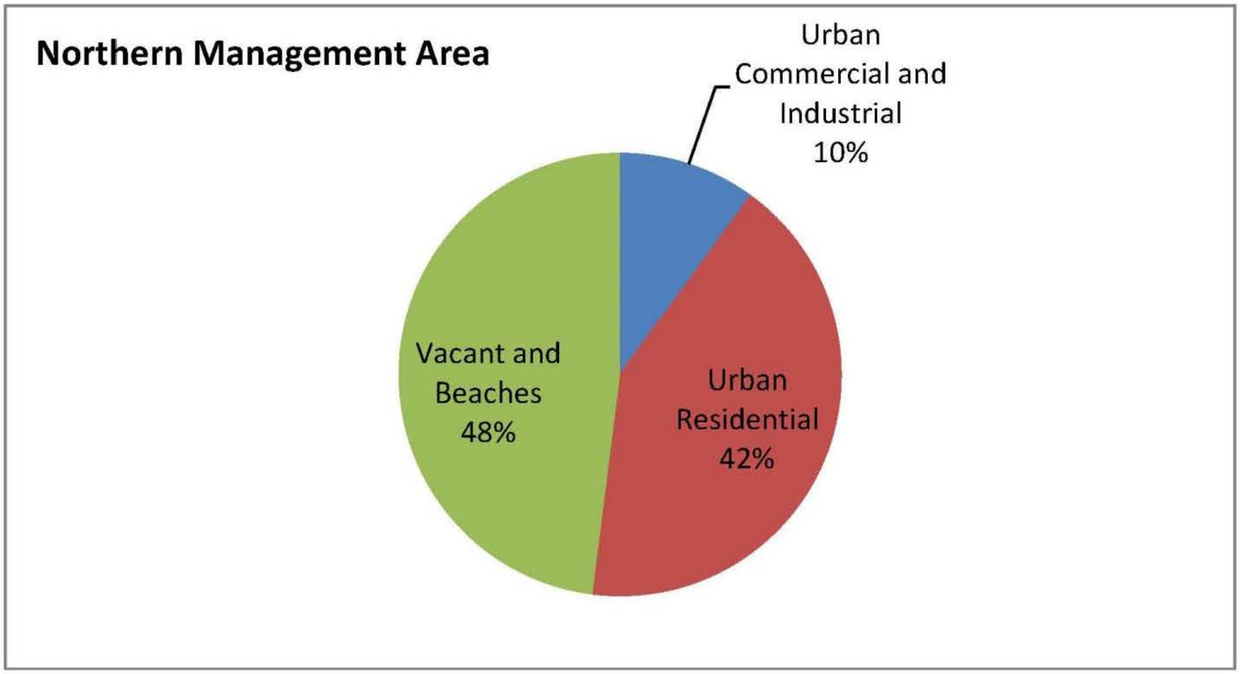


Figure 4-10: Percentage of Land Use in Study Area – Current (Baseline) Conditions



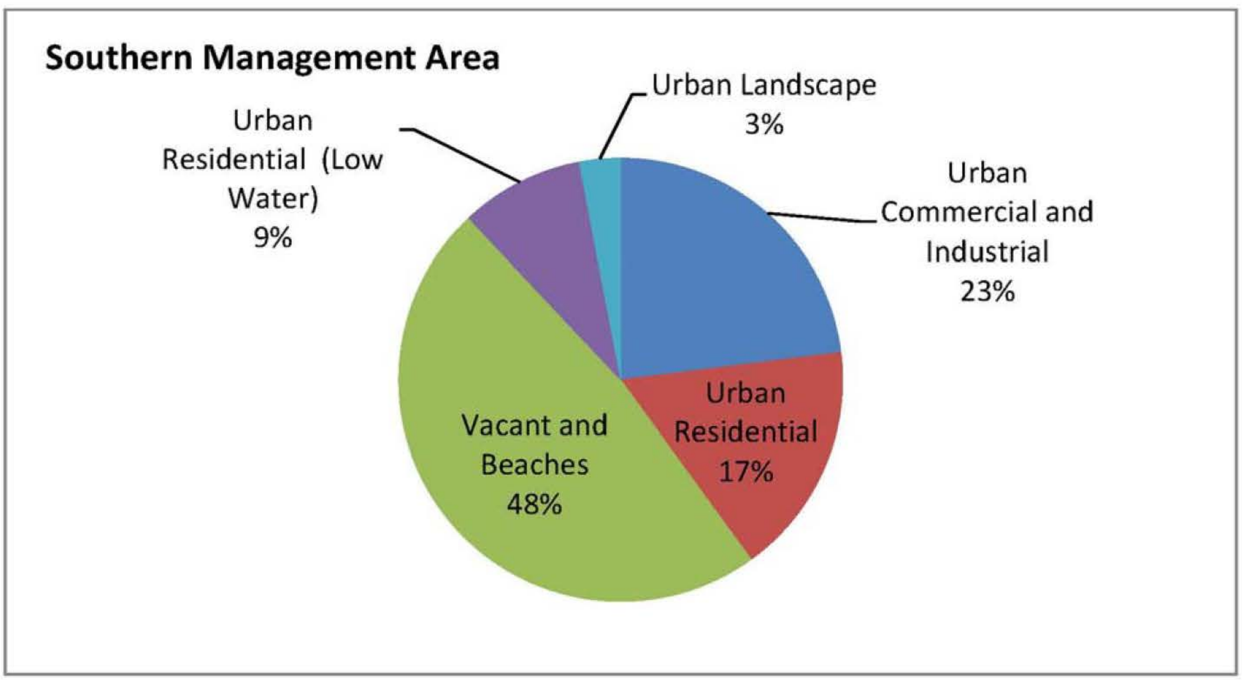
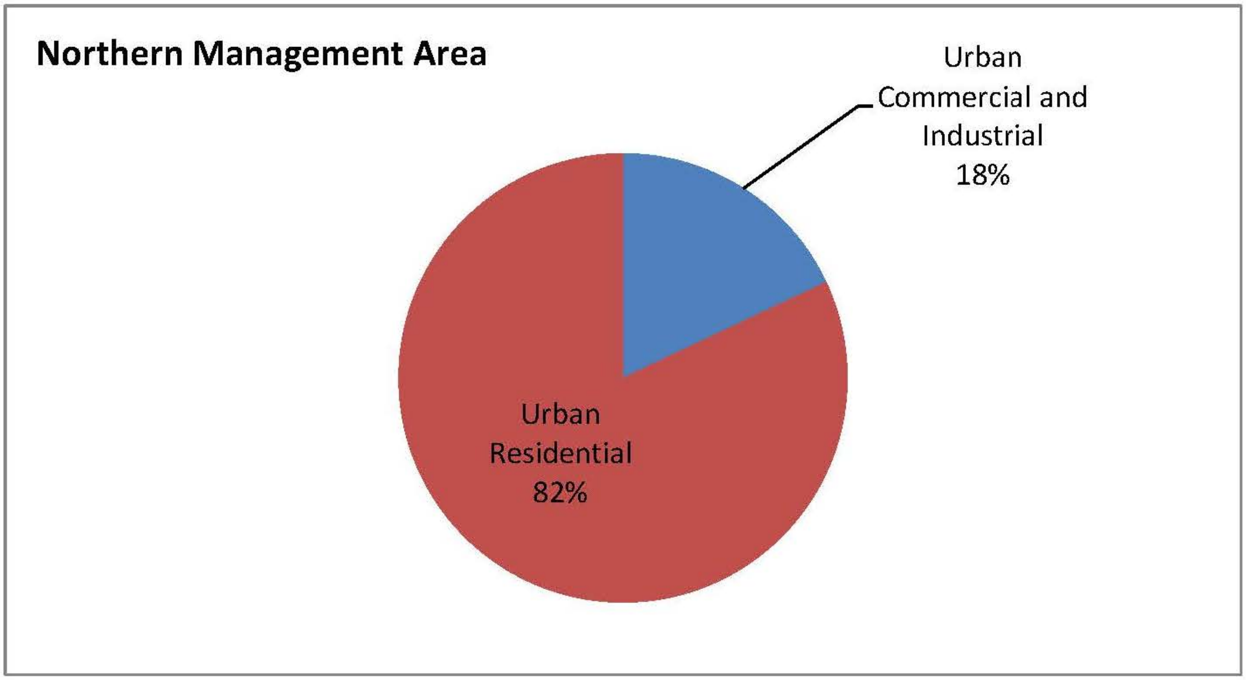


Figure 4-11: Percentage of TDS Loading in Study Area, by Land Use – Current (Baseline) Conditions



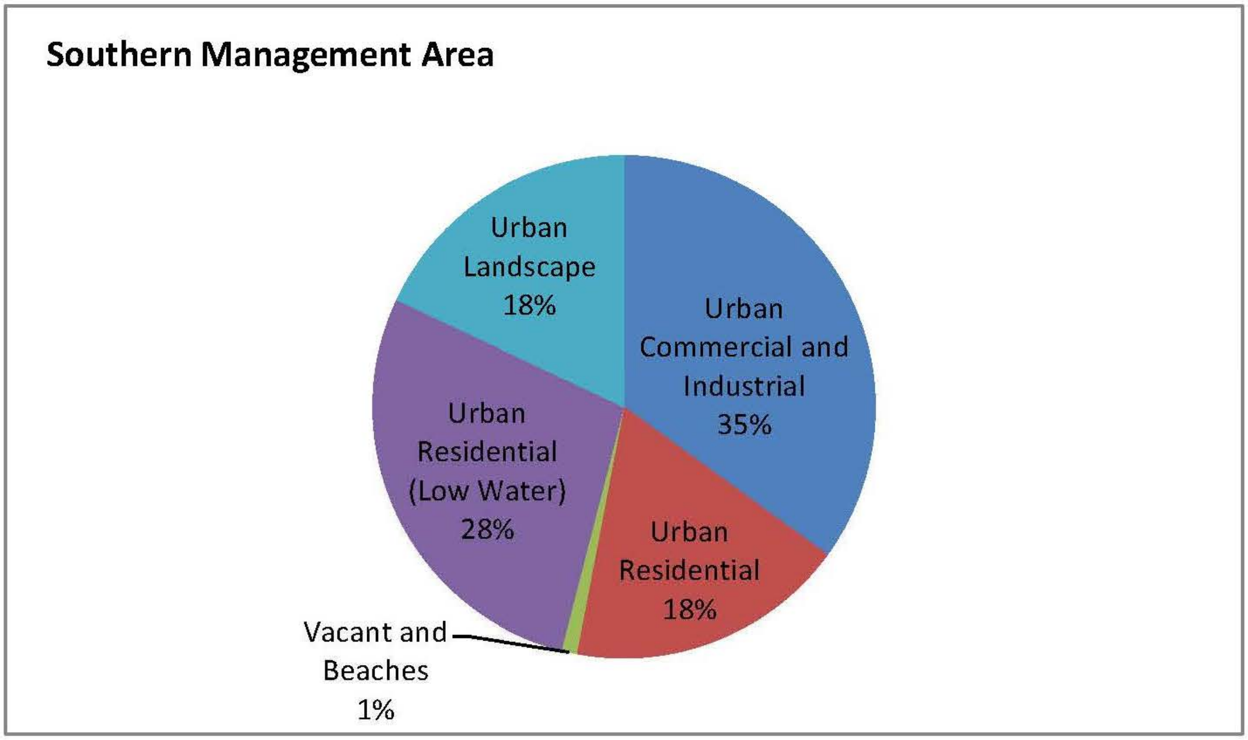
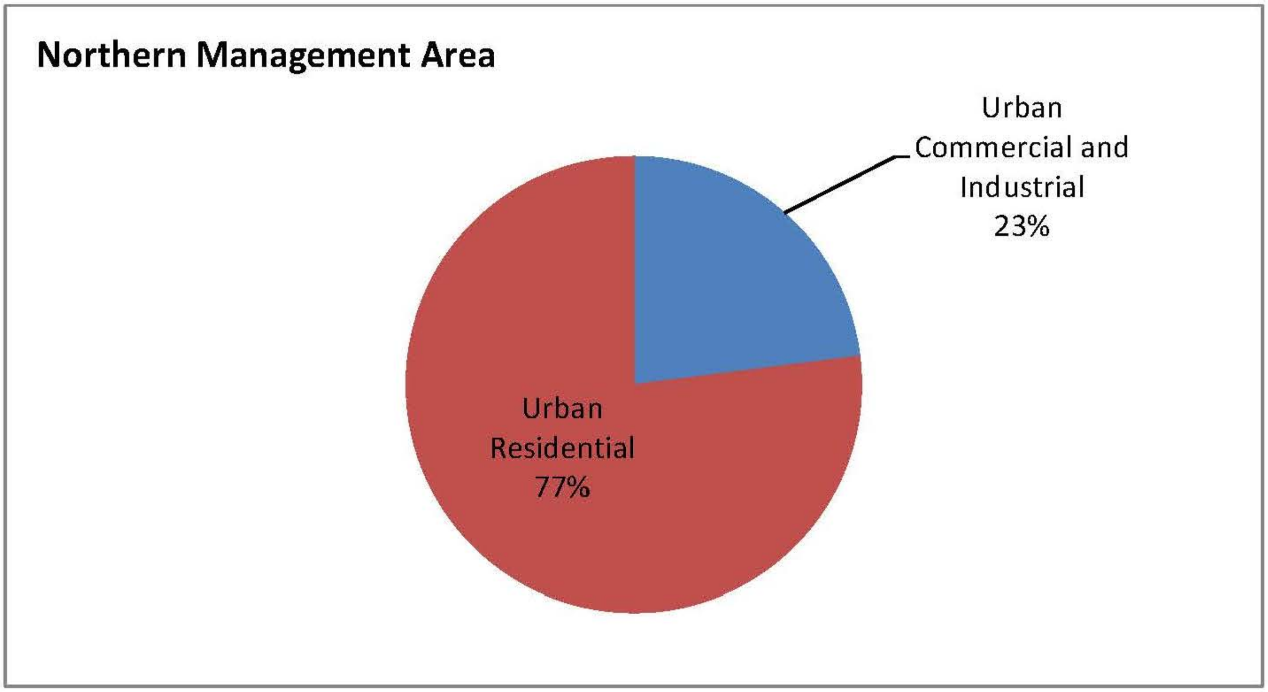


Figure 4-12: Percentage of Nitrogen Loading in Study Area, by Land Use – Current (Baseline) Conditions



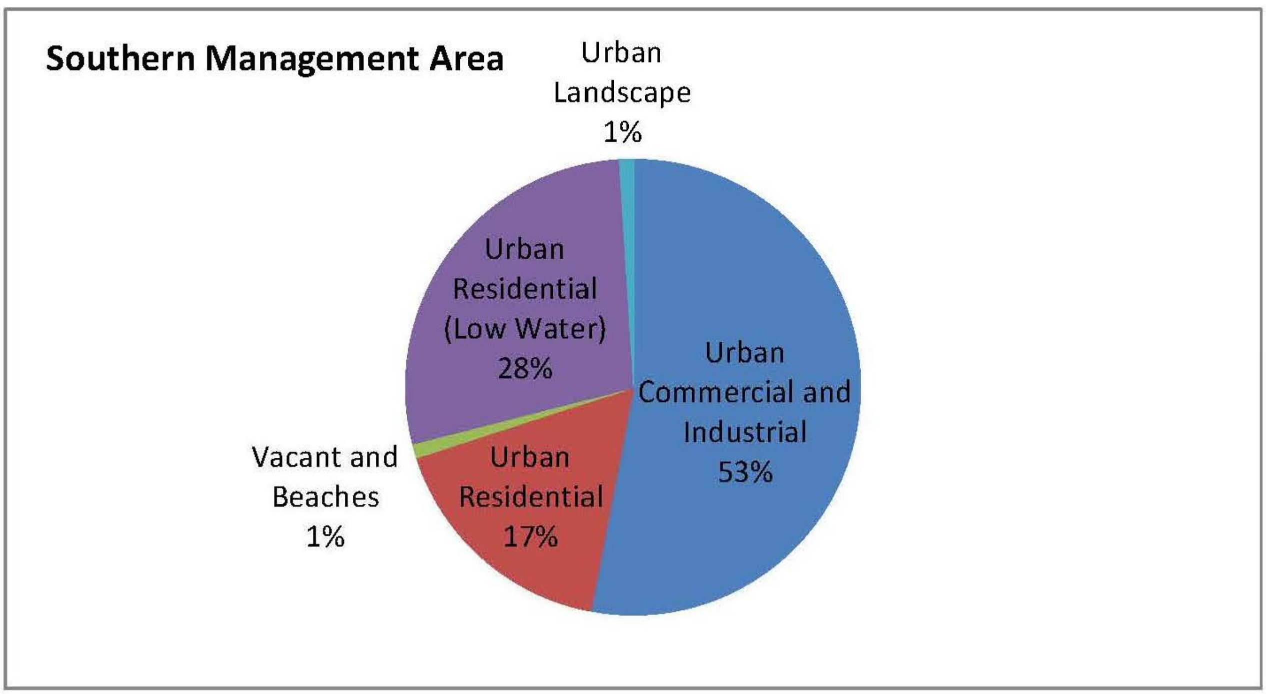


Table 4-9 summarizes the overall contribution of each land use group to total TDS and nitrogen loading to the groundwater basin at build-out (per the City's General Plan).

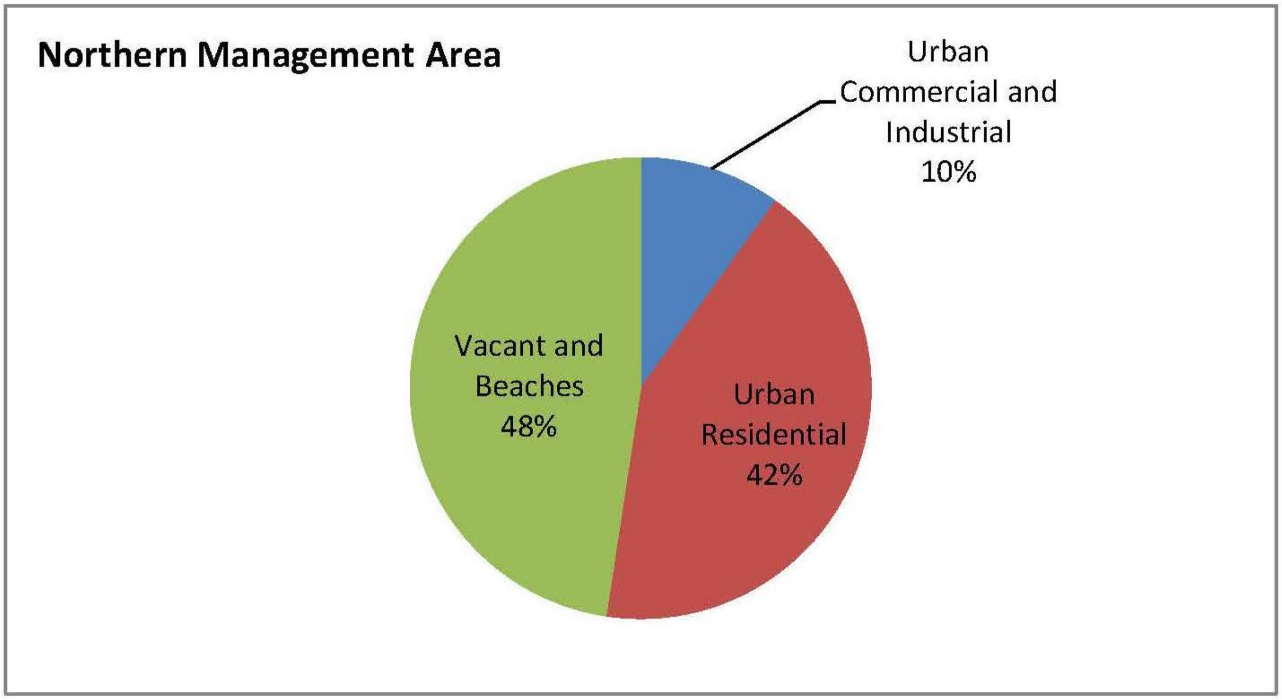
Table 4-9: TDS and Nitrate Loading Results under Build-Out Conditions

Northern Management Zone Land Use Group	Total Area (acres)	Percent of Total Area	Percentage of Total TDS Loading	Percentage of Nitrogen Loading
Urban Commercial & Industrial	27	10%	19%	19%
Urban Residential (Low Water)	0	0%	0%	0%
Urban Residential	115	42%	81%	81%
Urban Landscape	0	0%	0%	0%
Vacant/Beaches	129	48%	0%	0%

Southern Management Zone Land Use Group	Total Area (acres)	Percent of Total Area	Percentage of Total TDS Loading	Percentage of Nitrogen Loading
Urban Commercial & Industrial	129	44%	69%	69%
Urban Residential (Low Water)	26	9%	15%	15%
Urban Residential	47	16%	10%	10%
Urban Landscape	10	3%	6%	6%
Vacant/Beaches	79	27%	0%	0%

As before, the highest levels of nitrogen and TDS loading, per area, occur in urban residential areas in the northern management zone, while urban commercial and industrial land uses continue to have the highest percent TDS and nitrate loading in the southern management area. The relative proportion of the land uses by area, TDS loading, and nitrate-N loading are shown in Figures 4-13, 4-14 and 4-15, respectively.

Figure 4-13: Percentage of Land Use in Study Area – Build-Out Conditions



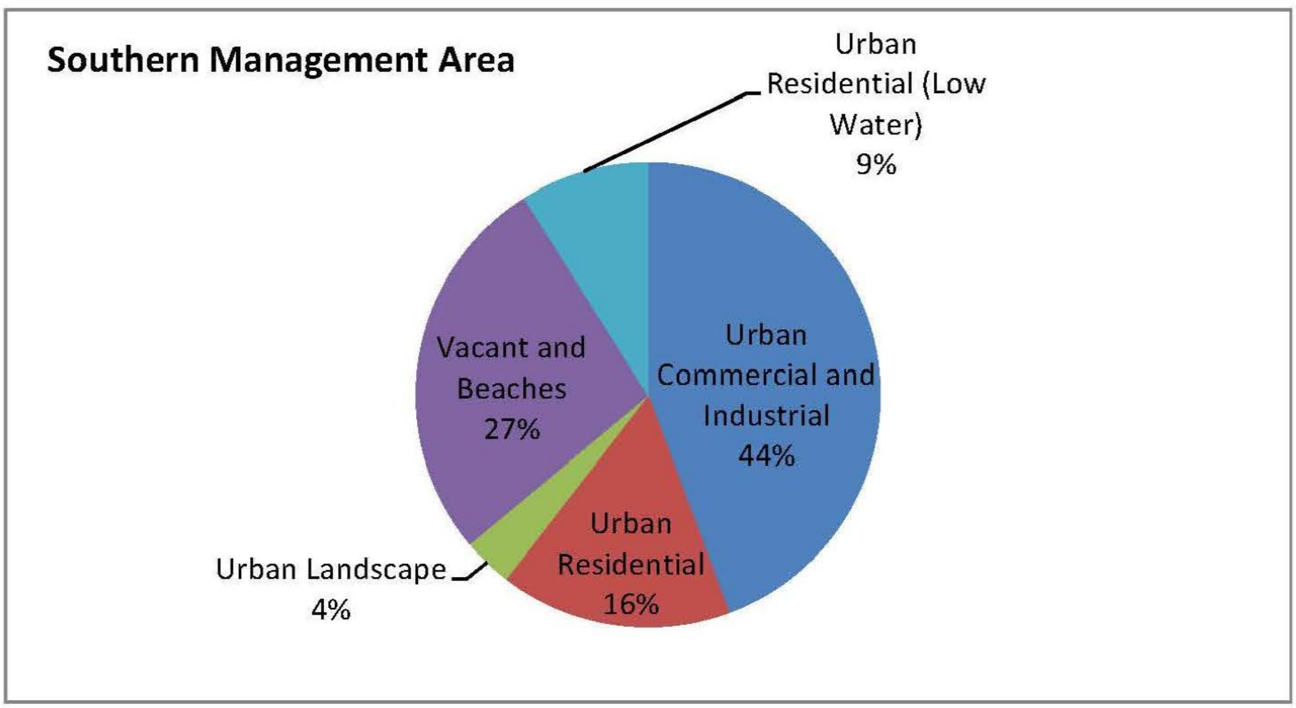
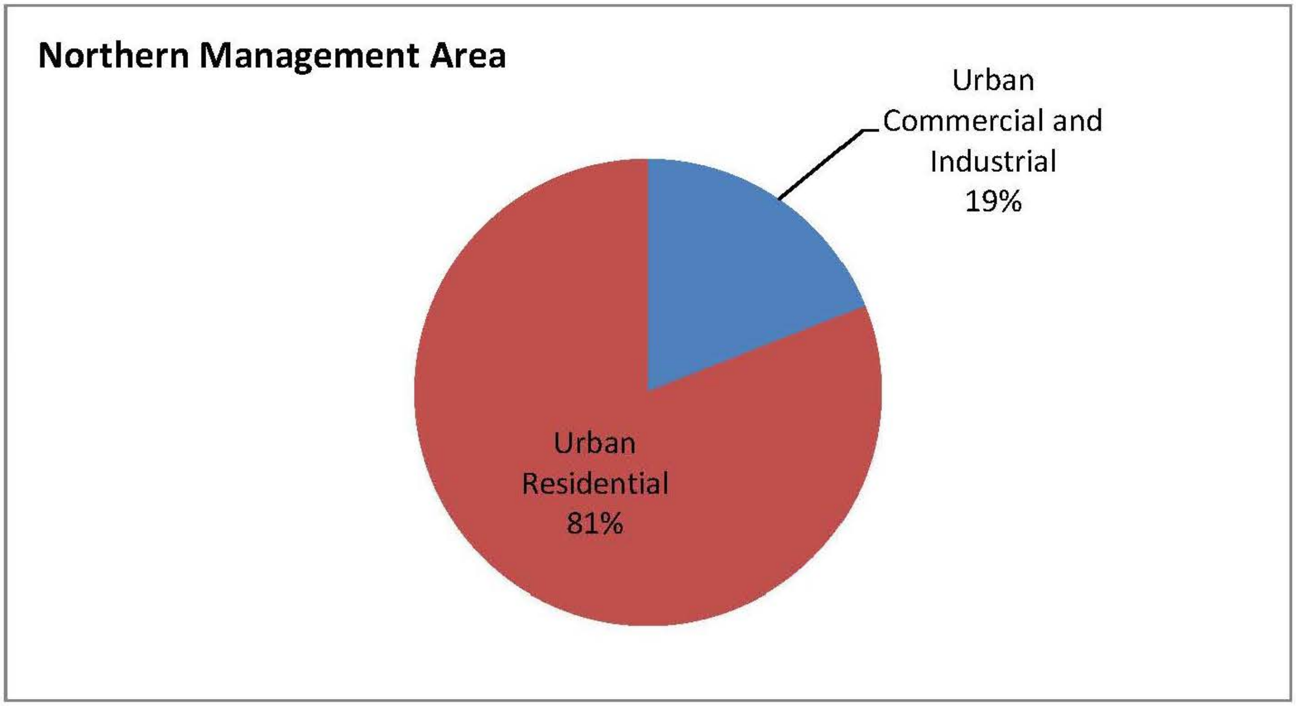


Figure 4-14: Percentage of TDS Loading in Study Area, by Land Use – Build-Out Conditions



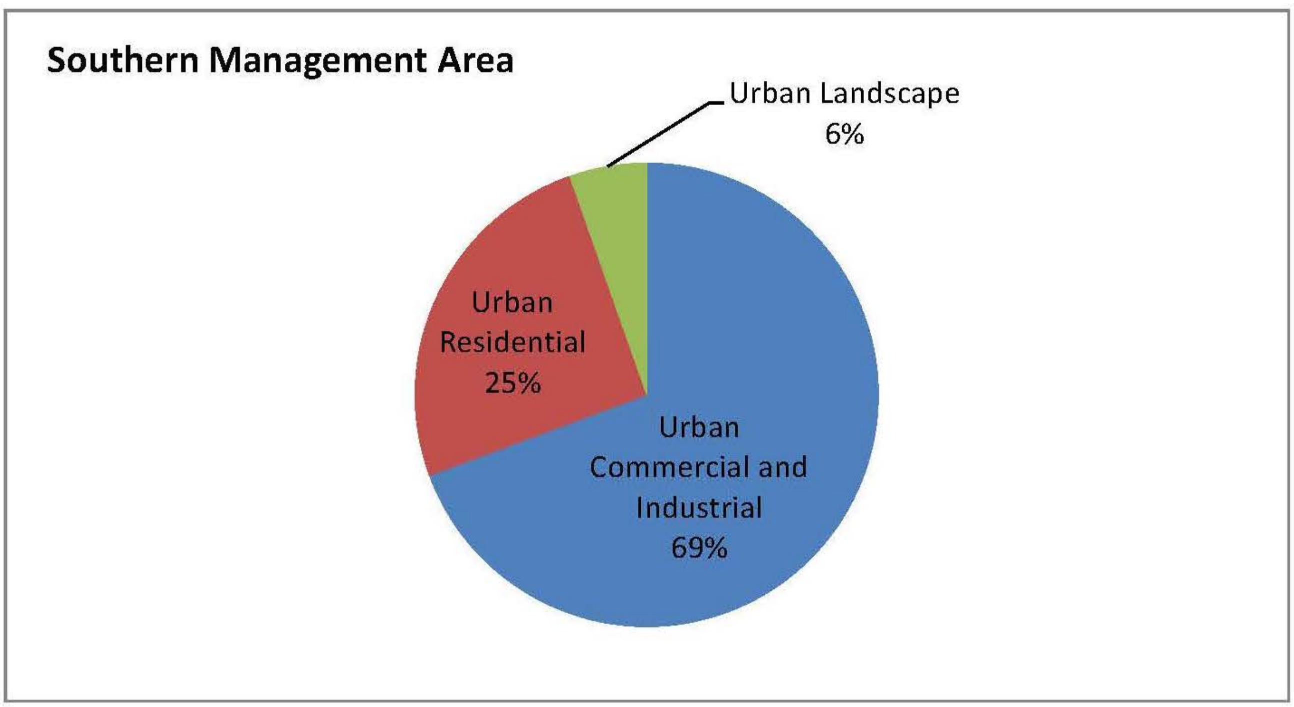
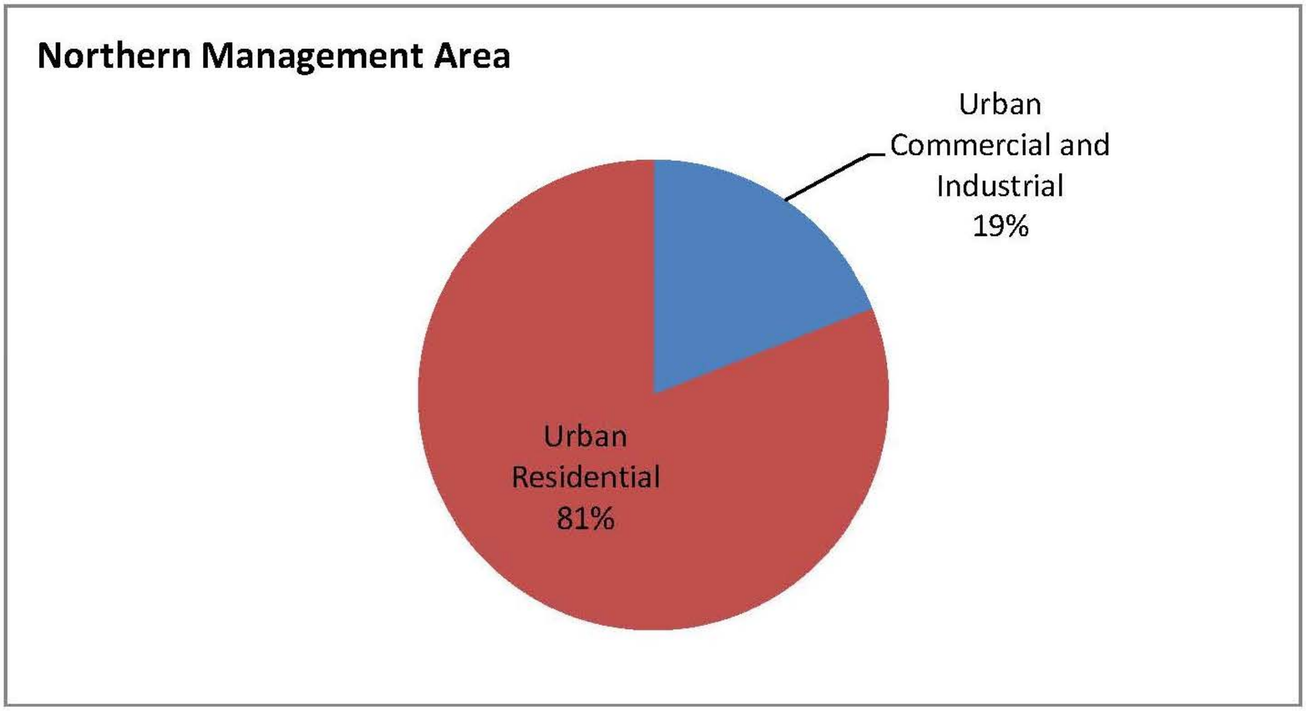
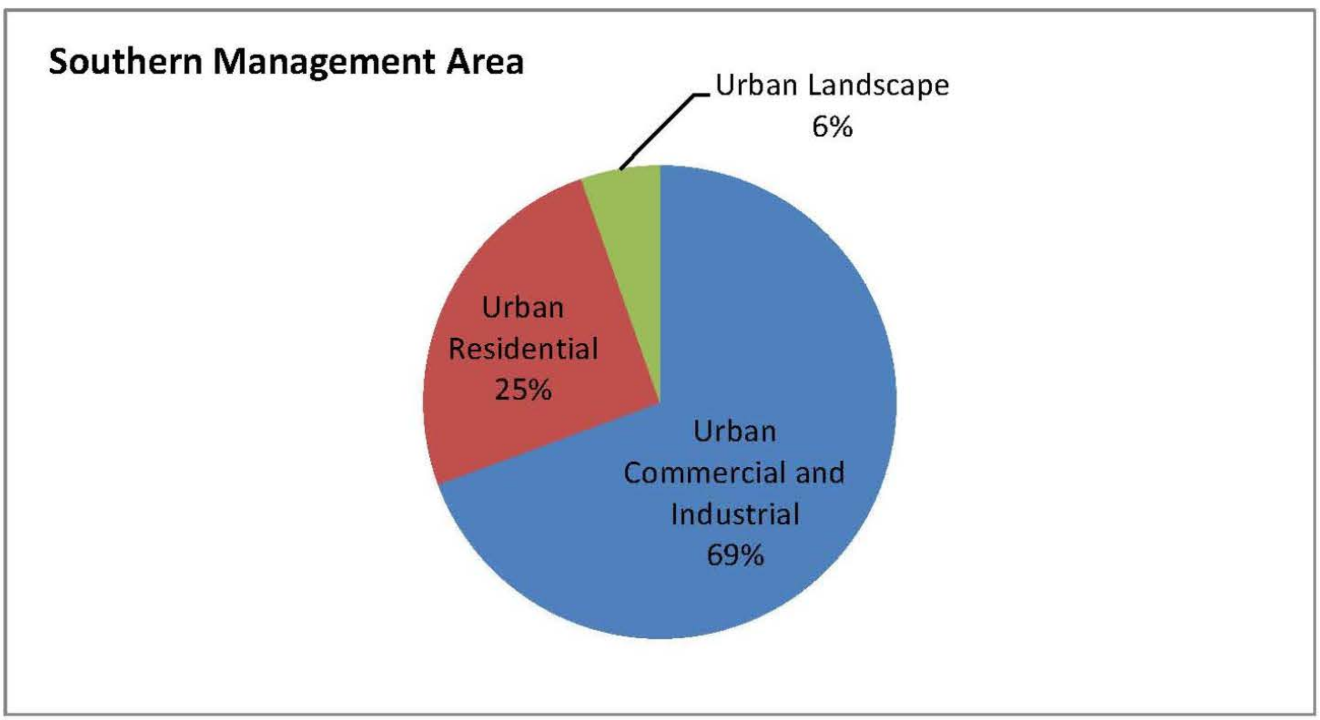


Figure 4-15: Percentage of Nitrogen Loading in Study Area, by Land Use – Build-Out Conditions





4.7 Future Groundwater Quality Analysis

This section describes the results from the analysis of future groundwater quality as a result of Project implementation. Two scenarios were evaluated in this analysis: (1) a No Project scenario that assumes continued use of OWDSs in the Prohibition Area and projected land use at build-out per the City's General Plan; and (2) implementation of the CCWTF Project as previously described. Under this second scenario, once fully implemented, the CCWTF Project will be the only recycled water project in the Malibu Valley Groundwater Basin and the recycled water produced by the CCWTF will be used for irrigation with any unused recycled water will be injected into the groundwater basin. The modeling results are presented in Appendix A.

4.7.1 Simulation of Future Groundwater Quality under No Project and CCWTF Project Scenarios

Groundwater quality concentrations for TDS and nitrate were simulated for the No Project and CCWTF Project scenarios using a spreadsheet-based analytical mixing model. This mixing model was developed in Microsoft EXCEL™ and is essentially a set of linked spreadsheets used to represent 'instantaneously mixed' groundwater volumes. This mixing model, combined with the loading analysis, was designed to account for current groundwater volumes and salt/nutrient masses in storage in the Malibu Valley Groundwater Basin, and to track the loading/unloading of salts and nutrients through various major groundwater sources and sinks under baseline (current) and future land and water use scenarios (based on the City's General Plan for future development through build-out). Concentration estimates were based on water and mass inflows and outflows (balances), mixed with the volume of water in storage in the groundwater basin and the average ambient groundwater quality (as previously described). The water balance components are based upon a MODFLOW groundwater flow model developed and used to simulate future impacts to the groundwater basin, and are further extrapolated such that the future groundwater quality analysis simulates the period of 2010 to 2039.

In the mass balance model, inflows and outflows are evaluated on an annual basis and applied to the previous model year basin or management area volume and water quality to determine the iterative water quality in the basin or management area. Simulations are on a basin-wide or management area-wide basis and do not consider localized hydrogeologic characteristics. Constituent concentrations of each of the inflow components are based on available water quality data or the surface loading estimates as previously described. As available surface and subsurface water quality data are limited, future revisions of this plan should confirm or revise constituent concentrations based on any additional available data.

A primary assumption of the mixing model is that the salt and nutrient mixing within a given mixing volume is complete during each annual timestep. While the Malibu Valley Groundwater Basin is relatively small, it has been divided into northern and southern management areas to simulate the 'worst-case' scenario in which the southern area accounts for both the highest density of future land use (and therefore the highest likelihood of land use-related salt and nutrient loading to the groundwater basin), plus all of the proposed CCWTF recycled water injection into the groundwater basin. The effect of the complete mixing assumption can have two potential errors, therefore, as related to the simulations: (1) overestimation or underestimation of the salt and/or nutrient concentrations assigned to subsurface flows between the two management areas, and (2) an overestimation of the effects of salt and/or nutrient loading changes associated with point sources (i.e. land use) in one or the other management areas. The effect of these two potential errors on the salt and nutrient transport between the two management areas is limited as flows between the two areas are generally fairly consistent, groundwater flows are solely from the northern to southern management areas, the majority of the future changes that could result in loading to the groundwater basin occur in the southern management area. Therefore, the volume-weighted average concentrations are representative of the concentrations for the inter-area fluxes.

The baseline (current) period water balances estimates all groundwater inflows and outflows for the baseline period and the associated change in storage based on estimates provided by the MODFLOW groundwater flow model of the basin. Future changes in water balance components under the CCWTF Project Scenario simulated the cessation of septic system use by phase and the introduction of recycled water reuse (irrigation) and well injection. No other recycled water projects are considered in the analysis as the CCWT Project will be in the only recycled water project in the basin.

TDS and nitrate concentrations are associated with each water balance inflow and outflow component. In order to simulate the effect of current and future salt and nutrient loading on groundwater quality in the groundwater basin, the spreadsheet mixing model ‘mixed’ the volume and quality of each inflow and outflow with the existing volume of groundwater and mass of TDS and nitrate in storage and tracked the annual change in groundwater storage and salt and nutrient masses for each year of simulation.

4.7.2 Water Balance Components

The MODFLOW numerical model provided estimates of groundwater inflows and outflows to/from the groundwater basin and changes in groundwater storage from 2003 to 2013. This period represents existing groundwater basin conditions as characterized by average climatic conditions and was calibrated against existing data (McDonald Morrissey and Associates, 2014).

Major inflow components in the numerical groundwater model include:

- Well injection of recycled water
- Ocean water inflow
- Precipitation recharge
- Inflow from septic systems
- Deep percolation from irrigation
- Natural stream inflow from Malibu Creek and Lagoon

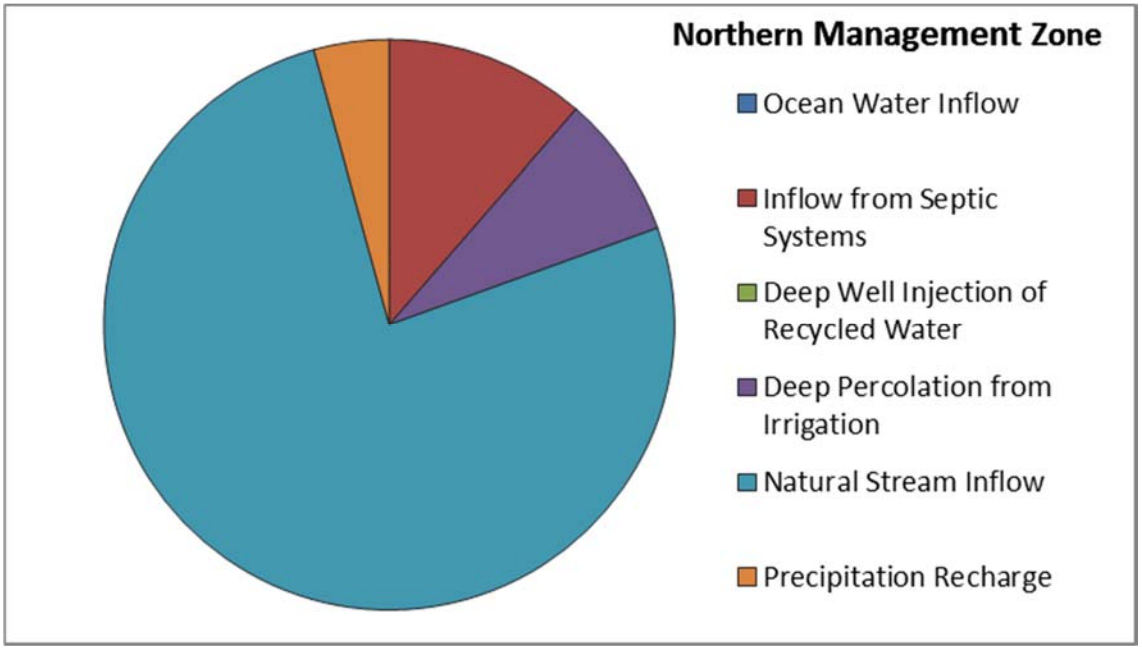
Figures 4-16, 4-17, 4-18 and 4-19 show the breakdown of inflows into the groundwater basin by water balance component for the No Project Scenario and for each phase of the CCWTF Project Scenario assuming phasing as required by the MOU.

Major outflows in the numerical groundwater model include:

- Subsurface drainage to land features (e.g. wetlands)
- Evapotranspiration
- Groundwater flow to the ocean
- Stream gain from groundwater to the Malibu Creek and Lagoon

Areal anthropogenic recharge sources (irrigation deep percolation and septic systems) are not independently considered in the flow model but instead are subsumed within the model areal recharge rates. Model areal recharge rates were apportioned into natural sources (precipitation) and anthropogenic sources (return flows) based on the results of the surface loading model.

Figure 4-16: Inflows to Malibu Valley Groundwater Basin by Component – No Project Scenario



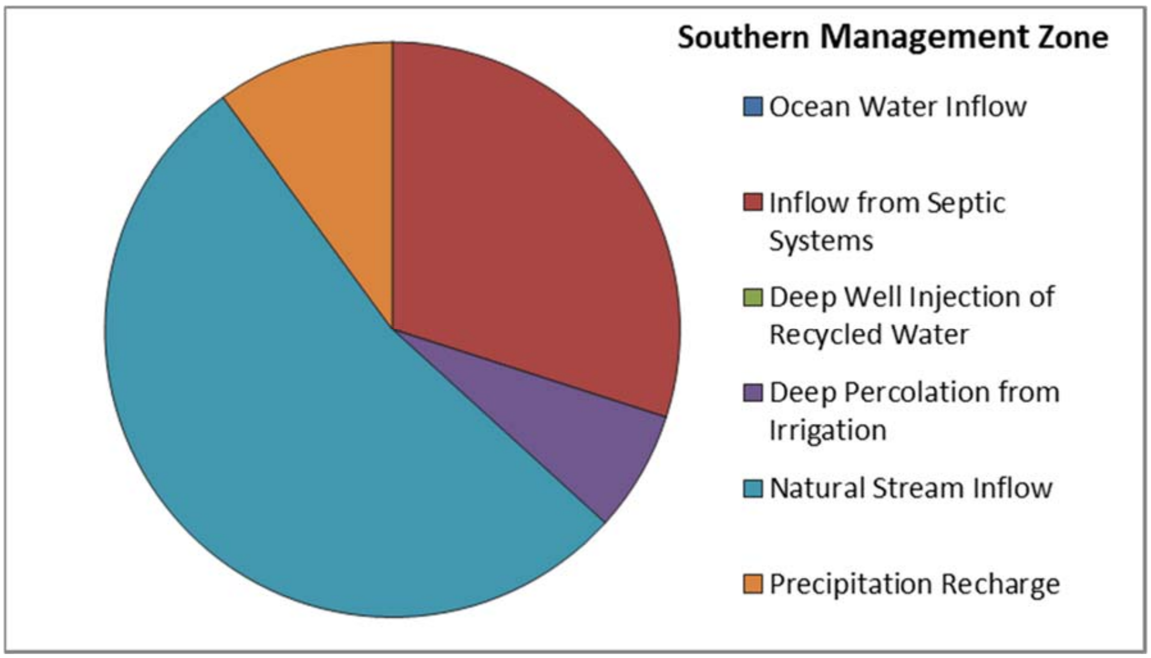
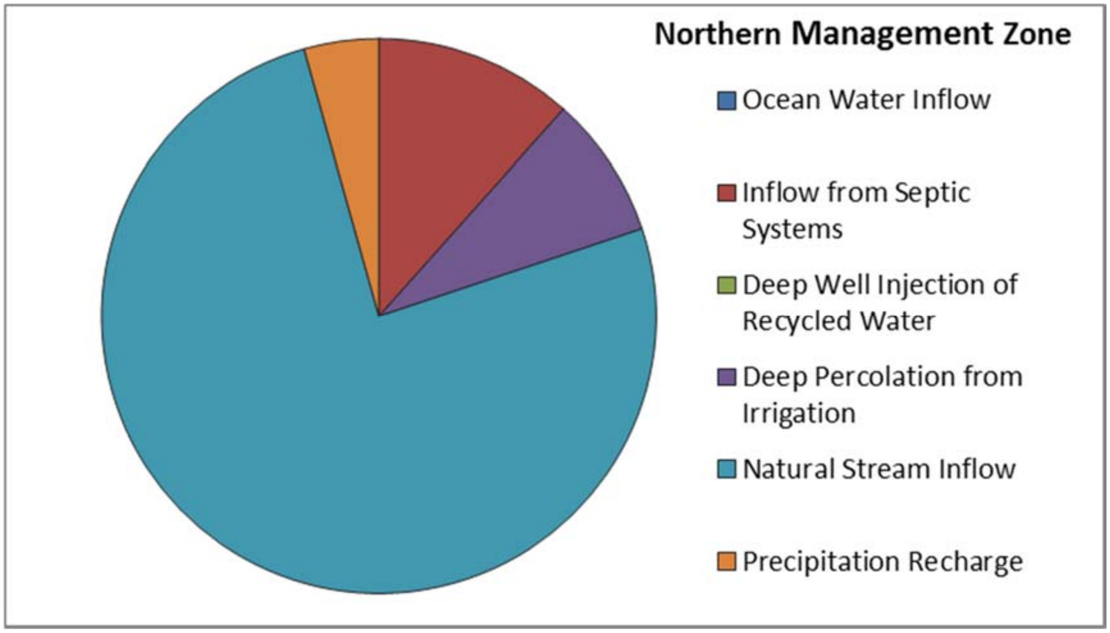


Figure 4-17: Inflows to Malibu Valley Groundwater Basin by Component – Phase 1 of CCWTF Project



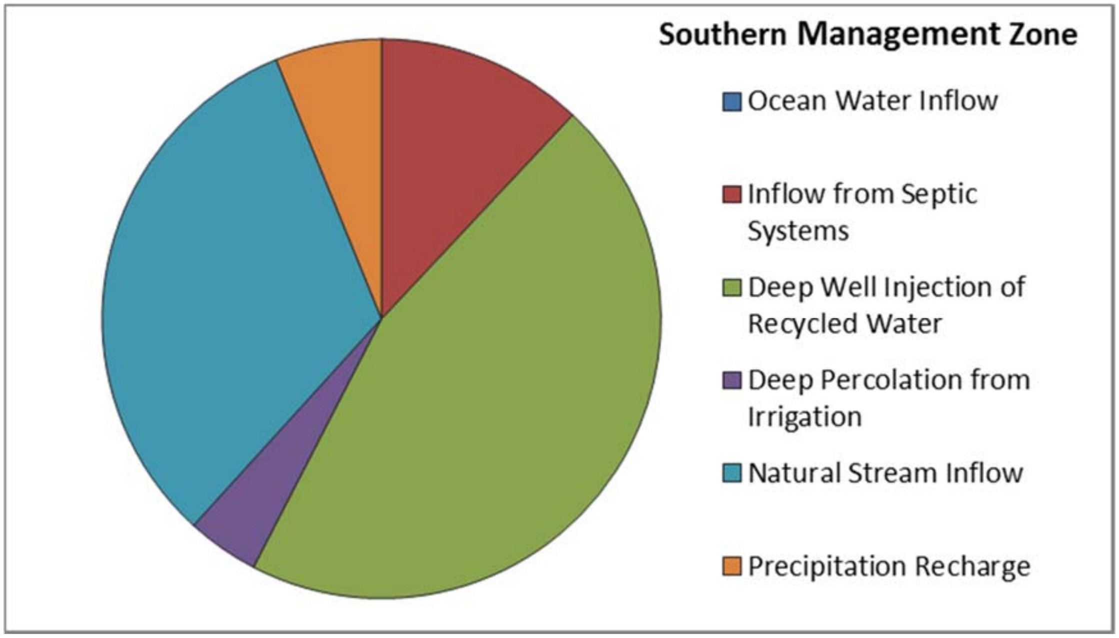
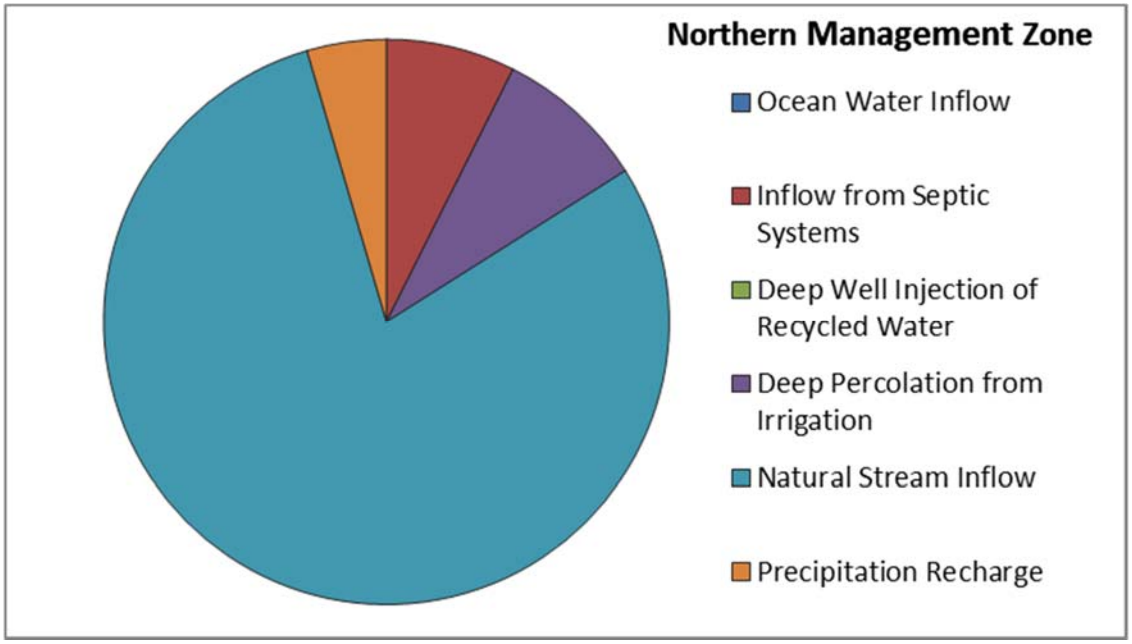


Figure 4-18: Inflows to Malibu Valley Groundwater Basin by Component – Phase 2 of CCWTF Project



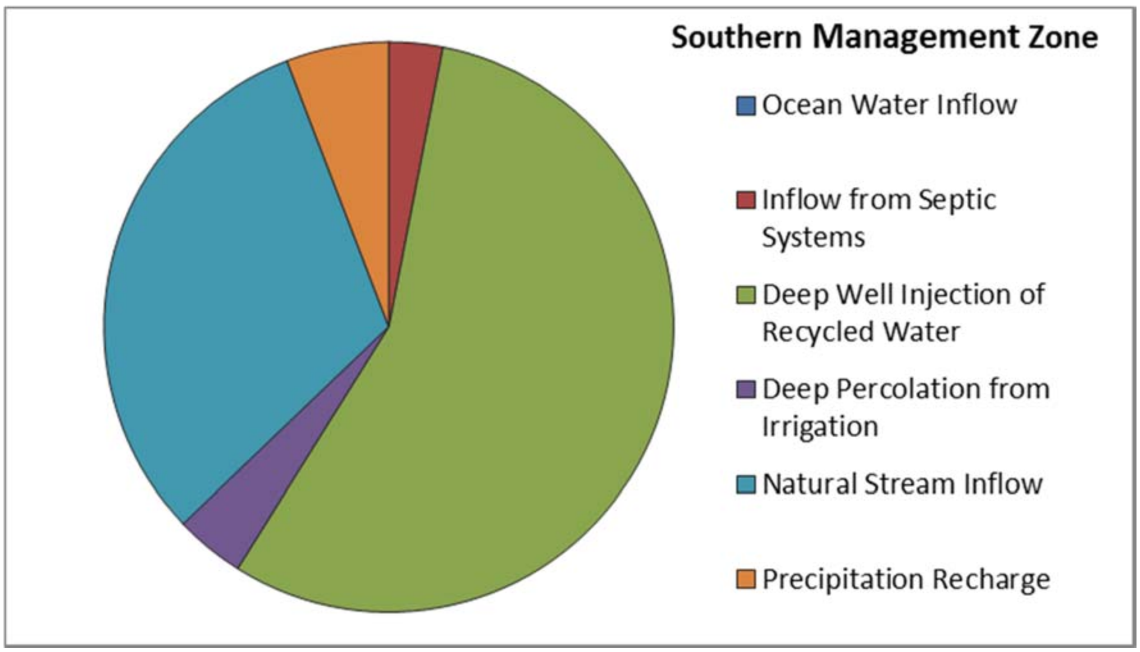
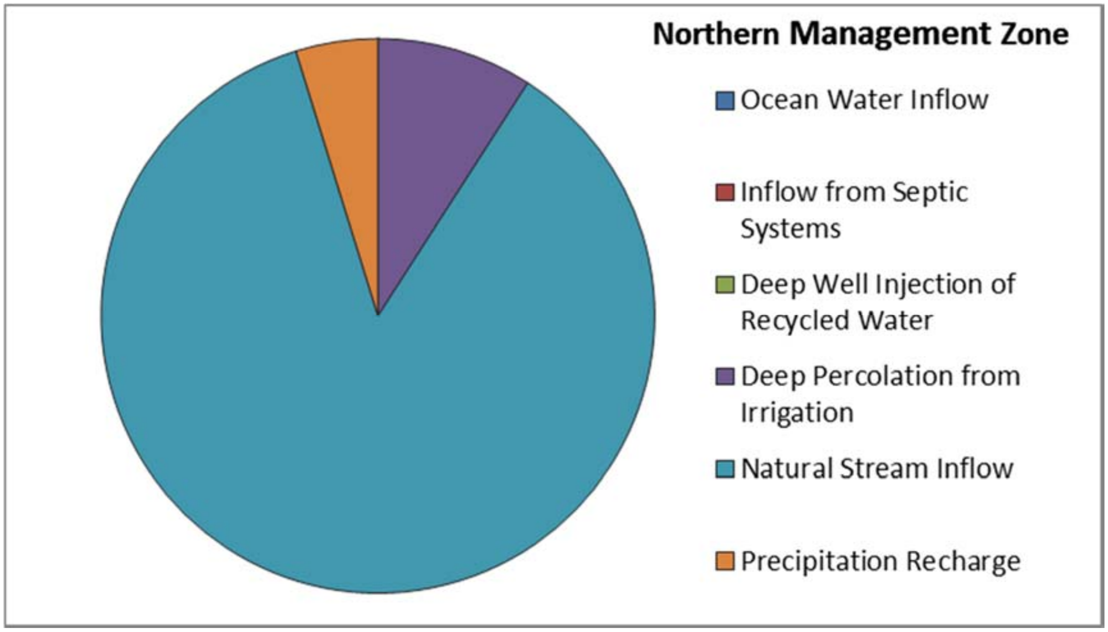
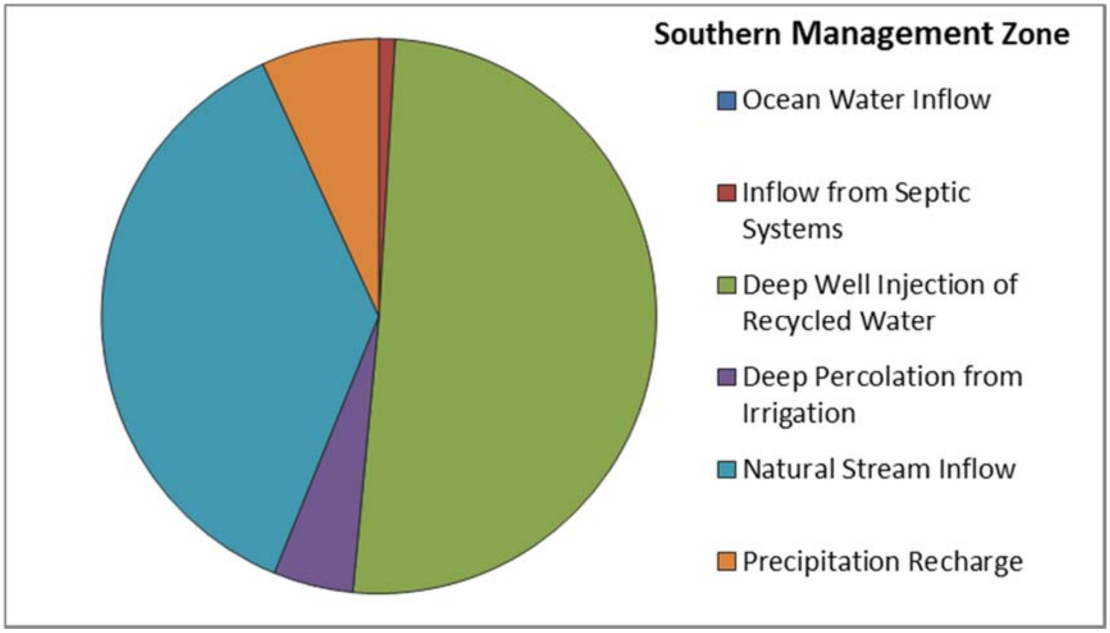


Figure 4-19: Inflows to Malibu Valley Groundwater Basin by Component – Phase 3 of CCWTF Project





4.7.3 Water Quality of Inflows and Outflows

TDS and nitrate concentration estimates for groundwater basin inflows and outflows in the water balance are described below, followed by a discussion of the mixing model calibration and results.

