Area of Special Biological Significance 24
Draft Compliance Plan For
The County of Los Angeles and City of Malibu

Submitted to:

State Water Resources Control Board
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EXECUTIVE SUMMARY

Background

The Laguna Point to Latigo Point Area of Special Biological Significance (ASBS), also referred to as ASBS 24, was established in 1974 by the State Board to preserve sensitive marine habitat (SWRCB, 1979). It stretches 24 miles, contains 11,842 marine acres, and is the largest ASBS along the mainland of Southern California. A wide range of sandy substrate, rocky reef, and coastal pelagic species can be found within ASBS 24. Figure ES-1 shows a small portion of ASBS 24 east of Point Dume.

Figure ES-1. ASBS 24 Looking East Across Dume Cove

Since 1983, the California Ocean Plan (Ocean Plan) has prohibited the discharge of waste into ASBS along the California Coast, unless the State Water Resources Control Board (State Board) grants an exception to dischargers. The southern and central portions of ASBS 24 that are located in Los Angeles County (County) are subject to direct discharges from roads, landscape runoff, homes, and small businesses. In general, the near-coast storm water runoff along ASBS 24 within the County is conveyed through storm drain systems and / or natural drainage courses before it is discharged at multiple locations along the beach. In 2004, the City of Malibu (City), County of Los Angeles, and the Los Angeles County Flood Control District (District) requested exceptions for storm water discharges to ASBS 24 from the State Board. The State Board received requests from numerous other applicants for an exception to the Ocean Plan. In 2012, the State Board adopted a General Exception.

The General Exception includes Special Protections which specify prohibited discharges and other requirements that dischargers covered under the General Exception must comply with. The County, the District, and the City were included in the list of responsible entities required to prepare a Draft and Final ASBS Compliance Plan for point source discharges of storm water in ASBS 24. This Compliance Plan has been prepared by the County, District, and City (collectively the Parties) in accordance with the General Exception

Point Source Discharge Locations (Outfalls Equal to and Greater Than 18 Inches)

Los Angeles County Department of Public Works (LACDPW) has identified 12 storm drain outfalls having a diameter equal to or greater than 18 inches that drain to ASBS 24 and are owned and maintained by the County. Nine storm drain outfalls that have a diameter greater than

or equal to 18 inches and drain to ASBS 24 are owned and maintained by the District. These nine outfalls occur along Broad Beach and Escondido Beach and convey runoff from upstream neighborhoods. The City identified eight storm drain outfalls that are privately owned and maintained and have diameters equal to or greater than 18 inches. These storm drains convey runoff from City owned and maintained inlets on Broad Beach Road and Wildlife Road to the storm drain outfalls located along Broad Beach and the seaside cliffs of Point Dume. An additional 10 storm drain outfalls are currently of undetermined ownership. These storm drains with undetermined ownership convey flow from the Pacific Coast Highway, and upstream neighborhoods. These 39 storm drain outfalls are considered point source discharges of storm water to ASBS 24. Figure ES-2 shows the locations of point source discharges along the County shoreline of ASBS-24. The Compliance Plan Map is included in the Appendix A.

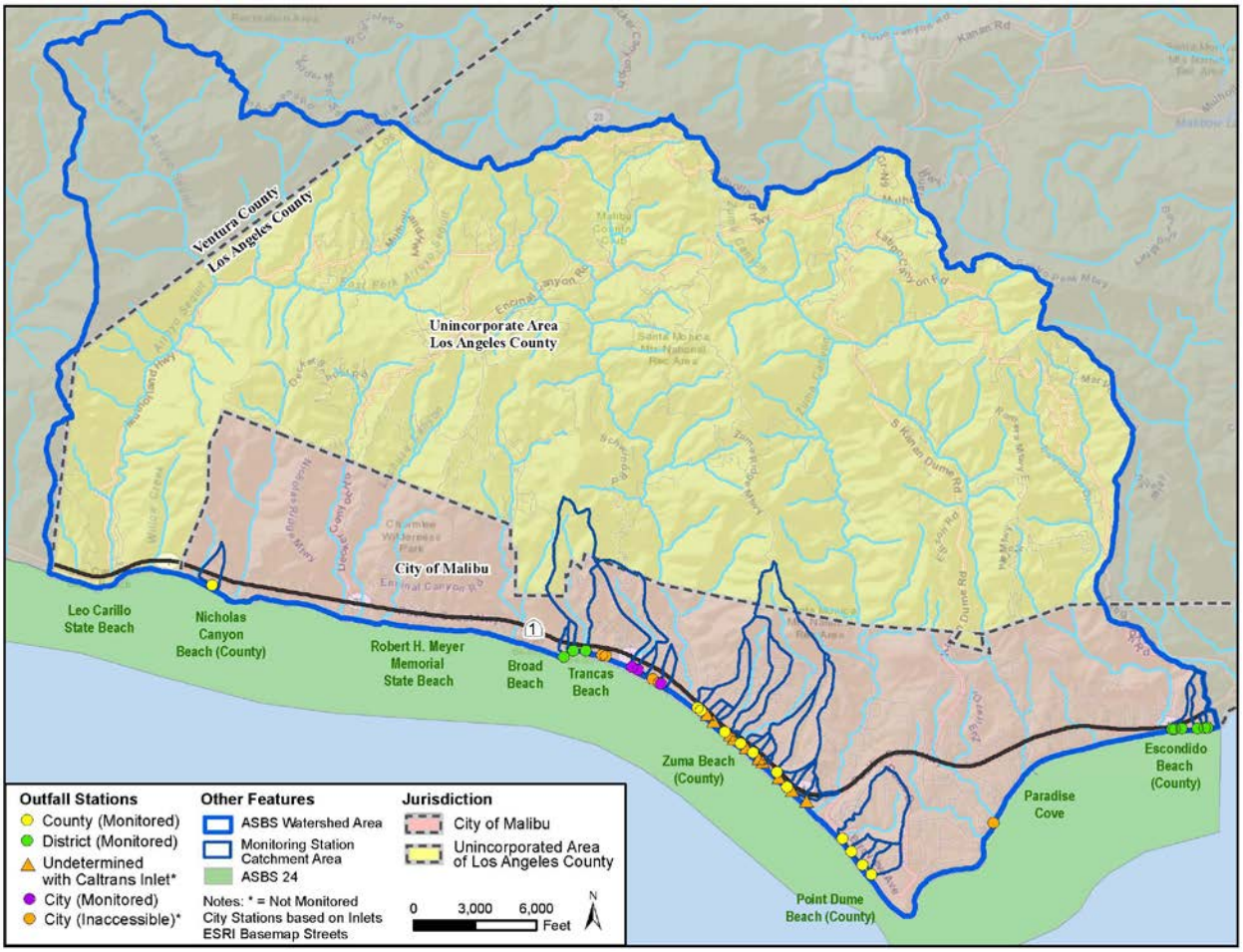

Figure ES-2. ASBS-24 Point Source Discharge Locations

Compliance Plan Map

A Compliance Plan Map for the ASBS 24 watershed area has been created and can be updated using Environmental Systems Research Institute (ESRI) ArcMap 10 and is provided in Appendix A. This map shows storm water conveyances and other storm drain features associated with surface drainage of storm water runoff, including catch basins, inlets/outlets, outfalls, storm drain lines, channels, and creeks. The map identifies core monitoring stations and shows the location of other outfalls equal to or greater than 18 inches that are private, state, or federal and not monitored by the Parties. Drainage areas for the core monitoring stations, watershed sub-basins and flow directions within these sub-basins are depicted, as well as the overall ASBS 24 watershed area. The map includes the locations of waste and hazardous material storage areas, sewage conveyances and treatment facilities, landslide zones, and roads. Jurisdictional boundaries for the unincorporated area of the County, the City, and state and federal lands within these areas are shown. This Plan provides information regarding the Compliance Plan Map datasets and the procedures for updating applicable GIS files and the map.

Dry Weather Requirement

The General Exception prohibits all non-authorized non-storm water (dry weather) discharges into the ASBS. Dry weather runoff is any runoff that is not the result of a precipitation event. This is also referred to as "non-storm water discharges" (SWRCB, 2012a). The Parties have implemented nonstructural measures that are designed to eliminate non-authorized, non-storm water runoff. These measures include public information and participation programs (PIPPs), operations and maintenance (O&M) programs, and enforcement programs. A list of existing programs with brief descriptions is provided in Appendix B.

Dry weather monitoring of outfalls has been performed to ensure compliance with the requirements of the General Exception. A summary of these outfall inspections for 2012 and 2013 is provided within the main body of the Plan on Table 3-3 and Table 3-4, respectively. Of the inspected outfalls, only ASBS-002 had flow reaching the surf, and this occurred only once out of the 13 times in 2012 and once out of the three times in 2013. Subsequent inspections performed in March and May, 2013, at ASBS-002 indicated that flow was not present. Some other outfalls were observed with flows or ponded water; however, due to the distances between the outfalls and the surf zones, these flows did not reach the surf zones. Inspections will continue to ensure that discharges of non-storm, non-authorized runoff do not occur.

Receiving Water Assessment

In 2008, a study was conducted as part of Bight 2008 to assess water quality in southern California ASBS (Schiff et al., 2011). The study was designed to evaluate the range of natural water quality near reference drainage locations and to compare water quality near ASBS discharges to these natural water quality conditions. The 2008 study provided initial estimates of reference thresholds, set at 85th percentile, based on data collected at reference sites. As part of the Bight 2013 Regional Monitoring Program, additional reference monitoring was performed under the Regional Monitoring Program, and the 85th percentile reference thresholds were revised.

Wet weather monitoring was performed by LACDPW at two receiving water locations: 1) S01, located off Zuma Beach directly out from ASBS-016, a 60-inch storm drain; and 2) S02, located off Escondido Beach directly out from ASBS-028, a 36-inch storm drain. The City performed monitoring at receiving water Site 24-BB-03R. For safety reasons this site was only sampled once. Therefore, the assessment of compliance with natural water quality was primarily performed for receiving water station S02, which had samples collected during three wet weather events. Receiving water station S02 is associated with ASBS-028, which is a 36-inch outfall that drains a mixture of developed and vacant land. Receiving water station S02 is considered to be representative of the typical to worst case scenario of the potential impact that storm water runoff may have on the water quality within the ASBS. The receiving water quality assessment is presented in Section 4.0, and a summary of the assessment is presented below.

In samples collected in the receiving water (Site S02), selenium, mercury, and total polynuclear aromatic hydrocarbons (PAHs) concentrations were above the 85th percentile reference threshold and had post-storm concentrations that exceeded those of the pre-storm samples collected during two consecutive monitored storm events. Based on the guidance found in Attachment 1 of the General Exception, this indicates an exceedance of natural water quality in the ASBS for these constituents.

Receiving water samples collected (Site S02) during one event, but not in subsequent events, that had concentrations above both the 85th percentile threshold and pre-storm concentrations include pyrethroids, nitrate as N, copper, lead, and zinc. These constituents do not meet the guidance criteria and are not considered an exceedance of the natural water quality in the ASBS.

During the three monitored events flow from ASBS-016 only reach the receiving water once at Site S01 and thus, receiving water chemistry data was only obtained once at S01 as part of the General Exception monitoring. Mercury, silver, zinc, and total PAHs concentrations in the receiving water were greater than both the 85th percentile threshold and pre-storm concentrations for Site S01. Receiving water concentrations above both the 85th percentile thresholds and pre-storm concentrations occurring during only one event is not considered to be an exceedance of natural water quality.

Pre-storm and post-storm samples were collected and analyzed at Site 24-BB-03R for only one event. The selenium concentration in the receiving water was greater than both the 85th percentile threshold and pre-storm concentrations (see Table 4-3). The concentration of selenium being above the 85th percentile threshold and pre-storm concentrations in one event is not considered an exceedance of natural water quality at Site 24-BB-03R. However, the selenium result at Site 24-BB-03R is consistent with the results at Site S02 where selenium is considered to be an exceedance of natural water quality based on first and second event results.

Pollution Loading Reduction Assessment

The General Exception states that the ASBS Compliance Plan shall describe how the necessary pollutant reductions in storm water runoff will be achieved through prioritization of outfalls and implementation of BMPs to achieve end-of-pipe pollutant concentrations targets during a design storm to below either the Table 1 Instantaneous Maximum Water Quality Objectives (WQOs) in Chapter II of the Ocean Plan or a 90% reduction in pollutant loading during storm events for the applicant's total discharge. Constituents that are currently in exceedance of the natural water

quality threshold of the ASBS, and that also have an associated Ocean Plan Table 1 Instantaneous Maximum WQO value (mercury and selenium), were compared with the Table 1 Instantaneous Maximum WQOs in order to determine the appropriate pollutant load reduction in accordance with the General Exception.

Monitoring Results

Chemistry results obtained from monitoring outfall discharges to ASBS 24 are presented in the main body of the Plan in Table 5-1 through Table 5-3, respectively. The Ocean Plan Table 1 Instantaneous Maximum WQOs for mercury and selenium are 0.4 µg/L and 150 µg/L, respectively. The Ocean Plan Table 1 does not list Instantaneous Maximum WQOs for PAHs. During the three monitored events the sampling results were all below these Ocean Plan Table 1 Instantaneous Maximum values. A summary of the highest measured values in comparison with the Ocean Plan Table 1 Instantaneous Maximum values as well as other Ocean Plan Table 1 WQOs is provided on Table ES-1.

Table ES-1. Summary of Ocean Plan WQOs Comparison to Maximum Outfall Results

	Ocean Plan Table 1 Values (Receiving Water Mixing Zone)			Maximum Measured Value (in Outfall Prior to Mixing Zone)		
Parameter	6-Month Median	Daily Maximum	Instantaneous Maximum	February 2013, Event 1	March 2013, Event 2	February 2014, Event 3
Mercury	0.04	0.16	0.4	0.16	0.06	<0.0012
Selenium	15	60	150	0.79	1.0	5.1

Outfall Assessment Conclusions

Following the guidance found in the Special Protections an assessment of outfalls was performed to determine where structural controls may be required to achieve the specified pollutant loading limitations on point source discharges into ASBS 24. The outfall assessment included comparing the mercury and selenium monitoring data results obtained to Ocean Plan Table 1 Instantaneous Maximum WQOs. The Ocean Plan Table 1 does list Instantaneous Maximum values for the protection of marine aquatic life for total PAHs. (The Ocean Plan Table 1 only lists a 30-day Average PAHs WQO for the protection of human health.) As shown in Table ES-1 the results of the comparison indicated the discharges to the ASBS from point sources (outfalls) are currently achieving, and significantly below, the target levels. Therefore, based on available data, the outfalls being evaluated in this Plan under the Regional Monitoring Program are currently not considered priority outfalls, and in accordance with the Special Protections of the General Exception, additional controls (e.g., BMPs) to achieve pollutant load reductions are not required in the tributary drainage areas to the Parties' outfalls.

Anthropogenic Sedimentation Assessment

In accordance with the requirements of the General Exception, the natural habitat conditions in the ASBS shall not be altered as a result of anthropogenic sedimentation (SWRCB, 2012a). An assessment of the potential areas prone to anthropogenic sedimentation was performed as part of this Compliance Plan for the purpose of identifying areas where sediment control BMPs may be required. The general assessment process included first performing a desktop analysis of geological conditions, topography, land use, and aerial imagery for the applicable area. Next, a

reconnaissance of the area was performed to verify desktop findings and further analyze the drainage areas. Finally, the desktop and reconnaissance data collected were then complied into this Plan.

Geologic processes, beginning as far back as 80 million years, created the sedimentary formations predominantly found along the coast shoreline and Point Dume upland mesa area, which include siltstone and sandstone. Approximately 16 million years ago, seismic actively began and continued for 3 million years to form the Santa Monica Mountains, which are composed of a combination of sedimentary and igneous rock formations (City, 1995). Land use zoning and development have occurred predominantly along the coast within the flatter areas at lower elevations. Some development has occurred inland within the Santa Monica Mountains, but for the most part, development in the mountainous areas of the ASBS 24 watershed has been restricted due to the conservation of the area at the federal, state, and local levels.

The desktop analysis included determining the general sediment risk for the area based on the procedures outlined in the Construction General Permit. These procedures included determining the rainfall erosivity (R factor), which is based on data collected over several years to determine the annual storm kinetic energy, on average, for the area. That factor, combined with properties of common soils and various slopes (up to 50%) and heights (up to 50 ft.), were used to determine the potential annual disturbed loose soil areas within the watershed. Calculation results indicated that the potential for soil loss within disturbed areas increases rapidly for areas having slopes greater than 10% and heights greater than a few feet. These results were used during the field reconnaissance to aid in determining if areas have the potential to contribute anthropogenic sedimentation to ASBS 24.

Field reconnaissance was performed with a focus on the areas that drain to the identified outfalls that discharge to ASBS 24. In general, the drainage areas primarily consisted of larger lots (0.25 to approximately 1 acre) with existing residential structures, hardscape improvements, and landscaping. Landscape vegetation of sloped areas within developed areas, including residential properties and roadway rights-of-way, were observed to have fairly good cover. No signs of erosion as a result of manmade improvements (e.g., rills, gullies caused by runoff from impervious surfaces) were observed in sloped areas, alongside secondary roads, or the PCH.

The sedimentation assessment indicates that currently there are no areas prone to anthropogenic sedimentation within the drainage areas to the identified outfalls that discharge to ASBS 24. Land use in the drainage areas consists predominantly of residential and vacant (open space) designations with associated roadway connections. The sloped areas associated with residential properties were observed to have good vegetation cover and appeared to be regularly maintained by landscaping professionals (see Figure 7-9). Areas where cuts (excavation) were made during the construction of roadways were observed to have either good vegetation cover that has been maintained by responsible property owners or consist of hard coastal bluff materials resistant to erosive forces (e.g., large bluff along the southeast portion of Zuma County Beach, as shown on Figure 7-11). Therefore, at this time, no additional sediment BMPs are required by this plan.

Conclusions

The assessments performed in the preparation of this Compliance Plan indicate that no additional structural controls (BMPs) are required based on the guidance presented within the Special

Protections. However, the Parties recognize that the ABSB 24 is one of most valued resources in the region and that wherever possible and feasible additional reductions in pollutant loading should be achieved. Accordingly, various existing nonstructural programs will continue to be implemented in order to maintain compliance with the requirements of the Special Protections and possibly achieve further reductions in pollutant loading. The Parties are considering implementing additional nonstructural controls and enhancements to existing controls for the purpose of further reducing pollutant loading to the ASBS. Additionally, proposed structural BMPs are currently in the construction phase for the areas of Broad Beach Road and Wildlife Road.

Cost Estimate

The Parties have implemented numerous nonstructural controls and related programs in order to eliminate non-storm water, non-authorized discharges to ASBS 24. The Parties continue to maintain these measures, and the annual estimated costs associated with the key programs, which are detailed in Section 3.0, are provided on Table ES-2. Appendix B contains a list along with brief descriptions of various existing nonstructural measures implemented by the Parties.

Structural controls are being proposed and currently in the planning and permitting phase for the areas of Broad Bead Road and Wildlife Road. These structural controls will provide additional pollutant loading into the ASBS but are not directly connected the Compliance Plan (i.e., not a result of the assessments performed for this document and not a requirement of this document). The costs for these structural controls are not included on Table ES-2. More information on these structural controls, included estimated costs, is included in Appendix C.

Table ES-2. Annual Nonstructural Programs Costs

Program Type	Approximate Cost ($/year)
PIPP Subtotal	**$228,407**
O&M Subtotal	**$1,182,500**
Enforcement Subtotal	**$106,057**
Total	**$1,516,964**

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LIST OF ABBREVIATIONS AND ACRONYMS

Ag	Silver
AMSL	above mean sea level
As	arsenic
ASBS	Areas of Special Biological Significance
Bight	Southern California Bight Regional Monitoring Program
Bight 2008	Southern California Bight 2008 Regional Monitoring Program
Bight 2013	Southern California Bight 2013 Regional Monitoring Program
BMP	best management practice
CA	California
Caltrans	California Department of Transportation
Cd	cadmium
City	City of Malibu
Committee	Bight 2013 ASBS Planning Committee
County	County of Los Angeles
CPS	Coastal Preservation Specialist
Cr	chromium
Cu	copper
District	Los Angeles County Flood Control District
EI	Erosivity Index
EMAP	Monitoring & Assessment Program
EPPP	Environmentally Preferable Purchases and Practices Policy
ESRI	Environmental Systems Research Institute
ft.	feet
GIS	Geographic Information System
Hg	mercury
HSPF	Hydrologic Simulation Program–FORTRAN
Hydrology Manual	Los Angeles County Hydrology Manual
IC/ID	Illicit Connection/Illicit Discharge
in.	inches
LACDPW	Los Angeles County Department of Public Works
LACoMAX	Los Angeles County Materials Exchange
LAWQCB	Los Angeles Regional Water Quality Control Board
LIEP	Landscape Irrigation Efficiency Program
LSPC	Loading Simulation Program C++
LSWPPP	Local Storm Water Pollution Prevention Plan
LUP	Land Use Plan
m	meter
MACC	Malibu Area Conservation Coalition
mg/L	milligram per liter
MS4	municipal separate storm sewer system
N	nitrogen
Ni	nickel
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance

Ocean Plan	California Ocean Plan
OFG	Ocean Friendly Garden
P	phosphorus
PAH	polynuclear aromatic hydrocarbons
Parties	LACDPW, District, and City
Pb	lead
PCH	Pacific Coast Highway
PIPP	public information and participation program
Plan	Compliance Plan
POTFW	wash-off potency factor
RCPP	Recycled Products Purchasing Policy
RGO	retail gasoline outlets
RMD	Road Maintenance Division
ROW	Right-of-way
SCAG	Southern California Association of Governments
SCCWRP	Southern California Coastal Water Research Project
Se	selenium
State Board	State Water Resources Control Board
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	California State Water Resources Control Board
T.H.	townhouse
Tc	time of concentration
TMDL	total maximum daily load
TN	total nitrogen
TP	total phosphorus
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
USLE	Universal Soil Loss Equation
WDID	Waste Discharge Identification Number
Weston	Weston Solutions, Inc.
WMMS	Watershed Management Modeling System
WQOs	water quality objectives
WWECP	Wet Weather Erosion Control Plan
Zn	zinc
µg/L	microgram per liter

1.0 INTRODUCTION

In 1974 and 1975, the California State Water Resources Control Board (SWRCB) designated 34 coastal areas in California as Areas of Biological Significance (ASBS). The ASBSs are ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable. One of these ASBS, known as ASBS 24, is located along 24 miles of the Ventura and Los Angeles County coastline, from Laguna Point to Latigo Point (SWRCB, 1979).

The California Ocean Plan (Ocean Plan) prohibition on discharges of waste to ASBS has been in place since 1983. The SWRCB may grant exceptions to this prohibition if the exception will not compromise the protection of ocean waters for beneficial uses and the public interest will be served (SWRCB, 2012a). On March 20, 2012, the SWRCB adopted a General Exception to the Ocean Plan ASBS waste discharge prohibition. The General Exception was amended and adopted as Resolution 2012-0031 on June 19, 2012 (SWRCB, 2012b).

The General Exception includes Special Protections that dischargers covered under the General Exception must comply with. For ASBS 24, the County of Los Angeles (County), the Los Angeles County Flood Control District (District), and the City of Malibu (City) were included in the list of responsible entities required to prepare an ASBS Compliance Plan for point source discharges of storm water and a Pollution Prevention Plan for non-point source waste discharges by September 30, 2013. An extension of one year was granted due to the lack of rainfall and water quality monitoring opportunities. This Compliance Plan has been prepared by the County, District, and City (the Parties) as specified in the General Exception. The Pollution Prevention Plan has been prepared under a separate cover.

1.1 Compliance Plan Objective and Scope

This Compliance Plan (Plan) documents the existing ASBS and ASBS watershed conditions and policies within the Parties' jurisdiction for the purpose of demonstrating either compliance with the point source discharges of storm water requirements specified in the General Exception Attachment B – *Special Protection for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharge* (Special Protections), or describing the steps necessary to achieve compliance within the time frame allotted. This Plan focuses on point source discharges, which by this document are defined as outfalls that have associated storm networks that drain significant areas and that are entirely or partially maintained by an agency. Using this definition, point sources identified in this document coincide with conveyances that are equal to or greater than 18 inches in size (diameter or width) that discharge directly to the ASBS shoreline and the Parties maintain the outfall and/or inlets. Potential discharges from smaller pipes and conveyances (not defined as point sources) are defined in the Special Protections as nonpoint sources, and discussed in the Pollution Prevention Plan.

The following tasks associated with point source discharge locations and drainage areas were performed as part of the process to prepare this Plan:

- Preparing a map of the ASBS watershed showing surface drainage of storm water runoff and outfall locations (18 inches or greater in size).
- Preparing procedures to allow for future updates to the Compliance Plan map.
- Evaluations of compliance with the permitted point source discharges of storm water, which includes the prohibition of non-storm water discharges (i.e., discharges not composed entirely of storm water and not specifically allowed in accordance with Special Protections Section I.A.1.e).
- Assessment of the Parties' inspection policies.
- Collection and analysis of water quality samples in accordance with Section IV of the Special Protections.
- Assessment, using water quality sample results, of whether the storm water discharges are altering the natural water quality of the ASBS.
- Assessment of pollutant load reduction targets and outfall prioritization.
- Assessment of potential sources of anthropogenic sedimentation.
- Compilation of assessment and data into this Compliance Plan.
- Description of the nonstructural controls currently employed and planned in the future and implementation schedule

1.2 ASBS 24 Watershed Responsible Agencies

The Laguna Point to Latigo Point ASBS, also referred to as ASBS 24, stretches 24 miles, contains 11,842 marine acres, and is the largest ASBS along the mainland of Southern California. The boundary of ASBS 24 extends out from the mean high tide line at Laguna Point in Ventura County to either 1,000 ft. from shore or to the 100-ft isobath (whichever is greater) in a southwesterly direction to Latigo Point in Malibu, Los Angeles County.

This Plan includes the applicable drainage areas and point discharges that are the Parties' purview. These include the areas of the unincorporated County and City of Malibu along the coast south the Los Angeles County boundary and west of Latigo Point. Figure 1-1 shows the overall ASBS watershed within Los Angeles County, along with jurisdictional boundaries. Properties within the ASBS watershed in which the Parties do not have jurisdictional authority and thus are excluded from this Plan include, but are not limited to, federal lands, state parks, and state rights-of-way (see Section 2.1.2 for more information on these excluded properties).

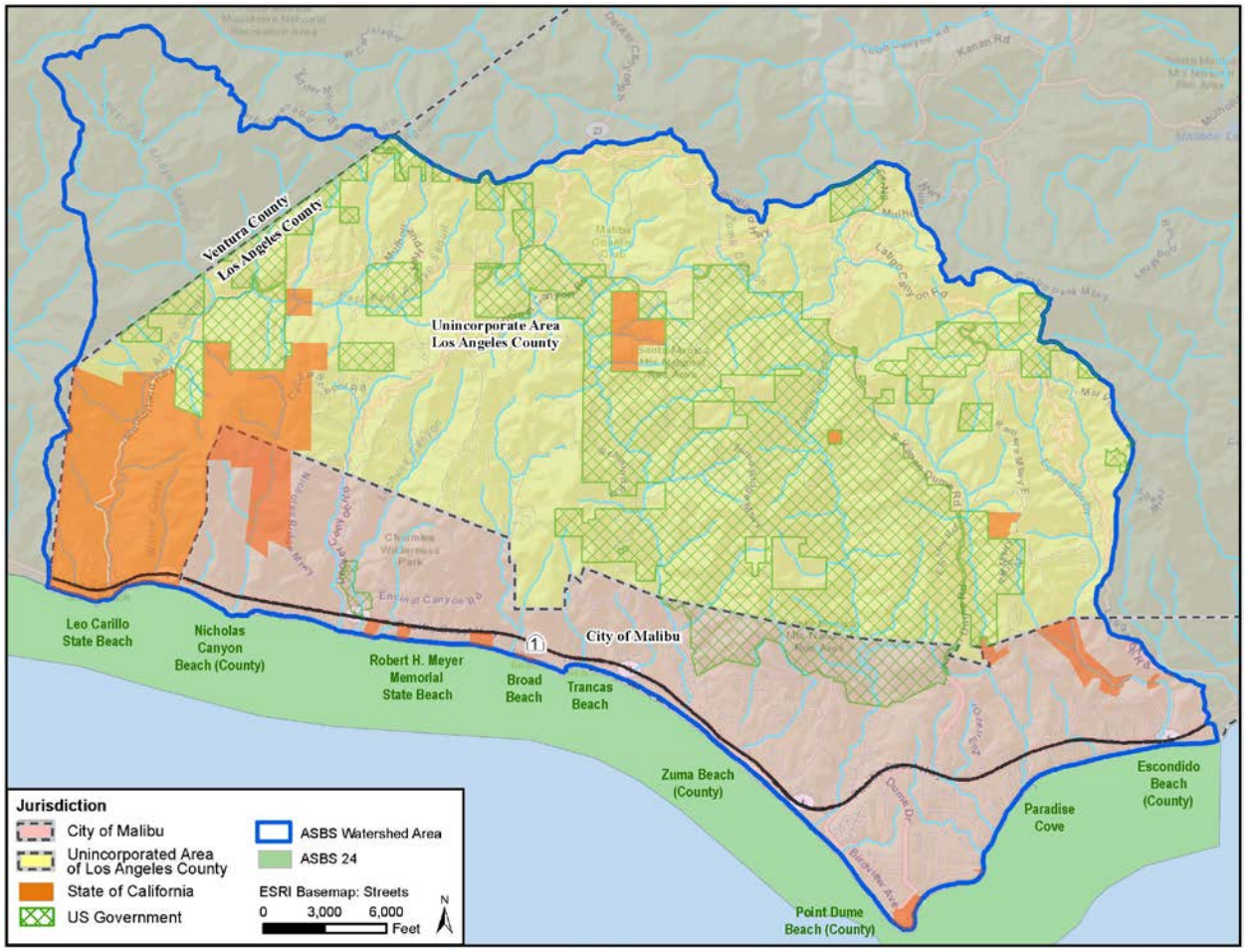

Figure 1-1. ASBS 24 Watershed and Jurisdictional Boundaries

2.0 ASBS 24 WATERSHED

2.1 General Site Conditions and Land Use

2.1.1 Topography

In general, the elevations within the ASBS 24 drainage area vary from sea level to 1,700 ft. above mean sea level (AMSL). Areas within the Santa Monica Mountains, typically north of the Pacific Coast Highway (PCH), contain steep hills, canyons, and valleys that drain to ASBS 24. These mountains consist of steep slopes with a 20% or greater gradient (SWRCB, 1979). Most of the developed areas along the coast lie below 100 ft., with the exception of the Point Dume and Malibu Park areas, which reach an elevation of approximately 500 ft. The hillsides and coastal mesas, such as Big Rock and Las Flores (both on the eastern end of town well outside of the ASBS), have elevations ranging from 300 to 400 ft. AMSL (City, 1995).

North of Broad Beach, extending to the County jurisdictional boundary, the coastal topography consists of narrow beaches adjacent to near-vertical natural bluffs that extend between 50 ft. to 200 ft. above mean sea level (alms). The mesas above the bluffs slope towards the coast at approximately 2% to 10%. The mesas extend inland and merge with the Santa Monica Mountains, which as previously stated are characterized by steep and rugged hillsides and valleys and canyons. The mesas have various valleys and canyons that coincide with the mountain valleys and canyons that provide the area with natural drainage to the ocean.

The area of Broad Beach south to Zuma County Beach is characterized, in general, by gentle seaward sloping natural topography (approximately 2 to 4%) with some near-vertical bluffs located further inland at varying distances from the ocean between approximately 1,000 ft. to 3,500 ft. and similar to those bluffs previously described.

The Point Dume area consists of narrow beaches followed by near vertical bluffs that extend from approximately 200 ft. northwest of the point to approximately 500 ft. northeast of the point. The mesa area above the beach is large and consists of sloping terrain which has formed high and low areas as well as valley and canyons that drain the area to the ocean. This topography continues northeast to approximately Escondido Beach, where the area has an approximately 10% gradient towards Escondido Creek.

South of Escondido Creek, the topography is similar to that of Broad Beach, with an area of gentle seaward sloping terrain along the ocean followed by relatively small inland bluffs and upland sloped areas.

2.1.2 Current Land Use

Land use data within the drainage area to the portion of ASBS 24 located south of the LA-Ventura County jurisdictional boundary were compiled and analyzed using GIS software and available land use data sources, including data provided by the City (2010 data for the City portion) and LACDPW (2008 data for the County portion). Both of these sources use Southern California Association of Governments (SCAG) land use codes. The SCAG classifications were

generalized for inclusion into this document and for mapping purposes. Roads were not included in the land use; however, data were filled in with the mapping and analysis software.

Along the coast, the location of the County jurisdictional boundary coincides with a natural high point in the topography, and thus, the drainage area boundary follows the County jurisdiction boundary fairly well for a couple of miles inland. The land use analysis indicated that the overall drainage area to ASBS 24 includes approximately 31,400 acres, of which approximately 28,480 acres are located within the County jurisdictional boundary, and 2,900 acres are located in Ventura County.

The portion of the drainage area located within Ventura County is composed primarily of natural open space, mountainous terrain. The drainage area within the LA County portion is under the jurisdiction of multiple entities, including national parks, state parks, Unincorporated County, City of Malibu and Caltrans. The properties located south of the jurisdictional boundary are within the Unincorporated County and City's jurisdiction. However, several parcels have federal, state, or conservation authority ownership and are designated as National or State Parks. Table 2-1 summarizes land areas associated with the County and City and includes information on federal- and state-owned properties.

Table 2-1. Property Ownership Summary

Ownership	Unincorporated County Area (acres)	City of Malibu Area (acres)	Total (acres)
Federal	7,490	740	8,230
State	2,330	520	2,850
Conservation Authority/Conservancy	300	10	310
Remainder (Non-specified)	10,140	6,950	17,090
Total	**20,260**	**8,220**	**28,480**

The general land use within the drainage area is approximately 86.1% open space public lands; 4.9% low-density residential; 4.8% very-low-density residential; 2.6% medium-density residential; and about 1.6% either low-density commercial, industrial, high-density residential, planned development, high-density commercial, water, urban reserve, and mixed use (SWRCB, 2012c).

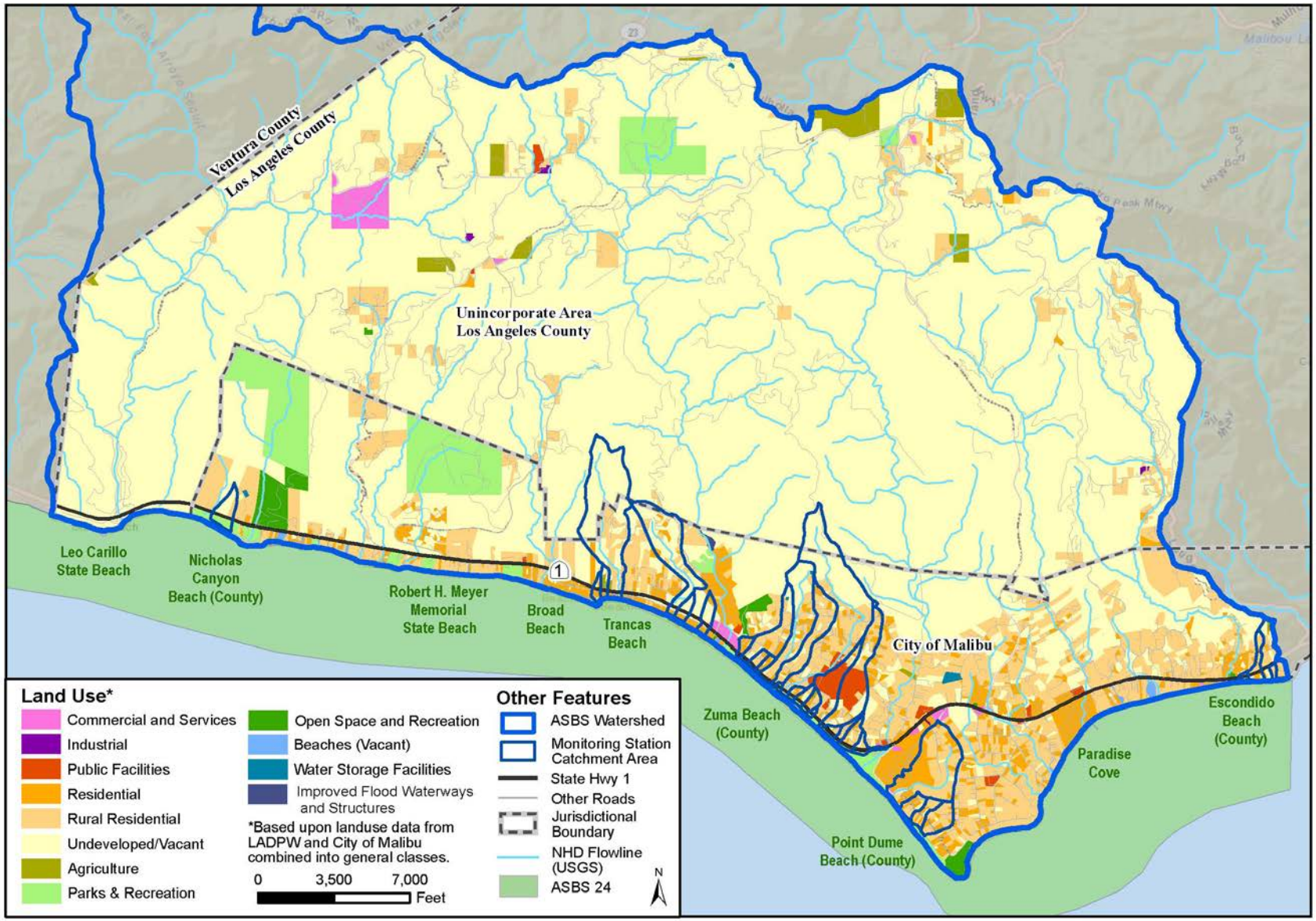

Figure 2-1. ASBS 24 Drainage Area Land Use Map

2.2 Geological Setting

2.2.1 Regional Geology

The ASBS 24 coastal drainage area is composed of an extremely complex geology that has resulted from the geologic uplift which formed the Santa Monica Mountains. The area is located within the northwestern corner of the Los Angeles basin, which lies at the boundary or juncture between two major geomorphic or structural provinces of southern California: 1) the Peninsular Ranges province, consisting primarily of a northwest-oriented structural grain; and 2) the Transverse Ranges structural province, which features a predominantly east-west-oriented structural grain. The Los Angeles structural basin originated roughly 16 million years ago in what is designated the Miocene geologic epoch. However, the Los Angeles basin area, in general, has been a site of continuous sedimentary deposition for at least the past 80 million years. The sedimentary rocks underlying the Santa Monica Mountains in the ASBS 24 drainage area are generally highly folded and complexly faulted (City, 1995).

2.2.2 ASBS 24 Geology

The Malibu Coast fault runs in an east-west alignment within the ASBS 24 drainage area. The fault is a boundary between two very different geologic terranes: to the south, Catalina Schist is overlain by Miocene and younger deposits; and to the north, Santa Monica Slate and plutonic granodiorite is overlain by Upper Cretaceous through upper Miocene deposits (i.e., Santa Monica Mountains) (Yerkes and Campbell, 1979). The fault is aligned in a near east-west direction following the coast line from the County's north jurisdictional boundary east to Lechuza Point. East of Lechuza Point the fault continues in a near east-west alignment to Corral Beach (east of ASBS 24). The fault continues east along the coastline (NPS, 2007). North of the Malibu Coast fault, the local bedrock structure of the Santa Monica Mountains can be modeled as an asymmetric, south-vergent, westward-plunging anticline, including sandstone and siltstone bedrock (e.g., Tuna Canyon Formation, Sespe Formation, Vaqueros Formation, and Topanga Group). South of the Malibu Coast fault, the ductile bedrock units, Trancas and Monterey Formations, contain a high percentage of shales, mudstones, and diatomaceous rocks that exhibit complex folding and pervasive shearing (City, 1995).

The majority of the area along the Malibu coast comprises the Santa Monica Mountains. The portion of the ASBS 24 and uplands areas between Point Mugu, which is north of the County's jurisdictional boundary and La Piedra State Beach, comprise the Santa Monica Mountains formations. North of Point Mugu, the coastal area consists of low-lying land that comprises the Ventura-Oxnard Alluvial Plain. The Malibu Coast fault separates the Santa Monica Mountains from the coastal formations between La Piedra State Beach and Corral Beach. The portion of ASBS 24 between La Piedra State Beach area and the south extents of Broad Beach, south of the Malibu Coast Fault, consists of Malibu Bluff Coast Trancas Formation. The Trancas Formation consists chiefly of sandstone, mudstone, silty shale, and claystone. This formation extends north (upland from the ocean), varying distances between a few hundred feet to a few thousand feet. Southeast of Broad Beach, the ASBS and entire upland coastal area, bound to the north by the Malibu Coast Fault, comprise the Malibu Bluff Coast Monterey/Modelo Formation (SWRCB, 1979). The Monterey Formation consists of marine clay shale and laminated to platy siltstone

that are variably diatomaceous, bituminous, phosphatic, siliceous, or cherty, and interbedded altered vitric tuffs and fine- to medium-grained sandstone that locally is schist bearing.