Natural Interface with Groundwater System

TDS and nitrate data from available surface water quality monitoring stations in the watershed were assessed to characterize the water quality of stream leakage from Malibu Creek and Lagoon. Based on recent water quality sampling, an average TDS concentration of 1,275 mg/L and average nitrate-N concentration of 2.46 mg/L were applied to Malibu Creek/Lagoon leakage for the baseline period (data were based on water quality testing completed as part of the Malibu Creek and Lagoon Total Maximum Daily Load (TMDL) setting process, USEPA, 2013). The coastal interface primarily facilitates a basin outflow; based on available data, ocean water quality facilitates a nitrogen input of 1.50 mg/L to the groundwater basin. Additionally, basin-wide nitrogen precipitation concentrations of 0.56 mg/L contribute further loading to the basin (NADP, 2014).

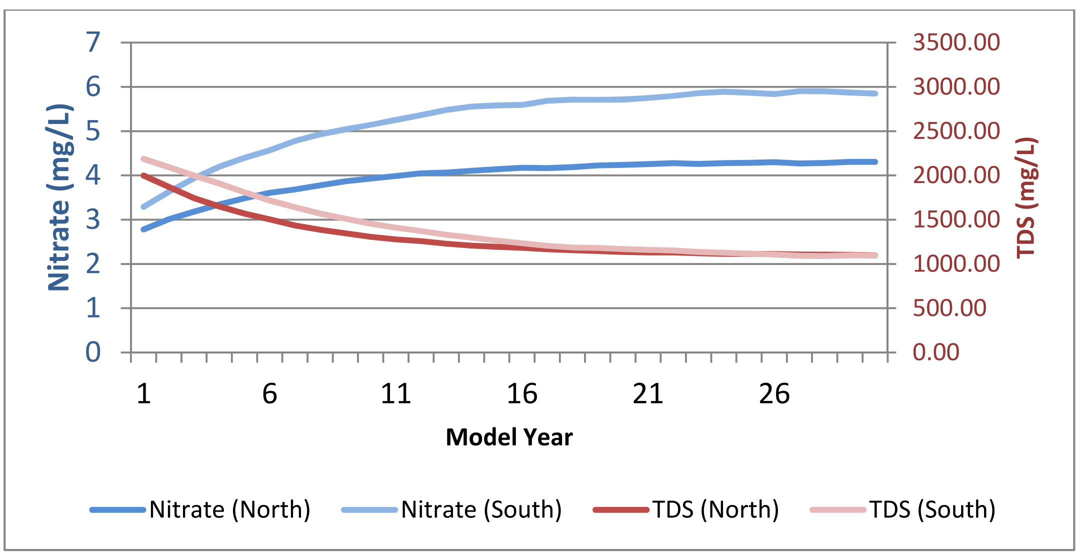
Anthropogenic Interface with Groundwater System

Salt and nutrient loads from agricultural, municipal, and septic sources are described in Section 4 - Source Identification and Loading Analysis. For the mixing model, the TDS and nitrogen mass loads for each return flow component were mixed with their respective annual return flow volumes to obtain an associated concentration. For the loading estimate, it was conservatively assumed that all nitrogen mass is converted to nitrate.

4.7.4 Mixing Model and Salt and Nutrient Balance

A spreadsheet mixing model was developed in order to simulate the effects of current salt and nutrient loading on groundwater quality in the Malibu Valley Groundwater Basin. In the mixing model, the simulated baseline period concentrations and trends were compared to the predominant pattern of observed concentrations and trends. Figure 4-20 shows the simulated average groundwater TDS and nitrate concentrations over the 30-year simulation period.

Figure 4-20: Simulated Baseline Average Groundwater Concentrations for Inland Area of the Malibu Valley Groundwater Basin



4.7.5 Future Conditions and Scenario Analysis

The spreadsheet mixing model was subsequently used to evaluate the effects of planned changes to the study area, including future salt and nutrient loadings on overall groundwater quality in the Malibu Valley Groundwater Basin, for the future planning period from 2010 to 2039. Future land use changes were superimposed over average water balance conditions during the 30-year baseline period (described above) to simulate future groundwater quality

The mixing model was then used to predict future water quality trends. This model is designed to incorporate the existing volume of groundwater and masses of TDS and nitrate in storage, and to track the annual change in groundwater storage and salt and nutrient mass for the groundwater basin as a whole over the study period. As previously mentioned, two future scenarios were simulated using the mixing model assuming build-out land use conditions:

- No Project Scenario – This scenario assumes average water balance conditions with no additional wastewater treatment (i.e., continued use of OWDSs) or recycled water injection.
- CCWTF Project Scenario – This scenario assumes recycled water irrigation and injection with centralized wastewater treatment/recycled water generation resulting in a total nitrogen concentration of 8 mg/L. No percolation in Winter Canyon is included in this scenario.

Under both scenarios, the average TDS and nitrate concentrations for the following water balance components were held constant:

- Deep percolation of areal precipitation
- Leakage from Malibu Creek and Lagoon
- Subsurface inflow from the Pacific Ocean

Average TDS and nitrate concentrations varied for other water balance components depending on model period and project implementation phasing (for the CCWTF Project Scenario).

Simulated Water Quality Results

Simulated TDS Groundwater Concentrations

Future changes in land use and implementation of the proposed CCWTF Project will not result in significant adverse changes to TDS loading to the groundwater basin. In fact, the TDS concentration of recycled water to be injected into the Malibu Valley Groundwater Basin will be less than existing ambient groundwater concentrations (estimated to be 2,000 mg/L in the Northern Zone and 2,200 mg/L in the Southern Zone). Consequently, the proposed recycled water injection project will not result in an altered future groundwater quality, and, if anything, will result in improvements to groundwater quality with respect to TDS in the injection area (see Figure 4-20).

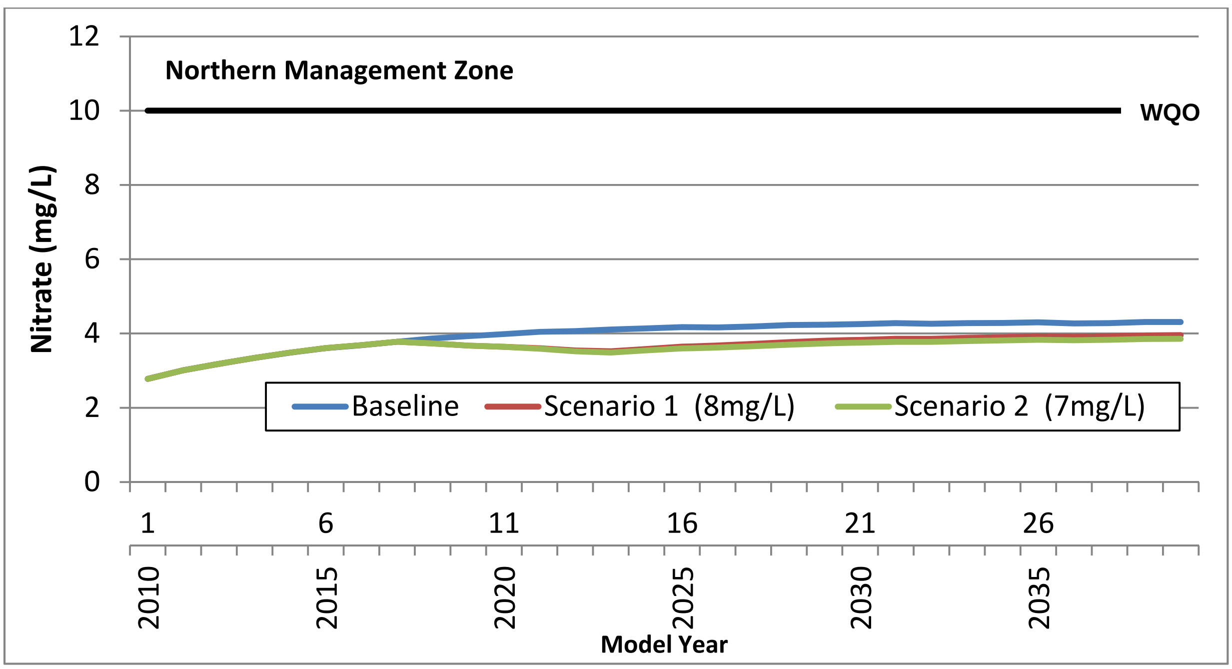
Table 4-10: TDS Concentrations in Groundwater at End of Model Period

Scenario	Northern Zone TDS (mg/L)	Southern Zone TDS (mg/L)	Basin-wide TDS (mg/L)
Current Average Concentrations	2,000	2,200	2,100
Projected Conditions - No Project Scenario	1,097	1,095	936
Percent Assimilative Capacity Created	45%	55%	53%
Projected Conditions – CCWTF Project Scenario	1,105	1,115	934
Percent Assimilative Capacity Created	45%	54%	53%

Simulated Nitrate-N Groundwater Concentrations

Figure 4-21 shows the results of the mixing model for nitrate-N for the three future conditions simulated. This figure plots the simulated future concentration trends for each scenario against the Basin Plan WQO of 10 mg/L. Table 4-11 summarizes the simulated average groundwater nitrate-N concentration at the end of the modeled period.

Figure 4-21: Simulated Future Groundwater Nitrate-N Concentrations



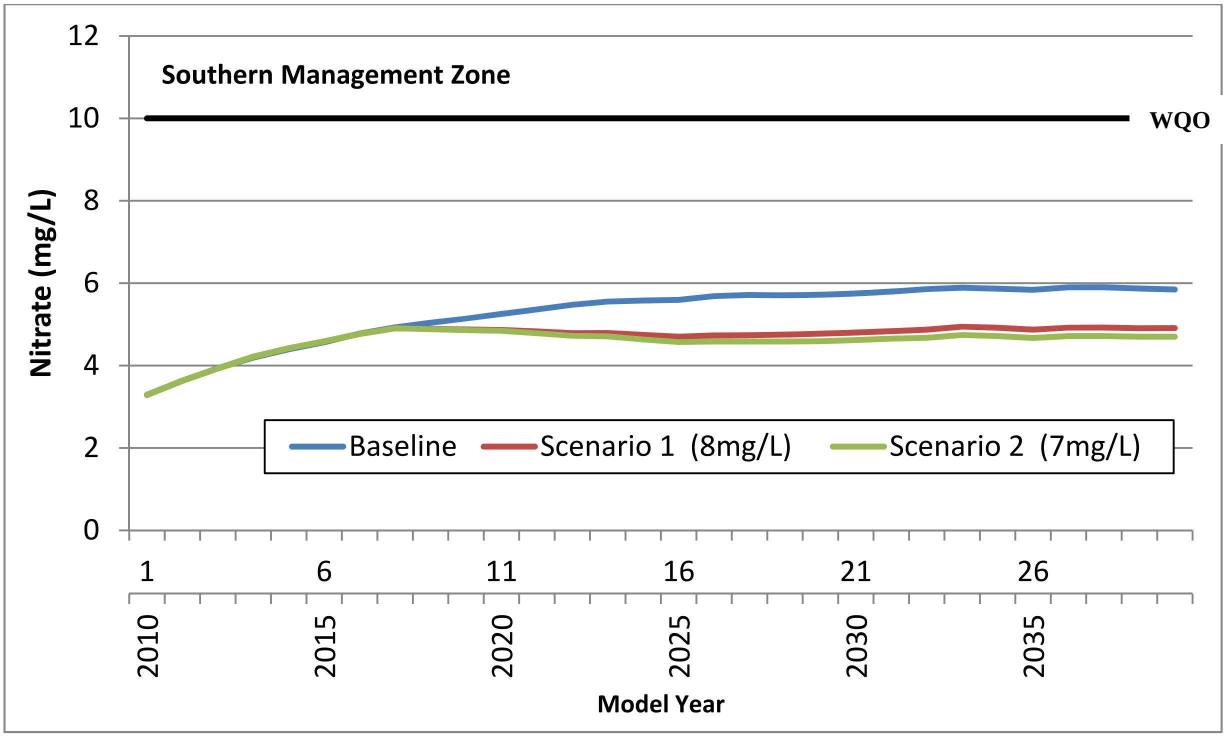

Southern Management Zone
WQO
Nitrate (mg/L)
12
10
8
6
4
2
0
Baseline
Scenario 1 (8mg/L)
Scenario 2 (7mg/L)
1
6
11
16
21
26
2010
2015
2020
2025
2030
2035
Model Year

Table 4-11: Nitrate-N Concentrations in Groundwater after 10 Years of Operations

Scenario	Northern Zone Nitrate- N (mg/L)	Southern Zone Nitrate- N (mg/L)	Basin-wide Nitrate- N (mg/L)
Current Average Concentrations	2.78	3.29	3.23
Projected Conditions – No Project Scenario	3.99	5.26	4.53
Percent Assimilative Capacity Used	17%	29%	19%
Projected Conditions - CCWTF Project Scenario	3.64	4.86	4.23
Percent Assimilative Capacity Used	12%	23%	15%

Table 4-12: Nitrate-N Concentrations in Groundwater at End of Model Period (Year 2040)

Scenario	Northern Zone Nitrate- N (mg/L)	Southern Zone Nitrate- N (mg/L)	Basin-wide Nitrate- N (mg/L)
Current Average Concentrations	2.78	3.29	3.23
Projected Conditions – No Project Scenario	4.31	5.85	4.91
Percent Assimilative Capacity Used	21%	38%	25%
Projected Conditions - CCWTF Project Scenario	3.95	4.91	4.10
Percent Assimilative Capacity Used	16%	24%	13%

4.8 Model Findings

Based on the analysis documented herein, the following findings can be made:

- Proposed recycled water injections into the Malibu Valley Groundwater Basin will improve (decrease) the average TDS concentrations in the Malibu Valley Groundwater Basin. At present, TDS groundwater concentrations in the basin are at or above the WQO of 2,000 mg/L. The proposed recycled water injections will reduce groundwater TDS concentrations as the injected water will contain a lower TDS concentration than the ambient background quality, thus creating assimilative capacity in the groundwater basin.
- Similar to TDS, sulfate concentrations in groundwater in the basin are primarily above the WQO. As sulfate concentrations in imported potable water used in the Civic Center Area are low, resultant sulfate concentrations in the recycled water are also expected to be lower than that of ambient groundwater and the reuse/injection of recycled water will, over time, decrease groundwater sulfate concentrations resulting in the creation of assimilative capacity in the groundwater basin.
- While there is presently assimilative capacity in the groundwater basin for chloride (presently 288 mg/L), the proposed CCWTF project is expected to result in decreases of chloride concentrations in groundwater over time in a manner similar to that for TDS and sulfate for the same reasons – the introduction of treated effluent originating from low-chloride imported potable water.

- Since recycled water injection represents only about a third of the nitrogen loading to the groundwater basin, only about 16% of the groundwater basin's assimilative capacity for nitrate-N is utilized by the CCWTF Project in the northern management zone. This number is approximately 24% for the southern area (where current and proposed future land uses result in greater loading to a smaller area). Basin-wide, this value becomes approximately 13% of the overall basin's assimilative capacity. This is in comparison to use of 21% of the assimilative capacity in the northern management zone under the No Project conditions, 38% of assimilative capacity used in the southern management zone under the No Project conditions, and use of 25% of the assimilative capacity basin-wide under the No Project conditions.
- Average nitrate concentrations in the Malibu Valley Groundwater Basin are projected to increase similarly under both scenarios evaluated for the simulation period from 2010 to 2019 (by which point, the first two phases of the CCWTF Project will have been implemented). Starting around 2019, the proposed CCWTF Project will have significant enough effects on groundwater quality such that the concentration trends diverge from baseline conditions and approach lower steady-state concentration at the end of the model period (2040).
- Under the modeled scenario using the City's General Plan at build-out (Year 2040) for future land development, in the Northern Management Zone, approximately 66% of future nitrate loading comes from overlying land uses with the remaining 34% coming from septic systems whereas, in the Southern Management Zone (where the injection wells will be located), approximately 43% of nitrate loading comes from overlying land uses with the remaining 57% coming from groundwater injection and/or septic systems.

In summary, TDS concentrations in groundwater will reduce from current concentrations on the order of 2,000 mg/L to approximately 1,100 mg/L under future build-out conditions including injection of recycled water by the CCWTF Project. This will increase the assimilative capacity of the groundwater basin from 0% to 45%.

Projected future increases in nitrate-N concentrations in the Malibu Valley Groundwater Basin will remain below the WQO established for nitrate-N in the Basin Plan. Approximately 13% of the overall groundwater basin's assimilative capacity for nitrate-N will be utilized by the CCWTF Project and planned future land uses, of which only about 7% of the assimilative capacity for nitrate-N is utilized by the CCWTF Project and the remaining portion is utilized by future land uses which would occur under either scenario evaluated (i.e. development of currently vacant lands and changes to existing land uses). For the northern management zone, approximately 16% of this zone's overall assimilative capacity for nitrate-N will be used by the CCWTF Project and planned future land uses, approximately 24% of the southern management zone's overall assimilative capacity for nitrate-N would be used. Finally, it is important to note that the modeling evaluation documented herein is conservative given the assumptions incorporated in the mixing model for nitrate (i.e. all nitrogen loading is converted to nitrate, no in-basin denitrification, no advection, dispersion or diffusion within the groundwater basin, no salt is removed from the basin once loading occurs), and will therefore overestimate the actual TDS and nitrogen loadings to and impacts on the groundwater basin water quality.

Chapter 5 Anti-Degradation Assessment

5.1 CCWTF Project Justification

Per the regulatory orders previously described, the OWDSs used throughout the Malibu Valley Groundwater Basin are impacting groundwater quality and contributing to non-point source pollution in Malibu Creek and Lagoon and the near-shore environment. These water quality impacts affect local habitat and oftentimes result in beach closures to avoid risk to public health. The beach closures, in turn, result in economic impacts to the community through lost revenue. Resolution R-2009-007 was adopted by the LARWQCB in November 2009 to address these impacts to the groundwater basin, Malibu Creek, Malibu Lagoon, and local beaches. The resolution approved an amendment to the Basin Plan prohibiting new OWDSs and OWDS discharges from existing systems in the Malibu Civic Center Area. In 2010, the SWRCB adopted Resolution 2010-0045 approving a Basin Plan Amendment incorporating this prohibition and establishing a phased schedule for compliance. These orders have resulted in a de facto building moratorium resulting from the OWDS prohibition, which has created further economic uncertainty for property owners within the Civic Center Area.

In July 2013, the USEPA issued TMDLs for Malibu Creek and Lagoon including a 7 mg/L TMDL for mean annual dissolved oxygen concentration, 1 mg/L for total nitrogen, and 0.1 mg/L for total phosphorus during the summer, and 8 mg/L total nitrogen for the winter. TMDLs were also issued for bacteria in the Creek and Lagoon. Compliance with these TMDLs is intended to improve local aquatic habitats.

In response to the regulatory actions, TMDLs, and impacts throughout the groundwater basin, the City of Malibu began designing the CCWTF Project. Construction of the CCWTF will allow for the collection of all wastewater from the Prohibition Area and treatment of the wastewater to Title 22 standards. The resulting recycled water will be used for landscape irrigation within the Civic Center and surrounding areas with any remaining, unused recycled water injected into the Malibu Valley Groundwater Basin. By implementing a centralized, regional wastewater treatment facility to treat all of the wastewater in the Prohibition Area, other wastewater collection, treatment, and disposal projects will not be required. The CCWTF Project will be the only recycled water project overlying the Malibu Valley Groundwater Basin and will be providing recycled water to all qualified users overlying the groundwater basin. The CCWTF Project will achieve the following benefits:

- It will create assimilative capacity in the basin for TDS, sulfate, and most likely, chloride, by up to 53% basin-wide. Much of this assimilative capacity will be occurring naturally as a result of ‘basin flushing’ and is not directly linked to implementation of the CCWTF project itself. However, the introduction of recycled water use to the groundwater basin will not result in harmful increases in TDS or related salts in the underlying groundwater basin.
- Nitrogen loading to the basin will be reduced by a total of 1,227 lbs each year (an approximate reduction of 60%).
- The CCWTF Project will not only eliminate OWDS discharges, it will also improve groundwater quality over time as the quality of the recycled water will be better than that of the ambient groundwater for several key constituents.
- Injection of the recycled water into the groundwater basin will create a seawater intrusion barrier, further protecting the quality of the groundwater.
- Offsetting potable water supplies with recycled water will reduce the need for imported water resulting in avoided costs.

- Improved surface water quality in Malibu Creek and Lagoon resulting from CCWTF Project implementation and the cessation of OWDS use will result in fisheries and habitat improvements.
- Beach closures will be minimized and/or eliminated providing increased recreation benefits and avoiding economic impacts.
- Incorporating recycled water into the City's water supply portfolio will help with adaptation to and mitigation of climate change by diversifying the City's water supplies and through potable water offsets, reduced potable water treatment and pumping-related distributed, thereby reducing greenhouse gas emissions associated with electricity use.

These improvements, the California anti-degradation policy, and its relation to the Project are described in the following sections.

5.2 California Anti-Degradation Policy Summary

The SWRCB's *Statement of Policy with Respect to Maintaining High Quality of Waters in California* (otherwise known as Resolution No. 68-16) states that it is the policy of the State to maintain and promote high water quality. The purpose of this Resolution is to allow the State of California to grant permits and licenses for water and waste disposals into water bodies while providing maximum benefit and maintaining the health, safety, and welfare of Californians. In general, Resolution 68-16 establishes that:

- Whenever the existing water quality is better than the quality prescribed in policies, such high quality shall be maintained unless it can be demonstrated that any change is consistent with the maximum benefit to the people, will not affect present and future beneficial use of such water and will not result in water quality less than that prescribed in the policies.
- Waste discharges that lead to increased volume or concentration of waste is required to meet waste discharge requirements which will result in the best practicable treatment of control of discharges necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people will be maintained.

In summary, the California Anti-Degradation Policy requires that existing high quality waters be maintained to the maximum extent possible. However, there is leniency in discharge quality if the action is part of the best overall solution that provides benefits that outweigh the costs of lowered water quality.

The Recycled Water Policy, adopted by the SWRCB in 2009, established evaluation criteria for projects utilizing recycled water for groundwater recharge, such that a single recycled water project may use less than 10 percent of the available assimilative capacity, and multiple recycled water projects may use less than 20 percent of the available assimilative capacity, until such time as a Salt and Nutrient Management Plan is adopted.

- A project that utilizes less than 10 percent of the available assimilative capacity in a basin/sub-basin (or multiple projects utilizing less than 20 percent of the available assimilative capacity in a basin/sub-basin) need only conduct an anti-degradation analysis verifying the use of the assimilative capacity. For those basins/sub-basins where the Regional Water Boards have not determined the baseline assimilative capacity, the baseline assimilative capacity shall be calculated by the initial project proponent, with review and approval by the Regional Water Board, until such time as the salt/nutrient plan is approved by the Regional Water Board and is in effect. For compliance with this subparagraph, the available assimilative capacity shall be calculated by comparing the mineral water quality objective with the average concentration of the basin/sub-basin, either over the most recent five years of data available or using a data set approved by the Regional Water Board Executive Officer. In determining whether the available assimilative capacity will be exceeded by the project or projects, the Regional Water Board shall calculate the impacts of the project or projects over at least a ten year time frame.

- In the event a project or multiple projects utilize more than the fraction of the assimilative capacity designated, then a Regional Water Board-deemed acceptable anti-degradation analysis shall be performed to comply with the Resolution No. 68-16.

5.3 Applicability to the CCWTF Project

The CCWTF Project will result in a centralized wastewater treatment collection and facility that will allow for the cessation of OWDS use throughout the groundwater basin. Recycled water produced at by the CCWTF Project will be reused for irrigation with any unused recycled water injected into the underlying groundwater basin. As the CCWTF Project will ultimately collect and treat all municipal wastewater in the Malibu Valley Groundwater Basin (and from some surrounding areas), it will replace the need for any other recycled water project in the area and will result in the CCWTF Project as being the only recycled water project in the groundwater basin.

Overall, the net effect of the proposed CCWTF Project will be to decrease the concentration of TDS, sulfate, and possibly chloride, in groundwater, and significantly reduce the mass of nitrogen loading to the Malibu Valley Groundwater Basin through the model period ending in the year 2040. At present, neither the northern nor southern management zones currently have any assimilative capacity for TDS with present average concentrations of approximately 2,000 and 2,200 mg/L respectively (as compared to a WQO of 2,000 mg/L). Implementation of the CCWTF Project will result in the injection of recycled water with lower resultant TDS concentrations, creating up to approximately 45% assimilative capacity in the northern management zone and approximately 55% in the southern management zone. (That is, average TDS concentrations will decrease from around 2,000 mg/L to around 1,100 mg/L with implementation of the CCWTF Project.) If the CCWTF Project were not implemented, the assimilative capacity of TDS (as well as chloride and sulfate) would not be created and nitrogen loadings would not decrease, as further described in this section.

In terms of nitrate, in the northern management zone under current conditions, the existing OWDSs are contributing approximately 2,045 lbs of nitrogen per year, whereas recycled water injections associated with the proposed CCWTF Project will contribute approximately 818 lbs per year at build-out (assuming an effluent nitrate concentration of 8 mg/L, well below the Basin Plan WQO of 10 mg/L), a reduction of 1,227 lbs of nitrogen each year (an approximate reduction of 60%). In the southern management zone, an approximate reduction of 60% is also estimated, with the No Project and CCWTF Project Scenarios exhibiting 6,032 lbs and 2,428 lbs of nitrate contribution, respectively. Other significant findings applicable to the proposed CCWTF Project implemention include the following:

- The proposed CCWTF Project will minimally increase the concentration of nitrate (measured as N) within the groundwater basin (specifically the deeper Civic Center Gravels zone); however, the net increase of nutrients will not exceed WQOs and therefore will “not result in water quality less than that prescribed in the policies.”
- The portion of the groundwater basin downgradient of the proposed injection well locations is adjacent to the shoreline and would not be used for potable water supply in the future due to elevated TDS levels and high connectedness with the ocean (and associated increased risk for seawater intrusion).

Three injection wells are planned along Malibu Road, all of which will penetrate the Civic Center Gravels to a maximum depth of approximately 160 feet and all of which will be located within approximately 1,200 feet of the ocean. As shown in Figure 3-2, an offshore hydraulic gradient exits this area of the groundwater basin and therefore the discharge from the injection wells will be directed south toward the ocean/Santa Monica Bay where it will exit the groundwater basin at the southwestern edge of the basin through ocean floor seeps. Given the location of the injection wells and presence of an offshore gradient, the majority of the groundwater basin will be unaffected by the injected recycled water with higher nutrient concentrations and its viability as a future potential potable supply as required by the municipal designation in the Basin Plan will not be compromised by CCWTF Project implementation. Additional water quality benefits anticipated from the CCWTF Project include:

1. A seawater intrusion barrier will be created by the injections to further protect the municipal designation; and
2. The reduction in nutrient loadings to the shallow alluvial aquifer and Malibu Creek and Lagoon (and areas immediately downstream from the Lagoon) by the elimination of OWDS discharges.

However, as a precaution due to the CCWTF Project’s contribution of nitrate to the groundwater basin, conservative measures to protect public health are planned as part of the project. Specifically, public health will be protected by a new well ordinance recently passed by the City that will restrict the installation of news wells and pumping of groundwater in the Civic Center Area.

In summary, the benefits to be achieved by the CCWTF Project, which include the removal of OWDS discharges with high nutrients from shallow groundwater and connected surface water, groundwater basin protection from seawater intrusion, and potable water offset through the use of recycled water for irrigation (including indirect impacts such as reduced treatment costs and greenhouse gas emissions), far outweigh the anticipated slight increase in groundwater nutrient concentrations.

It is our conclusion that, while a slight degradation of groundwater water quality within the Malibu Valley Groundwater Basin is anticipated as a result of CCWTF Project implementation, the overall water quality changes associated with the project are consistent with the maximum benefit of the people of the State and the use of the groundwater basin’s assimilative capacity should be granted.

Table 5-1: Summary of Anti-Degradation Assessment

SWRCB Resolution No. 68-16 Component	Anti-Degradation Assessment
Water quality changes associated with proposed project are consistent with the maximum benefit of the people of the State.	• The Project will not cause groundwater quality to exceed applicable WQOs • Use of recycled water for irrigation potentially reduces the need for groundwater pumping, while injection of recycled water helps mitigate saline water intrusion into the basin to protect municipal use designation • Assimilative capacity will be created (53%) in the groundwater basin for TDS • A similar level of assimilative capacity will likely be created for sulfate for the groundwater basin
The water quality changes associated with proposed project will not unreasonably affect present and anticipated beneficial uses.	
The water quality changes will not result in water quality less than prescribed in the Basin Plan.	
The projects are consistent with the use of best practicable treatment or control to avoid pollution or nuisance and maintain the highest water quality consistent with maximum benefit to the people of the State.	• The concentration of nitrate-N in recycled water produced by the Project will be 8 mg/L; this concentration is well below the Basin Plan WQO of 10 mg/L and will protect the beneficial use of the groundwater basin as identified in the Basin Plan
The proposed project is necessary to accommodate important economic or social development.	• The Project is necessary to help achieve the TMDLs established for Malibu Creek and Lagoon • The recycled water supply and potable offset are an integral part of the City's water supply portfolio • A de facto building moratorium has been created due to the OWDS prohibition, creating economic uncertainty for property owners affected by the Prohibition Resolution.

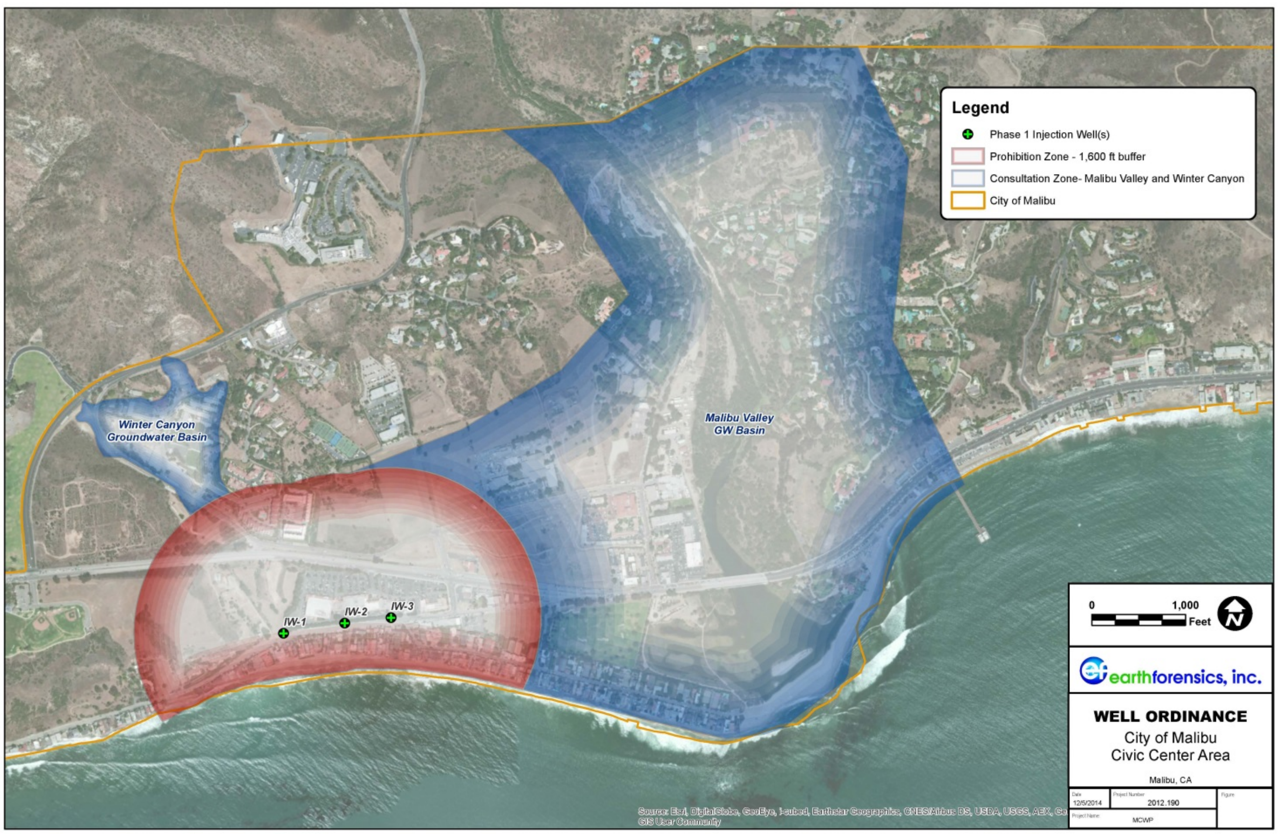
Chapter 6 Groundwater Basin Management Plan

The following are general categories of measures that, when implemented, will help protect the beneficial uses of the Malibu Valley Groundwater Basin. Specific strategies or activities within each of the categories that can be implemented are described in Chapter 7 as part of the SNMP Implementation Plan.

6.1 Groundwater Basin Management

At present, there are no potable water supply wells within the Malibu Valley Groundwater Basin. However, as part of the CCWTF Project, three injection wells will be installed in the basin and used to disperse unused disinfected tertiary-treated recycled water. These wells have been located and designed to minimize groundwater elevation and quality impacts on the groundwater basin and to promote flow of the injected water south to the ocean. As such, protection zones will be established around these wells to ensure that other groundwater uses/extractions do not impact the designed performance of these wells, to protect human health against the potential ingestion of the injected recycled water, and to provide an injection barrier against possible future seawater intrusion. Figure 6-1, below, shows the proposed locations of the wellhead protection areas established under the City's new groundwater well ordinance.

Figure 6-1: Proposed Prohibition and Consultation Zones



In general, the City's new groundwater management ordinance will designate the City as the primary management agency for the Malibu Valley Groundwater Basin; however, the authority to issue well construction or destruction permits will remain with the Los Angeles County Department of Public Health (LADPH) (see Section 6.4, below). This ordinance, combined with the City's land use planning and development ordinances and regulations, promotes a comprehensive approach to managing basin recharge (including protection of recharge areas), groundwater basin quality and the interactions between the groundwater basin and the adjacent Malibu Creek and Lagoon.

6.2 Recharge Area Protection

Precipitation and surface water runoff, effluent of domestic septic systems, and infiltration at the basin's margins are the primary sources of flow into the groundwater basin. Recharge areas associated with these inflow sources included unpaved land in the groundwater basin and at the basin's margin/intersection with upland areas. Development of these areas has the potential to limit precipitation and surface water runoff recharge. To this end, the City requires that new projects retain onsite the Storm Water Quality Design Volume (SWQDv) defined as the greater of the 85th percentile, 24-hour storm event or the 0.75", 24-hour storm event. Alternatives are available if a development cannot meet this criteria, but the goals of this requirement are to maximize onsite recharge and minimize the potential for pollutants to become entrained in the stormwater runoff and contributing to water quality impacts of local surface water bodies.

6.3 Contaminated Groundwater Migration Control

The City of Malibu has had limited industrial and agricultural development and, to date, consists primarily of residential and commercial development. As such, there are limited areas of groundwater contamination associated with development-related pollutants, and most of these are located around Pacific Coast Highway. The migration and remediation of contaminated groundwater is of primary concern to local urban and water supply agencies, including the City of Malibu and LARWQCB, and the LARWQCB actively requires that identified areas of contamination be investigated and remediated.

While the City does not have authority or responsibility for remediation of contamination, it is committed to coordinating with responsible parties and regulatory agencies to keep the local entities informed of the status of known groundwater contamination in the Basin. To address the management of contaminated areas of the groundwater basin, the following actions may be implemented:

- Coordinate with USGS and/or other appropriate agencies to expand network of monitoring wells to provide an early warning system.
- If detections occur in existing or future monitoring wells, facilitate meetings between the responsible parties and potentially impacted water agency(ies) and regulatory agency(ies) to develop strategies to minimize the further spread of contaminants. For example, groundwater injection and/or extraction patterns could be altered in the vicinity of a pollutant plume to change the groundwater gradient.
- Provide a forum to share all information on mapped contaminant plumes and leaking underground storage tank (UST) sites in order to develop groundwater extraction patterns and onsite planning of future production or monitoring wells.
- Meet with representatives of LARWQCB staff to establish a positive relationship and identify ways to have open and expedient communications regarding any new occurrences of contamination. Open communication channels are especially important when contamination is believed to have reached the water table.

- Track upcoming regulations on septic systems, National Pollutant Discharge Elimination System (NPDES) Permits, agricultural discharges and other regulatory programs that pertain to water quality.

6.4 Well Construction Policies

It is the responsibility of the Los Angeles County Department of Public Health (LADPH) to protect human health. The Environmental Health Division, Drinking Water Program is responsible for reviewing plans and approving private residential water wells within designated cities (including the City of Malibu) and unincorporated areas of the County, as well as regulating small water systems. They retain this authority under the following codes:

- Los Angeles County Code, Title 28, Plumbing, Chapter 6, Section 601.1 provides the County with jurisdictional authority to ensure that each plumbing fixture be provided with an adequate supply of potable running water piped in an approved manner so as to prevent backflows or cross-connections.
- Los Angeles County Code, Title 11, Health and Safety, Section 11.38.165 which requires laboratory analyses showing that the water quality meetings the primary bacteriological and chemical requirements of the Safe Drinking Water Standards and specifies requirements for well construction.
- California Water Well Standards, Bulleting 74-90/74-80 which specifies required standards for well construction, abandonment and destruction.

In addition, under the City's approved Local Coastal Program, water well siting and construction is regulated relative to protecting human health and the beneficial uses of the groundwater basin.

6.5 Well Abandonment and Destruction Programs

As with well construction, the LADPH is responsible for issuing permits for the abandonment and/or destruction of wells. Similar to well construction, the County utilizes the State's Water Well Standards as its primary requirements for well abandonment and/or destruction. The City of Malibu, at this time, does not administer a well abandonment and destruction program.

6.6 Mitigation of Overdraft Conditions/Control of Saline Water Intrusion

As previously noted, the Malibu Valley Groundwater Basin has historically experienced overdraft conditions, which were mitigated by the cessation of groundwater pumping and the introduction of imported water supply. However, the groundwater basin retains its beneficial use designation as a municipal water supply and, as such, has the potential to once again be utilized as a supply and result in overdraft conditions. To mitigate for possible future conditions that could, once again, trigger saltwater intrusion into the groundwater basin, the City of Malibu is implementing the CCWTF Project, which includes the injection of unused recycled water into the Malibu Valley Groundwater Basin in an area adjacent to the Pacific Ocean. The result of this injection will be a partial injection barrier, restricting seawater intrusion. Additionally, the City of Malibu will be enacting a new groundwater management ordinance that will establish prohibition and consultation zones around the proposed injections wells in order to protect human health and to ensure the designed performance of the injection system. Because the ordinance will be incorporated into City's municipal code and as the City is the lead for the Local Coastal Program (LCP), which requires obtaining a Coastal Development Permit and City approval for new well construction within the City boundaries, the City is, and will be, able to manage groundwater extraction from the basin and control/mitigate overdraft and/or seawater intrusion. Finally, the City will continue to encourage the use of Low Impact Development (LID) techniques and other similar practices that will look to retain stormwater runoff onsite and to encourage the onsite percolation of precipitation.

6.7 Coordination and Cooperation with Stakeholders

At present, as the lead local regulatory entity in the Malibu Valley Groundwater Basin, the City of Malibu leads several stakeholder coordination and outreach efforts, including holding regular stakeholder and TAC meetings for key projects and programs. In addition to these efforts, the following measures can be implemented to enhance local and regional coordination and cooperation.

- Encourage and assist coordination efforts between local agencies in forming groundwater protection projects and programs.
- Coordinate with state agencies, federal agencies, neighboring water entities and related agencies, and non-governmental organizations. These entities may include the LARWQCB, WD29, and the Los Angeles County Department of Public Health.
- Create an educational outreach program to educate the public as to the importance of groundwater basin protection.

6.8 Groundwater Monitoring

At present, monitoring activities in the Malibu Valley Groundwater Basin are conducted on a site-by-site basis per project-specific permit requirements and/or programs. As part of the CCWTF Project, a groundwater and surface water monitoring program was developed as part of permit requirements. This proposed program is summarized below and will likely be implemented over time with the project itself. This monitoring program will be the largest within the groundwater basin, and will eventually form the backbone of a basin-wide monitoring program to be implemented as part of the SNMP and to gather data to meet the requirements of the MOU between the City and the LARWQCB. Additionally, this monitoring program, and the resultant analyses, will provide the performance measures by which the effectiveness of the implementation measures contained within this SNMP will be assessed.

6.8.1 Groundwater Elevation Monitoring

The groundwater elevation monitoring program for the CCWTF project for compliance with the project-specific Waste Discharge Requirement (WDR) will consist of monitoring in nine (9) monitoring wells (six shallow monitoring wells and three deep groundwater monitoring wells). This will include three (3) well pairs in various locations around the groundwater basin, one shallow well in the upgradient (northern) part of the groundwater basin, and two (2) wells in Winter Canyon (Figure 6-2). Baseline groundwater monitoring for compliance with the MOU will begin in 2015, and elevation monitoring will continue thereafter to provide a better understanding of the groundwater elevation conditions of the Civic Center Area, including elevation trends relative to tidal, lagoon and precipitation influences. Elevation levels and water quality measurements will be taken concurrently in a uniform procedure. To determine groundwater elevation, a depth-to-groundwater below top of casing (btoc) will be measured by an electronic well sounder with a surveyor's measuring tape, measuring to the nearest $1/100^{th}$ of a foot. This measurement and the top-of-casing elevations will be taken by a licensed surveyor, who can then use these values to calculate a final groundwater elevation. Data will be summarized in regular reports provided to the LARWQCB. After two years of monitoring, the groundwater monitoring well network and constituents to be analyzed will be reevaluated for appropriateness in meeting monitoring objectives in conjunction with the LARWQCB.

6.8.2 Groundwater Quality Monitoring

Groundwater monitoring for water quality within the Malibu Valley Groundwater Basin will consist of several programs that build off each other to provide comprehensive groundwater basin monitoring. It is anticipated that, as the CCWTF project is implemented, individual site monitoring programs will gradually cease and a more comprehensive basin-wide monitoring program will gradually be implemented. For the purposes of this SNMP, this basin-wide monitoring program will use the monitoring program required by the CCWTF WRR-WDR permit as its base, and then tier off that to conduct water quality and groundwater elevation monitoring necessary for SNMP implementation and to provide the data required for compliance with the MOU between the City and the LARWQCB. These monitoring programs are described below in more detail.

Groundwater Quality Monitoring – Waste Discharge Requirements

Groundwater monitoring for water quality within the Malibu Valley Groundwater Basin for compliance with the CCWTF WRR-WDR permit will utilize the same nine wells as the elevation monitoring previously described. The mix of shallow and deeper monitoring wells will ensure adequate spatial and vertical coverage of the basin in the vicinity of the proposed CCWTF injection to be able to monitor for potential adverse impacts. Figure 6-2, below, shows the monitoring locations that will be included in the monitoring program; information regarding the monitoring wells is included in Table 6-1. The monitored parameters and frequency are described in Table 6-2. Wells will be purged prior to groundwater sampling to ensure that samples are representative of the groundwater basin. Purging will be performed prior to collecting the water quality samples so as to obtain accurate measurements of temperature, pH, electroconductivity, and total dissolved solids. The samples obtained are within a tolerance of ±10% accuracy. Groundwater samples are then couriered to a State-certified analytical laboratory for testing. Analytical data will be tabulated, reviewed, and analyzed for trends; results will be summarized in a monitoring report submitted to the LARWQCB.

Figure 6-2: Proposed Monitoring Locations in the Malibu Valley Groundwater Basin for WDR Compliance

Table 6-1: Groundwater Sampling Locations and Frequency

Well Name	Screened Zone
LAMW-5S	Winter Canyon
SMBRP-9	Shallow
SMBRP-12	Shallow
MCWP-MW-04S	Shallow
MCWP-MW-04D	Deep
MCWP-MW07S	Shallow
MCWP-MW07D	Deep
MCWP-MW09	Deep
TY-MW-1	Winter Canyon

Table 6-2: Groundwater Sample Analyses and Frequency

Constituents	Units	Type of Sample	Minimum Frequency of Analysis - Baseline	Minimum Frequency of Analysis – Long Term
Water level elevation [1]	Feet	Recorder	Annually	Quarterly
pH	pH units	Grab	Annually	Quarterly
$BOD_5 20^0C$	mg/L	Grab	Annually	Quarterly
Turbidity	NTU	Grab	Annually	Quarterly
Total Coliform	MPN/100mL	Grab	Annually	Quarterly
Fecal Coliform	MPN/100mL	Grab	Annually	Quarterly
Enterococcus Coliform	MPN/100mL	Grab	Annually	Quarterly
Total Suspended Solids	mg/L	Grab	Annually	Quarterly
Residual Chlorine	mg/L	Grab	Annually	Quarterly
Total Organic Carbon	mg/L	Grab	Annually	Quarterly
Oil and grease	mg/L	Grab	Annually	Quarterly
Nitrate + Nitrite as Nitrogen	mg/L	Grab	Annually	Quarterly
Nitrate as nitrogen	mg/L	Grab	Annually	Quarterly
Nitrite as nitrogen	mg/L	Grab	Annually	Quarterly
Ammonia nitrogen	mg/L	Grab	Annually	Quarterly
Organic Nitrogen	mg/L	Grab	Annually	Quarterly
Total Nitrogen	mg/L	Grab	Annually	Quarterly
Total Phosphorus	mg/L	Grab	Annually	Quarterly
Total Dissolved Solids	mg/L	Grab	Annually	Quarterly
Sulfate	mg/L	Grab	Annually	Quarterly
Chloride	mg/L	Grab	Annually	Quarterly
Boron	mg/L	Grab	Annually	Quarterly
Methylene Blue Active Substances (MBAS)	mg/L	Grab	Annually	Quarterly
Constituents listed in Tables A1 to A5	Various	Grab	Annually	Annually
Constituents of Emerging Concern (CECs)	Various	Grab	Annually	Annually
Priority Pollutants	µg/L	Grab	Annually	Annually

Note: Constituents listed in Tables A1 to A5 and for CECs and Priority Pollutants are included in Appendix B

Table 6-3: Groundwater Sample Containers

Constituents	Sampling Container
Total Coliform, Fecal Coliform, Enterococcus	Bacti Bottles with Sodium Thiosulfate
TDS, pH, Nitrate, Nitrite, Sulfate, Chloride	500 mL polyethylene bottles
Ammonia, Total Nitrogen, Organic Nitrogen, Total Phosphorus	500 mL polyethylene bottles with Sulfuric Acid
Boron	500 mL polyethylene bottles with Nitric Acid
17β-estradiol, Caffeine, Triclosan, Sucralose, N,N-Diethyl-meta-toluamide, NDMA	1 L amber glass with Sodium Azide and Ascorbic Acid

Groundwater Quality Monitoring – Salt and Nutrient Management Plan (SNMP)

Groundwater monitoring for salt and nutrient management plan implementation will tier off the previously-described monitoring program for WDR compliance. This monitoring program will utilize the same nine wells as for the WDR-compliance monitoring, but will also include an additional seven (7) wells for a total of 16 wells (Table 6-4). This mix of shallow and deeper monitoring wells are spatially distributed around the Malibu Valley Groundwater Basin as shown in Figure 6-3, and will monitor for potential impacts to the groundwater basin resulting from recycled water irrigation (in addition to the recycled water injection, that will be evaluated as part of the WDR-compliance monitoring program). All wells included in this monitoring program will be sampled for nitrate as nitrogen, total dissolved solids, chloride and sulfate on a semi-annual basis, and for constituents of emerging concern (CECs) are required by the State's Recycled Water Policy.

Table 6-4: Groundwater Sampling Locations for SNMP Monitoring

Well Name	Screened Zone	Sampled for WDR Compliance?
LAMW-5S	Winter Canyon	Yes
SMBRP-9	Shallow	Yes
SMBRP-12	Shallow	Yes
SMBRP-13	Shallow	No
MCWP-MW10	Shallow	No
CCPE	Shallow	No
MBCMW-9	Shallow	No
WF-MW-2	Shallow	No
MCWP-MW-04S	Shallow	Yes
MCWP-MW-04D	Deep	Yes
MCWP-MW07S	Shallow	Yes
MCWP-MW07D	Deep	Yes
MCWP-MW09	Deep	Yes
MCWP-MW05	Deep	No
MCWP-MW06	Deep	No
TY-MW-1	Winter Canyon	Yes

Figure 6-3: Groundwater Monitoring Locations in the Malibu Valley Groundwater Basin for SNMP Compliance

Groundwater Quality Monitoring – MOU Compliance

Groundwater monitoring for compliance with the City's MOU with the LARWQCB will also tier off the previously-described monitoring program for WDR compliance and will utilize most of the same wells as for SNMP monitoring (Table 6-5). The monitoring wells used in this program are focused on providing the necessary information to document changes to water quality in the Shallow Alluvium as a result of CCWTF implementation. As such, wells used in this program are aligned so as to capture changes in shallow groundwater quality downgradient of key areas currently on OWDSs and adjacent to Malibu Creek and Lagoon (Figure 6-4). All wells included in this monitoring program will be sampled for nitrate, nitrite, ammonia (all as nitrogen), organic nitrogen, total phosphorus, and fecal and total coliform bacteria on a semi-annual basis.

Table 6-5: Groundwater Sampling Locations for MOU Monitoring

Well Name	Screened Zone	Sampled for WDR Compliance?
LAMW-5S	Winter Canyon	Yes
SMBRP-9	Shallow	Yes
SMBRP-12	Shallow	Yes
SMBRP-13	Shallow	No
MCWP-MW10	Shallow	No
CCPE	Shallow	No
MBCMW-9	Shallow	No
WF-MW-2	Shallow	No
MCWP-MW-04S	Shallow	Yes
MCWP-MW-04D	Deep	Yes
MCWP-MW07S	Shallow	Yes
MCWP-MW07D	Deep	Yes
MCWP-MW09	Deep	Yes
TY-MW-1	Winter Canyon	Yes

Figure 6-4: Groundwater Monitoring Locations in the Malibu Valley Groundwater Basin for MOU Compliance

6.8.3 Surface Water

A surface water monitoring program will be implemented in Malibu Creek and Lagoon and in near-shore ocean areas. Six monitoring stations are to be established in Malibu Lagoon, and four are to be established in the near-shore ocean area along Malibu Road (see Figure 6-5).

Surface water samples will be collected at ankle depth beneath the surface. Samples will be carefully taken in the field by trained field personnel. Differences in samples due to tidal fluctuation will be corrected for. Water temperature, the physical appearance of the sample, the sample location, the date and time, the water elevation, and the direction of the current will be recorded in field notes. Samples will be couriered to a State-certified analytical laboratory for further analysis. Analytical data will be tabulated, reviewed, and analyzed for trends; results will be summarized in a monitoring report submitted to the LARWQCB.

Table 6-6: Surface Water Sample Analyses and Frequency

Constituents	Units	Type of Sample	Minimum Frequency of Analysis
Total Coliform	MPN/100mL	Grab	Quarterly
Fecal Coliform	MPN/100mL	Grab	Quarterly
Nitrate as nitrogen	mg/L	Grab	Quarterly
Nitrite as nitrogen	mg/L	Grab	Quarterly
Ammonia nitrogen	mg/L	Grab	Quarterly
Organic Nitrogen	mg/L	Grab	Quarterly
Total Phosphorus	mg/L	Grab	Quarterly

Table 6-7: Ocean Water Sample Analyses and Frequency

Constituents	Units	Type of Sample	Minimum Frequency of Analysis
Total Coliform	MPN/100mL	Grab	Quarterly
Fecal Coliform	MPN/100mL	Grab	Quarterly
Nitrate as nitrogen	mg/L	Grab	Quarterly
Nitrite as nitrogen	mg/L	Grab	Quarterly
Ammonia as nitrogen	mg/L	Grab	Quarterly
Organic Nitrogen	mg/L	Grab	Quarterly
Total Phosphorus	mg/L	Grab	Quarterly

Table 6-8: Surface Water Sample Containers

Constituents to be Analyzed (Method)	Sampling Container	Hold Time	Comments
Total Coliform (9221B) Enterococcus (9230B)	Bacti Bottles with Sodium Thiosulfate	8 hours	
Nitrate (300.0) Nitrite (300.1)	500 mL polyethylene bottles	48 hours	Samples can be preserved with Sulfuric Acid for 28 day hold time
Ammonia (SM 4500-NH3_D) Organic Nitrogen (350.1/351.2) Boron (200.7 Rev 4.4) Chloride and Sulfate (300.0) Total Phosphorus (365.3)	500 mL polyethylene bottles with Sulfuric Acid	28 days	Organic Nitrogen is a calculated value

Figure 6-5: Surface Water Monitoring Locations for WDR Compliance

Chapter 7 SNMP Implementation and Periodic Review

7.1 Basin-Wide Management Actions

The following basin-wide management actions are recommended for the implementation to achieve the basin management goals and objectives. The applicability of each to managing salt and/or nutrient loadings to the groundwater basin (SNMP) versus groundwater basin management (GWMP) are identified below.

- Active groundwater management and adaptation (SNMP & GWMP)
- Identification and protection of natural recharge areas (GWMP)
- Management to control the migration of contaminated groundwater (GWMP)
- Management of saline/saltwater intrusion (SNMP & GWMP)
- Control of wastewater salinity/nutrient loads (SNMP & GWMP)
- Stormwater capture and recharge management (SNMP & GWMP)
- Land use regulation (SNMP & GWMP)
- Groundwater monitoring programs (SNMP & GWMP)
- Public outreach and cooperation with other entities on water resource-related issues (SNMP & GWMP)

Each of these is described in more detail below. Table 7-1 summarizes these actions and identifies their present status.

7.1.1 Active Groundwater Management and Adaptation

At present, there are no production wells operating in the Malibu Valley Groundwater Basin. With implementation of the CCWTF Project, an injection well field will be constructed and operated, requiring the development of a groundwater management ordinance to manage future groundwater use to protect the operational integrity of the injection wells, protect public health, and to reduce the potential for seawater intrusion into the groundwater basin. As described in Section 6.1, this ordinance will establish prohibition and consultation zones for well construction and use, and combined with the City's Local Coastal Program (LCP) and land use planning authorities, will allow the City to actively manage the groundwater basin and to adapt to changing conditions. The City will continue to coordinate with the Los Angeles County Department of Public Health in the issuance of well construction permits, and will continue to implement all regulations, guidelines and permits governing the reuse of disinfected treated effluent in the basin. These actions will further aid the City in groundwater basin management. Additionally, the City will continue to implement its current requirement that projects requiring a Coastal Development Permit and falling into one of eight pre-defined categories prepare a Water Quality Management Plan (WQMP) to show how treatment control BMPs and/or structural BMPs will be used to minimize or prevent the discharge of polluted runoff after construction. Finally, the City will continue to work cooperative within the groundwater basin to aid in meeting the TMDLs that have been issued for Malibu Creek and Lagoon as these waters are directly connected to the shallow alluvium of the Malibu Valley Groundwater Basin.

7.1.2 Identification and Protection of Natural Recharge Areas

Groundwater in the Malibu Valley Groundwater Basin is replenished through runoff from upland areas, subsurface wastewater dispersal, precipitation infiltration, Malibu Creek/Lagoon, and infiltration from excess irrigation. More efficient irrigation practices will result in a reduction of the amount of applied water and subsequently reduce the amount of deep percolation. This creates the need to identify areas of natural recharge and develop plans for protection. Actions could include:

- Consideration of parcel location and soil types relative to the groundwater basin prior to issuing a building permit on undeveloped lands.
- Limitations on the amount of impervious service in new development and/or requirements to retain and recharge stormwater runoff onsite.
- Programs to educate the public and planning entities about the importance of protecting recharge areas.

To implement these actions, recharge areas need to be identified. GIS-based maps of natural areas can be used to inform planning entities of the importance of these areas in order to make the proper protection recommendations.

7.1.3 Control of Contaminated Groundwater Migration

The City's Environmental Sustainability Department will continue to coordinate with other local, state and federal regulatory agencies to protect water resources and manage the migration of contaminated groundwater within the groundwater basin.

7.1.4 Saline Water/Saltwater Intrusion Management

Key to managing saltwater intrusion into the Malibu Valley Groundwater Basin is limiting the potential for overdraft conditions to occur. This can best be achieved by both managing groundwater extractions and by promoting basin recharge. While one means for sustaining and enhancing recharge in a groundwater basin is through the use of artificial recharge as a means to supplement natural recharge, shallow groundwater levels in the Malibu Valley Groundwater Basin limit, for the most part, the viability of large-scale artificial recharge projects. However, should the groundwater basin be used as a regulatory water supply in the future, this concept may need to be considered. Possible project concepts may include the conjunctive use of surface water and groundwater, or the potential for stormwater capture and recharge. In the interim, the City can best prevent overdraft/saltwater intrusion by managing groundwater extractions and promoting the use of onsite stormwater runoff retention and percolation. Additionally, as previously described in Section 6.1, as part of the CCWTF project, unused recycled water will be injected into the Malibu Valley Groundwater Basin at locations along Malibu Road, approximately 400 feet north of the Pacific Ocean. This injection will result in the formation of a partial injection barrier, which will help to limit saltwater intrusion into the groundwater basin.

As part of the CCWTF permitting requirements, the City of Malibu will be enacting a groundwater management ordinance to manage the location and extraction from new wells in the groundwater basin. As described in Section 6.1, the City's new groundwater management ordinance, combined with the City's land use planning policies and development ordinances and regulations and its role as the lead agency for implementation of the LCP (including issuance of Coastal Development Permits), promotes a comprehensive approach to managing basin recharge (including protection of recharge areas), groundwater basin quality and the interactions between the groundwater basin and the adjacent Malibu Creek and Lagoon. The authority to issue well construction or destruction permits will, however, continue to involve the LADPH Drinking Water Program.

The City's program for managing stormwater runoff is described below in Section 7.1.6.

7.1.5 Management of Salt and Nutrient Loads to Recycled Water

Implementation of the CCWTF will result in the use and injection of disinfected recycled water in the Malibu Valley Groundwater Basin. As one source of salt and nutrient loading to the basin, management of salt and nutrient contributions via wastewater to the treatment plant will be necessary to ensure that the treatment system is not overloaded and the discharges of these types of constituent to the basin are managed to the most practical extent possible.