The Malibu bluff coast is triangular with its widest point at Point Dume. This region is structurally the most complex within the ASBS. The rocks are highly folded and steeply dipping so that very different rock types lie next to each other. The western part of this bluff coast from little Sycamore Canyon to Trancas Beach is made up of older Tertiary (Miocene) erosion-resistant rocks of the Trancas Formation. The white cliffs of Paradise Cove are outcrops of the Miocene age Modelo Formation which forms steep inclined bids from Zuma Beach eastward to Corral Beach. This formation is predominantly siliceous shale and was probably formed in the deep sea. The headland at Point Dume is highly resistant igneous breccia which has protected the softer sedimentary shale behind it from erosion. In addition to the Miocene deposits, there is an irregular veneer of Pleistocene marine terrace deposits on the bluff between the ocean and the mountains adjacent to the eastern section of the ASBS. This is a reddish, poorly stratified, and sorted material, which is soft and easily dissected. It tends to form steep-sided stream gullies and sea cliffs (SWRCB, 2008).

The geologic features within the ASBS 24 drainage area are shown in Figure 2-2. Map symbols used along the coastal area were defined using the National Geologic Map Database. Pleistocene marine terrace deposits along the shoreline include the Trancas and Monterey Formations. The symbols used to depict general costal geologic features in Figure 2-2 include the following:

- Qa – Alluvial gravel, sand, and clay of flood plains.
- Qaf – Artificial cut and fill.
- Qao – Older dissected alluvial gravel, sand and clay; on coastal area deposited in part on a wave-cut platform, forms several terraces.
- Qg – Gravel and sand of major stream channels.
- Qls – Landslide debris.
- Qos – Old dune sand at Point Dume.
- Qs – Beach Sand.
- Tr – Trancas Formation composed of marine sandstone, mudstone, silty shale, and claystone.
- Tmt – Modelo/Monterey Formation composed of marine clay shale and laminated to platy siltstone with sandstone.

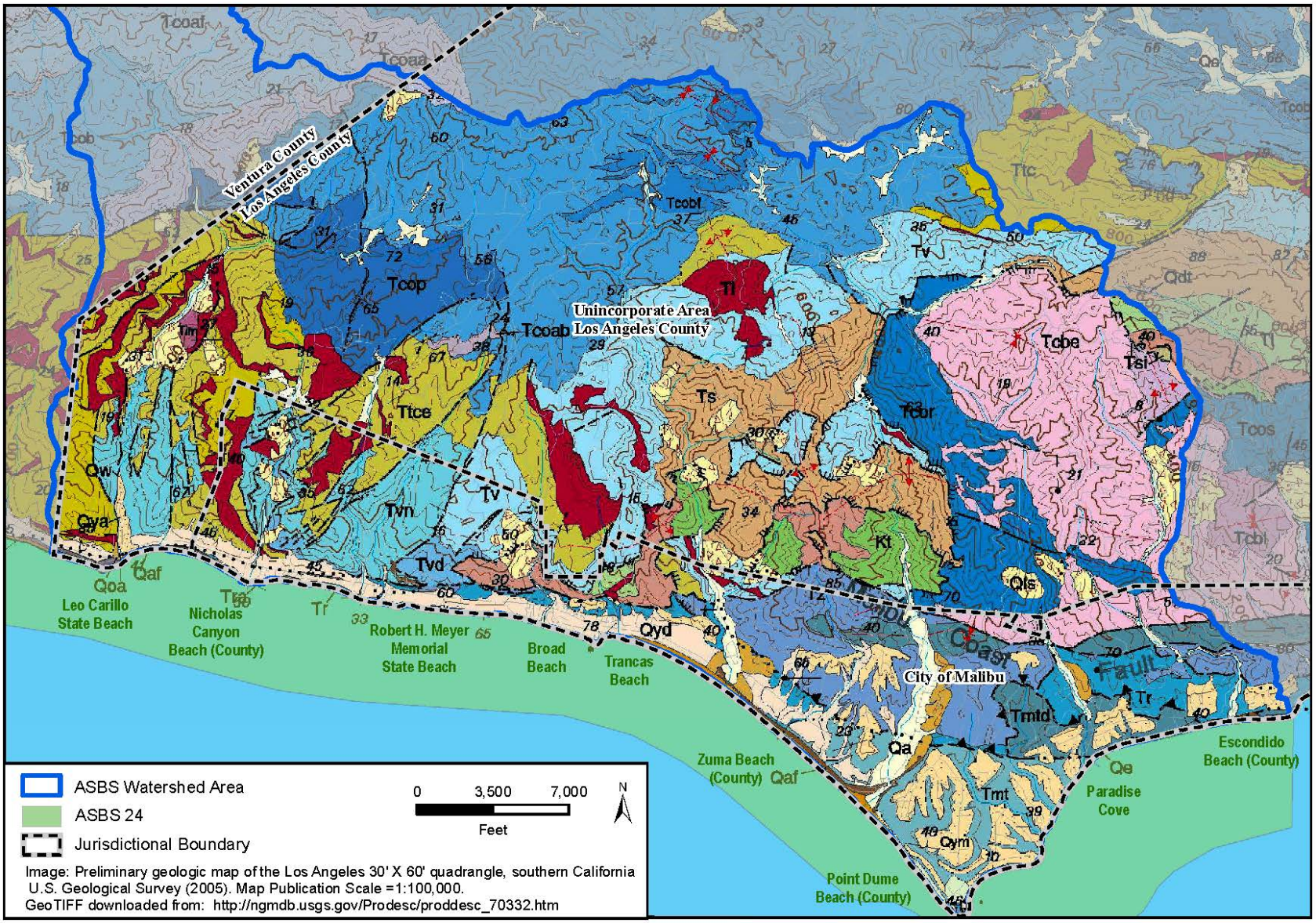

Figure 2-2. Geology Map of Overall ASBS 24 Drainage Area

2.3 Site Hydrology

The Santa Monica Mountains within the ASBS watershed generally slope towards the south to southwest. Except for the lower laying and relatively flat portion of the coast north of Point Dume extending to Broad Beach, the coast is lined with a steep bluff area that varies in height. Slopes along the coast above the bluff are gentle to moderate, with gradients typically between 2% and 20%. Inland, the watershed consists of much steeper terrain (typically 3:1 or steeper) covered with native coastal vegetation.

The Santa Monica Mountains have formed various peaks and valleys that collect runoff into 21 natural streams and gullies that drain to ASBS 24. Outside of this network of natural streams, 39 storm drain outfalls 18 inches in diameter or larger fall under the Parties' responsibility. Typically, the drainage areas to these outfalls consist of open space and/or development. The areas of development primarily include residential properties occupied by single-family dwellings surrounded by maintained landscaping along with associated roadways. The state-maintained PCH with various associated storm drain inlets extends across the length of the watershed near the coastline.

2.4 Monitoring Activities

2.4.1 2013 Regional Monitoring Program

As part of the exception process, LACDPW and the City participated in the Bight 2008 and Bight 2013 ASBS Planning Committee (Committee) with the State Board, the Southern California Coastal Water Research Project (SCCWRP), and other ASBS dischargers in Southern California. Together, the Committee developed a Regional ASBS Work Plan that is based on the Special Protections document. The Regional ASBS Work Plan is intended to provide compliance guidance to applicants of the General Exception in Southern California that wish to participants in the Southern California Bight 2013 Regional Monitoring Program (Bight 2013).

All outfalls that are equal to or greater than 18 inches in diameter are required to be monitored for oil and grease, total suspended solids (TSS), and toxicity, while outfalls that are equal to or greater than 36 inches in diameter are required to be monitored for metals, polynuclear aromatic hydrocarbons (PAHs), pyrethroids, organophosphorus pesticides, and nutrients (ammonia, nitrate, and phosphates) in addition to oil and grease, TSS, and toxicity. Furthermore, each discharger participating in the Regional Monitoring Program is required to monitor one ocean receiving water station which is representative of worst-case discharge conditions (i.e., co-located at a large drain greater than 36 inches, if possible).

As participants in the Bight 2013, LACDPW monitored 21 storm drains along ASBS 24, nine of which are operated by LACFCD, and 12 of which are operated by the County. Additionally, the City of Malibu, which owns storm drain inlets that drain to ASBS 24 via outfalls that are privately owned, monitor three outfalls located along Broad Beach; other private outfalls with City maintained inlets were not proposed to be monitored due to being inaccessible.

The ASBS Special Protections monitoring data used in this document were collected and analyzed during the 2012-2013 and 2013-2014 wet seasons. The monitoring performed complies

with the monitoring requirements of the Regional Monitoring Program through the identification of water quality impacts to ASBS 24 during storm events. The Special Protections document describes the following two types of monitoring programs:

1. **Core Discharge Monitoring** – collecting and analyzing wet weather runoff from the discharge of outfalls during a storm event.
2. **Ocean Receiving Water Monitoring** – collecting and analyzing samples from the ocean before and after a storm event at two locations (i.e., directly in front of the discharge and at a reference site removed from the discharge). For the monitoring performed during the 2012-2014 wet weather season, ocean receiving water monitoring at the discharge site was the responsibility of the discharger, while reference station monitoring was performed by SCCWRP.

2.5 ASBS 24 OUTFALL DESCRIPTIONS

A description of the point source outfalls is provided that includes the location, size, ownership, and tributary general land use. LACDPW identified 11 storm drain outfalls having a diameter equal to or greater than 18 inches that drain to ASBS 24 and are owned and maintained by the County. Nine storm drain outfalls that have a diameter greater than or equal to 18 inches and drain to ASBS 24 are owned and maintained by the District. These nine outfalls occur along Broad Beach and Escondido Beach and convey runoff from upstream neighborhoods and PCH. The City identified eight privately owned storm drain outfalls with City maintained inlets that have diameters equal to or greater than 18 inches. These storm drains convey runoff from Broad Beach Road and Wildlife Road to the storm drain outfalls located along Broad Beach and the seaside cliffs of Little Dume Cove. An additional 10 storm drain outfalls are currently of undetermined ownership. These storm drains with undetermined ownership convey flow from PCH and upstream neighborhoods. These 39 storm drain outfalls are considered point source discharges of storm water to ASBS 24 and are described in the following section. Figure 2-3 shows the outfall locations.

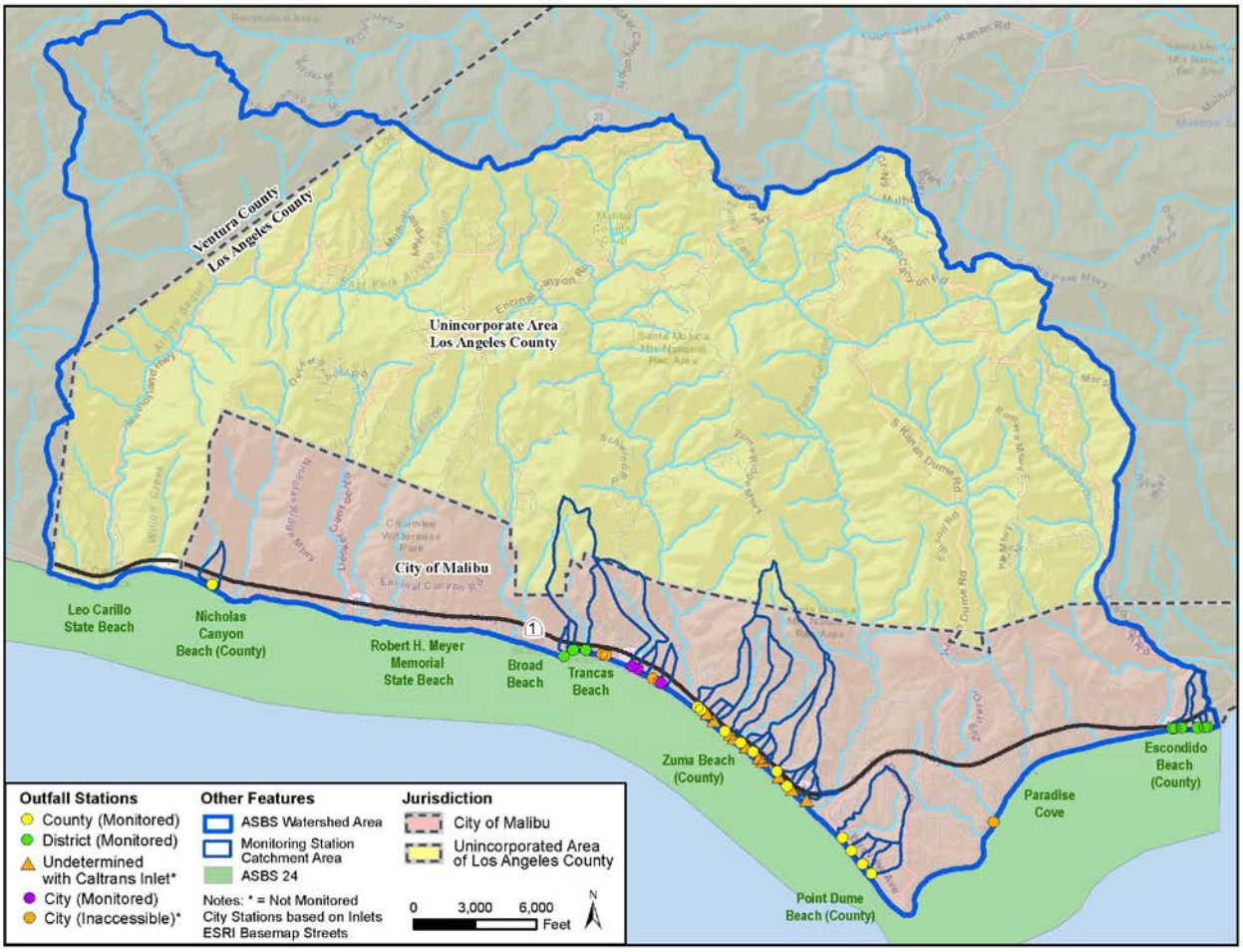

Figure 2-3. ASBS Outfall Location Map

2.5.1 County Outfalls

The 11 outfalls that fall under the jurisdiction of the County are located along Zuma Beach (six outfalls), Westward Beach (four outfalls) and Nicholas Beach (one outfall). The location of each County outfall is provided on Table 2-2 and show in Figure 2-4. A summary, including the diameter, monitoring data collected at each outfall pipe, and the observed flow connection (or absence), is provided on Table 2-3. A description of each outfall is provided in the text following Figure 2-4.

Table 2-2. County Outfall Locations and Diameters

Beach Location	Site Name	Latitude	Longitude	Pipe Diameter (inches)
Zuma Beach	ASBS-004	34.028038	-118.840179	24
	ASBS-005	34.027683	-118.839637	36
	ASBS-008	34.024833	-118.835784	24
	ASBS-011	34.023258	-118.833213	24
	ASBS-013	34.022087	-118.83123	18
	ASBS-016	34.019493	-118.827316	60
	ASBS-018	34.01749	-118.825668	24
Westward Beach	ASBS-021	34.010665	-118.816688	48
	ASBS-022	34.00893	-118.815261	36
	ASBS-023	34.007139	-118.81343	42
	ASBS-024	34.005847	-118.811958	24
Nicholas Beach	ASBS-031	34.043883	-118.918621	22

Table 2-3. County Outfall Diameters, Collected Monitoring Data, and Flow Summary

Beach Location	Site Name	Pipe Diameter (in)	Analyses Performed	Storm Events Analyzed			Did flow reach receiving water?		
				2/19/2013	3/8/2013	2/28/2014	2/19/2013	3/8/2013	2/28/2014
Zuma Beach	ASBS-004	24	TSS, O&G, Bivalve Toxicity	x	x	x	Yes	No	Yes
	ASBS-005	36	Full Chem. List*; Bivalve Toxicity	x	x	x	No	No	Yes
	ASBS-008	24	TSS, O&G, Bivalve Toxicity	Not Monitored	x	Not Monitored	Unknown	No	Unknown
	ASBS-011	24	TSS, O&G, Bivalve Toxicity	x	x	x	No	No	No
	ASBS-013	18	TSS, O&G, Bivalve Toxicity	No Flow	x	x	No	No	No
	ASBS-016**	60	Full Chem. List*; Bivalve Toxicity	No Flow	x	x	No	No	Yes
	ASBS-018	24	TSS, O&G, Bivalve Toxicity	**x**	**x**	**x**	No	No	No
Westward Beach	ASBS-021	48	Full Chem. List*; Bivalve Toxicity	**x**	**x**	**x**	No	Yes	Yes
	ASBS-022	36	Full Chem. List*; Bivalve Toxicity	**x**	**x**	**x**	No	No	Yes
	ASBS-023	42	Full Chem. List*; Bivalve Toxicity	**x**	**x**	**x**	No	No	No
	ASBS-024	24	TSS, O&G, Bivalve Toxicity	**x**	**x**	**x**	No	No	Yes
Nicholas Beach	ASBS-031	22	TSS, O&G, Bivalve Toxicity	**No Flow**	**No Flow**	**No Flow**	No	No	No
Ocean Receiving Water	S01	n/a	Full Chem. List*; Kelp, Bivalve, and Echinoderm Toxicity	No Flow to ocean from ASBS-016	No Flow to ocean from ASBS-016		Not Applicable		

*Full chemistry list= TSS, oil and grease, metals, PAHs, pyrethroids, OP pesticides, ammonia, nitrate and total phosphorus.

* *Flow monitoring equipment installed in this outfall pipe.

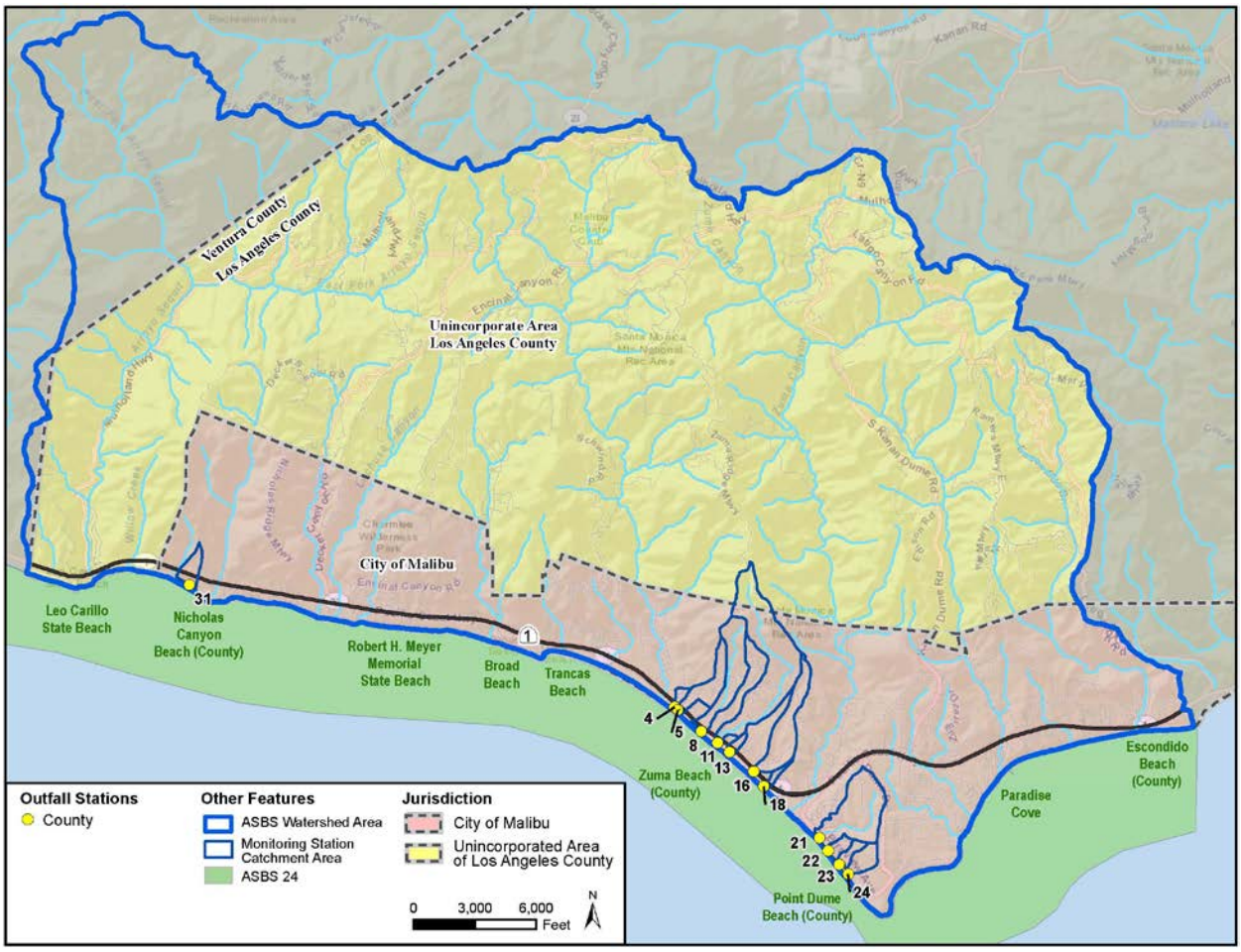

Figure 2-4. County ASBS Outfall Location Map

Zuma Beach Outfalls

ASBS-004 is a 24-inch outfall located at the northern end of Zuma Beach, adjacent to the northernmost parking lot along Zuma Beach Access Road (Figure 2-5). This outfall is accessible during all tides and was sampled during three monitored storm events (February 19 and March 8, 2013 and February 28, 2014). The watershed draining to ASBS-004 is 9.8 acres in size and the surrounding landscape at ASBS-004 consists of a gradually sloping, broad sandy beach.

Figure 2-5. ASBS-004 Outfall

ASBS-005 is a 36-inch outfall located at the northern end of Zuma Beach, adjacent to the northernmost parking lot along Zuma Beach Access Road, and directly across from the intersection of Guernsey Avenue with PCH (Figure 2-6). This outfall is accessible during all tides and was sampled during the February 19, March 8, 2013, and February 28, 2014, storm events. The watershed draining to ASBS-005 is 65.8 acres in size and the surrounding landscape at ASBS-005 consists of a gradually sloping, broad sandy beach.

Figure 2-6. ASBS-005 Outfall

ASBS-008 is a 24-inch outfall located at the northern end of Zuma Beach, near a parking lot along Zuma Beach Access Road (Figure 2-7). This outfall is accessible during all tides and was sampled during the March 8, 2013, storm event (it was added to the list of monitored sites following the February 19, 2013, storm event). The watershed draining to ASBS-008 is 114.8 acres in size and the surrounding landscape at ASBS-008 consists of a gradually sloping, broad sandy beach.

Figure 2-7. ASBS-008 Outfall

ASBS-011 is a 24-inch outfall located in middle portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road (Figure 2-8). This outfall is accessible during all tides and was sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-011 is 7.0 acres in size and the surrounding landscape at ASBS-011 consists of a gradually sloping, broad sandy beach.

Figure 2-8. ASBS-011 Outfall

ASBS-013 is an 18-inch outfall located in middle portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road (Figure 2-9). This outfall is accessible during all tides and was sampled during only the March 8, 2013, and February 28, 2014, storm events, as it did not flow during the February 19, 2013, storm event. The watershed draining to ASBS-013 is 10.4 acres in size and the surrounding landscape at ASBS-013 consists of a gradually sloping, broad sandy beach.

Figure 2-9. ASBS-013 Outfall

ASBS-016 is a 60-inch outfall located in middle portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road (Figure 2-10). This box culvert outfall is accessible during all tides and was sampled during only the March 8, 2013, and February 28, 2014, storm events, as it did not flow during the February 19, 2013, storm event. Flow monitoring equipment was installed in this outfall. The watershed draining to ASBS-016 is 115.1 acres in size and the surrounding landscape at ASBS-016 consists of a gradually sloping, broad sandy beach.

Figure 2-10. ASBS-016 Outfall

ASBS-018 is a 24-inch outfall located at the southern end of Zuma Beach, adjacent to a lifeguard station in the middle of the beach off Zuma Beach Access Road (Figure 2-11). This outfall is accessible during all tides and was sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-018 is 10.0 acres in size and the surrounding landscape consists of a gradually sloping, broad sandy beach.

Figure 2-11. ASBS-018 Outfall

Westward Beach Outfalls

ASBS-021 is a 48-inch outfall located at the northern end of Westward Beach, adjacent to an entrance gate near the intersection of Birdview Ave. and Westward Beach Road (Figure 2-12). This outfall is accessible during all tides and was sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014).The watershed draining to ASBS-021 is 170 acres in size and the surrounding landscape at ASBS-021 consists of a gradually sloping, broad sandy beach.

Figure 2-12. ASBS-021 Outfall

ASBS-022 is a 36-inch outfall located at the northern end of Westward Beach, midway between the entrance gate and the edge of the parking lot on Westward Beach Road (Figure 2-13). This outfall is accessible during all tides and was sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014).. The watershed draining to ASBS-022 is 18.4 acres in size and the surrounding landscape at ASBS-022 consists of a gradually sloping, broad sandy beach.

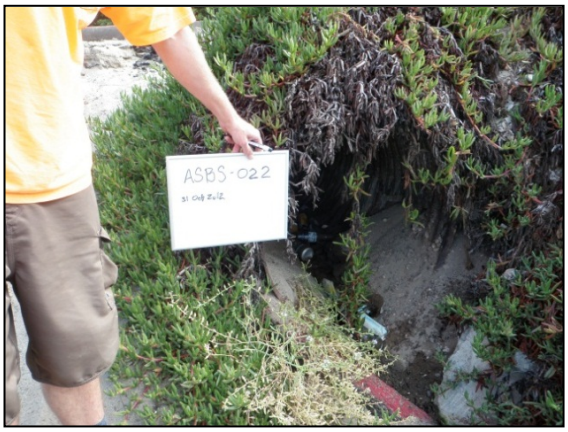

Figure 2-13. ASBS-022 Outfall

ASBS-023 is a 42-inch outfall located in the middle portion of Westward Beach, approximately 100 meters (m) north of the parking lot on Westward Beach Road (Figure 2-14). This outfall is difficult to find since it is hidden by ice plant. ASBS-023 is accessible during all tides and was sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-023 is 18.4 acres in size and the surrounding landscape at ASBS-023 consists of a gradually sloping, broad sandy beach.

Figure 2-14. ASBS-023 Outfall

ASBS-024 is a 24-inch outfall located in the middle portion of Westward Beach, approximately 100 m south of the edge of the parking lot on Westward Beach Road (Figure 2-15). This outfall is accessible during all tides and was sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-024 is 34.9 acres in size and the surrounding landscape at ASBS-024 consists of a gradually sloping, broad sandy beach.

Figure 2-15. ASBS-024 Outfall

Nicholas Beach Outfall

ASBS-031 is a 22-inch outfall located in the middle portion of Nicholas Beach, at the base of Nicholas Beach Road (Figure 2-16). This outfall is accessible during all tides; however, no flow was observed during either of the monitored storm events. The watershed draining to ASBS-031 is 30.1 acres in size and the surrounding landscape at ASBS-031 consists of a gradually sloping, broad sandy beach.

Figure 2-16. ASBS-031 Outfall

2.5.2 Outfalls Whose Ownership is Undetermined [With Inlets Owned by Caltrans]

Along Zuma Beach, 10 outfalls drain to ASBS 24 and are equal to or greater than 18 inches in diameter; however, ownership has not been determined. These outfalls have inlets maintained by Caltrans. A brief summary of the location and diameter of each of these outfalls with undetermined ownership is provided on Table 2-4, and Figure 2-17 shows the outfall locations. A description of each outfall is provided in the text that follows Figure 2-17.

Table 2-4. Locations and Diameters of Outfalls with Undetermined Ownership

Beach Location	Site Name	Latitude	Longitude	Pipe diameter (inches)
Zuma Beach	ASBS-006	34.027069	-118.838623	24
	ASBS-007	34.026184	-118.837539	24
	ASBS-009	34.024349	-118.834899	24
	ASBS-010	34.023872	-118.834304	18
	ASBS-012	34.022735	-118.832267	24
	ASBS-014	34.021247	-118.830307	24
	ASBS-015	34.02082	-118.829696	18
	ASBS-017	34.018711	-118.827049	30
	ASBS-019	34.016979	-118.824882	24
	ASBS-020	34.015602	-118.822525	36

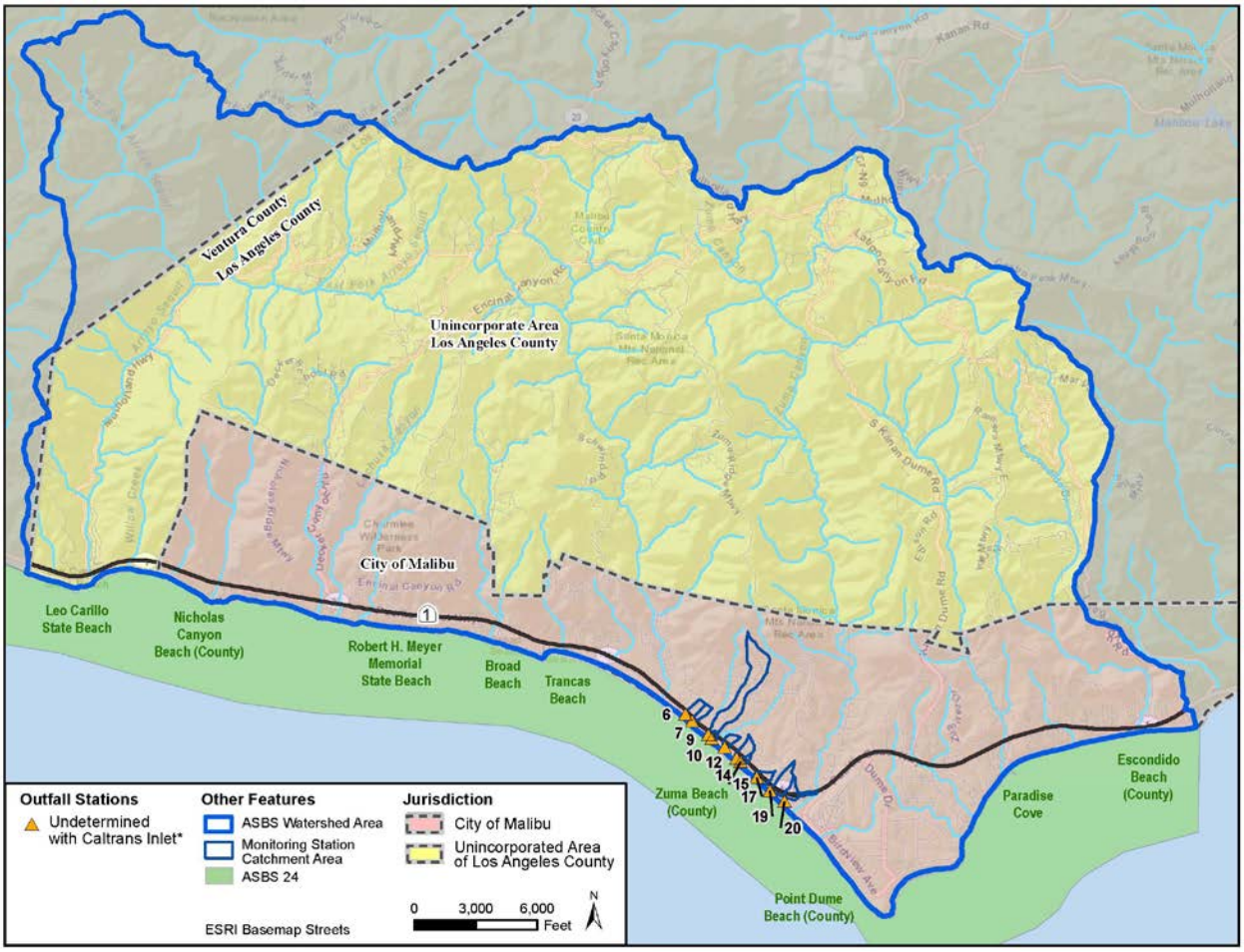

Figure 2-17. Undetermined Ownership (with Caltrans Inlets) ASBS Outfall Location Map

Zuma Beach Outfalls

ASBS-006 is a 24-inch outfall located in the northern portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road (Figure 2-18). The watershed draining to ASBS-006 is 10.2 acres in size and the surrounding landscape at ASBS-006 consists of a gradually sloping, broad sandy beach.

Figure 2-18. ASBS-006 Outfall

ASBS-007 is a 24-inch outfall located in the northern portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road (Figure 2-19). The watershed draining to ASBS-007 is 7.8 acres in size and the surrounding landscape at the outfall consists of a gradually sloping, broad sandy beach.

Figure 2-19. ASBS-007 Outfall

ASBS-009 is a 24-inch outfall located in the middle portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road, approximately 90 m south of Seadrift Cove (Figure 2-20). The watershed draining to ASBS-009 is 78.6 acres in size and the surrounding landscape at ASBS-009 consists of a gradually sloping, broad sandy beach.

Figure 2-20. ASBS-009 Outfall

ASBS-010 is an 18-inch outfall located in the middle portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road, approximately 170 m south of Seadrift Cove (Figure 2-21). The watershed draining to ASBS-010 is 2.4 acres in size and the surrounding landscape at ASBS-010 consists of a gradually sloping, broad sandy beach.

Figure 2-21. ASBS-010 Outfall

ASBS-012 is a 24-inch outfall located in the middle portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road, approximately 400 m south of Seadrift Cove (Figure 2-22). The watershed draining to ASBS-012 is 7.0 acres in size and the surrounding landscape at ASBS-012 consists of a gradually sloping, broad sandy beach.

Figure 2-22. ASBS-012 Outfall

ASBS-014 is a 24-inch outfall located in the middle portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road, directly in front of the Beaches and Harbors maintenance yard (Figure 2-23). The watershed draining to ASBS-014 is 12.1 acres in size and the surrounding landscape at ASBS-014 consists of a gradually sloping, broad sandy beach.

Figure 2-23. ASBS-014 Outfall

ASBS-015 is an 18-inch outfall located in the middle portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road, approximately 65 m south of the Beaches and Harbors maintenance yard (Figure 2-24). The watershed draining to ASBS-015 is 3.0 acres in size and the surrounding landscape at ASBS-015 consists of a gradually sloping, broad sandy beach.

Figure 2-24. ASBS-015 Outfall

ASBS-017 is an 18-inch outfall located in the southern portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road, directly in front of a helicopter landing pad (Figure 2-25). The watershed draining to ASBS-017 is 8.8 acres in size and the surrounding landscape at ASBS-017 consists of a gradually sloping, broad sandy beach.

Figure 2-25. ASBS-017 Outfall

ASBS-019 is a 24-inch outfall located in the southern portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road, approximately 420 m north of the Zuma Beach entrance gate (Figure 2-26). The watershed draining to ASBS-019 is 20.8 acres in size and the surrounding landscape at the outfall consists of a gradually sloping, broad sandy beach.

Figure 2-26. ASBS-019 Outfall

ASBS-020 is a 36-inch outfall located in the southern portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road, approximately 200 m north of the Zuma Beach entrance gate, in the center of the beach (Figure 2-27). The watershed draining to ASBS-020 is 12.3 acres in size and the surrounding landscape at ASBS-020 consists of a gradually sloping, broad sandy beach.

Figure 2-27. ASBS-020 Outfall

2.5.3 District Outfalls

The nine outfalls that fall under the jurisdiction of the District are located along Broad Beach (three outfalls) and Escondido Beach (six outfalls). The location of each County Outfall is provided on Table 2-5 and shown on Figure 2-28. A summary, including the diameter, monitoring data collected at each outfall pipe, and the observed flow connection (or absence), is provided on Table 2-6. A description of each outfall is provided in the text following Figure 2-28.

Table 2-5. District Outfall Locations and Diameters

Beach Location	Site Name	Latitude	Longitude	Pipe Diameter (inches)
Broad Beach	ASBS-001	34.034702	-118.861846	24
	ASBS-002	34.035556	-118.860328	18
	ASBS-003	34.035526	-118.858276	51
Escondido Beach	ASBS-025	34.025646	-118.763717	18
	ASBS-026	34.025653	-118.763336	24
	ASBS-027	34.025726	-118.762153	24
	ASBS-028	34.025772	-118.75962	36
	ASBS-029	34.025856	-118.758468	18
	ASBS-030	34.025897	-118.757987	18

Table 2-6. District Outfall Locations, Diameters, and Monitoring Information

Beach Location	Site Name	Pipe Diameter (in)	Analyses Performed	Storm Events Analyzed			Did flow reach receiving water?		
				2/19/2013	3/8/2013	2/28/2014	2/19/2013	3/8/2013	2/28/2014
Broad Beach	ASBS-001	24	TSS, O&G, Bivalve Toxicity	x	x	x	Yes	Yes	Yes
	ASBS-002	18	TSS, O&G, Bivalve Toxicity	x	x	x	Yes	Yes	Yes
	ASBS-003	51	Full Chem. List*; Bivalve Toxicity	**x**	**x**	**x**	Yes	Yes	Yes
Escondido Beach	ASBS-025	18	TSS, O&G, Bivalve Toxicity	**x**	**x**	**x**	Yes	Yes	Yes
	ASBS-026	24	TSS, O&G, Bivalve Toxicity	**x**	**x**	**x**	Yes	Yes	Yes
	ASBS-027	24	TSS, O&G, Bivalve Toxicity	**x**	**x**	**x**	Yes	No	Yes
	ASBS-028**	36	Full Chem. List*; Bivalve Toxicity	**x**	**x**	**x**	Yes	Yes	Yes
	ASBS-029	18	TSS, O&G, Bivalve Toxicity	**x**	**x**	**x**	Yes	No	Yes
	ASBS-030	18	TSS, O&G, Bivalve Toxicity	**x**	**x**	**x**	No	No	Yes
Ocean Receiving Water	S02	N/A	Full Chem. List*; Kelp, Bivalve, and Echinoderm Toxicity	x	x	x	Not applicable		

*Full chemistry list= TSS, oil and grease, metals, PAHs, pyrethroids, OP pesticides, ammonia, nitrate and total phosphorus.

* *Flow monitoring equipment installed in this outfall pipe.

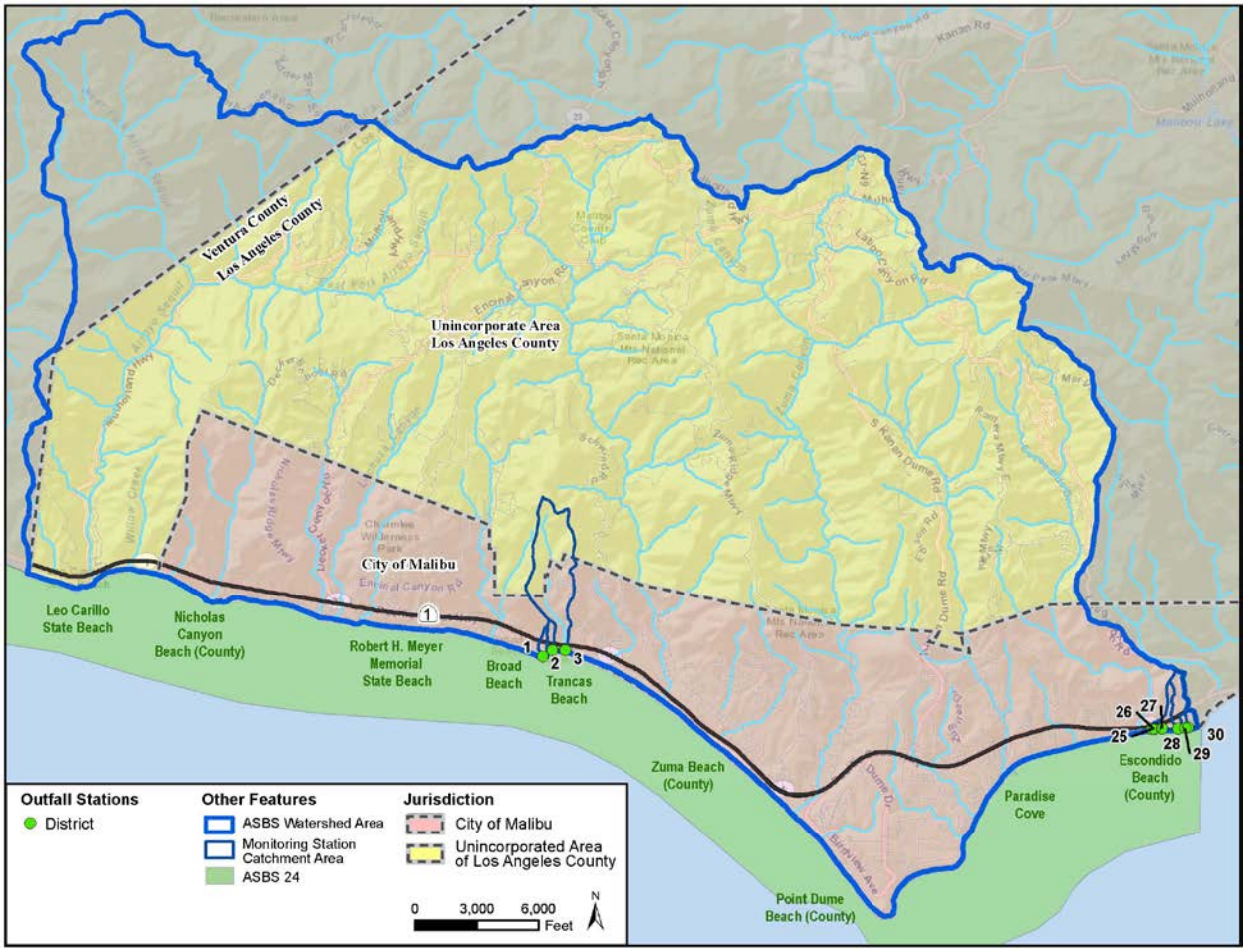

Figure 2-28. District ASBS Outfall Location Map

Broad Beach Outfalls

ASBS-001 is a 24-inch outfall located at the northern end of Broad Beach, along Point Lechuza, beneath a large residence (Figure 2-29). This outfall is inaccessible during high tide and was sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014)from a manhole located approximately 140 ft. from the beach on Point Lechuza Drive. The watershed draining to ASBS-001 is 9.4 acres in size and the area surrounding the outfall consists of a rocky intertidal area interspersed along a narrow, sandy beach.

Figure 2-29. ASBS-001 Outfall

ASBS-002 is an 18-inch outfall located at the northern end of Broad Beach, south of Point Lechuza, adjacent to a residence that has been undergoing construction (Figure 2-30). This outfall is inaccessible during high tide but was successfully sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014).The watershed draining to ASBS-002 is 11.0 acres in size and the area surrounding the outfall consists of a narrow, sandy beach with intermittent rocky reef.

Figure 2-30. ASBS-002 Outfall

ASBS-003 is a 51-inch outfall located at the northern end of Broad Beach, south of Point Lechuza, between two residences (Figure 2-31). This outfall is inaccessible during high tide but was successfully sampled during three monitored storm events (February 19 and March 8, 2013 and February 28, 2014). The watershed draining to ASBS-003 is 253.5 acres in size and a rocky intertidal area is located directly west of the outfall.

Figure 2-31. ASBS-003 Outfall

Escondido Beach Outfalls

ASBS-025 is an 18-inch outfall located at the southern end of Escondido Beach, south of the Malibu Cove Colony Drive entrance off PCH (Figure 2-32). The outfall is integrated with the foundation of a residence and discharges directly onto the sand between two residences. This outfall is inaccessible during high tide but was successfully sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-025 is 0.8 acres in size and the landscape surrounding the outfall is composed of a steep, sandy beach.

Figure 2-32. ASBS-025 Outfall

ASBS-026 is a 24-inch outfall located at the southern end of Escondido Beach, south of the Malibu Cove Colony Drive entrance off PCH (approximately 30 m southeast of ASBS-025). The outfall is integrated with the foundation of a residence and discharges directly onto the sand beneath the residence (Figure 2-33). This outfall is inaccessible during high tide but was successfully sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-026 is 2.5 acres in size and the landscape surrounding the outfall is composed of a steep, sandy beach.

Figure 2-33. ASBS-026 Outfall

ASBS-027 is a 24-inch outfall located at the southern end of Escondido Beach, approximately 300 m east of the Malibu Cove Colony Drive entrance off PCH (Figure 2-34). The outfall is integrated with the foundation of a residence and discharges directly onto the sand beneath the residence. This outfall is inaccessible during high tide but was successfully sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-027 is 18.9 acres in size and the landscape surrounding the outfall is composed of a steep, sandy beach.

Figure 2-34. ASBS-027 Outfall

ASBS-028 is a 36-inch outfall located at the southern end of Escondido Beach, approximately 500 m east of the Malibu Cove Colony Drive entrance off PCH (Figure 2-35). The outfall is integrated with the foundation of a residence and discharges directly onto the sand beneath the residence. Flow monitoring equipment was installed in this outfall near the inlet on Malibu Cove Colony Drive. This outfall is inaccessible during high tide but was successfully sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-028 is 36.0 acres in size and the landscape surrounding the outfall is composed of a steep, sandy beach.

Figure 2-35. ASBS-028 Outfall

ASBS-029 is an 18-inch outfall located at the southern end of Escondido Beach, near the end of Malibu Cove Colony Drive (Figure 2-36). The outfall lies between two residences and discharges directly onto the sand. This outfall is inaccessible during high tide but was successfully sampled three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-029 is 3.8 acres in size and the landscape surrounding the outfall is composed of a steep, sandy beach.

Figure 2-36. ASBS-029 Outfall

ASBS-030 is an 18-inch outfall located at the southern end of Escondido Beach, near the end of Malibu Cove Colony Drive (approximately 45 m east of ASBS-029). The outfall is integrated with the foundation of a residence and discharges directly onto the sand beneath the residence (Figure 2-37). This outfall is inaccessible during high tide but was successfully sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-030 is 8.9 acres in size and the landscape surrounding the outfall is composed of a steep, sandy beach.

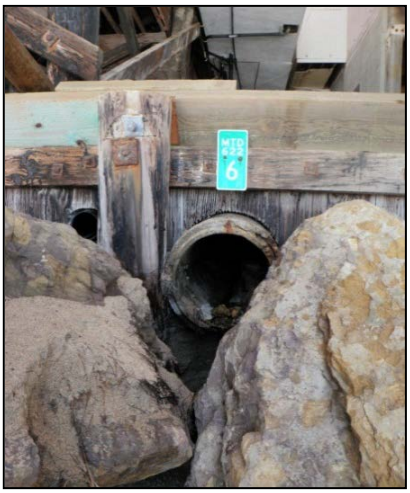

Figure 2-37. ASBS-030 Outfall

2.5.4 Private Outfalls with Inlets Owned by the City

Eight outfalls that are greater than, or equal to, 18 inches in diameter and located along Broad Beach and Little Dume Beach are privately owned with inlets maintained by the City. Currently, three of the outfalls along Broad Beach are being monitored as part of Bight 2013 and the compliance requirements of the General Exception. Although the City maintains ownership of the inlets for each of these storm drains, the ownership status of the outfalls is privately owned. The other five private outfalls with City maintained inlets along Broad Beach and Little Dume Cove that are greater than, or equal to, 18 inches in diameter are not being monitored due to inaccessibility during storm events or due to locations high on Bluffs. A brief summary of the location and diameter for each of these outfall pipes is provided on Table 2-7. Figure 2-38 shows the locations of these private outfalls with City maintained inlets, and a description of each outfall is provided in the text following Figure 2-38.

Table 2-7. City Outfall Locations, Diameters, and Monitoring Information

Beach Location	Site Name	City Outfall ID	City Inlet ID	Latitude	Longitude	Pipe diameter (inches)
Broad Beach	24-BB-01*	24-BB-01Z	24-BB-01A	34.03118	-118.84615	24
	24-BB-02*	24-BB-02Z	24-BB-02B	34.03302	-118.84988	18
	24-BB-03*	24-BB-03Z	24-BB-03A	34.0334	-118.85082	30
	ASBS-B	ASBS-B-Z**	ASBS-B-A	34.03499	-118.85567	18
	ASBS-C	ASBS-C-Z	ASBS-C-A	34.03485	-118.85502	30
	ASBS-F	ASBS-F-Z**	ASBS-F-A	34.03186	-118.84748	24
	ASBS-G	ASBS-G-Z	ASBS-G-A	34.03134	-118.84649	24
Little Dume Beach	ASBS-I	ASBS-I-Z	ASBS-I-A	34.01292	-118.79237	18

*Site currently undergoing monitoring in accordance with the General Exception.
**Site with no visible outfall.

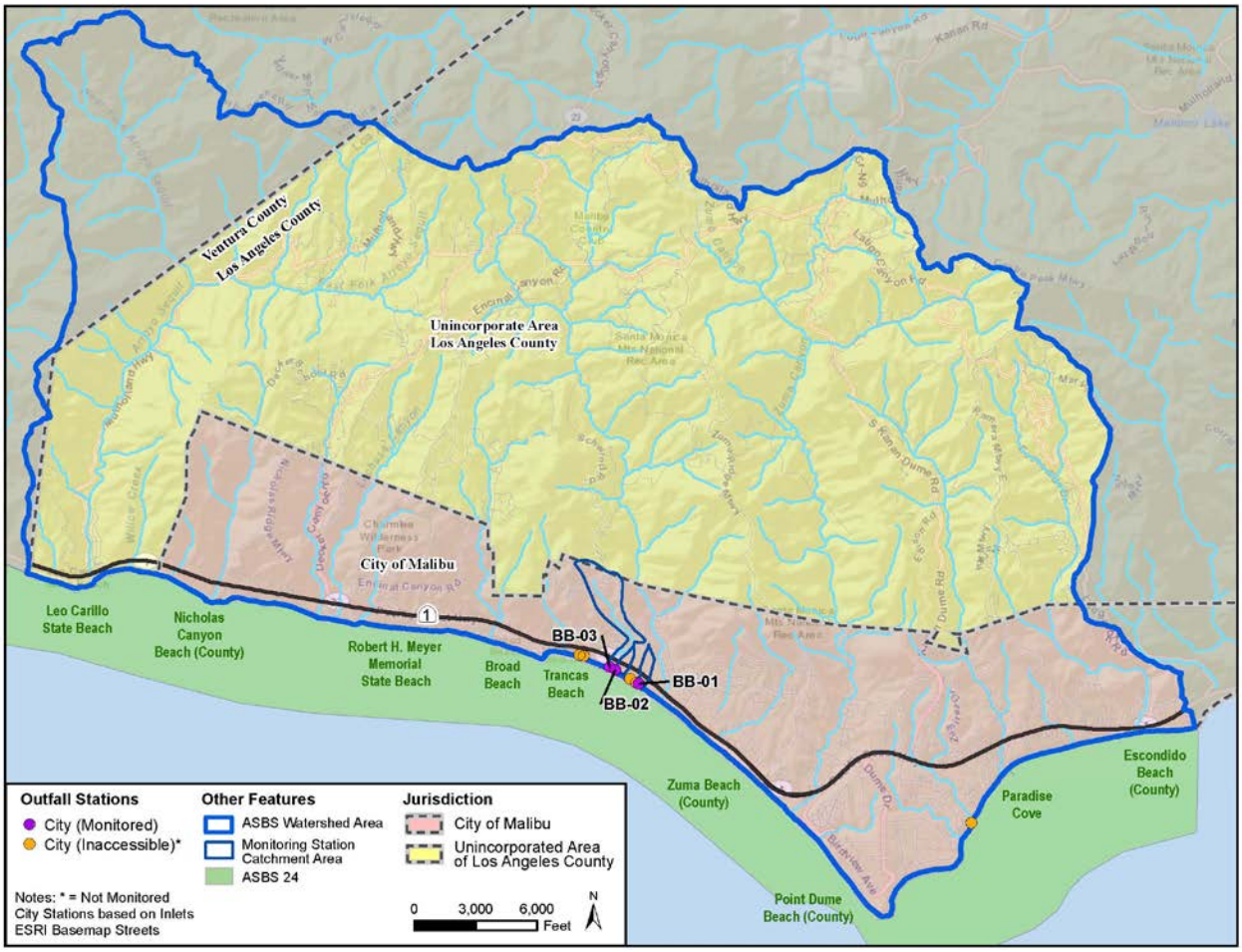

Figure 2-38. City ASBS Outfall Location Map

Broad Beach Outfalls

Site 24-BB-01Z is a 24-inch outfall located at the southern end of Broad Beach, near the intersection of Trancas Canyon Road and PCH (Figure 2-39). The outfall is located behind rock revetment and is inaccessible during high tide or dangerous surf conditions. This outfall was successfully sampled during the February 28, 2014, storm event. The monitoring program will continue into the 2014-2015 wet season and thus, sampling may be performed prior to the submittal of the final Plan. The watershed draining to 24-BB-01Z is 19.9 acres in size and consists primarily of single family residences, commercial, transportation right-of-way (ROW), and PCH ROW land uses. The landscape surrounding the outfall is composed of a rock revetment and narrow, sandy beach with near-shore reef and kelp.

Figure 2-39. 24-BB-01Z Outfall

Site 24-BB-02Z is an 18-inch outfall located at the southern end of Broad Beach, approximately 200 m south of the intersection of Lunita Road and PCH (Figure 2-40). This outfall was successfully sampled during the February 28, 2014, storm event. The monitoring program will continue into the 2014-2015 wet season and thus, sampling may be performed prior to the submittal of the final Plan. The outfall is located among the shoreline rock revetment and is inaccessible during high tide or dangerous surf conditions. The watershed draining to 24-BB-02Z is 13.9 acres in size and consists primarily of single family residences, vacant, transportation ROW, and PCH ROW land uses. The landscape surrounding the outfall is composed of rock revetment a narrow, sandy beach.

Figure 2-40. 24-BB-02Z Outfall

Site 24-BB-03Z is a 30-inch outfall located at the southern end of Broad Beach, approximately 100 m south of the intersection of Lunita Road and PCH (Figure 2-41). This outfall was successfully sampled during the February 28, 2014, storm event. The monitoring program continues into the 2013-2014 wet season and thus, sampling may be performed prior to the submittal of the Final Plan. The outfall is located among the shoreline rock revetment and is inaccessible during high tide or dangerous surf conditions. The watershed draining to 24-BB-03Z is 127.6 acres in size and consists primarily of rural residential, vacant, single family residences, transportation ROW, and PCH ROW land uses. the landscape surrounding the outfall is composed of rock revetment and a narrow, sandy beach.

Figure 2-41. 24-BB-03Z Outfall

Site ASBS-B-Z (outfall has a potential correlation to the SWQCB list as SAD790, although not confirmed) is an 18-inch outfall located at the northern end of Broad Beach, directly across from the intersection of La Herran Road and PCH. The City owns the inlet to this site, but existence and ownership of the outfall has not been determined, as the outlet may have been reconfigured during installation of the private rock revetment. The outfall may be located among shoreline riprap; however, the outfall is currently not visible and thus, considered inaccessible. No sampling has been performed at this site. The landscape surrounding the outfall is composed of rock revetment and a narrow, sandy beach with some near-shore reef.

Site ASBS-C-Z is a 30-inch outfall located at the northern end of Broad Beach, approximately 30 m south of the intersection of La Herran Road and PCH (Figure 2-42). While the City owns the inlet to this outfall, the outfall is considered private. The outfall is located behind and partially buried by the rock revetment and is inaccessible at all times due to the steep rock revetment that surrounds the outfall. No sampling has been performed at this site. The watershed draining to ASBS-C is 66.8 acres in size and consists primarily of single family residences, vacant, transportation ROW, and PCH ROW land uses. The landscape surrounding the outfall is composed of rock revetment and a narrow, sandy beach with some near-shore reef.

Figure 2-42. ASBS-C Outfall

Site ASBS-F is a 24-inch outfall located at the southern end of Broad Beach, approximately 350 m northeast of the intersection of Trancas Canyon Road and PCH. The outfall is located among shoreline riprap; however, the outfall is currently not visible and thus, considered inaccessible.

No sampling has been performed at this site, and the landscape surrounding the outfall is composed of a rock revetment and narrow, sandy beach.

Site ASBS-G (outfall has a potential correlation to SWQCB list as MUG232 or SAD900, although not confirmed) has a 24-inch outfall located at the southern end of Broad Beach, approximately 200 m northeast of the intersection of Trancas Canyon Road and PCH. The outfall is located among shoreline riprap; however, the outfall is currently not visible and thus, considered inaccessible. No sampling has been performed at this site. The landscape surrounding the outfall is composed of a narrow, sandy beach.

Little Dume Beach Outfalls

Site ASBS-I (also referred to as PC02 in other documents) is an 18-inch outfall located on Little Dume Beach, approximately 100 m east of the end of Wildlife Drive (Figure 2-43). The outfall is located on a cliff-side bluff and is inaccessible. No sampling has been performed at this site. The watershed draining to ASBS-I is 6.7 acres in size and the landscape surrounding the outfall is composed of a narrow, sandy beach with near-shore reef and kelp.

Figure 2-43. ASBS-I Outfall

2.6 ASBS 24 Compliance Plan Map

A Compliance Plan Map for the ASBS 24 watershed area has been created and can be updated using ESRI ArcMap 10. This map shows storm water conveyances and other storm drain features associated with surface drainage of storm water runoff, including catch basins, inlets/outlets, outfalls, storm drain lines, channels, and creeks. The map identifies core monitoring stations and shows the location of other outfalls equal to or greater than 18 inches that are private, state, or federal and not monitored by the Parties. Drainage areas for the core monitoring stations, areas of potential sheet flow, the planned Broad Beach Road biofiltration best management practices (BMPs), watershed sub-basins and flow directions within these sub-basins are depicted, as well as the overall ASBS 24 watershed area. The map includes the locations of waste and hazardous material storage areas (located on private commercial properties), sewage conveyances and treatment facilities, landslide zones, and roads. Jurisdictional boundaries for the unincorporated area of the County, the City, and state and federal lands within these areas are shown. This subsection of the Compliance Plan provides information regarding the Compliance Plan Map datasets and the procedures for updating applicable GIS files and the map.

2.6.1 Compliance Plan Map Files

The Compliance Plan Map includes several types of files, organized by file type, in the following folders:

- MXD – MXD files are the map documents produced in ESRI ArcMap. An MXD contains the map template (e.g., size, layout) and calls upon ESRI GIS shapefiles that are stored in the Shapefiles folder. The MXD contains a table of contents, text, and graphic elements, and specifies how data will be displayed. The MXD establishes relative file paths to the shapefiles. Currently, the MXD folder contains only one file: Compliance_Plan_Map.MXD. Additional versions of the map can be saved in this folder, as needed.

- Shapefiles – Shapefiles are GIS format data files that are called upon by the map. Changes to shapefiles will be reflected in the map if the map calls upon the data stored in the shapefile. A spreadsheet listing all of the shapefiles, contents, and sources is provided as Table 2-8.

- Data Files – Data files contain MS Excel spreadsheets, including those added as tables to the MXD. Changes to MS Excel files do not update the map. New or revised tables must be added to the MXD, and can be used to create XY events (based on latitude and longitude data in the table), or joined to existing shapefiles through a common field ID to append additional data fields to the GIS features.

Table 2-8 lists the GIS shapefiles used in the Compliance Plan Map by filename, and provides GIS feature types (e.g., points, lines, polygons), descriptions of the contents of the GIS file, information regarding the original source, and how to update the data in the Compliance Plan Map as needed. The file order in this table is based on the order of the items in the map legend (Figure 2-44).

2.6.2 Compliance Plan Map Update Procedures

Update procedures are provided by GIS shape file on Table 2-8 and are dependent upon original source and other considerations. Many of the original source GIS files were provided by LACDPW, some files by the City, and were received in GIS shapefile format; therefore, files have been maintained in shapefile format (i.e., not converted to geodatabase format). The County possesses a complete set of the files used to prepare the map (Compliance Plan Map dataset). As these base data layers are updated by the Parties in their primary GIS database, the revised GIS files can be provided to the County and copied in the local Compliance Plan Map dataset, processed, and used to replace the older file versions. The City and County/District Outfall Stations (and Other Outfalls) locations are maintained in separate shapefiles such that this information can be updated independently by each party and then reinserted into the GIS database without overwriting another parties' information. If the new filename is the same as the previous version, the new data should display within ArcMap when the file is replaced in the

Shapefile folder. However, if the data attribute options have been updated, the symbology for the data layer should be checked in the table of contents to ensure that all values have a symbol and will be drawn. If the map layer does not display (i.e., a red exclamation point will appear in the table of contents next to the filename), check the data source file path and update as needed. GIS shapefiles should be clipped to the overall ASBS watershed area (GIS file), and geometry recalculated to update line lengths and polygon areas. All GIS data should be maintained in the following projected coordinate system: CA State Plane, Datum NAD83, Zone V, units Survey Feet for consistency.

In addition, GIS files can be edited within ESRI ArcMap to update map features and attribute data, such as a change in monitoring stations, a revision to the monitoring station catchment areas, the inclusion of monitoring data results to outfall locations, or the addition of new BMPs to the BMP shapefile. This process can be performed in an edit session using the Editing toolbar. Note that map labels on the map are currently static (i.e., have been converted to annotation stored in the map) to better control their placement. Therefore, text labels will need to be created for new features that are added to existing shapefiles or for new shapefile features for which map labeling is appropriate.

Facilities with hazardous material storage areas should be updated on an annual basis by requesting the Active Facility Inventory List from LA County Fire for Zip Code 90265. The address information can be formatted in an MS Excel spreadsheet for the geocoding process. After adding the table to ArcMap, run the geocoder tool, and clip the resulting shapefile to the ASBS 24 watershed area.

Updates can also be made to the MXD, such as adding new features layers, revising the layout, or other map template items to change the look of the map. New GIS files can also be easily added to the map as additional data become available related to compliance activities. Note that the map legend is static and will not automatically update when new GIS files are added to the MXD. The legend can be manually updated using the drawing and text tools or a new legend inserted. An MXD can be saved as a new file to maintain previous versions in the database.

Table 2-8. GIS Shapefiles Used in Compliance Plan Map

Filename	Type	Description	Original Source	To Update
LAC_ASBS24_Outfalls	Point	County and District Monitoring Stations in ASBS 24 Monitoring Program, including Core MS4 Outfalls, Outfalls that have Caltrans Inlets but undetermined ownership of Outflalls (not monitored) and Ocean Receiving Water Stations, and creek reference station. Includes ownership information.	Core Monitoring Stations provided by LADPW in table format and imported into GIS from an MS Excel spreadsheet using latitude and longitude data provided in file to map locations.	Station locations and attribute data can be edited in GIS to update file (i.e., add, remove, or change location or attribute data associated with monitoring stations).
City_Outfalls	Point	Outfalls identified for the City's ASBS 24 Monitoring Program. City has jurisdiction of inlets but outfalls were determined by City to be privately owned. Three of these eight Outfalls are monitored, and five are considered inaccessible. Includes the City's Ocean Receiving Water station.	Field notes in an MS PowerPoint file provided by the City. GIS file created using latitude and longitude data. Other outfalls ≥ 18 inches that were listed in the field notes but not included in monitoring program are provided in file called "Other_Outfalls_City_Recon".	Edit or replace GIS file as needed to add, remove, or change location or attribute data associated with monitoring stations.
Other_Outfalls_County_Recon	Point	This file contains outfalls that were identified in field reconnaissance activities by the County for which ownership is private or undetermined. These outfalls are not in the monitoring program. Not all outfalls were visible or could be verified.	Provided by LADPW in table format and imported into GIS from an MS Excel spreadsheet using latitude and longitude data fields provided in file.	Station locations and attribute data can be edited in GIS to update file. This file complements the LAC_ASBS24_Outfalls file as the outfalls ≥ 18 inches but not in County monitoring program as ownership is private or undetermined.
Other_Outfalls_City_Recon	Point	This file contains outfalls that were identified in field reconnaissance activities by the City of Malibu and were determined to be privately owned and were not included in the monitoring program. Not all outfalls were visible or could be verified.	Field notes in an MS PowerPoint file provided by the City. Tabular data imported into GIS using latitude and longitude data from field notes.	Station locations and attribute data can be edited in GIS to update file. This file complements the City_Outfalls that were also identified in the City recon activities, found to be privately owned but chosen for compliance monitoring.
Catchbasins_ws	Point	Catch basin locations within the ASBS 24 watershed area. Ownership or maintenance of catch basins given in file as: LACFCD for District, City, Road Maintenance Division or not listed (blank).	Based on integrating data from two different catch basin files and removing duplicates. One file provided by LADPW (used as primary data source), the other found on LA County GIS data portal (supplementary).	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary. Record catch basin cleaning frequency attribute data.
Inlet_Outlet_from_LADPW_ws	Point	Inlet and outlet locations clipped to ASBS 24 watershed.	Provided by LADPW. Feature type (inlet or outlet) attribute data was blank, so features could not be symbolized differently.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary. Improve data by completing data fields.
City_inlets_ASBS_Drainage	Point	Point locations for inlets identified by the City as owned by the City.	Table provided by the City.	Locations and attribute information can be edited in GIS or a new table imported into GIS.
Lateral_Lines_SD_from_LADPW_ws	Line	Lateral line storm drains clipped to ASBS 24 watershed.	Provided by LADPW.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary.
Gravity_Main_SD_from_LADPW_ws	Line	Storm drain mains clipped to ASBS 24 watershed.	Provided by LADPW.	Replace GIS file with updated one (LADPW source) as available and clip to ASBS 24 watershed boundary.
Storm_Drains_LADPW_clip_ws	Line	Includes pipes, channels, and creeks that convey stormwater runoff clipped to the watershed boundary.	LA County GIS data portal.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary.
Prelimin_drain_areas_core_mon_outfalls	Polygon	Catchment areas delineated for the Core Monitoring Stations.	Delineated by Weston based on desktop data review using 2-ft contour data, sub-basins, and storm drain data. Not field-verified and should be considered preliminary.	Catchment areas and attribute data can be edited in GIS to update file. New drainage areas will need to be delineated as stations are added.
BMP_Areas	Polygon	Shows structural BMPs that can be mapped, and currently displays the Planned Biofiltration BMP at Broad Beach Rd. Does not include non-structure BMPS or Operations and Maintenance Activities (See compliance plan for details).	Based upon project boundary shown in Biofiltration Project report.	Edit or replace GIS file as needed to add, remove, or change location or attribute data associated with these features.
ASBS_24_Watershed	Polygon	An overall boundary watershed based on the eight watersheds that drain to the ASBS 24 area.	Based on sub-basins GIS file from LADPW with internal boundaries dissolved for the eight watersheds.	Edit boundary in GIS as needed.

Table 2-8. GIS Shapefiles Used in Compliance Plan Map

Filename	Type	Description	Original Source	To Update
Subbasins_ws	Polygon	Watershed sub-basins clipped to the ASBS 24 watershed boundary	Provided by LADPW.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary.
Subbasins_flow_dir_ws	Line	Watershed sub-basins clipped to the ASBS 24 watershed boundary.	Provided by LADPW.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary.
Sewer_Treatment_Plant_ws	Point	Sewer treatment plant locations within the ASBS 24 watershed area.	Provided by LADPW.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary.
Sewer_Pump_Station_ws	Point	Sewer pump station locations within the ASBS 24 watershed area.	Provided by LADPW.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary.
Areas_potential_sheet_flow	Polygon	Areas identified as having potential sheet flow are the parking lots at Nicholas Canyon, Zuma, and Westward Beaches.	Parking lot areas were digitized from aerial imagery to create the polygon file.	Edit or replace GIS file as needed to add, remove, or change location or attribute data associated with these features.
Sewer_Pipe_ws	Line	Sewer pump station locations within the ASBS 24 watershed area.	Provided by LADPW.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary.
Sewer_Maintenance_Service_Area_ws	Polygon	Sewer maintenance service area within the ASBS 24 watershed area.	Provided by LADPW.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary.
Pacific_Coast_Highway_ws	Line	Centerline feature of PCH (State Hwy 1) extracted from CAMS 2011 GIS file and clipped to the ASBS 24 watershed boundary.	LA County GIS data portal: http://egis3.lacounty.gov/dataportal/2011/12/09/2011-la-county-street-centerline-street-address-file/.	As updated versions of file become available, extract PCH lines from the new shapefile and clip to the ASBS 24 watershed.
Roads_ws	Line	Non-private road centerline features extracted from the CAMS 2011 GIS file and clipped to the ASBS 24 watershed boundary.	LA County GIS data portal: http://egis3.lacounty.gov/dataportal/2011/12/09/2011-la-county-street-centerline-street-address-file/.	Replace road file with updated versions as available and clip to the ASBS 24 watershed.
Facilities_with_haz_materials	Point	Geocoded addressed for facilities that generate or store hazardous materials within the ASBS 24 watershed.	Facility addresses provided by LA County Fire Dept in excel spreadsheet.	Request the annual update of Facility (Active) Inventory List from LA County Fire for Zip Code 90265. Format address data in Excel spreadsheet for geocoder. Geocode in ArcMap and clip the shapefile to the ASBS24 watershed.
County_Bndry	Polygon	Boundary of the County.	Los Angeles County GIS Data Portal.	No update expected.
Jurisdictional_Boundary_ws	Polygon	Jurisdictional boundaries for the unincorporated portion of the County and the City clipped to the ASBS 24 watershed.	Los Angeles County GIS Data Portal.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary.
State_and_Federal_Lands_ws	Polygon	Land areas identified as in state or rederal ownership clipped to the ASBS watershed area.	Based on parcels in state or federal ownership extracted from Parcel GIS data file provided by LADPW.	Process updated parcel file (LADPW source) to extract parcels with state or federal ownership; dissolve boundaries by owner type/code; clip to the ASBS 24 watershed boundary.
ASBS_24_Boundary	Polygon	ASBS 24 watershed boundary.	CA State Water Resources Control Board.	To be updated only if boundary is changed. Replace GIS file if new one is published by agency.
USGS_Landslides_zone_clipped_ws	Polygon	Landslide zones for 1:24k USGS sheets of Point Dume and Trifuno Pass merged into a single GIS file.	Provided by the City, available from USGS.	Update GIS file as new data are published by USGS or if County revises data based on landslide activity.

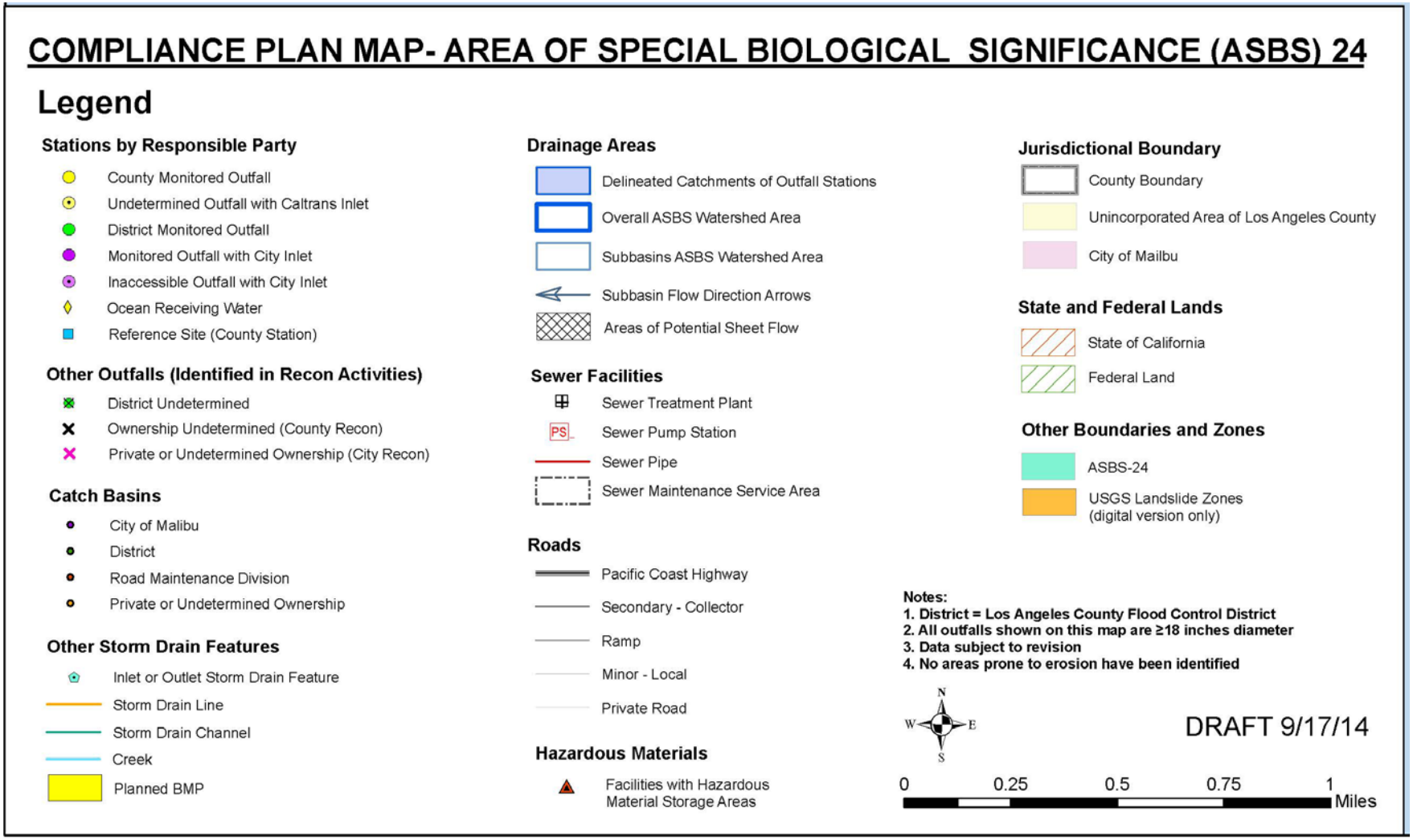

Figure 2-44. Compliance Plan Map Legend

3.0 DRY WEATHER COMPLIANCE

Section I.A.2.b of the General Exception states that the ASBS Compliance Plan will describe measures taken by the Parties to eliminate non-authorized, non-storm water runoff (e.g., dry weather flows), how these measures will be maintained over time, and how these measures are monitored and documented (SWRCB, 2012b).

The Parties have implemented nonstructural measures that are designed to eliminate non-authorized, non-storm water runoff, including public information and participation programs (PIPPs), operations and maintenance (O&M) programs, and enforcement programs. A list of existing programs is provided in Appendix B. When used in combination, nonstructural controls have been proven to provide improved effectiveness in load and flow reduction, at a lower cost, than many structural solutions (Brown et al., 2010; Pohl, 2010; Cac and Ogawa, 2010; Krieger et al., 2010). A discussion of the Parties' use of each of these types of nonstructural BMPs follows.

Dry weather monitoring of outfalls has been performed to ensure compliance with the requirements of the General Exception. This document summarizes those monitoring activities and results.

3.1 Nonstructural Controls

Nonstructural controls are designed to prevent dry weather runoff and pollution generation, control sources of dry weather runoff and pollution once generated, and eliminate the true source of pollutants, if appropriate. This document identifies nonstructural controls used by the Parties in order to meet the requirements of the General Exception and Special Protections of the California Ocean Plan (SWRCB, 2012a).

3.1.1 Nonstructural Program Terms and Definitions

Nonstructural programs are designed to prevent pollution generation, control sources of pollution once generated, and eliminate the true source of pollutants. The following common terms and definitions are related to nonstructural controls, which are used throughout the document, including:

- Pollution Prevention Measures target pollutants and wastes before they are generated. These measures typically emphasize conserving or reusing resources to prevent pollution.
- Source Controls target specific sources of pollution to reduce or eliminate pollutants from entering the municipal separate storm sewer system (MS4) and / or ultimately the receiving water. Source controls may include institutional controls (e.g., codes, ordinances, and regulations), outreach, education, incentive programs, and enforcement measures.
- True Source Controls recognize that the source pollutant may be the physical design of a product, such as copper-based pesticides or copper break-pads. In this instance, product regulation and true source control can only be achieved at the state or national level. True source controls support regulatory change outside the local jurisdiction.

Nonstructural programs have been classified in this document using a "three-legged stool" approach where the three legs of the stool consist of PIPPs, Enforcement Programs, and O&M Programs (see Figure 3-1). When used in combination, nonstructural controls have been proven to provide improved effectiveness in load and flow reduction, at a lower cost, than many structural solutions (Brown et al., 2010; Pohl, 2010; Cac and Ogawa, 2010; Krieger et al., 2010).

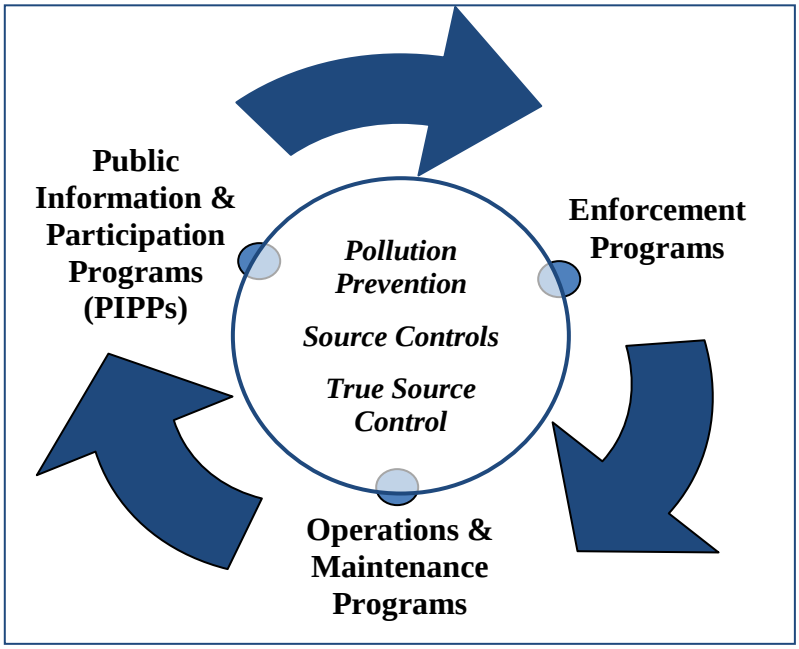

Figure 3-1. ASBS 24 Nonstructural Programs

3.1.2 Nonstructural Program Adaptive Management Process

The ASBS 24 PIPPs, enforcement, and O&M nonstructural programs have been implemented using adaptive management (Figure 3-2) to plan, implement, assess, and refine individual nonstructural controls. Nonstructural programs implemented to date have ensured compliance with the zero dry weather discharge criteria of the Special Protections. Receiving water data collected under the 2013 Regional Monitoring Program represent the initial assessment of wet weather loading to ASBS 24. Some nonstructural programs implemented to date, identified in this document, also have the potential to help reduce wet weather pollutant loads. Effectiveness assessments will play a key role in ongoing implementation of the nonstructural program by identifying the optimal enhanced programs and establishing a process for planning subsequent phases of nonstructural implementation.

Figure 3-2. Adaptive Management Process

3.2 Existing Nonstructural Programs

The Parties proactively participate in regional nonstructural planning efforts and implement nonstructural controls to protect the receiving water quality of ASBS 24. A detailed list of existing PIPPs, enforcement programs, and O&M programs is provided in Appendix B. This section contains a description of key nonstructural programs related to compliance with the prohibited discharges listed in the General Exception.

3.2.1 Public Information and Participation Programs

PIPPs encompass the education, outreach efforts, and rebate / incentive programs implemented by the Parties which encourage positive behavior changes that eliminate or reduce potential polluting behaviors, encourage reporting and cleanup of discharges, and reduce water consumption. Waste management and water conservation PIPPs have been implemented by the County and the City and are described in the following sub-sections.

3.2.1.1 Waste Management PIPPs – Outreach Programs

Clean LA is the County's main PIPP. Clean LA offers online and hotline resources to residents, businesses, and local governments to answer questions related to household hazardous and electronic waste collection, composting, recycling, illegal dumping prevention, and water quality impacts of proper waste management. The Clean LA hotline, which is shared with the District, fielded 34,064 calls throughout Los Angeles County during the fiscal year covered under the 2011-2012 Annual Report (LACDPW, 2012). Within the Clean LA tool box, the Rethink LA program encourages "rethinking" about opportunities to implement reduction, recycling, and reuse, and offers the Los Angeles County Materials Exchange (LACoMAX) as a unique Web platform for buying recycled products, exchanging materials, and advertising garage sales. These online educational resources are interlinked and represent the types of programmatic tiering possible within a PIPP.

Similarly, the Malibu Green Room Web page, a one-stop resource for all things "green" in the City, is one of the City's key PIPP resources. The Web page includes information related to environmental protection ordinances, the City's 24-Hour Pollution Prevention Hotline (initiated in June 2012), special waste collection events, the ocean friendly gardens (OFG) and California (CA) Friendly Landscapes programs and examples of properties where such gardens are installed, design and implementation of structural BMPs, and environmental events, as well as examples of what actions the City has taken to become more sustainable. This Web page is linked with other City-managed Web pages, such as the ASBS Web page, the *Keep it Clean, Malibu* campaign and projects and programs offered by partner agencies.

3.2.1.2 Water Conservation PIPPs – Incentive Programs

Three incentive programs are managed regionally by the Los Angeles County Waterworks and West Basin Municipal Water Districts and are advertised within the ASBS 24 watershed by the County and City. The programs are used to encourage water conservation for outdoor landscaping, thereby preventing dry weather runoff to ASBS 24 from over-irrigation. These programs vary based on available funding, but have included incentives such as the Landscape Irrigation Efficiency Program (LIEP) (completed in 2013), which offered installation of free,

efficient sprinkler heads and an irrigation efficiency evaluation at qualified properties; the Water Saving Devices Rebate Program, a residential rebate program for water saving devices such as rotary sprinkler nozzles and irrigation controllers; and Cash for Grass, a residential rebate program for replacing grass with water-efficient landscaping.

3.2.1.3 Water Conservation PIPP – Surfrider Ocean Friendly Garden (OFG) Program

The Surfrider OFG Program is a regional effort to promote water conservation and eliminate dry weather runoff from over-irrigation and other anthropogenic sources. The County and City manage webpages identifying OFG "case studies" within their jurisdiction and frequently host educational and outreach events at OFGs located at public facilities. Recently, the City has also been promoting the Metropolitan Water District-funded CA Friendly Landscapes program, which is a reimagining of the OFG program intended to engage a broader audience who might not otherwise resonate with the concept of "ocean friendly".

3.2.1.4 Water Conservation PIPP – CA Friendly Landscaping Program

The CA Friendly Landscaping Program targets residences and businesses to promote water conservation and eliminate non-point source pollution from landscaping. It is a reimagining of the OFG Program by the Metropolitan Water District in an attempt to engage a broader audience statewide. Similarly to the OFG Program, it is promoted by its local water Districts and agencies. The program includes educational workshops, training events, and incentives such as landscape water efficiency rebates. The City hosted two CA Friendly Landscaping Workshops from 2013-2014.

3.2.1.5 Water Conservation PIPP – City of Malibu ASBS Focused Outreach Program

The City of Malibu Focused ASBS Outreach Program included a Coastal Preservation Specialist (CPS) position that was created by the City under a State Proposition 84 grant to perform direct and focused outreach to residents and to develop an outreach campaign to reach the community at large raising awareness of ASBS 24. One of the roles of the CPS was to develop and implement PIPPs that prevent dry weather flows. The CPS mailed a general ASBS education letter to every parcel within the ASBS and regularly gave public educational and school presentations on ASBS topics (e.g., OFGs, water conservation) that may be implemented by residents and are being implemented by the City. Additionally, the CPS attended public events to educate about protecting the ASBS. As the City's representative, the CPS interfaced with schools for environmental education programs with Pepperdine University, Point Dume Marine Science School, and Malibu High School. The CPS also developed new ASBS content and maintained pages on the City's web page, interfaced with the media, and expanded the City's outreach of ASBS topics using social media platforms including Facebook, Twitter, and Instagram. The *Keep it Clean, Malibu* website further enhanced the City's ASBS content and encourages residents to prevent pollution by providing guidance on the proper use of common products and best practices relating to other sources (e.g., pet waste).