The CCWTF has been designed to nitrify/denitrify the wastewater loads it will receive. This will aid in minimizing nutrient concentrations in the resultant recycled water. The processes do not, however, treat for salts and therefore salt loads to the system must be managed externally. To achieve this, the City will be enacting an ordinance banning the use of salt-based regenerative water softeners within the groundwater basin. This common method for controlling salt loads should aid in minimizing the transfer of those salts to the groundwater basin.

7.1.6 Stormwater Capture and Recharge

Stormwater capture and recharge encompasses both the capture and percolation of stormwater runoff, but also limiting the pollutants that can be carried by such runoff. Primary to this is the City's compliance with the MS4 permits issued by the LARWQCB. The Municipal Storm Water Permitting Program implemented by the State Water Resources Control Board (SWRCB) regulates storm water discharges from municipal separate storm sewer systems (MS4s) to protect surface water and groundwater quality. The permits were issued in two phases, with Phase I covering National Pollutant Discharge Elimination System General Permit (NPDES) storm water permits for medium (serving between 100,000 and 250,000 people) and large (serving 250,000 people) municipalities, and Phase II covering smaller municipalities (population less than 100,000), including non-traditional Small MS4s (such as military bases, public campuses, prison and hospital complexes). The City of Malibu falls into the Phase II permitting process, and compliance with this program will aid in both stormwater management and groundwater basin protection.

The City will also continue to implement programs and regulations that promote stormwater capture and recharge. The City promotes green architecture (including LID techniques) through its Green Building Standards Code and requires all new projects retain onsite the Storm Water Quality Design Volume (SWQDv) defined as the greater of the 85th percentile, 24-hour storm event or the 0.75", 24-hour storm event. Additionally, the City requires that all projects needing a Coastal Development Permit include a Stormwater Management Plan (SWMP) to mitigate the effect of development on stormwater after construction and to maximize, to the extent practicable, the percentage of permeable surfaces and the retention of dry-weather runoff on the site.

7.1.7 Land Use Regulation

Groundwater in the Malibu Valley Groundwater Basin is affected by overlying land use and interconnections with Malibu Creek and Lagoon on the east and the Pacific Ocean to the south. To maintain groundwater quality within the basin, areas of poor water quality in the basin should be mapped using GIS and this information used to develop strategies to control the migration and movement of poor quality water into and within the basin. Additionally, future land use should be considered carefully by the City's Planning Department before issuing building permits to minimize the potential for groundwater quality impacts resulting from these new land uses. Finally, the City will continue to implement Ordinance No. 343 that requires homeowners to maintain water-efficient landscapes.

7.1.8 Groundwater Monitoring

Groundwater elevation and quality monitoring is currently occurring in the Malibu Valley Groundwater Basin, and will be consolidated and formalized, to some extent, following the implementation of the CCWTF Project. Local agencies and individual permit holders will continue to monitor groundwater levels and quality as required by their permits and should provide these data to the City for consolidation into a single database for analysis. Significant changes in groundwater elevations and/or quality should be reported and investigated as needed, allowing the appropriate subsequent actions to be undertaken as appropriate.

As part of its compliance with CCWTF-related permits, the City will be implementing a groundwater and surface water monitoring program to evaluate potential impacts to the basin resulting from injection of unused recycled water. This program is described in Section 6.8. Additionally, the City will be developing two supplemental monitoring programs, tiering off the one required by the CCWTF permits, to meet the monitoring objectives of the SNMP for the Malibu Valley Groundwater Basin, and to evaluate groundwater improvements as a result of CCWTF implementation as required by its MOU with the LARWQCB. These two supplemental programs are also described in Section 6.8.

7.1.9 Public Outreach

The City has currently been implementing public outreach efforts as part of its CCWTF project implementation and SNMP development. The City will continue to use forums such as these project-related stakeholder meetings to supplement its general outreach programs relative to groundwater management. Additionally, there are several, publically available websites that provide excellent information on groundwater management, salinity control, and recycled water use. These websites can be used to assist in promoting public outreach and understanding.

Additionally, local and regional agencies will continue to work together to coordinate outreach to residents in the Malibu Valley Groundwater Basin to promote education regarding groundwater management issues, water resource quality protection, and to coordinate, as needed, on the implementation of groundwater basin management activities.

Table 7-1: Summary of Management Actions

Category	Description	Existing/Planned	Description
Groundwater Management and Adaptation	Groundwater Management Ordinance	Planned	Manage groundwater extractions from existing wells and installation and extraction from new wells
	Water Quality Mitigation Plan (WQMP)	Existing	For projects that require a Coastal Development Permit and fall into one of 8 pre-defined categories, a WQMP must be prepared to show how treatment control BMPs and/or structural BMPs will be used to minimize or prevent the discharge of polluted runoff after construction.
	Well construction/destruction permits	Existing	Los Angeles County Department of Public Health issues permits for groundwater construction and destruction
	Recycled water non-potable reuse regulations, guidelines and permits	Existing	Implement regulations, guidelines and permits as part of the CCWTF recycled water delivery system will help to mitigate future recycled-water related loadings to the groundwater basin.
	Total Maximum Daily Loads (TMDLs)	Existing	As a result of surface water-groundwater interactions between Malibu Creek/Lagoon and the MVGB, aid in meeting TMDLs for Malibu Creek/Lagoon will aid in protecting groundwater quality
Protect/Enhance Groundwater Recharge	Land development approvals	Existing	Manage development to protect key basin recharge areas
	Mapping of basin recharge areas	Planned	Recharge zones for the groundwater basin will be mapped and used in consideration of land use approvals
	Stormwater runoff retention ordinance	Existing	New projects are to retain onsite the Storm Water Quality Design Volume (SWQDv) defined as the greater of the 85th percentile, 24-hour storm event or the 0.75", 24-hour storm event.
Contaminated Groundwater Migration Control	Regulatory coordination	Existing	The City's Environmental Sustainability Department coordinates with other local, state and federal regulatory agencies to protect water resources and manage the migration of contaminated groundwater
Saline Water Intrusion Management	Recycled water injection as part of CCWTF	Planned	Injection will establish a partial recharge barrier against future saline water intrusion
	Groundwater Management Ordinance	Planned	Manage groundwater extractions from existing wells and installation and extraction from new wells

Category	Description	Existing/Planned	Description
Groundwater Monitoring	Groundwater elevation and water quality monitoring program	Planned	Groundwater monitoring will be required as part of the WRR/WDR for the CCWTF
	SNMP monitoring program	Planned	A supplemental monitoring program will be implemented, tiering off the WDR monitoring program, to provide necessary information for SNMP implementation
	MOU monitoring program	Planned	A supplemental monitoring program will be implemented, tiering off the WDR monitoring program, to provide necessary information for evaluating the impacts of CCWTF implementation on the shallow alluvium per MOU requirements
Wastewater Salinity/Nutrient Control	Regenerative salt-based water softeners ordinance	Planned	Control loading of salts in wastewater to reduce salts in recycled water
	CCWTF construction and operation	Planned	Wastewater collection and nitrogen treatment
Stormwater Capture/Runoff Management	LID and stormwater BMPs	Existing	City promotes green architecture (including LID techniques) through its Green Building Standards Code and implementation of State General Permits
	Stormwater runoff retention ordinance	Existing	New projects are to retain onsite the Storm Water Quality Design Volume (SWQDv) defined as the greater of the 85th percentile, 24-hour storm event or the 0.75”, 24-hour storm event.
	MS4 NPDES permits issued by LARWQCB	Existing	
	Stormwater Management Plans (SWMP)	Existing	All projects which require a Coastal Development Permit must include a SWMP to mitigate the effect of development on stormwater after construction and must maximize, to the extent practicable, the percentage of permeable surfaces and the retention of dry-weather runoff on the site

Category	Description	Existing/Planned	Description
Public Outreach	MVGB GWMP and SNMP	Planned	City is presently preparing a SNMP and GWMP for the MVGB
	Cooperation and coordination between water-related entities	Ongoing	The City currently coordinates with multiple entities in the groundwater basin on water resource-related issues, including, but not limited to, the LARWQCB, National Park Service, Resource Conservation District of the Santa Monica Mountains, California State Coastal Conservancy, Las Virgenes Municipal Water District, Malibu Coastal Land Conservancy
	Southern California Salinity Coalition (www.socalsalinity.org)	Existing	
	WateReuse Association (www.watereuse.org) and WateReuse Research Foundation (www.watereuse.org/foundation)	Existing	
Land Use Regulation	Land development approvals	Existing	Manage development to protect key basin recharge areas
	Landscape water conservation requirements	Existing	M.W.C. Section 9.22, City Ordinance No. 343 requires homeowners to maintain water-efficient landscapes

7.2 Performance Measures and Evaluation

Performance measures were developed to evaluate the effectiveness of the implementation measures that have been proposed to manage salt and/or nutrient loading to the groundwater basin. Performance measures include the SNMP Monitoring Program (Section 6.8), specifically the collection, analysis, and reporting of SNMP-related data in groundwater throughout the basin, To further assess indicator constituents in groundwater, the City's regular monitoring reports will provide maps depicting TDS and nitrate concentrations as measured in the monitoring wells in the SNMP monitoring program; TDS and nitrate trend graphs; and a discussion of salt and nutrient concentrations/trends in groundwater with respect to WQOs established in the Basin Plan to assess overall groundwater quality in the Malibu Valley Groundwater Basin. Thus, both the City's WRR-WDR-required monitoring and reporting program and the SNMP Monitoring Program will provide the means for assessing and reporting on salt and nutrient concentrations in groundwater and an ongoing evaluation of the effectiveness of the existing and planned implementation measures specified in the SNMP.

7.3 Adaptive Management Measures

Every 10 years, the City will coordinate with basin stakeholders to review the SNMP for its consistency with the SWRCB Recycled Water Policy (refer to Appendix C), the LARWQCB Basin Plan (refer to Appendix D), the SWRCB Anti-Degradation Policy (refer to Appendix E), and other applicable regulatory documents. The SNMP will be updated, as necessary, to reflect current and estimated future conditions in the Malibu Valley Groundwater Basin. Salt and nutrient management strategies and options will be updated in accordance with actions that have been taken (or in response to potential expanded salinity or nutrient problems due to any action not taken) since the previous review. Additionally, based on results from the SNMP Monitoring Program, interim updates to the SNMP may be conducted when deemed necessary.

7.4 Key Stakeholder Responsibilities

As the primary local regulatory agency overlying the Malibu Valley Groundwater Basin (MVGB), the City of Malibu is responsible for land use and planning decisions, for implementing the Local Coastal Program (including issuing Coastal Development Permits) and for implementing the new groundwater management ordinance for the groundwater basin. As such, the City will be the lead agency responsible for implementing this SNMP. The City will work with key stakeholders in the groundwater basin as part of the implementation process. Key stakeholders include:

- Los Angeles County Department of Public Health (LADPH)
- Los Angeles County Water Works District No. 29 (WD No. 29)
- Los Angeles Regional Water Quality Control Board (LARWCB)
- California State Coastal Conservancy
- Las Virgenes Municipal Water District (LVMWD)

The primary responsibilities of the City as the lead implementing agency are to ensure the protection of the groundwater basin, coordination with other local water- and environmental management agencies, and implementation of the City's and State's ordinances, regulations, and guidance. The LADPH will continue to retain responsibility for issuing groundwater extraction well construction and destruction permits and for implementing cross-connection inspections, while WD No. 29, as the sole potable water purveyor for the groundwater basin, will coordinate with the City for the sale of recycled water. The City will, however, maintain responsibility for implementing and maintaining recycled water connections (including, but not limited to, implementation of user agreements).

For the SNMP, the LARWQCB is the lead agency for purposes of CEQA and is responsible for preparing any Substitute Environmental Documentation (SED), required for SNMP implementation. The MVGB stakeholders will support the LARWQCB in the CEQA process as appropriate.

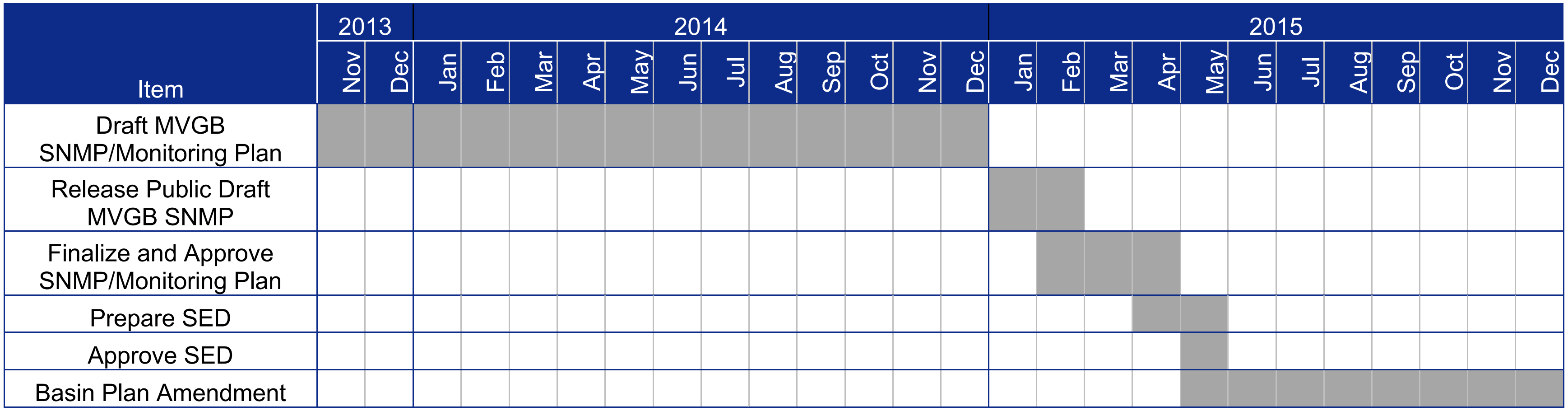
The Recycled Water Policy states that within one year of the receipt of a proposed SNMP, the RWQCB shall consider adopting an implementation plan, consistent with Water Code Section 13242, for those groundwater basins within their regions where water quality objectives for S/Ns are being, or are threatening to be, exceeded. The implementation plan would be adopted as an amendment to the Basin Plan and shall be based on the SNMP approved by the LARWQCB. It is expected that the Basin Plan Amendment will be prepared by the LARWQCB and adopted by the LARWQCB Board.

7.5 Implementation Schedule

At the request of the City, the LARWQCB issued an approval letter to extend the deadline for submittal of the Draft Malibu Valley Groundwater Basin SNMP to LARWQCB for review by June 30, 2015. Following LARWQCB review and approval, the LARWQCB will then prepare the Basin Plan Amendment. The Basin Plan Amendment will be presented to the LARWQCB Board for adoption, following a 45-day public comment period. The schedule below presents a preliminary schedule for this project moving forward. The schedule estimates the Basin Plan Amendment being adopted by January 2016. It is noted that the Recycled Water Policy allows that within one year of the receipt of the Final SNMP, the local RWQCB shall consider for adoption revised implementation plans, consistent with Water Code Section 13242.

Once the LARWQCB has approved the SNMP Monitoring Plan and established a GeoTracker weblink for the SNMP Monitoring Program for the Malibu Valley Groundwater Basin, the City will implement the SNMP Monitoring Program by collecting TDS and nitrate data from the 16 SNMP monitoring wells on a semi-annual basis and uploading the groundwater quality data to the GeoTracker database. It is anticipated that the SNMP Monitoring Plan will be implemented in approximately late-2015.

Figure 7-1: Malibu Valley Groundwater Basin SNMP Implementation Schedule



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Appendix A - Results of Malibu Valley Groundwater Basin Loading and Mixing Model

TDS Loading to Malibu Valley Groundwater Basin
Baseline (Current) Conditions
Northern Management Zone

						Inflow									
			Initial Basin Characteristics			Stream Seepage			Surface Loading		Precipitation			Flow into Subb	
		Year	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)
N	1	2010	1998.00	6.81E+09	1.36E+13	1275.00	8.53E+08	1.09E+12	1.84E+08	7.90E+10	0.00	4.46E+07	0.00E+00	2187.00	1.11E+08
N	2	2011	1870.02	6.81E+09	1.27E+13	1275.00	8.68E+08	1.11E+12	2.08E+08	7.90E+10	0.00	7.10E+07	0.00E+00	2092.96	1.35E+08
N	3	2012	1743.25	6.82E+09	1.19E+13	1275.00	7.82E+08	9.97E+11	2.20E+08	7.90E+10	0.00	2.96E+07	0.00E+00	1998.04	1.06E+08
N	4	2013	1649.74	6.79E+09	1.12E+13	1275.00	8.56E+08	1.09E+12	2.10E+08	7.90E+10	0.00	3.44E+07	0.00E+00	1908.36	1.14E+08
N	5	2014	1569.46	6.78E+09	1.06E+13	1275.00	8.26E+08	1.05E+12	2.11E+08	7.90E+10	0.00	3.69E+07	0.00E+00	1809.89	1.07E+08
N	6	2015	1503.47	6.79E+09	1.02E+13	1275.00	9.32E+08	1.19E+12	2.01E+08	7.90E+10	0.00	9.96E+07	0.00E+00	1716.83	1.65E+08
N	7	2016	1435.09	6.79E+09	9.74E+12	1275.00	8.59E+08	1.09E+12	2.11E+08	7.90E+10	0.00	5.75E+07	0.00E+00	1640.55	1.31E+08
N	8	2017	1386.49	6.78E+09	9.40E+12	1275.00	7.57E+08	9.65E+11	2.36E+08	7.90E+10	0.00	2.22E+07	0.00E+00	1568.67	9.94E+07
N	9	2018	1346.65	6.78E+09	9.13E+12	1275.00	7.99E+08	1.02E+12	2.36E+08	7.90E+10	0.00	3.41E+07	0.00E+00	1510.72	1.11E+08
N	10	2019	1307.49	6.77E+09	8.85E+12	1275.00	8.17E+08	1.04E+12	2.15E+08	7.90E+10	0.00	3.72E+07	0.00E+00	1454.13	1.07E+08
N	11	2020	1277.62	6.78E+09	8.66E+12	1275.00	8.53E+08	1.09E+12	1.84E+08	7.90E+10	0.00	4.46E+07	0.00E+00	1409.99	1.11E+08
N	12	2021	1257.61	6.78E+09	8.53E+12	1275.00	8.68E+08	1.11E+12	2.08E+08	7.90E+10	0.00	7.10E+07	0.00E+00	1371.74	1.35E+08
N	13	2022	1228.47	6.79E+09	8.34E+12	1275.00	7.82E+08	9.97E+11	2.20E+08	7.90E+10	0.00	2.96E+07	0.00E+00	1330.54	1.06E+08
N	14	2023	1208.02	6.76E+09	8.17E+12	1275.00	8.56E+08	1.09E+12	2.10E+08	7.90E+10	0.00	3.44E+07	0.00E+00	1297.51	1.14E+08
N	15	2024	1193.74	6.75E+09	8.06E+12	1275.00	8.26E+08	1.05E+12	2.11E+08	7.90E+10	0.00	3.69E+07	0.00E+00	1263.79	1.07E+08
N	16	2025	1181.62	6.76E+09	7.99E+12	1275.00	9.32E+08	1.19E+12	2.01E+08	7.90E+10	0.00	9.96E+07	0.00E+00	1234.79	1.65E+08
N	17	2026	1164.98	6.76E+09	7.87E+12	1275.00	8.59E+08	1.09E+12	2.11E+08	7.90E+10	0.00	5.75E+07	0.00E+00	1204.83	1.31E+08
N	18	2027	1155.61	6.75E+09	7.80E+12	1275.00	7.57E+08	9.65E+11	2.36E+08	7.90E+10	0.00	2.22E+07	0.00E+00	1186.21	9.94E+07
N	19	2028	1146.23	6.75E+09	7.73E+12	1275.00	7.99E+08	1.02E+12	2.36E+08	7.90E+10	0.00	3.41E+07	0.00E+00	1180.56	1.11E+08
N	20	2029	1135.23	6.74E+09	7.65E+12	1275.00	8.17E+08	1.04E+12	2.15E+08	7.90E+10	0.00	3.72E+07	0.00E+00	1167.37	1.07E+08
N	21	2030	1129.54	6.75E+09	7.62E+12	1275.00	8.53E+08	1.09E+12	1.84E+08	7.90E+10	0.00	4.46E+07	0.00E+00	1158.66	1.11E+08
N	22	2031	1130.35	6.75E+09	7.63E+12	1275.00	8.68E+08	1.11E+12	2.08E+08	7.90E+10	0.00	7.10E+07	0.00E+00	1151.08	1.35E+08
N	23	2032	1120.16	6.75E+09	7.57E+12	1275.00	7.82E+08	9.97E+11	2.20E+08	7.90E+10	0.00	2.96E+07	0.00E+00	1134.95	1.06E+08
N	24	2033	1114.28	6.73E+09	7.50E+12	1275.00	8.56E+08	1.09E+12	2.10E+08	7.90E+10	0.00	3.44E+07	0.00E+00	1125.60	1.14E+08
N	25	2034	1113.36	6.72E+09	7.48E+12	1275.00	8.26E+08	1.05E+12	2.11E+08	7.90E+10	0.00	3.69E+07	0.00E+00	1114.71	1.07E+08
N	26	2035	1112.32	6.73E+09	7.49E+12	1275.00	9.32E+08	1.19E+12	2.01E+08	7.90E+10	0.00	9.96E+07	0.00E+00	1106.19	1.65E+08
N	27	2036	1106.26	6.73E+09	7.44E+12	1275.00	8.59E+08	1.09E+12	2.11E+08	7.90E+10	0.00	5.75E+07	0.00E+00	1091.02	1.31E+08
N	28	2037	1105.09	6.72E+09	7.43E+12	1275.00	7.57E+08	9.65E+11	2.36E+08	7.90E+10	0.00	2.22E+07	0.00E+00	1088.03	9.94E+07
N	29	2038	1102.19	6.72E+09	7.40E+12	1275.00	7.99E+08	1.02E+12	2.36E+08	7.90E+10	0.00	3.41E+07	0.00E+00	1097.09	1.11E+08
N	30	2039	1097.21	6.71E+09	7.36E+12	1275.00	8.17E+08	1.04E+12	2.15E+08	7.90E+10	0.00	3.72E+07	0.00E+00	1095.91	1.07E+08

TDS Loading to Malibu Valley Groundwater Basin
Baseline (Current) Conditions
Northern Management Zone

	Outflow												
asin	Ocean Outflow			ET	Stream Outflow			Flow out of Subbasin			Concluding Basin Charact	
Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Mass (mg)
2.44E+11	1998.00	0.00E+00	0.00E+00	5.08E+07	1998.00	3.37E+06	6.73E+09	1998.00	1.14E+09	2.27E+12	6.81E+09	1.27E+13
2.84E+11	1870.02	0.00E+00	0.00E+00	3.48E+07	1870.02	1.52E+07	2.84E+10	1870.02	1.23E+09	2.30E+12	6.82E+09	1.19E+13
2.12E+11	1743.25	0.00E+00	0.00E+00	3.47E+07	1743.25	4.38E+06	7.64E+09	1743.25	1.12E+09	1.96E+12	6.79E+09	1.12E+13
2.18E+11	1649.74	0.00E+00	0.00E+00	4.36E+07	1649.74	6.55E+06	1.08E+10	1649.74	1.18E+09	1.95E+12	6.78E+09	1.06E+13
1.94E+11	1569.46	0.00E+00	0.00E+00	5.03E+07	1569.46	3.25E+06	5.11E+09	1569.46	1.11E+09	1.75E+12	6.79E+09	1.02E+13
2.83E+11	1503.47	0.00E+00	0.00E+00	5.73E+07	1503.47	3.82E+07	5.75E+10	1503.47	1.30E+09	1.96E+12	6.79E+09	9.74E+12
2.15E+11	1435.09	0.00E+00	0.00E+00	6.03E+07	1435.09	8.81E+06	1.26E+10	1435.09	1.20E+09	1.72E+12	6.78E+09	9.40E+12
1.56E+11	1386.49	0.00E+00	0.00E+00	5.43E+07	1386.49	2.23E+06	3.09E+09	1386.49	1.06E+09	1.47E+12	6.78E+09	9.13E+12
1.68E+11	1346.65	0.00E+00	0.00E+00	4.35E+07	1346.65	6.70E+06	9.03E+09	1346.65	1.14E+09	1.53E+12	6.77E+09	8.85E+12
1.56E+11	1307.49	0.00E+00	0.00E+00	4.51E+07	1307.49	3.19E+06	4.17E+09	1307.49	1.12E+09	1.47E+12	6.78E+09	8.66E+12
1.57E+11	1277.62	0.00E+00	0.00E+00	5.08E+07	1277.62	3.37E+06	4.31E+09	1277.62	1.14E+09	1.45E+12	6.78E+09	8.53E+12
1.86E+11	1257.61	0.00E+00	0.00E+00	3.48E+07	1257.61	1.52E+07	1.91E+10	1257.61	1.23E+09	1.54E+12	6.79E+09	8.34E+12
1.41E+11	1228.47	0.00E+00	0.00E+00	3.47E+07	1228.47	4.38E+06	5.39E+09	1228.47	1.12E+09	1.38E+12	6.76E+09	8.17E+12
1.48E+11	1208.02	0.00E+00	0.00E+00	4.36E+07	1208.02	6.55E+06	7.91E+09	1208.02	1.18E+09	1.42E+12	6.75E+09	8.06E+12
1.35E+11	1193.74	0.00E+00	0.00E+00	5.03E+07	1193.74	3.25E+06	3.88E+09	1193.74	1.11E+09	1.33E+12	6.76E+09	7.99E+12
2.03E+11	1181.62	0.00E+00	0.00E+00	5.73E+07	1181.62	3.82E+07	4.52E+10	1181.62	1.30E+09	1.54E+12	6.76E+09	7.87E+12
1.58E+11	1164.98	0.00E+00	0.00E+00	6.03E+07	1164.98	8.81E+06	1.03E+10	1164.98	1.20E+09	1.39E+12	6.75E+09	7.80E+12
1.18E+11	1155.61	0.00E+00	0.00E+00	5.43E+07	1155.61	2.23E+06	2.58E+09	1155.61	1.06E+09	1.23E+12	6.75E+09	7.73E+12
1.31E+11	1146.23	0.00E+00	0.00E+00	4.35E+07	1146.23	6.70E+06	7.68E+09	1146.23	1.14E+09	1.30E+12	6.74E+09	7.65E+12
1.25E+11	1135.23	0.00E+00	0.00E+00	4.51E+07	1135.23	3.19E+06	3.62E+09	1135.23	1.12E+09	1.27E+12	6.75E+09	7.62E+12
1.29E+11	1129.54	0.00E+00	0.00E+00	5.08E+07	1129.54	3.37E+06	3.81E+09	1129.54	1.14E+09	1.28E+12	6.75E+09	7.63E+12
1.56E+11	1130.35	0.00E+00	0.00E+00	3.48E+07	1130.35	1.52E+07	1.71E+10	1130.35	1.23E+09	1.39E+12	6.75E+09	7.57E+12
1.21E+11	1120.16	0.00E+00	0.00E+00	3.47E+07	1120.16	4.38E+06	4.91E+09	1120.16	1.12E+09	1.26E+12	6.73E+09	7.50E+12
1.28E+11	1114.28	0.00E+00	0.00E+00	4.36E+07	1114.28	6.55E+06	7.30E+09	1114.28	1.18E+09	1.31E+12	6.72E+09	7.48E+12
1.19E+11	1113.36	0.00E+00	0.00E+00	5.03E+07	1113.36	3.25E+06	3.62E+09	1113.36	1.11E+09	1.24E+12	6.73E+09	7.49E+12
1.82E+11	1112.32	0.00E+00	0.00E+00	5.73E+07	1112.32	3.82E+07	4.25E+10	1112.32	1.30E+09	1.45E+12	6.73E+09	7.44E+12
1.43E+11	1106.26	0.00E+00	0.00E+00	6.03E+07	1106.26	8.81E+06	9.75E+09	1106.26	1.20E+09	1.32E+12	6.72E+09	7.43E+12
1.08E+11	1105.09	0.00E+00	0.00E+00	5.43E+07	1105.09	2.23E+06	2.47E+09	1105.09	1.06E+09	1.17E+12	6.72E+09	7.40E+12
1.22E+11	1102.19	0.00E+00	0.00E+00	4.35E+07	1102.19	6.70E+06	7.39E+09	1102.19	1.14E+09	1.25E+12	6.71E+09	7.36E+12
1.17E+11	1097.21	0.00E+00	0.00E+00	4.51E+07	1097.21	3.19E+06	3.50E+09	1097.21	1.12E+09	1.23E+12	6.72E+09	7.36E+12

teristics
Concentration (mg/L)
1870.02
1743.25
1649.74
1569.46
1503.47
1435.09
1386.49
1346.65
1307.49
1277.62
1257.61
1228.47
1208.02
1193.74
1181.62
1164.98
1155.61
1146.23
1135.23
1129.54
1130.35
1120.16
1114.28
1113.36
1112.32
1106.26
1105.09
1102.19
1097.21
1096.76

TDS Loading to Malibu Valley Groundwater Basin
Baseline (Current) Conditions
Southern Management Zone

							Inflow								
			Initial Basin Characteristics			Stream Seepage			Surface Loading		Precipitation			Flow into Subb	
		Year	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)
S	1	2010	2187.00	7.99E+09	1.75E+13	1275.00	3.27E+08	4.16E+11	1.78E+08	1.25E+11	0.00	6.37E+07	0.00E+00	1998.00	1.19E+09
S	2	2011	2092.96	8.03E+09	1.68E+13	1275.00	1.98E+08	2.53E+11	1.91E+08	1.25E+11	0.00	8.00E+07	0.00E+00	1870.02	1.14E+09
S	3	2012	1998.04	7.93E+09	1.58E+13	1275.00	1.97E+08	2.52E+11	1.99E+08	1.25E+11	0.00	3.84E+07	0.00E+00	1743.25	1.35E+09
S	4	2013	1908.36	8.13E+09	1.55E+13	1275.00	3.07E+08	3.92E+11	2.45E+08	1.25E+11	0.00	4.01E+07	0.00E+00	1649.74	1.23E+09
S	5	2014	1809.89	8.18E+09	1.48E+13	1275.00	3.85E+08	4.91E+11	2.59E+08	1.25E+11	0.00	5.14E+07	0.00E+00	1569.46	1.09E+09
S	6	2015	1716.83	8.14E+09	1.40E+13	1275.00	1.29E+08	1.65E+11	2.09E+08	1.25E+11	0.00	1.16E+08	0.00E+00	1503.47	1.16E+09
S	7	2016	1640.55	7.95E+09	1.30E+13	1275.00	3.24E+08	4.13E+11	2.27E+08	1.25E+11	0.00	7.05E+07	0.00E+00	1435.09	1.13E+09
S	8	2017	1568.67	7.86E+09	1.23E+13	1275.00	4.79E+08	6.10E+11	2.13E+08	1.25E+11	0.00	2.94E+07	0.00E+00	1386.49	1.14E+09
S	9	2018	1510.72	7.90E+09	1.19E+13	1275.00	3.71E+08	4.73E+11	2.12E+08	1.25E+11	0.00	4.49E+07	0.00E+00	1346.65	1.24E+09
S	10	2019	1454.13	7.97E+09	1.16E+13	1275.00	3.64E+08	4.64E+11	1.94E+08	1.25E+11	0.00	4.66E+07	0.00E+00	1307.49	1.14E+09
S	11	2020	1409.99	7.99E+09	1.13E+13	1275.00	3.27E+08	4.16E+11	1.78E+08	1.25E+11	0.00	6.37E+07	0.00E+00	1277.62	1.19E+09
S	12	2021	1371.74	8.02E+09	1.10E+13	1275.00	1.98E+08	2.53E+11	1.91E+08	1.25E+11	0.00	8.00E+07	0.00E+00	1257.61	1.14E+09
S	13	2022	1330.54	7.92E+09	1.05E+13	1275.00	1.97E+08	2.52E+11	1.99E+08	1.25E+11	0.00	3.84E+07	0.00E+00	1228.47	1.35E+09
S	14	2023	1297.51	8.12E+09	1.05E+13	1275.00	3.07E+08	3.92E+11	2.45E+08	1.25E+11	0.00	4.01E+07	0.00E+00	1208.02	1.23E+09
S	15	2024	1263.79	8.17E+09	1.03E+13	1275.00	3.85E+08	4.91E+11	2.59E+08	1.25E+11	0.00	5.14E+07	0.00E+00	1193.74	1.09E+09
S	16	2025	1234.79	8.13E+09	1.00E+13	1275.00	1.29E+08	1.65E+11	2.09E+08	1.25E+11	0.00	1.16E+08	0.00E+00	1181.62	1.16E+09
S	17	2026	1204.83	7.94E+09	9.57E+12	1275.00	3.24E+08	4.13E+11	2.27E+08	1.25E+11	0.00	7.05E+07	0.00E+00	1164.98	1.13E+09
S	18	2027	1186.21	7.85E+09	9.31E+12	1275.00	4.79E+08	6.10E+11	2.13E+08	1.25E+11	0.00	2.94E+07	0.00E+00	1155.61	1.14E+09
S	19	2028	1180.56	7.90E+09	9.32E+12	1275.00	3.71E+08	4.73E+11	2.12E+08	1.25E+11	0.00	4.49E+07	0.00E+00	1146.23	1.24E+09
S	20	2029	1167.37	7.97E+09	9.30E+12	1275.00	3.64E+08	4.64E+11	1.94E+08	1.25E+11	0.00	4.66E+07	0.00E+00	1135.23	1.14E+09
S	21	2030	1158.66	7.98E+09	9.25E+12	1275.00	3.27E+08	4.16E+11	1.78E+08	1.25E+11	0.00	6.37E+07	0.00E+00	1129.54	1.19E+09
S	22	2031	1151.08	8.01E+09	9.23E+12	1275.00	1.98E+08	2.53E+11	1.91E+08	1.25E+11	0.00	8.00E+07	0.00E+00	1130.35	1.14E+09
S	23	2032	1134.95	7.91E+09	8.98E+12	1275.00	1.97E+08	2.52E+11	1.99E+08	1.25E+11	0.00	3.84E+07	0.00E+00	1120.16	1.35E+09
S	24	2033	1125.60	8.11E+09	9.13E+12	1275.00	3.07E+08	3.92E+11	2.45E+08	1.25E+11	0.00	4.01E+07	0.00E+00	1114.28	1.23E+09
S	25	2034	1114.71	8.16E+09	9.10E+12	1275.00	3.85E+08	4.91E+11	2.59E+08	1.25E+11	0.00	5.14E+07	0.00E+00	1113.36	1.09E+09
S	26	2035	1106.19	8.12E+09	8.99E+12	1275.00	1.29E+08	1.65E+11	2.09E+08	1.25E+11	0.00	1.16E+08	0.00E+00	1112.32	1.16E+09
S	27	2036	1091.02	7.94E+09	8.66E+12	1275.00	3.24E+08	4.13E+11	2.27E+08	1.25E+11	0.00	7.05E+07	0.00E+00	1106.26	1.13E+09
S	28	2037	1088.03	7.84E+09	8.53E+12	1275.00	4.79E+08	6.10E+11	2.13E+08	1.25E+11	0.00	2.94E+07	0.00E+00	1105.09	1.14E+09
S	29	2038	1097.09	7.89E+09	8.66E+12	1275.00	3.71E+08	4.73E+11	2.12E+08	1.25E+11	0.00	4.49E+07	0.00E+00	1102.19	1.24E+09
S	30	2039	1095.91	7.96E+09	8.72E+12	1275.00	3.64E+08	4.64E+11	1.94E+08	1.25E+11	0.00	4.66E+07	0.00E+00	1097.21	1.14E+09

TDS Loading to Malibu Valley Groundwater Basin
Baseline (Current) Conditions
Southern Management Zone

	Outflow													
asin	Ocean Outflow			ET	Stream Outflow			Flow out of Subbasin			Concluding Basin Charact	
Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Mass (mg)
2.38E+12	2187.00	1.24E+08	2.72E+11	7.85E+07	2187.00	7.43E+08	1.63E+12	2187.00	7.77E+08	1.70E+12	8.03E+09	1.68E+13
2.13E+12	2092.96	9.37E+07	1.96E+11	5.02E+07	2092.96	8.53E+08	1.79E+12	2092.96	7.11E+08	1.49E+12	7.93E+09	1.58E+13
2.35E+12	1998.04	8.90E+07	1.78E+11	5.34E+07	1998.04	8.05E+08	1.61E+12	1998.04	6.34E+08	1.27E+12	8.13E+09	1.55E+13
2.03E+12	1908.36	1.35E+08	2.57E+11	6.66E+07	1908.36	7.76E+08	1.48E+12	1908.36	7.97E+08	1.52E+12	8.18E+09	1.48E+13
1.71E+12	1809.89	1.60E+08	2.89E+11	8.16E+07	1809.89	7.31E+08	1.32E+12	1809.89	8.56E+08	1.55E+12	8.14E+09	1.40E+13
1.75E+12	1716.83	7.74E+07	1.33E+11	7.70E+07	1716.83	9.66E+08	1.66E+12	1716.83	6.85E+08	1.18E+12	7.95E+09	1.30E+13
1.62E+12	1640.55	1.30E+08	2.13E+11	9.10E+07	1640.55	8.03E+08	1.32E+12	1640.55	8.20E+08	1.35E+12	7.86E+09	1.23E+13
1.58E+12	1568.67	1.79E+08	2.81E+11	9.23E+07	1568.67	6.13E+08	9.62E+11	1568.67	9.30E+08	1.46E+12	7.90E+09	1.19E+13
1.67E+12	1510.72	1.49E+08	2.25E+11	6.78E+07	1510.72	7.35E+08	1.11E+12	1510.72	8.50E+08	1.28E+12	7.97E+09	1.16E+13
1.49E+12	1454.13	1.41E+08	2.05E+11	7.18E+07	1454.13	6.99E+08	1.02E+12	1454.13	8.16E+08	1.19E+12	7.99E+09	1.13E+13
1.52E+12	1409.99	1.24E+08	1.75E+11	7.85E+07	1409.99	7.43E+08	1.05E+12	1409.99	7.77E+08	1.10E+12	8.02E+09	1.10E+13
1.43E+12	1371.74	9.37E+07	1.29E+11	5.02E+07	1371.74	8.53E+08	1.17E+12	1371.74	7.11E+08	9.76E+11	7.92E+09	1.05E+13
1.66E+12	1330.54	8.90E+07	1.18E+11	5.34E+07	1330.54	8.05E+08	1.07E+12	1330.54	6.34E+08	8.44E+11	8.12E+09	1.05E+13
1.49E+12	1297.51	1.35E+08	1.75E+11	6.66E+07	1297.51	7.76E+08	1.01E+12	1297.51	7.97E+08	1.03E+12	8.17E+09	1.03E+13
1.30E+12	1263.79	1.60E+08	2.02E+11	8.16E+07	1263.79	7.31E+08	9.24E+11	1263.79	8.56E+08	1.08E+12	8.13E+09	1.00E+13
1.37E+12	1234.79	7.74E+07	9.56E+10	7.70E+07	1234.79	9.66E+08	1.19E+12	1234.79	6.85E+08	8.46E+11	7.94E+09	9.57E+12
1.32E+12	1204.83	1.30E+08	1.57E+11	9.10E+07	1204.83	8.03E+08	9.67E+11	1204.83	8.20E+08	9.88E+11	7.85E+09	9.31E+12
1.32E+12	1186.21	1.79E+08	2.13E+11	9.23E+07	1186.21	6.13E+08	7.27E+11	1186.21	9.30E+08	1.10E+12	7.90E+09	9.32E+12
1.43E+12	1180.56	1.49E+08	1.76E+11	6.78E+07	1180.56	7.35E+08	8.68E+11	1180.56	8.50E+08	1.00E+12	7.97E+09	9.30E+12
1.29E+12	1167.37	1.41E+08	1.65E+11	7.18E+07	1167.37	6.99E+08	8.16E+11	1167.37	8.16E+08	9.53E+11	7.98E+09	9.25E+12
1.34E+12	1158.66	1.24E+08	1.44E+11	7.85E+07	1158.66	7.43E+08	8.61E+11	1158.66	7.77E+08	9.01E+11	8.01E+09	9.23E+12
1.29E+12	1151.08	9.37E+07	1.08E+11	5.02E+07	1151.08	8.53E+08	9.82E+11	1151.08	7.11E+08	8.19E+11	7.91E+09	8.98E+12
1.51E+12	1134.95	8.90E+07	1.01E+11	5.34E+07	1134.95	8.05E+08	9.14E+11	1134.95	6.34E+08	7.20E+11	8.11E+09	9.13E+12
1.37E+12	1125.60	1.35E+08	1.51E+11	6.66E+07	1125.60	7.76E+08	8.73E+11	1125.60	7.97E+08	8.97E+11	8.16E+09	9.10E+12
1.22E+12	1114.71	1.60E+08	1.78E+11	8.16E+07	1114.71	7.31E+08	8.15E+11	1114.71	8.56E+08	9.54E+11	8.12E+09	8.99E+12
1.29E+12	1106.19	7.74E+07	8.56E+10	7.70E+07	1106.19	9.66E+08	1.07E+12	1106.19	6.85E+08	7.58E+11	7.94E+09	8.66E+12
1.25E+12	1091.02	1.30E+08	1.42E+11	9.10E+07	1091.02	8.03E+08	8.76E+11	1091.02	8.20E+08	8.95E+11	7.84E+09	8.53E+12
1.26E+12	1088.03	1.79E+08	1.95E+11	9.23E+07	1088.03	6.13E+08	6.67E+11	1088.03	9.30E+08	1.01E+12	7.89E+09	8.66E+12
1.37E+12	1097.09	1.49E+08	1.63E+11	6.78E+07	1097.09	7.35E+08	8.07E+11	1097.09	8.50E+08	9.32E+11	7.96E+09	8.72E+12
1.25E+12	1095.91	1.41E+08	1.54E+11	7.18E+07	1095.91	6.99E+08	7.66E+11	1095.91	8.16E+08	8.94E+11	7.97E+09	8.75E+12

teristics
Concentration (mg/L)
2092.96
1998.04
1908.36
1809.89
1716.83
1640.55
1568.67
1510.72
1454.13
1409.99
1371.74
1330.54
1297.51
1263.79
1234.79
1204.83
1186.21
1180.56
1167.37
1158.66
1151.08
1134.95
1125.60
1114.71
1106.19
1091.02
1088.03
1097.09
1095.91
1096.74

TDS Loading to Malibu Valley Groundwater Basin
Future Scenario
Northern Management Zone

			Initial Basin Characteristics			Inflow: Stream Seepage			Inflow: Surface Loading		Inflow: Precipitation			Inflow: Flow into Subb.	
		Year	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)
N	1	2010	1998.00	6.81E+09	1.36E+13	1275.00	8.53E+08	1.09E+12	3.68E+08	7.90E+10	0.00	4.46E+07	0.00E+00	2187.00	1.11E+08
N	2	2011	1820.83	7.00E+09	1.27E+13	1275.00	8.68E+08	1.11E+12	2.08E+08	7.90E+10	0.00	7.10E+07	0.00E+00	2087.72	1.35E+08
N	3	2012	1706.06	7.00E+09	1.19E+13	1275.00	7.82E+08	9.97E+11	2.20E+08	7.90E+10	0.00	2.96E+07	0.00E+00	1978.15	1.06E+08
N	4	2013	1620.60	6.98E+09	1.13E+13	1275.00	8.56E+08	1.09E+12	2.10E+08	7.90E+10	0.00	3.44E+07	0.00E+00	1886.18	1.14E+08
N	5	2014	1546.98	6.96E+09	1.08E+13	1275.00	8.26E+08	1.05E+12	2.11E+08	7.90E+10	0.00	3.69E+07	0.00E+00	1781.24	1.07E+08
N	6	2015	1485.93	6.98E+09	1.04E+13	1275.00	9.32E+08	1.19E+12	2.01E+08	7.90E+10	0.00	9.96E+07	0.00E+00	1682.35	1.65E+08
N	7	2016	1421.91	6.97E+09	9.92E+12	1275.00	8.59E+08	1.09E+12	2.11E+08	7.90E+10	0.00	5.75E+07	0.00E+00	1600.14	1.31E+08
N	8	2017	1376.10	6.97E+09	9.59E+12	1275.00	7.38E+08	9.42E+11	2.36E+08	7.90E+10	0.00	2.22E+07	0.00E+00	1528.00	9.92E+07
N	9	2018	1338.85	6.96E+09	9.32E+12	1275.00	7.78E+08	9.92E+11	2.36E+08	7.90E+10	0.00	3.41E+07	0.00E+00	1478.19	1.11E+08
N	10	2019	1301.84	6.96E+09	9.06E+12	1275.00	7.93E+08	1.01E+12	2.15E+08	7.90E+10	0.00	3.72E+07	0.00E+00	1425.47	1.07E+08
N	11	2020	1273.51	6.96E+09	8.87E+12	1275.00	8.31E+08	1.06E+12	1.84E+08	8.29E+10	0.00	4.46E+07	0.00E+00	1381.36	1.06E+08
N	12	2021	1254.95	7.01E+09	8.80E+12	1275.00	8.48E+08	1.08E+12	2.08E+08	8.29E+10	0.00	7.10E+07	0.00E+00	1346.67	1.30E+08
N	13	2022	1227.40	7.06E+09	8.67E+12	1275.00	7.65E+08	9.76E+11	2.20E+08	8.29E+10	0.00	2.96E+07	0.00E+00	1302.29	1.01E+08
N	14	2023	1208.09	7.09E+09	8.56E+12	1275.00	8.63E+08	1.10E+12	2.10E+08	8.29E+10	0.00	3.44E+07	0.00E+00	1271.24	9.98E+07
N	15	2024	1194.43	7.20E+09	8.60E+12	1275.00	8.31E+08	1.06E+12	2.11E+08	8.29E+10	0.00	3.69E+07	0.00E+00	1237.03	9.27E+07
N	16	2025	1182.90	7.34E+09	8.68E+12	1275.00	9.39E+08	1.20E+12	2.01E+08	8.29E+10	0.00	9.96E+07	0.00E+00	1208.48	1.50E+08
N	17	2026	1167.26	7.46E+09	8.71E+12	1275.00	8.68E+08	1.11E+12	2.11E+08	8.29E+10	0.00	5.75E+07	0.00E+00	1176.60	1.16E+08
N	18	2027	1158.30	7.58E+09	8.78E+12	1275.00	7.63E+08	9.73E+11	2.36E+08	8.29E+10	0.00	2.22E+07	0.00E+00	1165.64	8.40E+07
N	19	2028	1149.63	7.71E+09	8.86E+12	1275.00	8.04E+08	1.03E+12	2.36E+08	8.29E+10	0.00	3.41E+07	0.00E+00	1175.47	9.67E+07
N	20	2029	1139.81	7.83E+09	8.92E+12	1275.00	8.22E+08	1.05E+12	2.15E+08	8.29E+10	0.00	3.72E+07	0.00E+00	1164.88	9.30E+07
N	21	2030	1134.53	7.96E+09	9.04E+12	1275.00	8.51E+08	1.09E+12	1.84E+08	8.29E+10	0.00	4.46E+07	0.00E+00	1161.27	9.91E+07
N	22	2031	1134.72	8.08E+09	9.17E+12	1275.00	8.68E+08	1.11E+12	2.08E+08	8.29E+10	0.00	7.10E+07	0.00E+00	1157.85	1.22E+08
N	23	2032	1126.03	8.20E+09	9.23E+12	1275.00	7.84E+08	9.99E+11	2.20E+08	8.29E+10	0.00	2.96E+07	0.00E+00	1130.12	9.25E+07
N	24	2033	1120.70	8.30E+09	9.30E+12	1275.00	8.63E+08	1.10E+12	2.10E+08	8.29E+10	0.00	3.44E+07	0.00E+00	1126.15	9.98E+07
N	25	2034	1119.40	8.42E+09	9.42E+12	1275.00	8.31E+08	1.06E+12	2.11E+08	8.29E+10	0.00	3.69E+07	0.00E+00	1113.50	9.27E+07
N	26	2035	1118.02	8.56E+09	9.57E+12	1275.00	9.39E+08	1.20E+12	2.01E+08	8.29E+10	0.00	9.96E+07	0.00E+00	1108.59	1.50E+08
N	27	2036	1112.81	8.68E+09	9.65E+12	1275.00	8.68E+08	1.11E+12	2.11E+08	8.29E+10	0.00	5.75E+07	0.00E+00	1078.28	1.16E+08
N	28	2037	1111.19	8.79E+09	9.77E+12	1275.00	7.63E+08	9.73E+11	2.36E+08	8.29E+10	0.00	2.22E+07	0.00E+00	1107.26	8.40E+07
N	29	2038	1108.72	8.92E+09	9.89E+12	1275.00	8.04E+08	1.03E+12	2.36E+08	8.29E+10	0.00	3.41E+07	0.00E+00	1160.60	9.67E+07
N	30	2039	1105.17	9.04E+09	1.00E+13	1275.00	8.22E+08	1.05E+12	2.15E+08	8.29E+10	0.00	3.72E+07	0.00E+00	1115.41	9.30E+07

TDS Loading to Malibu Valley Groundwater Basin
Future Scenario
Northern Management Zone

	Outflow													
asin	Ocean Outflow			ET	Stream Outflow			Flow out of Subbasin			Concluding Basin Charact	
Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Mass (mg)
2.44E+11	1998.00	0.00E+00	0.00E+00	5.08E+07	1998.00	3.37E+06	6.73E+09	1998.00	1.14E+09	2.27E+12	7.00E+09	1.27E+13
2.83E+11	1820.83	0.00E+00	0.00E+00	3.48E+07	1820.83	1.52E+07	2.76E+10	1820.83	1.23E+09	2.24E+12	7.00E+09	1.19E+13
2.10E+11	1706.06	0.00E+00	0.00E+00	3.47E+07	1706.06	4.38E+06	7.48E+09	1706.06	1.12E+09	1.92E+12	6.98E+09	1.13E+13
2.15E+11	1620.60	0.00E+00	0.00E+00	4.36E+07	1620.60	6.55E+06	1.06E+10	1620.60	1.18E+09	1.91E+12	6.96E+09	1.08E+13
1.91E+11	1546.98	0.00E+00	0.00E+00	5.03E+07	1546.98	3.25E+06	5.03E+09	1546.98	1.11E+09	1.72E+12	6.98E+09	1.04E+13
2.77E+11	1485.93	0.00E+00	0.00E+00	5.73E+07	1485.93	3.82E+07	5.68E+10	1485.93	1.30E+09	1.94E+12	6.97E+09	9.92E+12
2.10E+11	1421.91	0.00E+00	0.00E+00	6.03E+07	1421.91	8.81E+06	1.25E+10	1421.91	1.20E+09	1.70E+12	6.97E+09	9.59E+12
1.52E+11	1376.10	0.00E+00	0.00E+00	5.57E+07	1376.10	3.68E+06	5.07E+09	1376.10	1.04E+09	1.43E+12	6.96E+09	9.32E+12
1.64E+11	1338.85	0.00E+00	0.00E+00	4.44E+07	1338.85	1.10E+07	1.47E+10	1338.85	1.11E+09	1.49E+12	6.96E+09	9.06E+12
1.53E+11	1301.84	0.00E+00	0.00E+00	4.61E+07	1301.84	5.70E+06	7.42E+09	1301.84	1.09E+09	1.42E+12	6.96E+09	8.87E+12
1.47E+11	1273.51	0.00E+00	0.00E+00	5.14E+07	1273.51	5.25E+06	6.69E+09	1273.51	1.06E+09	1.35E+12	7.01E+09	8.80E+12
1.75E+11	1254.95	0.00E+00	0.00E+00	3.51E+07	1254.95	2.14E+07	2.68E+10	1254.95	1.15E+09	1.44E+12	7.06E+09	8.67E+12
1.31E+11	1227.40	0.00E+00	0.00E+00	3.52E+07	1227.40	6.46E+06	7.93E+09	1227.40	1.05E+09	1.29E+12	7.09E+09	8.56E+12
1.27E+11	1208.09	0.00E+00	0.00E+00	4.17E+07	1208.09	3.74E+06	4.52E+09	1208.09	1.05E+09	1.26E+12	7.20E+09	8.60E+12
1.15E+11	1194.43	0.00E+00	0.00E+00	4.80E+07	1194.43	1.91E+06	2.28E+09	1194.43	9.82E+08	1.17E+12	7.34E+09	8.68E+12
1.82E+11	1182.90	0.00E+00	0.00E+00	5.54E+07	1182.90	3.50E+07	4.14E+10	1182.90	1.18E+09	1.40E+12	7.46E+09	8.71E+12
1.37E+11	1167.26	0.00E+00	0.00E+00	5.78E+07	1167.26	5.70E+06	6.65E+09	1167.26	1.07E+09	1.25E+12	7.58E+09	8.78E+12
9.79E+10	1158.30	0.00E+00	0.00E+00	5.16E+07	1158.30	9.99E+05	1.16E+09	1158.30	9.26E+08	1.07E+12	7.71E+09	8.86E+12
1.14E+11	1149.63	0.00E+00	0.00E+00	4.13E+07	1149.63	4.73E+06	5.43E+09	1149.63	1.00E+09	1.15E+12	7.83E+09	8.92E+12
1.08E+11	1139.81	0.00E+00	0.00E+00	4.31E+07	1139.81	1.82E+06	2.08E+09	1139.81	9.88E+08	1.13E+12	7.96E+09	9.04E+12
1.15E+11	1134.53	0.00E+00	0.00E+00	4.92E+07	1134.53	2.86E+06	3.24E+09	1134.53	1.01E+09	1.15E+12	8.08E+09	9.17E+12
1.42E+11	1134.72	0.00E+00	0.00E+00	3.36E+07	1134.72	1.40E+07	1.59E+10	1134.72	1.10E+09	1.25E+12	8.20E+09	9.23E+12
1.04E+11	1126.03	0.00E+00	0.00E+00	3.31E+07	1126.03	2.92E+06	3.29E+09	1126.03	9.89E+08	1.11E+12	8.30E+09	9.30E+12
1.12E+11	1120.70	0.00E+00	0.00E+00	4.17E+07	1120.70	3.74E+06	4.20E+09	1120.70	1.05E+09	1.17E+12	8.42E+09	9.42E+12
1.03E+11	1119.40	0.00E+00	0.00E+00	4.80E+07	1119.40	1.91E+06	2.14E+09	1119.40	9.82E+08	1.10E+12	8.56E+09	9.57E+12
1.67E+11	1118.02	0.00E+00	0.00E+00	5.54E+07	1118.02	3.50E+07	3.92E+10	1118.02	1.18E+09	1.32E+12	8.68E+09	9.65E+12
1.25E+11	1112.81	0.00E+00	0.00E+00	5.78E+07	1112.81	5.70E+06	6.34E+09	1112.81	1.07E+09	1.19E+12	8.79E+09	9.77E+12
9.30E+10	1111.19	0.00E+00	0.00E+00	5.16E+07	1111.19	9.99E+05	1.11E+09	1111.19	9.26E+08	1.03E+12	8.92E+09	9.89E+12
1.12E+11	1108.72	0.00E+00	0.00E+00	4.13E+07	1108.72	4.73E+06	5.24E+09	1108.72	1.00E+09	1.11E+12	9.04E+09	1.00E+13
1.04E+11	1105.17	0.00E+00	0.00E+00	4.31E+07	1105.17	1.82E+06	2.01E+09	1105.17	9.88E+08	1.09E+12	9.18E+09	1.01E+13

teristics
Concentration (mg/L)
1820.83
1706.06
1620.60
1546.98
1485.93
1421.91
1376.10
1338.85
1301.84
1273.51
1254.95
1227.40
1208.09
1194.43
1182.90
1167.26
1158.30
1149.63
1139.81
1134.53
1134.72
1126.03
1120.70
1119.40
1118.02
1112.81
1111.19
1108.72
1105.17
1104.33

TDS Loading to Malibu Valley Groundwater Basin
Future Scenario
Southern Management Zone