As part of the Proposition 84 State funding, the CPS was tasked with developing an outreach campaign to educate people about the issue and the result was *Keep it Clean, Malibu* – a multi-

platform educational campaign designed to positively, proactively make people think about storm drains and what goes into them. The campaign contains five main elements:

1. A series of four Public Service Announcements starring a beautiful urban mermaid coming into contact with the pollutants we create on land.
2. A series of four storm drains painted by a local artist to draw attention to the drains and their connection to the ocean. A video highlighting the making of this artwork was also created.
3. An active social media campaign on Instagram primarily, but also Facebook and Twitter. Citizens are encouraged to get involved in celebrating the ASBS by posting pictures of the gorgeous marine life in the area.
4. Two special events designed to kick off the campaign and draw attention to the issue – a ribbon cutting ceremony for the storm drain art project and a red carpet premier for the video series, which was held on Earth Day.
5. Distribution of wearable collateral materials (bright blue hats and temporary tattoos) which prominently feature the "Keep it Clean, Malibu" slogan, in effect creating walking billboards of the message.

In addition to these five main elements, the City partnered with local organizations to promote the ASBS campaign messages at their special events and through their websites and social media. These partnerships range from water and energy utilities to schools to business and community groups. The special events included:

1. Pepperdine University Earth Day Fair
2. Earth Day Celebration hosted by Malibu Chamber of Commerce and Malibu Country Mart
3. Rhyming in the Universe Earth Day Celebration hosted by Team United and Malibu Ballet Performing Arts Society
4. Fiesta Malibu hosted by Juan Cabrillo Elementary School

The bright blue hats and temporary tattoos used to promote the *Keep It Clean, Malibu* message were received with enthusiasm. In order to receive a hat, citizens sign an ASBS Pledge to prevent polluted runoff and protect ocean water quality with their daily activities.

In addition, ASBS 24 coastline and inland areas that could be tributary to it were regularly patrolled by the CPS, who looked for dry-weather runoff and other pollution threats in the coastal and inland areas. County staff routinely coordinated with the CPS on reports of over-irrigation. When individual properties were identified as non-compliant with ASBS regulations, such as due to over-irrigation, they were mailed educational materials and a cease-and-desist letter. Each of these property owners were personally engaged to correct the issue by providing education on the potential impacts to the ASBS and tailoring solutions to the property.

Even though the grant-funded outreach project that included the CPS is complete, the City recently added a new position which will assume the outreach and inspections duties of the CPS. The *Keep It Clean, Malibu* campaign and relevant videos may be found at www.keepitcleanmalibu.com and ASBS education in general at www.malibucity.org/ASBS.

3.2.2 Operations and Maintenance Programs

O&M programs are in place to maintain infrastructure within the area draining to ASBS 24. O&M programs, including street and parking lot sweeping, catch basin cleaning, and trash management and recycling programs, have been implemented by the LACDPW and the City and are described in the following sections. A map of the different programs and their implementation areas is presented in Figure 3-3.

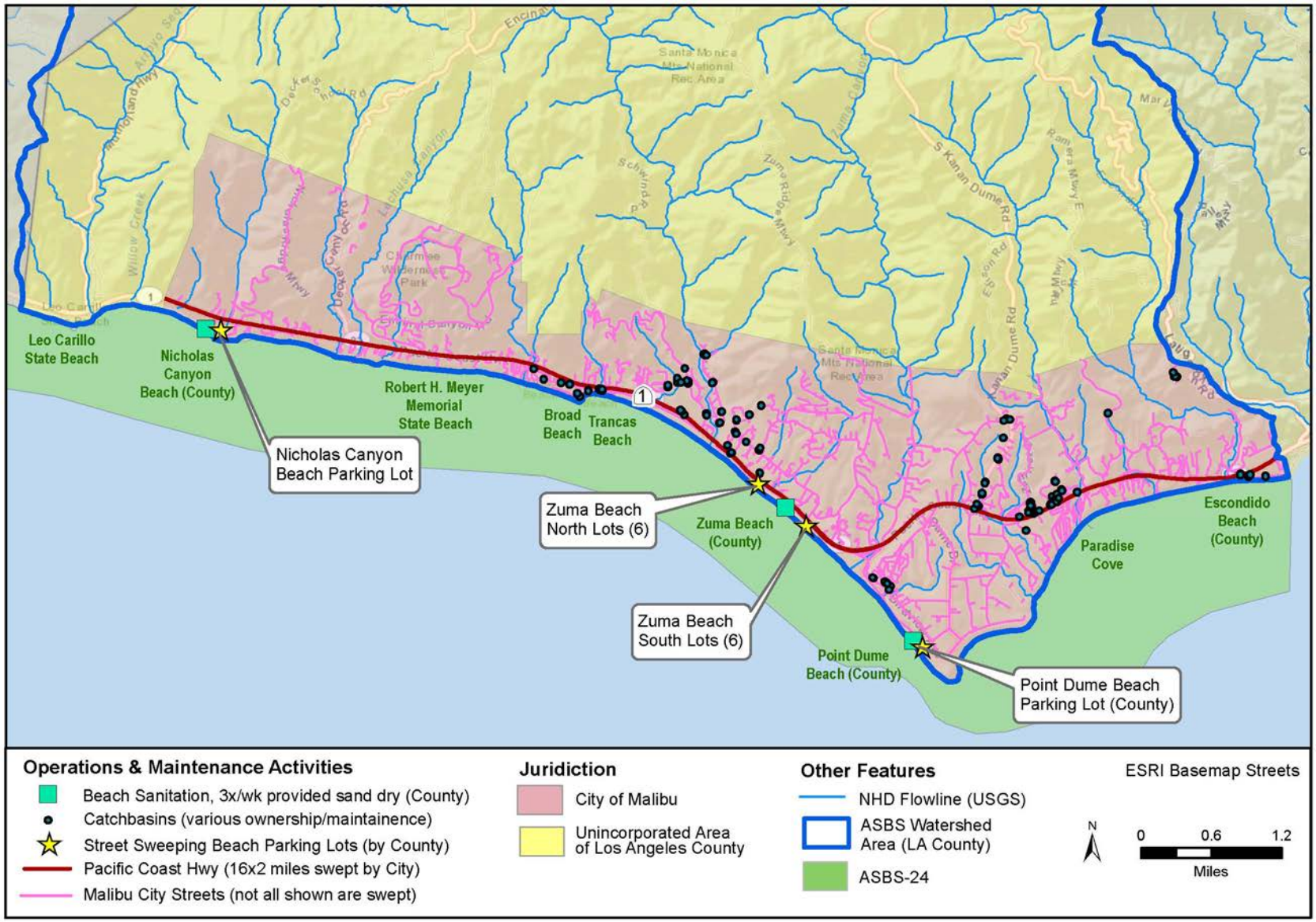

Figure 3-3. Locations of O&M Operations

3.2.2.1 Street and Parking Lot Sweeping

Studies have demonstrated that street sweeping is effective in reducing sediment, metals, and pesticide loading and, to a lesser extent, bacteria loading to the receiving water through physical removal of pollutants from paved surfaces (City of San Diego, 2010a, City of Portland, 2006). The County and City regularly maintain the roads, streets, and parking lots within the area draining to ASBS 24. The existing sweeping programs are presented on Table 3-1. Within the ASBS 24 drainage area, the County has jurisdiction over three beaches with County-maintained parking lots. All parking lots are swept on Saturday, Sunday, and Monday by a vacuum or regenerative air sweeper. The City shares a contract with California Department of Transportation (Caltrans) for sweeping PCH. The City's sweeping program was modified in 2013 to agree with Caltrans' statewide street sweeping policy, which requires use of mechanical sweeping equipment no more than once per week. The PCH is scheduled to be swept on Friday mornings (from 2:00 a.m. to 7:00 a.m.) to optimize sweeper access to the curb and gutter. City-maintained streets are swept monthly with a mechanical sweeper. The City maintains four regular sweeping schedules that are completed on the first, second, or third Monday or the third Wednesday of each month.

Table 3-1. Existing Street and Parking Lot Sweeping Programs within ASBS 24

Agency	Location	Technology	Frequency
Los Angeles County Dept. of Beaches & Harbors	Nicholas Canyon County Beach Parking Lot	Vacuum/ Regenerative Air	3 times/week
	Zuma Beach County Beach (12 Parking Lots)	Vacuum/ Regenerative Air	3 times/week
	Point Dume County Beach Parking Lot	Vacuum/ Regenerative Air	3 times/week
City of Malibu	Pacific Coast Highway	Mechanical	Once/week
	City-Maintained Streets	Mechanical	Once/month

3.2.2.2 Catch Basin Cleaning

The LACDPW and City implemented catch basin inspection and cleaning programs are designed to ensure that catch basins are: 1) properly marked with a "no dumping" message, most commonly applied with paint and stencil2) free of debris, and 3) in good condition. Catch basins are visually inspected by staff in the field and problem systems are flagged for maintenance. The routine inspection and cleaning/repair program is implemented in accordance with the priority assigned by each permittee to each system (i.e., catch basins consistently generating the highest volumes of trash and debris are Priority A; moderate volumes are Priority B; low volumes are Priority C). Priority A catch basins are cleaned four times a year, Priority B catch basins are cleaned twice a year, and Priority C catch basins are cleaned once a year. There are 121 catch basins within the ASBS 24 drainage area under the Parties' jurisdiction. A reported in the City of Malibu's 2011-2012 Annual Report, the material removed from the catch basins within the drainage areas to ASBS 24 mostly consists of "green waste that grows and thrives in the Southern California climate." There are 14 catch basins under the City's jurisdiction, which are classified as Priority B. There are 69 Priority B catch basins under the District's jurisdiction. The remaining 38 are under the County's jurisdiction (Road Maintenance Division) and are located in the upper portion of the watershed. These 38 catch basins are not part of the MS4 that drains to the ASBS and are classified as Priority C catch basins.

3.2.2.3 Waste Management & Recycling Programs

The County's and City's waste management programs include collection of waste and recyclables in public places such as bus stops, safe disposal of household hazardous waste; used oil collection/recycling events; waste management education; solid waste hauler permitting; Christmas tree recycling; brush clearance/green waste recycling events; bulky item collection; construction and demolition debris recycling; electronic and universal waste disposal; and an expanded polystyrene foam recycling program (i.e., Waste to Waves program). Education about recycling opportunities is provided through the PIPP discussed in Section 3.2.1.

The County's waste management program includes a regional beach sand "sanitation" program that is implemented at the three County Beaches located within ASBS 24. The beach sanitation program involves collecting beach debris in a screened hopper pulled by a tractor and properly disposing of the material. A rake system attached to the back of the tractor turns over the sand and allows solar radiation to "sanitize" the beach sand. Beach sand sanitation activities are implemented three times per week, provided that the beach sand is not wet. The implementation is scheduled during the morning hours to allow for maximal day-light exposure.

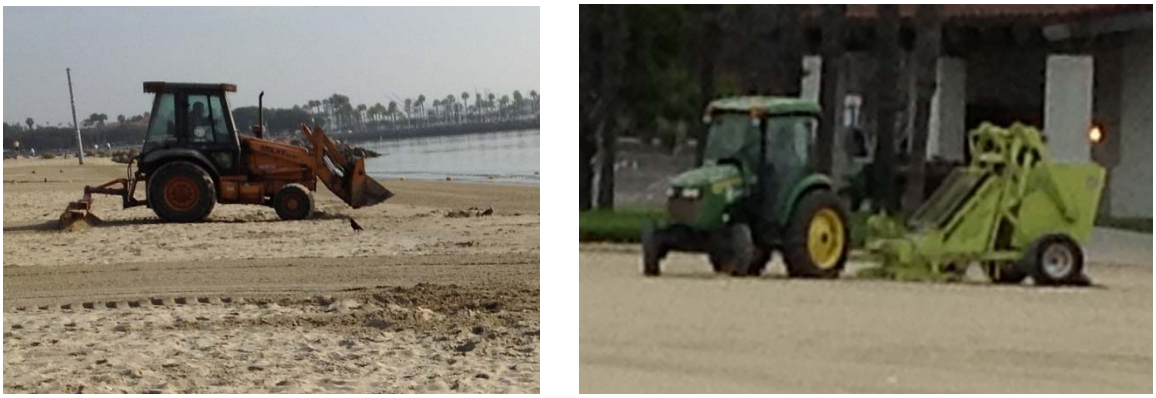

Figure 3-4. County Beach Sand Sanitation Program Equipment at Work

3.2.3 Enforcement Programs

Enforcement programs supporting environmental ordinances passed by the County and City are intended to eliminate non-authorized flows as defined in the General Exception; control illicit discharges; provide sediment and erosion control for construction sites'; verify National Pollutant Discharge Elimination System (NPDES) and ASBS compliance; and implement appropriate education and enforcement in response to runoff, trash, and other greening efforts. Existing enforcement programs within the area draining to ASBS 24 include the LACDPW and City illicit connection/illicit discharge (IC/ID) elimination programs, LACDPW and City construction programs, the City's commercial and industrial business inspection program (should an industrial facility begin operating; there are currently no industrial facilities in the City), and City enforcement of violations observed while implementing the Clean Bay Restaurant certificate program (discussed in further detail later in this document). IC/ID elimination programs are discussed in the following section, and construction programs, commercial and industrial business inspection programs, and the Clean Bay Restaurant certificate program are discussed as part of the Inspection Program Assessment in Section 3.3.1.

3.2.3.1 Illicit Connection/Illicit Discharge Elimination Programs

The IC/ID Programs implemented by the Parties are designed to eliminate pollution by illicit connections and discharges to the MS4 and ultimately the ocean receiving waters. The regional IC/ID Programs start with detection. The LACDPW staffs a 24-hour Pollution Prevention Hotline, which is shared with the District and available in English and Spanish. A Chinese hotline is also offered, which is available in Mandarin. Any IC/IDs reported to the hotlines are routed to the appropriate personnel for response, which may include ceasing, cleaning up, or diverting IC/ID flows before they reach the ocean receiving water. The City utilized the LACDPW's hotlines for public reporting of IC/IDs through June 2012, and then the City launched its own 24-hour Pollution Prevention Hotline. IC/IDs may also be detected by the Parties during desktop screening of the MS4. Permitted and suspected IC/IDs are stored in the Maintenance Management System database for the LACDPW and District and in an Access database for the City. Regional IC/ID investigation data collected by the Parties and reported in for the last 11 fiscal years, which run from July 1st of the previous calendar year through June 30th of the corresponding calendar year, are presented on Table 3-2.

The need for enforcement actions within the area draining to ASBS 24 is infrequent, with an overall decreasing pattern in the past 5 years. Recent dry weather monitoring of LACDPW outfalls has determined that no dry weather flows from these outfalls reach the ocean receiving water. Annually, there are relatively few IC/IDs within the City's jurisdiction and most of the IC/IDs tracked have been related to irrigation runoff. When individual properties are identified as non-compliant with ASBS regulations due to irrigation runoff, they are mailed a letter to "cease and desist" the observed discharge. The CPS then works with the property owners to help correct the runoff problem. The property owner must submit a report within 1 month detailing how the problem was fixed. The CPS may conduct additional site visits and continue monitoring the site, or other additional actions depending on the specific case. General letters, including Notices to Comply, are sent to high-priority neighborhoods and individuals identified, based on the CPS' field reconnaissance and historic data. Areas where discharges, if they were to occur, are more likely to impact the ASBS are deemed a high priority. The purpose is to inform and educate the public about ASBS discharge restrictions. A database with information on every case, including all communication and photos is maintained.

Table 3-2. 2011-2012 IC/ID Program Regional Data

Fiscal Year[1]	Total Reported/ Identified		Cleaned Up/ Terminated/ Discontinued		No Evidence Discharge		Conditionally Exempt/In Compliance		Enforcement or Other Action	
	IDs	ICs	IDs	ICs	IDs	ICs	IDs	ICs	IDs	ICs
County of Los Angeles (Source LACDPW, 2012)										
2002	18	2	18	2	0	-	0	0	0	0
2003	73	4	73	4	0	-	0	0	0	0
2004	11	0	11	0	0	-	0	0	0	0
2005	77	0	77	0	0	-	0	0	0	0
2006	65	0	65	0	0	-	0	0	0	0
2007	39	0	39	0	0	-	0	0	0	0
2008	219	1	219	1	7	-	0	0	0	1
2009	72	2	66	1	28	-	4	0	5	2
2010	34	2	34	1	3	-	0	0	0	2
2011	6	0	6	0	1	-	0	0	0	0
2012	2	0	1	0	1	-	0	0	0	0
Fiscal Year[1]	**Total Reported/ Identified**		**Cleaned Up/ Terminated/ Discontinued**		**No Evidence Discharge**		**Conditionally Exempt/In Compliance**		**Enforcement or Other Action**	
	IDs	**ICs**	**IDs**	**ICs**	**IDs**	**ICs**	**IDs**	**ICs**	**IDs**	**ICs**
Los Angeles County Flood Control District (Source: District, 2012)										
2002	495	494	154	48	5	-	3	398	1	0
2003	631	1,563	268	123	0	-	1	85	1	154
2004	265	1,375	166	145	44	-	4	89	0	68
2005	203	1,352	170	138	59	-	2	523	6	33
2006	204	1,079	184	84	37	-	0	819	11	31
2007	221	479	204	41	16	-	0	226	9	36
2008	223	775	216	33	7	-	0	426	11	218
2009	151	534	138	40	12	-	0	262	0	46
2010	88	409	59	67	29	-	0	219	0	68
2011	51	99	51	17	0	-	0	68	0	12
2012	87	170	87	50	14	-	0	95	0	9
Fiscal Year[1, 2]	**Total Reported/ Identified**		**Cleaned Up/ Terminated/ Discontinued**		**No Evidence Discharge**		**Conditionally Exempt/In Compliance**		**Enforcement or Other Action**	
	IDs	**ICs**	**IDs**	**ICs**	**IDs**	**ICs**	**IDs**	**ICs**	**IDs**	**ICs**
City of Malibu (Source: City, 2012)										
2002	6	0	5	0	1	-	0	0	0	0
2003	9	0	7	0	2	-	0	0	0	0
2004	5	0	5	0	0	-	0	0	0	0
2005	9	0	6	0	3	-	0	0	1	0
2006	25	0	11	0	13	-	1	0	11	0
2007	11	0	6	0	5	-	0	0	7	0
2008	41	3	25	1	6	-	5	0	20	3
2009	36	2	26	2	4	-	0	0	28	2
2010	36	1	16	1	13	-	3	0	18	1
2011	27	0	15	0	7	-	3	0	8	0
2012	17	0	8	0	2	-	6	0	5	0

Note 1: IC/ID data covers the entire jurisdictional areas of the County, District, and City.
Note 2: Due to the ASBS restrictions on non-storm water discharges, the City considers any discharge inland of ASBS to not be conditionally exempt regardless of the nature of the discharge (with the exception of the exemptions in the Special Protections for seeps and other such natural flows including footing drains).

3.2.4 Dry Weather Monitoring

3.2.4.1 City of Malibu ASBS Focused Outreach Program

As part of the City of Malibu ASBS Focused Outreach Program the ASBS 24 was regularly patrolled by the CPS who looked for dry-weather runoff and other pollution threats in the coastal and inland areas. The CPS was funded by a Proposition 84 grant that continued through July 2014. Even though the grant-funded outreach project that included the CPS is complete, the City recently added a new position which will assume the outreach and inspections duties previously performed by the CPS. When individual properties are identified as being out of compliance with the Special Provisions and City policies, such as through over-irrigation, they are mailed educational materials and a cease-and-desist letter (see Section 3.2.3.1). Each of these property owners were personally engaged to correct the issue by providing education on the potential impact to the ASBS and tailoring solutions (e.g., water conservation techniques, available rebate programs) to the property. There were eighty-three illicit discharge cases over the study period covered by the grant (November 2011 – March 2014) with a 96% success rate abating the runoff with "cease and desist discharge" letters followed by additional outreach, assistance, and sometimes site visits. Site visits were conducted at twenty-five properties to understand and mitigate runoff. Of the eighty-three cases over the project period, only three remain open. Two of the illicit discharge cases (2%) required assistance from code enforcement to gain compliance. Seventeen of the eighty-three properties were beachfront properties (20%), and only one illicit discharge from a low priority nonpoint source over the two and a half year project period actually reached the receiving water (1%). The patrol program coupled with outreach efforts to correct the observed issues is successful, but labor intensive.

3.2.4.2 County Dry Weather Outfall Inspections

County staff has been regularly performing inspections of outfalls along the ASBS to document the presence or absence of flow and where needed, take action to eliminate prohibited discharges. A summary of these outfall inspections for 2012 and 2013 is provided on Table 3-3 and Table 3-4, respectively. Of the inspected outfalls, only ASBS-002 had flows reaching the surf. Flow from this outfall was noted reaching the surf once out of the 13 times visited in 2012 and once out of the three times visited in 2013. In both cases these flows reaching the surf were observed in the first month that inspections occurred (January and February for 2012 and 2013, respectively). The suspected source of the flow was over-irrigation in 2012; outreach to residents has been performed as detailed Section 3.2.1. It is anticipated that this outreach effort has addressed the potential source of the non-storm water flows. In 2013 the suspected source of the flow was from a nearby construction site, and City staff visited that construction site to ensure that appropriated BMPs were in place to prevent future discharges. Inspections performed March and May of 2013 at ASBS-002 indicated that flow was not present. Several other outfalls were observed with flows or ponded water; however, due to the distance between the outfall and the surf zone, these minor flows did not reach the receiving water. Inspections will continue to ensure that discharges of non-storm, non-authorized runoff do not occur.

Table 3-3. 2012 Outfall Dry Weather Inspections Summary

Outfall	Beach	January, 2012			February, 2012			March, 2012			April, 2012			Source / Notes
		No. of Visits	No. of Flow	No. Flow to Surf	No. of Visits	No. of Flow	No. Flow to Surf	No. of Visits	No. of Flow	No. Flow to Surf	No. of Visits	No. of Flow	No. Flow to Surf	
ASBS-001	Broad Beach	1	1		4	2		4	2		3	1		Undetermined
ASBS-002	Broad Beach				6	3	1	4	2		3	1		Over irrigation
ASBS-003	Broad Beach	1			6			4			3			
ASBS-004	Zuma Beach	1			5	4		4	4		2	1		Over irrigation
ASBS-005	Zuma Beach	1			5			4			2			
ASBS-006	Zuma Beach				5	1		4			2			Undetermined low flow
ASBS-007	Zuma Beach				5	4		4	4		2	2		Hillside dewatering
ASBS-008	Zuma Beach													
ASBS-009	Zuma Beach				5			4			2			
ASBS-010	Zuma Beach													
ASBS-011	Zuma Beach				5	2		4	4		2	1		Hillside dewatering
ASBS-012	Zuma Beach													
ASBS-013	Zuma Beach													
ASBS-014	Zuma Beach													
ASBS-015	Zuma Beach													
ASBS-016	Zuma Beach													
ASBS-017	Zuma Beach													
ASBS-018	Zuma Beach													
ASBS-019	Zuma Beach													
ASBS-020	Zuma Beach													
ASBS-021	Westward Beach													
ASBS-022	Westward Beach													
ASBS-023	Westward Beach				2	1		3			2	1		Undetermined low flow
ASBS-024	Westward Beach													
ASBS-025	Escondido Beach													
ASBS-026	Escondido Beach													
ASBS-027	Escondido Beach	1	1		3	3		5	4		1	1		Hillside dewatering
ASBS-028	Escondido Beach													
ASBS-029	Escondido Beach				3	3		5	4		1	1		Hillside dewatering
ASBS-030	Escondido Beach				3	1		5			1			Sudsy water
ASBS-031	Nicholas Beach													

Table 3-4. 2013 Outfall Dry Weather Inspections Summary

Outfall	Beach	February, 2013			March, 2013			May, 2013			July, 2013			Source / Notes
		No. of Visits	No. of Flow	No. Flow to Surf	No. of Visits	No. of Flow	No. Flow to Surf	No. of Visits	No. of Flow	No. Flow to Surf	No. of Visits	No. of Flow	No. Flow to Surf	
ASBS-001	Broad Beach	1			1			1						
ASBS-002	Broad Beach	1	1	1	1			1						Construction site. Corrected.
ASBS-003	Broad Beach	1			1			1						
ASBS-004	Zuma Beach	1	1		1	1		1	1		1			Over irrigation
ASBS-005	Zuma Beach	1			1			1			1			
ASBS-006	Zuma Beach	1			1			1			1			
ASBS-007	Zuma Beach	1	1		1	1		1	1		1			Hillside dewatering
ASBS-008	Zuma Beach	1			1			1			1			
ASBS-009	Zuma Beach	1			1			1			1			
ASBS-010	Zuma Beach	1			1			1			1			
ASBS-011	Zuma Beach	1	1		1	1		1	1		1	1		Natural stream north of PCH
ASBS-012	Zuma Beach	1			1			1			1			
ASBS-013	Zuma Beach	1			1			1			1			
ASBS-014	Zuma Beach	1			1			1			1			
ASBS-015	Zuma Beach	1			1			1			1			
ASBS-016	Zuma Beach	1			1			1			1			
ASBS-017	Zuma Beach	1			1			1			1			
ASBS-018	Zuma Beach	1			1			1			1			
ASBS-019	Zuma Beach	1			1			1			1			
ASBS-020	Zuma Beach	1			1			1			1			
ASBS-021	Westward Beach	1			1			1			1			
ASBS-022	Westward Beach	1			1			1			1	1		Trickle of water drops observed
ASBS-023	Westward Beach	1			1			1			1			
ASBS-024	Westward Beach	1			1			1			1			
ASBS-025	Escondido Beach	1			1									
ASBS-026	Escondido Beach	1			1									
ASBS-027	Escondido Beach	1			1									
ASBS-028	Escondido Beach	1			1									
ASBS-029	Escondido Beach	1	1		1	1								Hillside dewatering
ASBS-030	Escondido Beach	1			1									
ASBS-031	Nicholas Beach	1			1			1			1			

3.3 Inspection Program Assessment

Section I.A.2.c of the General Exception states that for MS4s, the ASBS Compliance Plan requires the following minimum inspection frequencies:

1. Weekly during the rainy season for construction sites.
2. Monthly during rainy season for industrial facilities.
3. Twice during the rainy season for commercial facilities.

In addition, the General Exception states that storm water drain outfalls equal to or greater than 18 inches in diameter or width will be inspected once prior to the beginning of the rainy season and once during the rainy season, and maintained to remove trash and other anthropogenic debris (SWRCB, 2012b).

Section 3.3.1 outlines the Parties' existing inspection programs and Section 3.3.2 outlines the recommended inspection program enhancements that would meet the requirements of the General Exception.

3.3.1 Existing Inspection Programs

The following sections outline the Parties' inspection programs that are currently in place. Discussions of specific LACDPW, District, and City inspections, where available, are limited to those areas draining to ASBS 24.

3.3.1.1 Commercial and Industrial Inspection Programs

Existing inspection programs for commercial and industrial facilities (e.g., restaurants, retail gasoline outlets (RGOs), automotive service facilities, United States Environmental Protection Agency (EPA) Phase I facilities, landfills) were conducted in accordance with the requirements of the 2001 NPDES permit (Order No. 01-182) (LARWQCB, 2001). The Permit included requirements for tracking, inspecting, and ensuring compliance for those facilities that are critical sources of storm water pollutants. The 2012 NPDES permit (Order No. R4-2012-0175) inspection frequencies are unchanged from the 2001 Permit requirements, although the minimum interval between inspections is reduced from 12 months to 6 months. The 2012 Permit also includes the requirement that commercial and industrial facility operators be notified of BMP requirements applicable to their site at least once during the 5-year permit cycle.

Commercial facility inspections are required by the NPDES Permit at a minimum of twice during the 5-year permit cycle. In 2008, the City began inspecting food-service related commercial businesses annually, exceeding the permit requirements. For industrial facilities, one industrial facility inspection is required within the first 2 years of the 2012 Permit and a second inspection is only required if an industrial facility has not filed a No Exposure Certification with the SWRCB. The City inspects RGOs and auto service facilities at least every other year, exceeding the permit requirement. The 2012 Permit requires follow-up inspections to be completed within 4 weeks of an infraction, and a minimum of two follow-up inspections and two enforcement letters must be issued to demonstrate a permittee's good faith effort to encourage a business to comply with the NPDES requirements.

Overall, the General Exception requires more frequent inspections than the NPDES permits. Commercial facility inspections are required at a minimum of twice per year during the rainy season. Industrial facility inspections are required a minimum of monthly, also during the rainy season. A summary of the seasonal minimum inspection frequencies required by the two NPDES permits and the General Exception for commercial and industrial facilities are presented on Table 3-5.

Table 3-5. Minimum Inspection Frequencies for Commercial and Industrial Facilities

Inspection Program	Inspection Frequency Required in ASBS 24	Historic Inspection Frequency, NPDES Permit Order R4-2012-0175	Historic Inspection Frequency, NPDES Permit Order No. 01-182
Commercial	Twice/year (rainy season)	Twice/5-year permit cycle, with at least 6 months between inspections	Twice/5-year Permit cycle, with at least one year between inspections[3]
Industrial[1]	Monthly (rainy season)	Twice/5-year permit cycle, with at least 6 months between inspections[2]	

[1]Industrial inspections frequencies will be implemented, if applicable to the ASBS 24 watershed.
[2] First inspection is required within 2 years of permit effective date. Second inspection (with at least 6 months between) is required before permit expiration if a No Exposure Certification has not been filed. Second inspections will also be performed at a minimum of 25% of facilities with No Exposure Certifications.
[3] No second inspection required at Phase I Tier II facilities determined to have no risk of exposure of industrial activities to storm water.

3.3.1.2 County Industrial and Commercial Inspection Program

The land use under the LACDPW's jurisdiction within the area draining to ASBS 24 is primarily undeveloped open space. There are no industrial facilities or commercial facilities within the area draining to ASBS 24 that must comply with the inspection frequencies outlined in the General Exception.

3.3.1.3 District Industrial and Commercial Inspection Program

Aside from its own properties and facilities, the District has no planning, zoning, development, permitting, or other land use authority over industrial or commercial facilities within its service area. As such, the District has no qualifying industrial or commercial facilities within the area draining to ASBS 24 that must comply with the inspection frequencies outlined in the General Exception.

3.3.1.4 City Industrial/Commercial Facilities Inspection Program

The goals of the City's commercial and industrial (should an industrial facility begin operating; there are currently no industrial facilities in the City) inspection program include compliance verification, enforcement as needed, and education regarding storm water and runoff issues, recycling, and City environmental quality ordinances.

The City's commercial and industrial inspection program is overseen by Environmental Programs staff. During an inspection, educational materials that may be provided include surface cleaning techniques, waste management, waste minimization, and recycling options; storm water pollution prevention tips; and potential BMPs tailored to the inspected business. Businesses may

call City staff with any storm water- or inspection-related questions. City Environmental Programs staff also coordinates interdepartmentally with other City staff including the code enforcement officer ,Public Works and the Building Safety inspectors, who have been trained to watch for storm water BMP infractions and are authorized to issue correction notices in the field. Code Enforcement and the Environmental Programs staff work together to issue cease-and-desist letters if violations have not been corrected. Repeat offenses are subject to increased enforcement procedures and may be subject to Malibu's administrative citation ordinance, exposing the violator to civil penalties as well as traditional enforcement remedies.

The City conducts annual inspections of food-service commercial facilities and at least every other year on automotive related service facilities, going above and beyond the historic requirements of the NPDES Permit. There is not an extensive base of commercial businesses operating within the City. As reported in the 2011-2012 Annual Report (City, 2012), the City inspected 60 restaurants/food service-related businesses, three grocers,[1] six RGOs, and three automotive services[2] during the reporting year. Only a subset of these commercial businesses is located within the ASBS 24 watershed. Based on a review of available data, the area draining to ASBS 24 contains approximately 15 businesses that sell or serve food, three inns/motels/hotels, a couple of other stores, and one service station.

In conjunction with the annual commercial inspection program, the City implements the Clean Bay Restaurant Certification program of the Bay Foundation in partnership with several other agencies in the south Santa Monica Bay area specifically for food-service related businesses. Through the program, restaurants and other food management businesses are inspected and certified for proper handling of waste, managing wash water, and implementing environmental policies that protect the storm drain system and ultimately the ocean receiving waters. The program certifies businesses as either 100% compliant with all program criteria or as non-compliant and therefore not certified under the Clean Bay Restaurant program. The program's primary success stems from brand recognition. It is a benefit to the partner agencies to work together in a larger regional and more recognized certification program so they may share resources such as promotional items and marketing materials, the advantage of Bay Foundation staff helping to promote the program at special events, and a standardized protocol; in essence, taking advantage of strength in numbers. As popularity and name recognition increases, there is a greater incentive to be certified in the program and more businesses will want to participate and take the extra steps to ensure they maintain certification. If a participant is found to not meet criteria or have a violation during the year that they are certified, they are subject to a strict rescinding policy and may have the certification revoked until the next period. The City's 2011-2012 Annual Report indicated that 93% of relevant businesses under the City's jurisdiction were currently certified under the program (City, 2012).

The City has complied with requirements to conduct inspections of industrial facilities when applicable. Industrial land use is very limited within the City's jurisdiction; in the 2011-2012 Annual Report, only one facility had active coverage under the State Industrial Activities Storm

[1] During the 2012-2013 annual reporting year, the Hughes Market grocery closed for business. The business will be replaced with a new organic grocer.
[2] All four RGOs that formerly housed automotive bays no longer offer these services. Two of the automotive service facilities are primarily RGOs.

Water General Permit and was in the process of terminating coverage. This business is under new ownership and is now a hardware store. Additionally, this industrial facility was in the Malibu Creek Watershed, not in a watershed draining to ASBS 24.

The City is exploring protocols to more readily identify any new commercial and industrial facilities located within the area draining to ASBS 24 and ensure that inspections are implemented in accordance with the General Exception requirements. All current commercial facilities have been identified. There are no industrial facilities.

3.3.1.5 Construction Site Inspection Programs

In accordance with the Los Angeles County Municipal NPDES Permit, permittees are required to develop, implement, and enforce a construction program that prevents illicit construction-related discharges of pollutants into the MS4 and receiving waters; implements and maintains structural and nonstructural BMPs to reduce pollutants in storm water runoff from construction sites; reduces construction site discharges of pollutants to the MS4 to the maximum extent practicable; and prevents construction site discharges to the MS4 from causing or contributing to a violation of water quality standards.

Existing construction site inspection programs were implemented in accordance with the requirements of the 2001 NPDES permit. The Permit requires permittees to inspect all construction sites (1 acre and greater) a minimum of once during the wet season and requires implementation of BMPs such as inspection of graded areas during rain events to control erosion from slopes and channels. For all construction sites where a Storm Water Pollution Prevention Plan (SWPPP) is not adequately implemented, permittees are required to conduct a follow-up inspection within 2 weeks of the initial inspection. In addition, proof of a Waste Discharger Identification (WDID) number for filing a Notice of Intent (NOI) for coverage under the General Construction Storm Water Permit and certification that a SWPPP has been prepared is required prior to issuance of a grading permit. Permittees are also required to use a database or other effective system to track grading permits for construction sites totaling 5 acres or greater. In the case of violations, two follow-up inspections within 3 months and two enforcement letters must be issued to demonstrate a permittee's good faith effort to encourage a business to comply with the NPDES requirements.

The 2012 NPDES Permit outlines the new, more stringent requirements for construction site frequency that became effective on December 28, 2012. According to the 2012 NPDES Permit, construction sites with a minimum of 1 acre of soil disturbance must be inspected by permittees a minimum of three times (e.g., prior to land disturbance, during active construction, and at the conclusion of the project) and at least monthly during the rainy season. Additionally, sites that discharge to a water body listed on the Section 303(d) List as impaired for sediment or turbidity, or determined to be a "significant threat to water quality," will be inspected by permittees at least once every 2 weeks during the rainy season. All sites will be inspected prior to a forecasted storm event[3] and within 48 hours after a recorded storm event.[4] The 2012 NPDES Permit

[3] A forecast storm event is defined by the NPDES permit as two or more consecutive days with a greater than 50% chance of rainfall that has been predicted by the National Oceanic and Atmospheric Administration (NOAA). This definition is in agreement with the definition of a storm event in the Construction General Permit.

requires construction sites consisting of less than 1 acre of soil disturbance to be managed through the permittees' erosion and sediment control ordinances and building permit requirements. These smaller construction sites shall be inspected on an as-needed basis. The inspection requirements of the 2012 NPDES Permit are in addition to the visual inspection programs implemented by the construction contractor's Qualified SWPPP Practitioner in accordance with the requirements of the Construction General Permit.[5] Under the 2012 NPDES Permit, permittees are required to use an electronic system to inventory permits for all construction sites.

The General Exception requires more frequent inspections than the 2012 NPDES Permit in areas draining to ASBS 24. Construction sites, defined as sites with 1 acre or more of disturbance (SWRCB, 2010), must be inspected weekly during the rainy season. A summary of the seasonal minimum inspection frequencies required by the two NPDES permits and the General Exception are presented on Table 3-6.

Table 3-6. Minimum Inspection Frequencies for Construction Sites (1 Acre or Greater)

Inspection Program	Inspection Frequency Required in ASBS 24	Historic Inspection Frequency, NPDES Permit Order R4-2012-0175	Historic Inspection Frequency, NPDES Permit Order No. 01-182
Construction	Weekly (rainy season)	Three times (before, during, and following construction) and: Monthly (rainy season) or Once every two weeks (rainy season)*	Once/year, following rain event

*For construction sites tributary to a water body on the Section 303(d) List due to sediment or turbidity.

3.3.1.6 County Construction Site Inspection Program

The LACDPW Architectural Engineering, Construction, and Building and Safety Divisions, along with applicable County departments, are responsible for County construction inspections. The LACDPW's construction program requires all construction projects to develop and implement erosion and sediment control BMP plans prior to the start of construction (i.e., Wet Weather Erosion Control Plan [WWECP] for sites less than one acre of disturbed land, Local Storm Water Pollution Prevention Plan [LSWPPP] and a WWECP for sites greater than 1 acre of disturbed land). The LSWPPP must include year-round BMPs to control pollutants that originate from the construction site due to construction activities.

[4] A recorded storm event is defined in the NPDES permit as a ½-inch rain event. This definition is in agreement with the definition of a storm event in the Construction General Permit.

[5] In accordance with the Construction General Permit, non-storm water visual inspections are required weekly for Risk Level 1, 2, and 3 projects. These inspections are recorded quarterly and performed daily for LUP Type 1, 2, and 3 projects. Inspections are also required before forecasted storm events and within 48 hours of a recorded storm event.

In addition to filing an LSWPPP, for projects greater than 1 acre, the applicant must file a NOI per the State General Construction Storm Water Permit and obtain a WDID number from the State Water Resources Control Board (SWRCB, 2010). Prior to grading plan approvals, the LACDPW requires the applicant to submit copies of the NOI, WDID, and SWPPP. Projects are notified of any required changes to the SWPPP and BMPs prior to the start of the rainy season. Inspections occur thereafter, and also after each significant rainfall event. Post-construction structural BMPs are inspected annually as part of the permit renewal process. In the event that enforcement actions are taken, they occur in the order listed: warnings, stop-work notices, office meetings, notices of violation, referrals to the Regional Board, and fines or non-payment of general contractor's invoices until the violation is corrected.

The LACDPW has begun implementing new protocols to identify and track active construction sites located within the area draining to outfalls that discharge to the ASBS 24 in order to ensure that inspections are implemented in accordance with the General Exception schedule requirements, where applicable.

3.3.1.7 District Construction Site Inspection Program

Aside from its own properties and facilities, the District has no planning, zoning, development, permitting, or other land use authority over new developments or redevelopment projects, or development construction sites within its service area. Under the 2012 NPDES Permit, the District is subject to the minimum control measures of a Public Agency Activities Program, which differ from the minimum control measures imposed on other permittees. Only the Public Construction Activities Management Program, a component of the Public Agency Activities Program, could potentially be applicable to District facilities within the area draining to ASBS 24. When active construction sites under the jurisdiction of District are located within the area draining to ASBS 24, internal construction site inspections would be implemented in accordance with the existing inspection criteria defined by the LACDPW, as discussed in Section 3.3.1.6.

3.3.1.8 City Construction Site Inspection Program

Grading within the City is limited to single-lot development. The area of disturbance is restricted due to development constraints implemented by the City of Malibu Local Coastal Plan and the Municipal Code. The Development Construction Inspection Program is implemented by the Environmental Sustainability Department and the Public Works Department. Applicants are notified if an NOI for coverage under the State General Construction Storm Water Permit is required, and plans are not approved until proof of a WDID has been submitted.

The City's construction inspection program for all sediment-disturbing projects begins with a pre-grading meeting with the general contractor, deputy building official, and building safety inspector (occasionally the LACDPW inspector). At the pre-grading meeting, the SWPPP is reviewed and appropriate BMPs, including sediment and erosion controls, are discussed, and the implementation schedule is developed by construction phase. During the meeting, it is stressed to all contractors that the job site will be shut down until the required measures are in place if the contractor fails to comply. The SWPPP is discussed with the general contractor at commencement of building construction activities, with a reminder of the repercussions (i.e., tiered enforcement actions, up to and including site closure) of failing to comply. Project sites

are visited regularly during the grading phase. During the construction phase, the building inspector routinely conducts on-site inspections. The implementation and maintenance of the appropriate BMPs are checked at each inspection.