			Inflow													
		Year	Initial Basin Characteristics			Stream Seepage			Surface Loading		Precipitation			Flow into Subb.	
			Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)
S	1	2010	2187.00	7.99E+09	1.75E+13	1275.00	3.27E+08	4.16E+11	1.78E+08	7.90E+10	0.00	6.37E+07	0.00E+00	1998.00	1.14E+09
S	2	2011	2087.72	7.98E+09	1.67E+13	1275.00	1.98E+08	2.53E+11	1.91E+08	7.90E+10	0.00	8.00E+07	0.00E+00	1820.83	1.24E+09
S	3	2012	1978.15	7.98E+09	1.58E+13	1275.00	1.97E+08	2.52E+11	1.99E+08	7.90E+10	0.00	3.84E+07	0.00E+00	1706.06	1.14E+09
S	4	2013	1886.18	7.97E+09	1.50E+13	1275.00	3.07E+08	3.92E+11	2.45E+08	7.90E+10	0.00	4.01E+07	0.00E+00	1620.60	1.19E+09
S	5	2014	1781.24	7.98E+09	1.42E+13	1275.00	3.85E+08	4.91E+11	2.59E+08	7.90E+10	0.00	5.14E+07	0.00E+00	1546.98	1.14E+09
S	6	2015	1682.35	7.99E+09	1.34E+13	1275.00	1.29E+08	1.65E+11	2.09E+08	7.90E+10	0.00	1.16E+08	0.00E+00	1485.93	1.35E+09
S	7	2016	1600.14	7.98E+09	1.28E+13	1275.00	3.24E+08	4.13E+11	2.27E+08	7.90E+10	0.00	7.05E+07	0.00E+00	1421.91	1.23E+09
S	8	2017	1528.00	7.99E+09	1.22E+13	1275.00	4.72E+08	6.01E+11	2.13E+08	1.24E+11	0.00	2.94E+07	0.00E+00	1376.10	1.04E+09
S	9	2018	1478.19	7.62E+09	1.13E+13	1275.00	3.65E+08	4.66E+11	2.12E+08	1.24E+11	0.00	4.49E+07	0.00E+00	1338.85	1.11E+09
S	10	2019	1425.47	7.24E+09	1.03E+13	1275.00	3.57E+08	4.55E+11	1.94E+08	1.24E+11	0.00	4.66E+07	0.00E+00	1301.84	1.08E+09
S	11	2020	1381.36	6.87E+09	9.49E+12	1275.00	3.27E+08	4.16E+11	1.78E+08	1.51E+11	0.00	6.37E+07	0.00E+00	1273.51	1.07E+09
S	12	2021	1346.67	6.42E+09	8.65E+12	1275.00	2.02E+08	2.58E+11	1.91E+08	1.51E+11	0.00	8.00E+07	0.00E+00	1254.95	1.17E+09
S	13	2022	1302.29	6.00E+09	7.82E+12	1275.00	2.02E+08	2.57E+11	1.99E+08	1.51E+11	0.00	3.84E+07	0.00E+00	1227.40	1.07E+09
S	14	2023	1271.24	5.57E+09	7.08E+12	1275.00	3.13E+08	3.99E+11	2.45E+08	1.71E+11	0.00	4.01E+07	0.00E+00	1208.09	1.24E+09
S	15	2024	1237.03	5.34E+09	6.61E+12	1275.00	3.91E+08	4.99E+11	2.59E+08	1.71E+11	0.00	5.14E+07	0.00E+00	1194.43	1.17E+09
S	16	2025	1208.48	5.10E+09	6.16E+12	1275.00	1.33E+08	1.70E+11	2.09E+08	1.71E+11	0.00	1.16E+08	0.00E+00	1182.90	1.39E+09
S	17	2026	1176.60	4.84E+09	5.70E+12	1275.00	3.28E+08	4.19E+11	2.27E+08	1.71E+11	0.00	7.05E+07	0.00E+00	1167.26	1.27E+09
S	18	2027	1165.64	4.61E+09	5.37E+12	1275.00	4.84E+08	6.17E+11	2.13E+08	1.71E+11	0.00	2.94E+07	0.00E+00	1158.30	1.12E+09
S	19	2028	1175.47	4.34E+09	5.10E+12	1275.00	3.77E+08	4.81E+11	2.12E+08	1.71E+11	0.00	4.49E+07	0.00E+00	1149.63	1.19E+09
S	20	2029	1164.88	4.07E+09	4.74E+12	1275.00	3.68E+08	4.70E+11	1.94E+08	1.71E+11	0.00	4.66E+07	0.00E+00	1139.81	1.17E+09
S	21	2030	1161.27	3.80E+09	4.42E+12	1275.00	3.27E+08	4.16E+11	1.78E+08	1.71E+11	0.00	6.37E+07	0.00E+00	1134.53	1.20E+09
S	22	2031	1157.85	3.51E+09	4.06E+12	1275.00	2.02E+08	2.58E+11	1.91E+08	1.71E+11	0.00	8.00E+07	0.00E+00	1134.72	1.30E+09
S	23	2032	1130.12	3.24E+09	3.66E+12	1275.00	2.02E+08	2.58E+11	1.99E+08	1.71E+11	0.00	3.84E+07	0.00E+00	1126.03	1.19E+09
S	24	2033	1126.15	2.96E+09	3.33E+12	1275.00	3.13E+08	3.99E+11	2.45E+08	1.71E+11	0.00	4.01E+07	0.00E+00	1120.70	1.24E+09
S	25	2034	1113.50	2.73E+09	3.04E+12	1275.00	3.91E+08	4.99E+11	2.59E+08	1.71E+11	0.00	5.14E+07	0.00E+00	1119.40	1.17E+09
S	26	2035	1108.59	2.49E+09	2.76E+12	1275.00	1.33E+08	1.70E+11	2.09E+08	1.71E+11	0.00	1.16E+08	0.00E+00	1118.02	1.39E+09
S	27	2036	1078.28	2.23E+09	2.40E+12	1275.00	3.28E+08	4.19E+11	2.27E+08	1.71E+11	0.00	7.05E+07	0.00E+00	1112.81	1.27E+09
S	28	2037	1107.26	2.00E+09	2.21E+12	1275.00	4.84E+08	6.17E+11	2.13E+08	1.71E+11	0.00	2.94E+07	0.00E+00	1111.19	1.12E+09
S	29	2038	1160.60	1.73E+09	2.01E+12	1275.00	3.77E+08	4.81E+11	2.12E+08	1.71E+11	0.00	4.49E+07	0.00E+00	1108.72	1.19E+09
S	30	2039	1115.41	1.46E+09	1.62E+12	1275.00	3.68E+08	4.70E+11	1.94E+08	1.71E+11	0.00	4.66E+07	0.00E+00	1105.17	1.17E+09

TDS Loading to Malibu Valley Groundwater Basin
Future Scenario
Southern Management Zone

	Outflow													
asin	Ocean Outflow			ET	Stream Outflow			Flow out of Subbasin			Concluding Basin Charact	
Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Mass (mg)
2.28E+12	2187.00	1.24E+08	2.72E+11	7.85E+07	2187.00	7.43E+08	1.63E+12	2187.00	7.77E+08	1.70E+12	7.98E+09	1.67E+13
2.26E+12	2087.72	9.37E+07	1.96E+11	5.02E+07	2087.72	8.53E+08	1.78E+12	2087.72	7.11E+08	1.48E+12	7.98E+09	1.58E+13
1.94E+12	1978.15	8.90E+07	1.76E+11	5.34E+07	1978.15	8.05E+08	1.59E+12	1978.15	6.34E+08	1.25E+12	7.97E+09	1.50E+13
1.93E+12	1886.18	1.35E+08	2.54E+11	6.66E+07	1886.18	7.76E+08	1.46E+12	1886.18	7.97E+08	1.50E+12	7.98E+09	1.42E+13
1.76E+12	1781.24	1.60E+08	2.85E+11	8.16E+07	1781.24	7.31E+08	1.30E+12	1781.24	8.56E+08	1.52E+12	7.99E+09	1.34E+13
2.00E+12	1682.35	7.74E+07	1.30E+11	7.70E+07	1682.35	9.66E+08	1.62E+12	1682.35	6.85E+08	1.15E+12	7.98E+09	1.28E+13
1.75E+12	1600.14	1.30E+08	2.08E+11	9.10E+07	1600.14	8.03E+08	1.28E+12	1600.14	8.20E+08	1.31E+12	7.99E+09	1.22E+13
1.43E+12	1528.00	1.79E+08	2.74E+11	9.41E+07	1528.00	7.30E+08	1.12E+12	1528.00	1.12E+09	1.72E+12	7.62E+09	1.13E+13
1.48E+12	1478.19	1.49E+08	2.20E+11	6.92E+07	1478.19	8.50E+08	1.26E+12	1478.19	1.04E+09	1.54E+12	7.24E+09	1.03E+13
1.41E+12	1425.47	1.41E+08	2.01E+11	7.32E+07	1425.47	8.23E+08	1.17E+12	1425.47	1.01E+09	1.44E+12	6.87E+09	9.49E+12
1.37E+12	1381.36	1.22E+08	1.68E+11	8.06E+07	1381.36	9.15E+08	1.26E+12	1381.36	9.70E+08	1.34E+12	6.42E+09	8.65E+12
1.47E+12	1346.67	9.08E+07	1.22E+11	5.16E+07	1346.67	1.02E+09	1.37E+12	1346.67	9.01E+08	1.21E+12	6.00E+09	7.82E+12
1.31E+12	1302.29	8.58E+07	1.12E+11	5.50E+07	1302.29	9.75E+08	1.27E+12	1302.29	8.26E+08	1.08E+12	5.57E+09	7.08E+12
1.49E+12	1271.24	1.13E+08	1.43E+11	6.80E+07	1271.24	9.19E+08	1.17E+12	1271.24	9.65E+08	1.23E+12	5.34E+09	6.61E+12
1.40E+12	1237.03	1.36E+08	1.68E+11	8.32E+07	1237.03	8.73E+08	1.08E+12	1237.03	1.03E+09	1.27E+12	5.10E+09	6.16E+12
1.65E+12	1208.48	6.33E+07	7.65E+10	7.87E+07	1208.48	1.10E+09	1.33E+12	1208.48	8.66E+08	1.05E+12	4.84E+09	5.70E+12
1.49E+12	1176.60	1.17E+08	1.37E+11	9.26E+07	1176.60	9.31E+08	1.10E+12	1176.60	9.91E+08	1.17E+12	4.61E+09	5.37E+12
1.30E+12	1165.64	1.66E+08	1.93E+11	9.40E+07	1165.64	7.54E+08	8.79E+11	1165.64	1.10E+09	1.28E+12	4.34E+09	5.10E+12
1.37E+12	1175.47	1.35E+08	1.59E+11	6.91E+07	1175.47	8.76E+08	1.03E+12	1175.47	1.02E+09	1.20E+12	4.07E+09	4.74E+12
1.34E+12	1164.88	1.28E+08	1.49E+11	7.33E+07	1164.88	8.54E+08	9.95E+11	1164.88	9.91E+08	1.15E+12	3.80E+09	4.42E+12
1.36E+12	1161.27	1.13E+08	1.31E+11	8.04E+07	1161.27	9.11E+08	1.06E+12	1161.27	9.58E+08	1.11E+12	3.51E+09	4.06E+12
1.47E+12	1157.85	8.19E+07	9.48E+10	5.14E+07	1157.85	1.02E+09	1.18E+12	1157.85	8.91E+08	1.03E+12	3.24E+09	3.66E+12
1.34E+12	1130.12	7.64E+07	8.63E+10	5.47E+07	1130.12	9.64E+08	1.09E+12	1130.12	8.19E+08	9.25E+11	2.96E+09	3.33E+12
1.38E+12	1126.15	1.13E+08	1.27E+11	6.80E+07	1126.15	9.19E+08	1.03E+12	1126.15	9.65E+08	1.09E+12	2.73E+09	3.04E+12
1.31E+12	1113.50	1.36E+08	1.52E+11	8.32E+07	1113.50	8.73E+08	9.72E+11	1113.50	1.03E+09	1.14E+12	2.49E+09	2.76E+12
1.56E+12	1108.59	6.33E+07	7.01E+10	7.87E+07	1108.59	1.10E+09	1.22E+12	1108.59	8.66E+08	9.60E+11	2.23E+09	2.40E+12
1.42E+12	1078.28	1.17E+08	1.26E+11	9.26E+07	1078.28	9.31E+08	1.00E+12	1078.28	9.91E+08	1.07E+12	2.00E+09	2.21E+12
1.24E+12	1107.26	1.66E+08	1.83E+11	9.40E+07	1107.26	7.54E+08	8.35E+11	1107.26	1.10E+09	1.22E+12	1.73E+09	2.01E+12
1.32E+12	1160.60	1.35E+08	1.57E+11	6.91E+07	1160.60	8.76E+08	1.02E+12	1160.60	1.02E+09	1.18E+12	1.46E+09	1.62E+12
1.30E+12	1115.41	1.28E+08	1.43E+11	7.33E+07	1115.41	8.54E+08	9.53E+11	1115.41	9.91E+08	1.11E+12	1.19E+09	1.36E+12

TDS Loading to Malibu Valley Groundwater Basin
Future Scenario
Southern Management Zone

teristics
Concentration (mg/L)
2087.72
1978.15
1886.18
1781.24
1682.35
1600.14
1528.00
1478.19
1425.47
1381.36
1346.67
1302.29
1271.24
1237.03
1208.48
1176.60
1165.64
1175.47
1164.88
1161.27
1157.85
1130.12
1126.15
1113.50
1108.59
1078.28
1107.26
1160.60
1115.41
1140.72

TDS Loading to Malibu Valley Groundwater Basin
Baseline (Current) Conditions
Northern Management Zone

						Inflow										
			Initial Basin Characteristics			Stream Seepage			Surface Loading		Precipitation			Flow into Subb		
		Year	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)
N	1	2010	1998.00	6.81E+09	1.36E+13	1275.00	8.53E+08	1.09E+12	1.84E+08	7.90E+10	0.00	4.46E+07	0.00E+00	2187.00	1.11E+08
N	2	2011	1870.02	6.81E+09	1.27E+13	1275.00	8.68E+08	1.11E+12	2.08E+08	7.90E+10	0.00	7.10E+07	0.00E+00	2092.96	1.35E+08
N	3	2012	1743.25	6.82E+09	1.19E+13	1275.00	7.82E+08	9.97E+11	2.20E+08	7.90E+10	0.00	2.96E+07	0.00E+00	1998.04	1.06E+08
N	4	2013	1649.74	6.79E+09	1.12E+13	1275.00	8.56E+08	1.09E+12	2.10E+08	7.90E+10	0.00	3.44E+07	0.00E+00	1908.36	1.14E+08
N	5	2014	1569.46	6.78E+09	1.06E+13	1275.00	8.26E+08	1.05E+12	2.11E+08	7.90E+10	0.00	3.69E+07	0.00E+00	1809.89	1.07E+08
N	6	2015	1503.47	6.79E+09	1.02E+13	1275.00	9.32E+08	1.19E+12	2.01E+08	7.90E+10	0.00	9.96E+07	0.00E+00	1716.83	1.65E+08
N	7	2016	1435.09	6.79E+09	9.74E+12	1275.00	8.59E+08	1.09E+12	2.11E+08	7.90E+10	0.00	5.75E+07	0.00E+00	1640.55	1.31E+08
N	8	2017	1386.49	6.78E+09	9.40E+12	1275.00	7.57E+08	9.65E+11	2.36E+08	7.90E+10	0.00	2.22E+07	0.00E+00	1568.67	9.94E+07
N	9	2018	1346.65	6.78E+09	9.13E+12	1275.00	7.99E+08	1.02E+12	2.36E+08	7.90E+10	0.00	3.41E+07	0.00E+00	1510.72	1.11E+08
N	10	2019	1307.49	6.77E+09	8.85E+12	1275.00	8.17E+08	1.04E+12	2.15E+08	7.90E+10	0.00	3.72E+07	0.00E+00	1454.13	1.07E+08
N	11	2020	1277.62	6.78E+09	8.66E+12	1275.00	8.53E+08	1.09E+12	1.84E+08	7.90E+10	0.00	4.46E+07	0.00E+00	1409.99	1.11E+08
N	12	2021	1257.61	6.78E+09	8.53E+12	1275.00	8.68E+08	1.11E+12	2.08E+08	7.90E+10	0.00	7.10E+07	0.00E+00	1371.74	1.35E+08
N	13	2022	1228.47	6.79E+09	8.34E+12	1275.00	7.82E+08	9.97E+11	2.20E+08	7.90E+10	0.00	2.96E+07	0.00E+00	1330.54	1.06E+08
N	14	2023	1208.02	6.76E+09	8.17E+12	1275.00	8.56E+08	1.09E+12	2.10E+08	7.90E+10	0.00	3.44E+07	0.00E+00	1297.51	1.14E+08
N	15	2024	1193.74	6.75E+09	8.06E+12	1275.00	8.26E+08	1.05E+12	2.11E+08	7.90E+10	0.00	3.69E+07	0.00E+00	1263.79	1.07E+08
N	16	2025	1181.62	6.76E+09	7.99E+12	1275.00	9.32E+08	1.19E+12	2.01E+08	7.90E+10	0.00	9.96E+07	0.00E+00	1234.79	1.65E+08
N	17	2026	1164.98	6.76E+09	7.87E+12	1275.00	8.59E+08	1.09E+12	2.11E+08	7.90E+10	0.00	5.75E+07	0.00E+00	1204.83	1.31E+08
N	18	2027	1155.61	6.75E+09	7.80E+12	1275.00	7.57E+08	9.65E+11	2.36E+08	7.90E+10	0.00	2.22E+07	0.00E+00	1186.21	9.94E+07
N	19	2028	1146.23	6.75E+09	7.73E+12	1275.00	7.99E+08	1.02E+12	2.36E+08	7.90E+10	0.00	3.41E+07	0.00E+00	1180.56	1.11E+08
N	20	2029	1135.23	6.74E+09	7.65E+12	1275.00	8.17E+08	1.04E+12	2.15E+08	7.90E+10	0.00	3.72E+07	0.00E+00	1167.37	1.07E+08
N	21	2030	1129.54	6.75E+09	7.62E+12	1275.00	8.53E+08	1.09E+12	1.84E+08	7.90E+10	0.00	4.46E+07	0.00E+00	1158.66	1.11E+08
N	22	2031	1130.35	6.75E+09	7.63E+12	1275.00	8.68E+08	1.11E+12	2.08E+08	7.90E+10	0.00	7.10E+07	0.00E+00	1151.08	1.35E+08
N	23	2032	1120.16	6.75E+09	7.57E+12	1275.00	7.82E+08	9.97E+11	2.20E+08	7.90E+10	0.00	2.96E+07	0.00E+00	1134.95	1.06E+08
N	24	2033	1114.28	6.73E+09	7.50E+12	1275.00	8.56E+08	1.09E+12	2.10E+08	7.90E+10	0.00	3.44E+07	0.00E+00	1125.60	1.14E+08
N	25	2034	1113.36	6.72E+09	7.48E+12	1275.00	8.26E+08	1.05E+12	2.11E+08	7.90E+10	0.00	3.69E+07	0.00E+00	1114.71	1.07E+08
N	26	2035	1112.32	6.73E+09	7.49E+12	1275.00	9.32E+08	1.19E+12	2.01E+08	7.90E+10	0.00	9.96E+07	0.00E+00	1106.19	1.65E+08
N	27	2036	1106.26	6.73E+09	7.44E+12	1275.00	8.59E+08	1.09E+12	2.11E+08	7.90E+10	0.00	5.75E+07	0.00E+00	1091.02	1.31E+08
N	28	2037	1105.09	6.72E+09	7.43E+12	1275.00	7.57E+08	9.65E+11	2.36E+08	7.90E+10	0.00	2.22E+07	0.00E+00	1088.03	9.94E+07
N	29	2038	1102.19	6.72E+09	7.40E+12	1275.00	7.99E+08	1.02E+12	2.36E+08	7.90E+10	0.00	3.41E+07	0.00E+00	1097.09	1.11E+08
N	30	2039	1097.21	6.71E+09	7.36E+12	1275.00	8.17E+08	1.04E+12	2.15E+08	7.90E+10	0.00	3.72E+07	0.00E+00	1095.91	1.07E+08

TDS Loading to Malibu Valley Groundwater Basin
Baseline (Current) Conditions
Northern Management Zone

	Outflow													
asin	Ocean Outflow			ET	Stream Outflow			Flow out of Subbasin			Concluding Basin Charact	
Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Mass (mg)
2.44E+11	1998.00	0.00E+00	0.00E+00	5.08E+07	1998.00	3.37E+06	6.73E+09	1998.00	1.14E+09	2.27E+12	6.81E+09	1.27E+13
2.84E+11	1870.02	0.00E+00	0.00E+00	3.48E+07	1870.02	1.52E+07	2.84E+10	1870.02	1.23E+09	2.30E+12	6.82E+09	1.19E+13
2.12E+11	1743.25	0.00E+00	0.00E+00	3.47E+07	1743.25	4.38E+06	7.64E+09	1743.25	1.12E+09	1.96E+12	6.79E+09	1.12E+13
2.18E+11	1649.74	0.00E+00	0.00E+00	4.36E+07	1649.74	6.55E+06	1.08E+10	1649.74	1.18E+09	1.95E+12	6.78E+09	1.06E+13
1.94E+11	1569.46	0.00E+00	0.00E+00	5.03E+07	1569.46	3.25E+06	5.11E+09	1569.46	1.11E+09	1.75E+12	6.79E+09	1.02E+13
2.83E+11	1503.47	0.00E+00	0.00E+00	5.73E+07	1503.47	3.82E+07	5.75E+10	1503.47	1.30E+09	1.96E+12	6.79E+09	9.74E+12
2.15E+11	1435.09	0.00E+00	0.00E+00	6.03E+07	1435.09	8.81E+06	1.26E+10	1435.09	1.20E+09	1.72E+12	6.78E+09	9.40E+12
1.56E+11	1386.49	0.00E+00	0.00E+00	5.43E+07	1386.49	2.23E+06	3.09E+09	1386.49	1.06E+09	1.47E+12	6.78E+09	9.13E+12
1.68E+11	1346.65	0.00E+00	0.00E+00	4.35E+07	1346.65	6.70E+06	9.03E+09	1346.65	1.14E+09	1.53E+12	6.77E+09	8.85E+12
1.56E+11	1307.49	0.00E+00	0.00E+00	4.51E+07	1307.49	3.19E+06	4.17E+09	1307.49	1.12E+09	1.47E+12	6.78E+09	8.66E+12
1.57E+11	1277.62	0.00E+00	0.00E+00	5.08E+07	1277.62	3.37E+06	4.31E+09	1277.62	1.14E+09	1.45E+12	6.78E+09	8.53E+12
1.86E+11	1257.61	0.00E+00	0.00E+00	3.48E+07	1257.61	1.52E+07	1.91E+10	1257.61	1.23E+09	1.54E+12	6.79E+09	8.34E+12
1.41E+11	1228.47	0.00E+00	0.00E+00	3.47E+07	1228.47	4.38E+06	5.39E+09	1228.47	1.12E+09	1.38E+12	6.76E+09	8.17E+12
1.48E+11	1208.02	0.00E+00	0.00E+00	4.36E+07	1208.02	6.55E+06	7.91E+09	1208.02	1.18E+09	1.42E+12	6.75E+09	8.06E+12
1.35E+11	1193.74	0.00E+00	0.00E+00	5.03E+07	1193.74	3.25E+06	3.88E+09	1193.74	1.11E+09	1.33E+12	6.76E+09	7.99E+12
2.03E+11	1181.62	0.00E+00	0.00E+00	5.73E+07	1181.62	3.82E+07	4.52E+10	1181.62	1.30E+09	1.54E+12	6.76E+09	7.87E+12
1.58E+11	1164.98	0.00E+00	0.00E+00	6.03E+07	1164.98	8.81E+06	1.03E+10	1164.98	1.20E+09	1.39E+12	6.75E+09	7.80E+12
1.18E+11	1155.61	0.00E+00	0.00E+00	5.43E+07	1155.61	2.23E+06	2.58E+09	1155.61	1.06E+09	1.23E+12	6.75E+09	7.73E+12
1.31E+11	1146.23	0.00E+00	0.00E+00	4.35E+07	1146.23	6.70E+06	7.68E+09	1146.23	1.14E+09	1.30E+12	6.74E+09	7.65E+12
1.25E+11	1135.23	0.00E+00	0.00E+00	4.51E+07	1135.23	3.19E+06	3.62E+09	1135.23	1.12E+09	1.27E+12	6.75E+09	7.62E+12
1.29E+11	1129.54	0.00E+00	0.00E+00	5.08E+07	1129.54	3.37E+06	3.81E+09	1129.54	1.14E+09	1.28E+12	6.75E+09	7.63E+12
1.56E+11	1130.35	0.00E+00	0.00E+00	3.48E+07	1130.35	1.52E+07	1.71E+10	1130.35	1.23E+09	1.39E+12	6.75E+09	7.57E+12
1.21E+11	1120.16	0.00E+00	0.00E+00	3.47E+07	1120.16	4.38E+06	4.91E+09	1120.16	1.12E+09	1.26E+12	6.73E+09	7.50E+12
1.28E+11	1114.28	0.00E+00	0.00E+00	4.36E+07	1114.28	6.55E+06	7.30E+09	1114.28	1.18E+09	1.31E+12	6.72E+09	7.48E+12
1.19E+11	1113.36	0.00E+00	0.00E+00	5.03E+07	1113.36	3.25E+06	3.62E+09	1113.36	1.11E+09	1.24E+12	6.73E+09	7.49E+12
1.82E+11	1112.32	0.00E+00	0.00E+00	5.73E+07	1112.32	3.82E+07	4.25E+10	1112.32	1.30E+09	1.45E+12	6.73E+09	7.44E+12
1.43E+11	1106.26	0.00E+00	0.00E+00	6.03E+07	1106.26	8.81E+06	9.75E+09	1106.26	1.20E+09	1.32E+12	6.72E+09	7.43E+12
1.08E+11	1105.09	0.00E+00	0.00E+00	5.43E+07	1105.09	2.23E+06	2.47E+09	1105.09	1.06E+09	1.17E+12	6.72E+09	7.40E+12
1.22E+11	1102.19	0.00E+00	0.00E+00	4.35E+07	1102.19	6.70E+06	7.39E+09	1102.19	1.14E+09	1.25E+12	6.71E+09	7.36E+12
1.17E+11	1097.21	0.00E+00	0.00E+00	4.51E+07	1097.21	3.19E+06	3.50E+09	1097.21	1.12E+09	1.23E+12	6.72E+09	7.36E+12

teristics
Concentration (mg/L)
1870.02
1743.25
1649.74
1569.46
1503.47
1435.09
1386.49
1346.65
1307.49
1277.62
1257.61
1228.47
1208.02
1193.74
1181.62
1164.98
1155.61
1146.23
1135.23
1129.54
1130.35
1120.16
1114.28
1113.36
1112.32
1106.26
1105.09
1102.19
1097.21
1096.76

TDS Loading to Malibu Valley Groundwater Basin
Baseline (Current) Conditions
Southern Management Zone

						Inflow									
			Initial Basin Characteristics			Stream Seepage			Surface Loading		Precipitation			Flow into Subb	
		Year	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)
S	1	2010	2187.00	7.99E+09	1.75E+13	1275.00	3.27E+08	4.16E+11	1.78E+08	1.25E+11	0.00	6.37E+07	0.00E+00	1998.00	1.19E+09
S	2	2011	2092.96	8.03E+09	1.68E+13	1275.00	1.98E+08	2.53E+11	1.91E+08	1.25E+11	0.00	8.00E+07	0.00E+00	1870.02	1.14E+09
S	3	2012	1998.04	7.93E+09	1.58E+13	1275.00	1.97E+08	2.52E+11	1.99E+08	1.25E+11	0.00	3.84E+07	0.00E+00	1743.25	1.35E+09
S	4	2013	1908.36	8.13E+09	1.55E+13	1275.00	3.07E+08	3.92E+11	2.45E+08	1.25E+11	0.00	4.01E+07	0.00E+00	1649.74	1.23E+09
S	5	2014	1809.89	8.18E+09	1.48E+13	1275.00	3.85E+08	4.91E+11	2.59E+08	1.25E+11	0.00	5.14E+07	0.00E+00	1569.46	1.09E+09
S	6	2015	1716.83	8.14E+09	1.40E+13	1275.00	1.29E+08	1.65E+11	2.09E+08	1.25E+11	0.00	1.16E+08	0.00E+00	1503.47	1.16E+09
S	7	2016	1640.55	7.95E+09	1.30E+13	1275.00	3.24E+08	4.13E+11	2.27E+08	1.25E+11	0.00	7.05E+07	0.00E+00	1435.09	1.13E+09
S	8	2017	1568.67	7.86E+09	1.23E+13	1275.00	4.79E+08	6.10E+11	2.13E+08	1.25E+11	0.00	2.94E+07	0.00E+00	1386.49	1.14E+09
S	9	2018	1510.72	7.90E+09	1.19E+13	1275.00	3.71E+08	4.73E+11	2.12E+08	1.25E+11	0.00	4.49E+07	0.00E+00	1346.65	1.24E+09
S	10	2019	1454.13	7.97E+09	1.16E+13	1275.00	3.64E+08	4.64E+11	1.94E+08	1.25E+11	0.00	4.66E+07	0.00E+00	1307.49	1.14E+09
S	11	2020	1409.99	7.99E+09	1.13E+13	1275.00	3.27E+08	4.16E+11	1.78E+08	1.25E+11	0.00	6.37E+07	0.00E+00	1277.62	1.19E+09
S	12	2021	1371.74	8.02E+09	1.10E+13	1275.00	1.98E+08	2.53E+11	1.91E+08	1.25E+11	0.00	8.00E+07	0.00E+00	1257.61	1.14E+09
S	13	2022	1330.54	7.92E+09	1.05E+13	1275.00	1.97E+08	2.52E+11	1.99E+08	1.25E+11	0.00	3.84E+07	0.00E+00	1228.47	1.35E+09
S	14	2023	1297.51	8.12E+09	1.05E+13	1275.00	3.07E+08	3.92E+11	2.45E+08	1.25E+11	0.00	4.01E+07	0.00E+00	1208.02	1.23E+09
S	15	2024	1263.79	8.17E+09	1.03E+13	1275.00	3.85E+08	4.91E+11	2.59E+08	1.25E+11	0.00	5.14E+07	0.00E+00	1193.74	1.09E+09
S	16	2025	1234.79	8.13E+09	1.00E+13	1275.00	1.29E+08	1.65E+11	2.09E+08	1.25E+11	0.00	1.16E+08	0.00E+00	1181.62	1.16E+09
S	17	2026	1204.83	7.94E+09	9.57E+12	1275.00	3.24E+08	4.13E+11	2.27E+08	1.25E+11	0.00	7.05E+07	0.00E+00	1164.98	1.13E+09
S	18	2027	1186.21	7.85E+09	9.31E+12	1275.00	4.79E+08	6.10E+11	2.13E+08	1.25E+11	0.00	2.94E+07	0.00E+00	1155.61	1.14E+09
S	19	2028	1180.56	7.90E+09	9.32E+12	1275.00	3.71E+08	4.73E+11	2.12E+08	1.25E+11	0.00	4.49E+07	0.00E+00	1146.23	1.24E+09
S	20	2029	1167.37	7.97E+09	9.30E+12	1275.00	3.64E+08	4.64E+11	1.94E+08	1.25E+11	0.00	4.66E+07	0.00E+00	1135.23	1.14E+09
S	21	2030	1158.66	7.98E+09	9.25E+12	1275.00	3.27E+08	4.16E+11	1.78E+08	1.25E+11	0.00	6.37E+07	0.00E+00	1129.54	1.19E+09
S	22	2031	1151.08	8.01E+09	9.23E+12	1275.00	1.98E+08	2.53E+11	1.91E+08	1.25E+11	0.00	8.00E+07	0.00E+00	1130.35	1.14E+09
S	23	2032	1134.95	7.91E+09	8.98E+12	1275.00	1.97E+08	2.52E+11	1.99E+08	1.25E+11	0.00	3.84E+07	0.00E+00	1120.16	1.35E+09
S	24	2033	1125.60	8.11E+09	9.13E+12	1275.00	3.07E+08	3.92E+11	2.45E+08	1.25E+11	0.00	4.01E+07	0.00E+00	1114.28	1.23E+09
S	25	2034	1114.71	8.16E+09	9.10E+12	1275.00	3.85E+08	4.91E+11	2.59E+08	1.25E+11	0.00	5.14E+07	0.00E+00	1113.36	1.09E+09
S	26	2035	1106.19	8.12E+09	8.99E+12	1275.00	1.29E+08	1.65E+11	2.09E+08	1.25E+11	0.00	1.16E+08	0.00E+00	1112.32	1.16E+09
S	27	2036	1091.02	7.94E+09	8.66E+12	1275.00	3.24E+08	4.13E+11	2.27E+08	1.25E+11	0.00	7.05E+07	0.00E+00	1106.26	1.13E+09
S	28	2037	1088.03	7.84E+09	8.53E+12	1275.00	4.79E+08	6.10E+11	2.13E+08	1.25E+11	0.00	2.94E+07	0.00E+00	1105.09	1.14E+09
S	29	2038	1097.09	7.89E+09	8.66E+12	1275.00	3.71E+08	4.73E+11	2.12E+08	1.25E+11	0.00	4.49E+07	0.00E+00	1102.19	1.24E+09
S	30	2039	1095.91	7.96E+09	8.72E+12	1275.00	3.64E+08	4.64E+11	1.94E+08	1.25E+11	0.00	4.66E+07	0.00E+00	1097.21	1.14E+09

TDS Loading to Malibu Valley Groundwater Basin
Baseline (Current) Conditions
Southern Management Zone

	Outflow													
asin	Ocean Outflow			ET	Stream Outflow			Flow out of Subbasin			Concluding Basin Charact	
Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Mass (mg)
2.38E+12	2187.00	1.24E+08	2.72E+11	7.85E+07	2187.00	7.43E+08	1.63E+12	2187.00	7.77E+08	1.70E+12	8.03E+09	1.68E+13
2.13E+12	2092.96	9.37E+07	1.96E+11	5.02E+07	2092.96	8.53E+08	1.79E+12	2092.96	7.11E+08	1.49E+12	7.93E+09	1.58E+13
2.35E+12	1998.04	8.90E+07	1.78E+11	5.34E+07	1998.04	8.05E+08	1.61E+12	1998.04	6.34E+08	1.27E+12	8.13E+09	1.55E+13
2.03E+12	1908.36	1.35E+08	2.57E+11	6.66E+07	1908.36	7.76E+08	1.48E+12	1908.36	7.97E+08	1.52E+12	8.18E+09	1.48E+13
1.71E+12	1809.89	1.60E+08	2.89E+11	8.16E+07	1809.89	7.31E+08	1.32E+12	1809.89	8.56E+08	1.55E+12	8.14E+09	1.40E+13
1.75E+12	1716.83	7.74E+07	1.33E+11	7.70E+07	1716.83	9.66E+08	1.66E+12	1716.83	6.85E+08	1.18E+12	7.95E+09	1.30E+13
1.62E+12	1640.55	1.30E+08	2.13E+11	9.10E+07	1640.55	8.03E+08	1.32E+12	1640.55	8.20E+08	1.35E+12	7.86E+09	1.23E+13
1.58E+12	1568.67	1.79E+08	2.81E+11	9.23E+07	1568.67	6.13E+08	9.62E+11	1568.67	9.30E+08	1.46E+12	7.90E+09	1.19E+13
1.67E+12	1510.72	1.49E+08	2.25E+11	6.78E+07	1510.72	7.35E+08	1.11E+12	1510.72	8.50E+08	1.28E+12	7.97E+09	1.16E+13
1.49E+12	1454.13	1.41E+08	2.05E+11	7.18E+07	1454.13	6.99E+08	1.02E+12	1454.13	8.16E+08	1.19E+12	7.99E+09	1.13E+13
1.52E+12	1409.99	1.24E+08	1.75E+11	7.85E+07	1409.99	7.43E+08	1.05E+12	1409.99	7.77E+08	1.10E+12	8.02E+09	1.10E+13
1.43E+12	1371.74	9.37E+07	1.29E+11	5.02E+07	1371.74	8.53E+08	1.17E+12	1371.74	7.11E+08	9.76E+11	7.92E+09	1.05E+13
1.66E+12	1330.54	8.90E+07	1.18E+11	5.34E+07	1330.54	8.05E+08	1.07E+12	1330.54	6.34E+08	8.44E+11	8.12E+09	1.05E+13
1.49E+12	1297.51	1.35E+08	1.75E+11	6.66E+07	1297.51	7.76E+08	1.01E+12	1297.51	7.97E+08	1.03E+12	8.17E+09	1.03E+13
1.30E+12	1263.79	1.60E+08	2.02E+11	8.16E+07	1263.79	7.31E+08	9.24E+11	1263.79	8.56E+08	1.08E+12	8.13E+09	1.00E+13
1.37E+12	1234.79	7.74E+07	9.56E+10	7.70E+07	1234.79	9.66E+08	1.19E+12	1234.79	6.85E+08	8.46E+11	7.94E+09	9.57E+12
1.32E+12	1204.83	1.30E+08	1.57E+11	9.10E+07	1204.83	8.03E+08	9.67E+11	1204.83	8.20E+08	9.88E+11	7.85E+09	9.31E+12
1.32E+12	1186.21	1.79E+08	2.13E+11	9.23E+07	1186.21	6.13E+08	7.27E+11	1186.21	9.30E+08	1.10E+12	7.90E+09	9.32E+12
1.43E+12	1180.56	1.49E+08	1.76E+11	6.78E+07	1180.56	7.35E+08	8.68E+11	1180.56	8.50E+08	1.00E+12	7.97E+09	9.30E+12
1.29E+12	1167.37	1.41E+08	1.65E+11	7.18E+07	1167.37	6.99E+08	8.16E+11	1167.37	8.16E+08	9.53E+11	7.98E+09	9.25E+12
1.34E+12	1158.66	1.24E+08	1.44E+11	7.85E+07	1158.66	7.43E+08	8.61E+11	1158.66	7.77E+08	9.01E+11	8.01E+09	9.23E+12
1.29E+12	1151.08	9.37E+07	1.08E+11	5.02E+07	1151.08	8.53E+08	9.82E+11	1151.08	7.11E+08	8.19E+11	7.91E+09	8.98E+12
1.51E+12	1134.95	8.90E+07	1.01E+11	5.34E+07	1134.95	8.05E+08	9.14E+11	1134.95	6.34E+08	7.20E+11	8.11E+09	9.13E+12
1.37E+12	1125.60	1.35E+08	1.51E+11	6.66E+07	1125.60	7.76E+08	8.73E+11	1125.60	7.97E+08	8.97E+11	8.16E+09	9.10E+12
1.22E+12	1114.71	1.60E+08	1.78E+11	8.16E+07	1114.71	7.31E+08	8.15E+11	1114.71	8.56E+08	9.54E+11	8.12E+09	8.99E+12
1.29E+12	1106.19	7.74E+07	8.56E+10	7.70E+07	1106.19	9.66E+08	1.07E+12	1106.19	6.85E+08	7.58E+11	7.94E+09	8.66E+12
1.25E+12	1091.02	1.30E+08	1.42E+11	9.10E+07	1091.02	8.03E+08	8.76E+11	1091.02	8.20E+08	8.95E+11	7.84E+09	8.53E+12
1.26E+12	1088.03	1.79E+08	1.95E+11	9.23E+07	1088.03	6.13E+08	6.67E+11	1088.03	9.30E+08	1.01E+12	7.89E+09	8.66E+12
1.37E+12	1097.09	1.49E+08	1.63E+11	6.78E+07	1097.09	7.35E+08	8.07E+11	1097.09	8.50E+08	9.32E+11	7.96E+09	8.72E+12
1.25E+12	1095.91	1.41E+08	1.54E+11	7.18E+07	1095.91	6.99E+08	7.66E+11	1095.91	8.16E+08	8.94E+11	7.97E+09	8.75E+12

teristics
Concentration (mg/L)
2092.96
1998.04
1908.36
1809.89
1716.83
1640.55
1568.67
1510.72
1454.13
1409.99
1371.74
1330.54
1297.51
1263.79
1234.79
1204.83
1186.21
1180.56
1167.37
1158.66
1151.08
1134.95
1125.60
1114.71
1106.19
1091.02
1088.03
1097.09
1095.91
1096.74

Nitrogen Loading to Malibu Valley Groundwater Basin
Future Scenario with Effluent at 8 mg/L Nitrate-N
Northern Management Zone

			Initial Basin Characteristics			Inflow								
						Stream Seepage			Surface Loading		Precipitation			
		Year	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)
N	1	2010	2.78	6.81E+09	1.89E+10	2.46	8.53E+08	2.10E+09	1.84E+08	2.26E+09	0.56	4.46E+07	2.48E+07	3.29
N	2	2011	3.01	6.81E+09	2.05E+10	2.46	8.68E+08	2.14E+09	2.08E+08	2.26E+09	0.56	7.10E+07	3.95E+07	3.64
N	3	2012	3.18	6.82E+09	2.17E+10	2.46	7.82E+08	1.92E+09	2.20E+08	2.26E+09	0.56	2.96E+07	1.65E+07	3.93
N	4	2013	3.34	6.79E+09	2.27E+10	2.46	8.56E+08	2.11E+09	2.10E+08	2.26E+09	0.56	3.44E+07	1.91E+07	4.22
N	5	2014	3.48	6.78E+09	2.36E+10	2.46	8.26E+08	2.03E+09	2.11E+08	2.26E+09	0.56	3.69E+07	2.05E+07	4.42
N	6	2015	3.61	6.79E+09	2.45E+10	2.46	9.32E+08	2.29E+09	2.01E+08	2.26E+09	0.56	9.96E+07	5.53E+07	4.59
N	7	2016	3.69	6.79E+09	2.50E+10	2.46	8.59E+08	2.11E+09	2.11E+08	2.26E+09	0.56	5.75E+07	3.19E+07	4.77
N	8	2017	3.78	6.78E+09	2.56E+10	2.46	7.38E+08	1.82E+09	2.36E+08	2.26E+09	0.56	2.22E+07	1.23E+07	4.91
N	9	2018	3.73	7.04E+09	2.62E+10	2.46	7.78E+08	1.91E+09	2.36E+08	2.26E+09	0.56	3.41E+07	1.89E+07	4.89
N	10	2019	3.67	7.29E+09	2.68E+10	2.46	7.93E+08	1.95E+09	2.15E+08	2.26E+09	0.56	3.72E+07	2.07E+07	4.87
N	11	2020	3.64	7.56E+09	2.75E+10	2.46	8.31E+08	2.05E+09	1.39E+08	2.11E+09	0.56	4.46E+07	2.48E+07	4.86
N	12	2021	3.60	7.86E+09	2.83E+10	2.46	8.48E+08	2.09E+09	1.61E+08	2.11E+09	0.56	7.10E+07	3.95E+07	4.83
N	13	2022	3.55	8.17E+09	2.90E+10	2.46	7.65E+08	1.88E+09	1.73E+08	2.11E+09	0.56	2.96E+07	1.65E+07	4.79
N	14	2023	3.52	8.45E+09	2.97E+10	2.46	8.63E+08	2.12E+09	8.23E+07	2.11E+09	0.56	3.44E+07	1.91E+07	4.79
N	15	2024	3.59	8.58E+09	3.08E+10	2.46	8.31E+08	2.05E+09	8.59E+07	2.11E+09	0.56	3.69E+07	2.05E+07	4.74
N	16	2025	3.65	8.73E+09	3.18E+10	2.46	9.39E+08	2.31E+09	7.71E+07	2.11E+09	0.56	9.96E+07	5.53E+07	4.70
N	17	2026	3.68	8.87E+09	3.26E+10	2.46	8.68E+08	2.14E+09	8.32E+07	2.11E+09	0.56	5.75E+07	3.19E+07	4.73
N	18	2027	3.72	9.00E+09	3.35E+10	2.46	7.63E+08	1.88E+09	1.06E+08	2.11E+09	0.56	2.22E+07	1.23E+07	4.74
N	19	2028	3.77	9.14E+09	3.44E+10	2.46	8.04E+08	1.98E+09	1.05E+08	2.11E+09	0.56	3.41E+07	1.89E+07	4.75
N	20	2029	3.80	9.27E+09	3.52E+10	2.46	8.22E+08	2.02E+09	8.91E+07	2.11E+09	0.56	3.72E+07	2.07E+07	4.77
N	21	2030	3.83	9.42E+09	3.60E+10	2.46	8.51E+08	2.09E+09	7.49E+07	2.11E+09	0.56	4.46E+07	2.48E+07	4.80
N	22	2031	3.85	9.56E+09	3.69E+10	2.46	8.68E+08	2.13E+09	9.11E+07	2.11E+09	0.56	7.10E+07	3.95E+07	4.84
N	23	2032	3.86	9.70E+09	3.74E+10	2.46	7.84E+08	1.93E+09	9.36E+07	2.11E+09	0.56	2.96E+07	1.65E+07	4.87
N	24	2033	3.88	9.82E+09	3.81E+10	2.46	8.63E+08	2.12E+09	8.23E+07	2.11E+09	0.56	3.44E+07	1.91E+07	4.95
N	25	2034	3.90	9.95E+09	3.88E+10	2.46	8.31E+08	2.05E+09	8.59E+07	2.11E+09	0.56	3.69E+07	2.05E+07	4.92
N	26	2035	3.92	1.01E+10	3.96E+10	2.46	9.39E+08	2.31E+09	7.71E+07	2.11E+09	0.56	9.96E+07	5.53E+07	4.87
N	27	2036	3.91	1.02E+10	4.00E+10	2.46	8.68E+08	2.14E+09	8.32E+07	2.11E+09	0.56	5.75E+07	3.19E+07	4.92
N	28	2037	3.92	1.04E+10	4.07E+10	2.46	7.63E+08	1.88E+09	1.06E+08	2.11E+09	0.56	2.22E+07	1.23E+07	4.92
N	29	2038	3.95	1.05E+10	4.15E+10	2.46	8.04E+08	1.98E+09	1.05E+08	2.11E+09	0.56	3.41E+07	1.89E+07	4.91
N	30	2039	3.95	1.06E+10	4.21E+10	2.46	8.22E+08	2.02E+09	8.91E+07	2.11E+09	0.56	3.72E+07	2.07E+07	4.91

Nitrogen Loading to Malibu Valley Groundwater Basin
Future Scenario with Effluent at 8 mg/L Nitrate-N
Northern Management Zone

		Outflow										
Flow into Subbasin		Ocean Outflow			ET	Stream Outflow			Flow out of Subbasin			
Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)
1.11E+08	3.66E+08	2.78	0.00E+00	0.00E+00	5.08E+07	2.78	3.37E+06	9.37E+06	2.78	1.14E+09	3.15E+09
1.35E+08	4.93E+08	3.01	0.00E+00	0.00E+00	3.48E+07	3.01	1.52E+07	4.57E+07	3.01	1.23E+09	3.70E+09
1.06E+08	4.18E+08	3.18	0.00E+00	0.00E+00	3.47E+07	3.18	4.38E+06	1.39E+07	3.18	1.12E+09	3.57E+09
1.14E+08	4.81E+08	3.34	0.00E+00	0.00E+00	4.36E+07	3.34	6.55E+06	2.19E+07	3.34	1.18E+09	3.94E+09
1.07E+08	4.74E+08	3.48	0.00E+00	0.00E+00	5.03E+07	3.48	3.25E+06	1.13E+07	3.48	1.11E+09	3.88E+09
1.65E+08	7.55E+08	3.61	0.00E+00	0.00E+00	5.73E+07	3.61	3.82E+07	1.38E+08	3.61	1.30E+09	4.70E+09
1.31E+08	6.26E+08	3.69	0.00E+00	0.00E+00	6.03E+07	3.69	8.81E+06	3.25E+07	3.69	1.20E+09	4.41E+09
9.92E+07	4.87E+08	3.78	0.00E+00	0.00E+00	5.57E+07	3.78	3.68E+06	1.39E+07	3.78	1.04E+09	3.93E+09
1.11E+08	5.43E+08	3.73	0.00E+00	0.00E+00	4.44E+07	3.73	1.10E+07	4.08E+07	3.73	1.11E+09	4.14E+09
1.07E+08	5.21E+08	3.67	0.00E+00	0.00E+00	4.61E+07	3.67	5.70E+06	2.09E+07	3.67	1.09E+09	4.02E+09
1.06E+08	5.17E+08	3.64	0.00E+00	0.00E+00	5.14E+07	3.64	5.25E+06	1.91E+07	3.64	1.06E+09	3.86E+09
1.30E+08	6.28E+08	3.60	0.00E+00	0.00E+00	3.51E+07	3.60	2.14E+07	7.70E+07	3.60	1.15E+09	4.14E+09
1.01E+08	4.82E+08	3.55	0.00E+00	0.00E+00	3.52E+07	3.55	6.46E+06	2.29E+07	3.55	1.05E+09	3.73E+09
9.98E+07	4.78E+08	3.52	0.00E+00	0.00E+00	4.17E+07	3.52	3.74E+06	1.32E+07	3.52	1.05E+09	3.68E+09
9.27E+07	4.40E+08	3.59	0.00E+00	0.00E+00	4.80E+07	3.59	1.91E+06	6.85E+06	3.59	9.82E+08	3.52E+09
1.50E+08	7.07E+08	3.65	0.00E+00	0.00E+00	5.54E+07	3.65	3.50E+07	1.28E+08	3.65	1.18E+09	4.30E+09
1.16E+08	5.50E+08	3.68	0.00E+00	0.00E+00	5.78E+07	3.68	5.70E+06	2.09E+07	3.68	1.07E+09	3.93E+09
8.40E+07	3.98E+08	3.72	0.00E+00	0.00E+00	5.16E+07	3.72	9.99E+05	3.72E+06	3.72	9.26E+08	3.44E+09
9.67E+07	4.59E+08	3.77	0.00E+00	0.00E+00	4.13E+07	3.77	4.73E+06	1.78E+07	3.77	1.00E+09	3.78E+09
9.30E+07	4.43E+08	3.80	0.00E+00	0.00E+00	4.31E+07	3.80	1.82E+06	6.92E+06	3.80	9.88E+08	3.75E+09
9.91E+07	4.76E+08	3.83	0.00E+00	0.00E+00	4.92E+07	3.83	2.86E+06	1.09E+07	3.83	1.01E+09	3.87E+09
1.22E+08	5.92E+08	3.85	0.00E+00	0.00E+00	3.36E+07	3.85	1.40E+07	5.39E+07	3.85	1.10E+09	4.24E+09
9.25E+07	4.50E+08	3.86	0.00E+00	0.00E+00	3.31E+07	3.86	2.92E+06	1.13E+07	3.86	9.89E+08	3.82E+09
9.98E+07	4.94E+08	3.88	0.00E+00	0.00E+00	4.17E+07	3.88	3.74E+06	1.45E+07	3.88	1.05E+09	4.06E+09
9.27E+07	4.56E+08	3.90	0.00E+00	0.00E+00	4.80E+07	3.90	1.91E+06	7.45E+06	3.90	9.82E+08	3.83E+09
1.50E+08	7.33E+08	3.92	0.00E+00	0.00E+00	5.54E+07	3.92	3.50E+07	1.37E+08	3.92	1.18E+09	4.62E+09
1.16E+08	5.72E+08	3.91	0.00E+00	0.00E+00	5.78E+07	3.91	5.70E+06	2.23E+07	3.91	1.07E+09	4.18E+09
8.40E+07	4.14E+08	3.92	0.00E+00	0.00E+00	5.16E+07	3.92	9.99E+05	3.92E+06	3.92	9.26E+08	3.63E+09
9.67E+07	4.75E+08	3.95	0.00E+00	0.00E+00	4.13E+07	3.95	4.73E+06	1.86E+07	3.95	1.00E+09	3.96E+09
9.30E+07	4.56E+08	3.95	0.00E+00	0.00E+00	4.31E+07	3.95	1.82E+06	7.20E+06	3.95	9.88E+08	3.91E+09

Nitrogen Loading to Malibu Valley Groundwater Basin
Future Scenario with Effluent at 8 mg/L Nitrate-N
Northern Management Zone

Concluding Basin Characteristics		
Volume (L)	Mass (mg)	Concentration (mg/L)
6.81E+09	2.05E+10	3.01
6.82E+09	2.17E+10	3.18
6.79E+09	2.27E+10	3.34
6.78E+09	2.36E+10	3.48
6.79E+09	2.45E+10	3.61
6.79E+09	2.50E+10	3.69
6.78E+09	2.56E+10	3.78
7.04E+09	2.62E+10	3.73
7.29E+09	2.68E+10	3.67
7.56E+09	2.75E+10	3.64
7.86E+09	2.83E+10	3.60
8.17E+09	2.90E+10	3.55
8.45E+09	2.97E+10	3.52
8.58E+09	3.08E+10	3.59
8.73E+09	3.18E+10	3.65
8.87E+09	3.26E+10	3.68
9.00E+09	3.35E+10	3.72
9.14E+09	3.44E+10	3.77
9.27E+09	3.52E+10	3.80
9.42E+09	3.60E+10	3.83
9.56E+09	3.69E+10	3.85
9.70E+09	3.74E+10	3.86
9.82E+09	3.81E+10	3.88
9.95E+09	3.88E+10	3.90
1.01E+10	3.96E+10	3.92
1.02E+10	4.00E+10	3.91
1.04E+10	4.07E+10	3.92
1.05E+10	4.15E+10	3.95
1.06E+10	4.21E+10	3.95
1.08E+10	4.28E+10	3.96

Nitrogen Loading to Malibu Valley Groundwater Basin
Future Scenario with Effluent at 8 mg/L Nitrate-N
Southern Management Zone

						Inflow								
			Initial Basin Characteristics			Stream Seepage			Surface Loading		Precipitation			
		Year	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)
S	1	2010	3.29	7.99E+09	2.63E+10	2.46	3.27E+08	8.03E+08	1.78E+08	4.12E+09	0.56	6.37E+07	3.54E+07	2.78
S	2	2011	3.64	7.98E+09	2.90E+10	2.46	1.98E+08	4.88E+08	1.91E+08	4.12E+09	0.56	8.00E+07	4.44E+07	3.01
S	3	2012	3.93	7.98E+09	3.14E+10	2.46	1.97E+08	4.86E+08	1.99E+08	4.12E+09	0.56	3.84E+07	2.14E+07	3.18
S	4	2013	4.22	7.97E+09	3.36E+10	2.46	3.07E+08	7.56E+08	2.45E+08	4.12E+09	0.56	4.01E+07	2.23E+07	3.34
S	5	2014	4.42	7.98E+09	3.53E+10	2.46	3.85E+08	9.48E+08	2.59E+08	4.12E+09	0.56	5.14E+07	2.86E+07	3.48
S	6	2015	4.59	7.99E+09	3.66E+10	2.46	1.29E+08	3.18E+08	2.09E+08	4.12E+09	0.56	1.16E+08	6.47E+07	3.61
S	7	2016	4.77	7.98E+09	3.81E+10	2.46	3.24E+08	7.97E+08	2.27E+08	4.12E+09	0.56	7.05E+07	3.92E+07	3.69
S	8	2017	4.91	7.99E+09	3.92E+10	2.46	4.72E+08	1.16E+09	3.22E+08	3.47E+09	0.56	2.94E+07	1.63E+07	3.78
S	9	2018	4.89	7.73E+09	3.78E+10	2.46	3.65E+08	8.99E+08	3.21E+08	3.47E+09	0.56	4.49E+07	2.49E+07	3.73
S	10	2019	4.87	7.46E+09	3.63E+10	2.46	3.57E+08	8.79E+08	3.13E+08	3.47E+09	0.56	4.66E+07	2.59E+07	3.67
S	11	2020	4.86	7.21E+09	3.51E+10	2.46	3.27E+08	8.03E+08	3.10E+08	3.24E+09	0.56	6.37E+07	3.54E+07	3.64
S	12	2021	4.83	6.89E+09	3.33E+10	2.46	2.02E+08	4.97E+08	3.14E+08	3.24E+09	0.56	8.00E+07	4.44E+07	3.60
S	13	2022	4.79	6.60E+09	3.16E+10	2.46	2.02E+08	4.96E+08	3.18E+08	3.24E+09	0.56	3.84E+07	2.14E+07	3.55
S	14	2023	4.79	6.28E+09	3.01E+10	2.46	3.13E+08	7.69E+08	3.57E+08	3.57E+09	0.56	4.01E+07	2.23E+07	3.52
S	15	2024	4.74	6.16E+09	2.92E+10	2.46	3.91E+08	9.63E+08	3.69E+08	3.57E+09	0.56	5.14E+07	2.86E+07	3.59
S	16	2025	4.70	6.03E+09	2.84E+10	2.46	1.33E+08	3.28E+08	3.22E+08	3.57E+09	0.56	1.16E+08	6.47E+07	3.65
S	17	2026	4.73	5.89E+09	2.79E+10	2.46	3.28E+08	8.08E+08	3.29E+08	3.57E+09	0.56	7.05E+07	3.92E+07	3.68
S	18	2027	4.74	5.76E+09	2.73E+10	2.46	4.84E+08	1.19E+09	3.36E+08	3.57E+09	0.56	2.94E+07	1.63E+07	3.72
S	19	2028	4.75	5.61E+09	2.67E+10	2.46	3.77E+08	9.28E+08	3.34E+08	3.57E+09	0.56	4.49E+07	2.49E+07	3.77
S	20	2029	4.77	5.46E+09	2.60E+10	2.46	3.68E+08	9.06E+08	3.27E+08	3.57E+09	0.56	4.66E+07	2.59E+07	3.80
S	21	2030	4.80	5.33E+09	2.56E+10	2.46	3.27E+08	8.03E+08	3.21E+08	3.57E+09	0.56	6.37E+07	3.54E+07	3.83
S	22	2031	4.84	5.18E+09	2.51E+10	2.46	2.02E+08	4.97E+08	3.25E+08	3.57E+09	0.56	8.00E+07	4.44E+07	3.85
S	23	2032	4.87	5.04E+09	2.46E+10	2.46	2.02E+08	4.97E+08	3.28E+08	3.57E+09	0.56	3.84E+07	2.14E+07	3.86
S	24	2033	4.95	4.89E+09	2.42E+10	2.46	3.13E+08	7.69E+08	3.57E+08	3.57E+09	0.56	4.01E+07	2.23E+07	3.88
S	25	2034	4.92	4.77E+09	2.35E+10	2.46	3.91E+08	9.63E+08	3.69E+08	3.57E+09	0.56	5.14E+07	2.86E+07	3.90
S	26	2035	4.87	4.64E+09	2.26E+10	2.46	1.33E+08	3.28E+08	3.22E+08	3.57E+09	0.56	1.16E+08	6.47E+07	3.92
S	27	2036	4.92	4.50E+09	2.21E+10	2.46	3.28E+08	8.08E+08	3.29E+08	3.57E+09	0.56	7.05E+07	3.92E+07	3.91
S	28	2037	4.92	4.37E+09	2.15E+10	2.46	4.84E+08	1.19E+09	3.36E+08	3.57E+09	0.56	2.94E+07	1.63E+07	3.92
S	29	2038	4.91	4.22E+09	2.07E+10	2.46	3.77E+08	9.28E+08	3.34E+08	3.57E+09	0.56	4.49E+07	2.49E+07	3.95
S	30	2039	4.91	4.07E+09	2.00E+10	2.46	3.68E+08	9.06E+08	3.27E+08	3.57E+09	0.56	4.66E+07	2.59E+07	3.95

Nitrogen Loading to Malibu Valley Groundwater Basin
Future Scenario with Effluent at 8 mg/L Nitrate-N
Southern Management Zone

		Outflow									
Flow into Subbasin		Ocean Outflow			ET	Stream Outflow			Flow out of Subbasin		
Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)	Volume (L)	Concentration (mg/L)	Volume (L)	Mass (mg)	Concentration (mg/L)	Volume (L)	Mass (mg)
1.14E+09	3.17E+09	3.29	1.24E+08	4.09E+08	7.85E+07	3.29	7.43E+08	2.45E+09	3.29	7.77E+08	2.56E+09
1.24E+09	3.74E+09	3.64	9.37E+07	3.41E+08	5.02E+07	3.64	8.53E+08	3.10E+09	3.64	7.11E+08	2.59E+09
1.14E+09	3.62E+09	3.93	8.90E+07	3.50E+08	5.34E+07	3.93	8.05E+08	3.16E+09	3.93	6.34E+08	2.49E+09
1.19E+09	3.98E+09	4.22	1.35E+08	5.67E+08	6.66E+07	4.22	7.76E+08	3.27E+09	4.22	7.97E+08	3.36E+09
1.14E+09	3.96E+09	4.42	1.60E+08	7.07E+08	8.16E+07	4.42	7.31E+08	3.23E+09	4.42	8.56E+08	3.78E+09
1.35E+09	4.86E+09	4.59	7.74E+07	3.55E+08	7.70E+07	4.59	9.66E+08	4.43E+09	4.59	6.85E+08	3.14E+09
1.23E+09	4.54E+09	4.77	1.30E+08	6.20E+08	9.10E+07	4.77	8.03E+08	3.83E+09	4.77	8.20E+08	3.91E+09
1.04E+09	3.93E+09	4.91	1.79E+08	8.80E+08	9.41E+07	4.91	7.30E+08	3.58E+09	4.91	1.12E+09	5.51E+09
1.11E+09	4.13E+09	4.89	1.49E+08	7.29E+08	6.92E+07	4.89	8.50E+08	4.16E+09	4.89	1.04E+09	5.10E+09
1.08E+09	3.98E+09	4.87	1.41E+08	6.88E+08	7.32E+07	4.87	8.23E+08	4.01E+09	4.87	1.01E+09	4.94E+09
1.07E+09	3.91E+09	4.86	1.22E+08	5.92E+08	8.06E+07	4.86	9.15E+08	4.45E+09	4.86	9.70E+08	4.72E+09
1.17E+09	4.21E+09	4.83	9.08E+07	4.38E+08	5.16E+07	4.83	1.02E+09	4.92E+09	4.83	9.01E+08	4.35E+09
1.07E+09	3.80E+09	4.79	8.58E+07	4.11E+08	5.50E+07	4.79	9.75E+08	4.67E+09	4.79	8.26E+08	3.95E+09
1.24E+09	4.34E+09	4.79	1.13E+08	5.40E+08	6.80E+07	4.79	9.19E+08	4.40E+09	4.79	9.65E+08	4.62E+09
1.17E+09	4.21E+09	4.74	1.36E+08	6.46E+08	8.32E+07	4.74	8.73E+08	4.14E+09	4.74	1.03E+09	4.87E+09
1.39E+09	5.09E+09	4.70	6.33E+07	2.97E+08	7.87E+07	4.70	1.10E+09	5.19E+09	4.70	8.66E+08	4.07E+09
1.27E+09	4.68E+09	4.73	1.17E+08	5.51E+08	9.26E+07	4.73	9.31E+08	4.41E+09	4.73	9.91E+08	4.69E+09
1.12E+09	4.17E+09	4.74	1.66E+08	7.85E+08	9.40E+07	4.74	7.54E+08	3.58E+09	4.74	1.10E+09	5.21E+09
1.19E+09	4.50E+09	4.75	1.35E+08	6.41E+08	6.91E+07	4.75	8.76E+08	4.16E+09	4.75	1.02E+09	4.85E+09
1.17E+09	4.46E+09	4.77	1.28E+08	6.10E+08	7.33E+07	4.77	8.54E+08	4.07E+09	4.77	9.91E+08	4.72E+09
1.20E+09	4.59E+09	4.80	1.13E+08	5.42E+08	8.04E+07	4.80	9.11E+08	4.37E+09	4.80	9.58E+08	4.60E+09
1.30E+09	5.00E+09	4.84	8.19E+07	3.96E+08	5.14E+07	4.84	1.02E+09	4.92E+09	4.84	8.91E+08	4.31E+09
1.19E+09	4.60E+09	4.87	7.64E+07	3.72E+08	5.47E+07	4.87	9.64E+08	4.69E+09	4.87	8.19E+08	3.99E+09
1.24E+09	4.79E+09	4.95	1.13E+08	5.58E+08	6.80E+07	4.95	9.19E+08	4.54E+09	4.95	9.65E+08	4.77E+09
1.17E+09	4.58E+09	4.92	1.36E+08	6.70E+08	8.32E+07	4.92	8.73E+08	4.30E+09	4.92	1.03E+09	5.05E+09
1.39E+09	5.47E+09	4.87	6.33E+07	3.08E+08	7.87E+07	4.87	1.10E+09	5.37E+09	4.87	8.66E+08	4.22E+09
1.27E+09	4.98E+09	4.92	1.17E+08	5.74E+08	9.26E+07	4.92	9.31E+08	4.58E+09	4.92	9.91E+08	4.88E+09
1.12E+09	4.39E+09	4.92	1.66E+08	8.15E+08	9.40E+07	4.92	7.54E+08	3.71E+09	4.92	1.10E+09	5.41E+09
1.19E+09	4.71E+09	4.91	1.35E+08	6.62E+08	6.91E+07	4.91	8.76E+08	4.30E+09	4.91	1.02E+09	5.01E+09
1.17E+09	4.64E+09	4.91	1.28E+08	6.29E+08	7.33E+07	4.91	8.54E+08	4.19E+09	4.91	9.91E+08	4.86E+09

Concluding Basin Characteristics		
Volume (L)	**Mass (mg)**	**Concentration (mg/L)**
7.98E+09	2.90E+10	3.64
7.98E+09	3.14E+10	3.93
7.97E+09	3.36E+10	4.22
7.98E+09	3.53E+10	4.42
7.99E+09	3.66E+10	4.59
7.98E+09	3.81E+10	4.77
7.99E+09	3.92E+10	4.91
7.73E+09	3.78E+10	4.89
7.46E+09	3.63E+10	4.87
7.21E+09	3.51E+10	4.86
6.89E+09	3.33E+10	4.83
6.60E+09	3.16E+10	4.79
6.28E+09	3.01E+10	4.79
6.16E+09	2.92E+10	4.74
6.03E+09	2.84E+10	4.70
5.89E+09	2.79E+10	4.73
5.76E+09	2.73E+10	4.74
5.61E+09	2.67E+10	4.75
5.46E+09	2.60E+10	4.77
5.33E+09	2.56E+10	4.80
5.18E+09	2.51E+10	4.84
5.04E+09	2.46E+10	4.87
4.89E+09	2.42E+10	4.95
4.77E+09	2.35E+10	4.92
4.64E+09	2.26E+10	4.87
4.50E+09	2.21E+10	4.92
4.37E+09	2.15E+10	4.92
4.22E+09	2.07E+10	4.91
4.07E+09	2.00E+10	4.91
3.94E+09	1.94E+10	4.93

Appendix B - Draft WRR-WDR for City of Malibu Civic Center Wastewater Treatment Facility Project

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

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ORDER NO. R4-2015-XXXX
FILE NO. 11-087
CI NO. 10042

WASTE DISCHARGE REQUIREMENTS AND
WATER RECYCLING REQUIREMENTS
FOR
CITY OF MALIBU
(MALIBU CIVIC CENTER WASTEWATER TREATMENT FACILITY – PHASES I & II PROJECTS)

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The California Regional Water Quality Control Board, Los Angeles Region (Regional Board) finds:

INTRODUCTION

1. Residences, businesses, and public facilities in the City of Malibu (City) use on-site wastewater disposal systems (OWDSs) to discharge sewage to the subsurface and underlying groundwater. In several areas of the City, high flows of wastewater from these OWDSs coupled with unfavorable hydrogeological conditions have raised concerns about reliance on OWDSs. The Malibu Civic Center Area alone (Figure 1) with relatively intensive land use activities by more than 400 dischargers, generates up to 119,000 gallons per day (GPD) of wastewater, which pollutes groundwater and surface water with nitrates, bacteria, and other waste constituents.

   A. Basin Plan Prohibition - To address the pollution caused by OWDSs in the Malibu Civic Center Area, the Regional Board on November 5, 2009, adopted an amendment to Chapter IV of the *Water Quality Control Plan for the Coastal Watersheds of Los Angeles and Ventura Counties* (Basin Plan) to prohibit OWDSs in the Malibu Civic Center Area (and a small portion of unincorporated Los Angeles County) through Resolution No. R4-2009-007 (Basin Plan Amendment). On September 21, 2010, the State Water Resources Control Board (State Water Board) approved Resolution No. R4-2009-007. Subsequently, the Office of Administrative Law (OAL) approved Resolution No. R4-2009-007 on December 23, 2010. The Basin Plan Amendment became effective on December 23, 2010. The Basin Plan Amendment immediately prohibits all new OWDSs in the Malibu Civic Center Area, with the exception of certain specific projects identified in Table 4-zz, which were deemed by the Regional Board to be existing OWDSs. The Basin Plan Amendment prohibits all discharges from existing OWDSs, including those projects identified on Table 4-zz, in accordance with a phased schedule. Existing OWDSs in commercial areas must cease discharges by November 5, 2015 (Phase I); existing OWDSs in residential areas must cease discharges by November 5, 2019 (Phase II). The Basin Plan Amendment does not prevent repairs, maintenance, and upgrades to existing

OWDSs prior to November 5, 2019, provided that such repairs, maintenance, and upgrades do not expand the capacity of the OWDSs or increase flows of wastewaters. The Basin Plan Amendment explicitly states:

> "This prohibition does not preclude a publicly owned, community-based, solution that includes specific wastewater disposal sites subject to waste discharge requirements to be prescribed by the Regional Board."

B. Memorandum of Understanding (MOU) – To assist in the implementation of the Basin Plan Amendment, the Regional Board, the State Water Board, and the City entered into an MOU, regarding *"Phased Implementation of Basin Plan Amendment Prohibiting On-site Wastewater Disposal Systems in the Malibu Civic Center Area"*, which was revised on December 4, 2014. In the MOU, the City agreed to construct one or more centralized wastewater treatment facilities – the Malibu Civic Center Wastewater Treatment Facility (Civic Center Facility) - to provide sewer treatment for commercial and residential properties in the prohibition area. The MOU sets forth a three phase process: (1) facility construction and connection to commercial properties (Phase I); construction and connection to a portion of residential properties (Phase II), and construction and connection of the remaining residential properties (Phase III) if necessary after completion of a water quality sampling property to determine whether implementation of Phases I and II have resulted in a meaningful decrease in bacteria and nitrogen in Malibu Lagoon.

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2. The Civic Center Facility, a Publicly-Owned Treatment Works (POTW), will eliminate discharges from OWDSs in the Malibu Civic Center Area via the following three (3) phases:

A. Phase I – Connection of commercial properties, colored with yellow in Figure 2, to the Civic Center Facility by June 30, 2017;

B. Phase II – Connection of residential properties, colored with coral in Figure 2, to the Civic Center Facility by November 5, 2022; and,

C. Phase III – Connection of remaining residential properties and HRL, colored with fuchsia in Figure 2, to the Civic Center Facility by November 5, 2025.

PURPOSE OF ORDER

3. Pursuant to California Water Code (CWC) sections 13260 and 13522.5, the City submitted a Report of Waste Discharge (ROWD) to the Regional Board on April 3, 2014 to apply for Waste Discharge Requirements (WDRs) and Water Recycling Requirements (WRRs) authorizing the City to discharge tertiary-treated wastewater for Phase I and Phase II from the Civic Center Facility to groundwater through land disposal via injection, irrigation, percolation, and/or other non-potable recycled water applications that comply with California Code of Regulations (CCR), title 22, division 4, chapter 3 (hereafter "Title 22").

4. The City is responsible for the discharge of waste and the production, distribution and application of recycled water under WDRs/WRRs pursuant to CWC sections 13263 and 13523.1 (Master Reclamation Permit) for the Civic Center Facility – Phases I & II Projects. The City is responsible for processing individual end-use application, inspecting point-of-

use facilities, and ensuring end-users' compliance with the water recycling requirements contained in this Order. The City is responsible for compliance with the requirements in this Order.

5. The Regional Board staff conducted an inspection of the Civic Center Facility site on September 17, 2014. The purpose of this inspection was to verify the information provided in the ROWD, the surface and groundwater monitoring workplan, and the Phase I Title 22 Engineering Report submitted to the Regional Board on April 3, 2014, May 30, 2014, and August 18, 2014, respectively. Regional Board staff visited the sites of the Civic Center Facility, injection wells, groundwater monitoring wells, Malibu Lagoon and near-shore ocean surface water monitoring stations, and Winter Canyon and its drain to the ocean outfall.

6. For the purposes of this Order, references to the "discharger" or "permittee" in applicable federal and state laws, regulations, plans, or policy are held to be equivalent to references to the City.

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CIVIC CENTER FACILITY – PHASES I & II PROJECTS

7. **Description of Civic Center Facility Vicinity**

   A. The Civic Center Facility (34° 2' 9.35" N, 118° 41' 55.50" W) is sited on a 4.1-acre parcel at 24000 Civic Center Way, the intersection of Civic Center Way and East Pacific Coast Highway (the west side of the Malibu Civic Center Area) and approximately 1,700 feet southwest of the Malibu City Hall (Figure 1). The Civic Center Facility will serve business, residential, and public properties within the Malibu Civic Center Area.

   B. The Malibu Civic Center Area is generally defined as follows:

      a. Westerly to the City boundary along Malibu Canyon Road;

      b. Northerly to the ridgeline including the City and a small portion of the County of Los Angeles;

      c. Easterly to Sweetwater Mesa; and,

      d. Southerly to Santa Monica Bay.

   The Malibu Civic Center Area has a residential population estimated at 1,300. The area also serves as the core of the City's business, cultural and commercial activities.

   C. The area is not defined according to municipal borders or parcel lines. Rather, the area subject to the prohibition is delineated according to hydrogeological parameters and drainage patterns; as groundwater flow roughly mimics surface drainage, the prohibition boundary follows a topographic high surrounding both the Winter Canyon and lower Malibu Creek (also known as Malibu Valley) watersheds. All properties extending seaward of this boundary to the ocean are subject to the prohibition, including the coastal strips along the Pacific Coast Highway stretching from Amarillo Beach to Surfrider Beach. This entire area, which is referred to as the "Malibu Civic

Center Area," totals 2.2 square miles of which 1.5 square miles and 0.7 square miles are within the City and the unincorporated area of County of Los Angeles, respectively.

D. The Malibu Civic Center Area is categorized in the Basin Plan Hydrologic Unit 404.21 including Amarillo Beach, Malibu Beach, and Malibu Lagoon.

GROUNDWATER BASIN CHARACTERISTICS

8. The Malibu Valley Groundwater Basin beneath the Malibu Civic Center Area is a small alluvial basin and located along the Los Angeles County coastline. The basin is bounded by the Pacific Ocean on the south, and by the Santa Monica Mountains, composed of non-water-bearing Tertiary age rocks, on all remaining sides. The valley is typified by steep canyons that generally run north to south, and is flanked on both sides by canyons - Sweetwater Canyon to the east, and Winter Canyon to the west. The basin drains to Malibu Creek and Santa Monica Bay.

   Water-bearing formations in the Malibu Valley Groundwater Basin can be generally subdivided into four categories or strata (layers) as follows:

   A. Shallow Alluvium – a shallow zone of permeable alluvial sediments consisting of silts and sands;

   B. Low Permeability Zone – a fine-grained estuarine deposits consisting of clay and silt layers;

   C. Civic Center Gravels – a lower/deeper aquifer with coarse-grained stratum consisting of sands, gravel, and cobbles; and,

   D. Bedrock – zones of unconsolidated materials containing permeable sand and gravel deposits.

9. **Reports and Technical Memorandums**

   The City submitted the following reports for the design of the Civic Center Facility project:

   A. *Ocean Dilution Analysis,* dated March 18, 2014 – The City evaluated the potential impacts from injecting treated wastewater into the Malibu Valley Groundwater Basin.

   B. *Malibu Groundwater Injection Feasibility Project,* dated March 24, 2014 – The City collected site-specific data necessary to design an injection well system.

   C. *Sea Water Rise Analysis,* dated March 24, 2014 – The City identified areas within the City that may be flooded due to impacts associated with climate change.

   D. *Groundwater Modeling Analysis of Proposed Wastewater Dispersal – City of Malibu,* dated April 3, 2014 – The City evaluated the possible impacts on groundwater levels and groundwater flow resulting from the proposed subsurface injection of treated disinfected wastewater into deep coarse-grained alluvial deposits in the Malibu Civic Center Area. The model concluded that almost all injected wastewater will flow toward the Santa Monica Bay. The approximate model-estimated injection capacities for each of the two (2) proposed phases of development are as follows:

Phase 1 -- 311,000 GPD

Phase 2 -- 498,000 GPD

E. *Assimilative Capacity and Antidegradation Analysis for Proposed Injection Dispersal,* dated May 15, 2014 – The City evaluated the potential groundwater quality impacts resulting from injecting treated wastewater into the Malibu Valley Groundwater Basin. The concentration of nitrate in groundwater at the lower aquifer where injection will occur is 3.6 mg/L. The model indicated that the injection of 100% of the wastewater with a nitrate concentration of 8 mg/L for 30 years will increase the nitrate concentration in the groundwater to between 4.1 mg/L and 4.9 mg/L, which will be a smaller increase than without injection. Without injection, the nitrate concentration will increase to 4.9 mg/L and 5.85 mg/L after 30 years due to the accumulation of nitrate from the discharges from the existing OWDSs.

F. *Review of Nitrogen Limit Implications for Wastewater Treatment Facility,* May 27, 2014 – The City reviewed and compared treatment process, costs, and operation and maintenance efforts needed to achieve the nitrate as nitrogen effluent limit of 8 mg/L as compared to an effluent limit of 5 mg/L.

G. *City of Malibu Engineer's Report for the Production, Distribution and Use of Recycled Water Phase 1* (*Phase I Title 22 Engineering Report*), August 20, 2014 – The City described the characteristics of treated wastewater generated from the Civic Center Facility, and the processes of treatment, distribution, disposal and reuse.

H. *Simulation of Anticipated Injections in Groundwater Flow Model,* dated August 25, 2014 – The City indicated that the maximum volumes of 311,000 and 498,000 GPD can be effectively disposed via injection for Phases I and II, respectively.

10. **Civic Center Facility**

A. The Civic Center Facility is owned and operated by the City.

B. The Civic Center Facility is a tertiary-treated wastewater treatment plant, treating domestic and commercial wastewater generated within the Malibu Civic Center Area.

C. The wastewater treatment processes of the Civic Center Facility include coarse and fine mechanical screening and grit removal for preliminary treatment of the influent wastewater. The effluent after the preliminary treatment flows to an equalization basin. The effluent of an equalization basin will flow to a Membrane Bioreactor (MBR) consisting of biological reactors and membrane-based solids removal. The MBR will provide carbonaceous oxidation, nitrification/denitrification and solids removal to meet the limits of the WDRs/WRRs. Disinfection of the treated effluent will be achieved by Ultraviolet (UV) disinfection. Disinfection will be followed by the addition of chlorine to maintain a chlorine residual in the distribution system to minimize microorganisms re-growth and bio-fouling in the pipelines and injection wells. Treated, disinfected effluent will be recycled within the community via a

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recycled water distribution system. Effluent not used for landscape irrigation and/or land disposal~~injection~~ via injection~~land disposal~~ will be discharged at three percolation ponds (Figure 3 for the layout of treatment devices).

a. **Coarse Screen** – Coarse screen used in the wastewater treatment plant removes solids, including typically wood, plastic materials, and rags.

b. **Grit Removal** – Grit removal is used to remove as much sand and silt as possible to prevent wear on pumps, accumulations in bioreactor and membrane reactor, and clogging of sludge piping.

c. **Fine Screen** – Fine screen with 2 millimeter openings removes inert solids before entering the bioreactor.

d. **Flow Equalization** – Flow equalization basin provides a relatively constant flow rate to the subsequent treatment operations and processes.

e. **Bioreactor** – The bacteria species *Nitrosomonas* and *Nitrobacter* in the bioreactor provide nitrification. *Nitrosomonas* and *Nitrobacter* convert ammonia to nitrite and nitrite to nitrate, respectively. *Psudomonas* bacteria convert nitrite and nitrate to nitrogen.

f. **Membrane Reactor** – Membrane reactor provides further carbonaceous oxidation and suspended solids removal.

g. **UV Disinfection** – UV radiation penetrates an organism's cell wall, and destroys/retards the cell's ability to reproduce.

h. **Chlorination** – Chlorination with sodium hypochlorite is used to minimize re-growth and bio-fouling of bacteria, pathogens, and viruses in the pipelines and injection wells.

Table 1 lists additional treatment devices used in Phases I and II.

Table 1 – Treatment Devices of the Civic Center Facility at Phases I and II

Treatment Device	Dimension/Spec	Volume per Treatment Device (Gallons)	Retention time (Hours)
Equalization Basin (1X)	• 30 feet (Wide) 40 feet (Length) 11 feet (Depth)	• 99,000	• 12.4 (Phase I) • 6.6 (Phase II)
Bioreactor (2X)	• 20 feet (Wide) 50 feet (Length) 16 ~ 17.6 feet (Depth)	• Pre-Anoxic Basin: 24,500 • Aeration Basin: 65,000 • De-Oxygenation Basin: 11,000 • Post-Anoxic Basin: 21,100	• 33.0 (Phase I) • 17.5 (Phase II)
Membrane Reactor (2X)	• Avg: 8.3 gpd/sf[1] • Max: 9.7 gpd/sf • 17,760 sf[2] membrane minimum	• Tank volumes vary by manufacturer.	Varies by manufacturer.
Ultra Violet	• 8 lamps per reactor	• 0.1 Million per Day	Varies by

Table 1 – Treatment Devices of the Civic Center Facility at Phases I and II			
Treatment Device	**Dimension/Spec**	**Volume per Treatment Device (Gallons)**	**Retention time (Hours)**
Reactor (3X)	minimum		manufacturer and lamp intensity and validation.

[1]. gpd/sf: Gallons per day per square foot.
[2]. sf: square foot

Sludge will be hauled to the Sanitation Districts of Los Angeles County Joint Water Pollution Control Plant, or other similar permitted facilities.

D. Design Capacities of the Civic Center Facility are specified in Table 2.

Table 2 – Design Capacities of the Civic Center Facility at Phases I and II	
Phase	**Design Capacity (GPD)**
I	191,000
II	361,000

E. Nitrate-N Reduction

Nitrate-N loading from OWDSs is approximately 20 mg/L. Effluent less than 8 mg/L of nitrate-N will be discharged from the Civic Center Facility after treatment. The proposed Project will reduce by approximately 60% the existing nitrate-N loading to the groundwater basin.

F. Treated Effluent Applications

The treated effluent of 191,000 GPD for Phase I and 361,000 GPD for Phase II from the Civic Center Facility is to be discharged through the following applications:

a. Landscape Irrigation – Treated wastewater after disinfection will be recycled for landscape irrigation.

b. Disposal via Groundwater Injection – Treated wastewater after disinfection will be injected to the Civic Center Gravels via three (3) injection wells W-1, W-2, and W-3, located approximately 1,000 to 1,500 feet southeast to the Civic Center Facility.

c. Disposal via Percolation – The Winter Canyon Groundwater Basin beneath the Civic Center Facility will be used for percolation of the treated wastewater, if the treated wastewater is not recycled or injected into the lower aquifer of the Civic Center Gravels of the Malibu Valley Groundwater Basin. This method of disposal will serve as a backup and will only be used if needed (see Finding No. 13 for additional information).

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11. **Wastewater Collection and Recycled Water Distribution Systems**

A. Pipeline Transmission – Figure 4 shows the extent and locations of the wastewater collection and recycled water distribution systems. Pipelines are designed in accordance with acceptable seismic safety standards so as to protect against the possibility of rupture.

B. Wastewater and Recycled Water Pump Systems – Wastewater pump stations are located along pipeline alignments, below ground and on public rights-of-way and/or easements (Figure 4). Each wastewater pump station has odor controls. Two (2) recycled water pump stations are located at the Civic Center Facility site.

12. **Injection Wells**

Treated wastewater from the Civic Center Facility is to be disposed through three (3) injection wells W-1, W-2, and W-3 located at the southern boundary of the Malibu Colony Plaza and the northern side of Malibu Road (Figure 4). These wells are approximately 400 feet from each other and are in close proximity to the recycled water distribution system pipeline. Each injection well is 14 inches in diameter and is connected via subsurface and surface piping with the recycled water distribution line. Table 3 shows specifications of three (3) injection wells.

Table 3 – Specifications of Injection Wells

	W-1, W-2, and W-3
Depth below Ground Surface (Feet)	170
Screen Intervals below Ground Surface (Feet)	55 - 134
Aquifer	Civic Center Gravels
Total Injection Rate [1] (GPM[2])	130 (Phase I) and 250 (Phase II)

[1]. The total daily injection rate at three injection wells is up to 130 GPM for Phase I and 250 GPM for Phase II. The actual injection rate at any well location will vary, depending on the flow rate of unused recycled water (which will be dependent on factors such as landscape irrigation demand, wastewater generation, and water discharge at percolation ponds).

[2]. GPM: Gallons per minute.

13. **Percolation Ponds**

A. Three (3) percolation ponds (Figure 2) in the Winter Canyon area are to be constructed at the site of the Civic Center Facility as a back-up method for disposal of recycled water into the Winter Canyon groundwater basin. Water that cannot be either reused through irrigation or disposed through injection wells will be pumped to percolation ponds then percolate into Winter Canyon groundwater basin, typically during periods when other facilities are unavailable because of an emergency or due to scheduled maintenance. Disposal to the percolation ponds will be alternated from pond to pond.

B. The upper Winter Canyon is a separate groundwater system from the Malibu Valley Groundwater Basin underlying the majority of the Civic Center area, as determined

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based on hydrogeological studies. It is estimated that the Winter Canyon groundwater basin can provide a percolation capacity of up to 100,000 GPD.

C. Each percolation pond is approximately 120 feet long and 3 to 5 feet deep. Two of rectangular percolation ponds are approximately 20 feet wide and 2,700 square foot. The third percolation pond is approximately an irregular polygon, 20 to 40 feet wide, and 3,860 square foot. The percolation rate of soil beneath the percolation ponds is 1.5 feet per day.

R E V I S E D T E N T A T I V E

14. **Groundwater Monitoring Wells**

A. Groundwater monitoring wells are used to ensure that the injection does not cause mounding of groundwater or cause the groundwater to exceed groundwater quality objectives set forth in Table 10 in the Malibu Civic Center Area.

B. The groundwater monitoring well network consists of a total of nine (9) wells within the southern part of the Malibu Civic Center Area. Two (2) wells (TY-MW-1 and LAMW-5S) are in Winter Canyon, and provide water quality data downgradient and upgradient, respectively, of the Civic Center Facility. Four (4) wells (SMBRP-9, MCWP-MW04S, MCWP-MW07S, and SMBRP-12,) are screened in the shallow unconfined alluvial aquifer. Three (3) wells (MCWP-MW04D, MCWP-MW07D, and MCWP-MW09) are screened in the deeper Civic Center Gravels aquifer (Figure 5). More information of these groundwater monitoring wells is available in Table 4, Section IV. 3.A. of the accompanying Monitoring and Reporting Program CI No. 10042 (MRP).

15. **Surface Water Monitoring Stations**

A surface water monitoring program (Malibu Lagoon and near-shore ocean) evaluates the quality of surface waters and any improvement resulting from the implementation of Phases I and II. Six (6) stations are located at Malibu Lagoon, and four (4) stations are located at the near-shore ocean area along Malibu Road (Figure 6). The three (3) lagoon sampling locations will be evenly distributed along Malibu Creek north of Pacific Coast Highway (PCH), and the other three (3) sampling locations will be located across from Malibu Lagoon, south of PCH. The ocean samples will be collected along the beach adjacent to the southern edge of Malibu Bluffs Park to the mouth of Malibu Lagoon.

16. **Contingency Plan** – For the Phase I Project, the City has developed an Operation, Maintenance, and Monitoring Plan (OMM Plan) that incorporates specific procedures to be followed by operating staff for all potential emergencies or conditions. The OMM plan for the Phase I Project will ensure that equipment and facilities for treatment and injection operate at peak performance levels. The OMM Plan contained in the *Phase I Title 22 Engineering Report* was provided to the State Water Board's Division of Drinking Water (DDW) (formerly the State Department of Public Health) on August 21, 2014. The DDW approved it on September 18, 2014.

17. Regional Board staff consulted with following agencies regarding the Civic Center Facility project:

A. The United State Environmental Protection Agency (USEPA) on April 21, 2014 and July 16, 2014 – Updated and discussed groundwater modeling results and the system design of the Civic Center Facility.

B. The DDW on December 18, 2012, July 23, 2013, September 5, 2013, and February 12, 2014 – Discussed the method of disposing of the treated effluent via injection wells.

18. On September 12, 2011, August 6, 2013, December 12, 2013, February 20, 2014, and January ~~7~~8, 2015, the City conducted five (5) Technical Advisory Committee (TAC) meetings to receive input regarding the Civic Center Facility project. Attendees included college professors, environmental group, resource agencies, City's Consultants and interested persons. The City provided the layout of the Civic Center Facility, the reuse of treated effluent, and the groundwater injection locations. The City also presented the results of special studies, including the model for injected wastewater flow and possible impacts to Malibu Creek and Lagoon.

APPLICABLE PLANS, POLICIES AND REGULATIONS

The following plans, policies and regulations apply to the discharges authorized by this Order to protect the waters of the state.

19. **Water Quality Control Plan for the Coastal Watersheds of Los Angeles and Ventura Counties (Basin Plan)** – On June 13, 1994, the Regional Board adopted a revised Basin Plan. The Basin Plan: (i) designates beneficial uses for surface and groundwater, (ii) establishes narrative and numeric water quality objectives that must be attained or maintained to protect the designated beneficial uses, and (iii) sets forth implementation programs to protect the beneficial uses of the waters of the state. The Basin Plan also incorporates State Water Board Resolution 68-16, Anti-degradation Policy (see Finding No. 24 below for detail). In addition, the Basin Plan incorporates by reference applicable State and Regional Board plans and policies and other pertinent water quality policies and regulations. The Regional Board prepared the 1994 update of the Basin Plan to be consistent with previously adopted State and Regional Board plans and policies. This Order implements the plans, policies and provisions of the Regional Board's Basin Plan. The Basin Plan has been amended occasionally since 1994.

The Basin Plan (Chapter 3) incorporates Title 22 CCR primary maximum contaminant levels (MCLs) by reference (see Finding No. 22 below for detail) as water quality objectives. This incorporation by reference is prospective including future changes to the incorporated provisions as the changes take effect. The Title 22 CCR primary MCLs are applicable water quality objectives for a receiving water to protect beneficial uses when that receiving water is designated as municipal and domestic supply. Also, the Basin Plan specifies that "Ground waters shall not contain taste or odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses." Therefore the Title 22 CCR secondary MCLs, which are limits based on aesthetic, organoleptic standards, are applicable water quality objectives for a receiving water to protect beneficial uses when that receiving water is designated as municipal and domestic supply. These water quality objectives are implemented in this Order to protect groundwater quality.

In addition, the Basin Plan identifies beneficial uses based on State Water Board Resolution No. 88-63, which established state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply. Beneficial uses applicable to the coastal areas in Table 4 and groundwater in Table 5 are as follows:

Table 4 – Basin Plan Beneficial Uses of Coastal Features

Receiving Water	Beneficial Use(s)
Amarillo Beach (Hydro. Unit No. 404.21)	Existing: Navigation; water contact and non-contact recreation; commercial and sport fishing; marine habitat; wildlife habitat; and shellfish harvesting. Potential: Spawning, reproduction, and/or early development of fish.
Malibu Beach (Hydro. Unit No. 404.21)	Existing: Navigation; water contact and non-contact recreation; commercial and sport fishing; marine habitat; wildlife habitat; migration of aquatic organisms; spawning, reproduction, and/or early development of fish [1]; and shellfish harvesting [2].
Malibu Lagoon (Hydro. Unit No. 404.21)	Existing: Navigation; water contact and non-contact recreation; estuarine habitat; marine habitat; wildlife habitat; rare and endangered species [3]; migration of aquatic organisms [4]; spawning, reproduction, and/or early development of fish [4]; and wetland habitat.

[1]. Most frequently used grunion spawning beaches. Other beaches may be used as well.
[2]. Areas exhibiting large shellfish populations include Malibu, Point Dume, Point Fermin, White Point and Zuma Beach.
[3]. One or more rare species utilize all ocean, bays, estuaries, and coastal wetlands for foraging and/or nesting.
[4]. Aquatic organisms utilize all bays, estuaries, lagoons and coastal wetlands, to a certain extent, for spawning and early development. This may include migration into areas, which are heavily influenced by freshwater inputs.

Table 5 – Basin Plan Beneficial Uses of Groundwater

Receiving Water	Beneficial Use(s)
Malibu Valley Groundwater (DWR Basin No. 4-22)	Existing: Agricultural supply. Potential: Municipal and domestic water supply; and industrial process supply.

Total Maximum Daily Loads (TMDLs). To restore water quality and impaired beneficial uses, USEPA and/or the Regional Board have adopted the following TMDLs, specified in Table 6:

Table 6 – TMDLs of Malibu Areas and Santa Monica Bay Beaches

	Malibu Creek Watershed[1] Nutrient TMDLs	Malibu Creek and Lagoon Bacteria TMDLs	Santa Monica Bay Beaches Wet and Dry Bacteria TMDLs
Total Nitrogen[2] (04/15	1.0 mg/L	---	---

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Table 6 – TMDLs of Malibu Areas and Santa Monica Bay Beaches			
	Malibu Creek Watershed[1] Nutrient TMDLs	Malibu Creek and Lagoon Bacteria TMDLs	Santa Monica Bay Beaches Wet and Dry Bacteria TMDLs
to 11/15)			
Total Nitrogen (11/16 to 04/14)	8.0 mg/L	---	---
Geometric Mean[3] Bacteria (04/01 to 10/31)	---	0-day exceedance	0-day exceedance
Geometric Mean Bacteria (11/01 to 03/31)	---	0-day exceedance	0-day exceedance
Single Sample[3] Bacteria (04/01 to 10/31)	---	0-day exceedance	0-day exceedance
Single Sample Dry Weather Bacteria (11/01 to 03/31)	---	≤ 3-day exceedances	≤ 3-day exceedances
Single Sample Wet Weather[4] Bacteria (11/01 to 03/31)	---	≤ 17-day exceedances	≤ 17-day exceedances

[1]. Malibu Creek Watershed includes Malibu Lagoon.
[2]. Total Nitrogen is the sum of nitrate (NO_3), nitrite (NO_2), organic nitrogen, and ammonia (all expressed as N).
[3]. Basin Plan bacteria water quality limits are following:
In Marine Waters Designated for Water Contact Recreation (REC-1)
1. Geometric Mean Limits
   a. Total coliform density shall not exceed 1,000/100 ml.
   b. Fecal coliform density shall not exceed 200/100 ml.
   c. *Enterococcus* density shall not exceed 35/100 ml.
2. Single Sample Limits
   a. Total coliform density shall not exceed 10,000/100 ml.
   b. Fecal coliform density shall not exceed 400/100 ml.
   c. *Enterococcus* density shall not exceed 104/100 ml.
   d. Total coliform density shall not exceed 1,000/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1.

In Fresh Waters Designated for Water Contact Recreation (REC-1) (not applicable to Santa Monica Bay Beaches Wet and Dry Bacteria TMDLs)
1. Geometric Mean Limits
   a. *E. coli* density shall not exceed 126/100 ml.
2. Single Sample Limits
   a. *E. coli* density shall not exceed 235/100 ml.

[4]. Wet weather is defined as days with rainfall >=0.1 inch and the three (3) days following the rain event.

Based on the model assimilating the migration of wastewater after a period of 20 years, the injected wastewater will not reach Malibu Creek and Malibu Lagoon. Therefore, water quality limits prescribed in the Malibu Creek Watershed Nutrient TMDLs and Malibu Creek

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and Lagoon Bacteria TMDLs are not incorporated as water quality objectives since there is no discharge.

20. Clean Water Act section **303(d) List** – In the 2006 Clean Water Act Section 303(d) list, approved by the United States Environmental Protection Agency (USEPA) on June 28, 2007, impairments to beneficial uses are formally identified for the following water resources:

    a. Malibu Lagoon: impaired by Coliform Bacteria, Eutrophication.

    b. Malibu Creek: impaired by Coliform Bacteria, Nutrients (Algae).

    c. Malibu Beach: impaired by Indicator Bacteria.

    d. Malibu Lagoon Beach (Surfrider Beach): impaired by Coliform Bacteria.

    e. Carbon Beach: impaired by Indicator Bacteria.

21. **Ocean Plan** – The State Water Board adopted the *Water Quality Control Plan for Ocean Water of California, California Ocean Plan* (Ocean Plan) in 1972 and amended it in 1978, 1983, 1988, 1990, 1997, 2000, 2005, 2009, and 2012. The State Water Board adopted the latest amendment on October 16, 2010 and it became effective on July 1, 2013. The Ocean Plan is applicable, in its entirety, to point source discharges to the ocean. The Ocean Plan does not directly apply to the discharge authorized by this Order, but is included herein as the basis for determining whether the discharge will result in improvements to ocean water quality. The Ocean Plan identifies beneficial uses of ocean waters of the State to be protected as summarized in Table 7 below:

Table 7 – Ocean Plan Beneficial Uses

Receiving Water	Beneficial Use(s)
Pacific Ocean	Industrial water supply; water contact and non-contact recreation, including aesthetic enjoyment; navigation; commercial and sport fishing; mariculture; preservation and enhancement of designated Area of Special Biological Significance [1] (ASBS); rare and endangered species; marine habitat; fish migration; fish spawning and shellfish harvesting.

[1]. There are no any ASBSs in the vicinity of the Malibu Valley.

22. **Title 22 CCR** –Title 22 CCR contains primary and secondary MCLs for inorganic, organic, and radioactive contaminants in drinking water. These MCLs are codified in Title 22 CCR. Title 22 primary MCLs (see Attachments A1 to A5) have been incorporated into the Basin Plan as water quality objectives. MCLs are used as the bases for effluent limits for discharges of recycled water in WDRs and WRRs to protect the designated beneficial uses of municipal and domestic supply.

23. **Recycled Water Policy** – State Water Board Resolution No. 2009-0011, *Adoption of a Policy for Water Quality Control for Recycled Water* (Recycled Water Policy), is intended to support the State Water Board's Strategic Plan to promote sustainable local water supplies. Increasing the acceptance and promoting the use of recycled water is a means towards achieving sustainable local water supplies and can result in reduction in

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greenhouse gases, a significant driver of climate change. The Recycled Water Policy is also intended to encourage beneficial use of, rather than solely disposal of, recycled water generated from municipal wastewater sources in a manner that fully implements state and federal water quality laws.

24. **State Water Board Resolution No. 68-16** "Statement of Policy with Respect to Maintaining High Quality of Waters in California" (also called the "Anti-degradation Policy") requires the Regional Board, in regulating the discharge of waste, to maintain the high quality waters of the state until it is demonstrated that any change in quality will be consistent with maximum benefit to the people of the State, will not unreasonably affect beneficial uses, and will not result in water quality less than that described in the State Water Board's policies (e.g., quality that exceeds water quality objectives). Further, any activity that produces waste must meet waste discharge requirements that will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

    The discharge of waste authorized by this Order will cause some degradation of groundwater in the Civic Center Gravels. The current concentration of nitrate as nitrogen in groundwater in the area to be used for injection is 3.6 mg/L.. The City prepared a study entitled *"Assimilative Capacity and Antidegradation Analysis for proposed injection"*, which concluded that the nitrate concentration in groundwater will continue to increase to between 4.9 mg/L and 5.85 mg/L after 30 years due to the continuous discharge from existing OWDSs if the Civic Center Facility is not available to treat wastes now being discharged from the OWDSs. The study also concluded that the discharge of treated wastewater with a nitrate concentration of 8 mg/L through injection wells, percolation, and infiltration of irrigation water will cause an increase in concentrations of nitrate in groundwater to between 4.1 mg/L and 4.9 mg/L after 30 years. By eliminating the use of OWDSs in the Malibu Civic Center Area and instead treating the wastewater using advanced tertiary treatment and discharging the treated wastewater to the groundwater using injection wells, percolation ponds, and irrigation, the nitrate concentration will increase to 4.1 mg/L from 3.6 mg/L after 30 years rather than to 4.9 mg/L after 30 years.

    The Malibu Valley shallow groundwater basin is impaired by nitrate and bacteria. The operation of the Civic Center Facility will eliminate the nitrate loading to the shallow aquifer. The Civic Center Facility will use best practicable treatment or control in compliance with this Order. The Order requires the wastewater to be treated to, at a minimum, comply with water quality objectives set forth in the Basin Plan and the requirements of Title 22 Water Recycling Criteria to protect public health. The use of best practicable treatment or control required by this Order will result in compliance with the Basin Plan water quality objectives, including objectives for nitrate, other nitrogen-related compounds, and bacteria including total coliform and fecal coliform. This will assure that neither pollution nor nuisance will occur and that the highest water quality will be maintained.

    The Civic Center Facility is designed to remove nitrogen-related compounds and bacteria, but not total dissolved solids, sulfate, chloride, and boron (collectively salts). Wastewater discharged either from the existing OWDSs, if the Civic Center Facility is not available, or from the Civic Center Facility, will result in the same impacts on the salt concentrations at the groundwater in the Malibu Valley Groundwater Basin.

The discharge authorized by this Order is consistent with the maximum benefit of the people of the State. The Civic Center Facility will produce better quality effluent than that generated by the existing OWDSs because it will have significantly improved treatment of bacteria using ultraviolet disinfection and the nitrate loading to shallow aquifer is expected to be reduced by as much as 60%. The use of treated effluent for irrigation will result in conservation of potable water of up to approximately 43,000 GPD in Phase I and 97,000 GPD in Phase II. The use of OWDSs has resulted in impaired water quality in Malibu Creek and Malibu Lagoon and the aquifers underlying the Malibu Civic Center Area. The Civic Center Facility will replace the use of OWDSs with a much greater level of treatment and control, which will eliminate the impacts of those discharges on Malibu Creek, Malibu Lagoon, Santa Monica Bay and the groundwater.

25. **AB 685 – CWC Section 106 –** It is the policy of the State of California that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes. This order promotes that policy by requiring discharges to meet maximum contaminant levels developed to protect human health and ensure that water is safe for domestic use.

26. These WDRs/WRRs are established pursuant to CWC section 13263 because this project has the potential to affect the quality of the waters of the State, to impact the beneficial uses of those waters, or to cause a nuisance. These WDRs/WRRs conform to CWC section 13523 and State Water Board Resolution 2009-011, the Recycled Water Policy, because they meet the need for recycled water use.

27. Section 13523 of the CWC provides that a Regional Board, after consulting with and receiving recommendations from DDW or its delegated local health agency, and after any necessary hearing, shall, if it determines such action to be necessary to protect the health, safety, or welfare of the public, prescribe water recycling requirements for water that is used or proposed to be used as recycled water. Section 13523 further provides at a minimum that the recycling requirements shall include, or be in conformance with, the statewide water recycling criteria established by DDW pursuant to Water Code Section 13521. DDW adopted revised Water Recycling Criteria (Chapter 3, Division 4, Title 22, CCR) that became effective on June 18, 2014. Criteria applicable to this recycling project are prescribed in this Order.

28. These WRRs are established pursuant to CWC section 13523. The WRRs prescribe the limits for recycled water and the City's responsibilities for the production and monitoring of recycled water. The City is also responsible for inspecting point-of-use facilities, and ensuring compliance with the WRRs contained in this Order.

    The City prepared the *Phase I Title 22 Engineering Report*, dated August 2014, on its proposed production, distribution, and use of recycled water for irrigation as required by section 60323 of Title 22, CCR. On September 18, 2014, Engineering Report was approved by DDW with additional requirements, specified in Section VII.10. of this Order. All additional requirements had been incorporated with this Order and the accompanying MRP.

29. The requirements contained in this Order are in conformance with the goals and objectives of the Basin Plan and the Ocean Plan and implement the requirements of the CWC and Title 22.

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30. **Publicly Owned Treatment Works (POTW)** – The term POTW means a treatment works as defined by section 212 of the federal Clean Water Act, which is owned by a State or municipality (as defined by section 502(4) of the Act). This definition includes any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes and other conveyances only if they convey wastewater to a POTW treatment facility. The term also means the municipality as defined in section 502(4) of the Clean Water Act, which has jurisdiction over the indirect discharges to and the discharges from such treatment works. (40 CFR 403.3(q)).

CEQA AND NOTIFICATION

31. The City is the lead agency for purposes of the California Environmental Quality Act (CEQA) (Pub. Res. Code §§21000 et seq). In accordance with CEQA, the City released a Notice of Preparation (NOP) on November 21, 2013. The NOP provided notice to the public and public agencies that an Environmental Impact Report (EIR) would be prepared for the construction of the Civic Center Facility Project and its discharge to groundwater. The Draft EIR and a Recirculated Draft EIR were released for public comment on May 30, 2014 and June 12, 2014, respectively, with notices published in the Malibu Times, notices mailed interested parties and circulation to response agencies through the State Clearinghouse (SCH No. 2013111075). On July 21, 2014, the City conducted a Planning Commission public hearing to accept verbal comments on the Draft EIR. Through this period, written and oral comments were received from a total of 32 agencies, organizations and individuals. The City has incorporated responses to all written and oral comments into the Final EIR. On December 15, 2014, the City Council held a public hearing. ~~and certified t~~The Final EIR was certified by the City Council on January 12, 2015.

32. The Regional Water Board is a responsible agency for purposes of CEQA and has considered the EIR prepared by the City as required by the CEQA Guidelines (Title 14 CCR, Chap. 3, Section 15096). Because the EIR did not identify significant environmental effects with respect to water quality, this Order does not include specific mitigation measures for purposes of CEQA. The Regional Board has incorporated requirements into this Order to protect the quality of the waters of the state consistent with the applicable plans and policies that apply to the discharges regulated by this Order and has established a monitoring and reporting program to determine compliance with the terms of the Order and to assure protection of water quality.

33. *Public Notice* – On December 23, 2014, the Regional Board notified the City and interested agencies and persons via Lyris mailing system, regular mails, and electronic mails on December 30, 2014 of its intent to issue WDRs/WRRs Order No. R4-2015-XXXX for the discharge to groundwater, distribution and use of secondary treated and disinfected effluent as recycled water, and has provided an opportunity to submit written comments.

The Regional Board, in a public meeting, heard and considered all comments pertaining to these WDRS/WRRs.

IT IS HEREBY ORDERED that the City shall comply with the following:

I. INFLUENT LIMITS AND REQUIREMENTS

Influent wastewater shall be limited to wastewater only from the Malibu Civic Center Area.

II. TERTIARY-TREATED EFFLUENT/RECYCLED WATER LIMITS

1. The maximum quantities of the tertiary-treated effluent shall not exceed the design capacity of the Civic Center Facility, 191,000 GPD for Phase I and 361,000 GPD for Phase II.

2. The Title 22 recycled water for irrigation and groundwater disposal via injection shall not exceed the design capacities of the Civic Center Facility, specified in Table 8. Discharge of treated wastewater to groundwater through percolation shall not exceed the quantities specified in Table 8.

Table 8 – Maximum Discharge Quantities of Effluent and Maximum Quantities of Recycled Water Applications at Phase I and Phase II		
Phase	Maximum Volume Discharge from Civic Center Facility for Groundwater Injection and Recycled Water Used for Irrigation (GPD)	Groundwater Percolation as Backup (GPD)
I	191,000	50,000
II	361,000	100,000

3. The DDW has approved the use of recycle water for landscape irrigation for the Phase I project. If the City plans to use the recycled water for other purposes, the City must submit the request letter and the Title 22 Engineering Report to DDW and the Regional Board for review and approval.

4. Recycled water applications for Phase II is subject to DDW's approval. The City must furnish the Title 22 Engineering Report for Phase II recycled water use for DDW's approval prior to the application of recycled water produced by Phase II.

5. The effluent/recycled water shall not contain constituents with concentrations exceeding limits listed in Table 9.

Table 9 – Effluent/Recycled Water Limits						
Constituents	Units	Monthly Average	Weekly Average	Daily Maximum	Instantaneous Minimum [1]	Instantaneous Minimum [2]
Oil and grease	mg/L	10 [3]	---	15 [3]	---	---
Total suspended solids	mg/L	15 [3]	40 [3]	45 [3]	---	---
	% removal	≥ 85 [4]	---	---	---	---

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Table 9 – Effluent/Recycled Water Limits						
Constituents	**Units**	**Monthly Average**	**Weekly Average**	**Daily Maximum**	**Instantaneous Minimum [1]**	**Instantaneous Minimum [2]**
$BOD_{5@20^{\circ}C}$	mg/L	20 [3]	30 [3]	45 [3]	---	---
	% removal	≥ 85 [4]	---	---	---	---
pH	pH units	---	---	---	6.5 [3, 5]	8.5 [3, 5]
MBAS	mg/L	0.5 [6]	---	---	---	---
Nitrate + Nitrite as Nitrogen	mg/L	8 [7]	---	---	---	---
Nitrate as Nitrogen	mg/L	8 [7]	---	---	---	---
Nitrite as Nitrogen	mg/L	1 [8]	---	---	---	---
Total Dissolved Solids	mg/L	2,000 [8]	---	---	---	---
Sulfate	mg/L	500 [8]	---	---	---	---
Chloride	mg/L	500 [8]	---	---	---	---
Boron	mg/L	2.0 [8]	---	---	---	---

[1]. Instantaneous Minimum Effluent Limit: The lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limit).
[2]. Instantaneous Maximum Effluent Limit: The highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limit).
[3]. Limits are based on best professional judgment. Limits adopted by this Regional Board exist in the permits for tertiary-treated wastewater treatment plants.
[4]. Limits are based on secondary treatment requirements, 40 CFR section 133.102.
[5]. Excursion from this range shall not be considered a violation provided the duration is not more than 10 minutes in a 24-hour period, and pH shall at all times be within 6 to 9.
[6]. Basin Plan Title 22 Drinking Water Standard for methylene blue activated substances (MBAS.
[7]. Limits are determined based on the model results, and to be consistent with State Water Board Resolution No. 68-16.
[8]. Basin Plan Groundwater Quality Objective.

6. Recycled water used for irrigation and waste disposal via aquifer injection and groundwater percolation shall be limited to tertiary-treated and disinfected effluent only, as proposed. The tertiary-treated and disinfected effluent used as recycled water is wastewater that has been filtered and subsequently disinfected with UV that meets the following criteria:

   A. UV disinfection shall comply with the "Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse" (August 2012) published by the National Water Research Institute, which specifies for permeability of membrane filtration that:

      a. The design UV dose shall be at least 80 millijoules per square centimeter (mJ/cm^2) under maximum daily flow; and,

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b. The filtered effluent UV transmittance shall be 65% or greater at 254 nanometer.

The City shall submit a performance testing protocol for the UV system prior to operation and submit results of the performance testing to the Executive Officer of the Regional Board and DDW as they become available.

B. Effluent shall be, at all times, adequately disinfected and oxidized. In the event that the effluent exceeds any of the following, based on daily grab samples, the City shall suspend recycled water applications until such time that the cause of the failure has been identified and corrected. Any failure to meet the total coliform limits shall be reported to the DDW and the Regional Board in the next quarterly report.

a. A 7-day median of 2.2 most probable number (MPN) per 100 milliliters for two (2) consecutive days;

b. 23 MPN per 100 milliliters in more than one sample in any 30-day period; and,

c. 240 MPN per 100 milliliters in any sample.

C. A filtered wastewater shall be an oxidized wastewater that has been passed through membrane so that the turbidity of the filtered wastewater does not exceed any of the following:

a. 0.2 Nephelometric Turbidity Unit (NTU) more than 5 percent of the time within a 24-hour period; and,

b. 0.5 NTU at any time.

7. Maximum Contaminant Limits: The effluent shall not contain trace, toxic and other constituents in concentrations exceeding the applicable maximum contaminant levels (Attachment A) for drinking water established by the DDW in sections 64431 (Attachment A1), 64443 (Attachment A2), 64444 (Attachment A3), 64533 (Attachment A4), and 64449 (Attachment A5), Article 5, Chapter 15, Title 22 of the CCR, or subsequent revisions or at levels that adversely affect the beneficial uses of receiving groundwater. Concentrations of contaminants in the effluent shall, at all times, not exceed the following MCLs. In case of a violation of any primary or secondary MCL, the City shall notify and submit a report according to Provision IX.6. of this Order.

A. Primary MCLs specified in Chapter 15, Domestic Water Quality and Monitoring, Title 22, CCR:

a. Inorganic chemicals in Section 64431, Table 64431-A, except for nitrogen compounds, Attachment A1 of this Order;

b. Radionuclides in Section 64443, Table 4, Attachment A2 of this Order; and,

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c. Regulated organic chemicals in Section 64444, Table 64444-A, Attachment A3 of this Order.

B. Primary MCLs for disinfection byproducts specified in Chapter 15.5, Article 2, Section 64533, Table 64533-A, Attachment A4 of this Order.

C. Secondary MCLs in Chapter 15, Domestic Water Quality and Monitoring, Title 22, CCR, Table 64449-A, Attachment A5 of this Order.

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III. GROUNDWATER LIMITS

1. Groundwater at Well Nos. SMBRP-9, SMBRP-12, LAMW-5S, TY-MW-1, MCWP-MW04D, MCWP-MW04S, MCWP-MW07S, and MCWP-MW09 shall not contain constituents with concentrations exceeding limits listed in Table 10.

Table 10 – Groundwater Limits

Constituents	Units	Monthly Average	7-Day Average	Single Sample Maximum
Nitrate + Nitrite as Nitrogen (for Civic Center Gravels)	mg/L	5 [1]	---	---
Nitrate + Nitrite as Nitrogen (for Shallow Alluvium)	mg/L	10 [2]	---	---
Total Dissolved Solids	mg/L	2,000 [3]	---	---
Sulfate	mg/L	500 [3]	---	---
Chloride	mg/L	500 [3]	---	---
Boron	mg/L	2.0 [3]	---	---
Total coliform	MPN/100mL	---	1.1[3]	---
Fecal coliform	MPN/100mL	---	1.1[3]	---

[1]. Limit for deep Well Nos. MCWP-MW09 and MCWP-MW04D is based on the anti-degradation analysis summarized in the report titled "*Assimilative Capacity and Antidegradation Analysis for Proposed Injection Dispersal*", dated May 15, 2014

[2]. Limit for shallow Well Nos. SMBRP-9, TY-MW-1, MCWP-MW04S, MCWP-MW07S, SMBRP-12, and LAMW-5S is based on Basin Plan Groundwater Quality Objectives.

[3]. Basin Plan Groundwater Quality Objectives.

2. The City shall monitor groundwater in both the Shallow Alluvium and Civic Center Gravels for a minimum of two years prior to operation of the Civic Center Facility to establish ambient groundwater quality in both aquifers. The City shall demonstrate that the discharges from the Civic Center Facility do not contribute to the degradation of groundwater quality above either the limits specified in Table 10 or ambient groundwater quality as established by monitoring. This shall be accomplished by compliance with the effluent limits on Table 9.

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IV. SPECIFICATIONS FOR USE OF RECYCLED WATER

1. The City is the distributor of the recycled water and responsible for recycled water uses for landscape irrigation, specified in Table 8. The City shall submit a revised Title 22 Engineering Report to DDW and the Regional Board for review and approval, if additional recycled water use is proposed.

2. Recycled water shall not be used for direct human consumption or for the processing of food or drink intended for human consumption.

3. The delivery of recycled water to end-users shall be subject to DDW approval and/or its delegated local agency.

4 The Executive Officer of the Regional Board is delegated with authority to approve the new recycled water application(s), including quantity, upon the DDW's approval recommendation letter on a revised Title 22 Engineering Report received by this Regional Board.

V. USE AREA REQUIREMENTS

"Use area" means an area with defined boundaries, which may contain one or more facilities where recycled water is used. The City shall be responsible to ensure that all users of recycled water comply with the following:

1. No irrigation with, or impoundment of, disinfected secondary-treated recycled water shall take place within 900 feet of any domestic water supply well.

2. Recycled water shall be applied at agronomic rates and when soil is not saturated, such that volume does not ~~such a rate and volume as not to~~ exceed vegetative demand and soil moisture conditions. Special precautions must be taken to prevent clogging of spray nozzles and over-watering, and minimize the production of runoff. Pipelines shall be maintained so as to prevent leakage.

3. Any incidental runoff from recycled water projects shall be handled as follows:

   A. The discharge of recycled water to surface water is prohibited.

   B. Discharges of recycled water to surface waters may only occur where regulated under a separate NPDES permit issued by the Regional Board.

   Incidental runoff is defined as unintended small amounts (volume) of runoff from recycled water use areas, such as unintended, minimal over-spray from sprinklers that escapes the recycled water use area. Irrigation system maintenance shall be consistent with the requirements found in the State Board's Recycled Water Policy.

4. Spray, mist, or runoff shall not enter dwellings, designated outdoor eating areas, or food handling facilities, and shall not contact any drinking water fountain.

5. Recycled water shall not be used for irrigation during periods of rainfall and/or runoff.

6. Recycled water shall be retained on the designated area and shall not be allowed to escape as surface flow.

7. All recycled water use areas that are accessible to the public shall be posted with signs that are visible to the public, in a size no less than 4 inches high by 8 inches wide, that include the following wording: "RECYCLED WATER – DO NOT DRINK" as shown in Figure 7. Each sign shall display an international symbol similar to that shown in Figure 7. An alternative signage and wording may be used upon approval by the Executive Officer of the Regional Board.

8. No physical connection shall be made or allowed to exist between any recycled water piping and any piping conveying potable water, except as allowed under Section 7604 of Title 17, CCR.

9. The portions of the recycled water piping system that are in areas subject to access by the general public shall not include any hose bibs (a faucet or similar device to which a common garden hose can be readily attached). Only quick couplers that differ from those used on the potable water system shall be used on the portions of the recycled water piping system in areas subject to public access.

10. Recycled water use shall not result in earth movement in geologically unstable areas.

VI. REQUIREMENTS FOR DUAL-PLUMBED SYSTEM

1. "Dual plumbed" means a system that utilizes separated piping systems for recycled water and potable water within a facility and where the recycled water is used for either of the following purposes:

   A. To serve non-potable plumbing outlets (excluding fire suppression systems) within a building; or,

   B. Outdoor landscape irrigation at individual residences.

2. The public water supply shall not be used as a backup or supplemental source of water for a dual-plumbed recycled water system unless the connection between the two (2) systems is protected by an air gap separation which complies with the requirements of Section 7602 (a) and 7603 (a) of Title 17, CCR, and that such connection has been approved by the DDW and/or its delegated local agency.

3. The City shall not deliver recycled water to a facility using a dual-plumbed system unless the report required pursuant to Section 13522.5 of the CWC, and which meets the requirements set forth in sections VI.4. and/or VI.5. of this Order, has been submitted, and approved by, DDW or its delegated local agency and the Regional Board. The Regional Board shall be furnished with a copy of the DDW approval within 30 days following the approval.

4. Prior to the initial operation of the dual-plumbed recycled water system and annually thereafter, the dual-plumbed system within each facility and use site shall be inspected for possible cross connections with the potable water system. The recycled water system shall also be tested for possible cross connections at least

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once every four (4) years. The inspections and the testing shall be performed by a cross connection control specialist certified by the California-Nevada section of the American Water Works Association or an organization with equivalent certification requirements. A written report documenting the result of the inspection and testing for the prior year shall be submitted to the DDW within 30 days following completion of the inspection or testing.

5. The City shall notify DDW of any incidence of backflow from the dual-plumbed recycled water system into the potable water system within 24 hours of discovery of the incident.

6. Any backflow prevention device installed to protect the public water system serving the dual-plumbed recycled water system shall be inspected and maintained in accordance with Section 7605 of Title 17, CCR.

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VII. GENERAL REQUIREMENTS

1. Bypass, discharge, or delivery to the use area of inadequately treated recycled water, at any time, is prohibited.

2. The recycling facility and areas where any potential pollutants are stored shall be adequately protected from inundation and damage by storm flows and runoff.

3. Adequate freeboard and/or protection shall be maintained in the recycled water storage tanks and process tanks to ensure that direct rainfall will not cause overtopping.

4. The wastewater treatment and use of recycled water shall not result in nuisance conditions caused by breeding of mosquitoes, gnats, midges, or other pests.

5. Odors of sewage origin shall not be perceivable any time outside the boundary of the treatment facility.

6. The City shall, at all times, properly operate and maintain all treatment facilities and control systems (and related appurtenances), which are installed or used by the City to achieve compliance with the conditions of this Order. Proper operation and maintenance includes: effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls (including appropriate quality assurance procedures).

7. Any wastes that do not meet the foregoing requirements shall be held in impervious containers and discharged at a legal point of disposal.

8. A copy of these requirements shall be maintained at the wastewater treatment facility so as to be available at all times to operating personnel.

9. Based on DDW's conditional approval letter, dated September 18, 2014 to the Regional Board, the City shall fulfill the following requirements:

   A. The *Phase I Title 22 Engineering Report* is acceptable for the intended use of the recycled water generated by the Civic Center Facility for landscape irrigation only. If the City plans to pursue additional recycled water uses, the City must submit an engineering report to DDW and the Regional Board for review and approval.

B. The City shall establish an ordinance to regulate any new wells proposed in the Civic Center Area. The ordinance shall protect the beneficial uses of groundwater and human health. Such an ordinance must be established prior to the initiation of the Civic Center Facility operation.