Violations are addressed immediately. All issues receive an Initial Notice of Violation/Warning and corrective actions are required with strict compliance deadlines (24 hours during rainy weather and up to 72 hours during non-critical times). Sites are then re-inspected to verify compliance and a stop-work order may be issued until compliance is verified (City, 2012).

In accordance the General Construction Permit construction projects of 1 acre or greater are inspected at least twice during the rainy season The City currently inspects all construction sites monthly, and higher risk construction sites before/during rain events as of the 2013-2014 winter. The City has begun implementing new protocols to identify and track active single-lot construction sites located within the area draining to outfalls that discharge to the ASBS 24 to ensure that construction site inspections are implemented weekly during the rainy season, in accordance with the General Exception requirements (summarized on Table 3-6).

3.3.1.9 Storm Drain Outfall Inspection and Cleaning Programs

Existing storm drain inspection programs were implemented in accordance with the requirements of the 2001 NPDES Permit . Each permittee was required to implement a Public Agency Activities Program to minimize storm water pollution impacts and to identify opportunities to reduce these impacts from areas of existing development. One of the activities covered under the Public Agency Activities Program is storm drain operation and maintenance, which includes visual monitoring of open-channels and other drainage structures for trash and debris at least annually; removal of trash and debris from open channels at least once annually prior to the wet season; elimination of the discharge of contaminants during MS4 maintenance; and proper disposal of debris and trash removed during storm drain maintenance. The storm drain inspection frequency was not modified in the 2012 NPDES Permit .

In addition to the annual inspection required by the NPDES Permits, the General Exception requires an additional inspection during the rainy season. A summary of the minimum inspection frequencies required by the two NPDES Permits and the General Exception is presented on Table 3-7.

Table 3-7. Minimum Inspection Frequencies for Storm Drain Outfalls

Inspection Program	Inspection Frequency Required in ASBS 24	Historic Inspection Frequency, NPDES Permit Order R4-2012-0175	Historic Inspection Frequency, NPDES Permit Order No. 01-182
MS4 outfalls	Once prior to rainy season; once during rainy season	Once/year, before the rainy season	Once/year, before the rainy season

3.3.1.10 County MS4 Outfall Inspection Program

Systems within the area draining to ASBS 24 that are at least 18 inches in diameter are generally located in the parking lots along County beaches. Beach sand frequently piles up in the outlet of these systems. These outfalls are cleared by DBH prior to the rainy season and catch basin systems are cleaned out in late summer or early fall, prior to the rainy season and again during

the rainy season, as part of the LACDPW's Road Maintenance Division annual drainage inspection program.

The LACDPW has begun implementing new protocols to identify applicable outfalls that discharge to ASBS 24 to ensure that inspections are implemented in accordance with the General Exception schedule requirements (i.e., in addition to prior to the rainy season, second inspection to be performed during the rainy season).

3.3.1.11 City MS4 Outfall Inspection and Cleaning Program

The City's Storm Drain/Culvert Facilities Maintenance program is in place for annual and post-storm inspection and cleaning of storm drain facilities. All storm drain inlets are cleaned annually, and priority storm drains are cleaned at a minimum of twice annually. This program ensures that litter, debris, and pollutants are removed to prevent them from getting into the local waterways and impacting beneficial uses. In collaboration with LACDPW, the City will be conducting similar protocols to identify outfalls that discharge to ASBS 24. In general, citywide outlets are inspected when accessible. No applicable ASBS outlets are owned by the City. A contract service provider conducts the culvert cleaning and maintenance work on behalf of the City.

3.3.2 Inspection Program Enhancements to Comply with ASBS Special Protection Requirements

As the Parties modify their inspection programs to comply with the requirements of the current 2012 NPDES Permit, the Parties will need to include enhanced protocols for inspection programs implemented for sites within the area draining to outfalls that discharge to the ASBS 24. The inspection program requirements of the 2012 NPDES Permit and the General Exception are presented in Section 3.3.1 and the details of the required program enhancements are discussed in the following sections.

3.3.2.1 County Inspection Program Enhancements

The recommended enhancements to the LACDPW's existing inspection program are presented on Table 3-8 and include:

- During the rainy season, increase the inspection frequency to once per week for construction sites (at least 1 acre) under the LACDPW's jurisdiction that are located within the applicable area draining to ASBS 24.
- Conduct inspection and cleaning of storm drain outfalls measuring at least 18 inches in diameter or width catch basins that are located within the area draining to ASBS 24 once prior to the rainy season and once during the rainy season, at a minimum.

Table 3-8. County Inspection Program Enhancements

Program	Enhancement	Frequency
Commercial	Not applicable	-
Industrial	Not applicable	-
Construction (at least 1 acre)	Increase inspection frequency	Once/week (rainy season)
Storm Drain Outfalls	Coordinate inspections with	Once/dry season (prior to rainy season)

	ASBS criteria	and once/rainy season/year

3.3.2.2 District Inspection Program Enhancements

The recommendations for the DPW's inspection program are presented on Table 3-9 and include the following:

- When the District's active construction sites (at least 1 acre) are located within the applicable area draining to ASBS 24, District will implement inspections once per week during the rainy season in accordance with Special Protections and during the dry season in accordance with the requirements of the 2012 NPDES Permit.
- Conduct inspection and cleaning of storm drain outfalls measuring at least 18 inches in diameter or width catch basins which are located within the area draining to ASBS 24 once prior to the rainy season and once during the rainy season, at a minimum.

Table 3-9. District Inspection Program Enhancements

Program	Enhancement	Frequency
Commercial	Not applicable	-
Industrial	Not applicable	-
Construction (at least 1 acre)	Increase inspection frequency	Once/week (rainy season)
Storm Drain Outfalls	Coordinate inspections with ASBS criteria	Once/dry season (prior to rainy season) and once/rainy season/year

3.3.2.3 City Inspection Program Enhancements

The recommended enhancements to the City's existing inspection program are presented on Table 3-10 and include the following:

- During the wet season, increase the inspection frequency for construction sites (at least 1 acre) within the City's jurisdiction that are located within the applicable area draining to ASBS 24 to once per week.
- The outfalls associated with City maintained inlets are located on private properties and considered private. The City does not own or maintain outfalls that discharge to ASBS 24. As such, no enhancements are currently proposed for the City to inspect and clean outfalls.

Table 3-10. City Inspection Program Enhancements

Program	Enhancement	Frequency
Commercial	Increase inspection frequency	Twice/year (rainy season)
Industrial	Currently not applicable based on existing land uses	-
Construction (at least 1 acre)	Increase inspection frequency	Once/week (rainy season)

4.0 RECEIVING WATER ASSESSMENT

A determination of whether there is currently an exceedance of the natural water quality of the ASBS is the first step in the process of assessing the potential pollutant load reductions targets required to enhance the water quality of the ASBS. Wet weather receiving water quality monitoring data results were evaluated in comparison to data for reference monitoring sites, in accordance with the flowchart provided as Attachment 1 to the General Exception, to determine if an exceedance of the natural water quality currently exists.

4.1 Determination of Compliance with Natural Water Quality

In 2008, a study was conducted as part of Bight 2008 to assess water quality in southern California ASBS (Schiff et al., 2011). The study was designed to evaluate the range of natural water quality near reference drainage locations and to compare water quality near ASBS discharges to these natural water quality conditions. Additional reference monitoring was performed under the Regional Monitoring Program. During the development of this draft Compliance Plan, compliance with natural water quality was determined by comparing receiving water data from wet weather monitoring recently conducted for ASBS 24 to the 85th percentile threshold of reference sample concentrations measured during Bight 2008 and Bight 2013.

Concentrations of pollutants in post-storm receiving water were compared to those in pre-storm receiving water and to the 85th percentile threshold of reference sample concentrations. When post-storm receiving water concentrations are greater than the 85th percentile threshold and are greater than pre-storm concentrations for two or more storm events, results from the next storm are analyzed. If post-storm receiving water concentrations are again greater than the 85th percentile threshold and pre-storm concentrations, the constituent(s) are classified as exceedances of natural water quality. Concentrations of TSS, ammonia, nitrate, total orthophosphate, and total metals were compared to the 85th percentile thresholds.

Wet weather monitoring was performed by LACDPW at two receiving water locations: 1) S01, located off Zuma Beach directly out from ASBS-016, a 60-inch storm drain; and 2) S02, located off Escondido Beach, directly out from ASBS-028, a 36-inch storm drain. Monitoring was conducted during storm events occurring on February 19 and March 8, 2013, and February 28, 2014. Wet weather flows from ASBS-016 only reached the ocean receiving water at S01 during the February 28, 2014, monitored event. The City performed monitoring at receiving water Site 24-BB-03R. For safety reasons, this site was only sampled during the February 28, 2014, event. Therefore, the assessment of compliance with natural water quality was primarily performed for receiving water station S02, which had samples collected during three wet weather events. Receiving water station S02 is associated with ASBS-028, which is a 36-inch outfall that drains a mixture of developed and vacant land. There are additional identified point source clustered west and east of this site with three (ASBS-025, ASBS-026, and ASBS-027) located to the west (within 0.25 miles) and two (ASBS-029 and ASBS-030) located to the east (within 0.1 miles). Therefore, receiving water station S02 is considered to be representative of the typical to worst case scenario of the potential impact that storm water runoff may have on the water quality within the ASBS. Figure 4-1 shows the locations of the receiving water stations monitored in support of the preparation of this Plan.

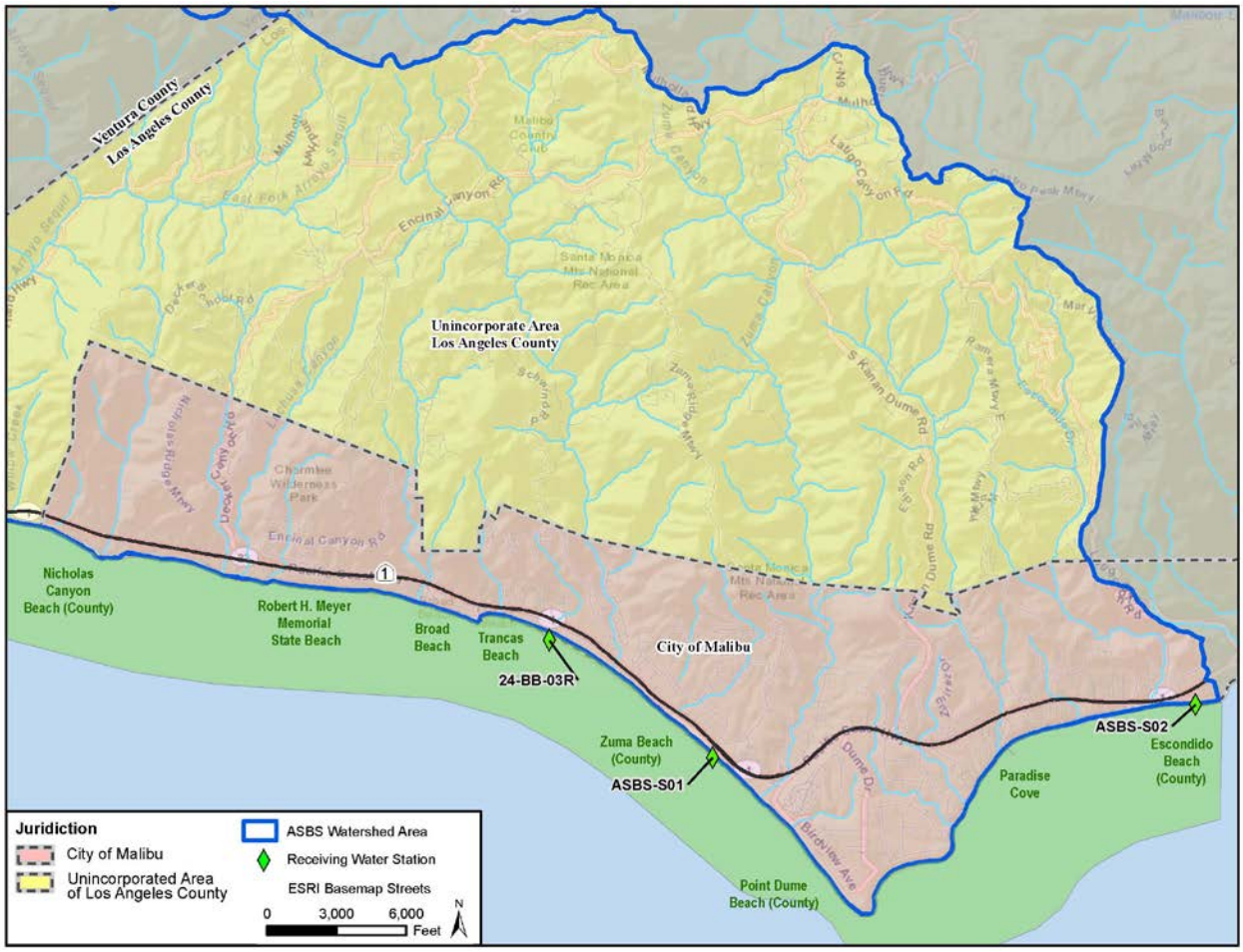

Figure 4-1. ASBS 24 Receiving Water Monitoring Locations

4.1.1 February 19, 2013, Storm Event Receiving Water Monitoring

The February 2013 storm event resulted in approximately 0.12 inches of rainfall based on rain gauge data obtained from County Fire Station 70 located at 3970 Carbon Canyon Road in Malibu, CA. Receiving water results were compared to the available list of constituents of reference site 85th percentile values. Post-storm concentrations of nitrate as nitrogen (N), selenium, total PAHs, and total pyrethroids were greater than the 85th percentile threshold (see Table 4-1). However, the nitrate as N post-storm concentration was less than the pre-storm concentration; therefore, the nitrate as N concentration is considered to be similar to background concentrations and is not classified as an exceedance. Since the selenium, total PAHs, and total pyrethroids concentrations were greater than the 85th percentile threshold and were greater than pre-storm concentrations, results from the proceeding storm event were analyzed to determine whether the natural water quality has been exceeded.

For constituents that are summed to get total values for comparison to 85th percentile total values (e.g., all OP pesticides, total PAHs, total pyrethroids), half of the method detection limits (MDL) were used for non-detect values. In the case of total pyrethroids for example, the reference sampling resulted in all non-detect values, and therefore the summation of the MDLs for the 10

selected pyrethroids is 6.75 µg/L. Following this process to determine total pyrethroids for the ASBS 24 receiving water stations results in an exceedance of 85th percentile threshold value anytime a pyrethroid included in the assessment has a measurable result (i.e., 85th percentile threshold in reality is zero). In actuality, the individual pyrethroid values may be less than half the MDL values (undetermined currently based on laboratory limitations) resulting in the possibility that the total pyrethroid value is less than the 85th percentile threshold. The same is true for both all OP pesticides and total PAHs assessments.

Table 4-1. February 2013 Receiving Water Results

Parameter	Units	85th Percentile of Reference Data	S01-PRE 2/18/2013	S02-PRE 2/18/2013	S02-POST 2/19/2013
General Chemistry					
Ammonia as N	mg/L	0.015	0.09	0.04J	<0.02
Nitrate as N	mg/L	0.374	0.51	0.38	0.25
Oil & Grease	mg/L	0.5	14.1	<1	<1
Total Orthophosphate as P	mg/L	0.114	0.02	0.02	0.03
Total Suspended Solids	mg/L	55.4	5.2	7.9	40.5
Total Metals					
Arsenic (As)	µg/L	`	1.718	1.471	1.393
Cadmium (Cd)	µg/L	0.16	0.0229	0.0601	0.058
Chromium (Cr)	µg/L	2.6	0.3192	0.5437	0.6366
Copper (Cu)	µg/L	1.9	0.149	0.321	0.454
Lead (Pb)	µg/L	0.72	0.0513	0.102	0.1867
Mercury (Hg)	µg/L	0.0006	<0.0012	<0.0012	<0.0012
Nickel (Ni)	µg/L	2.2	0.2724	0.509	0.7661
Selenium (Se)	µg/L	0.017	0.007J	0.015	0.031
Silver (Ag)	µg/L	0.08	0.03	0.01J	<0.01
Zinc (Zn)	µg/L	19	1.0376	1.2033	12.2809
Organophosphorus Pesticides					
*All OP Pesticides	ng/L	6	6	6	6
Polynuclear Aromatic Hydrocarbons					
*Total PAHs	ng/L	12.5	12.5	12.5	41.1
Pyrethroids					
Bifenthrin	ng/L		<0.5	<0.5	<0.5
Deltamethrin/Tralomethrin	ng/L		<0.5	<0.5	<0.5
Esfenvalerate	ng/L		1.1J	<0.5	0.8J
All Other Pyrethroids	ng/L		ND	ND	ND
*Total Pyrethroids	ng/L	6.75	8.6	6.75	7.3

< - result less than the MDL.
ND - results less than the MDLs (multiple MDL values)
J - Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.

Red outline – Post-storm receiving water concentration is greater than 85th percentile of Reference Data AND greater than pre-storm concentration.

*Totals calculated using result values when if detected and half the MDL when results were <MDL.

4.1.2 March 8, 2013, Storm Event Receiving Water Monitoring

The March 2013 storm event resulted in approximately 0.74 inches of rainfall based on rain gauge data obtained from County Fire Station 70. The selenium and total PAHs concentrations in the receiving water were again greater than both the 85th percentile threshold and pre-storm concentrations (see Table 4-2). As a result, the concentrations of both constituents are considered to be exceedances of natural water quality and may be contributing to alterations in natural ocean water quality within ASBS 24. In addition, concentrations of nitrate as N, copper, lead, mercury, zinc, and total PAHs were greater than both the 85th percentile threshold and pre-storm concentrations. Results from the subsequent monitored wet weather event (February 2014) were used to evaluate whether the listed constituents in storm water runoff were considered to be contributing to an exceedance of natural water quality.

The receiving water Site S02 results for the first monitored event (February 2013 event) included a concentration total pyrethroid that was greater than both the 85th percentile threshold and pre-storm concentrations (see Table 4-1). The February 2014 receiving water Site S02 concentration for total pyrethroid was not greater than both the 85th percentile threshold and pre-storm concentrations (see Table 4-2).

Table 4-2. March 2013 Receiving Water Results

Parameter	Units	85th Percentile of Reference Data	S01-PRE 3/6/2013	S02-PRE 3/6/2013	S02-POST 3/8/2013
General Chemistry					
Ammonia as N	mg/L	0.015	0.04J	0.03J	<0.02
Nitrate as N	mg/L	0.374	0.48	0.49	0.54
Oil & Grease	mg/L	0.5	<1	<1	<1
Total Orthophosphate as P	mg/L	0.114	0.03	0.03	0.06
Total Suspended Solids	mg/L	55.4	3.8	14.9	33.3
Total Metals					
Arsenic (As)	µg/L	1.72	1.558	1.563	1.577
Cadmium (Cd)	µg/L	0.16	0.0281	0.0587	0.1396
Chromium (Cr)	µg/L	2.6	0.2422	0.6549	2.5224
Copper (Cu)	µg/L	1.9	0.157	0.378	2.924
Lead (Pb)	µg/L	0.72	0.0288	0.1558	1.0434
Mercury (Hg)	µg/L	0.0006	<0.0012	<0.0012	0.0046J
Nickel (Ni)	µg/L	2.2	0.2849	0.625	1.8595
Selenium (Se)	µg/L	0.017	0.008J	0.017	0.052
Silver (Ag)	µg/L	0.08	<0.01	0.01J	<0.01
Zinc (Zn)	µg/L	19	2.6986	37.8762	54.1039
Organophosphorus Pesticides					
*All OP Pesticides	ng/L	6	6	6	6
Polynuclear Aromatic Hydrocarbons					
*Total PAHs	ng/L	12.5	12.5	12.5	25.5
Pyrethroids					
Bifenthrin	ng/L		<0.5	<0.5	8.4
Deltamethrin/Tralomethrin	ng/L		10.6	26.6	<0.5
Esfenvalerate	ng/L		<0.5	<0.5	<0.5
All Other Pyrethroids	ng/L		ND	ND	ND
*Total Pyrethroids	ng/L	6.75	19.85	35.85	17.65

< - result less than the MDL.
ND - results less than the MDLs (multiple MDL values)
J - Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.
Red outline – Post-storm receiving water concentration is greater than 85th percentile of Reference Data AND greater than pre-storm concentration.
Orange fill – Analyte concentration has exceeded 85th percentile of Reference Data during 1st and 2nd monitoring event.
*Totals calculated using result values if above the MDL and half the MDL when results were less than the MDL.

4.1.3 February 28, 2014, Storm Event Receiving Water Monitoring

The February 2014 storm event resulted in a total event rainfall of approximately 2.26 inches of rainfall based on rain gauge data obtained from County Fire Station 70. Pre- and post-storm samples were collected at Sites S01, S02, and 24-BB-03R.

The concentrations of total orthophosphate as P, TSS, mercury, selenium, silver, total PAHs, and total pyrethroids in receiving water at Site S02 were greater than both the 85th percentile threshold and pre-storm concentrations (see Table 4-3). Based on the results from the first and second monitored events in accordance with the General Exception, selenium and total PAHs are considered to be exceedances of natural water quality. The selenium and total PAHs results at Site S02 from the February 2014 event are consistent with those previous data. The mercury result being higher than both the 85th percentile threshold and pre-storm concentration for the second consecutive monitored event is considered to be exceedance of the natural water quality and may be contributing to alterations in natural ocean water quality within ASBS 24. Of the three storms monitored, the February 2014 events results for Site S02 are the only one where orthophosphate as P, TSS, or silver were above both the 85th percentile threshold and pre-storm concentrations. Therefore, the receiving water Site S02 measured concentrations of total orthophosphate as P, TSS, and silver being above both the 85th percentile threshold and pre-storm concentrations during one event are not considered to be exceedances of natural water quality.

The receiving water Site S02 results for the second monitored event (March 2013 event) included concentrations of nitrate as N, copper, lead and zinc that were greater than both the 85th percentile threshold and pre-storm concentrations (see Table 4-2). The February 2014 receiving water Site S02 concentrations for nitrate as N, copper, lead, and zinc were not greater than both the 85th percentile threshold and pre-storm concentrations (see Table 4-3), and therefore these constituents are not considered to be exceedances of the natural water quality.

Mercury, silver, zinc, and total PAHs concentrations in receiving water were greater than both the 85th percentile threshold and pre-storm concentrations for Site S01 (see Table 4-3). This monitored event was the only one of three in which flow from ASBS-016 reached the receiving water at Site S01, and thus, was the only time receiving water chemistry data were obtained at S01 as part of the General Exception monitoring. Based on first and second event results for Site S02, total PAHs is considered to be an exceedances of natural water quality. Based on second and third event results for Site S02, mercury is considered to be an exceedance of natural water quality. The receiving water Site S01 measured concentrations of silver and zinc being above both the 85th percentile threshold and pre-storm concentrations during one event is not considered to be an exceedance of natural water quality.

Pre-storm and post-storm samples were collected and analyzed at Site 24-BB-03R. For safety reasons, this site was not sampled previous to this event. The selenium concentration in the receiving water was greater than both the 85th percentile threshold and pre-storm concentrations for Site 24-BB-03R (see Table 4-3). The concentration of selenium being above the 85th percentile threshold and pre-storm concentrations is not considered an exceedance of natural water quality at Site 24-BB-03R. The selenium result at Site 24-BB-03R above the 85th percentile threshold and pre-storm concentrations are consist with the results for Site S02 where

selenium is considered to be an exceedance of natural water quality based on the first and second event results.

Table 4-3. February 2014 Receiving Water Results

Parameter	Units	85th Percentile of Reference Data	S01-PRE	S01-POST	S02-PRE	S02-POST	24-BB-03R-PRE	24-BB-03R-POST
			2/25/2014	2/28/2014	2/25/2014	2/28/2014	2/25/2014	2/28/2014
General Chemistry								
Ammonia as N	mg/L	0.015	<0.02	<0.02	<0.02	<0.02	ND	ND
Nitrate as N	mg/L	0.374	0.03J	0.02J	0.02J	<0.01	0.04	ND
Oil & Grease	mg/L	0.5	<1	<1	<1	<1	ND	ND
Total Orthophosphate as P	mg/L	0.114	0.02	0.02	0.02	0.18	0.02	0.02
Total Suspended Solids	mg/L	55.4	19.5	25.2	87.7	150	10.8	7.1
Total Metals								
Arsenic (As)	µg/L	1.72	1.472	1.283	6.604	4.122	1.388	1.322
Cadmium (Cd)	µg/L	0.16	0.0249	0.0228	0.5099	0.2623	0.0152	0.022
Chromium (Cr)	µg/L	2.6	1.1131	0.3893	26.0119	4.9578	1.4705	0.6962
Copper (Cu)	µg/L	1.9	0.676	0.221	6.001	2.289	0.167	0.646
Lead (Pb)	µg/L	0.72	0.2367	0.0584	7.265	1.5477	ND	0.2159
Mercury (Hg)	µg/L	0.0006	<0.0012J	0.014	<0.0012	0.0261	ND	ND
Nickel (Ni)	µg/L	2.2	0.8679	0.3565	21.5664	4.2441	0.2951	0.4901
Selenium (Se)	µg/L	0.017	0.016	0.011J	0.083	0.155	0.012	0.026
Silver (Ag)	µg/L	0.08	0.09	0.18	0.03	0.14	0.14	0.12
Zinc (Zn)	µg/L	19	5.3515	21.0509	41.7076	12.0229	2.9144	17.3532
Organophosphorus Pesticides								
*All OP Pesticides	ng/L	6	6	6	6	6	6	6
Polynuclear Aromatic Hydrocarbons								
*Total PAHs	ng/L	12.5	17.4	18.5	29.6	84.1	19.2	18.8
Pyrethroids								
Bifenthrin	ng/L		<0.5	<0.5	<0.5	2.5	<0.5	<0.5
Deltamethrin/Tralomethrin	ng/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Esfenvalerate	ng/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
All Other Pyrethroids	ng/L		ND	ND	ND	ND	ND	ND
*Total Pyrethroids	ng/L	6.75	6.75	6.75	6.75	9	6.75	6.75

< - result less than the MDL.
ND - results less than the MDLs (multiple MDL values)
J - Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.
Red outline – Post-storm receiving water concentration is greater than 85th percentile of Reference Data AND greater than pre-storm concentration.
Orange fill – Analyte concentration has exceeded 85th percentile of Reference Data during 1st and 2nd monitoring event.
*Totals calculated using result values if above the MDL and half the MDL when results were less than the MDL.

4.1.4 Receiving Water Monitoring Conclusions

In post-storm samples collected in the receiving water (Site S02), selenium and total PAHs concentrations were above the 85th percentile reference threshold and had post-storm concentrations that exceeded those of the pre-storm samples collected during three consecutive monitored storm events (February and March 2013 and February 2014)Mercury results at Site S02 were above 85th percentile reference threshold and pre-storm concentrations for two consecutive events (March 2013 and February 2014). Based on the guidance found in

Attachment 1 of the General Exception, this indicates an exceedance of natural water of the ASBS for these constituents.

Receiving water samples (Site S02) collected during the second monitored event had concentrations of nitrate as N, copper, lead, and zinc above the 85th percentile reference thresholds and were above the pre-storm concentrations. Based on Attachment 1 of the General Exception, if these constituents are above the 85th percentile reference thresholds in post-storm receiving water samples collected during the next monitoring event, then there would be an exceedance in the natural water quality of the ASBS for these additional constituents. February 2014 receiving water (Site S02) concentrations for nitrate as N, copper, lead, and nickel were not greater than both the 85th percentile threshold and pre-storm concentrations, and these constituents are not considered an exceedance of natural water quality.

Of the three storms monitored, the only event in which flow from ASBS-016 reached the receiving water at Site S01 was during the February 28, 2014, storm (third monitored event), and thus, was the only time receiving water chemistry data were obtained at S01 as part of the General Exception monitoring. Mercury, silver, zinc and total PAHs concentrations in receiving water were greater than both the 85th percentile threshold and pre-storm concentrations for Site S01. Based on the Site S02 results from the first and second events total PAHs is considered to be exceedance of natural water quality. Based on the Site S02 results from the second and third events mercury is considered to be exceedance of natural water quality. The receiving water Site S01 measured concentrations of silver and zinc being above both the 85th percentile thresholds and pre-storm concentrations during one event is not considered to be exceedances of natural water quality.

Pre-storm and post-storm samples were collected and analyzed at Site 24-BB-03R. For safety reasons, this site was not sampled previous to this event. The selenium concentration in receiving water was greater than both the 85th percentile threshold and pre-storm concentration for Site 24-BB-03R (see Table 4-3). The concentration of selenium being above the 85th percentile threshold and pre-storm concentrations is not considered an exceedance of natural water quality at Site 24-BB-03R. The selenium results at Site 24-BB-03R above the 85th percentile threshold and pre-storm concentrations are consistent with the results for Site S02 where selenium is considered to be an exceedance of natural water quality based on the first and second event results

4.2 Bight 2008 Data for ASBS 24

A review of Bight 2008 ASBS 24 data was conducted, and a summary of the review is provided for reference and for comparison to the determination made in this Compliance Plan. Bight 2008 constituent concentrations values were obtained from a series of graphs provided as an appendix to the Bight 2008 report and are approximate (tabular data not currently available). The Bight 2008 effort included collecting and analyzing both reference and discharge receiving water samples. The Bight 2008 report showed the comparison between the reference 85th percentile threshold values and discharge samples (Schiff et al., 2011).

4.2.1 Metals

For total chromium, the Bight 2008 85th percentile threshold of reference conditions was 1.6 µg/L (revised by Bight 2013 data to 2.6 µg/L). Of the five ASBS 24 post-storm samples assessed for total chromium during Bight 2008, four had concentrations below the threshold (ranging from approximately 0.5 to 1.0 µg/L) and one was above the threshold (approximately 3.4 µg/L)(Schiff et al., 2011).

For total copper, the Bight 2008 85th percentile threshold was 2.2 µg/L (revised by Bight 2013 data to 1.9 µg/L). Of the three ASBS 24 post-storm samples assessed for total copper during Bight 2008, two had concentrations below the threshold (approximately 0.4 and 0.5 µg/L) and one was slightly above the threshold (approximately 2.3 µg/L)(Schiff et al., 2011).

For total nickel, the Bight 2008 85th percentile threshold was 1.5 µg/L (revised by Bight 2013 data to 2.2 µg/L). For the three ASBS 24 post-storm samples assessed during Bight 2008, two had concentrations below the threshold (approximately 0.5 and 0.7 µg/L) and one was above the threshold (approximately 4.2 µg/L)(Schiff et al., 2011).

For total zinc, the Bight 2008 85th percentile threshold was 8.6 µg/L (revised by Bight 2013 data to 19 µg/L). Of the five ASBS 24 post-storm samples assessed for total zinc during Bight 2008, three had concentrations below the threshold (ranging from 0 to approximately 2.1 µg/L) and two were above the threshold (approximately 10.5 and 11.0 µg/L)(Schiff et al., 2011).

Samples collected as part of the Bight 2008 efforts were not analyzed for mercury or selenium, and thus no Bight 85th percentile thresholds were established for these constituents.

4.2.2 Total Suspended Solids

For TSS, the Bight 2008 85th percentile threshold was 16.5 mg/L(revised by Bight 2013 data to 55.4 µg/). Of the five ASBS 24 post-storm samples assessed for TSS during the Bight 2008, two had concentrations below the threshold (approximately 8.0 and 10.0 µg/L) and three were above the threshold (ranging from approximately 50 to 130 µg/L)(Schiff et al., 2011).

4.2.3 Total PAHs

For total PAHs, the Bight 2008 85th percentile threshold was 19.6 ng/L (revised by Bight 2013 data to 12.5 ng/L). Of the four ASBS 24 post-storm samples assessed for total PAHs during the Bight 2008, all four samples had concentrations below the threshold (approximately 0, 5, 8, and 11 ng/L)(Schiff et al., 2011).

4.2.4 Organophosphorus Pesticides and Pyrethroids

Samples collected as part of the Bight 2008 efforts were not analyzed for organophosphorus pesticides or pyrethroids, and thus no Bight 85th percentile thresholds were established for these constituents.

5.0 OUTFALL ASSESSMENT OF POLLUTANT LOAD REDUCTION TARGETS

An assessment of the potential pollutant load reductions targets was performed to determine the magnitude of controls required to be implemented in order to enhance the water quality of the ASBS. The first step in the assessment process was to evaluate wet weather receiving water quality monitoring data in comparison to data for reference monitoring sites, in accordance with the flowchart provided as Attachment 1 to the General Exception, to determine if an exceedance of the natural water quality currently exists (see Section 4.0). This evaluation determined that an exceedance of natural water exists for three constituents at receiving water Site S02 and discussed in more detail in Section 4.0. Water quality results from outfall monitoring were evaluated for the applicable constituent to identify discharge locations that have a potential to be contributing to the exceedance of natural water quality. More specifically, the assessment evaluated where BMPs may be required to achieve outfall design storm discharge concentrations, on average, by either: 1) end-of-pipe concentrations below the Table B Instantaneous Maximum Water Quality Objectives (WQOs) in Chapter II of the Ocean Plan, or 2) achieving a 90% reduction in pollutant loading during storm events for the responsible applicant's total discharge. The Ocean Plan was updated subsequent to the General Exception adoption. The updated Ocean Plan now refers to Table B as Table 1 (formerly Table B), and this Plan utilized the updated table title.

5.1 Outfall Wet Weather Monitoring Results

The General Exception states that the ASBS Compliance Plan shall describe how the necessary pollutant reductions in storm water runoff will be achieved through prioritization of outfalls and implementation of BMPs to reduce end-of-pipe pollutant concentrations during a design storm to below either the Table 1 Instantaneous Maximum WQOs in Chapter II of the Ocean Plan or a 90% reduction in pollutant loading during storm events for the applicant's total discharge. For the constituents that are currently in exceedance of the natural water quality of the ASBS (mercury, selenium, and total PAHs), this draft ASBS Compliance Plan evaluates outfall discharges in comparison to the Table 1 Instantaneous Maximum WQOs as the pollutant load targets in order to be in compliance with the General Exception.

Chemistry results obtained from outfalls to ASBS 24 during the February 2013, March 2013, and February 2014 storm events are presented on Table 5-1 through Table 5-3, respectively. Site ASBS-008 was not added to the monitoring list until after the February 19, 2013, storm event, so no data were collected during the first monitoring event. Site ASBS-008 was inadvertently not monitored during the third storm event. Sites ASBS-013, ASBS-016, and ASBS-031 did not flow during the February 19, 2013, storm event, and Sites ASBS-013 and ASBS-031 did not flow during the March 8, 2013, storm event. Site ASBS-031 did not flow during the February 2014 storm event. Outfalls that were less than 36 inches in diameter were evaluated for oil and grease and TSS only, while outfalls that were 36 inches or greater in diameter were evaluated for ammonia, nitrate, oil and grease, TSS, total orthophosphate, total metals, PAHs, organophosphorus pesticides, and pyrethroids. Table 5-1 through Table 5-3

Table 5-3 include both PAHs (based on 13 constituents listed in the Ocean Plan) and total PAHs (based on the 25 constituents analyzed by the laboratory based on guidance from the Bight 2013 Committee). These tables also list the more commonly detected individual pyrethroids as well as the total pyrethroids.

Table 5-1. February 2013 Outfall Chemistry Results

Parameter	Units	CA Ocean Plan	001	002	003	004	005	008	011	013	016[1]	018	021	022	023	024	025	026	027	028[2]	029	030	031
		Instantaneous Maximum	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013
General Chemistry																							
Ammonia as N	mg/L	6			1.47		1.12	Not sampled		Not sampled	Not sampled		0.78	1	0.68					0.64			Not sampled
Nitrate as N	mg/L				10.15		5.57						4.48	8.24	12.45					7.02			
Oil & Grease	mg/L		1.3	1.4	1.6	4	1.6		<1			<1	<1	1.9	2.3	6	3.7	7	3.1	<1	<1	30.9	
Total Orthophosphate as P	mg/L				0.53		0.6						0.22	0.35	0.63					0.28			
Total Suspended Solids	mg/L		270.7	53.8	584	284	186.5		1.8			75.5	22.5	38.7	63.2	453	90.5	870	218	16.3	133	61.3	
Total Metals																							
Arsenic (As)	µg/L	80			2.129		1.664	Not sampled		Not sampled	Not sampled		1.15	0.949	2.231					0.876			Not sampled
Cadmium (Cd)	µg/L	10			0.3074		0.3482						0.0953	0.1168	0.201					0.269			
Chromium (Cr)	µg/L	20			10.1209		7.9002						1.393	3.1286	3.2046					1.8548			
Copper (Cu)	µg/L	30			63.557		30.469						11.434	84.928	266.162					13.136			
Lead (Pb)	µg/L	20			13.9921		5.8034						1.317	4.3272	4.8762					2.0076			
Mercury (Hg)	µg/L	0.4			0.1611		0.0505						<0.0012	<0.0012	<0.0012					<0.0012			
Nickel (Ni)	µg/L	50			11.5741		10.4739						2.7542	3.1307	7.007					5.2478			
Selenium (Se)	µg/L	150			0.794		0.102						0.138	0.151	0.355					0.435			
Silver (Ag)	µg/L	7			<0.01		<0.01						<0.01	<0.01	<0.01					<0.01			
Zinc (Zn)	µg/L	200			141.3834		128.8537						60.3801	135.3146	269.0515					38.9739			
Organophosphorus Pesticides																							
*All OP Pesticides	ng/L				ND		ND	N.S.		N.S.	N.S.		ND	ND	2868.9					ND			N.S.
Polynuclear Aromatic Hydrocarbons																							
Fluoranthene	ng/L				59.2		122	Not Sampled		Not Sampled	Not Sampled		26.9	70.9	101.2					<1			Not Sampled
PAHs[3]	ng/L				102		208.4						42	103.7	255.6					<1			
Total PAHs[4]	ng/L				161.2		341.4						68.9	174.6	380.2					6.1			
Pyrethroids																							
Bifenthrin	ng/L				700.8		<0.5	Not Sampled		Not Sampled	Not Sampled		<0.5	320.9	1184.5					<0.5			Not Sampled
Deltamethrin/Tralomethrin	ng/L				<0.5		<0.5						<0.5	<0.5	<0.5					<0.5			
Esfenvalerate	ng/L				152.4		<0.5						<0.5	<0.5	<0.5					<0.5			
All Other Pyrethroids	ng/L				29.3		ND						ND	ND	344.4					ND			
*Total Pyethroids	ng/L				882.5		ND						ND	320.9	1528.9					ND			

< - results less than the method detection limit (MDL).
ND - results less than the MDLs (multiple results)
Green fill- concentration is greater than California Ocean Plan Imax criteria
Note 1 - Site associated with Receiving Water Station S01
Note 2 - Site associated with Receiving Water Station S02
Note 3 - PAHs based on constituents listed in Ocean Plan
Note 4 - Total PAHs based on constituents listed in Bight 2013 Work Plan.

Table 5-2. March 2013 Outfall Chemistry Results

Parameter	Units	CA Ocean Plan	001	002	003	004	005	008	011	013	016[1]	018	021	022	023	024	025	026	027	028[2]	029	030	031
		Instantaneous Maximum	3/8/2013	3/8/2013	3/8/2013	3/7/2013	3/7/2013	3/8/2013	3/7/2013	3/7/2013	3/8/2013	3/8/2013	3/8/2013	3/7/2013	3/8/2013	3/8/2013	3/8/2013	3/7/2013	3/7/2013	3/8/2013	3/7/2013	3/7/2013	3/7/2013
General Chemistry																							
Ammonia as N	mg/L	6			2.1		4.75			Not Sampled	4.8		0.57	1.32	0.66					7.8			Not Sampled
Nitrate as N	mg/L				3.78		3.51				10.2		3.24	4.84	5.15					5.29			
Oil & Grease	mg/L		221.1	<1	1.1	83.4	<1	<1	<1		<1	<1	<1	<1	1.3	1.2	1.5	4.8	1.7	6.7	<1	1.2	
Total Orthophosphate as P	mg/L				0.5		0.34				0.79		0.51	0.16	0.51					0.75			
Total Suspended Solids	mg/L		531	52.7	315.7	17.5	37.1	115.4	<0.5		782	58.1	64.1	10.7	33	63.6	64.3	660	17.9	616	29.7	32.4	
Total Metals																							
Arsenic (As)	µg/L	80			2.505		1.43			Not Sampled	3.738		2.13	2.257	2.158					7.287			Not Sampled
Cadmium (Cd)	µg/L	10			0.6881		0.0848				1.2527		0.5355	0.0901	0.0767					10.9524			
Chromium (Cr)	µg/L	20			23.8781		2.5783				39.2081		7.1327	1.9708	1.8344					32.3596			
Copper (Cu)	µg/L	30			41.556		27.149				33.872		20.484	35.044	116.98					198.495			
Lead (Pb)	µg/L	20			19.8277		1.7097				10.1402		3.9416	1.0592	3.6519					46.2982			
Mercury (Hg)	µg/L	0.4			0.0238		0.0158				0.0236		0.0148	0.007J	<0.0012					0.0596			
Nickel (Ni)	µg/L	50			22.3039		4.5323				47.8272		10.479	2.0729	3.4917					77.0818			
Selenium (Se)	µg/L	150			0.363		0.115				0.176		0.076J	0.521	0.151					1.004			
Silver (Ag)	µg/L	7			<0.01		0.06				<0.01		0.08	0.06	0.04					0.06			
Zinc (Zn)	µg/L	200			142.7101		104.6536				125.2092		88.1959	41.841	157.6642					800.687			
Organophosphorus Pesticides																							
*All OP Pesticides	ng/L				ND		ND			N.S.	ND		ND	ND	4128.6					ND			N.S.
Polynuclear Aromatic Hydrocarbons																							
Fluoranthene	ng/L				199.3		29.4			Not Sampled	70		51.8	9.8	83.8					476			Not Sampled
PAHs[3]	ng/L				665.2		53				231.3		131.8	18.5	251.4					1145.6			
Total PAHs[4]	ng/L				1036.2		101.4				340.2		205.2	31.3	473.9					1754.2			
Pyrethroids																							
Bifenthrin	ng/L				214		<0.5			Not Sampled	<0.5		<0.5	74.6	167.5					203.9			Not Sampled
Deltamethrin/Tralomethrin	ng/L				<0.5		50.3				<0.5		<0.5	<0.5	<0.5					<0.5			
Esfenvalerate	ng/L				<0.5		<0.5				<0.5		<0.5	<0.5	<0.5					<0.5			
All Other Pyrethroids	ng/L				ND		37.8				ND		ND	ND	268.6					ND			
*Total Pyethroids	ng/L				214		88.1				ND		ND	74.6	436.1					203.9			

< - results less than the method detection limit (MDL).
ND - results less than the MDLs (multiple results)
Green fill- concentration is greater than California Ocean Plan Imax criteria
Note 1 - Site associated with Receiving Water Station S01
Note 2 - Site associated with Receiving Water Station S02
Note 3 - PAHs based on constituents listed in Ocean Plan
Note 4 - Total PAHs based on constituents listed in Bight 2013 Work Plan.