C. Backflow devices are required to prevent cross contamination, as the Civic Center Facility will be able to access potable water should recycled water deliveries not be available. A swing tee or removable pipe section will be included at the Civic Center Facility site, and appropriate backflow prevention measures will be taken as part of the connection process. In accordance with Section 7604 of the Title 17, Table 1(c)(1), air-gap devices shall be provided at premises where the public water system is used to supplement the recycled water supply. An air-gap separation shall be at least double the diameter of the supply pipe and in no case shall this separation be less than one inch pursuant to Section 7602. The location of an-air-gap separation shall be located as close as practical to the user's connection pursuant to Section 7603. The DDW recommends the City to obtain certified cross connection control specialist(s) to inspect and test for potential cross connections.

D. The City shall provide uninterrupted chlorine feed pursuant to Section 60353 of Title 22.

E. The off-spec (inadequately treated) water shall be diverted to an equalization basin. Off-spec water must either be directed back to the head of the Civic Center Facility for another treatment. The City must consult with the Regional Board for the requirements of disposing treated or inadequately treated recycled water.

F. In accordance with Section 60321(a) of Title 22, disinfected tertiary recycled water shall be sampled at least once daily for total coliform bacteria. The coliform samples must be taken when the Civic Center Facility is in operation. The samples shall be taken from the disinfected effluent and analyzed by an approval laboratory. The results of total coliform bacteria shall be reported quarterly to the regulatory agencies.

G. In accordance with Section 60321(b) of Title 22, turbidity must be sampled continuously using a continuous turbidity meter and recorder. The turbidity samples must be taken at intervals of no more than 1.2 hours over a 24-hour period to determine compliance for turbidity. If the continuous turbidity meter and recorder failed, grab sampling may be substituted for a period of up to 24-hours. The results of t shall be reported quarterly to the regulatory agencies.

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H. In accordance with Section 64572(d) of Title 22, crossing of potable and non-potable water pipeline shall be constructed no less than 45-degrees and potable water pipeline shall be at least one foot above that pipeline. No connection joints shall be made in the water main within four horizontal feet of the non-potable pipeline.

10. Ponds will be maintained to ensure that percolation rate at the pond bottom will not decrease over time. The City shall submit the as-built dimensions of three percolation ponds to the Regional Board, when they built with the Civic Center Facility.

11. The distribution and irrigation systems shall be maintained by the City.

12. The quality of treated wastewater shall continue to improve after being injected and migrating through aquifer that is defined as part of the treatment zone in the subsurface.

VIII. PROHIBITIONS

1. Wastes discharged and recycled water applications shall not contain tastes, odors, color, foaming, any materials, or other objectionable characteristics in concentrations that would:

   A. Affect human, animal, and plant life;

   B. Cause nuisance or adversely affect the beneficial uses and quality of the receiving groundwater; and,

   C. Impact ocean water that may be in hydraulic connection with groundwater.

2. Discharge of waste classified as 'hazardous', as defined in Section 2521(a) of Title 23, CCR, Section 2510 et seq., is prohibited. Discharge of waste classified as 'designated,' as defined in CWC Section 13173, in a manner that causes violation of receiving water limits, is prohibited.

3. The recycled water storage basin and storage tank shall not contain floating materials, including solids, foams or scum in concentrations that cause nuisance, adversely affect beneficial uses, or serve as a substrate for undesirable bacterial or algae growth or insect vectors.

4. There shall be no onsite disposal of sludge. Sludge-drying activities are allowed, but only as an intermediate treatment prior to offsite disposal. Any offsite disposal of wastewater or sludge shall be made only to a legal point of disposal. For purposes of this Order, a legal disposal site is one for which requirements have been established by a California Regional Board or comparable regulatory entity, and which is in full compliance therewith. Any wastewater or sludge handling shall be in such a manner as to prevent its reaching surface waters or watercourses.

5. Odors originating at this facility shall not be perceivable beyond the limits of the facility property owned by the City.

6. No new connections may be made without notification to the Regional Board.

7. The discharge of waste shall not create a condition of pollution, contamination, or nuisance.

8. Bypass, discharge or overflow of untreated wastes, except as allowed by Section VIII.9. of this Order, is prohibited.

9. Bypass (the intentional diversion of waste stream from any portion of a treatment facility) is prohibited. The Regional Board may take enforcement action against the City for bypass unless:

   A. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage. (Severe property damage means substantial physical damage to property, damage to the treatment facilities that cause them to become inoperable, or substantial and permanent loss in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.)

   B. There were no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated waste, or maintenance during normal periods of equipment down time. This condition is not satisfied if adequate back-up equipment shall have been installed in the exercise of reasonable engineering judgment to prevent a bypass that could occur during normal periods of equipment downtime or preventive maintenance.

   C. The City must submit written notice at least 24 hours in advance of the need for a bypass to the Regional Board Executive Officer.

10. Any discharge of wastewater from the treatment system (including the wastewater collection system) at any point other than specifically described in this Order and except as provided for in Section VIII.9 of this Order, is prohibited.

11. Any injection of treated wastewater at any point(s) other than three (3) injection wells defined in this Order is prohibited.

12. The discharge of effluent, including runoff, spray or droplets from the irrigation system, shall not occur outside the boundaries of the land application area.

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IX. PROVISIONS

1. The City shall submit plans for any change of the recycled water project to and obtain approval from DDW and the Regional Board. The American Water Works Association Guidelines for the Distribution of Non-Potable Water shall be followed, including installation of purple pipe, adequate signs, etc. As-built drawings shall show the final locations of the potable water, sewer, and recycled water pipelines; and indicate adequate separation between the recycled water and potable domestic water lines, which shall also be marked clearly or labeled using separate colors for identification. In addition, a copy of each application to DDW for a recycled water project shall be delivered to the Regional Board for inclusion in the administrative file.

2. If the recycled water system lateral pipelines are located on an easement contiguous to a homeowners private property and where there is a reasonable probability that an illegal or accidental connection to the recycled water line could be made, the City shall provide a buffer zone or other necessary measures between the recycled water lines and the easement to prevent any illegal or accidental connection to the recycled water lines. The City shall notify such homeowners about the recycled water lateral and restrictions on usage of recycled water.

3. The City shall inspect the recycled water use areas on a periodic basis. A report of findings of the inspection shall be submitted to DDW and the Regional Board.

4. The City shall submit to the Regional Board, under penalty of perjury, technical self-monitoring reports according to the specifications contained in the Monitoring and Reporting Program as directed by the Executive Officer.

5. The City shall notify DDW and this Regional Board by telephone or electronic means within 24 hours of knowledge of any violations of recycled water use conditions, any adverse conditions as a result of the use of recycled water and any discharge exceeding the effluent limits prescribed in this Order from the Civic Center Facility or/and the recycled water storage basin; written confirmation shall follow within 5 working days from date of notification, unless otherwise specified in this Order. The report shall include, but not limited to, the following information, as appropriate:

   A. Nature and extent of the violation;

   B. Date and time: when the violation started, when compliance was achieved; and, when injection was suspended and restored, as applicable;

   C. Duration of violation;

   D. Cause(s) of violation;

   E. Corrective and/or remedial actions taken and/or will be taken with time schedule for implementation to prevent future violations; and

   F. Impact of the violation.

6. The direct use of disinfected recycled water for irrigation and unpaved roadway dust control could affect the public health, safety, or welfare; requirements for such uses are therefore necessary in accordance with Section 13523 of the CWC.

7. The 50,000-gallon recycled water storage tank shall comply with the following provisions:

   A. The recycled water storage tank is designed not to spill during wet months. Under this circumstance, spills that occur under extreme weather conditions or emergencies should not be considered for enforcement.

   B. The recycled water storage tank can be drained and refilled with potable water or flushed with potable water prior to the onset of the wet season. Flushing will not displace all of the recycled water but the water quality threat is minimal.

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8. This Order does not exempt the City from compliance with any other laws, regulations, or ordinances which may be applicable; they do not legalize the recycling and use facilities; and they leave unaffected any further constraint on the use of recycled water at certain site(s) that may be contained in other statutes or required by other agencies.

9. This Order does not alleviate the responsibility of the City to obtain other necessary local, state, and federal permits to construct facilities necessary for compliance with this Order; nor does this Order prevent imposition of additional standards, requirements, or conditions by any other regulatory agency. Expansion of the recycled water distribution facility shall be contingent upon issuance of all necessary requirements and permits, including a conditional use permit.

10. After notice and opportunity for a hearing, this Order may be modified, revoked and reissued, or terminated for cause, that include, but is not limited to: failure to comply with any condition in this Order, endangerment of human health or environment resulting from the permitted activities in this Order, obtaining this Order by misrepresentation or failure to disclose all relevant facts, and acquisition of new information which could have justified the application of different conditions if known at the time of Order adoption.

    The filing of a request by the City for modification, revocation and reissuance, or termination of the Order; or a notification of planned changes or anticipated noncompliance does not stay any condition of this Order.

11. The City shall furnish, within a reasonable time, any information that the Regional Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order. The City shall also furnish the Regional Board, upon request, with copies of records required to be kept under this Order for at least three (3) years.

12. In an enforcement action, it shall not be a defense for the City that it would have been necessary to halt or to reduce the permitted activity in order to maintain compliance with this Order. Upon reduction, loss, or failure of the treatment facility, the City shall, to the extent necessary to maintain compliance with this Order, control production or all discharges, or both, until the facility is restored or an alternative method of treatment is provided. This provision applies, for example, when the primary source of power of the treatment facility fails, is reduced, or is lost.

13. This Order includes "Standard Provisions Applicable to Waste Discharge Requirements" (Attachment B – Standard Provisions). In the event of conflict between provisions stated herein and the Standard Provisions, the provisions stated herein prevail.

14. This Order includes the WDRs/WRRs and the attached MRP (CI No. 10042). If there is any conflict among provisions stated in the MRP and these WDRs/WRRs, those provisions stated herein before prevail.

15. After a year of injecting treated wastewater into the aquifers, the City shall update the OMM Plan and submit it to the Regional Board for review and approval, if there is

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any change to the original OMM Plan. The Civic Center Facility shall be operated in accordance with the approved OMM Plan.

The OMM Plan shall cover critical operational parameters to include routine testing procedures for optimization of the UV dose for disinfection and reduction of light-sensitive contaminants, and all treatment processes, maintenance and calibration schedules for all monitoring equipment, process alarm set points, and response procedures for all alarms in each treatment process of the Civic Center Facility, including criteria for diverting recycled water if water quality requirements are not met, start-up, emergency response and contingency plans. During the first year of operation of the Civic Center Facility, all treatment processes shall be optimized to reduce contaminant levels. The results of these initial optimization efforts shall be incorporated into the updated OMM Plan. The OMM Plan shall include staffing levels with applicable certification levels for the Civic Center Facility operations personnel. Significant changes in the operation of any of the treatment processes shall be reported to the DDW and the Regional Board. Changes in the approved OMM Plan must be approved by the DDW and the Regional Board prior to instituting changes.

Six (6) months prior to initiating Phase II Project planning, the City shall submit the Phase II Title 22 Engineering Report, with necessary updates, to DDW and the Regional Board for approval. The City shall furnish a copy of DDW's approval letter of the Phase II Title 22 Engineering Report to the Regional Board. The City is not allowed to use any recycled water prior to receiving the DDW's approval letter.

16. For any material change or proposed change in character, location or volume of recycled water, or its uses, the City shall submit at least 120 days prior to the proposed change an engineering report or addendum to the existing engineering report to the Regional Board and DDW [pursuant to CWC, section 13522.5 and CCR, Title 22, Section 60320.080] for approval. The Title 22 Engineering Report shall be prepared by a qualified engineer and geologist, registered or certified in the State of California. However, replacement of injection wells will not require a report of material change, or filing of a new Report of Waste Discharge.

17. The City shall provide an Annual Report described in the MRP to this Regional Board.

18. In order to limit the presence of constituents of concerns specified in Section II in the effluent and the recycled water including regulated and unregulated contaminants identified in Attachments A1 to A5 and Attachments C to E of the accompanying MRP, the City shall, for the purposes of protecting public health, ensure that its equipment and facilities for treatment and disposal operate at levels of peak performance.

19. Spill Clean-Up Contingency Plan (SCP) Requirements – Within ninety (90) days, the City is required to submit a SCP, which describes the activities and protocols to address clean-up of spills, overflows, and bypasses of untreated or partially treated wastewater from the City's collection system or treatment facilities. At a minimum, this SCP shall include sections on spill clean-up and containment measures, public notification, and monitoring. The City shall review and amend this SCP as

appropriate after each spill from the Civic Center Facility or in the service area of the Civic Center Facility. The City shall include a discussion in the annual summary report of any modifications to the SCP and the application of the SCP to all spills during the year.

20. Construction, Operation, and Maintenance Requirements

A. The Civic Center Facility subject to this Order shall be supervised and operated by persons possessing certificates of appropriate grade pursuant to CCR, Title 23, division 3, chapter 26 (Section 13625 - 13633).

B. The City shall maintain in good working order a sufficient alternate power source for operating the wastewater treatment and disposal facilities. All equipment shall be located to minimize failure due to moisture, liquid spray, flooding, and other physical phenomena. The alternate power source shall be designed to permit inspection and maintenance and shall provide for periodic testing. If such alternate power source is not in existence, the City shall halt, reduce, or otherwise control all discharges upon the reduction, loss, or failure of the primary source of power.

C. The City shall provide standby or emergency power facilities and/or storage capacity or other means so that in the event of plant upset or outage due to power failure or other cause, discharge of raw or inadequately treated sewage does not occur.

21. Sludge Disposal Requirements

A. All sludge generated at the wastewater treatment plant will be disposed of, treated, or applied to land in accordance with federal regulations contained in 40 CFR part 503. These requirements are enforceable by USEPA.

B. The City shall ensure compliance with the requirements in State Water Board Order No. 2004-10-DWQ, *"General Waste Discharge Requirements for the Discharge of Biosolids to Land for Use as a Soil Amendment in Agricultural, Silvicultural, Horticultural and Land Reclamation Activities"* for those sites receiving the City's biosolids which a Regional Water Quality Control Board has placed under this general order, and with the requirements in individual Waste Discharge Requirements (WDRs) issued by a Regional Board for sites receiving the City's biosolids.

C. The City shall comply, if applicable, with WDRs issued by other Regional Boards to which jurisdiction the biosolids are transported and applied.

D. The City shall furnish this Regional Board with a copy of any report submitted to USEPA, the State Water Board or other Regional Board, with respect to municipal sludge or biosolids.

22. Collection System Requirements

The State Water Board adopted General WDRs for Sanitary Sewer Systems, (WQ Order No. 2006-0003) on May 2, 2006, to provide a consistent, statewide regulatory

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approach to address SSO. The SSO WDRs require public agencies that own or operate sanitary sewer systems to develop and implement sewer system management plans and report all SSOs to the State Water Board's online SSO database. The City's collection system is part of the system that is subject to the WQ Order No. 2006-0003. As such, the City must properly operate and maintain its collection system (40 CFR part 122.41(e)). The City must report any non-compliance (40 CFR part 122.41(l)(6) and (7)) and mitigate any discharge from the collection system in violation of this Order (40 CFR part 122.41(d)).

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23. Spill Reporting Requirements

A. **Initial Notification** – Although State and Regional Board staff do not have duties as first responders, this requirement is an appropriate mechanism to ensure that the agencies that do have first responder duties are notified in a timely manner in order to protect public health and beneficial uses. For certain spills, overflows and bypasses, the City shall make notifications as required below:

a. In accordance with the requirements of Health and Safety Code section 5411.5, the City shall provide notification to the local health officer or the director of environmental health with jurisdiction over the affected water body of any unauthorized release of sewage or other waste that causes, or probably will cause, a discharge to any waters of the state as soon as possible, but no later than two (2) hours after becoming aware of the release.

b. In accordance with the requirements of CWC section 13271, the City shall provide notification to the California Emergency Management Agency (Cal EMA) of the release of reportable quantities of hazardous substances or sewage that causes, or probably will cause, a discharge to any waters of the state as soon as possible, but not later than two (2) hours after becoming aware of the release. CCR, Title 23, section 2250, established 1,000 gallons or more as a reportable quantity of sewage. The phone number for reporting these releases to the Cal EMA is (800) 852-7550.

c. The City shall notify the Regional Board of any unauthorized release of sewage from the Civic Center Facility that causes, or probably will cause, a discharge to a water of the state as soon as possible, but not later than two (2) hours after becoming aware of the release. This initial notification does not need to be made if the City has notified Cal EMA and the local health officer or the director of environmental health with jurisdiction over the affected waterbody. The phone number for reporting these releases of sewage to the Regional Board is (213) 576-6683. The phone numbers for after hours and weekend reporting of releases of sewage to the Regional Board are (213) 305-2284 and (213) 305-2253.

At a minimum, the following information shall be provided to the Regional Board:

i. The location, date, and time of the release;

ii. The water body that may be impacted by the discharge;

iii. An estimate of the amount of sewage or other waste released and the amount that reached the receiving water at the time of notification;

iv. If ongoing, the estimated flow rate of the release at the time of the notification;

v. The name, organization, phone number and email address of the reporting representative; and,

vi. A certification that the State Office of Emergency Services and the local health officer or directors of environmental health with jurisdiction over the possibly affected water bodies have been notified of the discharge.

B. **Monitoring** – For spills, overflows and bypasses reported under Section IX.23.A., the City shall monitor as required below:

To define the geographical extent of spill's impact, the City shall obtain grab samples (if feasible, accessible, and safe) for all spills, overflows or bypasses of any volume that reach any waters of the State (including surface and ground waters). The City shall analyze the samples for total and fecal coliforms, E. coli (if fecal coliform test shows positive), enterococcus, and relevant pollutants of concern, upstream and downstream of the point of entry of the spill (if feasible, accessible and safe). This monitoring shall be done on a daily basis from time the spill is known until the results of two (2) consecutive sets of bacteriological monitoring indicate the return to the background level or the County Department of Public Health authorizes cessation of monitoring.

C. **Reporting** – The initial notification required under Section IX.23.A. shall be followed by:

a. As soon as possible, but not later than twenty-four (24) hours after becoming aware of an unauthorized discharge of sewage or other waste from its wastewater treatment plant to a water of the state, the City shall submit a statement to Regional Board staff via email. If the discharge is 1,000 gallons or more, this statement shall certify that Cal EMA has been notified of the discharge in accordance with CWC section 13271. The statement shall also certify that the local health officer or director of environmental health with jurisdiction over the affected water bodies has been notified of the discharge in accordance with Health and Safety Code section 5411.5. The statement shall also include at a minimum the following information:

i. Agency, Order No., and MRP CI No.;

ii. The location, date, and time of the discharge;

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iii. The water body that received the discharge;

iv. A description of the level of treatment of the sewage or other waste discharged;

v. An initial estimate of the amount of sewage or other waste released and the amount that reached the impacted water body;

vi. The Cal EMA control number and the date and time that notification of the incident was provided to Cal EMA; and,

vii. The name of the local health officer or director of environmental health representative notified (if contacted directly); the date and time of notification; and the method of notification (e.g., phone, fax, email).

b. A written preliminary report shall be submitted to the Regional Board within five (5) working days after disclosure of the incident via the State Board GeoTracker database under Global ID WDR100000359. The final written report shall be included in the next quarterly monitoring report submitted to the GeoTracker database above. The written report shall document the information required in paragraph Section IX.23.D. below, monitoring results and any other information required in provisions of the Standard Provisions document including corrective measures implemented or proposed to be implemented to prevent/minimize future occurrences.

c. The City shall include a certification in the annual summary report (due according to the schedule in the accompanying MRP) that states that the sewer system emergency equipment, including alarm systems, backup pumps, standby power generators, and other critical emergency pump station components were maintained and tested in accordance with the City's preventive maintenance plan. Any deviations from or modifications to the Plan shall be discussed.

D. **Records** – The City shall prepare and maintain a record of all spills, overflows or bypasses of raw or partially treated sewage from its collection system or Civic Center Facility. This record shall be made available to the Regional Board upon request and a spill summary shall be included in the annual report, as required in the MRP CI No. 10042. The record shall contain:

a. The date and time of each spill, overflow, or bypass;

b. The location of each spill, overflow, or bypass;

c. The estimated volume of each spill, overflow, or bypass including gross volume, amount recovered and amount not recovered, monitoring results as required by Section IX.23.B.;

d. The cause of each spill, overflow, or bypass;

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e. Whether each spill, overflow, or bypass entered a receiving water and, if so, the name of the water body and whether it entered via storm drains or other man-made conveyances;

f. Any corrective measures implemented or proposed to be implemented to prevent/minimize future occurrences; and

g. The mandatory information included in Sanitary Sewer Overflows (SSO) online reporting for finalizing and certifying the SSO report for each spill, overflow, or bypass under the SSO WDR.

E. **Activities Coordination** – The Regional Board expects that the City will coordinate their compliance activities for consistency and efficiency with other entitles that have responsibilities to implement: (i) this WDRs/WRRs permit, and (ii) the SSO WDRs.

F. **Consistency with SSO WDRs –** The requirements contained in this Order in Sections IX.19. (SCP Requirements), IX.20. (Construction, Operation, and Maintenance Requirements), and IX.23. (Spill Reporting Requirements) are intended to be consistent with the requirements of the SSO WDRs. The Regional Board recognizes that there may be some overlap between the WDRs/WRRs permit provisions and SSO WDRs requirements. The requirements of the SSO WDRs are considered the minimum thresholds (see Finding 11 of WQ Order No. 2006-0003). To encourage efficiency, the Regional Board will accept the documentation prepared by the City under the SSO WDRs for compliance purposes, as satisfying the requirements in Sections IX.19., IX.20., and IX.23. provided the more stringent provisions enumerated in this Order, have also been addressed.

24. Constituents of Emerging Concerns (CEC) Requirements

A. In recent years, the Regional Board has incorporated monitoring of a select group of anthropogenic chemicals, particularly pesticides, pharmaceuticals and personal care products, known collectively as CECs, into permits to better understand the propensity, persistence and effects of CECs in our environment. Recently adopted permits in this region contain requirements for CEC effluent monitoring, including identification of the CECs to be monitored in the effluent, sample type, sampling frequency, and sampling methodology.

B. The City shall monitor the CECs in the effluent discharge as listed in Attachment C. Monitoring results shall be reported as part of the annual report. Analysis under this section is for monitoring purposes only. Analytical results will not be used for compliance determination purposes, since the methods have not been incorporated into 40 CFR part 136.

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X. REOPENER

This Order may be reopened any time at the Regional Board's discretion to include the most scientifically relevant, and appropriate limits or other requirements for the Civic

Center Facility and may specifically be reopened to make revisions consistent with an approved salt and nutrient management plan.

XI. EFFECTIVE DATE OF THE ORDER

This Order takes effect upon its adoption.

I, Samuel Unger, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Los Angeles Region on March 12, 2015.

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Samuel Unger, P.E.
Executive Officer

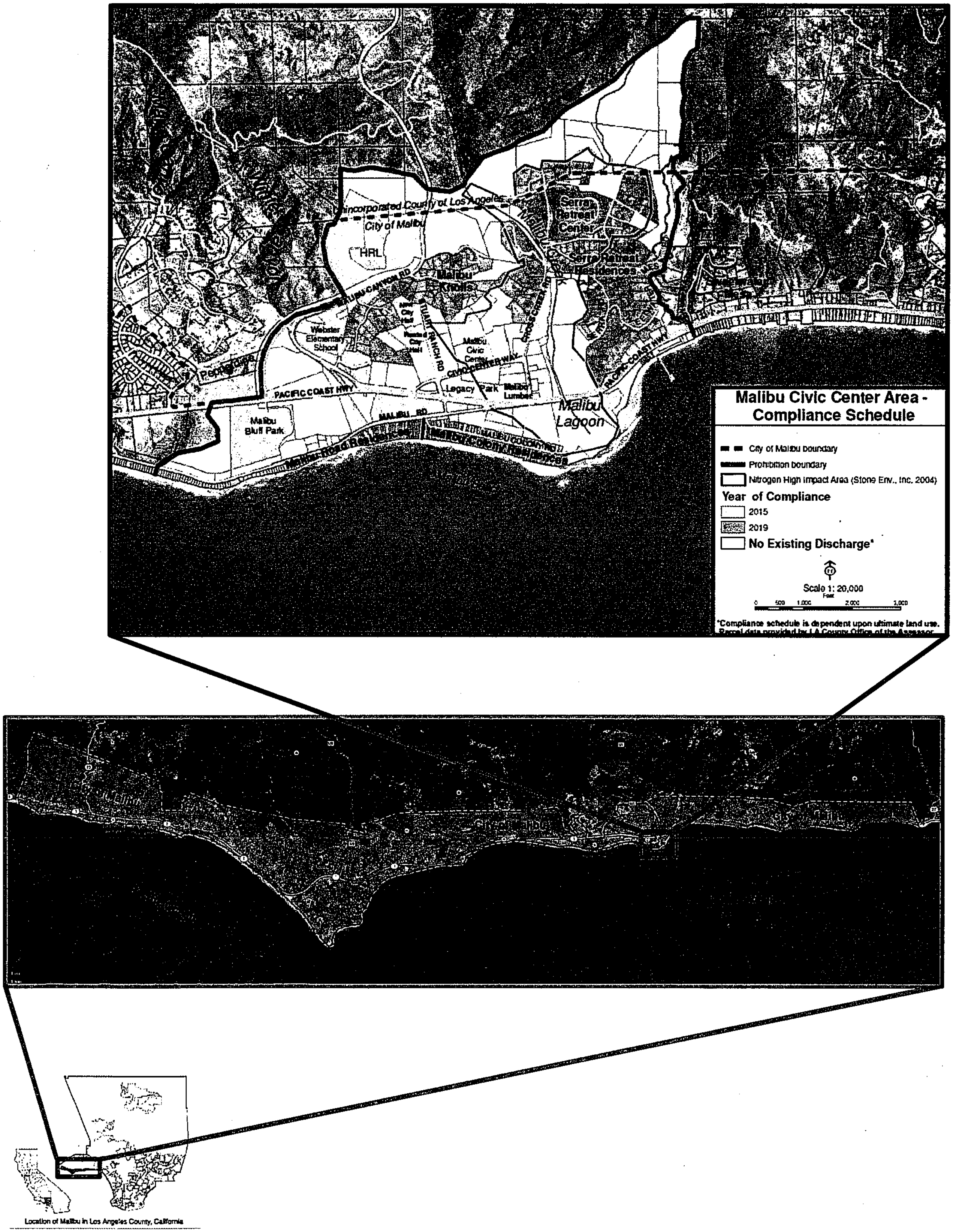

Figure 1 – Malibu Civic Center Area

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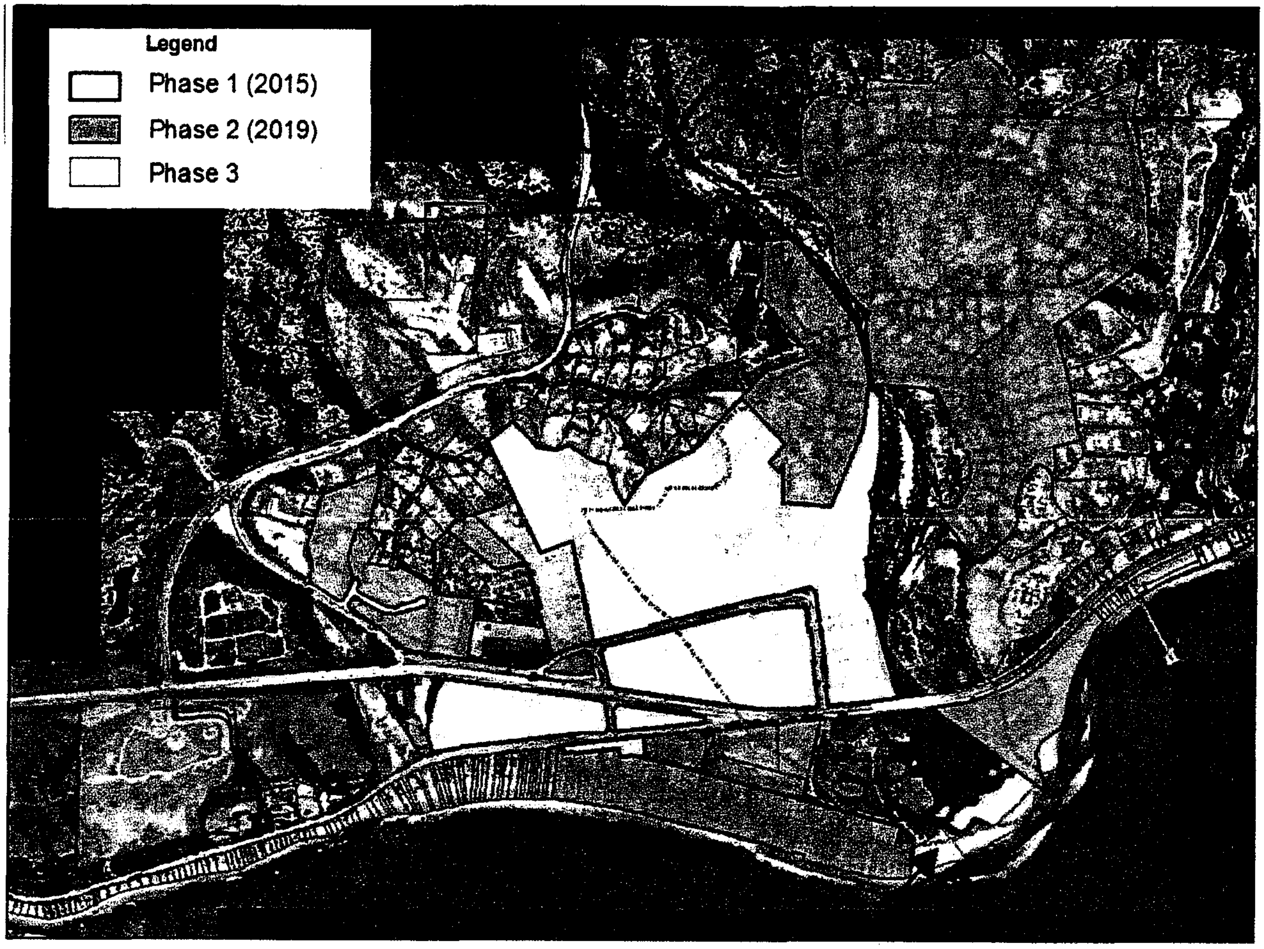

Legend
Phase 1 (2015)
Phase 2 (2019)
Phase 3

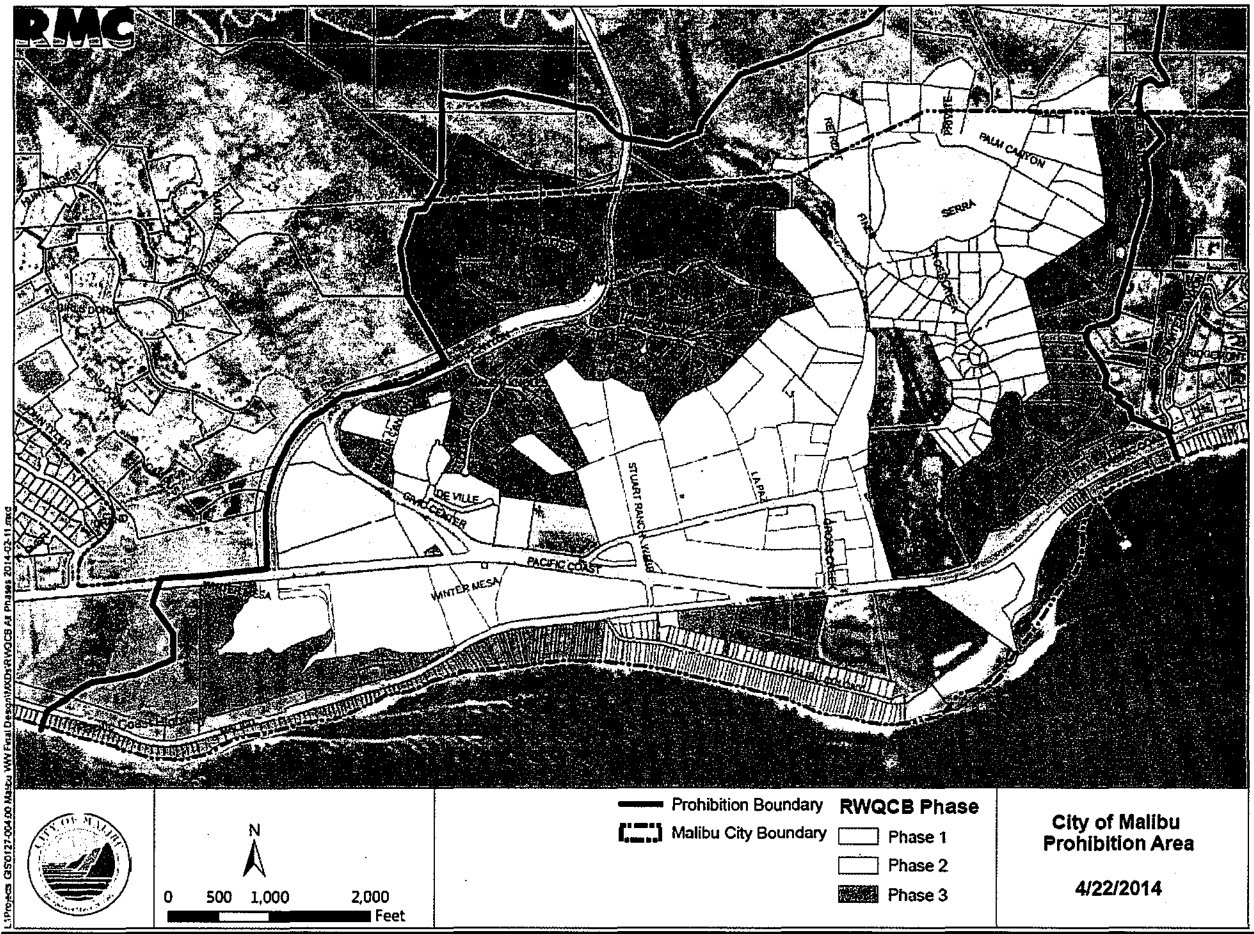


Figure 2 – Civic Center Wastewater Treatment Facility Phasing Options

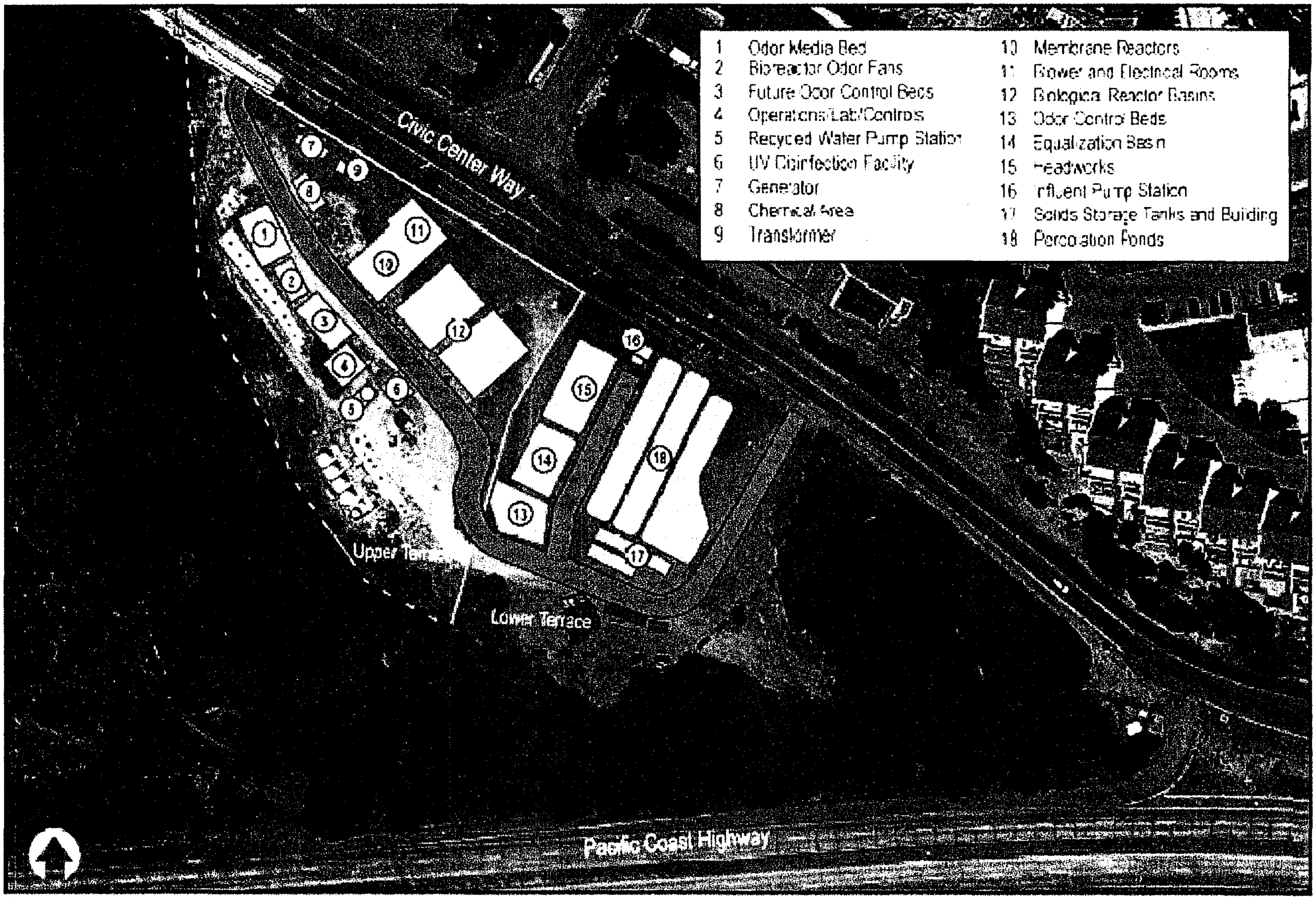
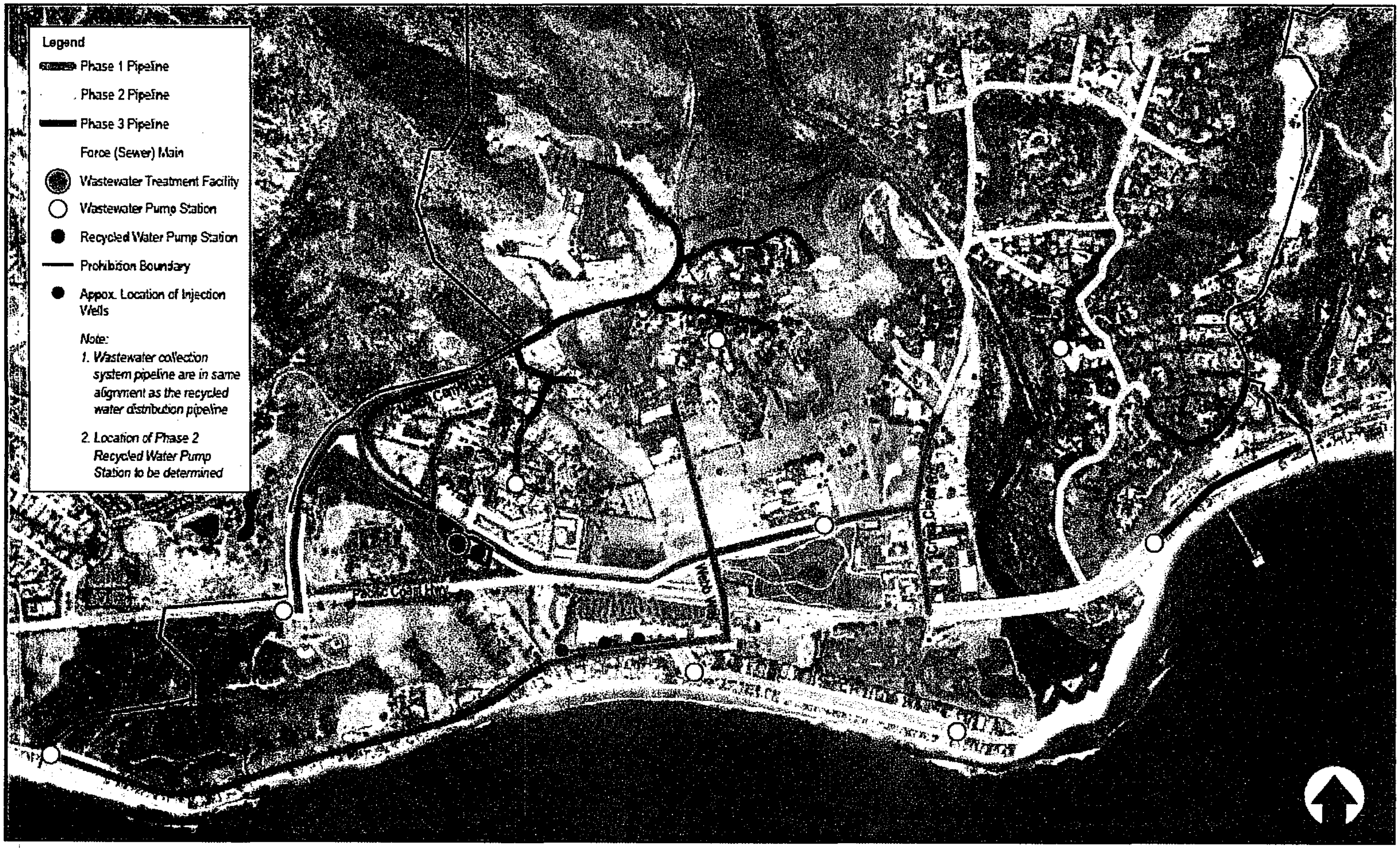


Figure 3 – Layouts of Malibu Civic Center Wastewater Treatment Facility


Legend
Phase 1 Pipeline
Phase 2 Pipeline
Phase 3 Pipeline
Force (Sewer) Main
Wastewater Treatment Facility
Wastewater Pump Station
Recycled Water Pump Station
Prohibition Boundary
Appox. Location of Injection Wells
Note:
1. Wastewater collection system pipeline are in same alignment as the recycled water distribution pipeline
2. Location of Phase 2 Recycled Water Pump Station to be determined

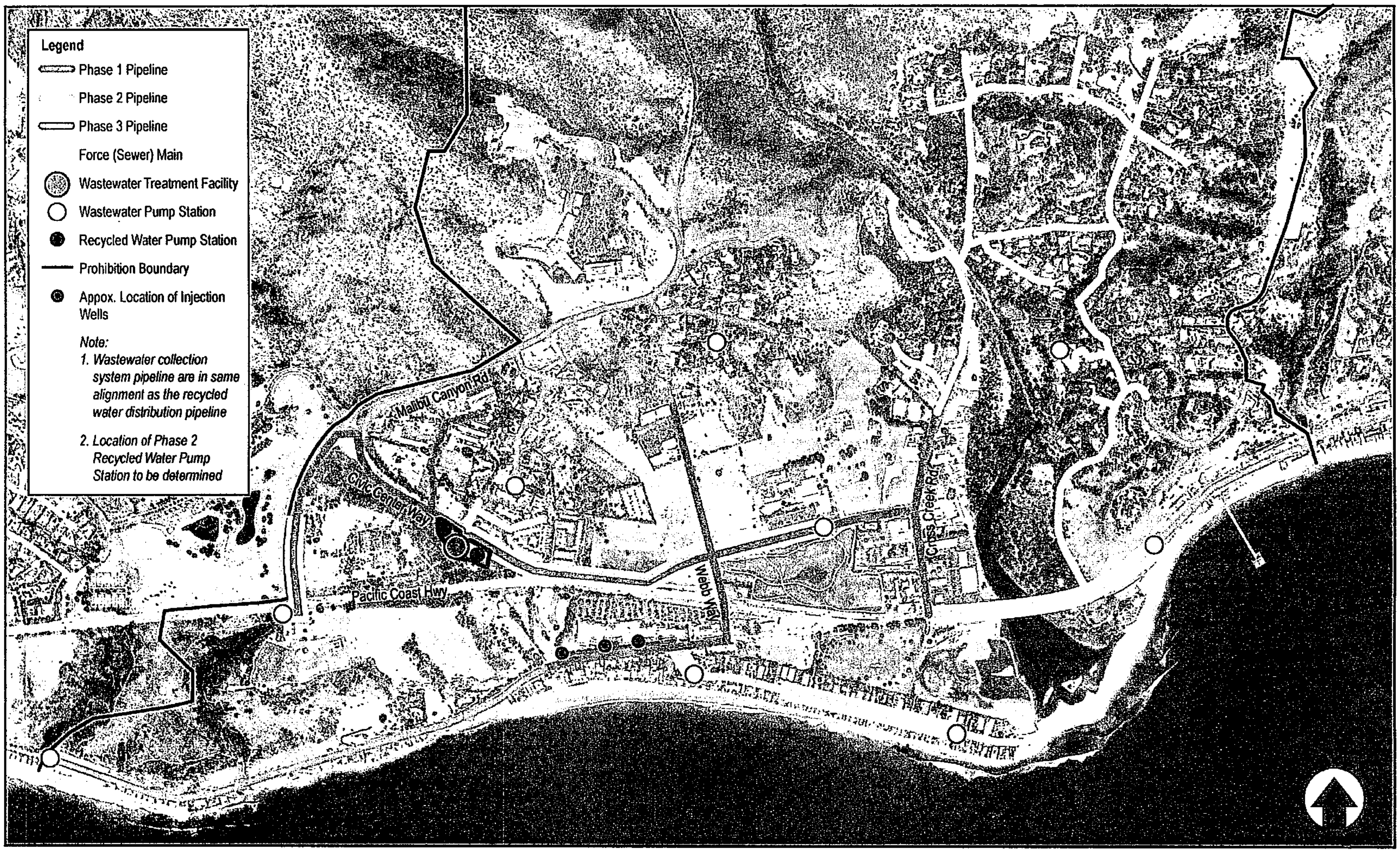


Figure 4 – Locations of Malibu Civic Center Wastewater Treatment Facility, Wastewater Collection and Recycled Water Pipelines, Wastewater and Recycled Water Pump Stations, and Injection Wells

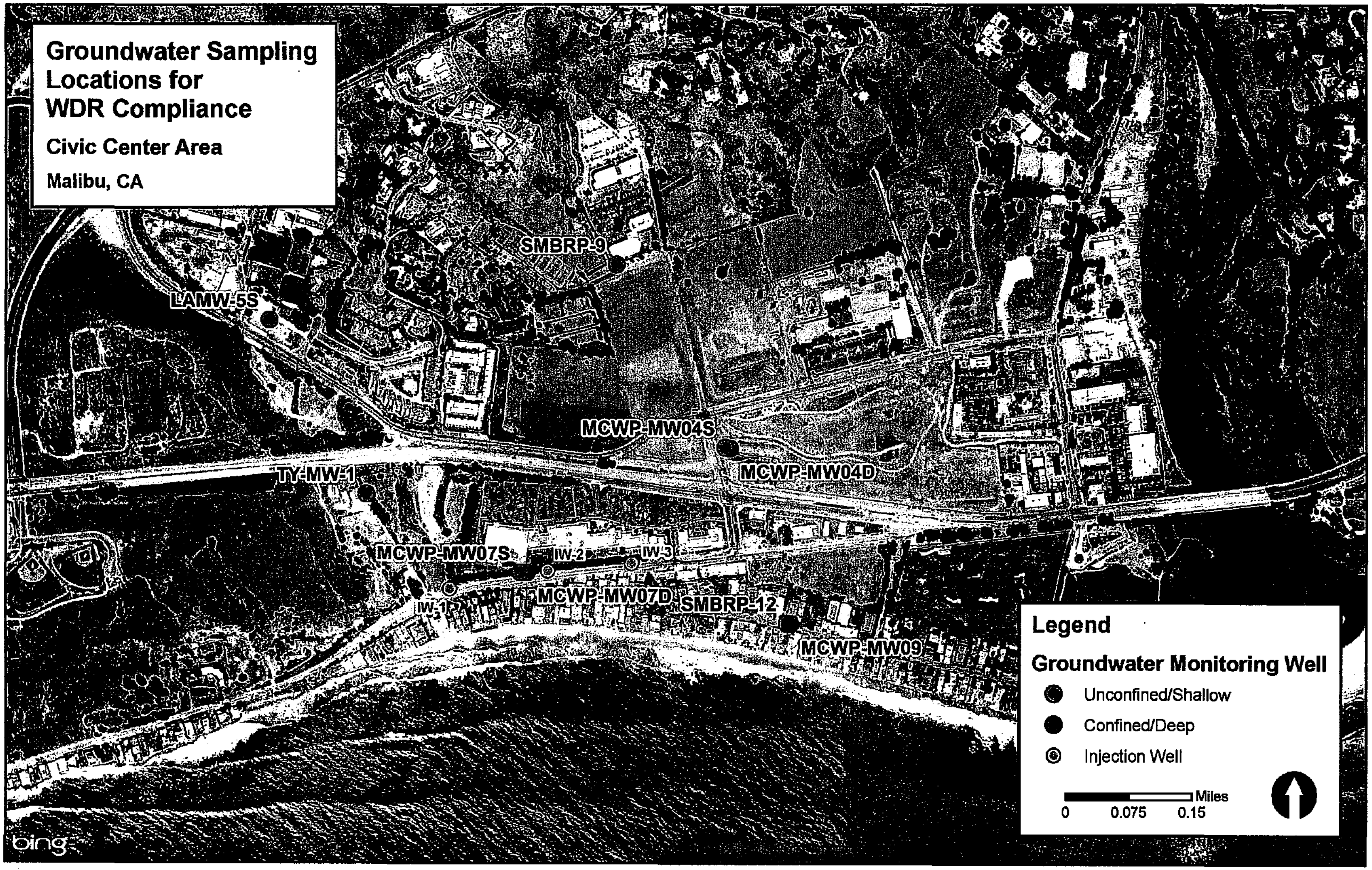


Figure 5 – Locations of Groundwater Monitoring Wells and Injection Wells

Figure 6 – Locations of Surface Water Monitoring Stations

Figure 7 – Exhibition of "Recycled Water – Do Not Drink"

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

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(213) 576-6660 • Fax (213) 576-6640
http://www.waterboards.ca.gov/losangeles/

MONITORING AND REPORTING PROGRAM CI. NO. 10042
FOR
CITY OF MALIBU
(MALIBU CIVIC CENTER WASTEWATER TREATMENT PLANT – PHASES I & II PROJECTS)
(File No. 11-087)

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This Monitoring and Reporting Program (MRP) No. CI 10042 is issued pursuant to California Water Code section 13267, which authorizes the Regional Water Quality Control Board, Los Angeles Region, (Regional Board) to require the City of Malibu (City) who discharges the tertiary-treated wastewater generated from the Malibu Civic Center Wastewater Treatment Facility (Civic Center Facility) into aquifers and/or recycles it for landscape irrigation to furnish technical or monitoring reports. The reports required herein are necessary to assure compliance with Waste Discharge Requirements (WDRs) and Water Recycling Requirements (WRRs) Order No. R4-2015-XXXX and to protect the waters of the state and their beneficial uses. The evidence that supports the need for the reports is set forth in the WDRs/WRRs and the Regional Board record.

I. SUBMITTAL OF REPORTS

1. The City shall comply with the Electronic Submittal of Information (ESI) requirements by submitting all reports required under the MRP, including electronic data format (EDF) groundwater and surface water monitoring data, injection location data, and monitoring reports. These reports shall be received by the Regional Board via the State Water Resources Control Board (State Water Board) GeoTracker database under Global ID WDR100000359 on the dates indicated as follows:

   A. **Quarterly Monitoring Reports** shall be received by the Regional Board by the 30th day of the month following the end of each quarterly monitoring period according to Table 1. The first Quarterly Monitoring Report under this program must be received by the Regional Board by July 30, 2015.

Table 1 – Reporting Period and Due	
Reporting Period	**Report Due**
January ~ March	April 30
April ~ June	July 30
July ~ September	October 30
October ~ December	January 30

   B. **Annual Summary Report** shall be received by the Regional Board by March 1 of each year. The first Annual Summary Report under this program must be received by the Regional Board no later than March 1, 2016.

2. If there is no discharge and/or water recycled during any reporting period, the report shall so state. Data collected during installation of injection wells or monitoring wells shall be included in the quarterly and annual report.

3. The data shall include the well specifications, ordinances, well heads elevation to mean sea level (MSL) and the method to develop the well. The construction of wells shall follow *California Well Standards* of the California Department of Water Resources.

4. All report shall be prepared by or under the direction of a licensed engineer in the State of California or a certified hydrogeologist in the State of California. All monitoring reports must include, at minimum, the following:

   A. Well and surface water station identification, date and time of sampling;

   B. Sampler identification, and laboratory identification; and,

   C. Quarterly observation of groundwater levels, recorded to 0.01 feet MSL, and flow direction.

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II. MONITORING REQUIREMENTS

1. Monitoring shall be used to determine compliance with the requirements of the Order No. R4-2015-XXXX and shall include, but not limited to, implementation and documentation of the following:

   A. Locations of each groundwater and surface water monitoring station where representative samples can be obtained and the rationale for the selection. The City must include a map, at a scale of 1 inch equals 1,200 feet or less, that clearly identifies the locations of the Civic Center Facility, all groundwater monitoring wells, injection wells, and surface water monitoring stations.

   B. Sampling protocols (specified in 40 CFR Part 136 or American Water Works Association standards where appropriate) and chain of custody procedures.

   C. For groundwater monitoring, outline the methods and procedures to be used for measuring water levels; purging wells; collecting samples; decontaminating equipment; containing, preserving, and shipping samples; and maintaining appropriate documentation. Also include the procedures for handling, storing, testing, and disposing of purge and decontamination waters generated from the sampling events.

   D. For surface water monitoring, outline the methods and procedures to be used for collecting samples; decontaminating equipment; containing, preserving, and shipping samples; and maintaining appropriate documentation. Also include the procedures for handling, storing, testing, and disposing of decontamination waters generated from the sampling events.

   E. Laboratory or laboratories, which conducted the analyses. Include copy or copies of laboratory certifications by the Environmental Laboratory

Accreditation Program (ELAP) of the State Water Board's Division of Drinking Water (DDW) every year or when the City changes their contract laboratory.

F.. Analytical test methods used and the corresponding Detection Limits for Purposes of Reporting (DLR) for unregulated and regulated chemicals. Please see the DDW's website at http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/EDT.shtml for unregulated and regulated chemicals.

F. Quality assurance and control measures.

2. The samples shall be analyzed using analytical methods described in 40 CFR Part 136; or where no methods are specified for a given pollutant, by commercially available methods approved by the United State Environmental Protection Agency (USEPA) or DDW, Regional Board and/or State Board. The City shall select the analytical methods that provide reporting detection limits (RDLs) lower than the limits prescribed in the accompanying Order No. R4-2015-XXXX.

3. The City shall instruct its laboratories to establish calibration standards so that the RDLs (or its equivalent if there is a different treatment of samples relative to calibration standards) are the lowest calibration standard. At no time shall the City use analytical data derived from extrapolation beyond the lowest point of the calibration curve.

4. Upon request by the City, the Regional Board, in consultation with the USEPA or DDW and the State Board Quality Assurance Program, may establish RDLs, in any of the following situations:

A. When the pollutant has no established method under 40 CFR 136 (revised May14, 1999, or subsequent revision);

B. When the method under 40 CFR 136 for the pollutant has a RDL higher than the limit specified in this Order; or,

C. When the City agree to use a test method that is more sensitive than those specified in 40 CFR Part 136 and is commercially available.

5. Samples of disinfected effluent must be analyzed within allowable holding time limits as specified in 40 CFR Part 136.3. All QA/QC analyses must be run on the same dates when samples were actually analyzed. The City shall make available for inspection and/or submit the QA/QC documentation upon request by Regional Board staff. Proper chain of custody procedures must be followed and a copy of that documentation shall be submitted with the quarterly report.

6. For unregulated chemical analyses, the City shall select methods according to the following approach:

A. Use drinking water methods, if available;

B. Use DDW-recommended methods for unregulated chemicals, if available;

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C. If there is no DDW-recommended drinking water method for a chemical, and more than a single USEPA-approved method is available, use the most sensitive USEPA-approved method;

D. If there is no USEPA-approved method for a chemical, and more than one method is available from the scientific literature and commercial laboratory, after consultation with DDW, use the most sensitive method;

E. If no approved method is available for a specific chemical, the City's laboratory may develop or use its own methods and should provide the analytical methods to DDW or the Regional Board for review. Those methods may be used until DDW recommended or USEPA-approved methods are available.

F. If the only method available for a chemical is for wastewater analysis (e.g., a chemical listed as a priority pollutant only), sample and analyze for that chemical in the treated and disinfected effluent.. Use this approach until the City's laboratory develops a method for the chemical in drinking water, or until a DDW-recommended or USEPA-approved drinking water method is available.

G. The City is required to inform the Regional Board, in event that D, E, F is occurring.

7. For constituents of emerging concerns (CECs) analyses:

CECs (see Attachment C2) are being collected for information purposes. There are currently no standards for the constituents listed in attachment C2. The attached reporting limits shall be used for these constituents.

III. REPORTING REQUIREMENTS

The City shall submit all reports to the Regional Board by the dates indicated in Section I. All quarterly, and annual monitoring reports shall contain a separate section titled "Summary of Non-Compliance", which discusses the compliance records and corrective actions taken or planned that may be needed to bring the reuse into full compliance with water recycling requirements. All quarterly and annual reports shall clearly list all non-compliance with WDRs/WRRs, as well as all excursions of effluent limits.

1. Quarterly reports

A. These reports shall include, at a minimum, the following information:

a. The volume of the effluent and the volume of treated wastewater used for land disposal~~injection~~ via injection~~land disposal~~, landscape irrigation, and/or percolation. If no recycled water is used during the quarter, the report shall so state.

b. The date and time of sampling and analyses on the effluent, groundwater, and surface water.

c. All analytical results of samples collected during the monitoring period of

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the effluent, groundwater, and surface water.

d. Documentation of all QA/QC procedures that were followed during sampling and laboratory analyses

e. Records of any operational problems, plant upset and equipment breakdowns or malfunctions, and any discharge(s) used for land disposal~~injection~~ via injection~~land disposal~~, landscape irrigation, and/or percolation.

f. Discussion of compliance, noncompliance, or violation of requirements.

f. All corrective or preventive action(s) taken or planned with schedule of implementation, if any violation occurs.

B. For the purpose of reporting compliance with numerical limitations, analytical data shall be reported using the following reporting protocols:

a. Sample results greater than or equal to the RDL must be reported "as measured" by the laboratory (i.e., the measured chemical concentration in the sample);

b. Sample results less than the RDL, but greater than or equal to the laboratory's method detection limit (MDL), must be reported as "Detected, but Not Quantified", or DNQ. The laboratory must write the estimated chemical concentration of the sample next to DNQ as well as the words "Estimated Concentration" (may be shortened to Est. Conc.); or

c. Sample results less than the laboratory's MDL must be reported as "None-Detected", or ND.

C. If the City samples and performs analyses (other than for process/operational control, startup, research, or equipment testing) on any sample more frequently than required in this MRP using approved analytical methods, the results of those analyses shall be included in the report. These results shall be included in the calculation of the average used in demonstrating compliance with average effluent, receiving groundwater water, etc., limitations.

D. The Regional Board may request supporting documentation, such as daily logs of operations.

2. Annual Reports

A. Tabular and graphical summaries of the monitoring data (quality of tertiary treated effluent, groundwater, and surface water; quantity of injected water) obtained during the previous calendar year. A comparison of laboratory results against effluent limits contained in these WDR/WRRs and notations of any exceedences of limits or other requirements shall be summarized and submitted at the beginning of the report.

B. Discussion of the compliance record and corrective or preventive action(s) taken or planned that may be needed to bring the treated effluent, including the treated effluent used for recycled water, into full compliance with the requirements in the accompanying Order No. R4-2015-XXXX.

C. An in-depth discussion of the results of the final effluent monitoring, groundwater monitoring, and surface water monitoring programs conducted during the previous year includes:

  a. Any change of receiving groundwater and surface water quality resulting from injection and use of recycled water for landscape irrigation; and,

  b. Any change of groundwater flow pattern resulting from injection.

  Temporal and spatial trends in the data shall be analyzed, with particular reference to comparisons between stations with respect to distances from the monitoring wells and comparisons to data collected during previous years. Appropriate statistical tests and indices, subject to approval by the Executive Officer, shall be calculated and included in the annual report.

D. The description of any changes and anticipated changes including any impacts in operation of any unit processes or facilities shall be provided.

E. A list of the analytical methods employed for each test and associated laboratory quality assurance/quality control procedures shall be included. The report shall restate the laboratories used by the City to monitor compliance with the accompanying Order, their status of certification, and provide a summary of analyses.

F. The report shall confirm operator certification and provide a list of current operating personnel, their responsibilities, and their corresponding grade of certification.

G. The report shall also summarize any change of the **Operation, Maintenance, and Monitoring Plan (OMM Plan)** due to the optimization of the existing Civic Center Facility operation. The summary shall discuss conformance with the Civic Center Facility's OMM Plan for operations, maintenance, and monitoring of the Civic Center Facility, and whether the OMM Plan requires revision for the current facilities.

H. Each annual report shall summarize the groundwater flow and transport and summary of the injection operations for the project. This report shall also use the most current data for the evaluation of the transport of injected water including concerns of emerging constituents; such evaluations must include, at a minimum, the following information:

  a. Total quantity of water injected into each major aquifer;

  b. Estimates of the rate and path of flow of the injected water; and,

c. Data used as parameters to calculate the rates of groundwater flow and volume of injected water reaching Santa Monica Bay, Malibu Creek and Lagoon.

IV. WATER QUALITY MONITORING REQUIREMENTS

1. Influent Monitoring

A. Influent monitoring is required to:

a. Determine compliance with WDRs/WRRs permit conditions.

b. Assess Civic Center Facility performance.

B. The City shall monitor influent to the Civic Center Facility at Influent Pump Station located in the main stream of the influent channel prior to the headworks as specified in Table 2.

Table 2 – Influent Monitoring			
Constituents	Units [1]	Type of Sample	Minimum Frequency of Analysis
Total waste flow	gpd	Recorder	Continuous [2]
Total suspended solids	mg/L	24-hour comp.	Weekly
$BOD_{5@20^{\circ}C}$	mg/L	24-hour comp.	Weekly

[1]. gpd: gallons per day;
mg/L: milligram/liter;
[2]. The City shall report the daily minimum, maximum, and average values.

2. Effluent Monitoring

A. Effluent monitoring is required to:

a. Determine compliance with WDRs/WRRs permit conditions and water quality standards.

b. Assess Civic Center Facility performance, identify operational problems and improve Facility performance.

B. The City shall monitor the discharge of tertiary-treated effluent at downstream of all treated effluent passing through this station, including the final disinfection process. If more than one analytical test method is listed for a given parameter, the City must select from the listed methods and corresponding Minimum Level.

C. The following shall constitute the effluent monitoring program, specified in Table 3:

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Table 3 – Effluent/Recycled Water Monitoring			
Constituent	**Unit [1]**	**Type of Sample [2]**	**Minimum Frequency of Analysis**
Total Flow	gpd	Recorder	Continuous [3]
pH	pH units	Grab	Daily
$BOD_{5@20^{\circ}C}$	mg/L	24-hour composite	Daily the first month and Wweekly thereafter [4]
Turbidity	NTU	Recorder	1.2 Hours [45]
Total Coliform	MPN/100mL	Grab	Daily
Fecal Coliform	MPN/100mL	Grab	Daily
Total Suspended Solids	mg/L	Grab	Weekly
Residual Chlorine	mg/L	Grab	Daily
Oil and Grease	mg/L	Grab	Monthly
Nitrate + Nitrite as Nitrogen	mg/L	Grab	Weekly
Nitrate as Nitrogen	mg/L	Grab	Weekly
Nitrite as Nitrogen	mg/L	Grab	Weekly
Ammonia Nitrogen	mg/L	Grab	Weekly
Organic Nitrogen	mg/L	Grab	Weekly
Total Nitrogen[56]	mg/L	Grab	Weekly
Total Phosphorus	mg/L	Grab	Monthly
Total Dissolved Solids	mg/L	Grab	Monthly
Sulfate	mg/L	Grab	Monthly
Chloride	mg/L	Grab	Monthly
Boron	mg/L	Grab	Monthly
MBAS[67]	mg/L	Grab	Monthly
Constituents listed in Attachments A1 to A5	various	Grab/24-hour composite	Quarterly
CECs[78] in Attachment C	various	Grab	Annually
Priority Pollutants in Attachment D	µg/L	Grab	Annually

[1]. NTU: nephelometric turbidity unit;
MPN/100mL: Most Probable Number/100 milliliter

[2]. Grab sample is an individual sample collected in a short period of time not exceeding 15 minutes. Grab samples shall be collected during normal peak loading conditions for the parameter of interest, which may or may not be during hydraulic peaks. When an automatic composite sampler is not used, composite sampling shall be done as follows: If the duration of the discharge is equal to or less than 24 hours but greater than eight (8) hours, at least eight (8) flow-

weighted samples shall be obtained during the discharge period and composited. For discharge duration of less than eight (8) hours, individual 'grab' sample may be substituted. 24-hour composite is for semi-volatile and volatile chemicals.

[3]. The City shall report the daily minimum, maximum, and average values. The City shall report the estimated daily volume of wastewater used for irrigation and for spray disposal.

[4]. The BOD shall be sampled and analyzed daily for the first month after initiation of operation, and weekly thereafter. If the concentration of BOD exceeds the effluent limits specified in the Order, the Discharger shall immediately begin to sample and analyze for BOD on a daily basis. The sampling frequency may resume back to weekly when the concentration of BOD in the daily sample again meets the BOD effluent limits.

[~~4~~5]. The turbidity samples must be taken at intervals of no more than 1.2 hours over a 24-hour period to determine compliance for turbidity. If the continuous turbidity meter and recorder failed, grab sampling may be substituted for a period of up to 24-hours.

[~~5~~6]. Total nitrogen: Sum of nitrate, nitrite, organic nitrogen and ammonia (all expressed as nitrogen).

[~~6~~7] MBAS: Methylene Blue Active Substances

[~~7~~8]. CECs: Constituents of Emerging Concerns. The City shall monitor the CECs in the effluent discharge. The City shall follow the requirements as discussed in the accompanying Permit Section IX.24.B. Analysis under this section is for monitoring purposes only. Analytical results obtained will not be used for compliance determination purposes, since the methods have not been incorporated into 40 CFR part 136.

D. CECs: CECs, listed in Attachment D, shall be monitored annually. The Executive Officer may add or delete chemicals from this list as new analytical methods become available and may also make revisions to approved analytical methods as needed. A revised CECs list will be made available to the City when changes occur. The City shall request (and submit a justification for) any deviation from the attached list for EO approval, if a change is required, before collecting samples.

3. Groundwater Monitoring

A. Groundwater Monitoring Well Specifications: Table 4 shows specifications of groundwater monitoring wells for baseline and long-term groundwater monitoring programs.

Table 4 – Specifications of Groundwater Monitoring Wells

ID	Monitoring Well Location	Well Depth (BGS[1])	Purpose of Monitoring Location
SMBRP-9	34°2'16.46" N; 118°41'34.90" W	45 feet	Upgradient water quality in the shallow alluvium
TY-MW-1	34°2'4.91" N; 118°41'51.03" W	41 feet	Downgradient water quality in Winter Canyon
MCWP-MW04S	34°2'7.08" N; 118°41'28.07" W	20 feet	Upgradient shallow alluvial water quality of the Malibu Colony Plaza

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Table 4 – Specifications of Groundwater Monitoring Wells			
ID	**Monitoring Well Location**	**Well Depth (BGS[1])**	**Purpose of Monitoring Location**
MCWP-MW07S	34°2'0.73" N; 118°41'40.97" W	20 feet	Downgradient shallow alluvial water quality of the Malibu Colony Plaza; adjacent to injection zone
SMBRP-12	34°1'58.25" N; 118°41'24.49" W	25 feet	Cross-gradient deep water quality
LAMW-5S	34°2'13.48" N; 118°41'56.09" W	~~20~~ 80 feet	Upgradient water quality in Winter Canyon
MCWP-MW04D	34°02'7.00" N; 118°41'27.90" W	148 feet	Upgradient deep Civic Center Gravels water quality of injection wells
MCWP-MW07D	34°2'0.70" N; 118°41'40.70" W	134 feet	Deep Civic Center Gravels water quality adjacent to injection wells W-1 and w-2
MCWP-MW09	34°1'58.26" N; 118°41'24.32" W	95 feet	Cross-gradient deep Civic Center Gravels water quality of injection wells

BGS: Below ground surface.

B. Baseline groundwater monitoring:

a. Baseline groundwater monitoring is required to:

i. Establish groundwater water quality database prior to land disposal~~injection~~ via injection~~land disposal~~ for deep aquifer (Civic Center Gravels) and landscape irrigation for shallow aquifer (Shallow Alluvium); and,

ii. Determine the responsibility of possible non-compliances in the future.

b. The City shall ~~conduct~~ initiate the baseline groundwater quality monitoring to collect data by ~~June 1~~October 15, 2015 and shall ~~continue~~conclude the baseline monitoring ~~to do so~~ prior to initiation of the land disposal~~injection~~ via injection~~land disposal~~. Representative samples of groundwater shall be collected at nine (9) monitoring wells of SMBRP-9, TY-MW-1, MCWP-MW04S, MCWP-MW07S, SMBRP-12, LAMW-5S, MCWP-MW04D, MCWP-MW07D, and MCWP-MW09, from major aquifers, including the aquifers of Shallow Alluvium, Civic Center Gravels, and Winter Canyon Alluvium specified in Table 4.

c. Table 5 sets forth the minimum constituents and parameters for monitoring baseline groundwater quality.

Table 5 – Baseline Groundwater Monitoring			
Constituents	**Units**	**Type of Sample**	**Minimum Frequency of Analysis[2]**

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Table 5 – Baseline Groundwater Monitoring			
Constituents	**Units**	**Type of Sample**	**Minimum Frequency of Analysis[2]**
Water level elevation [1]	Feet	Recorder	Annually
pH	pH units	Grab	Annually
$BOD_5 20^0C$	mg/L	Grab	Annually
Turbidity	NTU	Grab	Annually
Total Coliform	MPN/100mL	Grab	Annually
Fecal Coliform	MPN/100mL	Grab	Annually
Total Suspended Solids	mg/L	Grab	Annually
Residual Chlorine	mg/L	Grab	Annually
Total Organic Carbon	mg/L	Grab	Annually
Oil and grease	mg/L	Grab	Annually
Nitrate + Nitrite as Nitrogen	mg/L	Grab	Annually
Nitrate as nitrogen	mg/L	Grab	Annually
Nitrite as nitrogen	mg/L	Grab	Annually
Ammonia nitrogen	mg/L	Grab	Annually
Organic Nitrogen	mg/L	Grab	Annually
Total Nitrogen	mg/L	Grab	Annually
Total Phosphorus	mg/L	Grab	Annually
Total Dissolved Solids	mg/L	Grab	Annually
Sulfate	mg/L	Grab	Annually
Chloride	mg/L	Grab	Annually
Boron	mg/L	Grab	Annually
MBAS	mg/L	Grab	Annually
Constituents listed in Attachments A1 to A5	Various	Grab	Annually
CECs in Attachment C	Various	Grab	Annually
Priority Pollutants in Attachment D	µg/L	Grab	Annually

[1]. Water level elevations must be measured to the nearest 0.01 feet, and referenced to mean sea level.

~~[2]. Semi-annually shall include sample collected from wet and dry season.~~

C. Long-Term Groundwater Monitoring after Discharge:

a. Long-term groundwater monitoring is used to monitor any possible impact of land disposal ~~injection~~ via injection~~land disposal~~ and landscape irrigation or percolation on the receiving water quality of groundwater aquifers, Santa Monica Bay, Malibu Creek and Lagoon.

b. Long-term groundwater monitoring after discharge shall be collected the minimum constituents and parameters, specified in Table 6, for monitoring groundwater quality at monitoring wells of SMBRP-9, MCWP-MW04S, MCWP-MW07S, SMBRP-12, MCWP-MW04D, MCWP-MW07D, and MCWP-MW09 from major aquifers, including the aquifers of Shallow Alluvium, Civic Center Gravels, and Winter Canyon Alluvium.

Table 6 – Long-Term Groundwater Monitoring

Constituents	Units	Type of Sample	Minimum Frequency of Analysis[2]
Water level elevation [1]	Feet	Recorder	Quarterly
pH	pH units	Grab	Quarterly
$BOD_5 20^0C$	mg/L	Grab	Quarterly
Turbidity	NTU	Grab	Quarterly
Total Coliform	MPN/100mL	Grab	Quarterly
Fecal Coliform	MPN/100mL	Grab	Quarterly
Total Suspended Solids	mg/L	Grab	Quarterly
Residual Chlorine	mg/L	Grab	Quarterly
Total Organic Carbon	mg/L	Grab	Quarterly
Oil and grease	mg/L	Grab	Quarterly
Nitrate + Nitrite as Nitrogen	mg/L	Grab	Quarterly
Nitrate as nitrogen	mg/L	Grab	Quarterly
Nitrite as nitrogen	mg/L	Grab	Quarterly
Ammonia nitrogen	mg/L	Grab	Quarterly
Organic Nitrogen	mg/L	Grab	Quarterly
Total Nitrogen	mg/L	Grab	Quarterly
Total Phosphorus	mg/L	Grab	Quarterly
Total Dissolved Solids	mg/L	Grab	Quarterly
Sulfate	mg/L	Grab	Quarterly
Chloride	mg/L	Grab	Quarterly
Boron	mg/L	Grab	Quarterly
MBAS	mg/L	Grab	Quarterly
Constituents listed in Attachments A1 to A5	Various	Grab	Annually
CECs in Attachment C	µg/L	Grab	Annually

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Table 6 – Long-Term Groundwater Monitoring			
Constituents	**Units**	**Type of Sample**	**Minimum Frequency of Analysis[2]**
Priority Pollutants in Attachment D	μg/L	Grab	Annually

[1]. Water level elevations must be measured to the nearest 0.01 feet, and referenced to mean sea level.

[2]. Annual~~ly shall include~~ samples shall be collected ~~from wet~~ during the dry season each year.

c. If more than 10% of the permitted quarterly flow, specified in WDRs Table 8, is diverted to and discharged via the percolation ponds, the City shall collect groundwater samples at TY-MW-1 and LAMW-5S on a quarterly and annually basis as shown in MRP Table 6. If the 10% threshold is not exceeded, the monitoring frequency shall be adjusted to either an annual monitoring or the quarterly that the 10% was exceeded.

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4. Injection Well Monitoring

A. Injection Well Specifications: Table 7 shows specifications of injection wells.

Table 7 – Specifications of Injection Wells			
ID	**Location**	**Screen Intervals (BGS)**	**Well Depth (BGS)**
W-1	34°1'59.97" N; 118°41'45.59" W	55 feet to 134 feet	170 feet
W-2	34°2'0.83" N; 118°41'40.09" W	55 feet to 134 feet	170 feet
W-3	34°2'1.34" N; 118°41'34.75" W	55 feet to 134 feet	170 feet

B. The City shall record the volume and injection rate in gallons per day of treated wastewater injected through W-1 to W-3.

5. Surface Water Monitoring

A surface water monitoring program is implemented to evaluate the quality of surface waters at near-shore ocean and the Malibu Lagoon, and any changes in quality that might result from the injection.

A. Surface Water Monitoring Stations

Table 8 specifies locations and monitoring depths of four (4) near shore and six (6) Malibu Lagoon and Creek surface water monitoring stations.

Table 8 – Specifications of Surface Water Monitoring Stations

ID	Location	Monitoring Depth
Near shore		
N-001	34^{0}1'56.22" N; 118^{0}41'38.75" W	Ankle depth
N-002	34^{0}1'55.21" N; 118^{0}41'21.13" W	Ankle depth
N-003	34^{0}1'54.58" N; 118^{0}40'47.30" W	Ankle depth
N-004	34^{0}1'47.34" N; 118^{0}42'17.10" W	Ankle depth
Malibu Lagoon and Creek		
L-001	3402'14.27" N; 118040'59.31" W	1 foot below surface water
L-002	3402'11.97" N; 118041'1.51" W	1 foot below surface water
L-003	3402'6.66" N; 118040'58.52" W	1 foot below surface water
L-004	3402'1.81" N; 118040'58.55" W	1 foot below surface water
L-005	3402'0.65" N; 118040'49.29" W	1 foot below surface water
L-006	3401'58.44" N; 118041'7.10" W	1 foot below surface water

B. Surface Water Monitoring Constituents and Frequency

The City shall collect the minimum constituents, specified in Table 9, for monitoring surface water quality at ten (10) stations, specified in Table 8.

Table 9 – Specifications of Surface Water Monitoring

Constituents	Units	Type of Sample	Minimum Frequency of Analysis
Total Coliform	MPN/100mL	Grab	Quarterly
Fecal Coliform	MPN/100mL	Grab	Quarterly
Nitrate as nitrogen	mg/L	Grab	Quarterly
Nitrite as nitrogen	mg/L	Grab	Quarterly
Ammonia nitrogen	mg/L	Grab	Quarterly
Organic Nitrogen	mg/L	Grab	Quarterly
Total Phosphorus	mg/L	Grab	Quarterly

During wet-weather event, stormwater runoff will impact surface water monitoring stations. The surface water monitoring shall be conducted no earlier than three days, since rain (0.1 inch and greater) ceases.

VI. GENERAL MONITORING AND REPORTING REQUIREMENTS

1. The City shall comply with all Standard Provisions (Attachment B) related to monitoring, reporting, and recordkeeping.

2. For every item where the requirements are not met, the City shall submit a statement of the actions undertaken or proposed which will bring the treated effluent and/or treated effluent used for the recycled water program into full compliance with requirements at the earliest possible time, and submit a timetable for implementation of the corrective measures.

3. Monitoring reports shall be signed by either the principal Executive Officer or ranking elected official. A duly authorized representative of the aforementioned signatories may sign documents if:

   A. The authorization is made in writing by the signatory;

   B. The authorization specifies the representative as either an individual or position having responsibility for the overall operation of the regulated facility or activity; and,

   The written authorization is submitted to the Executive Officer of this Regional Board.

4. The monitoring report shall contain the following completed declaration:

   "I certify under penalty of law that this document, including all attachments and supplemental information, was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and imprisonment."

   Executed on the ___ day of _____ at ______
   ______________________ Signature
   ______________________ Title

5. The City shall retain records of all monitoring information, including all calibration and maintenance, monitoring instrumentation, and copies of all reports required by this Order, for a period of at least three (3) years from the date of sampling measurement, or report. This period may be extended by request of the Regional Board at any time and shall be extended during the course of any unresolved litigation regarding the regulated activity.

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6. Records of monitoring information shall include:

   A. The date, exact place, and time of sampling or measurements;

   B. The individual(s) who performed the sampling or measurements;

   C. The date(s) analyses were performed;

   D. The individual(s) who performed the analysis;

   E. The analytical techniques or methods used; and

   F. The results of such analyses.

7. The City shall submit to the Regional Board, together with the first monitoring report required by this Order, a list of all chemicals and proprietary additives which could affect the quality of the treated effluent and the treated effluent used for recycled water, including quantities of each. Any subsequent changes in types and/or quantities shall be reported promptly. An annual summary of the quantities of all chemicals, listed by both trade and chemical names, which are used in the treatment process shall be included in the annual report.

VII. WASTE HAULING REPORTING

In the event that waste sludge, septage, or other wastes are hauled offsite, the name and address of the hauler shall be reported, along with types and quantities hauled during the reporting period and the location of final point of disposal.. In the event that no wastes are hauled during the reporting period, a statement to that effect shall be submitted in the quarterly monitoring report.

VIII. MONITORING FREQUENCIES

Monitoring frequencies and parameters may be ~~adjusted to a less frequent basis or parameters dropped~~ revised by the Executive Officer. ~~if t~~The City may makes a request (with justification) to reduce the monitoring frequency or to modify the list of monitoring constituents, two years after optimizing the Civic Center Facility operation.~~and the Executive Officer determines that the request is adequately supported by statistical trends in the monitoring data submitted.~~ The City ~~can~~shall not make any adjustments until ~~written approval is received from~~ the Executive Officer provides written approval after determining that the request is adequately supported by monitoring data.

These records and reports are public documents and shall be made available for inspection during normal business hours at the office of the California Regional Water Quality Control Board, Los Angeles Region.

Ordered by:

____

Samuel Unger, P.E.
Executive Officer
Date: March 12, 2015

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Attachment A – Maximum Contaminant Levels

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Attachment A1

Attachment A1 Table 64431-A – Inorganic Chemicals[1]	
Chemical	**Maximum Contaminant Levels (mg/L)**
Aluminum	1
Antimony	0.006
Arsenic	0.01
Asbestos	7 MFL[2]
Barium	1
Beryllium	0.004
Cadmium	0.005
Chromium	0.05
Cyanide	0.15
Mercury	0.002
Nickel	0.1
Selenium	0.05
Thallium	0.002
Perchlorate	0.006
Fluoride	2

[1]. California Code of Regulation (CCR) Title 22, Section 64431.

[2]. MFL = million fibers per liter; MCL for fibers exceeding 10μm in length.

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Attachment A2

Table 4 – Radioactivity[1]	
Chemical	Maximum Contaminant Levels (pCi/L)
Combined Radium-226 and Radium-228	5
Gross Alpha Particle Activity (Including Radium-226 but Excluding Radon and Uranium)	15
Tritium	20,000
Strontium-90	8
Gross Beta Particle Activity	50
Uranium	20

[1]. CCR Title 22, Section 64443.

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Attachment A3

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Table 64444-A – Organic Chemicals[1]	
Chemical	**Maximum Contaminant Levels (mg/L)**
(a) Volatile Organic Chemicals	
Benzene	0.001
Carbon Tetrachloride (CTC)	0.0005
1,2-Dichlorobenzene	0.6
1,4-Dichlorobenzene	0.005
1,1-Dichloroethane	0.005
1,2-Dichloroethane (1,2-DCA)	0.0005
1,1-Dichloroethene (1,1-DCE)	0.006
Cis-1,2-Dichloroethylene	0.006
Trans-1,2-Dichloroethylene	0.01
Dichloromethane	0.005
1,2-Dichloropropane	0.005
1,3-Dichloropropene	0.0005
Ethylbenzene	0.3
Methyl-tert-butyl-ether (MTBE)	0.013
Monochlorobenzene	0.07
Styrene	0.1
1,1,2,2-Tetrachloroethane	0.001
Tetrachloroethylene (PCE)	0.005
Toluene	0.15
1,2,4-Trichlorobenzene	0.005
1,1,1-Trichloroethane	0.2
1,1,2-Trichloroethane	0.005
Trichloroethylene (TCE)	0.005
Trichlorofluoromethane	0.15

Table 64444-A – Organic Chemicals[1]	
Chemical	**Maximum Contaminant Levels (mg/L)**
1,1,2-Trichloro-1,2,2-Trifluoroethane	1.2
Vinyl Chloride	0.0005
Xylenes (m,p)	1.75
(b) Non-Volatile synthetic Organic Chemicals	
Alachlor	0.002
Atrazine	0.001
Bentazon	0.018
Benzo(a)pyrene	0.0002
Carbofuran	0.018
Chlordane	0.0001
2,4-D	0.07
Dalapon	0.2
1,2-Dibromo-3-chloropropane (DBCP)	0.0002
Di(2-ethylhexyl)adipate	0.4
Di(2-ethylhexyl)phthalate	0.004
Dinoseb	0.007
Diquat	0.02
Endothall	0.1
Endrin	0.002
Ethylene Dibromide (EDB)	0.00005
Glyphosate	0.7
Heptachlor	0.00001
Heptachlor Epoxide	0.00001
Hexachlorobenzene	0.001
Hexachlorocyclopentadiene	0.05
Lindane	0.0002

Table 64444-A – Organic Chemicals[1]	
Chemical	**Maximum Contaminant Levels (mg/L)**
Methoxychlor	0.03
Molinate	0.02
Oxamyl	0.05
Pentachlorophenol	0.001
Picloram	0.5
Polychlorinated Biphenyls	0.0005
Simazine	0.004
Thiobencarb	0.07
Toxaphene	0.003
2,3,7,8-TCDD (Dioxin)	3×10^{-8}
2,4,5-TP (Silvex)	0.05

[1]. CCR Title 22, Section 64444.

R E V I S E D T E N T A T I V E

Attachment A4

Table 64533-A – Disinfection Byproducts[1]	
Constituent	**Units**
Total Trihalomethanes (TTHM)	0.08 ppb
Bromodichloromethane	
Bromoform	
Chloroform	
Dibromochloromethane	
Haloacetic acid (five) (HAA5)	0.06 ppb
Monochloroacetic acid	
Dichloroacetic acid	
Trichloroacetic acid	
Monobromoacetic acid	
Dibromoacetic acid	
Bromate[2]	0.01ppb
Chlorite[3]	1 ppb

[1]. CCR Title 22, Section 64533, Chapter 15.5

[2]. Bromate is listed for plant using ozone disinfection only.

[3]. Chlorite is listed for plant using chlorine dioxide only.

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Attachment A5

Table 64449-A –Secondary Maximum Contaminant Levels[1]	
Chemical	**Units**
Aluminum	0.2 mg/L
Color	150 Units
Copper	1.0 mg/L
Corrosivity	Non corrosive
Foam Agents (MBAS)	0.5 mg/L
Iron	0.3 mg/L
Manganese	0.05 mg/L
Methyl-tert-butyl-ether (MTBE)	0.005 mg/L
Odor – Threshold	3 units
Silver	0.1 mg/L
Thiobencarb	0.001 mg/L
Zinc	5 mg/L

[1]. CCR Title 22, Section 64449.

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Attachment B – Standard Provisions Applicable to Waste Discharge Requirements

1. DUTY TO COMPLY

The discharger must comply with all conditions of these waste discharge requirements. A responsible party has been designated in the Order for this project, and is legally bound to maintain the monitoring program and permit. Violations may result in enforcement actions, including Regional Board orders or court orders requiring corrective action or imposing civil monetary liability, or in modification or revocation of these waste discharge requirements by the Regional Board. [CWC Section 13261, 13263, 13265, 13268, 13300, 13301, 13304, 13340, 13350]

2. GENERAL PROHIBITION

Neither the treatment nor the discharge of waste shall create a pollution, contamination or nuisance, as defined by Section 13050 of the California Water Code (CWC). [H&SC Section 5411, CWC Section 13263]

3. AVAILABILITY

A copy of these waste discharge requirements shall be maintained at the discharge facility and be available at all times to operating personnel. [CWC Section 13263]

4. CHANGE IN OWNERSHIP

The discharger must notify the Executive Officer, in writing at least 30 days in advance of any proposed transfer of this Order's responsibility and coverage to a new discharger containing a specific date for the transfer of this Order's responsibility and coverage between the current discharger and the new discharger. This agreement shall include an acknowledgement that the existing discharger is liable for violations up to the transfer date and that the new discharger is liable from the transfer date on. [CWC Sections 13267 and 13263]

5. CHANGE IN DISCHARGE

In the event of a material change in the character, location, or volume of a discharge, the discharger shall file with this Regional Board a new Report of Waste Discharge. [CWC Section 13260(c)]. A material change includes, but is not limited to, the following:

(a) Addition of a major industrial waste discharge to a discharge of essentially domestic sewage, or the addition of a new process or product by an industrial facility resulting in a change in the character of the Waste.

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(b) Significant change in disposal method, e.g., change from a land disposal to a direct discharge to water, or change in the method of treatment which would significantly alter the characteristics of the waste.

(c) Significant change in the disposal area, e.g., moving the discharge to another drainage area, to a different water body, or to a disposal area significantly removed from the original area potentially causing different water quality or nuisance problems.

(d) Increase in flow beyond that specified in the waste discharge requirements.

(e) Increase in the area or depth to be used for solid waste disposal beyond that specified in the waste discharge requirements. [CCR Title 23 Section 2210]

6. <u>REVISION</u>

These waste discharge requirements are subject to review and revision by the Regional Board. [CCR Section 13263]

7. <u>TERMINATION</u>

Where the discharger becomes aware that it failed to submit any relevant facts in a Report of Waste Discharge or submitted incorrect information in a Report of Waste Discharge or in any report to the Regional Board, it shall promptly submit such facts or information. [CWC Sections 13260 and 13267]

8. <u>VESTED RIGHTS</u>

This Order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property, do not protect the discharger from his liability under Federal, State or local laws, nor do they create a vested right for the discharger to continue the waste discharge. [CWC Section 13263(g)]

9. <u>SEVERABILITY</u>

Provisions of these waste discharge requirements are severable. If any provision of these requirements are found invalid, the remainder of the requirements shall not be affected. [CWC Section 921]

10. OPERATION AND MAINTENANCE

The discharger shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with conditions of this Order. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this Order. [CWC Section 13263(f)]

11. HAZARDOUS RELEASES

Except for a discharge which is in compliance with these waste discharge requirements, any person who, without regard to intent or negligence, causes or permits any hazardous substance or sewage to be discharged in or on any waters of the State, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the State, shall, as soon as (a) that person has knowledge of the discharge, (b) notification is possible, and (c) notification can be provided without substantially impeding cleanup or other emergency measures, immediately notify the Office of Emergency Services of the discharge in accordance with the spill reporting provision of the State toxic disaster contingency plan adopted pursuant to Article 3.7 (commencing with Section 8574.7) of Chapter 7 of Division 1 of Title 2 of the Government Code, and immediately notify the State Board or the appropriate Regional Board of the discharge. This provision does not require reporting of any discharge of less than a reportable quantity as provided for under subdivisions (f) and (g) of Section 13271 of the Water Code unless the discharger is in violation of a prohibition in the applicable Water Quality Control plan. [CWC Section 1327(a)]

12. PETROLEUM RELEASES

Except for a discharge which is in compliance with these waste discharge requirements, any person who without regard to intent or negligence, causes or permits any oil or petroleum product to be discharged in or on any waters of the State, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the State, shall, as soon as (a) such person has knowledge of the discharge, (b) notification is possible, and (c) notification can be provided without substantially impeding cleanup or other emergency measures, immediately notify the Office of Emergency Services of the discharge in accordance with the spill reporting provision of the State oil spill contingency plan adopted pursuant to Article 3.5 (commencing with Section 8574.1) of Chapter 7 of Division 1 of Title 2 of the Government Code. This provision does not require reporting of any discharge of less than 42 gallons unless the discharge is also required to be reported pursuant to Section 311 of the Clean Water Act or the discharge is in violation of a prohibition in the applicable Water Quality Control Plan. [CWC Section 13272] Standard Provisions Applicable to Waste Discharge Requirements

13. ENTRY AND INSPECTION

The discharger shall allow the Regional Board, or an authorized representative upon the presentation of credentials and other documents as may be required by law, to:

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(a) Enter upon the discharger's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;

(b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;

(c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and

(d) Sample or monitor at reasonable times, for the purposes of assuring compliance with this Order, or as otherwise authorized by the California Water Code, any substances or parameters at any location. [CWC Section 13267]

14. <u>MONITORING PROGRAM AND DEVICES</u>

The discharger shall furnish, under penalty of perjury, technical monitoring program reports; such reports shall be submitted in accordance with specifications prepared by the Executive Officer, which specifications are subject to periodic revisions as may be warranted. [CWC Section 13267]

All monitoring instruments and devices used by the discharger to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy. All flow measurement devices shall be calibrated at least once per year, or more frequently, to ensure continued accuracy of the devices. Annually, the discharger shall submit to the Executive Office a written statement, signed by a registered professional engineer, certifying that all flow measurement devices have been calibrated and will reliably achieve the accuracy required.

Unless otherwise permitted by the Regional Board Executive officer, all analyses shall be conducted at a laboratory certified for such analyses by the State Department of Health Services. The Regional Board Executive Officer may allow use of an uncertified laboratory under exceptional circumstances, such as when the closest laboratory to the monitoring location is outside the State boundaries and therefore not subject to certification. All analyses shall be required to be conducted in accordance with the latest edition of "Guidelines Establishing Test Procedures for Analysis of Pollutants" [40CFR Part 136] promulgated by the U.S. Environmental Protection Agency. [CCR Title 23, Section 2230]

15. <u>TREATMENT FAILURE</u>

In an enforcement action, it shall not be a defense for the discharger that it would have been necessary to halt or to reduce the permitted activity in order to maintain compliance with this Order. Upon reduction, loss, or failure of the treatment facility, the discharger shall, to the extent necessary to maintain compliance with this Order, control production or all discharges, or both, until the facility is restored or an alternative method of treatment is

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provided. This provision applies, for example, when the primary source of power of the treatment facility fails, is reduced, or is lost. [CWC Section 13263(f)]

16. DISCHARGE TO NAVIGABLE WATERS

Any person discharging or proposing to discharge to navigable waters from a point source (except for discharge of dredged or fill material subject to Section 404 fo the Clean Water Act and discharge subject to a general NPDES permit) must file an NPDES permit application with the Regional Board. [CCR Title 2 Section 22357]

17. ENDANGERMENT TO HEALTH AND ENVIRONMENT

The discharger shall report any noncompliance which may endanger health or the environment. Any such information shall be provided verbally to the Executive Officer within 24 hours from the time the discharger becomes aware of the circumstances. A written submission shall also be provided within five days of the time the discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected; the anticipated time it is expected to continue and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The Executive officer, or an authorized representative, may waive the written report on a case-by-case basis if the oral report has been received within 24 hours. The following occurrence(s) must be reported to the Executive Office within 24 hours:

(a) Any bypass from any portion of the treatment facility.

(b) Any discharge of treated or untreated wastewater resulting from sewer line breaks, obstruction, surcharge or any other circumstances.

(c) Any treatment plan upset which causes the effluent limitation of this Order to be exceeded. [CWC Sections 13263 and 13267]

18. MAINTENANCE OF RECORDS

The discharger shall retain records of all monitoring information including all calibration and maintenance records, all original strip chart recordings for continuous monitoring instrumentation, copies off all reports required by this Order, and record of all data used Standard Provisions Applicable to complete the application for this Order. Records shall be maintained for a minimum of three (3) years from the date of the sample, measurement, report, or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Board Executive Officer.

Records of monitoring information shall include:

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(a) The date, exact place, and time of sampling or measurement;

(b) The individual(s) who performed the sampling or measurement;

(c) The date(s) analyses were performed;

(d) The individual(s) who performed the analyses;

(e) The analytical techniques or method used; and

(f) The results of such analyses.

19. (a) All application reports or information to be submitted to the Executive Office shall be signed and certified as follows:

(1) For a corporation – by a principal executive officer or at least the level of vice president.

(2) For a partnership or sole proprietorship – by a general partner or the proprietor, respectively.

(3) For a municipality, state, federal, or other public agency – by either a principal executive officer or ranking elected official.

(b) A duly authorized representative of a person designated in paragraph (a) of this provision may sign documents if:

(1) The authorization is made in writing by a person described in paragraph (a) of this provision.

(2) The authorization specifies either an individual or position having responsibility for the overall operation of the regulated facility or activity; and

(3) The written authorization is submitted to the Executive Officer.

Any person signing a document under this Section shall make the following certification:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. [CWC Sections 13263, 13267, and 13268]"

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20. OPERATOR CERTIFICATION

Supervisors and operators of municipal wastewater treatment plants and privately owned facilities regulated by the PUC, used in the treatment or reclamation of sewage and industrial waste shall possess a certificate of appropriate grade in accordance with Title 23, California Code of Regulations Section 3680. State Boards may accept experience in lieu of qualification training. In lieu of a properly certified wastewater treatment plant operator, the State Board may approve use of a water treatment plan operator of appropriate grade certified by the State Department of Health Services where reclamation is involved.

Each plan shall be operated and maintained in accordance with the operation and maintenance manual prepared by the municipality through the Clean Water Grant Program [CWC Title 23, Section 2233(d)]

ADDITIONAL PROVISIONS APPLICABLE TO
PUBLICLY OWNED TREATEMENT WORKS' ADEQUATE CAPACITY

21. Whenever a publicly owned wastewater treatment plant will reach capacity within four (4) years the discharger shall notify the Regional Board. A copy of such notification shall be sent to appropriate local elected officials, local permitting agencies and the press. The discharger must demonstrate that adequate steps are being taken to address the capacity problem. The discharger shall submit a technical report to the Regional Board showing flow volumes will be prevented from exceeding capacity, or how capacity will be increased, within 120 days after providing notification to the Regional Board, or within 120 days after receipt of notification from the Regional Board, of a finding that the treatment plant will reach capacity within four (4) years. The time for filing the required technical report may be extended by the Regional Board. An extension of 30 days may be granted by the Executive Officer, and longer extensions may be granted by the Regional Board itself. [CCR Title 23, Section 2232]

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Attachment C – Monitoring for Constituents of Emerging Concerns (CECs) [1]

Constituent	Reporting Limit (µg/L)
17β-Estradiol	0.001
Caffeine	0.05
NDMA	0.002
Triclosan	0.05
DEET	0.05
Sucralose	0.1

[1]: CECs are based on Table 1 Groundwater Recharge Reuse – Subsurface Application of State Water Board Resolution 2013-003

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Attachment D – Monitoring for Priority Pollutants ~~Listed in California Toxics Rule~~

Antimony	Trichloroethylene	Fluoranthene
Arsenic	Vinyl Chloride	Fluorene
Beryllium	2-Chlorophenol	Hexachlorobenzene
Cadmium	2,4-Dichlorophenol	Hexachlorobutadiene
Chromium (III)	2,4-Dimethylphenol	Hexachlorocyclopentadiene
Chromium (VI)	4,6-Dinitro-2-Methylphenol	Hexachloroethane
Copper	2,4-Dinitrophenol	Indeno[1,2,3-cd]pyrene
Lead	2-Nitrophenol	Isophorone
Mercury	4-Nitrophenol	Naphthalene
Nickel	4-Chloro-3-Methylphenol	Nitrobenzene
Selenium	Pentachlorophenol	N-nitrosodimethylamine
Silver	Phenol	N-Nitrosodi-N-propylamine
Thallium	2,4,6-Trichlorophenol	N-Nitrosodiphenylamine
Zinc	Acenaphthene	Phenanthrene
Cyanide	Acenaphthylene	Pyrene
Asbestos	Anthracene	1,2,4-Trichlorobenzene
2,3,7,8-TCDD	Benzidine	Aldrin
Acrolein	Benzo[a]anthracene	alpha-BHC
Acrylonitrile	Benzo[a]pyrene	beta-BHC
Benzene	Benzo[b]fluoranthene	gamma-BHC
Bromoform	Benzo[ghi]perylene	delta-BHC
Carbon tetrachloride	Benzo[k]fluoranthene	Chlordane
Chlorobenzene	Bis(2-chloroethoxy) Methane	4,4'-DDT
Chlorodibromomethane	Bis(2-chloroethyl) Ether	4,4'-DDE
Chloroethane	Bis(2-chloroisopropyl) Ether	4,4'-DDD
2-Chloroethylvinyl Ether	Bis(2-ethylhexyl) Phthalate	Dieldrin
Chloroform	4-Bromophenyl Phenyl Ether	alpha-Endosulfan

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Dichlorobromomethane	Butylbenzyl Phthalate	beta-Endosulfan
1,1-Dichloroethane	2-Chloronaphthalene	Endosulfan Sulfate
1,2-Dichloroethane	4-Chlorophenyl Phenyl Ether	Endrin
1,1-Dichloroethylene	Chrysene	Endrin Aldehyde
1,2-Dichloropropane	Dibenzo[ah]anthracene	Heptachlor
1,3-dichloropropylene	1,2-Dichlorobenzene	Heptachlor Epoxide
Ethylbenzene	1,3-Dichlorobenzene	PCB (Aroclor-1016)
Methyl Bromide	1,4-Dichlorobenzene	PCB (Aroclor-1221)
Methyl Chloride	3,3'-Dichlorobenzidine	PCB (Aroclor-1232)
Methylene Chloride	Diethyl Phthalate	PCB (Aroclor-1242)
1,1,2,2-Tetrachloroethane	Dimethyl Phthalate	PCB (Aroclor-1248)
Tetrachloroethylene	Di-n-butyl Phthalate	PCB (Aroclor-1254)
Toluene	2,4-Dinitrotoluene	PCB (Aroclor-1260)
1,2-Trans-Dichloroethylene	2,6-Dinitrotoluene	Toxaphene
1,1,1-Trichloroethane	Di-n-octyl Phthalate	---
1,1,2-Trichloroethane	1,2-Diphenylhydrazine	---

REVISED TENTATIVE

Appendix C - Statewide Recycled Water Policy

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 2009-0011

ADOPTION OF A POLICY FOR
WATER QUALITY CONTROL FOR RECYCLED WATER

WHEREAS:

1. The Strategic Plan Update 2008-2012 for the Water Boards includes a priority to increase sustainable local water supplies available for meeting existing and future beneficial uses by 1,725,000 acre-feet per year, in excess of 2002 levels, by 2015, and ensure adequate water flows for fish and wildlife habitat. This Recycled Water Policy (Policy) is intended to support the Strategic Plan priority to Promote Sustainable Local Water Supplies. Increasing the acceptance and promoting the use of recycled water is a means towards achieving sustainable local water supplies and can result in reduction in greenhouse gases, a significant driver of climate change. The Policy is also intended to encourage beneficial use of, rather than solely disposal of, recycled water.

2. California Water Code section 13140 authorizes the State Water Resources Control Board (State Water Board) to adopt state policy for water quality control.

3. On March 20, 2007, the State Water Board conducted a public workshop on recycled water.

4. On September 28, 2007, staff circulated a draft Recycled Water Policy and a draft staff report/certified regulatory program environmental analysis/California Environmental Quality Act (CEQA) checklist for public comment.

5. On October 2, 2007, the State Water Board conducted a public workshop on the draft Recycled Water Policy.

6. On February 15, 2008, the State Water Board circulated an updated version of the draft Policy and the draft staff report/certified regulatory program environmental analysis/CEQA checklist.

7. On November 21, 2008, the State Water Board circulated another updated version of the draft Policy and the draft staff report/certified regulatory program environmental analysis/ CEQA checklist.

8. Staff has responded to significant verbal and written comments received from the public and made revisions to the draft Policy in response to the comments.

9. On January 6, 2009, the State Water Board conducted a public hearing on the draft Policy. In response, staff has revised the draft Policy, which is available at http://www.waterboards.ca.gov/water_issues/programs/water_recycling_policy/docs/draft_recycled_water_policy_011609.pdf. Staff has also revised the draft staff report, which is available at http://www.swrcb.ca.gov/water_issues/programs/water_recycling_policy/docs/020309_draftstaffreport_checklist_01162009.pdf.

10. The Policy includes findings, including findings related to compliance with State Water Board Resolution No. 68-16, that are hereby incorporated by reference.

11. The State Water Board received a letter from statewide water and wastewater entities dated December 19, 2008, strongly urging their member agencies to commit funding and in-kind resources to facilitate development of salt/nutrient management plans within the five-year timeframe established by the State Water Board in the Policy.

12. The Resources Agency has approved the State Water Board's and the Regional Water Quality Control Boards' water quality control planning process as a "certified regulatory program" that adequately satisfies the CEQA requirements for preparing environmental documents. State Water Board staff has prepared a "substitute environmental document" for this project that contains the required environmental documentation under the State Water Board's CEQA regulations. (California Code of Regulations, title 23, section 3777.) The substitute environmental documents include the "Draft Staff Report and Certified Regulatory Program Environmental Analysis Recycled Water Policy," which includes an environmental checklist, the comments and responses to comments, the Policy itself, and this resolution. The project is the adoption of a Recycled Water Policy.

13. In preparing the substitute environmental documents, the State Water Board has considered the requirements of Public Resources Code section 21159 and California Code of Regulations, title 14, section 15187, and intends these documents to serve as a Tier 1 environmental review. The State Water Board has considered the reasonably foreseeable consequences of adoption of the draft Policy; however, potential site-specific recycled water project impacts may need to be considered in any subsequent environmental analysis performed by lead agencies, pursuant to Public Resources Code section 21159.1.

14. Consistent with CEQA, the substitute environmental documents do not engage in speculation or conjecture but, rather, analyze the reasonably foreseeable environmental impacts related to methods of compliance with the draft Policy, reasonably foreseeable mitigation measures to reduce those impacts, and reasonably feasible alternative means of compliance that would avoid or reduce the identified impacts.

15. The draft Policy incorporates mitigation that reduces to a level that is insignificant any adverse effects on the environment. From a program-level perspective, incorporation of the mitigation measures described in the substitute environmental document will foreseeably reduce impacts to less than significant levels.

16. A policy for water quality control does not become effective until adopted by the State Water Board and until the regulatory provisions are approved by the Office of Administrative Law (OAL).

17. If, during the OAL approval process, OAL determines that minor, non-substantive modifications to the language of the Policy are needed for clarity or consistency, the Executive Director or designee may make such changes consistent with the State Water Board's intent in adopting this Policy, and shall inform the State Water Board of any such changes.

THEREFORE BE IT RESOLVED THAT:

The State Water Board:

1. Approves and adopts the CEQA substitute environmental documentation, which includes the staff report/certified regulatory program environmental analysis/CEQA checklist, and the response to comments, which was prepared in accordance with the requirements of the State Water Board's certified regulatory CEQA process (as set forth in California Code of Regulations, title 23, section 3775, et seq.), Public Resources Code section 21159, and California Code of Regulations, title 14, section 15187, and directs the Executive Director or designee to sign the environmental checklist.

2. After considering the entire record, including oral testimony at the public hearing, adopts the Recycled Water Policy.

3. Authorizes the Executive Director or designee to submit the Recycled Water Policy to OAL for review and approval.

4. If, during the OAL approval process, OAL determines that minor, non-substantive modifications to the language of the Policy are needed for clarity or consistency, directs the Executive Director or designee to make such changes and inform the State Water Board of any such changes.

CERTIFICATION

The undersigned, Clerk to the Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on February 3, 2009.

AYE:	Chair Tam M. Doduc Charles R. Hoppin Frances Spivy-Weber
NAY:	None
ABSENT:	Arthur G. Baggett, Jr.
ABSTAIN:	None

Jeanine Townsend

Jeanine Townsend
Clerk to the Board

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 2013-0003

ADOPTION OF AN AMENDMENT TO THE POLICY FOR WATER QUALITY CONTROL FOR RECYCLED WATER CONCERNING MONITORING REQUIREMENTS FOR CONSTITUTENTS OF EMERGING CONCERN

WHEREAS:

1. Provisions of the Policy for Water Quality Control for Recycled Water (Recycled Water Policy), adopted under Resolution No. 2009-0011, directed the State Water Resources Control Board (State Water Board) to convene a “blue-ribbon” advisory panel (Panel) to provide guidance on future actions related to monitoring constituents of emerging concern (CECs) in recycled water.

2. In June 2010, the Panel submitted a report titled “Monitoring Strategies for Chemicals of Emerging Concern (CECs) in Recycled Water – Recommendations of a Science Advisory Panel” (Report), which presented recommendations for monitoring CECs in municipal recycled water used for groundwater recharge.

3. In December 2010, the State Water Board held a public hearing regarding the Panel’s Report and received public comments.

4. In May 2012, staff circulated a draft amendment to the Recycled Water Policy that: (1) proposed, in accordance with the Panel’s recommendations, monitoring requirements for CECs and surrogates in recycled water used for groundwater recharge; and (2) proposed a reduction of priority pollutant monitoring of recycled water used for landscape irrigation.

5. In July 2012, a scientific peer review of the draft amendment and the Panel’s Report was conducted.

6. Staff reviewed comments received on the draft amendment from the public and peer reviewers and issued a revised draft amendment on September 14, 2012. Written comments were received on this draft prior to an October 9, 2012, due date.

7. The State Water Board held a public hearing on October 16, 2012, to consider adoption of the draft amendment. At the hearing, the adoption was postponed to refine the responses to comments and allow additional time for public review.

8. The Natural Resources Agency has approved the State Water Board’s and the Regional Water Quality Control Boards’ water quality control planning process as a “certified regulatory program” that adequately satisfies the California Environmental Quality Act requirements for preparing environmental documents. The amendment concerns monitoring requirements for priority pollutants and constituents of emerging concern. It is not a “project” as defined by title 14, California Code of Regulations chapter 3, Guidelines for Implementation of the California Environmental Quality Act. Hence, approval of an environmental document is not required to adopt the amendment.

THEREFORE BE IT RESOLVED THAT:

The State Water Board

1. Adopts the amendment to the Recycled Water Policy.

2. Directs State Water Board Staff to submit the amended Recycled Water Policy to the Office of Administrative Law (OAL) for final approval.

3. Directs the Executive Director or designee to make minor, non-substantive modifications to the language of the amendment, if OAL determines during its approval process that such changes are needed; and directs the Executive Director to inform the State Water Board of any such changes.

CERTIFICATION

The undersigned Clerk to the Board does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on January 22, 2013.

AYE:	Vice Chair Frances Spivy-Weber Board Member Tam M. Doduc Board Member Steven Moore
NAY:	None
ABSENT:	Chairman Charles R. Hoppin Board Member Felicia Marcus
ABSTAIN:	None

Jeanine Townsend

Jeanine Townsend
Clerk to the Board

Appendix D - Los Angeles RWQCB Basin Plan (Excerpts)

2. BENEFICIAL USES

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Introduction

Beneficial uses form the cornerstone of water quality protection under the Basin Plan. Once beneficial uses are designated, appropriate water quality objectives can be established and programs that maintain or enhance water quality can be implemented to ensure the protection of beneficial uses. The designated beneficial uses, together with water quality objectives (referred to as criteria in federal regulations), form water quality standards. Such standards are mandated for all waterbodies within the state under the California Water Code. In addition, the federal Clean Water Act mandates standards for all surface waters, including wetlands.

Twenty-four beneficial uses in the Region are identified in this Chapter. These beneficial uses and their definitions were developed by the State and Regional Boards for use in the Regional Board Basin Plans. Three beneficial uses were added since the original 1975 Basin Plans. These new beneficial uses are Aquaculture, Estuarine Habitat, and Wetlands Habitat.

Beneficial uses can be designated for a waterbody in a number of ways. Those beneficial uses that have been attained for a waterbody on, or after, November 28, 1975, must be designated as "existing" in the Basin Plans. Other uses can be designated, whether or not they have been attained on a waterbody, in order to implement either federal or state mandates and goals (such as fishable and swimmable) for regional waters. Beneficial uses of streams that have intermittent flows, as is typical of many streams in southern California, are designated as intermittent. During dry periods, however, shallow ground water or small pools of water can support some beneficial uses associated with intermittent streams; accordingly, such beneficial uses (e.g., wildlife habitat) must be protected throughout the year and are designated "existing." In addition, beneficial uses can be designated as "potential" for several reasons, including:

- implementation of the State Board's policy entitled "Sources of Drinking Water Policy" (State Board Resolution No. 88-63, described in Chapter 5),
- plans to put the water to such future use,
- potential to put the water to such future use,
- designation of a use by the Regional Board as a regional water quality goal, or
- public desire to put the water to such future use.

Beneficial Use Definitions

Beneficial uses for waterbodies in the Los Angeles Region are listed and defined below. The uses are listed in no preferential order.

Municipal and Domestic Supply (MUN)
Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.

Agricultural Supply (AGR)
Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

Industrial Process Supply (PROC)
Uses of water for industrial activities that depend primarily on water quality.

Industrial Service Supply (IND)
Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.

Ground Water Recharge (GWR)
Uses of water for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.

Freshwater Replenishment (FRSH)

Uses of water for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).

Navigation (NAV)
Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

Hydropower Generation (POW)
Uses of water for hydropower generation.

Water Contact Recreation (REC-1)
Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.

Non-contact Water Recreation (REC-2)
Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Commercial and Sport Fishing (COMM)
Uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

Aquaculture (AQUA)
Uses of water for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes.

Warm Freshwater Habitat (WARM)
Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Cold Freshwater Habitat (COLD)
Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Inland Saline Water Habitat (SAL)
Uses of water that support inland saline water ecosystems including, but not limited to, preservation or enhancement of aquatic saline habitats, vegetation, fish, or wildlife, including invertebrates.

Estuarine Habitat (EST)
Uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).

Wetland Habitat (WET)
Uses of water that support wetland ecosystems, including, but not limited to, preservation or enhancement of wetland habitats, vegetation, fish, shellfish, or wildlife, and other unique wetland functions which enhance water quality, such as providing flood and erosion control, stream bank stabilization, and filtration and purification of naturally occurring contaminants.

Marine Habitat (MAR)
Uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

Wildlife Habitat (WILD)
Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Preservation of Biological Habitats (BIOL)
Uses of water that support designated areas or habitats, such as **Areas of Special Biological Significance (ASBS),** established refuges, parks, sanctuaries, ecological reserves, or other areas where the preservation or enhancement of natural resources requires special protection.

The following coastal waters have been designated as ASBS in the Los Angeles Region. For detailed descriptions of their boundaries, see the Ocean Plan discussion in Chapter 5, Plans and Policies:

- San Nicolas Island and Begg Rock
- Santa Barbara Island and Anacapa Island
- San Clemente Island
- Mugu Lagoon to Latigo Point

- Santa Catalina Island, Subarea One, Isthmus Cove to Catalina Head
- Santa Catalina Island, Subarea Two, North End of Little Harbor to Ben Weston Point
- Santa Catalina Island, Subarea Three, Farnsworth Bank Ecological Reserve
- Santa Catalina Island, Subarea Four, Binnacle Rock to Jewfish Point

The following areas are designated Ecological Reserves or Refuges:

- Channel Islands National Marine Sanctuary
- Santa Barbara Island Ecological Reserve
- Anacapa Island Ecological Reserve
- Catalina Marine Science Center Marine Life
- Point Fermin Marine Life Refuge
- Farnsworth Bank Ecological Reserve
- Lowers Cove Reserve
- Abalone Cove Ecological Reserve
- Big Sycamore Canyon Ecological Reserve

Rare, Threatened, or Endangered Species (RARE)
Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.

Migration of Aquatic Organisms (MIGR)
Uses of water that support habitats necessary for migration, acclimatization between fresh and salt water, or other temporary activities by aquatic organisms, such as anadromous fish.

Spawning, Reproduction, and/or Early Development (SPWN)
Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

Shellfish Harvesting (SHELL)
Uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sports purposes.

Beneficial Uses for Specific Waterbodies

Tables 2-1 through 2-4 list the major regional waterbodies and their designated beneficial uses. These tables are organized by waterbody type: (i) inland surface waters (rivers, streams, lakes, and inland wetlands), (ii) ground water, (iii) coastal waters (bays, estuaries, lagoons, harbors, beaches, and ocean waters), and (iv) coastal wetlands. Within Table 2-1 waterbodies are organized by major watersheds. Hydrologic unit, area, and subarea numbers are noted in the surface water tables (2-1, 2-3, and 2-4) as a cross reference to the classification system developed by the California Department of Water Resources. For those surface waterbodies that cross into other hydrologic units, such waterbodies appear more than once in a table. Furthermore, certain coastal waterbodies are duplicated in more than one table for completeness (e.g., many lagoons are listed both in inland surface waters and in coastal features tables). Major groundwater basins are classified in Table 2-2 according to the Department of Water Resources Bulletin No. 118 (1980). A series of maps (Figures 2-1 to 2-22) illustrates regional surface waters, ground waters, and major harbors.

The Regional Board contracted with the California Department of Water Resources for a study of beneficial uses and objectives for the upper Santa Clara River (DWR, 1989) and for another study of the beneficial uses and objectives the Piru, Sespe, and Santa Paula Hydrologic areas of the Santa Clara River (DWR, 1993). In addition, the Regional Board contracted with Dr. Prem Saint of California State University at Fullerton to survey and research beneficial uses of all waterbodies throughout the Region (Saint, et al., 1993a and 1993b). Information from these studies was used to update this Basin Plan.

State Board Resolution No. 88-63 (Sources of Drinking Water) followed by Regional Board Resolution No. 89-03 (Incorporation of Sources of Drinking Water Policy into the Water Quality Control Plans (Basin Plans)) states that " All surface and ground waters of the State are considered to be suitable, or potentially suitable, for municipal or domestic waters supply and should be so designated by the Regional Boards ... [with certain exceptions which must be adopted by the Regional Board]." In adherence with these policies, all inland surface and ground waters have been designated as MUN - presuming at least a potential suitability for such a designation.

These policies allow for Regional Boards to consider the allowance of certain exceptions according to criteria set forth in SB Resolution No. 88-63. While supporting the protection of all waters that may be used as a municipal water supply in the future, the

Regional Board realizes that there may be exceptions to this policy.

In recognition of this fact, the Regional Board will soon implement a detailed review of criteria in the State Sources of Drinking Water policy and identify those waters in the Region that should be excepted from the MUN designation. Such exceptions will be proposed under a special Basin Plan Amendment and will apply exclusively to those waters designated as MUN under SB Res. No. 88-63 and RB Res. No. 89-03.

In the interim, no new effluent limitations will be placed in Waste Discharge Requirements as a results of these designations until the Regional Board adopts this amendment.

The following sections summarize general information regarding beneficial uses designated for the various waterbody types.

Inland Surface Waters

Inland surface waters consist of rivers, streams, lakes, reservoirs, and inland wetlands. Beneficial uses of these inland surface waters and their tributaries (which are graphically represented on Figures 2-1 to 2-10) are designated on Table 2-1.

Beneficial uses of inland surface waters generally include REC-1 (swimmable) and WARM, COLD, SAL, or COMM (fishable), reflecting the goals of the federal Clean Water Act. In addition, inland waters are usually designated as IND, PRO, REC-2, WILD, and are sometimes designated as BIOL and RARE. In a few cases, such as reservoirs used primarily for drinking water, REC-1 uses can be restricted or prohibited by the entities that manage these waters. Many of these reservoirs, however, are designated as potential for REC-1, again reflecting federal goals. Furthermore, many regional streams are primary sources of replenishment for major groundwater basins that supply water for drinking and other uses, and as such must be protected as GWR. Inland surface waters that meet the criteria mandated by the *Sources of Drinking Water Policy* (which became effective when the State Board adopted Resolution No. 88-63 in 1988) are designated MUN. (This policy is reprinted in Chapter 5, Plans and Policies).

Under federal law, all surface waters must have water quality standards designated in the Basin Plans. Most of the inland surface waters in the Region have beneficial uses specifically designated for them. Those waters not specifically listed (generally smaller tributaries) are designated with the same beneficial uses as the streams, lakes, or reservoirs to which they are tributary. This is commonly referred to as the "tributary rule."