Table 5-3. February 2014 Outfall Chemistry Results

Parameter	Units	CA Ocean Plan	001	002	003	004	005	008	011	013	016[1]	018	021	022	023	024	025	026	027	028[2]	029	030	031	24-BB-02Z	24-BB-03Z
		Instantaneous Maximum	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014
General Chemistry																									
Ammonia as N	mg/L	6			4.95		0.37	Not Sampled			0.68		0.43	1.51	<0.02					0.21			Not Sampled		0.47
Nitrate as N	mg/L				0.63		0.54				0.72		0.86	1.53	24.54					0.27					0.2
Oil & Grease	mg/L		<1	<1	2.5	<1	<1		<1	<1	<1	<1	<1	<1	<1	<1	<1	2.5	1.3	1J	<1	1.3		ND	ND
Total Orthophosphate as P	mg/L				1.08		0.2				0.86		0.83	0.84	0.94					0.27					0.34
Total Suspended Solids	mg/L		79.2	296	5095	593	497		70.4	119	803	55.3	148	7.9	4.8	27.5	18.2	103.2	78.8	40.3	1.9	42.6		82.8	393
Total Metals																									
Arsenic (As)	µg/L	80			9.083		1.792	Not Sampled			2.748		3.523	3.733	4.731					0.656			Not Sampled		2.598
Cadmium (Cd)	µg/L	10			3.8221		0.5467				1.4084		0.5483	0.1789	0.2771					0.1864					0.5776
Chromium (Cr)	µg/L	20			75.3533		20.632				23.607		5.9767	2.1554	1.7879					1.2621					22.7594
Copper (Cu)	µg/L	30			109.663		27.954				29.906		25.054	56.105	84.921					26.219					28.435
Lead (Pb)	µg/L	20			71.7821		6.1139				8.1312		5.7255	2.1098	0.5393					17.5522					16.3304
Mercury (Hg)	µg/L	0.4			<0.0012		<0.0012				<0.0012		<0.0012	<0.0012	<0.0012					<0.0012					<0.0012
Nickel (Ni)	µg/L	50			91.1114		25.8248				38.049		9.1185	4.7738	8.8064					2.9016					11.9473
Selenium (Se)	µg/L	150			0.331		0.221				0.226		0.319	1.22	5.101					0.334					0.099
Silver (Ag)	µg/L	7			0.17		0.08				0.1		0.07	0.21	0.06					0.01J					0.02
Zinc (Zn)	µg/L	200			454.8282		98.3671				151.1528		93.2702	97.0057	199.0364					87.6536					177.7661
Organophosphorus Pesticides																									
*All OP Pesticides	ng/L				ND		ND	N.S.			ND		ND	ND	ND					ND			N.S.		ND
Polynuclear Aromatic Hydrocarbons																									
Fluoranthene	ng/L				753.3		243	Not Sampled			92.6		105.8	14.2	612.6					204.7			Not Sampled		210.7
PAHs[3]	ng/L				7159.2		906.4				778		570.3	54.7	1982.1					812.2					1633.1
Total PAHs[4]	ng/L				9115.8		1341.8				1087.2		773.6	130.2	3195.6					1178.8					2187.2
Pyrethroids																									
Bifenthrin	ng/L				694.4		43.4	Not Sampled			5.4		80.3	16.9	188.7					1673.6			Not Sampled		31.6
Deltamethrin/Tralomethrin	ng/L				<0.5		<0.5				<0.5		<0.5	<0.5	<0.5					<0.5					<0.5
Esfenvalerate	ng/L				15.6		<0.5				<0.5		1.5J	0.6J	<0.5					<0.5					<0.5
All Other Pyrethroids	ng/L				3979.8		1.6				132.4		7.6	86.6	19.9					2.2					44.6
*Total Pyethroids	ng/L				4689.8		45				137.8		89.4	104.1	208.6					1675.8					76.2

< - results less than the method detection limit (MDL).
ND - results less than the MDLs (multiple results)
Green fill- concentration is greater than California Ocean Plan Imax criteria
Note 1 - Site associated with Receiving Water Station S01
Note 2 - Site associated with Receiving Water Station S02
Note 3 - PAHs based on constituents listed in Ocean Plan
Note 4 - Total PAHs based on constituents listed in Bight 2013 Work Plan.

The Ocean Plan Table 1 Instantaneous Maximum WQOs for mercury and selenium are 0.4 µg/L and 150 µg/L, respectively. Table 1 does not list Instantaneous Maximum WQOs for PAHs. This Plan focused on mercury and selenium in this assessment of pollutant load reduction targets. During the three monitored events the sampling results were all below these Ocean Plan Table 1 Instantaneous Maximum values. During the first storm monitored in 2013 (February 8, 2013), the highest measured values mercury and selenium were 0.16 µg/L and 0.79 µg/L, respectively, at ASBS-003. Outfall ASBS-028 had measured mercury and selenium concentrations of 0.06 µg/L and 1.0 µg/L, respectively, during the second monitored storm, which occurred in March 2013. During the third monitored storm, which occurred in February 2014, the measured selenium concentration at Outfall ASBS-023 was the highest value measured at 5.1 µg/L. All outfall samples collected and analyzed for mercury had results of non-detect during the third event. The summary of the highest measured values in comparison with the Ocean Plan Table 1 Instantaneous Maximum values as well as other Ocean Plan Table 1 limiting concentrations is provided on Table 5-4.

Table 5-4. Ocean Plan Comparison to Summary of Maximum Outfall Results

	Ocean Plan Table 1 Values (Receiving Water Mixing Zone)			Maximum Measured Value (in Outfall Prior to Mixing Zone)		
Parameter	6-Month Median	Daily Maximum	Instantaneous Maximum	February 2013, Event 1	March 2013, Event 2	February 2014, Event 3
Mercury	0.04	0.16	0.4	0.16	0.06	<0.0012
Selenium	15	60	150	0.79	1.0	5.1

The summary table of maximum outfall results values for mercury and selenium indicate that the pollutant loading storm water discharges from outfalls for these constituents is far below the Ocean Plan Table 1 Instantaneous Maximum values. The highest mercury value measured is equal to the Ocean Plan Table 1 Daily Maximum values. The highest selenium value measured is below the Ocean Plan Table 1 Instantaneous Maximum with over an order of magnitude difference between the two. The highest selenium value measured is also below the most limiting concentration of the Ocean Plan Table 1, which the 6-Month Median value. The measured values of mercury and selenium, besides those presented in the summary table above, were significantly less than the maximum measured.

Common major sources of mercury include scrap metal piles, deteriorating metal and paint, and airborne emissions from burning coal, oil or municipal waste (UWE, 1997). Selenium is a naturally occurring element that persists in soils and aquatic sediments and may be leached from sediments as a result of modifications in the natural hydrologic regime (LARWQCB, 2002).

5.2 Outfall Assessment Conclusions

Following the guidance found in the Special Protections an assessment of outfalls was performed to determine where structural controls may be required to achieve the specified pollutant loading limitations on point source discharges into ASBS 24. Preceding the outfall assessment was the receiving water assessment that indicated, also based on the guidance found in the Special Protections, that there are exceedances of natural water in the receiving water during wet weather events for mercury, selenium, and total PAHs where samples were available for this assessment. The outfall assessment included comparing the monitoring data for mercury and selenium to

Ocean Plan Table 1 Instantaneous Maximum limitations. The Ocean Plan Table 1 does not list Instantaneous Maximum values for the protection of marine aquatic life for total PAHs, it only lists 30-day Average concentration limits for the protection of human health. The results of the comparison indicate the discharges to the ASBS from point sources (outfalls) are currently achieving, and significantly below, the target levels. Therefore, based on available data and guidance documents, the outfalls being evaluated in this Plan under the Regional Monitoring Program are currently not considered priority outfalls, and in accordance with the Special Protections of the General Exception, additional controls (e.g., BMPs) to achieve pollutant load reductions are not required in the tributary drainage areas to the Parties' outfalls.

Based on the guidance presented within the Special Protections, the assessments performed in the preparation of this Compliance Plan indicated that additional structural BMPs are not required. However, the Parties recognize that the ABSB 24 is one of most valued resources in the region and that wherever possible, and feasible, additional reductions in pollutant loading should be achieved. Accordingly, proposed structural BMPs are currently in the construction phase for the areas of Broad Beach Road and Wildlife Road. Various existing nonstructural programs will continue to be implemented in order to maintain compliance with the requirements of the Special Protections and possibly achieve further reductions in pollutant loading. The Parties are considering implementing nonstructural controls and enhancements to existing controls for the purpose of further reducing pollutant loading to the ASBS.

6.0 CONTROL MEASURES

6.1 Enhanced Nonstructural Programs

Existing nonstructural PIPPs, O&M programs, and enforcement programs will continue to be implemented and maintained into the future to ensure ongoing protection of ASBS 24 and to meet the requirements of the ASBS Special Protections. This section describes enhancements to existing nonstructural programs intended to further promote load reductions and further improve and protect ASBS water quality. Proposed Potential program enhancements for feasibility consideration that will be evaluated and are presented in Appendix C and include the following:

- Infrastructure priority re-evaluation program.
- Enhanced, collaborative, environmentally friendly, alternative services program(s).
- ASBS education signage (County).
- Aggressive street sweeping (City).
- Street sweeping parking ordinances (City).
- Architectural copper and metal building material mitigation program(s) (City).
- Metal building material ordinances (City).

6.1.1.1 Infrastructure Priority Re-Evaluation Program

Currently, the County is in the design phase of retrofitting Unincorporated County areas catch basins in in North Santa Monica Bay from Arroyo Sequit on the northwest through Topanga Canyon on the southeast with full capture trash screens (this area includes the ASBS 24 drainage area). This activity includes a complete field inventory of all catch basins in the area. The Parties will enhance their existing annual cleaning programs for retrofitted catch basins.

If evaluation of future wet weather monitoring data indicates that additional nonstructural solutions are necessary to meet the Special Protection water quality criteria, the City and County will review and re-evaluate the existing inspection/cleaning priorities assigned to infrastructures located in the ASBS 24 drainage area. Agency-wide infrastructure inspection/cleaning programs (priorities and frequencies) are established using NPDES permit criteria and historic debris load data for each system. The receiving water or watershed of each system (e.g., catch basin, street, and parking lot) is not directly considered. Increased cleaning may be appropriate for ASBS 24 to enhance source control of gross pollutants (e.g., trash, debris, sediments) as well as associated pollutants, such as metals, organics, and nutrients. An infrastructure re-evaluation program may also provide benefits such as a streamlined, efficient, and effective implementation program for ASBS 24

6.1.1.2 Enhanced Collaborative Environmentally Friendly Alternative Services Program(s)

When implementing this type of program, the County and City will look for opportunities to enhance existing environmentally friendly alternative services and PIPPs currently provided by the Parties. Types of existing PIPPs that may be enhanced include the Clean Bay Restaurant Certification Program, the *Keep It Clean, Malibu* campaign, City of Malibu's Environmentally Preferable Purchases and Practices Policy (EPPP), Recycled Products Purchasing Policy (RCPP),

Restaurant Certification Program, and Los Angeles County's Rethink LA Program. The LACoMAX platform has been presented as an example of types of enhancements and synergies, which may be implemented depending on water quality needs and available funding.

Users have identified LACoMAX as “easy, fast and rewarding” and a “great resource for L.A. County” to exchange goods. To reach a larger audience, this program could be cross-referenced with similar programs such as the Malibu Green Room webpage, Craigslist-Los Angeles, and other regional websites. The platform currently provides six management regions for exchange, and the platform could be expanded to include ASBS- and TMDL-specific regions, along with educational information related to the benefits of the program and reduced impacts to the ASBS and receiving waters that may be caused by improper disposal of unwanted items. Partner webpages could provide links to other exchange programs and up-cycling venues (e.g., Goodwill, consignment, thrift stores, and swap meets). Additional enhancements to the platform may be identified by analyzing user data from the existing platform and/or requesting users to complete questionnaires.

6.1.1.3 ASBS Educational Signage

This program would involve the design and installation of educational placards along boardwalks and at parking lot entrances to the beaches. These placards, translated in both English and Spanish, will describe the unique resources of ASBS 24 and highlight features of interest specific to each beach. Additional educational messages related to source controls and pollution prevention measures will be determined based on wet weather data and targeted sources. This program could provide a direct nonstructural intervention to potential pollutant sources at County beaches, as well as influence behavior for local beachgoers who live in residential areas that discharge to ASBS 24.

6.1.1.4 Aggressive Street Sweeping

This program would involve enhancing the City’s existing street sweeping program. Aggressive street sweeping may include increased frequency of sweeping, use of enhanced sweeping technologies, or other sweeping solutions (USEPA, 2012a). The City may choose to implement a pilot study to determine the optimal sweeping program prior to full-scale implementation.

The City currently sweeps roads within its jurisdiction once each month and shares a contract with Caltrans to have PCH swept weekly. This program would involve increasing the frequency of sweeping on City streets located within the area draining to ASBS 24 to once per week. Increasing the sweeping frequency has been shown to increase the potential load reduction associated with metals, sediments, trash, and debris (City of San Diego, 2010a).

Vacuum and regenerative-air street sweeping technologies have been shown to be more effective than mechanical sweeping technologies at removing fine particulate matter, especially related to metals debris (City of San Diego, 2010a; City of Portland, 2006). As of 2013, the City uses motorized mechanical street sweeping equipment for all street sweeping activities. This proposed nonstructural program enhancement would apply to all City-maintained streets and would involve either: 1) replacing mechanical street sweepers with enhanced sweeping technologies during the standard end of the equipment life-cycle, or 2) requiring contractors responsible for local sweeping activities to only use enhanced sweeping technologies.

Because the City shares a street sweeping contract with Caltrans for sweeping the PCH it is subject to conditions of an agreement. At present, Caltrans' policy requires once-per-week sweeping using mechanical sweeping equipment. Historically, the City used enhanced sweeping technologies for streets within their jurisdiction, including the PCH. The City was requested by Caltrans to use mechanical sweepers due to their state-wide policy. Implementation of this recommended nonstructural program enhancement will require one of the following Caltrans policy changes: 1) a state-wide policy change, 2) local exemption to the state-wide policy, or 3) agreement to do additional sweeping beyond the state-wide policy requirement, using a vacuum or regenerative-air sweeper along the PCH in the ASBS 24 drainage area.

6.1.1.5 Street Sweeping Parking Ordinances

Mechanical sweeping technologies are most effective at removing trash, debris, and sediment from paved surfaces when the equipment travels along the curb and gutter (City of San Diego, 2010a; City of Portland, 2006). Under the existing City street sweeping program, residents and business owners have been requested to use off-street parking on scheduled street sweeping days whenever possible. Vehicles continue to park along the PCH and City streets during street sweeping days. The City currently does not have an ordinance restricting parking.

The City may consider implementing an ordinance prohibiting parking on City-maintained streets during regularly scheduled street sweeping activities. This programmatic enhancement would increase the potential load reduction associated with street sweeping activities independent of modifications to existing street sweeping equipment and sweeping frequency. Prior to implementation of a general parking ordinance, the City may need to conduct an education and outreach campaign and public opinion survey to identify the most effective street sweeping schedule and evaluate the public's appetite for program implementation. However, it is important to note that such an ordinance would be subject to scrutiny by the California Coastal Commission due to public beach access concerns, and is not likely to be feasible.

6.1.1.6 Architectural Copper and Metal Building Material Mitigation Program(s)

Metal building materials may appear to be a limited wet weather source, but in coastal areas buildings may be a year-round source of runoff and metals loading because the marine layer can create measurable runoff as water condenses on rooftops and buildings structures (City of San Diego, 2010b). Monitoring data of storm water wash-off from some metal building materials has been shown to be associated with elevated copper and zinc levels (Golding, 2008).

This program will investigate the feasibility of offering rebates for architectural copper and zinc mitigation measures applied to metal building structures. Potential mitigation measures may include: application of sacrificial paint (e.g., copper and zinc oxidation protection paints), downspout diversions, rain barrels, and cisterns. The rebate program could be modeled after the Cash for Grass and other water conservation incentive programs discussed in Section 3.2.1.2. Education materials could be incorporated into existing materials, such as the Surfrider OFG materials and ASBS materials, and online media, such as the Malibu Green Room and Clean LA websites.

6.1.1.7 Metal Building Material Ordinances

As discussed in Section 6.1.1.6, buildings with metal architectural features may be a year-round source of runoff and metals loading. Metal building material ordinances, including the architectural copper ban and zinc alternative building material ordinance, are proposed as a potential programs enhancement and are a true source control. It is generally recognized that implementation of any kind of metal building material ordinance will require significant education and outreach. Targeted audiences will include residents and businesses, and may also include architects and engineers who design and build structures within the ASBS 24 drainage area. A program such as this would first need to go through a feasibility review and also receive City Council approval.

Architectural Copper Ban

This City ordinance would prohibit use of architectural copper for all new developments and re-development projects for buildings and facilities located within the ASBS 24 watershed.

Zinc Alternative Building Material Ordinance

Galvanized zinc is frequently specified by agencies, including Caltrans, for outdoor installations due to material durability and lack of maintenance requirements. This City program would evaluate the feasibility of implementing a zinc building material policy that would eliminate, reduce, mitigate, or control the use of zinc building materials. Concurrent with the feasibility analysis, stakeholders would be engaged through public meetings. Based upon the findings of the feasibility analysis and stakeholder engagement process, a proposed zinc ordinance would be implemented.

6.2 Structural BMPs

The pollutant loading reduction assessment (Section 5.0) performed in preparation of this Plan indicated that structural BMPs are not required (pollutant loading is on average below the Ocean Plan Table B Instantaneous Maximum WQOs for the modeled design storm). However, the City is currently in the construction phase for roadway drainage improvements along Broad Beach Road and Wildlife Road. These projects will each install biofiltration BMP improvements and the Wildlife Road project only will also include infiltration improvements to capture and treat wet weather flows entering the associated catch basins. Additional information on these projects, including conceptual design and drainage analysis, is included in Appendix C.

6.3 Pollutant Load Reduction Quantification For Nonstructural Controls

This section demonstrates how existing nonstructural programs have contributed to compliance with the zero dry weather discharge criteria of the Special Protections. This section also discusses the quantifiable percent reductions that have been achieved and that will be achieved using enhanced nonstructural controls. The quantification of the effectiveness of nonstructural controls is a developing science. Although the effectiveness of most nonstructural controls is not well documented in available literature, data on recent studies (e.g., street sweeping and source studies) provide a basis for developing quantification estimates. It has also been recently documented (City of San Diego, 2010a; Brown et al., 2010; Pohl, 2010; Cac and Ogawa, 2010;

Krieger et al., 2010) that nonstructural controls that target operational and true source controls can provide far more cost-effective, long-term solutions than end-of-pipe treatment BMPs.

Nonstructural BMPs are designed to reduce the concentrations of constituents at the source prior to the generation of surface storm water runoff and therefore prior to runoff entering storm drains, reaching BMPs, and reaching the receiving water. Typical load reductions associated with the quantification of nonstructural programs is on the order of 25% (LARWQCB, 2005) (County of Los Angeles, 2012).

6.3.1 Load Reductions Associated with Nonstructural Solutions

The scope of the nonstructural program load reduction quantification is limited. Many nonstructural programs currently implemented within ASBS 24, such as the Parties' IC/ID and spill response programs, cannot be quantified and entered into a load reduction model because they are designed to control constituents at their source for a sporadic event. However, these programs do offer a water quality benefit, and various types of data are available and may be used to demonstrate changes in public behavior.

When targeted at the actual pollutant source, nonstructural solutions (e.g., operational source controls) have been shown in studies to be very effective at removing the source and therefore reducing concentrations/loads to below regulatory requirements. For example, the *Mission Bay Clean Beaches Initiative Bacterial Source Identification Study* found birds and over-irrigation to be two major sources of bacterial contamination (Weston, 2004). Monitoring conducted following a redesign of the irrigation system and relocation of an in-water raft popularly used by birds indicated that bacterial concentrations in the receiving waters were very low. During the study, there was one exceedance, and follow-up studies showed that the source of the exceedance was not associated with irrigation runoff or birds (Weston, 2006).

Furthermore, true source controls that replace or modify the constituent content of products that have been determined to impact water quality should be part of the nonstructural program. True source controls have been proven to be highly cost effective as in the case of the banning of the pesticide Diazinon, which has resulted in a clear reduction from well above to now below the water quality objective in the Chollas Creek watershed, which is under a TMDL for this contaminant (SDRWQCB, 2007). The recently approved legislation which requires reduction of copper in brake pads in California was achieved through the Brake Pad Partnership. The legislation was based on scientific data showing the impact of copper from brake pads on water quality in urban areas. This true source control approach will significantly reduce copper concentrations in most urbanized watersheds. In the urbanized Chollas Creek watershed (which is under a dissolved metals TMDL), it has been estimated that approximately 90% of the copper loading is from brake pad deposition (City of San Diego, 2009). It is anticipated that most of the copper load reduction necessary to meet the Chollas Creek TMDL will be achieved from the reduction of copper in brake pads, a true source control strategy.

As indicated in the Outfall Wet Weather Monitoring Results for 2013 and the Pollutant Load Reduction Targets, zinc and TSS are currently considered to be in exceedance of the natural water quality in ASBS 24. Nonstructural controls that include both operational and true source control measures to reduce zinc and TSS loading have therefore been emphasized.

6.3.2 Aggressive Street Sweeping

According to the EPA, street sweeping programs may reduce the need for other structural storm water BMPs and may prove more cost effective than structural BMPs, especially in more urbanized areas (USEPA, 2012a). Aggressive street sweeping can be highly effective in reducing wet weather metals loading (City of San Diego, 2010a; Seattle Public Utilities, 2009; City of Portland, 2006) and, to a lesser extent, bacteria (Skinner et al., 2010), while continuing to address trash, debris, and sediment pollution.

The County has implemented an aggressive street sweeping program at County Beach parking lots (i.e., sweeping three to four times per week with enhanced sweeping equipment). Given that these parking lots experience a reduced traffic load compared to the PCH and City streets and have an aggressive sweeping schedule and program, the County's existing parking lot sweeping program is considered to be appropriate for protecting ASBS 24 water quality (i.e., program at a high level where adding enhancements may provide diminishing returns).

The City currently implements a two-part street sweeping program, including weekly mechanical sweeping along PCH and monthly mechanical sweeping along City-maintained streets. Sections 6.1.1.4 and 6.1.1.5 discuss potential enhancements to the City's existing sweeping program, including modifications to the sweeping schedule, sweeping equipment, and City parking policies. The pollutant load reductions associated with these enhanced sweeping program options are discussed in Appendix A. Program implementation may be limited by cost, especially once enhanced sweeping programs have reached a point of diminishing returns (USEPA, 2012a).

6.3.3 Commercial Programs

Commercial land use represents a very small portion of the ASBS 24 watershed, and the City's existing commercial inspection and outreach programs have been effective at preventing discharges from these facilities. Restaurants and grocers represent the predominant commercial business within this drainage area and existing programs have ensured compliance with the zero dry weather runoff criteria of the Special Protections by eliminating outdoor washing activities and promoting pollution prevention measures. As of February 2013, 51 of the 63 qualifying restaurants and food management businesses within the City's entire jurisdiction (e.g., 81% overall participation) were re-certified as being 100% compliant with all Clean Bay Restaurant Certificate Program criteria, which includes zero dry weather discharge off-site. It is important to note that the program also includes criteria that are not related to water quality. For instance, if a business is not implementing a recycling program, they would not be eligible for certification. Therefore, the percentage of businesses protecting water quality is likely to be higher than the overall participation rate. Ongoing implementation of this program will continue to ensure continue compliance with the zero dry weather runoff criteria of the Special Protections.

The City's existing commercial programs also provide wet weather water quality benefits. For example, waste management and spill prevention programs eliminate or control outdoor trash, metals, grease, and bacteria sources, which may be washed into the MS4 during storm events. Elimination of outdoor washing activities, especially near landscaped areas, can also control erosion and sediment disturbance. To date, the existing commercial inspection and outreach programs implemented by the City have potentially resulted in a 1% to 4% pollutant load reduction and have been incorporated into the initial assessment of wet weather load. Additional

future load reductions may be achieved as participation in the Clean Bay Restaurant Certificate Program grows towards 100% participation and as synergies between PIPP programs are identified and incorporated into Enhanced Collaborative Environmentally Friendly Alternative Services Program(s).

6.3.4 Outreach, Water Conservation, and Irrigation Management Programs

Nationally, lawn care accounts for 32% of the total residential outdoor water use (USEPA, 2013) and over-irrigation is a common source of runoff. While irrigation runoff is a freshwater source and does not represent a pollutant unto itself, irrigation-related dry weather flows have the potential to erode landscaping and mobilize pollutants. Even when irrigation water does not reach the MS4, pollutant mobilization to impervious surfaces can create a non-point source of pollution during wet weather.

Use of water-saving devices (e.g., irrigation controllers, sprinkler heads) conserve water and prevent over-irrigation. The former LIEP and Water Saving Devices Rebates Programs educational literature provide an estimated water savings of 13,500 gallons per location converted per year. Use of drought-tolerant plants and landscaping in place of grass provides additional water savings and further reduces the likelihood of over-irrigation. The water conservation and over-irrigation reduction programs that the County and the City administer and provide educational support for in the ASBS 24 drainage area have helped control over-irrigation runoff and achieve compliance with the zero dry weather discharge criteria of the Special Protections. These programs have also helped reduce pollutant mobilization and creation of non-point sources on impervious surfaces. As participation in the rebate program grows, there is potential for an additional 1% to 2% wet weather pollutant load reduction through this indirect source control program.

OFGs and CA Friendly Landscapes are structural BMPs that infiltrate runoff and bio-remediate pollutants, effectively disconnecting both dry weather and the first flush of storm water runoff from the receiving water. The City has two demonstration landscapes that can be used as examples to the community: one at Legacy Park and one at Bluffs Park. The City recognizes three residential OFGs, one of which is located within ASBS 24 at Point Dume. Promotion of local OFGs contributes to their implementation by residents, educational institutions, and businesses. Ongoing implementation of this program and the resulting net increase in OFG implementation will likely translate to an additional 1% to 2% wet weather pollutant load reduction.

The City provides education and outreach on water-saving incentive programs and OFGs, and responds to irrigation-related IC/IDs. The City's new 24-hour Pollution Prevention Hotline has received fewer than 10 calls to date, or on average less than one per month. (The Clean LA hotline, which is shared with the District, fielded 34,064 calls during the fiscal year covered under the 2011-2012 Annual Report [LACDPW, 2012].) Most of the IC/ID field investigations have been due to over-irrigation and were resolved within a month through collaboration between the CPS and the property owner. Additionally, as of September 5, 2014, the City has launched new online water wasting report form in response to the historic drought conditions. This reporting form will make it more efficient for the community to notify and the City to respond to incidents of runoff due to over-irrigation among other water wasting activities. Ongoing implementation of the ASBS Focused Outreach Program will continue to increase

participation in rebate programs and OFG and CA Friendly Landscape implementation, contributing to the wet weather load reductions previously discussed.

6.3.5 Metal Building Material Management Program

Recent studies have shown that architectural copper and galvanized steel building materials can elevate the metals concentrations measured in storm water runoff from 10 to 100 times greater than concentrations measured for non-metal building materials (City of San Diego, 2009; Chang et al., 2004; Davis et al., 2001). Zinc in storm water runoff measured directly from galvanized metal surfaces is typically very high, between 1,000 and 15,000 µg/L (Golding, 2008).

An aggressive outreach and incentive program may encourage targeted audiences to proactively modify infrastructure (e.g., install OFGs and rain barrels to capture runoff, replace with non-metal materials, diversion of air conditioning condensate away from metal infrastructure) and behaviors (e.g., proactive housekeeping, apply and maintain sacrificial coatings). In the ASBS, a phase-out and full ban of copper and zinc building materials represents a true source control measure that could significantly reduce metals loading to ASBS 24. In Palo Alto, CA, a similar metal building material ordinance for copper plumbing fixtures was implemented in response to a copper TMDL (City of Palo Alto, 2011). Institutional controls and regulatory change also represent an important step toward laying the foundation for inspections, if determined to be appropriate.

A Simple Method model was prepared to estimate the load reductions from implementing this program. To complete the model, several assumptions related to a typical watershed were made and include the following:

- An urban watershed composed of 50% residential, 40% open space, and 10% transportation.
- Of runoff from these land uses, 25% have elevated concentrations of copper resulting from building materials (e.g., copper rain gutters).
- Incentive program would be utilized by 20% of the residential land use area.
- Where the incentive program is utilized, copper concentration reductions in storm water would be in the range of 40% to 80%.

Based on these assumptions, metal building material management programs could result in a 6% to 12% pollutant load reduction. For more information on the load reduction calculations, see Appendix D.

7.0 ASSESSMENT OF ANTHROPOGENIC SEDIMENTATION POTENTIAL

In accordance with the requirements of the General Exemption, the natural habitat conditions in the ASBS shall not be altered as a result of anthropogenic sedimentation (SWRCB, 2012b). An assessment of the potential areas prone to anthropogenic sedimentation was performed as part of this Compliance Plan for the purpose of identifying areas where sediment control BMPs may be required. The general assessment process included first performing a desktop analysis of geological conditions, topography, land use, and aerial imagery for the applicable area. Next, a reconnaissance of the area was performed to verify desktop findings and further analyze the drainage areas. Finally, the desktop and reconnaissance data collected were then compiled into this Plan, which details the assessment methodologies, results, and conclusions.

7.1 Sedimentation Definitions

Basic definitions relating to sedimentation and the coverage/applicability of the sedimentation identification assessment are provided below. These terms are relevant to the entire sedimentation assessment. Additional terms, applicable to specific subsections, are defined within the applicable subsection, as needed.

Erosion
"The process by which soil particles are detached and transported by the actions of wind, water, or gravity." (SWRCB, 2010).

Sediment
"Solid particulate matter, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level." (SWRCB, 2010).

Sedimentation
"Process of deposition of suspended matter carried by water, wastewater, or other liquids, by gravity. It is usually accomplished by reducing the velocity of the liquid below the point at which it can transport the suspended material." (SWRCB, 2010).

Anthropogenic Sedimentation
For the purposes of this assessment, anthropogenic sedimentation is defined as sedimentation resulting from mankind activities in the past or present. Stated differently, anthropogenic sedimentation is any sedimentation that would not be present in nature in the absence of mankind and mankind improvements (i.e., past and present absence of mankind).

Compliance Plan Anthropogenic Sedimentation Assessment Area
In accordance with the General Exception, the Compliance Plan focuses on the assessment of point source discharges, including pollutants, and the potential controls to reduce pollutant loading from these point sources. Therefore, the Compliance Plan assessment of areas prone to anthropogenic sedimentation was limited to the tributary drainages areas associated with the point source outfalls detailed in Section 2.6 of the Compliance Plan. Figure 7-1 shows the Parties' identified outfalls and drainage areas (catchment areas).

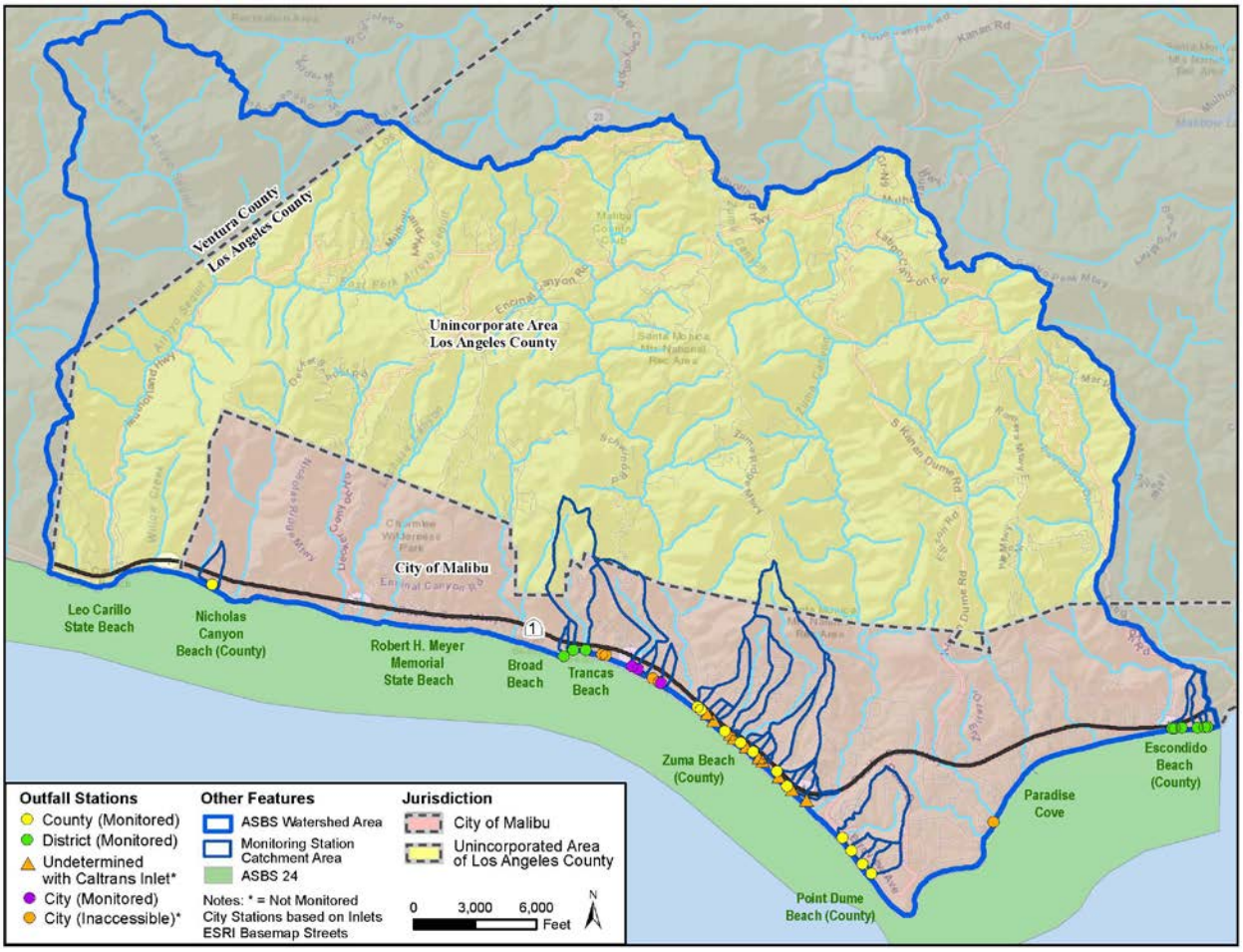

Figure 7-1. ASBS 24 Identified Outfall Catchment Areas

7.2 Desktop Analysis

A desktop analysis was performed evaluating the geology, topography, land use, and general surface condition (e.g., vegetation cover) in order to identify potential areas prone to erosion within the drainage areas tributary to the Parties' outfalls. The collection of area geological data included conducting literature reviews of five references applicable to the region ([City, 1995], [NPS, 1997], [Yerkes and Campbell, 1979],[SWRCB, 1979], and [SWRCB, 2012c]). County of Los Angeles Department of Transportation staff were interviewed regarding roadway maintenance activities and the frequency of sediment removal performed in the area. Sediment risk data for the area, obtained from the General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Actives (Construction General Permit) (SWRCB, 2010), were evaluated to determine the general sediment risk for disturbed areas. GIS data relating to topography, land use, and aerial imagery were analyzed to evaluated surface gradients and vegetative coverage types in the area.

7.2.1 ASBS 24 Assessment Area Geology

As detailed in Section 2.6, the Compliance Plan identified 38 outfall point sources along the ASBS 24 coast within the Parties' jurisdiction. The drainage area for the northerly most outfall,

located near Nicholas Canyon State Beach (ASBS-031), consists primarily of Santa Monica Mountain (Topanga Formations) with Trancas Formation along the shoreline. The drainage areas for the outfalls along the west half of Broad Beach (ASBS-001, -002, and -003) consist primarily of the Santa Monica Mountains (Topanga, Santa Susana/Coal Canyon, and Llajas Formations) with small areas of Trancas Formation along the coastline. The outfalls along the east half of Broad Beach and the northeast half of Zuma Beach (BB-001 through BB-003 and ASBS-004 through ASBS-016) have drainage areas that consist of varying percentages of Modelo Formation along the coast and Santa Monica Mountains (Topanga, Santa Susana/Coal Canyon, and Llajas Formations; Conejo Volcanics; and Diabase Intrusions). The outfalls located along the southeast half of Zuma Beach and Point Dume Beach (Westward Beach) (ASBS-017 through ASBS-024) have drainage areas within the Monterey/Modelo Formation. The drainage areas of the six outfalls located along Escondido consist of Santa Monica Mountain and small areas of Modelo Formation along the coast. Figure 7-2 and Figure 7-3 show the geological features and drainage areas of the Parties' outfalls identified in this Plan (NPS, 2007).

Map symbols used along the coastal area were defined using the National Geologic Map Database. Pleistocene marine terrace deposits along the shoreline include the Trancas and Monterey Formations. The symbols used to depict general costal geologic features in Figure 7-2 through Figure 7-3 included the following:

- Qa – Alluvial gravel, sand, and clay of flood plains.
- Qaf – Artificial cut and fill.
- Qao – Older dissected alluvial gravel, sand, and clay; on coastal area deposited in part on a wave-cut platform, forms several terraces.
- Qg – Gravel and sand of major stream channels.
- Qls – Landslide debris.
- Qos – Old dune sand at Point Dume.
- Qs – Beach Sand.
- Tr – Trancas Formation composed of marine sandstone, mudstone, silty shale, and claystone.
- Tmt – Modelo/Monterey Formation composed of marine clay shale and laminated to platy siltstone with sandstone.