Ground Waters

Beneficial uses for regional groundwater basins (Figure 1-9) are designated on Table 2-2. For reference, Figures 2-11 to 2-18 show enlargements of all of the major basins and sub-basins referred to in the ground water beneficial use table (Table 2-2) and the water quality objective table (Table 3-8) in Chapter 3.

Many groundwater basins are designated MUN, reflecting the importance of ground water as a source of drinking water in the Region and as required by the State Board's *Sources of Drinking Water Policy.* Other beneficial uses for ground water are generally IND, PROC, and AGR. Occasionally, ground water is used for other purposes (e.g., ground water pumped for use in aquaculture operations at the Fillmore Fish Hatchery).

Coastal Waters

Coastal waters in the Region include bays, estuaries, lagoons, harbors, beaches, and ocean waters. Beneficial uses for these coastal waters provide habitat for marine life and are used extensively for recreation, boating, shipping, and commercial and sport fishing, and are accordingly designated in Table 2-3. Figures 2-19 to 2-22 show specific sub-areas of some of these coastal waters.

Wetlands

Wetlands include freshwater, estuarine, and saltwater marshes, swamps, mudflats, and riparian areas. As the California Water Code (§13050[e]) defines "waters of the state" to be "any water, surface or underground, including saline waters, within the boundaries of the state," natural wetlands are therefore entitled to the same level of protection as other waters of the state.

Wetlands also are protected under the Clean Water Act, which was enacted to restore and maintain the physical, chemical, and biological integrity of the nation's waters, including wetlands. Regulations developed under the CWA specifically include wetlands "as waters of the United States" (40 CFR 116.3) and defines them as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Although the definition of wetlands differs widely among federal agencies, both the USEPA and the U.S. Army Corps of Engineers use this definition in administrating the 404 permit program.

Recently, both state and federal wetlands policies have been developed to protect these valuable waters. Executive Order W-59-93 (signed by Governor Pete Wilson on August 23, 1993) established state policy guidelines for wetlands conservation. The primary goal of this policy is to ensure no overall net loss and to achieve a long-term net gain in the quantity, quality, and permanence of wetland acreage in California. The federal wetlands policy, representing a significant advance in wetlands protection, was unveiled by nine federal agencies on August 24, 1993. This policy represents an agreement that is sensitive to the needs of landowners, more efficient, and provides flexibility in the permit process.

The USEPA has requested that states adopt water quality standards (beneficial uses and objectives) for wetlands as part of their overall effort to protect the nation's water resources. The 1975 Basin Plans identified a number of waters which are known to include wetlands; these wetlands, however, were not specifically identified as such. In this Basin Plan, a wetlands beneficial use category has been added to identify inland waters that support wetland habitat as well as a variety of other beneficial uses. The wetlands habitat definition recognizes the uniqueness of these areas and functions they serve in protecting water quality. Table 2-4 identifies and designates beneficial uses for significant coastal wetlands in the Region. These waterbodies are also included on Tables 2-1 and 2-3. Beneficial uses of wetlands include many of the same uses designated for the rivers, lakes, and coastal waters to which they are adjacent, and include REC-1, REC-2, WARM, COLD, EST, MAR, WET, GWR, COMM, SHELL, MIGR, SPWN, WILD and often RARE or BIOL.

As some wetlands can not be easily identified in southern California because of the hydrologic regime, the Regional Board identifies wetlands using indicators such as hydrology, presence of hydrophytic plants (plants adapted for growth in water), and/or hydric soils (soils saturated for a period of time during the growing season). The Regional Board contracted with Dr. Prem Saint, et al. (1993a and 1993b), to inventory and describe major regional wetlands. Information from this study was used to update this Basin Plan.

3. WATER QUALITY OBJECTIVES

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Introduction

The Clean Water Act (§303) requires states to develop water quality standards for all waters and to submit to the USEPA for approval all new or revised water quality standards which are established for inland surface and ocean waters. Water quality standards consist of a combination of beneficial uses (designated in Chapter 2) and water quality objectives (contained in this Chapter).

In addition to the federal mandate, the California Water Code (§13241) specifies that each Regional Water Quality Control Board shall establish water quality objectives. The Water Code defines water quality objectives as "the allowable limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area." Thus, water quality objectives are intended (i) to protect the public health and welfare and (ii) to maintain or enhance water quality in relation to the designated existing and potential beneficial uses of the water. Water quality objectives are achieved through Waste Discharge Requirements and other programs outlined in Chapter 4, Strategic Planning and Implementation. These objectives, when compared with future water quality data, also provide the basis for identifying trends toward degradation or enhancement of regional waters.

These water quality objectives supersede those contained in all previous Basin Plans and amendments adopted by the Los Angeles Regional Board. As new information becomes available, the Regional Board will review the objectives contained herein and develop new objectives as necessary. In addition, this Plan will be reviewed every three years (triennial review) to determine the need for modification.

Statement of Policy with Respect to Maintaining High Quality of Waters in California

A key element of California's water quality standards is the state's Antidegradation Policy. This policy, formally referred to as the *Statement of Policy with Respect to Maintaining High Quality Waters in California* (State Board Resolution No. 68-16), restricts degradation of surface or ground waters. In particular, this policy protects waterbodies where existing quality is higher than is necessary for the protection of beneficial uses.

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 68-16

STATEMENT OF POLICY WITH RESPECT TO
MAINTAINING HIGH QUALITY OF WATERS IN CALIFORNIA

WHEREAS the California Legislature has declared that it is the policy of the State that the granting of permits and licenses for unappropriated water and the disposal of wastes into the waters of the State shall be so regulated as to achieve highest water quality consistent with maximum benefit to the people of the State and shall be controlled so as to promote the peace, health, safety and welfare of the people of the State; and

WHEREAS water quality control policies have been and are being adopted for waters of the State; and

WHEREAS the quality of some waters of the State is higher than that established by the adopted policies and it is the intent and purpose of this Board that such higher quality shall be maintained to the maximum extent possible consistent with the declaration of the Legislature;

NOW, THEREFORE, BE IT RESOLVED:

1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

2. Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

3. In implementing this policy, the Secretary of the Interior will be kept advised and will be provided with such information as he will need to discharge his responsibilities under the Federal Water Pollution Control Act.

BE IT FURTHER RESOLVED that a copy of this resolution be forwarded to the Secretary of the Interior as part of California's water quality control policy submission.

CERTIFICATION

The undersigned, Executive Officer of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on October 24, 1968.

Dated: October 28, 1968

Original signed by
Kerry W. Mulligan, Executive Officer
State Water Resources Control Board

Under the Antidegradation Policy, any actions that can adversely affect water quality in all surface and ground waters (i) must be consistent with the maximum benefit to the people of the state, (ii) must not unreasonably affect present and anticipated beneficial use of such water, and (iii) must not result in water quality less than that prescribed in water quality plans and policies. Furthermore, any actions that can adversely affect surface waters are also subject to the federal Antidegradation Policy (40 CFR 131.12), developed under the CWA. The USEPA, Region IX, has also issued detailed guidance for the implementation of federal antidegradation regulations for surface waters within its jurisdiction (USEPA, 1987).

Regional Objectives for Inland Surface Waters

Narrative or numerical water quality objectives have been developed for the following parameters (listed alphabetically) and apply to all inland surface waters and enclosed bays and estuaries (including wetlands) in the Region. *Water quality objectives are in italics.*

Ammonia

The neutral, un-ionized ammonia species (NH_3) is highly toxic to fish and other aquatic life. The ratio of toxic NH_3 to total ammonia ($NH_4^+ + NH_3$) is primarily a function of pH, but is also affected by temperature and other factors. Additional impacts can also occur as the oxidation of ammonia lowers the dissolved oxygen content of the water, further stressing aquatic organisms. Ammonia also combines with chlorine (often both are present) to form chloramines - persistent toxic compounds that extend the effects of ammonia and chlorine downstream.

Oxidation of ammonia to nitrate may lead to groundwater impacts in areas of recharge.

In order to protect aquatic life, ammonia concentrations in receiving waters shall not exceed the values listed for the corresponding instream conditions in Tables 3-1 to 3-4.

Timing of compliance with this objective will be determined on a case-by-case basis. Discharges will have up to 8 years following the adoption of this plan by the Regional Board to (i) make the necessary adjustments/improvements to meet these objectives or (ii) to conduct studies leading to an approved site-specific objective for ammonia. If it is determined that there is an immediate threat or impairment of beneficial uses due to ammonia, the objectives in Tables 3-1 to 3-4 shall apply.

In order to protect underlying groundwater basins, ammonia shall not be present at levels that when oxidized to nitrate, pose a threat to groundwater.

Bacteria, Coliform

Total and fecal coliform bacteria are used to indicate the likelihood of pathogenic bacteria in surface waters. Water quality objectives for total and fecal coliform vary with the beneficial uses of the waterbody and are described below:

In waters designated for water contact recreation (REC-1), the fecal coliform concentration shall not exceed a log mean of 200/100 ml (based on a minimum of not less than four samples for any 30-day period), nor shall more than 10 percent of total samples during any 30-day period exceed 400/100 ml.

In waters designated for non-water contact recreation (REC-2) and not designated for water contact recreation (REC-1), the fecal coliform concentration shall not exceed a log mean of 2000/100 ml (based on a minimum of not less than four samples for any 30-day period), nor shall more than 10 percent of samples collected during any 30-day period exceed 4000/100 ml.

In all waters where shellfish can be harvested for human consumption (SHELL), the median total coliform concentration throughout the water column for any 30-day period shall not exceed 70/100 ml, nor shall more than ten percent of the samples collected during any 30-day period exceed 230/100 ml for a five-tube decimal dilution test or 330/100 ml when a three-tube decimal dilution test is used.

Table 3-1. One-hour Average Concentration for Ammonia[1,2] for Waters Designated as COLD (Salmonids or Other Sensitive Coldwater Species Present).

pH	Temperature, °C						
	0	5	10	15	20	25	30
Un-ionized ammonia (mg/liter NH_3)							
6.50	0.0091	0.0129	0.0182	0.026	0.036	0.036	0.036
6.75	0.0149	0.021	0.030	0.042	0.059	0.059	0.059
7.00	0.023	0.033	0.046	0.066	0.093	0.093	0.093
7.25	0.034	0.048	0.068	0.095	0.135	0.135	0.135
7.50	0.045	0.064	0.091	0.128	0.181	0.181	0.181
7.75	0.056	0.080	0.113	0.159	0.22	0.22	0.22
8.00	0.065	0.092	0.130	0.184	0.26	0.26	0.26
8.25	0.065	0.092	0.130	0.184	0.26	0.26	0.26
8.50	0.065	0.092	0.130	0.184	0.26	0.26	0.26
8.75	0.065	0.092	0.130	0.184	0.26	0.26	0.26
9.00	0.065	0.092	0.130	0.184	0.26	0.26	0.26
Total ammonia (mg/liter NH_3)							
6.50	35	33	31	30	29	20	14.3
6.75	32	30	28	27	27	18.6	13.2
7.00	28	26	25	24	23	16.4	11.6
7.25	23	22	20	19.7	19.2	13.4	9.5
7.50	17.4	16.3	15.5	14.9	14.6	10.2	7.3
7.75	12.2	11.4	10.9	10.5	10.3	7.2	5.2
8.00	8.0	7.5	7.1	6.9	6.8	4.8	3.5
8.25	4.5	4.2	4.1	4.0	3.9	2.8	2.1
8.50	2.6	2.4	2.3	2.3	2.3	1.71	1.28
8.75	1.47	1.40	1.37	1.38	1.42	1.07	0.83
9.00	0.86	0.83	0.83	0.86	0.91	0.72	0.58

1 To convert these values to mg/liter N, multiply by 0.822

2 Source: USEPA, 1986

Table 3-2. One-hour Average Concentration for Ammonia[1,2] for Waters Designated as WARM (Salmonids or Other Sensitive Coldwater Species Absent).

pH	Temperature, °C				
	0	5	10	15	20
	Un-ionized ammonia (mg/liter NH_3)				
6.50	0.0091	0.0129	0.0182	0.026	0.036
6.75	0.0149	0.021	0.030	0.042	0.059
7.00	0.023	0.033	0.046	0.066	0.093
7.25	0.034	0.048	0.068	0.095	0.135
7.50	0.045	0.064	0.091	0.128	0.181
7.75	0.056	0.080	0.113	0.159	0.22
8.00	0.065	0.092	0.130	0.184	0.26
8.25	0.065	0.092	0.130	0.184	0.26
8.50	0.065	0.092	0.130	0.184	0.26
8.75	0.065	0.092	0.130	0.184	0.26
9.00	0.065	0.092	0.130	0.184	0.26
	Total ammonia (mg/liter NH_3)				
6.50	35	33	31	30	29
6.75	32	30	28	27	27
7.00	28	26	25	24	23
7.25	23	22	20	19.7	19.2
7.50	17.4	16.3	15.5	14.9	14.6
7.75	12.2	11.4	10.9	10.5	10.3
8.00	8.0	7.5	7.1	6.9	6.8
8.25	4.5	4.2	4.1	4.0	3.9
8.50	2.6	2.4	2.3	2.3	2.3
8.75	1.47	1.40	1.37	1.38	1.42
9.00	0.86	0.83	0.83	0.86	0.91

1 To convert these values to mg/liter N, multiply by 0.822

2 Source: USEPA, 1986

Table 3-3. Four-day Average Concentration for Ammonia[1,2] for Waters Designated as COLD (Salmonids or Other Sensitive Coldwater Species Present).

pH	Temperature, °C						
	0	5	10	15	20	25	30
Un-ionized ammonia (mg/liter NH_3)							
6.50	0.0008	0.0011	0.0016	0.0022	0.0022	0.0022	0.0022
6.75	0.0014	0.0020	0.0028	0.0039	0.0039	0.0039	0.0039
7.00	0.0025	0.0035	0.0049	0.0070	0.0070	0.0070	0.0070
7.25	0.0044	0.0062	0.0088	0.0124	0.0124	0.0124	0.0124
7.50	0.0078	0.0111	0.0156	0.022	0.022	0.022	0.022
7.75	0.0129	0.0182	0.026	0.036	0.036	0.036	0.036
8.00	0.0149	0.021	0.030	0.042	0.042	0.042	0.042
8.25	0.0149	0.021	0.030	0.042	0.042	0.042	0.042
8.50	0.0149	0.021	0.030	0.042	0.042	0.042	0.042
8.75	0.0149	0.021	0.030	0.042	0.042	0.042	0.042
9.00	0.0149	0.021	0.030	0.042	0.042	0.042	0.042
Total ammonia (mg/liter NH_3)							
6.50	3.0	2.8	2.7	2.5	1.76	1.23	0.87
6.75	3.0	2.8	2.7	2.6	1.76	1.23	0.87
7.00	3.0	2.8	2.7	2.6	1.76	1.23	0.87
7.25	3.0	2.8	2.7	2.6	1.77	1.24	0.88
7.50	3.0	2.8	2.7	2.6	1.78	1.25	0.89
7.75	2.8	2.6	2.5	2.4	1.66	1.17	0.84
8.00	1.82	1.70	1.62	1.57	1.10	0.78	0.56
8.25	1.03	0.97	0.93	0.90	0.64	0.46	0.33
8.50	0.58	0.55	0.53	0.53	0.38	0.28	0.21
8.75	0.34	0.32	0.31	0.31	0.23	0.173	0.135
9.00	0.195	0.189	0.189	0.195	0.148	0.116	0.094

1 To convert these values to mg/liter N, multiply by 0.822.

2 Source: USEPA, 1992

Table 3-4. Four-day Average Concentration for Ammonia[1,2] for Waters Designated as WARM (Salmonids or Other Sensitive Coldwater Species Absent).

pH	Temperature, °C						
	0	5	10	15	20	25	30
Un-ionized ammonia (mg/liter NH_3)							
6.50	0.0008	0.0011	0.0016	0.0022	0.0031	0.0031	0.0031
6.75	0.0014	0.0020	0.0028	0.0039	0.0055	0.0055	0.0055
7.00	0.0025	0.0035	0.0049	0.0070	0.0099	0.0099	0.0099
7.25	0.0044	0.0062	0.0088	0.0124	0.0175	0.0175	0.0175
7.00	0.0078	0.0111	0.0156	0.022	0.031	0031	0.031
7.75	0.0129	0.0182	0.026	0.036	0.051	0.051	0.051
8.00	0.0149	0.021	0.030	0.042	0.059	0.059	0.059
8.25	0.0149	0.021	0.030	0.042	0.059	0.059	0.059
8.50	0.0149	0.021	0.030	0.042	0.059	0.059	0.059
8.75	0.0149	0.021	0.030	0.042	0.059	0.059	0.059
9.00	0.0149	0.021	0.030	0.042	0.059	0.059	0.059
Total ammonia (mg/liter NH_3)							
6.50	3.0	2.8	2.7	2.5	2.5	1.73	1.23
6.75	3.0	2.8	2.7	2.6	2.5	1.74	1.23
7.00	3.0	2.8	2.7	2.6	2.5	1.74	1.23
7.25	3.0	2.8	2.7	2.6	2.5	1.75	1.24
7.50	3.0	2.8	2.7	2.6	2.5	1.76	1.25
7.75	2.8	2.6	2.5	2.4	2.3	1.65	1.18
8.00	1.82	1.70	1.62	1.57	1.55	1.10	0.79
8.25	1.03	0.97	0.93	0.90	0.90	0.64	0.47
8.50	0.58	0.55	0.53	0.53	0.53	0.39	0.29
8.75	0.34	0.32	0.31	0.31	0.32	0.24	0.190
9.00	0.195	0.189	0.189	0.195	0.21	0.163	0.133

1 To convert these values to mg/liter N, multiply by 0.822.

2 Source: USEPA, 1992

Bioaccumulation

Many pollutants can bioaccumulate in fish and other aquatic organisms at levels which are harmful for both the organisms as well as organisms that prey upon these species (including humans).

Toxic pollutants shall not be present at levels that will bioaccumulate in aquatic life to levels which are harmful to aquatic life or human health.

Biochemical Oxygen Demand (BOD_5)

The 5-day BOD test indirectly measures the amount of readily degradable organic material in water by measuring the residual dissolved oxygen after a period of incubation (usually 5 days at 20 °C), and is primarily used as an indicator of the efficiency of wastewater treatment processes.

Waters shall be free of substances that result in increases in the BOD which adversely affect beneficial uses.

Biostimulatory Substances

Biostimulatory substances include excess nutrients (nitrogen, phosphorus) and other compounds that stimulate aquatic growth. In addition to being aesthetical unpleasant (causing taste, odor, or color problems), this excessive growth can also cause other water quality problems.

Waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses.

Chemical Constituents

Chemical constituents in excessive amounts in drinking water are harmful to human health. Maximum levels of chemical constituents in drinking waters are listed in the California Code of Regulations and the relevant limits are described below.

Surface waters shall not contain concentrations of chemical constituents in amounts that adversely affect any designated beneficial use.

Water designated for use as Domestic or Municipal Supply (MUN) shall not contain concentrations of chemical constituents in excess of the limits specified in the following provisions of Title 22 of the California Code of Regulations which are incorporated by reference into this plan: Table 64431-A of Section 64431 (Inorganic Chemicals), Table 64431-B of Section 64431 (Fluoride), and Table 64444-A of Section 64444 (Organic Chemicals). This incorporation by reference is prospective including future changes to the incorporated provisions as the changes take effect. (See Tables 3-5, 3-6, and 3-7.)

Table 3-5. The Maximum Contaminant Levels: Inorganic Chemicals (for MUN beneficial use) specified in Table 64431-A of Section 64431 of Title 22 of the California Code of Regulations as of 9-8-94.

Constituent	Maximum Contaminant Level mg/L
Aluminum	1.
Antimony	0.006
Arsenic	0.05
Asbestos	7 MFL*
Barium	1.
Beryllium	0.004
Cadmium	0.005
Chromium	0.05
Cyanide	0.2
Mercury	0.002
Nickel	0.1
Nitrate (as NO_3)	45.
Nitrate + Nitrite (sum as nitrogen)	10.
Nitrite (as nitrogen)	1.
Selenium	0.05
Thallium	0.002

* MFL = million fibers per liter; MCL for fibers exceeding 10 μm in lenght

Table 3-6. The Limiting and Optimum Concentrations for Fluoride (for MUN beneficial use) specified in Table 64431-B of Section 64431 of Title 22 of the California Code of Regulations as of 9-8-94.

Annual Average of Maximum Daily Air Temperature (°F)	Fluoride Concentration (mg/L)			
	Lower	Optimum	Upper	Maximum Concentration Level
53.7 and below	0.9	1.2	1.7	2.4
53.8 to 58.3	0.8	1.1	1.5	2.2
58.4 to 63.8	0.8	1.0	1.3	2.0
63.9 to 70.6	0.7	0.9	1.2	1.8
70.7 to 79.2	0.7	0.8	1.0	1.6
79.3 to 90.5	0.6	0.7	0.8	1.4

Chlorine, Total Residual

Disinfection of wastewaters with chlorine produces a chlorine residual. Chlorine and its reaction products are toxic to aquatic life.

Chlorine residual shall not be present in surface water discharges at concentrations that exceed 0.1 mg/L and shall not persist in receiving waters at any concentration that causes impairment of beneficial uses.

Color

Color in water can result from natural conditions (e.g., from plant material or minerals) or can be introduced from commercial or industrial sources. Color is primarily an aesthetic consideration, although extremely dark colored water can limit light penetration and cause additional water quality problems. Furthermore, color can impact domestic and industrial uses by discoloring clothing or foods. The secondary drinking water standard is 15 color units (DHS, 1992).

Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.

Exotic Vegetation

Exotic (non-native) vegetation introduced in and around stream courses is often of little value as habitat (food and cover) for aquatic-dependent biota. Exotic plants can quickly out-compete native vegetation and cause other water quality impairments.

Exotic vegetation shall not be introduced around stream courses to the extent that such growth causes nuisance or adversely affects beneficial uses.

Floating Material

Floating materials can be an aesthetic nuisance as well as provide substrate for undesirable bacterial and algal growth and insect vectors.

Waters shall not contain floating materials, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.

Table 3-7. The Maximum Contaminant Levels: Organic Chemicals (for MUN beneficial use) specified in Table 64444-A of Section 64444 of Title 22 of the California Code of Regulations as of 9-8-94.

Constituent	Maximum Contaminant Level mg/L
A. Volatile Organic Chamicals (VOCs)	
Benzene	0.001
Carbon Tetrachloride	0.0005
1,2-Dichlorobenzene	0.6
1,4-Dichlorobenzene	0.005
1,1-Dichloroethane	0.005
1,2-Dichloroethane	0.0005
1,1-Dichloroethylene	0.006
cis-1,2-Dichloroethylene	0.006
trans-1,2-Dichloroethylene	0.01
Dichloromethane	0.005
1,2-Dichloropropane	0.005
1,3-Dichloropropene	0.0005
Ethylbenzene	0.7
Monochlorobenzene	0.07
Styrene	0.1
1,1,2,2-Tetrachlorethane	0.001
Tetrachloroethylene	0.005
Toluene	0.15
1,2,4-Trichlorobenzene	0.07
1,1,1-Trichloroethane	0.200
1,1,2-Trichloroethane	0.005
Trichloroethylene	0.005
Trichlorofluoromethane	0.15
1,1,2-Trichloro-1,2,2-Trifluoroethane	1.2
Vinyl Chloride	0.0005
Xylenes (single isomer or sum of isomers)	1.750
B. Non-Volatile Synthetic Organic Chemicals (SOCs)	
Alachlor	0.002
Atrazine	0.003
Bentazon	0.018
Benzo(a)pyrene	0.0002
Carbofuran	0.018
Chlordane	0.0001
2,4-D	0.07
Dalapon	0.2
1,2-Dibromo-3-chloropropane	0.0002
Di(2-ethylhexyl)adipate	0.4
Di(2-ethylhexyl)phthalate	0.004
Dinoseb	0.007
Diquat	0.02
Endothall	0.1
Endrin	0.002
Ethylene Dibromide	0.00005
Glyphosate	0.7
Heptachlor	0.00001
Heptachlor Epoxide	0.00001
Hexachlorobenzene	0.001
Hexachlorocyclopentadiene	0.05
Lindane	0.0002
Methoxychlor	0.04
Molinate	0.02
Oxarnyl	0.2
Pentachlorophenol	0.001
Picloram	0.5
Polychlorinated Biphenyls	0.0005
Simazine	0.004
Thiobencarb	0.07
Toxaphene	0.003
2,3,7,8-TCDD (Dioxin)	$3X10^{-8}$
2,4,5-TP (Silvex)	0.05

Methylene Blue Activated Substances (MBAS)

The MBAS procedure tests for the presence of anionic surfactants (detergents) in water. Positive results can indicate the presence of domestic wastewater. This test can be used to indicate impacts from septic systems. Surfactants disturb the surface tension which affects insects and can affect gills in aquatic life. The secondary drinking water standard for MBAS is 0.5 mg/L (DHS, 1992).

Waters shall not have MBAS concentrations greater than 0.5 mg/L in waters designated MUN.

Mineral Quality

Mineral quality in natural waters is largely determined by the mineral assemblage of soils and rocks and faults near the land surface. Point and nonpoint source discharges of poor quality water can degrade the mineral content of natural waters. High levels of dissolved solids renders waters useless for many beneficial uses. Elevated levels of boron affect agricultural use (especially citrus).

Numerical mineral quality objectives for individual inland surface waters are contained in Table 3-8.

Nitrogen (Nitrate, Nitrite)

High nitrate levels in drinking water can cause health problems in humans. Infants are particularly sensitive and can develop methemoglobinemia (blue-baby syndrome). Excess nitrogen in surface waters also leads to excess aquatic growth and can contribute to elevated levels of NO_3 in ground water as well. The primary drinking water standard for nitrate (as NO_3) is 45 mg/L (DHS, 1992).

Waters shall not exceed 10 mg/L nitrogen as nitrate-nitrogen plus nitrite-nitrogen (NO_3-N + NO_2-N), 45 mg/L as nitrate (NO_3), 10 mg/L as nitrate-nitrogen (NO_3-N), or 1 mg/L as nitrite-nitrogen (NO_2-N) or as otherwise designated in Table 3-8.

Oil and Grease

Oil and grease are not readily soluble in water and form a film on the water surface. Oily films can coat birds and aquatic organisms, impacting respiration and thermal regulation, and causing death. Oil and grease can also cause nuisance conditions (odors and taste), are aesthetically unpleasant, and can restrict a wide variety of beneficial uses.

Waters shall not contain oils, greases, waxes or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.

Oxygen, Dissolved (DO)

Adequate dissolved oxygen levels are required to support aquatic life. Depression of dissolved oxygen can lead to anaerobic conditions resulting in odors or, in extreme cases, in fish kills. Dissolved oxygen requirements are dependent on the beneficial uses of the waterbody.

At a minimum (see specifics below), the ***mean*** *annual dissolved oxygen concentration of* ***all*** *waters shall be greater than 7 mg/L, and no single determination shall be less than 5.0 mg/L, except when natural conditions cause lesser concentrations.*

The dissolved oxygen content of all surface waters designated as WARM shall not be depressed below 5 mg/L as a result of waste discharges.

The dissolved oxygen content of all surface waters designated as COLD shall not be depressed below 6 mg/L as a result of waste discharges.

The dissolved oxygen content of all surface waters designated as both COLD and SPWN shall not be depressed below 7 mg/L as a result of waste discharges.

For that area known as the Outer Harbor area of Los Angeles-Long Beach Harbors, the mean annual dissolved oxygen concentrations shall be 6.0 mg/L or greater, provided that no single determination shall be less than 5.0 mg/L.

Table 3-8. Water Quality Objectives for Selected Constituents in Inland Surface Waters[a].

Reaches are in upstream to downstream order.

WATERSHED/STREAM REACH[b]	TDS (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	Boron[c] (mg/L)	Nitrogen[d] (mg/L)	SAR[e] (mg/L)
Miscellaneous Ventura Coastal Streams	*no waterbody specific objectives* [f]					
Ventura River Watershed:						
Above Camino Cielo Road	700	300	50	1.0	5	5
Between Camino Cielo Road and Casitas Vista Road	800	300	60	1.0	5	5
Between Casitas Vista Road and confluence with Weldon Canyon	1000	300	60	1.0	5	5
Between confluence with Weldon Canyon and Main Street	1500	500	300	1.5	10	5
Between Main St. and Ventura River Estuary	*no waterbody specific objectives* [f]					
Santa Clara River Watershed:						
Above Lang gaging station	500	100	50	0.5	5	5
Between Lang gaging station and Bouquet Canyon Road Bridge	800	150	100	1.0	5	5
Between Bouquet Canyon Road Bridge and West Pier Highway 99	1000	300	100	1.5	10	5
Between West Pier Highway 99 and Blue Cut gaging station	1000	400	100	1.5	5	10
Between Blue Cut gaging station and A Street, Fillmore	1300	600	100	1.5	5	5
Between A Street, Fillmore and Freeman Diversion "Dam" near Saticoy	1300	650	80	1.5	5	5
Between Freeman Diversion "Dam" near Saticoy and Highway 101 Bridge	1200	600	150	1.5	-	-
Between Highway 101 Bridge and Santa Clara River Estuary	*no waterbody specific objectives* [f]					
Santa Paula Creek above Santa Paula Water Works Diversion Dam	600	250	45	1.0	5	5
Sespe Creek above gaging station, 500' downstream from Little Sespe Creek	800	320	60	1.5	5	5
Piru Creek above gaging station below Santa Felicia Dam	800	400	60	1.0	5	5
Calleguas Creek Watershed:						
Above Potrero Road	850	250	150	1.0	10	f
Below Potrero Road	*no waterbody specific objectives* [f]					

Table 3-8. Water Quality Objectives for Selected Constituents in Inland Surface Waters[a] (cont.)

Reaches are in upstream to downstream order.

WATERSHED/STREAM REACH[b]	TDS (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	Boron[c] (mg/L)	Nitrogen[d] (mg/L)	SAR[e] (mg/L)
Miscellaneous Los Angeles County Coastal Streams	*no waterbody specific objectives* [f]					
Malibu Creek Watershed	*2000*	*500*	*500*	*2.0*	*10*	-
Ballona Creek Watershed	*no waterbody specific objectives* [f]					
Dominguez Channel Watershed	*no waterbody specific objectives* [f]					
Los Angeles River Watershed:						
Above Figueroa Street	950	300	150	g	8	g
Between Figueroa Street and Los Angeles River Estuary (Willow Street). Includes Rio Hondo below Santa Ana Freeway	1500	350	150	g	8	g
Rio Hondo above Santa Ana Freeway [h]	750	300	150	g	8	g
Santa Anita Creek above Santa Anita spreading grounds	250	30	10	g	f	g
Eaton Canyon Creek above Eaton Dam	250	30	10	g	f	g
Arroyo Seco above spreading grounds	300	40	15	g	f	g
Big Tujunga Creek above Hansen Dam	350	50	20	g	f	g
Pacoima Wash above Pacoima spreading grounds	250	30	10	g	f	g
San Gabriel River Watershed:						
Above Morris Dam	250	30	10	0.6	2	2
Between Morris Dam and Ramona Blvd.	*450*	*100*	*100*	*0.5*	8	g
Between Ramona Blvd. and Firestone Blvd.	750	300	150	*1.0*	8	g
Between Firestone Blvd. and San Gabriel River Estuary (downstream from Willow Street) including Coyote Creek	*no waterbody specific objectives* [f]					
All other minor San Gabriel Mountain streams tributary to San Gabriel Valley [i]	300	40	15	g	f	g
Island Watercourses:						
Anacapa Island	*no waterbody specific objectives* [f]					
San Nicolas Island	*no waterbody specific objectives* [f]					
Santa Barbara island	*no waterbody specific objectives* [f]					
Santa Catalina Island	*no waterbody specific objectives* [f]					
San Clemente Island	*no waterbody specific objectives* [f]					

Table 3-8. Water Quality Objectives for Selected Constituents in Inland Surface Waters[a] (cont.)

Reaches are in upstream to downstream order.

WATERSHED/STREAM REACH[b]	TDS (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	Boron[c] (mg/L)	Nitrogen[d] (mg/L)	SAR[e] (mg/L)
Other Watercourses:						
San Antonio Creek[j]	225	25	6	–	–	–
Chino Creek[j]	–	–	–	–	–	–

a. As part of the State's continuing planning process, data will continue to be collected to support the development of numerical water quality objectives for waterbodies and constituents where sufficient information is presently unavailable. Any new recommendations for water quality objectives will be brought before the Regional Board in the future.

b. All references to watersheds, streams and reaches include all tributaries. Water quality objectives are applied to all waters tributary to those specifically listed in the table. See Figures 2-1 to 2-10 for locations.

c. Where naturally occurring boron results in concentrations higher than the stated objective, a site-specific objective may be determined on a case-by-case basis.

d. Nitrate-nitrogen plus nitrite-nitrogen (NO3-N + NO2-N). The lack of adequate nitrogen data for all streams precluded the establishment of numerical objectives for all streams.

e. Sodium adsorption ratio (SAR) predicts the degree to which irrigation water tends to enter into cation-exchange reactions in soil.

SAR = Na+/((Ca++ + Mg++)/2)1/2

f. Site-specific objectives have not been determined for these reaches at this time. These areas are often impaired (by high levels of minerals) and there is not sufficient historic data to designate objectives based on natural background conditions. The following table illustrates the mineral or nutrient quality necessary to protect different categories of beneficial uses and will be used as a guideline for establishing effluent limits in these cases. Protection of the most sensitive beneficial use(s) would be the determining criteria for the selection of effluent limits.

Recommended objective (mg/L)	Beneficial Use Categories				
	MUN (Drinking Water Standards) [1]	**PROC**	**AGR**	**AQ LIFE*(Frshwtr)**	**GWR**
TDS	500 (USEPA secondary MCL)	50-1500 [2,7,9]	450-2000 [2,3,6]		Limits based on appropriate groundwater basin objectives and/or beneficial uses
Chloride	250 (USEPA secondary MCL)	20-1000 [2,9]	100-355 [2,3,8]	230 (4 day ave. continuous conc) [4]	
Sulfate	400-500 (USEPA proposed MCL)	20-300 [2,9]	350-600 [2,8]		
Boron			0.5-4.0 [2,6,8]		
Nitrogen	10 (USEPA MCL)				

References: 1) USEPA CFR § 141 et seq., 2) McKee and Wolf, 1963, 3) Ayers and Westcot, 1985, 4) USEPA, 1988, 5) Water Pollution Control Federation, 1989, 6) USEPA, 1973, 7) USEPA 1980, 8) Ayers, 1977.
* Aquatic life includes a variety of Beneficial Uses including WARM, COLD, SPWN, MIGR and RARE.

g. Agricultural supply is not a beneficial use of the surface water in the specified reach.

h. Rio Hondo spreading grounds are located above the Santa Ana Freeway

i. The stated objectives apply to all other surface streams originating within the San Gabriel Mountains and extend from their headwaters to the canyon mouth.

j. These watercourses are primarily located in the Santa Ana Region. The water quality objectives for these streams have been established by Santa Ana Region. Dashed lines indicate that numerical objectives have not been established, however, narrative objectives shall apply. Refer to the Santa Ana Region Basin Plan for more details.

Pesticides

Pesticides are used ubiquitously for a variety of purposes; however, their release into the environment presents a hazard to aquatic organisms and plants not targeted for their use. The extent of risk to aquatic life depends on many factors including the physical and chemical properties of the pesticide. Those of greatest concern are those that persist for long periods and accumulate in aquatic life and sediments.

No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses. There shall be no increase in pesticide concentrations found in bottom sediments or aquatic life.

Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of pesticides in excess of the limiting concentrations specified in Table 64444-A of Section 64444 (Organic Chemicals) of Title 22 of the California Code of Regulations which is incorporated by reference into this plan. This incorporation by reference is prospective including future changes to the incorporated provisions as the changes take effect. (See Table 3-7.)

pH

The hydrogen ion activity of water (pH) is measured on a logarithmic scale, ranging from 0 to 14. While the pH of "pure" water at 25 °C is 7.0, the pH of natural waters is usually slightly basic due to the solubility of carbon dioxide from the atmosphere. Minor changes from natural conditions can harm aquatic life.

The pH of inland surface waters shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharges. Ambient pH levels shall not be changed more than 0.5 units from natural conditions as a result of waste discharge.

The pH of bays or estuaries shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharges. Ambient pH levels shall not be changed more than 0.2 units from natural conditions as a result of waste discharge.

Polychlorinated Biphenyls (PCBs)

Polychlorinated biphenyls (PCBs) are a highly toxic and persistent group of organic chemicals that have been historically released into the environment. Many historic discharges still exist as sources in the environment.

The purposeful discharge of PCBs (the sum of chlorinated biphenyls whose analytical characteristics resemble those of Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, and Aroclor-1260) to waters of the Region, or at locations where the waste can subsequently reach waters of the Region, is prohibited.

Pass-through or uncontrollable discharges to waters of the Region, or at locations where the waste can subsequently reach water of the Region, are limited to 70 pg/L (30 day average) for protection of human health and 14 ng/L and 30 ng/L (daily average) to protect aquatic life in inland fresh waters and estuarine waters respectively.

Radioactive Substances

Radioactive substances are generally present in natural waters in extremely low concentrations. Mining or industrial activities increase the amount of radioactive substances in waters to levels that are harmful to aquatic life, wildlife or humans.

Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.

Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of radionuclides in excess of the limits specified in Table 4 of Section 64443 (Radioactivity) of Title 22 of the California Code of Regulations which is incorporated by reference into this plan. This incorporation by reference is prospective including future changes to the incorporated provisions as the changes take effect. (See Table 3-9.)

Table 3-9. The Maximum Contaminant Levels: Radioactivity (for MUN beneficial use) specified in Table 4 of Section 64443 of Title 22 of the California Code of Regulations as of 12-22-88.

MCL Radioactivity	Maximum Contaminant Level pCi/L
Combined Radium-226 and Radium-228	5
Gross Alpha particle activity (including Radium-226 but excluding Radon and Uranium)	15
Tritium	20,000
Strontium-90	8
Gross Beta particle activity	50
Uranium	20

(pCi/L = picocuries = curies x 10^{-12})

Solid, Suspended, or Settleable Materials

Surface waters carry various amounts of suspended and settleable materials from both natural and human sources. Suspended sediments limit the passage of sunlight into waters, which in turn inhibits the growth of aquatic plants. Excessive deposition of sediments can destroy spawning habitat, blanket benthic (bottom dwelling) organisms, and abrade the gills of larval fish.

Waters shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses.

Taste and Odor

Undesirable tastes and odors in water are an aesthetic nuisance, can impact recreational and other uses, and can indicate the presence of other pollutants.

Waters shall not contain taste or odor-producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible aquatic resources, cause nuisance, or adversely affect beneficial uses.

Temperature

Discharges of wastewaters can cause unnatural and/or rapid changes in the temperature of receiving waters which can adversely affect aquatic life.

The natural receiving water temperature of all regional waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses. Alterations that are allowed must meet the requirements below.

For waters designated WARM, water temperature shall not be altered by more than 5 °F above the natural temperature. At no time shall these WARM-designated waters be raised above 80 °F as a result of waste discharges.

For waters designated COLD, water temperature shall not be altered by more than 5 °F above the natural temperature.

Temperature objectives for enclosed bays and estuaries are specified in the "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays of California" (Thermal Plan), including any revisions thereto. See Chapter 5 for a description of the Thermal Plan.

Toxicity

Toxicity is the adverse response of organisms to chemical or physical agents. When the adverse response is mortality, the result is termed acute toxicity. When the adverse response is not mortality but instead reduced growth in larval organisms or reduced reproduction in adult organisms (or other appropriate measurements), a critical life stage effect (chronic toxicity) has occurred. The use of aquatic bioassays (toxicity tests) is widely accepted as a valid approach to evaluating toxicity of waste and receiving waters.

All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in, human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration or other appropriate methods as specified by the State or Regional Board.

The survival of aquatic life in surface waters, subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same waterbody in areas unaffected by the waste discharge or, when necessary, other control water.

There shall be no acute toxicity in ambient waters, including mixing zones. The acute toxicity objective for discharges dictates that the average survival in undiluted effluent for any three consecutive 96-hour static or continuous flow bioassay tests shall be at least 90%, with no single test having less than 70% survival when using an established USEPA, State Board, or other protocol authorized by the Regional Board.

There shall be no chronic toxicity in ambient waters outside mixing zones. To determine compliance with this objective, critical life stage tests for at least three species with approved testing protocols shall be used to screen for the most sensitive species. The test species used for screening shall include a vertebrate, an invertebrate, and an aquatic plant. The most sensitive species shall then be used for routine monitoring. Typical endpoints for chronic toxicity tests include hatchability, gross morphological abnormalities, survival, growth, and reproduction.

Effluent limits for specific toxicants can be established by the Regional Board to control toxicity identified under Toxicity Identification Evaluations (TIEs).

Turbidity

Turbidity is an expression of the optical property that causes light to be scattered in water due to particulate matter such as clay, silt, organic matter, and microscopic organisms. Turbidity can result in a variety of water quality impairments. The secondary drinking water standard for turbidity is 5 NTU (nephelometric turbidity units).

Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in natural turbidity attributable to controllable water quality factors shall not exceed the following limits:

Where natural turbidity is between 0 and 50 NTU, increases shall not exceed 20%.

Where natural turbidity is greater than 50 NTU, increases shall not exceed 10%.

Allowable zones of dilution within which higher concentrations may be tolerated may be defined for each discharge in specific Waste Discharge Requirements.

Regional Narrative Objectives for Wetlands

In addition to the regional objectives for inland surface waters (including wetlands), the following narrative objectives apply for the protection of wetlands in the Region.

Hydrology

Natural hydrologic conditions necessary to support the physical, chemical, and biological characteristics present in wetlands shall be protected to prevent significant adverse effects on:

- *natural temperature, pH, dissolved oxygen, and other natural physical/chemical conditions,*
- *movement of aquatic fauna,*
- *survival and reproduction of aquatic flora and fauna, and*
- *water levels.*

Habitat

Existing habitats and associated populations of wetlands fauna and flora shall be maintained by:

- *maintaining substrate characteristics necessary to support flora and fauna which would be present naturally,*
- *protecting food supplies for fish and wildlife,*
- *protecting reproductive and nursery areas, and*
- *protecting wildlife corridors.*

Regional Objectives for Ground Waters

The following objectives apply to all ground waters of the Region:

Bacteria

Total and fecal coliform bacteria are used to indicate the likelihood of pathogenic bacteria in waters.

In ground waters used for domestic or municipal supply (MUN) the concentration of coliform organisms over any seven day period shall be less than 1.1/100 ml.

Chemical Constituents and Radioactivity

Chemical constituents in excessive amounts in drinking water are harmful to human health. Maximum levels of chemical constituents in drinking waters are listed in the California Code of Regulations and the relevant limits are described below.

Ground waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents and radionuclides in excess of the limits specified in the following provisions of Title 22 of the California Code of Regulations which are incorporated by reference into this plan: Table 64431-A of section 64431 (Inorganic chemicals), Table 64431-B of Section 64431 (Fluoride), Table 64444-A of Section 64444 (Organic Chemicals), and Table 4 of Section 64443 (Radioactivity). This incorporation by reference is prospective including future changes to the incorporated provisions as the changes take effect. (See Tables 3-5, 3-6, 3-7, and 3-9.)

Ground waters shall not contain concentrations of chemical constituents in amounts that adversely affect any designated beneficial use.

Mineral Quality

Inorganic constituents in ground waters are largely influenced by thermodynamic reactions that occur as ground water comes into contact with various rock and soil types. For example, ground water that flows through beds of gypsum ($CaSO_4 \cdot 2H_2O$) typically has relatively high levels of calcium cations and sulfate anions. Ground water flowing through limestone ($CaCO_3$) also has relatively high levels of calcium cations, but coupled with bicarbonate anions instead of sulfate. Ground waters with these ions at levels greater than 120 mg/L (expressed as $CaCO_3$) are considered hard waters (Hem, 1989).

Human activities and land use practices can influence inorganic constituents in ground waters. Surface waters carrying abnormally high levels of salts (e.g., irrigation return flows) can degrade the ground waters that they recharge. Abnormally high levels of inorganic constituents can impair and preclude beneficial uses. For example, high levels of boron preclude agricultural use (especially for citrus crops) of ground waters. Hard waters present nuisance problems and may require softening prior to industrial use.

Numerical mineral quality objectives for individual groundwater basins are contained in Table 3-10.

Nitrogen (Nitrate, Nitrite)

High nitrate levels in drinking water can cause health problems in humans. Infants are particularly sensitive and can develop methemoglobinemia (blue-baby syndrome). The primary drinking water standard for nitrate (as NO_3) is 45 mg/L (DHS, 1992).

Human activities and land use practices can also influence nitrogen concentration in ground waters. For example, effluents from wastewater treatment plants, septic tanks and confined animal facilities can add high levels of nitrogen compounds to the ground water that they recharge. Irrigation water containing fertilizers can add high levels of nitrogen to ground water.

Ground waters shall not exceed 10 mg/L nitrogen as nitrate-nitrogen plus nitrite-nitrogen (NO_3-N + NO_2-N), 45 mg/L as nitrate (NO_3), 10 mg/L as nitrate-nitrogen (NO_3-N), or 1 mg/L as nitrite-nitrogen (NO_2-N).

Taste and Odor

Undesirable tastes and odors in water are an aesthetic nuisance and can indicate the presence of other pollutants.

Ground waters shall not contain taste or odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses.

Table 3-10. Water Quality Objectives for Selected Constituents in Regional Ground Waters[a].

DWR Basin No.[b]	BASIN	OBJECTIVES (mg/L)			
		TDS	Sulfate	Chloride	Boron
	Pitas Point Area [c]	None specified			
	Ojai Valley				
4-1	Upper Ojai Valley				
	West of Sulfur Mountain Road	1,000	300	200	1.0
	Central area	700	50	100	1.0
	Sisar area	700	250	100	0.5
4-2	Lower Ojai Valley				0.5
	West of San Antonio–Senior Canyon Creeks	1,000	300	200	0.5
	East of San Antonio–Senior Canyon Creeks	700	200	50	
4-3	**Ventura River Valley**				
	Upper Ventura	800	300	100	0.5
	San Antonio Creek area	1,000	300	100	1.0
	Lower Ventura	1,500	500	300	1.5
	Ventura Central [d]				
4-4	Santa Clara–Piru Creek area				
	Upper area (above Lake Piru)	1,100	400	200	2.0
	Lower area east of Piru Creek	2,500	1,200	200	1.5
	Lower area west of Piru Creek	1,200	600	100	1.5
	Santa Clara–Sespe Creek area				
	Topa Topa (upper Sespe) area	900	350	30	2.0
	Fillmore area				
	Pole Creek Fan area	2,000	800	100	1.0
	South side of Santa Clara River	1,500	800	100	1.1
	Remaining Fillmore area	1,000	400	50	0.7
	Santa Clara–Santa Paula area				
	East of Peck Road	1,200	600	100	1.0
	West of Peck Road	2,000	800	110	1.0
	Oxnard Plain				
	Oxnard Forebay	1,200	600	150	1.0
	Confined aquifers	1,200	600	150	1.0
	Unconfined and perched aquifers	3,000	1,000	500	--
4-6	Pleasant Valley				
	Confined aquifers	700	300	150	1.0
	Unconfined and perched aquifers	--	--	--	--
4-7	Arroyo Santa Rosa	900	300	150	1.0
4-8	Las Posas Valley				
	South Las Posas area				
	NW of Grimes Cyn Rd & LA Ave & Somis Rd	700	300	100	0.5
	E of Grimes Cyn Rd and Hitch Blvd	2,500	1,200	400	3.0
	S of LA Ave between Somis Rd & Hitch Blvd	1,500	700	250	1.0
	Grimes Canyon Rd & Broadway area	250	30	30	0.2
	North Las Posas area	500	250	150	1.0
4-5	**Upper Santa Clara**				
	Acton Valley	550	150	100	1.0
	Sierra Pelona Valley (Agua Dulce)	600	100	100	0.5
	Upper Mint Canyon	700	150	100	0.5
	Upper Bouquet Canyon	400	50	30	0.5
	Green Valley	400	50	25	--
	Lake Elizabeth–Lake Hughes area	500	100	50	0.5

Table 3-10. Water Quality Objectives for Selected Constituents in Regional Ground Waters[a] (cont.)

DWR Basin No.[b]	BASIN	OBJECTIVES (mg/L)			
		TDS	Sulfate	Chloride	Boron
4-4.07	**Eastern Santa Clara**				
	Santa Clara--Mint Canyon	800	150	150	1.0
	South Fork	700	200	100	0.5
	Placerita Canyon	700	150	100	0.5
	Santa Clara--Bouquet & San Francisquito Canyons	700	250	100	1.0
	Castaic Valley	1,000	350	150	1.0
	Saugus Aquifer	--	--	--	--
4-9	**Simi Valley**				
	Simi Valley Basin				
	Confined aquifers	1,200	600	150	1.0
	Unconfined aquifers	--	--	--	--
	Gillibrand Basin	900	350	50	1.0
4-10	**Conejo Valley**	800	250	150	1.0
4-11	**Los Angeles Coastal Plain**				
	Central Basin	700	250	150	1.0
	West Coast Basin	800	250	250	1.5
	Hollywood Basin	750	100	100	1.0
	Santa Monica Basin	1,000	250	200	0.5
4-12	**San Fernando Valley**				
	Sylmar Basin	600	150	100	0.5
	Verdugo Basin	600	150	100	0.5
	San Fernando Basin				
	West of Highway 405	800	300	100	1.5
	East of Highway 405 (overall)	700	300	100	1.5
	Sunland-Tugunga area[e]	400	50	50	0.5
	Foothill area[e]	400	100	50	1.0
	Area encompassing RT-Tujunga-Erwin-N. Hollywood-Whithall-LA/Verdugo-Crystal Springs-Headworks-Glendale/Burbank Well Fields	600	250	100	1.5
	Narrows area (below confluence of Verdugo Wash with the LA River)	900	300	150	1.5
	Eagle Rock Basin	800	150	100	0.5
4-13	**San Gabriel Valley**				
	Raymond Basin				
	Monk Hill sub-basin	450	100	100	0.5
	Santa Anita area	450	100	100	0.5
	Pasadena area	450	100	100	0.5
	Main San Gabriel Basin				
	Western area[f]	450	100	100	0.5
	Eastern area[f]	600	100	100	0.5
	Puente Basin	1,000	300	150	1.0
4-14 8-2[g]	**Upper Santa Ana Valley**				
	Live Oak area	450	150	100	0.5
	Claremont Heights area	450	100	50	--
	Pomona area	300	100	50	0.5
	Chino area	450	20	15	--
	Spadra area	550	200	120	1.0
4-15	**Tierra Rejada**	700	250	100	0.5
4-16	**Hidden Valley**	1,000	250	250	1.0
4-17	**Lockwood Valley**	1,000	300	20	2.0
4-18	**Hungry Valley and Peace Valley**	500	150	50	1.0

Table 3-10. Water Quality Objectives for Selected Constituents in Regional Ground Waters[a] (cont.)

DWR Basin No.[b]	BASIN	OBJECTIVES (mg/L)			
		TDS	Sulfate	Chloride	Boron
4-19	Thousand Oaks area	1,400	700	150	1.0
4-20	Russell Valley				
	Russell Valley	1,500	500	250	1.0
	Triunfo Canyon area	2,000	500	500	2.0
	Lindero Canyon area	2,000	500	500	2.0
	Las Virgenes Canyon area	2,000	500	500	2.0
4-21	Conejo-Tierra Rejada Volcanic area [h]	--	--	--	--
	Santa Monica Mountains--southern slopes [i]				
	Camarillo area	1,000	250	250	1.0
	Point Dume area	1,000	250	250	1.0
4-22	Malibu Valley	2,000	500	500	2.0
	Topanga Canyon area	2,000	500	500	2.0
	San Pedro Channel Islands [j]				
	Anacapa Island	--	--	--	--
	San Nicolas Island	1,100	150	350	--
	Santa Catalina Island	1,000	100	250	1.0
	San Clemente Island	--	--	--	--
	Santa Barbara Island	--	--	--	--

a. Objectives for ground waters outside of the major basins listed on this table and outlined in Figure 1-9 have not been specifically listed. However, ground waters outside of the major basins are, in many cases, significant sources of water. Furthermore, ground waters outside of the major basins are either potential or existing sources of water for downgradient basins and, as such, objectives in the downgradient basins shall apply to these areas.

b. Basins are numbered according to Bulletin 118-80 (Department of Water Resources, 1980).

c. Ground waters in the Pitas Point area (between the lower Ventura River and Rincon Point) are not considered to comprise a major basin, and accordingly have not been designated a basin number by the California Department of Water Resources (DWR) or outlined on Figure 1-9.

d. The Santa Clara River Valley (4-4), Pleasant Valley (4-6), Arroyo Santa Rosa Valley (4-7) and Las Posas Valley (4-8) Ground Water Basins have been combined and designated as the Ventura Central Basin (DWR, 1980).

e. The category for the Foothill Wells area in previous Basin Plan incorrectly groups ground water in the Foothill area with ground water in the Sunland-Tujunga area. Accordingly, the new categories, Foothill area and Sunland-Tujunga area, replace the old Foothill Wells area.

f. All of the ground water in the Main San Gabriel Basin is covered by the objectives listed under Main San Gabriel Basin – Eastern area and Western area. Walnut Creek, Big Dalton Wash, and Little Dalton Wash separate the Eastern area from the Western area (see dashed line on Figure 2-17). Any ground water upgradient of these areas is subject to downgradient beneficial uses and objectives, as explained in Footnote a.

g. The border between Regions 4 and 8 crosses the Upper Santa Ana Valley Ground Water Basin.

h. Ground water in the Conejo-Tierra Rejada Volcanic Area occurs primarily in fractured volcanic rocks in the western Santa Monica Mountains and Conejo Mountain areas. These areas have not been delineated on Figure 1-9.

i. With the exception of ground water in Malibu Valley (DWR Basin No. 4-22), ground waters along the southern slopes of the Santa Monica Mountains are not considered to comprise a major basin and accordingly have not been designated a basin number by the California Department of Water Resources (DWR) or outlined on Figure 1-9.

j. DWR has not designated basins for ground waters on the San Pedro Channel Islands.

Statewide Objectives for Ocean Waters

The State Board's *Water Quality Control Plan for Ocean Waters of California* (Ocean Plan) and the *Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California* (Thermal Plan) and any revision thereto, shall also apply to all ocean waters of the Region. These plans are described in Chapter 5, Plans and Policies. Copies of these plans can be obtained at the Office of Legislative and Public Affairs (OLPA) in Sacramento or at the Regional Board office.

Site Specific Objectives

While many pollutants are regulated under federal, state or regionally applied water quality standards, the Regional Board supports the idea of developing site-specific objectives (SSOs) in appropriate circumstances. Site-specific, or reach-specific, objectives are already in place for some parameters (i.e., mineral quality). These were established to protect a specific beneficial use or were based on antidegradation policies. The development of site-specific objectives requires complex and resource intensive studies; resources will limit the number of studies that will be performed in any given year. In addition, a Use Attainability Analysis (UAA) study will be necessary if the attainment of designated aquatic life or recreational beneficial uses is in question. UAAs include waterbody surveys and assessments which define existing uses, determine appropriateness of the existing and designated uses, and project potential uses by examining the waterbody's physical, chemical, and biological characteristics. Under certain conditions, a designated use may be changed if attaining that use would result in substantial and widespread economic and social impacts. Uses that have been attained can not be removed under a UAA analysis. If a UAA study is necessary, that study must be completed before a SSO can be determined. Early planning and coordination with Regional Board staff will be critical to the development of a successful plan for developing SSOs.

Site-specific objectives must be based on sound scientific data in order to assure protection of beneficial uses. There may be several acceptable methods for developing site-specific objectives. A detailed workplan will be developed with Regional Board staff and other agencies (if appropriate) based on the specific pollutant and site involved. State Board staff and the USEPA will participate in the development of the studies so that there is agreement on the process from the beginning of the study.

Although each study will be unique, there are several elements that should be addressed in order to justify the need for a site-specific objective. These may include, but are not limited to:

- Demonstration that the site in question has different beneficial uses (e.g., more or less sensitive species) as demonstrated in a UAA or that the site has physical or chemical characteristics that may alter the biological availability or toxicity of the chemical.
- Provide a thorough review of current technology and technology-based limits which can be achieved at the facility(ies) on the study reach.
- Provide a thorough review of historical limits and compliance with these limits at all facilities in the study reach.
- Conduct a detailed economic analysis of compliance with existing, proposed objectives.
- Conduct an analysis of compliance and consistency with all federal, state, and regional plans and policies.

Once it is agreed that a site-specific objective is needed, the studies are performed, and an objective is developed, the following criteria must be addressed in the proposal for the new objective.

- Assurance that aquatic life and terrestrial predators are not currently threatened or impaired from bioaccumulation of the specific pollutant <u>and</u> that the biota will not be threatened or impaired by the proposed site-specific level of this pollutant. Safe tissue concentrations will be determined from the literature and from consultation with the California Department of Fish and Game and the U.S. Fish and Wildlife Service.

  For terrestrial predators, the presence, absence, or threat of harmful bioaccumulated pollutants will be determined through consultation with the

California Department of Fish and Game and the U.S. Fish and Wildlife Service.

- Assurance that human consumers of fish and shellfish are currently protected from bioaccumulation of the study pollutant, and will not be affected from bioaccumulation of this pollutant under the proposed site-specific objective.
- Assurance that aquatic life is currently, and will be protected from chronic toxicity from the proposed site-specific objective.
- Assurance that the integrity of the aquatic ecosystem will be protected under the proposed site-specific objective.
- Assurance that no other beneficial uses will be threatened or impaired by the proposed site-specific objective.

Appendix E - SWRCB Resolution 68-16

STATE WATER RESOURCES CONTROL BOARD

RESOLUTION NO. 68-16

STATEMENT OF POLICY WITH RESPECT TO MAINTAINING HIGH QUALITY OF WATERS IN CALIFORNIA

WHEREAS the California Legislature has declared that it is the policy of the State that the granting of permits and licenses for unappropriated water and the disposal of wastes into the waters of the State shall be so regulated as to achieve highest water quality consistent with maximum benefit to the people of the State and shall be controlled so as to promote the peace, health, safety and welfare of the people of the State; and

WHEREAS water quality control policies have been and are being adopted for waters of the State; and

WHEREAS the quality of some waters of the State is higher than that established by the adopted policies and it is the intent and purpose of this Board that such higher quality shall be maintained to the maximum extent possible consistent with the declaration of the Legislature;

NOW, THEREFORE, BE IT RESOLVED:

1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

2. Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

3. In implementing this policy, the Secretary of the Interior will be kept advised and will be provided with such information as he will need to discharge his responsibilities under the Federal Water Pollution Control Act.

BE IT FURTHER RESOLVED that a copy of this resolution be forwarded to the Secretary of the Interior as part of California's water quality control policy submission.

CERTIFICATION

The undersigned, Executive Officer of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on October 24, 1968.

Dated: October 28, 1968

Kerry W. Mulligan
Executive Officer
State Water Resources
Control Board