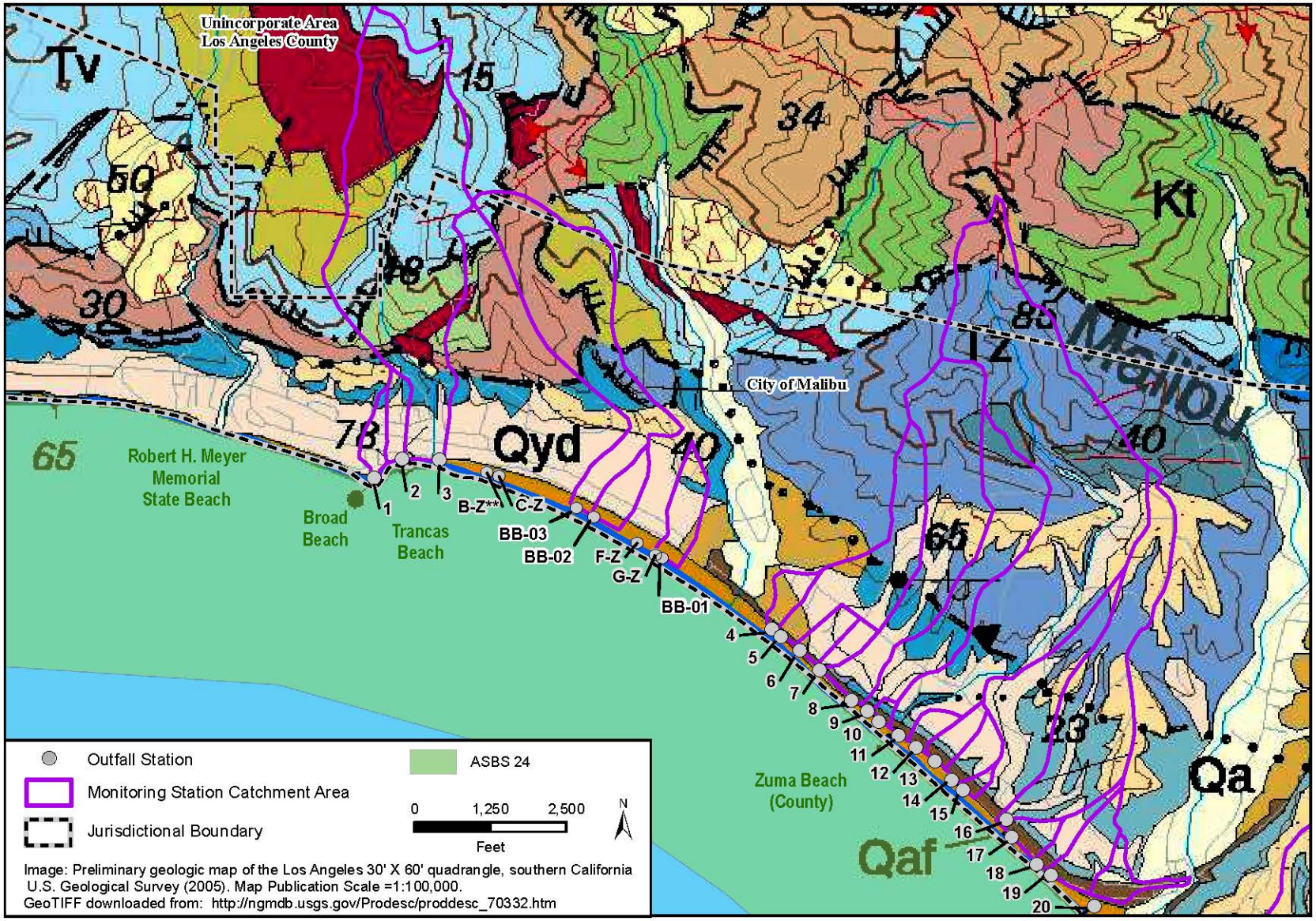

Figure 7-2. Geology of Outfall Drainage Areas, Broad Beach, and Zuma Beach

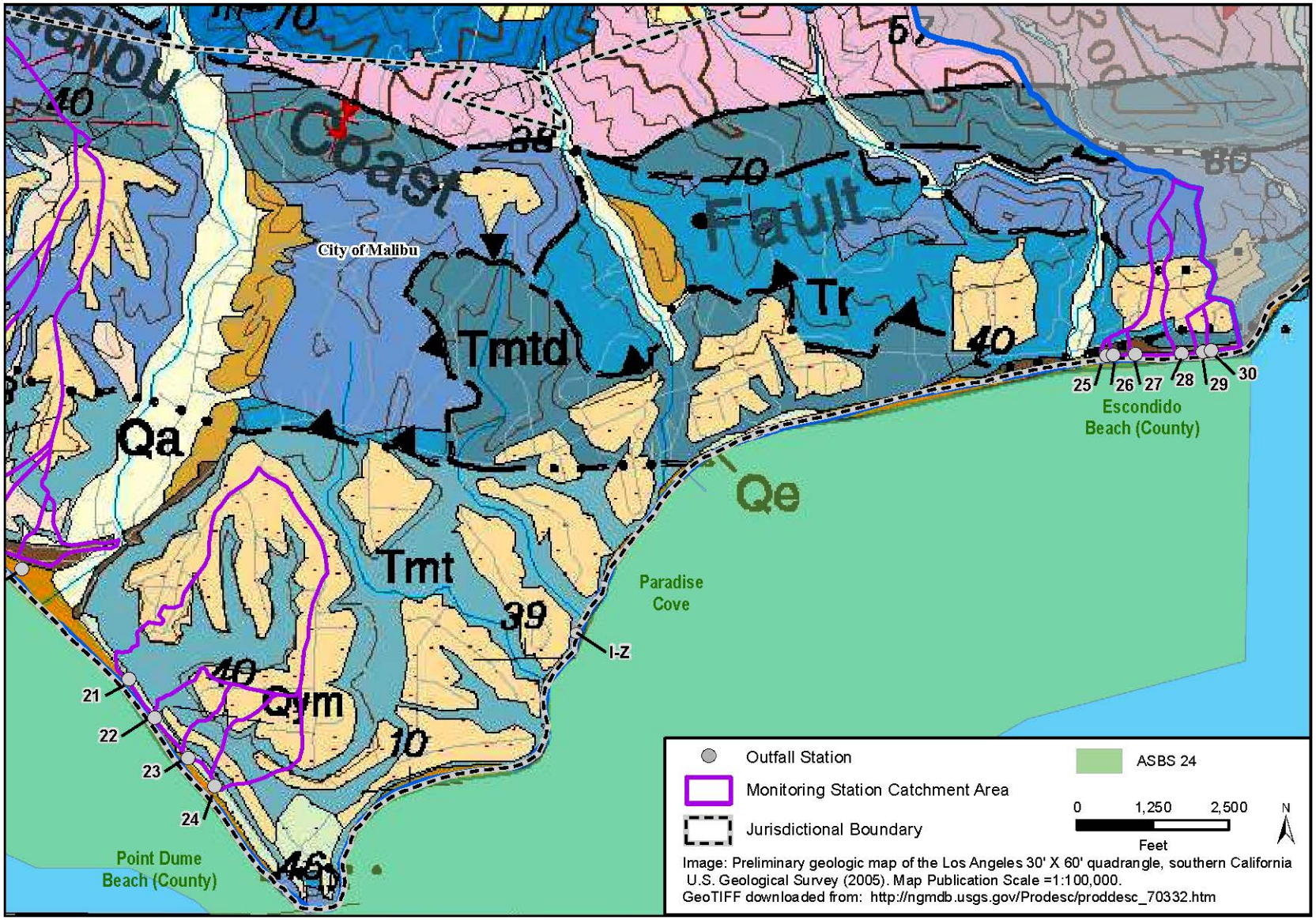

Figure 7-3. Geology of Outfall Drainage Areas, Point Dume Beach to Escondido Beach

7.2.2 Assessment Area Land Use

In general, land use within the drainage area tributary to the Parties' identified outfalls that discharge to ASBS 24 consists of various categories of residential and vacant land with relatively small amounts of commercial, transportation, and specialized (e.g., school, water storage) land uses. Table 7-1 summarizes the jurisdictional land uses for each catchment area.

Table 7-1. Outfall Drainage Area Land Use Summary

Land Use Designation	Catchment Outfall Designation													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
City														
Horse Ranches													0.8	2.0
Nurseries		3.4	1.5											
Duplexes, Triplexes, and 2- or 3-Unit Condos and Townhouses (THs)														
Low-Rise Apartments, Condos, and THs	0.2		3.7											
High-Density, Single-Family Residential	2.7	1.3	0.3	2.9					0.3		0.4			
Low-Density, Single-Family Residential	1.2	0.3	1.5	2.5	8.7	2.0	4.9	14.3	10.1		18.9	2.5	1.6	2.5
Rural Residential, High-Density	1.9	2.0	36.3	1.6	36.0	4.9	0.8	45.3	55.2	0.7	110.2	2.5	2.2	5.2
Rural Residential, Low-Density			18.4											
Trailer Parks and Mobile Home Courts, High-Density														
Retail Centers (Non-strip)														
Senior High Schools											14.5		0.3	
Transportation Rights-of-Way (ROWs)	0.6	0.4	0.9	1.3	4.7		0.1	4.3	2.7		8.9		0.2	0.1
Transportation ROWs – Pacific Coast Highway (PCH)	0.9	0.7	1.5	0.7	1.0	1.1	0.4	1.9	0.5	0.6	0.9	0.8	1.1	1.0
Vacant Undifferentiated	2.1	2.6	52.0		9.7	1.2	1.4	19.0	9.4		11.4		2.4	
Water Storage Facilities					0.5			1.1			0.8			
Undeveloped Reg. Parks and Rec. (U.S. Government)					4.1			27.2			86.3			
City Subtotal	**9.6**	**10.7**	**116.1**	**9**	**64.7**	**9.2**	**7.6**	**113.1**	**78.2**	**1.3**	**252.3**	**5.8**	**8.6**	**10.8**
County														
Beaches (Vacant)		0.1	0.3											
Beach Parks				0.7	1.1	1	0.3	1.6	0.4	1.1	1.4	1.3	1.7	1.4
Rural Residential, Low-Density														
Transportation ROWs														
Vacant Undifferentiated			95.8								2.8			
Vacant Undifferentiated (U.S. Government)			41.3								47.0			
County Subtotal	**-**	**0.1**	**137.4**	**0.7**	**1.1**	**1**	**0.3**	**1.6**	**0.4**	**1.1**	**51.2**	**1.3**	**1.7**	**1.4**
Total	**9.6**	**10.8**	**253.5**	**9.7**	**65.8**	**10.2**	**7.9**	**114.7**	**78.6**	**2.4**	**303.5**	**7.1**	**10.3**	**12.2**

Table 7-1. Outfall Drainage Area Land Use Summary (Continued)

Land Use Designation	Catchment Outfall Designation													
	15	16	17	18	19	20	21	22	23	24	25	26	27	28
City														
Horse Ranches														
Nurseries														2.9
Duplexes, Triplexes, and 2- or 3-Unit Condos and THs							3.3		0.2	1.7			0.5	1.0
Low-Rise Apartments, Condos, and THs							6.1							0.0
High-Density, Single-Family Residential		0.5							0.1		0.2	0.4	1.5	0.7
Low-Density, Single-Family Residential		14.5	0.4	2.2	4.4		19.7	5.4	4.8	6.7	0.1	0.3	2.7	1.4
Rural Residential, High-Density	1.2	26.5	2.8	4.7	7.9	3.7	86.2	8.4	9.2	22.2			9.0	13.1
Rural Residential, Low-Density														
Trailer Parks and Mobile Home Courts, High-Density							38.8							
Retail Centers (Non-Strip)						0.1	0.7							
Senior High Schools		38.2												
Transportation ROWs		8.1		0.3	0.5		4.4	1.8	1.1	1.8			0.5	
Transportation ROWs - PCH	0.6	0.5	1.7	0.7	1.7	3.1					0.6	0.7	1.9	5.0
Vacant Undifferentiated		24.1	1.4	1.3	3.7	2.5	4.6	1.8	1.8	1.7		1.0	2.8	11.8
Water Storage Facilities														
Undeveloped Reg. Parks and Rec. (U.S. Government)		2.1												
City Subtotal	**1.8**	**114.5**	**6.3**	**9.2**	**18.2**	**9.4**	**163.8**	**17.4**	**17.2**	**34.1**	**0.9**	**2.4**	**18.9**	**35.9**
County														
Beaches (Vacant)														
Beach Parks	1.2	0.6	2.6	0.9	2.6	2.8	1.9	1	1.1	0.7				
Rural Residential, Low-Density														
Transportation ROW							4.2							
Vacant Undifferentiated														
Vacant Undifferentiated (U.S. Government)														
County Subtotal	**1.2**	**0.6**	**2.6**	**0.9**	**2.6**	**2.8**	**6.1**	**1**	**1.1**	**0.7**	**-**	**-**	**-**	**-**
Total	**3.0**	**115.1**	**8.9**	**10.1**	**20.8**	**12.2**	**169.9**	**18.4**	**18.3**	**34.8**	**0.9**	**2.4**	**18.9**	**35.9**

Table 7-1. Outfall Drainage Area Land Use Summary (Continued)

Land Use Designation	Catchment Outfall Designation						
	29	30	31	BB01	BB02	BB03	Total
City							
Horse Ranches							**2.8**
Nurseries							**7.8**
Duplexes, Triplexes, and 2- or 3-Unit Condos & THs						2.1	**8.8**
Low-Rise Apartments, Condos, and THs							**10.0**
High-Density, Single-Family Residential	0.3	0.7		0.3			**12.6**
Low-Density, Single-Family Residential				5.7	3.1	8.6	**151.0**
Rural Residential, High-Density	3.5	6.5	0.3			19.3	**529.3**
Rural Residential, Low-Density			5.4				**23.8**
Trailer Parks and Mobile Home Courts, High-Density							**38.8**
Retail Centers (Non-Strip)				0.7			**1.5**
Senior High Schools							**53.0**
Transportation ROWs		0.9		1.3	0.8	2.4	**48.1**
Transportation ROWs – PCH	0.1	0.1	2.3	1.1	1.3	0.9	**35.4**
Vacant Undifferentiated		0.8	13.5	10.6	8.6	89.0	**292.2**
Water Storage Facilities							**2.4**
Undeveloped Reg. Parks & Rec. (U.S. Government)							**119.7**
City Subtotal	**3.9**	**9**	**21.5**	**19.7**	**13.8**	**122.3**	**1337.2**
County							
Beaches (Vacant)							**0.4**
Beach Parks			9.5				**36.9**
Rural Residential, Low-Density						0.7	**0.7**
Transportation ROW						0.1	**4.3**
Vacant Undifferentiated						4.5	**103.1**
Vacant Undifferentiated (U.S. Government)							**88.3**
County Subtotal	**-**	**-**	**9.5**	**-**	**-**	**5.3**	**233.3**
Total	**3.9**	**9.0**	**31.0**	**19.7**	**13.8**	**127.6**	**1,571.3**

7.2.3 Imagery Review

Aerial and other photographic imagery data were reviewed using Google Earth® software and Environmental Systems Research Institute® (ESRI) GIS imagery sources to determine the types of land cover within the Parties' outfall drainage areas. The review showed that areas occupied by residential lots along the coast typically consisted of single-family dwellings, each surrounded by large areas of well-maintained landscaping that included grass, shrubs and brushes, and trees. Further inland, north of the PCH, residential lots were occupied by single-family dwellings and either well-maintained landscape and/or open space, natural type vegetation. The Google Earth® street view tool imageries were reviewed, which showed the residential lots and secondary roadways as having well-maintained vegetated areas with very little non-vegetated (bare) areas.

Caltrans' PCH right-of-way and highway traverses several of the Parties' outfall drainage areas. Although Caltrans is not a responsible applicant included under this Compliance Plan, the area within the Caltrans right-of-way drains to the Parties' outfall and thus, was evaluated to determine if the area has the potential to contribute anthropogenic sedimentation to ASBS 24. The desktop review showed that some cuts (excavations) were made into native soils along the roadway. The review did not reveal obvious areas of excessive erosion and sedimentation. However, due to the common historic erosion problems associated with similar roadways

throughout the state, the areas where cuts were potentially made during roadway construction were flagged for further detailed evaluation during the field reconnaissance phase.

7.2.4 General Sedimentation Risk Assessment

In order to estimate the general sediment risk for the areas that drain to the Parties' outfalls, a sediment risk was determined for a hypothetical site based on the procedures detailed in the *NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities* (Construction General Permit). The intent of this assessment is to determine the potential sediment for areas where minor improvements (e.g., landscaping) or other circumstances may result in bare soil that would not be considered construction activity. The assessment completed as part of this plan is not performed for the purpose of assessing construction activities, which are permitted and inspected through applicable County and City programs, and which require that risks be determined and mitigated through the proper implementation of BMPs.

7.2.4.1 Sedimentation Risk Assessment Methodology

The risk determination procedure detailed in the Construction General Permit includes determining both the "project sediment risk" and the "receiving water risk." The two risks are then used in combination to determine the overall project risk. However, for this plan (assessing potential sedimentation), only the sediment risk was evaluated.

The Construction General Permit describes two options for determining sediment risk: 1) GIS Map Method – EPA Rainfall Erosivity Calculator and GIS map, and 2) Individual Method – EPA Rainfall Erosivity Calculator and individual data. Both of these methods include using available EPA resources to estimate a rainfall-runoff erosivity factor. Depending on the method selected, the soil erodibility, project length, and slope parameters are estimated either from a map (Method 1) or from site-specific data applied to an erodibility factor nomograph and length-slope factor table (Method 2). For both methods, the data are applied to the Universal Soil Loss Equation (USLE) to estimate a sediment load for the applicable period (SWRCB, 2010). The USLE is detailed as follows:

$$A = R*K*LS*C*P$$

Where:

- A = the computed soil loss (sheet and rill erosion) (tons/acre).
- R = the rainfall erosive factor for the given period.
- L = the slope length factor.
- S = the slope gradient factor.
- C = cover factor (1.0 for bare ground conditions).
- P = management operations & support practice (1.0 for bare ground conditions).

Based on the computed soil loss (sediment load), the site is classified as having either a low-, medium-, or high-sediment risk (SWRCB, 2010). Table 7-2 summarizes the risk levels associated with the various soil loss quantities.

Table 7-2. Sediment Risk Levels

Soil Loss	Risk Level
<15 tons/acre	Low
15 – 75 tons/acre	Medium
>75 tons/acre	High

Source: SWRCB, 2010.

7.2.4.2 Sedimentation Assessment Calculations

To assess the general sediment risk for the area, a hypothetical site was evaluated using the methods described in the Construction General Permit. The time period was estimated to be 2 months in duration, from December 1st through January 31st.

The rainfall erositvity factor, or R factor, is calculated as a product of the Erosivity Index (EI) percentage and the average annual R value. These two parameters were obtained from the *Storm Water Phase II Final Rule Construction Rainfall Erosivity Wavier*. The R factors are used as surrogate measures of the impact that rainfall has on erosion and have been mapped using isoerodent contours (USEPA, 2012b). The R values are based on the analyses of data which indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-minute intensity (I). The numerical value of R is the average annual sum of EI for storm events during a rainfall record of at least 22 years, and the isoerodent maps were developed based on R values calculated for more than 1,000 locations in the western United States (SWRCB, 2010). The average annual R value, based on the referenced isoerodent contour maps for the area, was estimated to be between the values of 60 and 80 (80 selected), with units of hundreds ft.*tonf*in*(ac*h*yr)$^{-1}$.

Next, it was determined that the area is within EI distribution zone 25. Based on this zone, the percentages of the EI distributions throughout the year were determined and are summarized on Table 7-3.

Table 7-3. Erosivity Index, Annual Distribution for Zone 25

Month	Jan	Jan	Jan	Feb	Mar	Mar	Mar	Apr	Apr	May	May	Jun	Jun
Day	1	16	31	15	1	16	31	15	30	15	30	14	29
EI (%)	0	9.8	20.8	30.2	37.6	45.8	50.6	54.4	56.0	56.8	57.1	57.11	57.2
Month	Jul	Jul	Aug	Aug	Sept	Sept	Oct	Oct	Nov	Nov	Dec	Dec	
Day	14	29	13	28	12	27	12	27	11	26	11	31	
EI (%)	57.6	58.5	59.8	62.2	65.3	67.5	68.2	69.4	74.8	86.6	93	100	

Source: USEPA, 2012b.

The final R factor calculation is summarized on Table 7-4.

Table 7-4. R Factor Calculation Summary

Parameter	Value
EI % (Oct. 1 – Dec. 31)	11.7%
EI % (Jan. 1 – Mar. 30)	20.8%
Total EI %	32.5%
Average Annual R Factor	80 (100*ft.*tonf*in)*(ac*h*yr)$^{-1}$
Computed R Factor	26.0 (100*ft.*tonf*in)*(ac*h*yr)$^{-1}$

7.2.4.3 GIS Map Method for KLS Factor

The Construction General Permit details the use of the EPA Monitoring & Assessment Program (EPA EMAP) map to assist with determining the combined K, L, and S parameters for use in the USLE equation.

The soil erodibility factor K represents the susceptibility of soil or surface material to erosion, transportability of the sediment, and the amount and rate of runoff given a particular rainfall input (or lack of absorption and infiltration), as measured under a standard condition. Fine-textured soils that are high in clay have low K values (approximately 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured sandy soils also have low K values (approximately 0.05 to 0.2) because of high infiltration resulting in low runoff. Medium-textured soils (e.g., silt loam) have moderate K values (approximately 0.25 to 0.45) because they are moderately susceptible to particle detachment and produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and be as large as 0.65 (SWRCB, 2010).

The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a slope length factor, L, and the slope gradient factor, S. Typically, as slope length and/or slope gradient increase, soil loss increases.

Figure 7-4 shows the EPA EMAP map. Based on this map, a KLS value of 1.6 was selected for the ASBS 24 drainage area.

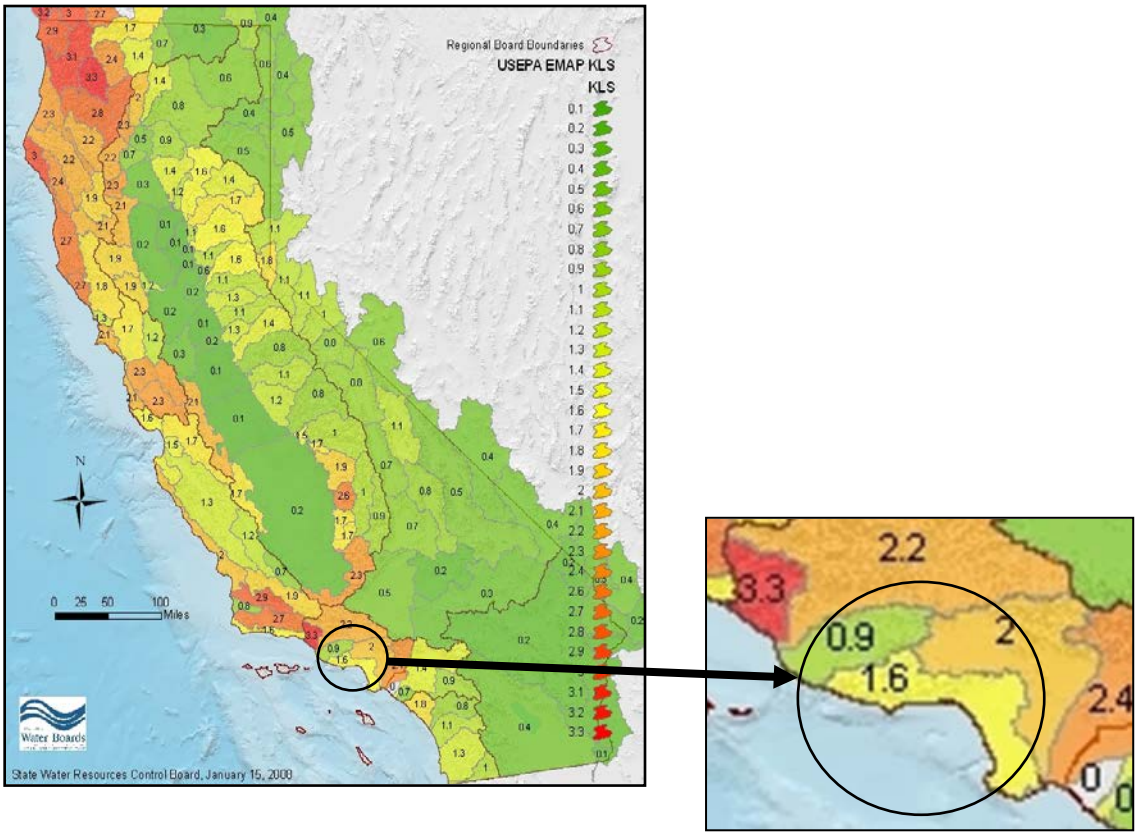

Figure 7-4. EPA EMAP (SWRCB, 2010)

The soil loss was calculated based on the assumptions made and values determined in this assessment. The soil loss for the hypothetical site was calculated to be 41.6 tons per acre. Based on the Construction General Permit sediment risk matrix (summarized on Table 7-2) and this value, disturbed areas (e.g., bare soil) draining to the ASBS would have, in general, a medium-level sediment risk.

7.2.4.4 Individual Method for KLS Factor

The Construction General Permit allows for site-specific data to be used in determining the KLS factor for the USLE equation. This includes performing soil analysis to determine the soil grain size distribution, site length, and average slope. This method was performed with the assumption that the soils consist of 60% sandy, 20% silty, and 20% clayey materials, which is reasonable for mountain formations and coastal bluffs. Based on an area of 0.25 acres (square), a length of 100 ft. was estimated. Based on the topography in the developed areas with slopes of approximately 2 to 10%, the higher end of the range was selected (10% slope).

Using the Soil Erodibility Factor Nomograph provided in the Construction General Permit, the K factor for the assumed soil composition was determined to be 0.19. Based on the LS Factors Table provided in the Construction General Permit and the stated assumptions, the LS factor was determined to be 1.46. Combining these parameters, it was determined that KLS is 0.277, the soil loss would be 7.2 tons per acre. Based on the Construction General Permit sediment risk matrix (summarized on Table 7-2), this value is considered a low-sediment risk for the applicable disturbed area.

7.2.4.5 Sediment Risk Assessment Summary

The assessment of the general sediment risk for disturbed areas with the ASBS 24 drainage area indicates that an area of disturbed soils without controls during the two relatively high rainfall months (December and January) during average conditions would have a potential sediment load of 7.2 tons per acre (per Method 2, individual site data calculations) or 41.6 tons per acre (per Method 1, GIS map data calculations). Smaller areas would have proportionally lower potential yields, as would disturbed areas with controls and/or disturbed areas that do not have a direct connection to the storm drain inlets (e.g., small area of disturbance above turf vegetation). Based on guidance found in the Construction General Permit, this equates to a low- (Method 1) to medium- (Method 2) sediment risk.

The difference between methods is based solely on the method used to calculate the KLS factor. The GIS map shows a large area with the same value, including the Santa Monica Mountains. Including the steep mountain terrain in the weighted average (by area), the slope calculation for the GIS map appears to have overestimated the KLS for the areas along the ASBS coast where developed areas are located. Additionally, the GIS map may overestimate the project slope length factor and slope gradient factor (LS factor). As such, the Method 2, site-specific data method seems much more accurate for the applicable area.

This assessment provides a general estimate of the sediment yield potential for disturbed (or bare) soil cover for the stated assumptions. The results of this assessment were used to aid in the evaluation of the drainage areas during field reconnaissance. Considering the soil loss calculations, the R factor is fixed for the area and the K factor may change slightly in the different geology across the drainage areas. However, the slope length (L) and slope gradient (S) vary greatly when areas with the potential to be prone to sedimentation are evaluated. The field reconnaissance was performed with a focus on the implications that the length and slope parameters have on the potential soil loss for areas of bare soil or spare vegetation. Table 7-5 provides annual soil loss calculations performed for various typical sloped small areas with bare soil or sparse vegetation cover throughout the year.

Table 7-5. Annual Soil Loss Calculations for Sloped Areas

Slope Length (ft.)	Slope Height (ft.)	Slope Gradient (%)	Width (ft.)	Area (acres)	KLS Factor	Annual Soil Loss (tons/year)
10	0.2	2	100	0.023	0.025	0.05
20	0.4	2	100	0.046	0.029	0.10
30	0.6	2	100	0.069	0.032	0.18
40	0.8	2	100	0.092	0.036	0.27
50	1	2	100	0.115	0.040	0.37
10	1	10	100	0.023	0.072	0.13
20	2	10	100	0.046	0.093	0.34
30	3	10	100	0.069	0.122	0.67
40	4	10	100	0.092	0.146	1.1
50	5	10	100	0.115	0.173	1.6
10	2.5	25	100	0.023	0.160	0.3
20	5	25	100	0.046	0.247	0.9
30	7.5	25	100	0.069	0.338	1.9
40	10	25	100	0.092	0.424	3.1
50	12.5	25	100	0.115	0.507	4.7
10	5	50	100	0.023	0.268	0.5
20	10	50	100	0.046	0.458	1.7
30	15	50	100	0.069	0.638	3.5
40	20	50	100	0.092	0.809	5.9
50	25	50	100	0.115	0.980	9.0

R = 80 (100*ft.*tonf*in)*(ac*h*yr)$^{-1}$.
K = 0.19.

Relative to the 50% (2:1 [horizontal: vertical]) gradient slope, the 2% slope gradient is estimated to lose only 4% as much soil for a 50-ft slope length, and the 10% slope gradient is estimated to lose approximately 18% as much. This relationship in non-linear, and as the slope gradient increases, the potential soil loss significantly increases. Similarly, as the slope length increases, the potential soil loss significantly increases. The 50-ft slope length calculation for the 2% slope gradient is estimated to have approximately seven times the soil loss of the 10-ft slope length for the same gradient. The 50-ft slope length calculation for the 50% slope gradient is estimated to have approximately 1,400% the soil loss of the 10-ft slope length for the same gradient. These typical calculations indicate that in areas where disturbance has created unnatural sloped areas, the potential for soil loss exponentially increases as the slope gradient and/or the slope length increase.

7.3 Sediment Assessment Field Reconnaissance

A field reconnaissance was conducted to confirm the desktop analysis and evaluate the ASBS 24 outfall drainage areas prone to erosion and sedimentation. All areas draining to outfalls that discharge to the ASBS 24 were observed for indications of existing or potential anthropogenic sedimentation. The field reconnaissance included driving the length of ASBS 24 as well as performing reconnaissance on foot within each outfall drainage area to perform a thorough evaluation. In general, the areas of developed land use evaluated were observed to be residences with associated hardscape (e.g., driveways, walkways) and well-maintained landscaping. Some areas were observed to have partially exposed (spare vegetation) natural bluff materials. Vegetation within the bluff areas consisted of a mixture of native scrubs and non-native species (e.g., ice plant). However, signs of erosion (e.g., rills, sloughing) were not observed on these

exposed bluff materials, indicating that bluff material consisted of dense siltstone and/or sandstone formations consistent with a desktop geology evaluation performed as part of this plan. The field reconnaissance is presented, starting at the northerly most identified outfall located at Nicholas Canyon County Beach, moving south, and finishing at the southeast limits of ASBS 24 and the Escondido Beach area.

The photograph depicted in Figure 7-5 was taken looking west and downward towards the Nicholas Canyon County Beach parking lot. The up-gradient area between PCH and the parking lot is shown to have fairly good vegetation cover. A narrow foot/animal path leads down the sloped area. Signs of erosion were not observed in the area. Compared to natural cover, a parking lot with an impervious surface located on a mesa, such as the case here, increases storm water runoff quantity and velocity resulting in the potential to erode soils if not properly designed. The parking lot was observed to have several storm drain inlets with associated piping to convey collected storm water down to the ocean without the potential to increase erosion of the bluffs (i.e., outfall located at sea level along rocky shoreline).

Figure 7-5. Nicholas Canyon County Beach Parking Lot

Figure 7-6 shows the area east of the PCH up-gradient from Nicholas Canyon County Beach. PCH and a residence occupy the area, where it appears that the highway and residential access driveway were constructed by cutting away (excavating) some the native materials and creating 2:1 (horizontal: vertical) slopes. These slopes are shown with vegetation cover and without evidence of active erosion.

Figure 7-6. Nicholas Canyon Beach Upper Watershed Area

The photograph depicted in Figure 7-7 was taken above Broad Beach and shows the bluff area located between PCH and the residences that are situated along the shoreline. During the field reconnaissance, the majority of the bluff appeared to have vegetation cover. Some steep portions were exposed, resembling natural bluffs observed in the area where development has been restricted (e.g., the nearby El Matador State Beach). Signs of erosion from these bare areas were not observed in the bluff along Broad Beach Road.

Figure 7-7. Bluff Area Above Broad Beach

The photograph depicted in Figure 7-8 shows the area along PCH and directly above Broad Beach. Similar bluff materials, but having lower height, were observed at this location with similar vegetation cover as the bluffs located along Broad Beach. Thick vegetation was observed at the bottom of the bluff material adjacent to the roadway.

Figure 7-8. Directly Above Broad Beach Area

The east end of Broad Beach Road has thicker vegetation cover and a lower bluff height compared to the west area. Figure 7-9 shows the typical street composition of residences and associated improvements along the south (seaward) side and off-street parking area along the north side followed by a vegetated sloped area.

Figure 7-9. East Portion of Broad Beach

Further up the watershed to Broad Beach the geology changes to that of the Santa Monica Mountains with hills and valleys. Figure 7-10 shows the residential development and associated landscaping in this area.

Figure 7-10. Area Up-Gradient of Broad Beach

The photograph depicted in Figure 7-11 shows the area across from the southeast side of Zuma County Beach, north of PCH. Field reconnaissance observed a large vertical bluff. This bluff appears to be Miocene age Modelo Formation that may have been a naturally formed vertical wall or a result of grading associated with the construction of PCH. Evidence of erosion was not observed during the reconnaissance. The materials appeared to be very hard and resistant to erosive forces of nature.

Figure 7-11. Vertical Bluff Across from Zuma Beach

As with the other areas evaluated, away from the coast the geology was observed to be Santa Monica Mountains in the watersheds upstream of the Zuma County Beach shoreline. Good vegetation cover was observed in the sloped areas around the existing improvements, which included residences and a water tank (Figure 7-12). Thick native vegetation was observed above the developed areas.

Figure 7-12. Up-Gradient of Zuma Beach Area

Figure 7-13 shows a residential property located east of the intersection of Birdview Avenue and Bluewater Road. Typical of residences in the area, the landscaping included a mixture of brushes and trees on the sloped areas and turf in the flatter areas.

Figure 7-13. Residence Near Birdview Avenue & Bluewater Road

The photograph depicted in Figure 7-14 shows the area above Escondido Beach. This area was observed to have more gentle slopes of approximately 4:1 (horizontal: vertical) compared to the bluff areas observed near Zuma County Beach and Broad Beach. East of Escondido Creek and north of PCH, thick vegetation cover was observed, consisting primarily of ice plant, palm trees, and eucalyptus trees.

Figure 7-14. Pacific Coast Highway Near Escondido Beach

7.4 Anthropogenic Sedimentation Assessment Summary and Conclusion

The assessment included a review of the topography, geology, land use, and imagery to determine potential areas prone to anthropogenic sedimentation. This review indicated that the topography, geology, and land use are related. Geologic processes, beginning as far back as 80 million years, formed the sedimentary formations predominantly found along the coast shoreline and Point Dume upland mesa area, which include siltstone and sandstone. Approximately 16 million years ago, seismic actively began and continued for 3 million years to form the Santa Monica Mountains, which are composed of a combination of sedimentary and igneous rock formations (City, 1995). Land use zoning and development have occurred predominantly along the coast within the flatter areas at lower elevations. Some development has occurred inland within the Santa Monica Mountains, but for the most part, development in the mountainous areas of the ASBS 24 watershed has been restricted due to the conservation of the area at the federal, state, and local levels.

The desktop analysis included determining the general sediment risk for the area based on the procedures outlined in the Construction General Permit. These procedures included determining the rainfall erosivity (R factor), which is based on data collected over several years to determine the annual storm kinetic energy, on average, for the area. That factor, combined with properties of common soils and various slopes (up to 50%) and heights (up to 50 ft.), were used to determine the potential annual soils for disturbed loose soil areas within the watershed. Calculation results indicated that the potential for soil loss within disturbed areas increases rapidly for areas having slopes greater than 10% and heights of greater than a few feet. These results were used during the field reconnaissance to aid in determining if areas have the potential to contribute anthropogenic sedimentation to ASBS 24.

Field reconnaissance was performed in the areas with a focus on the areas that drain to the identified outfalls that discharge to the ASBS 24. In general, the drainage areas primarily consisted of larger lots (0.25 to approximately 1 acre) with existing residential structures, hardscape improvements, and landscaping. Landscape vegetation of sloped areas within developed areas, including residential properties and roadway rights-of-way, were observed to have fairly good cover. No signs of erosion (e.g., rills, gullies) were observed in sloped areas or alongside secondary roads or PCH.

The conclusion of this sediment identification assessment is that currently there are no areas prone to anthropogenic sedimentation within the drainage areas tributary to the identified outfalls that discharge to ASBS 24. Land use in the drainage areas consists predominantly of residential and vacant (open space) designations with associated roadway connections. The sloped areas associated with residential properties were observed to have good vegetation cover and appeared to be regularly maintained by landscaping professionals. Areas where cuts (excavation) were made during the construction of roadways were observed to have either good vegetation cover that has been maintained by responsible property owners or consist of hard coastal bluff materials resistant to erosive forces (e.g., large bluff along the southeast portion of Zuma County Beach, as shown in Figure 7-11). Therefore, at this time, no additional sediment BMPs are required by this plan.

8.0 IMPLEMENTATION SCHEDULES

8.1 General Exception Schedule

The General Exception (Resolution No. 2012-0012) was adopted and became effective on March 20, 2012. Resolution No. 2012-0031 amended the General Exception to revise some of the sections to be consistent with other sections. The two documents collectively are referenced to as the General Exception with Resolution No. 2012-0012, establishing the effective date and Resolution No. 2012-0031 providing referenced content. Table 8-1 provides a summary of the key milestones specified in the General Exception. The General Exception states that the Draft Compliance Plan shall be submitted to the State Board within 18 months of the effective date of the General Exception. However, due to the limited number of monitoring opportunities during the 2012-2013 wet season, the Parties requested and were granted an extension of 12 months in order to perform additional wet weather monitoring. This timeline extension is included in the summary table.

Table 8-1. General Exception Schedule of Milestones

Description	Duration	Date
Resolution No. 2012-012 (General Exception)		Adopted March 20, 2012
Resolution No. 2012-021 (Amended General Exception)		Adopted June 19, 2012
Non-authorized non-storm water discharges prohibited	Effective date of the General Exception	March 20, 2012
Nonstructural controls necessary to comply shall be implemented	18 months after the General Exception effective date	September 20, 2013
Draft Compliance Plan	*30 months after the General Exception effective date	September 20, 2014
Final Compliance Plan	*42 months after the General Exception effective date	September 20, 2015
Structural controls identified in Compliance Plan necessary to comply shall be operational	*7 years after the General Exception effective date	March 20, 2019
All discharges comply with the General Exception requirements	*7 years after the General Exception effective date	March 20, 2019

*Additional 12 months added to duration based on Draft Compliance Plan extension granted by State Board to allow for additional wet weather core monitoring.

8.2 Nonstructural Controls Implementation Schedule

The Compliance Plan uses adaptive management (**Error! Reference source not found.**) to plan, implement, assess, and refine nonstructural solutions implemented by the Parties in the ASBS 24 tributary drainage area. The initial assessment included special studies and existing PIPP, enforcement, and O&M nonstructural programs (see Appendix B); the Parties are currently meeting the compliance requirements detailed in the General Exception. The steps forward listed in this section include nonstructural programs that will allow the Parties to continue to be in

compliance and may reduce wet weather pollutant loading. These steps forward include the following:

- Continue to implement, track, and refine effectiveness assessment protocols for nonstructural programs, as discussed in Section 3.0.

Table 8-2. Milestones and Schedule for Implementation of Enhanced Nonstructural Programs and Key Steps Forward

Timeline	Objective	Nonstructural Program(s) & Key Steps Forward
Initial Phase: 2005–2012	1. Understand baseline conditions in ASBS. 2. Identify/address dry-weather and storm water runoff. 3. Progress towards zero dry weather runoff.	Progressed towards existing nonstructural programs identified in Section 3.2.
Before September 20, 2013	1. Zero discharge of non-authorized non-storm water to ASBS 24. 2. Inspection Policies in compliance with General Exception.	▪ Public Outreach (see Section 3.2). ▪ Outfall inspection program. ▪ Catch basin program re-evaluated. ▪ Amended Inspection Program (see Section 3.3).
09/20/2013	Compliance with ASBS Special Protections for Dry Weather	
09/20/2014	Submit Draft ASBS Compliance Plan for ASBS 24	
Wet Weather: 2014–2015	1. Maintain zero dry weather runoff to ASBS 24. 2. Evaluate nonstructural BMPs that may provide wet weather load reductions.	▪ Evaluate aggressive street sweeping on City streets. ▪ Feasibility assessment and initial outreach for metal building materials ordinances.
09/20/2015	Submit Final ASBS Compliance Plan for ASBS 24	
Wet Weather: 2015–2019	1. Maintain zero dry weather runoff to ASBS 24. 2. Evaluate nonstructural BMPs that may provide wet weather load reductions.	▪ Enhanced aggressive street sweeping on PCH, if feasible. ▪ Evaluate metal building materials ordinances and metal building material management incentive programs. ▪ Evaluate enhanced collaborative environmentally friendly alternative services program(s).

9.0 COST ESTIMATES

The Parties have implemented numerous nonstructural controls and related programs in order to eliminate non-authorized discharges to ASBS 24. The Parties continue to maintain these measures, and the annual estimated costs associated with the key programs, which are detailed in Section 3.0, are provided on Table 9-1. For more information on existing nonstructural measures, see Appendix B.

Table 9-1. Annual Nonstructural Program Costs

Program Type	Program Name	Approximate Cost ($/year)
Public Information & Participation Programs (PIPP)	Rethink L.A.	[1]$10,000
	Los Angeles County Materials Exchange (LACoMAX)	Costs in Rethink L.A.
	Water District #29 Tiered Water Rates Based on Increased Usage	N/A
	Water Conservation Program – Water Saving Devices Rebate Program	[1]$5,000
	Cash for Grass	[1]$5,000
	Landscape Irrigation Efficiency Program (LIEP)	[1]$5,000
	Ocean Friendly Garden (OFG) Program	Included in ASBS Focused Outreach Program
	Pepperdine Business School OFG Partnership	Included in ASBS Focused Outreach Program
	Solid Waste Management Program	$167,450
	Coastal Preservation Specialist (CPS)	[2]$35,957
PIPP Sub-total		**$228,407**
Operations & Maintenance (O&M)	City Curb & Gutter Cleaning & Repair Program	[3]$295,000
	City Storm Drain/Culvert Facilities Maintenance	[3]$25,000
	City Street Sweeping Contract	[3]$42,500
	Los Angeles County Street Sweeping	[1]$435,000
	City Trash Collection	[3]$25,000
	County Beaches Trash Collection	[1]$360,000
	County Beaches – Sanitation Program	Included in Trash Collect.
	Environmentally Preferable Purchases and Practices Policy (EPPP), Recycled Products Purchasing Policy (RCPP)	N/A
O&M Sub-total		**$1,182,500**
Enforcement	City IC/ID Elimination Program	[3]$5,700
	County IC/ID Program	[1]$20,000
	City Pollution Prevention Hotline	$600
	Pollution Prevention Hotline, 1(888)Clean LA	[1]$3,000
	Coastal Preservation Specialist (CPS)	[2]$35,957
	Outfall Inspections	[4]$10,800
	City Commercial & Industrial Inspection Program	[4]$8,000
	Clean Bay Restaurant Certification Program	Included in Inspection
	Santa Monica Bay Regulations Review	N/A
	City Local Coastal Program	Included in Inspection
	City Construction Inspection Program	Included in Inspection
	Los Angeles County Construction Inspection Program	[4]$2,000
	Smoking at Beaches Ban	[1]$20,000
Enforcement Subtotal		**$106,057**
Total		**$1,516,964**

Note 1: Cost estimated based on fraction of regional program total cost (approximately 5%).
Note 2: Coastal Preservation Specialist cost divided evenly between PIPP and enforcement.
Note 3: Cost estimated based on fraction of City wide program total cost (approximately 50%).
Note 4: Cost estimated based on staff time to complete associated tasks.

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APPENDIX A

Compliance Plan Map


COMPLIANCE PLAN MAP- AREA OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS) 24
Legend
Stations by Responsible Party
County Monitored Outfall
Undetermined Outfall with Caltrans Inlet
District Monitored Outfall
Monitored Outfall with City Inlet
Inaccessible Outfall with City Inlet
Ocean Receiving Water
Reference Site (County Station)
Other Outfalls (Identified in Recon Activities)
District Undetermined
Ownership Undetermined (County Recon)
Private or Undetermined Ownership (City Recon)
Catch Basins
City of Malibu
District
Road Maintenance Division
Private or Undetermined Ownership
Other Storm Drain Features
Inlet or Outlet Storm Drain Feature
Storm Drain Line
Storm Drain Channel
Creek
Planned BMP
Drainage Areas
Delineated Catchments of Outfall Stations
Overall ASBS Watershed Area
Subbasins ASBS Watershed Area
Subbasin Flow Direction Arrows
Areas of Potential Sheet Flow
Sewer Facilities
Sewer Treatment Plant
Sewer Pump Station
Sewer Pipe
Sewer Maintenance Service Area
Roads
Pacific Coast Highway
Secondary - Collector
Ramp
Minor - Local
Private Road
Hazardous Materials
Facilities with Hazardous Material Storage Areas
Jurisdictional Boundary
County Boundary
Unincorporated Area of Los Angeles County
City of Mailbu
State and Federal Lands
State of California
Federal Land
Other Boundaries and Zones
ASBS-24
USGS Landslide Zones (digital version only)
Notes:
1. District = Los Angeles County Flood Control District
2. All outfalls shown on this map are ≥18 inches diameter
3. Data subject to revision
4. No areas prone to erosion have been identified
DRAFT 9/17/14
0 0.25 0.5 0.75 1 Miles
VENTURA COUNTY
LOS ANGELES COUNTY
Leo Carillo State Park
Leo Carillo State Beach
Nicholas Canyon Beach (County)
Charmlee County Park
Malibu Springs Open Space
Robert H. Meyer Memorial State Beach
Broad Beach
Trancas Beach
Broad Beach Road Biofiltration Project
Zuma Beach (County)
Point Dume Beach a.k.a. Westward Beach (County)
Paradise Cove
Escondido Beach (County)
Escondido Falls
Santa Monica Mountains National Recreation Area
ASBS-24
PACIFIC OCEAN
Pacific Coast Hwy
Mulholland Hwy
Decker Canyon Rd
Lechusa Rd
Latigo Canyon Rd
Encinal Canyon Rd
Kanan Dume Rd
Zuma Canyon
Trancas Canyon
Ramirez Canyon
Escondido Canyon
Arroyo Sequit
Nicholas Canyon
Los Alisos Canyon
Lachusa Canyon
Encinal Canyon
ASBS-R01
ASBS-031
ASBS-001
ASBS-002
ASBS-003
ASBS-B
ASBS-C
24-BB-03
BB-03R
24-BB-02
ASBS-F-Z
ASBS-G-Z
24-BB-01
ASBS-004
ASBS-005
ASBS-006
ASBS-007
ASBS-008
ASBS-009
ASBS-010
ASBS-011
ASBS-012
ASBS-013
ASBS-014
ASBS-015
ASBS-016
ASBS-S01
ASBS-017
ASBS-018
ASBS-019
ASBS-020
ASBS-021
ASBS-022
ASBS-023
ASBS-024
ASBS-I-Z
ASBS-025
ASBS-026
ASBS-027
ASBS-028
ASBS-029
ASBS-030
ASBS-S02

APPENDIX B

Existing Nonstructural Programs Table

Existing Nonstructural Programs Within the ASBS 24 Area

Nonstructural Program	Program Subcategory	Name of Nonstructural Control	Project Descriptions for Existing Nonstructural Controls	Project Location	Target Source/ Target Audience	Targeted Water Quality Problem	Method of Measure	Program Start Date	Implementation Status/ Completion Date	Lead Agency	Approx. Cost ($/year)
Enforcement	IC/ID	City of Malibu Illicit Connection/ Illicit Discharge (IC/ID) Elimination Program	This program involves coordination of multiple City Departments to cease and eliminate pollution by illicit connections and discharges to the storm water system. The City has an active education, response, and enforcement program.	Regional	Residential, Commercial	Urban Runoff	# IC/IDs responses/year	November 1997	Ongoing implementation	City of Malibu	$11,395 (City Wide)
Enforcement	IC/ID	Los Angeles County (County) IC/ID Program	This program involves coordination of multiple County departments to cease and eliminate pollution by illicit connections and discharges to the storm water system. The County has an active education, response, and enforcement program. The data are tracked for the County region, as well as for the County's Road Maintenance Division (RMD), as part of its annual pre-storm season drainage inspection program.	Regional	Residential, Commercial, Industrial	Urban Runoff	# IC/IDs responses/year	November 1997	Ongoing implementation	Los Angeles County, District	$443,500 *(Regional)*
Enforcement	IC/ID	City of Malibu Pollution Prevention Hotline	A 24-hour hotline was launched to enhance the IC/ID program. The goal of this program is to offer a consistent reporting tool to citizens during non-business hours for spills or runoff that may pollute streams or coastal waters. Calls are received and dispatched to the appropriate personnel for investigation and resolution. The hotline is available in English and Spanish. The community may call 310-359-8003 to report incidents.	Regional	Residential, Commercial	Urban Runoff	# Hotline calls/year # IC/ID abated/year due to hotline	June 2012	Ongoing implementation	City of Malibu	$600 (FY 13-14, phone)
Enforcement	IC/ID	Pollution Prevention Hotline, 1(888)Clean LA	A 24-hour, bilingual hotline offers County staff, cities, and the public a means to report spills or runoff that may pollute coastal waters. Calls are received and dispatched to the appropriate personnel for investigation and resolution. The hotline is available in English and Spanish. A Chinese hotline is also available in Mandarin.	Regional	Residential, Commercial, Industrial	Urban Runoff	# Hotline calls/year # IC/ID abated/year due to hotline	November 1997	Ongoing implementation	Los Angeles County, District	-
Enforcement	Education, Inspections, Enforcement and ID	City of Malibu Water Waster Online Reporting Form	An online form to allow the community to report water waste has been introduced. All stakeholders are encouraged to make a collective effort to use water wisely, eliminate runoff, and reduce water waste, creating a culture of water conservation and water quality protection, and keep each other accountable by talking with those they see wasting water and using the reporting form. The form includes options to report issues included in the City's water conservation code. The City will provide notice, education and enforcement where needed to resolve issues. The online Water Waster Report form can be found at this link www.malibucity.org/WaterWaster	Regional	Residential, Commercial	Water Conservation, Urban Runoff	# Reports/year # Reports which included runoff abated/year	September 2014	Ongoing implementation	City of Malibu	Staff Time

Existing Nonstructural Programs Within the ASBS 24 Area

Nonstructural Program	Program Subcategory	Name of Nonstructural Control	Project Descriptions for Existing Nonstructural Controls	Project Location	Target Source/ Target Audience	Targeted Water Quality Problem	Method of Measure	Program Start Date	Implementation Status/ Completion Date	Lead Agency	Approx. Cost ($/year)
Enforcement	Education, Inspections, Enforcement	Commercial & Industrial Inspection Program	The County and City have implemented protocols to identify commercial and industrial facilities located within the applicable ASBS 24 drainage area and currently perform inspections at these sites in accordance with the Special Protections requirements (commercial facilities twice during the rainy season and industrial facilities monthly during the rainy season) The goals of these inspections include compliance verification, enforcement as needed, and education regarding storm water and urban runoff issues, recycling, and environmental quality ordinances. The County has not identified commercial or industrial sites within the applicable unincorporated County. City Environmental Programs staff, Code Enforcement Officers, Public Works staff, and Building Safety staff are regularly trained to watch for storm water best management practice (BMP) infractions. Staff are authorized and directed to issue correction notices. Repeat offenses are subject to increased enforcement procedures ranging from cease and desist orders to administrative fines and traditional enforcement remedies (City of Malibu Ordinance 325). If commercial or industrial sites apply for permits within the applicable unincorporated County, the sites will be inspected at the required frequencies listed in the Special Protections. Additionally, an annual voluntary training is conducted for all City staff to learn about protecting water quality.	Regional	Commercial, "Industrial"	Bacteria Organics Oil/Grease Trash Urban Runoff	Changes in Inspection Results for Facilities:)	November 1997	Ongoing implementation	City of Malibu	$8,000
Enforcement/ PIPP	Education, Incentives, Inspections	Clean Bay Restaurant Certification Program	The program is implemented in partnership with the Bay Foundation (also known as the Santa Monica Bay Restoration Commission & Foundation) and other bay cities. The goal is to recognize restaurants and food facilities that go above and beyond the minimum required by law to prevent pollution. Facilities are inspected annually. Only businesses with an inspection score of 100% receive certification. The City implements the rescinding policy for the Clean Bay Restaurant Certificate program, whereby a business that has been certified is subject to having its Clean Bay status rescinded for failing to maintain all of the criteria.	Regional, City of Malibu	Commercial	Bacteria Organics Oil/Grease Trash Urban Runoff	# Certified facilities *Rate of certification has increased 30% between 2009 & 2013.*	April 2009	Ongoing implementation	City of Malibu	See Commercial & Industrial Inspection Program
Enforcement	City Planning	City of Malibu Local Coastal Program	The City of Malibu Local Coastal Program, as certified by the California Coastal Commission, includes the Land Use Plan (LUP) and Local Implementation Plan (LIP) that details many environmental quality and protection standards, objectives, and implementation measures for new development and redevelopment projects. Additionally, conditions are placed prohibiting the installation of any new drains to the ASBS.	City of Malibu	Construction	Trash, Sediments, Urban Runoff, Storm Water Runoff	See Construction Inspection Program	September 1998	Ongoing implementation	City of Malibu	See Commercial & Industrial Inspection Program

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Enforcement	Education, Inspections, Enforcement	City of Malibu Construction Inspection Program	The City has implemented protocols to identify existing and future construction sites located within the applicable ASBS 24 drainage area. Identified sites will be inspected in accordance with the Special Protections requirements (weekly during the rainy season). Grading within the City is limited to single lot development (see Ordinance No. 51U). The City engages with construction contractors throughout the construction process. At a pre-grading meeting, the contractor, deputy building official, and inspector(s) review the Storm Water Pollution Prevention Plan (SWPPP) and identify appropriate BMPs. The SWPPP is again discussed at commencement of construction, with a reminder of the repercussions (i.e., job site shut-down) of failing to comply. Project sites are visited regularly during the grading phase and construction phase. BMP implementation and maintenance is checked at each inspection.	Regional	Construction	Trash, Sediments, Urban Runoff	# of Grading Inspections # of Building Inspections	November 1997	Ongoing implementation	City of Malibu	See Commercial & Industrial Inspection Program
Enforcement	Education, Inspections, Enforcement	Los Angeles County Construction Inspection Program	The County has implemented protocols to identify existing and future construction sites located within the applicable ASBS 24 drainage area. Identified sites will be inspected in accordance with the Special Protections requirements (weekly during the rainy season). All construction permit applicants are required to prepare a Wet Weather Erosion Control Plan or Local SWPPP based on the Construction BMP Handbook. The County conducts inspections, follow-ups, and enforcement. A computer database is used to track all single-lot (non-tract) projects that are categorized by the disturbed/graded area (acres).	Regional	Construction	Trash, Sediments, Urban Runoff	<u>Winter 10-11:</u> 3,383 sites underwent wet weather inspections	November-1997	Program Enhancement August 2013	Los Angeles County	$11,000 *(Regional)*
Enforcement	Code Enforcement	Expanded Polystyrene Packaging Ban Inspections & Enforcement	Approximately 65 food facilities are inspected each year for compliance with Ordinance No. 286, M.M.C. Chapter 9.24, Ban on Expanded Polystyrene Food Packaging.	Regional	Commercial	Trash, Urban Runoff	Approximately 80 food facilities inspected/year	October 2005	Ongoing implementation	City of Malibu	See Commercial & Industrial Inspection Program
Enforcement	Code Enforcement	Smoking at Beaches Ban	The Los Angeles County Sheriff engages Beach Patrol for enforcement of Ordinance No. 265, M.M.C. Chapter 12.05.035, Ban on Smoking at Malibu Beaches.	Regional	Residential, Commercial	Trash, Urban Runoff	21 miles of beaches patrolled	May 2000	Ongoing implementation	City of Malibu	$482,983 (total Beach Patrol cost)
O&M	Street Maintenance	City of Malibu Curb & Gutter Cleaning & Repair Program	Contract for annual curb and gutter cleaning and repair. This service ensures proper functioning of drainage facilities.	City of Malibu	City Facilities	Trash, Metals, Sediments, Urban Runoff	# Facilities cleaned/year Pounds material removed/year	February 1987	Ongoing implementation	City of Malibu	$590,000 (FY 13-14, City Wide)

Existing Nonstructural Programs Within the ASBS 24 Area

Nonstructural Program	Program Subcategory	Name of Nonstructural Control	Project Descriptions for Existing Nonstructural Controls	Project Location	Target Source/ Target Audience	Targeted Water Quality Problem	Method of Measure	Program Start Date	Implementation Status/ Completion Date	Lead Agency	Approx. Cost ($/year)
O&M	Street Maintenance	City of Malibu Storm Drain/Culvert Facilities Maintenance	Contract for annual and post-storm inspection and cleaning of storm drain facilities. All storm drains are cleaned annually. Priority storm drains are cleaned at a minimum of twice annually. This program ensures that litter, debris, and pollutants are removed to prevent them getting into the local waterways and impacting beneficial uses.	Regional	City Facilities	Trash, Metals, Sediments, Urban Runoff	# facilities cleaned/year, by priority Pounds material removed/year	February 1987	Ongoing implementation	City of Malibu	$50,000 (FY 13-14, City Wide)
O&M	Street Maintenance	City of Malibu Street Sweeping Contract	Contract for sweeping for public streets in City by means of a mechanical-type street sweeper. Street sweeping is a requirement of the NPDES permit and is intended to remove litter, debris, and pollutants from the roadways, thus preventing them from getting into local waterways. City streets are swept monthly (90 miles total, ~60 miles within the ASBS). The Pacific Coast Highway is swept weekly (54 miles total, 16 miles within the ASBS).	Regional	Streets/Parking	Trash, Metals, Sediments, Urban Runoff	Broom miles swept/year Pounds removed/year	March 2002	Ongoing implementation	City of Malibu	$85,000 (FY 13-14, City Wide)
O&M	Street Maintenance	Los Angeles County Street Sweeping	The County sweeps parking lots along the coastal ASBS to remove litter, debris, and pollutants from the roadways, thus preventing them from getting into local waterways. Parking lots are swept with vacuum or regenerative air sweepers three times per week, based upon seasonal use rates. Sweeping occurs at: Zuma Beach (12 lots), Point Dume (1 lot), and Nicholas Canyon (1 lot).	County Beaches - Parking Lots	Streets/Parking	Trash, Metals, Sediments, Urban Runoff	Broom miles swept/year Pounds removed/year	November 1997	Ongoing implementation	Los Angeles County	$8.7 Million *(Regional)*
O&M	Waste Management	City of Malibu Trash Collection	The City performed a needs study and subsequent implementation of placing trash receptacles at bus stops and high-use areas along the Pacific Coast Highway and City streets. Additional animal-proof containers were placed in the ASBS watershed including along PCH and in the Point Dume area. The refuse is collected weekly to prevent littering and any additional debris from getting into local water ways and drains.	Regional	Residential, Commercial	Trash, Urban Runoff	Frequency of removal	August 2003	Ongoing implementation	City of Malibu	$50,000 (FY 13-14, City Wide)
O&M	Waste Management	County Beaches Trash Collection	County staff empty beach trash cans 7 days a week, as needed, to prevent littering and any additional debris from getting into local water ways and drains. Trash cans are donated by Adopt-A-Beach and broken cans are replaced quarterly, as needed.	County Beaches	Streets/Parking	Trash, Urban Runoff	Frequency of removal	November 1997	Ongoing implementation	Los Angeles County	$7.2 Million *(Regional)*
O&M	Waste Management	County Beaches - Sanitation Program	County staff “sanitizes" the beach 3 days a week, provided the sand is not wet. A tractor with rake and screen system is used to collect trash and turn over the beach sand. This process removes solids and debris and allows the sun to "sanitize" the sand during the day. Operations are between 5 am and 13:30 pm daily.	County Beaches	Residential	Trash	Daily pickup	-	Ongoing implementation	Los Angeles County	See County's Trash Collection Program

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O&M	Recycled Products Purchasing Policy	Environmentally Preferable Purchases and Practices Policy (EPPP), Recycled Products Purchasing Policy (RCP)	In accordance with Administrative Guideline No. 7.1.3 and M.M.C. 2.63.100, a policy was established to reduce waste by instituting new office practices that emphasize purchase of environmentally preferable products. The policy establishes the goal for all City employees to make waste diversion and reduction a routine part of the jobs, whenever feasible.	City of Malibu	City Facilities, City Staff	Trash, Urban Runoff	-	-	Ongoing implementation	City of Malibu	-
PIPP, O&M	Education, Waste Management	Solid Waste Management Program	Solid Waste Management Program was formed to comply with AB939 (California Integrated Waste Management Act of 1989) and implement source reduction of solid waste, including recycling, composting, environmentally safe transport, and land disposal. This includes City programs for safe disposal of household hazardous waste; used oil collection/recycling events; waste management education; solid waste hauler permitting; Christmas tree recycling; brush clearance/green waste recycling events; bulky item collection; construction and demolition debris recycling; electronic and universal waste disposal; and expanded polystyrene foam recycling program (i.e., Waste to Waves program). Program is in support of the CalRecycle goals to divert municipal waste from landfills.	Regional	Residential, Commercial	Trash, Urban Runoff	Changes to Malibu's Annual Recycling Rate: 57% (2000) to 68% (2012)	March 1997	Ongoing implementation	City of Malibu	$167,450
PIPP, O&M	Education, Waste Management	Rethink L.A.	Education and outreach program designed to encourage "rethinking" about waste management, including opportunities to implement reduction, recycling, and reuse. Program provides resources for buying recycled products and encourages carbon footprint BMPs, including a carbon footprint calculator, energy efficiency tips, and means of alternative transportation.	Regional	Residential, Commercial, Industrial	Trash, Urban Runoff	# Website visits # Workshops # Brochures # Attendees Regional Recycling Rate	-	Ongoing implementation	Los Angeles County	$200K *(Regional)*
PIPP, O&M	Education, Waste Management	Los Angeles County Materials Exchange (LACoMAX)	The goal of this program is to reduce waste transported to the landfill. The LACoMAX is an on-line service where the public may find, make available, or identify an entrepreneurial opportunity for discarding resource materials. The data platform includes 15 material classifications and six regions. It is also a location where garage sales may be advertised. The data platform provides information to other County waste management programs.	Regional	Residential, Commercial, Industrial, Construction	Trash, Urban Runoff	# Website visits # Workshops # Brochures # Attendees Regional Recycling Rate	-	Ongoing implementation	Los Angeles County	See Rethink L.A. program
PIPP	Education	Malibu Parks and Recreation Quarterly Newsletter	The Malibu Recreation Guide and Quarterly Newsletter is sent to residents and includes articles related to the Clean Water Program and Solid Waste Program. The City takes the opportunity to give reminders to the community about how to prevent pollution and reduce waste, as well as local event opportunities. The newsletters are also available at City Hall. ASBS articles have been regularly contributed since 2012.	City of Malibu	Residential	Urban Runoff	4 Issues/year # Newsletters mailed	December 1995	Ongoing implementation	City of Malibu	$33,000

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PIPP	Education	Malibu Chamber of Commerce Environmental Committee	The City is an active participant in the Malibu Chamber of Commerce Environmental Committee which aims to provide education and learning opportunities and recognition to local businesses and community through events, awards, workshops, and outreach campaigns.	Regional	Commercial, Residential,	Urban Runoff, Water Conservation, trash/recycling	# Workshops # Attendees # Brochures distributed	September 1999	Ongoing implementation	Malibu Chamber of Commerce	Not Applicable
PIPP	Education	Clean Water Act and Our Backyards Video	The Clean Water Act and Our Backyards video was produced locally in partnership with the Malibu Creek Watershed Council. It is regularly played on cable, and at local events and trainings. It gives an overview of how routine activities can affect water quality, BMPs to prevent pollution, and an explanation of TMDLs.	Regional	Residential	Urban Runoff	# Video presentations # Attendees/presentation	January 2002	Ongoing implementation	Malibu Creek Watershed Council	Not Applicable
PIPP	Education	*Living Lightly in Our Watersheds* Environmental Guide	The City and County collaborated with the Resource Conservation District of the Santa Monica Mountains in the revision and distribution of the *Living Lightly in Our Watersheds: A Guide for Residents of the Santa Monica Bay Watersheds* <www.malibuwatershed.org>. The guide was distributed to all Malibu residences and businesses. The City contributes to printing costs and distribution by mail and distributes materials at events. A new web-based and mobile platform is currently under development and is expected to launch by 2015. A new print edition of the guide is also expected in 2015.	Regional	Residential, Commercial	Urban Runoff	# Guides mailed # Visits to the website	July 2005	Ongoing implementation	Malibu Creek Watershed Council	$3,000 (City of Malibu) $20,000 (County of Los Angeles)
PIPP	Education	*Malibu Life* Environmental Newsletter	*Malibu Life* (formerly *Malibu Current*) Environmental Quarterly Newsletter is sent to all Malibu residences and businesses and distributed continuously to educate about ongoing environmental concerns and what the community can do to help, and provides updates on City environmental projects and programs. An ASBS article was published in Issue 2 Volume 1 in April 2007.	Regional	Residential	Urban Runoff, Water Conservation	# Articles # Newsletters mailed	April 2007	Implementation halted in 2010	City of Malibu	$2,000 (2010, printing & postage)
PIPP	Education	Wildlife and Marine Rescue Services	The City has had a contract with the California Wildlife Center since April 1996 to provide wildlife rescue services and was later amended to include marine mammal rescue services. In 2003, the City, in partnership with the California Wildlife Center, applied for and received a John H. Prescott Marine Mammal Rescue Assistance Grant. Wild Rescue is a secondary responder. Public outreach and education are also a part of the grant.	City of Malibu	Residential	Urban Runoff, Water Conservation	# Outreach events supported	March 1992	Ongoing implementation	City of Malibu, California Wildlife Center	$2,500 (FY 13-14) *($1,000-$2,500 historically)*

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PIPP	Education, Inspections, Incentives/ Enforcement	ASBS Focused Outreach Program Proposition 84 Project	This began as a Proposition 84 grant program, officially titled the Wildlife Road Treatment & ASBS Focused Outreach Program Proposition 84 Project. The temporary Coastal Preservation Specialist (CPS) position was created to perform outreach to the community. The CPS conducted field work throughout the ASBS area, including coastal and inland areas, to look for dry-weather runoff and other pollution threats. When individual properties were identified as being out of compliance with ASBS regulations, letters to "cease and desist" the discharge as well as educational materials were mailed. The City, via the CPS and/or other City staff worked with the property owners to help fix the problem. The property owner was required to submit a report detailing how the problem was fixed. The CPS and/or other City staff conducted site visits, continued monitoring the site, and performed other additional actions (case-specific). General letters, including Notices to Comply, were sent to neighborhoods and individuals of high priority that were considered more likely to impact the ASBS to inform them of ASBS discharge restrictions. A general ASBS letter was mailed to every parcel within the ASBS. A database with information on every case is maintained as issues arise in the ASBS watershed and includes all communications and photos. The project also included the installation of a structural BMP on Wildlife Road. The City plans to continue this program on a modified scale.	ASBS 24 (Area in Malibu city limits)	Residential, Commercial	Urban Runoff, Water Conservation	# ASBS letters mailed # Cease and Desist letters mailed # Follow-up 1-month reports submitted % Compliance with Orders to Cease and Desist Discharge # Notices to Comply letter mailed to high-priority addresses % Change in high-priority addresses. Photo documentation	November 2011	Ongoing implementation End of grant: July 2014 City Continuing Program	City of Malibu	$71,914 (grant)
PIPP	Education	Community Meetings and ASBS Presentations	Outreach presentations to home owner associations, property owner associations, and other community groups about the City's Clean Water Program, including protecting water quality and conserving water have been conducted. Recent outreach by the CPS was about urban runoff and the ASBS.	ASBS 24 (Area in Malibu city limits)	Residential	Urban Runoff	# Presentations	October 2007	Ongoing implementation End of grant: July 2014	City of Malibu	See ASBS Focused Outreach Program
PIPP	Education	Point Dume Marine Science School Assembly and Science Projects	The City has collaborated with the Point Dume Marine Science School on various programs since 2005. An assembly to grades K-5 was conducted including a presentation on the water cycle, urban runoff, and how to prevent pollution from reaching the ASBS. Each grade level then completed a science project related to some component of the assembly at the appropriate grade level. A video of the science day was filmed and posted on the City's YouTube channel. The assembly and project was implemented by the CPS as part of the ASBS Focused Outreach Program.	Point Dume Marine Science School	Students (Residents)	Urban Runoff	# Students # Science day projects # Video views/year	2005	Completed May 2012	City of Malibu	See ASBS Focused Outreach Program

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PIPP	Training	In-House ASBS Training	City staff has been trained about the ASBS. The most recent training in November 2012 discussed what to look for in the field, and how to work on ASBS cases. Binders with inspection report forms and educational handouts were created and placed in each City vehicle.	City of Malibu, City Hall	City Staff	Urban Runoff	# Staff trained	2007	Ongoing Implementation	City of Malibu	See ASBS Focused Outreach Program
PIPP	Education	ASBS Webpage	An ASBS section is on the City of Malibu website. The webpage provides interactive maps and information about ASBS, including many educational resources to help residents, businesses, and visitors understand and comply with ASBS regulations. Events, rebates, and other incentive programs are also posted. The web-page section can be viewed at this link www.malibucity.org/ASBS.	City of Malibu, Website	Residential, Commercial, Visitors	Urban Runoff, Water Conservation	# ASBS page views/year	May 2012	Ongoing implementation	City of Malibu	See ASBS Focused Outreach Program
PIPP	Education	Keep it Clean, Malibu Campaign	As part of the Proposition 84 State funding, an outreach campaign was developed (as an item in the CPS scope of work) to educate people about the issue and the result was Keep it Clean, Malibu – a multi-platform educational campaign designed to positively and proactively teach about the ASBS, and make people think about storm drains and what goes into them. The campaign contains five main elements: storm drain art murals and associated educational video, 4 public Service videos, a robust social media campaign, special events, and collateral materials giveaways that featured the campaign slogan and ASBS logo. The campaign can be viewed on this web-page www.malibucity.org/keepitclean.	City of Malibu, Website, Social Media	Residential, Commercial, Visitors	Urban Runoff, Water Conservation, Pollution Prevention	# of “likes” # of tags on social media # ASBS video views # of pledges signed/year	April 2014	Ongoing implementation	City of Malibu	See ASBS Focused Outreach Program
PIPP	Education	Malibu Green Room Webpage	This is an overview of City's sustainability practices, environmental projects, ordinances, and regulations, including coastal water protection and water drought response. Rebates and incentives provided by partner agencies are included on this web-page. The Green Room can be accessed from the Environmental Programs main page from this web-page www.malibucity.org/environmentalprograms.	Regional, City of Malibu, Website	Residential, Commercial	Urban Runoff, Water Conservation	# Malibu Green Room views/year	June 2012	Ongoing implementation	City of Malibu	Staff Time
PIPP	Education	City of Malibu Clean Water Program and Clean Water Team	The City's Clean Water Program and Team were formed with the ultimate goal of reducing or eliminating dry weather flow to the City's storm drains. It includes education of the businesses, residents, and visitors on water quality issues and BMPs and encourages participating in the team. It is the overlying program that manages regulatory compliance (e.g., NPDES, TMDLs), education, training, inspections and incidents response, and public agency activities. Outreach is provided on the City's website, at public speaking events, on local cable stations, at community events, and on distributed materials.	City of Malibu	Residential, Commercial	Urban Runoff, Storm Water Runoff	See other activities for defined metrics.	July 2002	Ongoing implementation	City of Malibu	Staff Time and Professional Services

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PIPP	Education, Incentives	Malibu Area Conservation Coalition	The Malibu Area Conservation Coalition (MACC) is a partnership of local government agencies, utilities, resource districts, and community stakeholders working within Malibu and the North Santa Monica Mountains that share the common goal of empowering local communities to conserve and protect natural and economic resources and habitat. Recognizing that watersheds, oceans, water, and power generation and delivery systems do not stop at jurisdictional boundaries, the coalition is dedicated to providing effective programs, environmental education, and outreach. MACC members work on joint projects and also cross-promote individual organizations' programs. Recent programs included Ocean Friendly Garden Program, Landscape Irrigation Efficiency Program, Cash for Grass, Earth Day festivals, and the Wild and Scenic Film Festival.	City of Malibu	Residential, Commercial	Trash, Urban Runoff, Water Conservation	# Participants # Events (certain programs will have more defined metrics)	August 2009	Ongoing implementation	City of Malibu	Staff Time
PIPP	Education, Incentives	Ocean Friendly Garden (OFG) Program	The OFG Program targets residences and businesses to promote water conservation and eliminate non-point source pollution from landscaping. It was implemented locally as a partnership of West Basin Municipal Water District and the Surfrider Foundation as part of a Proposition 50 Grant from the State. The program includes educational workshops, training events, irrigation controller rebates, and the design/build of demonstration gardens. The Bluffs Park OFG was redesigned and rebuilt (February-March 2013) into a demonstration garden. Outreach Events included: * Ribbon cutting ceremony (3/20/2013) * OFG Workshop (6/2013) * Urbanite Workshop * Chumash Day PowWow (4/13-14/2013) The overall OFG Program of the Surfrider Foundation offers additional resources.	Regional, Bluffs Park OFG	Residential, Commercial	Urban Runoff, Water conservation, Pollution prevention	# Events/year # Attendees/event # Demonstration gardens constructed	April 2009	Ongoing implementation	Surfrider, West Basin Municipal Water District, City of Malibu	See ASBS Focused Outreach Program for education. *OFG cost not included*
PIPP	Education, Incentives	CA Friendly Landscaping Program	The CA Friendly Landscaping Program targets residences and businesses to promote water conservation and eliminate non-point source pollution from landscaping. It is a reimagining of the OFG Program by the Metropolitan Water District in an attempt to engage a broader audience statewide. Similarly to the OFG Program, it is promoted by its local water Districts and agencies. The program includes educational workshops, training events, and incentives such as landscape water efficiency rebates. The City hosted two CA Friendly Landscaping Workshops from 2013-2014.	Regional	Residential, Commercial	Urban Runoff, Water conservation, Pollution prevention	# Events/year # Attendees/event # Participants/incentive program	2013	Ongoing implementation	West Basin Municipal Water District, Los Angeles County Waterworks District 29, City of Malibu	Staff Time

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PIPP	Education	Pepperdine Business School Sustainability Project	Pepperdine business students created urban runoff and ASBS outreach materials, including posters and videos (available in English and Spanish). Materials are available on the Protect the Coast section on the Malibu City website. The students also mapped the process to develop a potential OFG Program on campus, created a guide for a green business certification program, and researched compliance and opinion of a local water ordinance as part of a project management class.	Pepperdine University	Residential, Commercial	Urban Runoff	# Videos created (2) # Posters created Pepperdine OFG guide	January 2012	Completed March 2012	Pepperdine University, City of Malibu	See ASBS Focused Outreach Program
PIPP	Incentive	Water District #29 Tiered Water Rates Based on Increased Usage	Los Angeles County Water District 29 has implemented tiered water rates based on increased usage to encourage water conservation and reduce water waste to provide economic incentive to reduce landscape irrigation runoff.	City of Malibu	Residential, Commercial	Urban Runoff, Water Conservation	Regional change in water usage over time	February 2003	Ongoing implementation	Los Angeles County Water District #29	-
PIPP	Education	Water Conservation Program	This program is an education and incentive program promoting water conservation. Educational information on water conservation is provided on the website and distributed at workshops. An education program targeted at students (3rd-12th grade) has also been developed.	Regional	Residential, Commercial	Urban Runoff, Water Conservation	# Site visits # Workshops	April 2009	Ongoing implementation	Los Angeles County Waterworks	Regional Program Cost
PIPP	Education, Incentives	Water Conservation Program – Water Saving Devices Rebate Program	Rebates are offered for water saving devices, including high-efficiency washing machines, sprinkler nozzles, and irrigation controllers. Rebates of $25 to $100 per irrigation controller, depending upon Water District and property (capped at $235/applicant), are provided.	Regional	Residential, Commercial	Urban Runoff, Water Conservation	# Rebates obtained *Assumed up to 15% runoff reduction per site*	April 2009	Ongoing implementation	Los Angeles County Waterworks	Regional Program Cost
PIPP	Incentives	Cash for Grass (and other turf removal program iterations)	Through this program, residents are offered a rebate of $1 per square foot of grass replaced with water-efficient landscaping (i.e., native plants, mulch, un-grouted stepping stones, permeable hardscape, and crushed rock). The goal of this program is to encourage water conservation for outdoor landscaping methods, including native plantings, using mulch, and installing permeable pavers.	Regional	Residential, Commercial	Urban Runoff, Water Conservation	# Applications # Completed projects $ Rebates	April-09	Ongoing implementation	Los Angeles County Waterworks	Regional Program Cost
PIPP	Incentives	Landscape Irrigation Efficiency Program (LIEP) (and other water efficiency evaluation programs)	This grant funded program consisted of free water use surveys of properties by a certified landscape professional. The program also included free installation of efficient irrigation controllers (i.e., rotator sprinklers in place of conventional spray heads) for qualified sites. Programs of this type are ongoing and evolving as funding arises.	Regional	Residential, Commercial	Urban Runoff, Water Conservation	# Surveys # Sprinklers exchanged *Assumed up to 70% runoff reduction per site*	April 2009	Ongoing implementation as funding and resources allow	West Basin Municipal Water District	Regional Program Cost
PIPP	Education	Billboard Educational Campaign	This program was a countywide, 8-week billboard campaign designed to promote protective waste management practices. A used motor oil educational advertisement was displayed on 20 billboards throughout Los Angeles County.	Regional	Residential, Commercial	Bacteria, Oil, Urban Runoff	Route of advertisements # Impressions	February 13, 2012	Completed April 2012	District, Los Angeles County	-

Existing Nonstructural Programs Within the ASBS 24 Area

Nonstructural Program	Program Subcategory	Name of Nonstructural Control	Project Descriptions for Existing Nonstructural Controls	Project Location	Target Source/ Target Audience	Targeted Water Quality Problem	Method of Measure	Program Start Date	Implementation Status/ Completion Date	Lead Agency	Approx. Cost ($/year)
Compliance Monitoring	Compliance Monitoring	Santa Monica Bay Comprehensive Monitoring Program	The Santa Monica Bay Beaches Bacteria TMDL includes a coordinated shoreline monitoring program with regular monitoring of 9 sites within the City boundaries of the ASBS and 1 in the Unincorporated County (25 sample sites in North Santa Monica Bay total), and adoption of a wet Weather Implementation Plan to eliminate exceedances of bacteria above contact recreation standards in local waters, but specifically Santa Monica Bay beaches.	Santa Monica Bay	Water quality data	Recreational waters beneficial use	Annual compliance monitoring data	April 2000	Ongoing implementation	Los Angeles County, City of Malibu, Caltrans	County: $35K - $190K City: $112,000
Special Study	Compliance Monitoring/ Special Study	Assessment of Subtidal Rocky-Reef Resources in Santa Monica Bay	Assessment determined the status of algal, invertebrate, and fish communities in the Subtidal Rocky-Reef Resources in Santa Monica Bay, Malibu ASBS. The study provided baseline information on the condition of subtidal rocky reef habitats and established a monitoring program to track changes in the condition of subtidal rocky reef habitat over time, per the Santa Monica Bay Comprehensive Monitoring Program.	Santa Monica Bay	Biological assessments data	ASBS Assessment	Final Report	August 2003	Completed March 2005	SMBRC, SCCWRP	-
Special Study	Special Study	Marine Habitat Gaps in Santa Monica Bay	Compared existing data with the lists of key habitats and species of concern and identified information gaps and study needs.	Santa Monica Bay	Water quality data	ASBS Assessment	Final Report	January 2003	Completed July 2004	SCCWRP, SMBRC	-
Special Study	Special Study	Santa Monica Bay Marine Habitats and Living Resources Inventory	The Santa Monica Bay Marine Habitats and Living Resources Inventory was a literature review to identify gaps in existing studies of habitats and species in the region. Upon update of the inventory, data summary reports from the inventory by site location, habitat type, and taxa were generated.	Santa Monica Bay	Data assessment	ASBS Assessment	Final Report	July 2003	Completed February 2004	SCCWRP, SMBRC	-
Special Study	Database Management	Santa Monica Bay Spatial Database & Santa Monica Bay Data Evaluation	Data collected under existing monitoring protocols used throughout Santa Monica Bay were evaluated to determine their applicability in the Marine Life Protection Act (MLPA) process (complete January 2003-February 2004). A spatial database was developed to be compatible with the GIS database for the central coast marine-protected areas and has been populated with data for Santa Monica Bay (complete January 2003-July 2004).	Santa Monica Bay	Data assessment	ASBS Assessment	Database	July 2003	Completed July 2004	SCCWRP, SMBRC	-
Special Study	Special Study	Oceanographic Information for Trend Analysis in Santa Monica Bay	In collaboration with the Southern California Coastal Ocean Observing System (SCCOOS), collect and compile historical physical and biological oceanographic information for trend analysis in Santa Monica Bay.	Santa Monica Bay	Data assessment	ASBS Assessment	Final Report	October 2003	Completed July 2004	SCCWRP, SMBRC	-
Special Study	BIGHT '03; BIGH '08; BIGHT '13	Marine Habitat Study of Santa Monica Bay and ASBS	Collaboration with southern California Bight partners to identify key types of marine habitats and develop a master list of species of concern for Santa Monica Bay & the Southern California Bight. In 2008, the State Water Resources Control Board (SWRCB) worked with ASBS dischargers to collaboratively conduct a statewide ASBS regional monitoring program to provide better scientific information to the SWRCB for regulation of the ASBS	Santa Monica Bay & ASBS 24	Biological assessments data, Water quality data	Urban Runoff, Storm Water Runoff	Monitoring Data, Final Report	Jan. 2003, Nov. 2008, Sept. 2013	July 2004, April 2009, July 2014	SCCWRP, City of Malibu and Los Angeles County as partners	$35,000 (2003) $74,087 (2008) $74,087 (2013)

Existing Nonstructural Programs Within the ASBS 24 Area

Nonstructural Program	Program Subcategory	Name of Nonstructural Control	Project Descriptions for Existing Nonstructural Controls	Project Location	Target Source/ Target Audience	Targeted Water Quality Problem	Method of Measure	Program Start Date	Implementation Status/ Completion Date	Lead Agency	Approx. Cost ($/year)
			and in drafting the special protections for the ASBS. The City of Malibu and County contributed to scientific analysis of data for pre and post storm monitoring events in 2008 and 2013- 2014. The City will continue the wet weather monitoring program in 2014-2015 wet seasons in order to meet the obligations of the Special Protections.								
Special Study	Special Study	Malibu Creek Bacteria TMDL Reference Watershed Study	Monitoring of dry weather, dry winter weather, and wet weather for one year to develop representative numeric target for bacteria exceedance days. This study was conducted in Arroyo Sequit, a watershed which outlets at Leo Carillo State Beach in the ASBS.	Arroyo Sequit	Water quality data	Urban Runoff, Storm Water Runoff	Final Report	June 2006	Completed July 2007	SCCWRP	$1,594
Special Study	Special Study	Source ID Study of Ramirez and Escondido Creek	North Santa Monica Bay Bacteria Source Identification Study of Ramirez and Escondido Creeks conducted by the County of Los Angeles. The City was a participant and served on the technical advisory committee to develop a methodology to track sources of bacteria indicators. The County of Los Angeles halted this study in 2008 study due to low bacterial levels measured. Monitoring resumed in 2009. Study ended in 2011, after no exceedances were observed.	Ramirez and Escondido Creeks	Water quality data	Urban Runoff, Storm Water Runoff	Final Report	March 2007	Completed July 2011	Los Angeles County, SCCWRP	-
Special Study	Special Study	Low-Flow Diversion Task Force	The low-flow diversion task force recommended management actions that optimize operations for the District. The task force completed a pilot project in June 2010 to test new technologies for low-flow diversion monitoring that would be used to better operate the system and characterize the sources of dry weather flows. This pilot project was successful and the District is pursuing a project implement these improvements at all of its low-flow diversions.	Regional	Dry Weather Flow	Urban Runoff	Low-Flow Diversion Structure Improvement List	2009 (start pilot program) June 2010	June 2010 (end of pilot program) Ongoing task force efforts	District	Staff Time

APPENDIX C

Potential Enhanced Nonstructural Programs Table

Potential Nonstructural Program Enhancements to Achieve Additional Wet Weather Load Reductions

Nonstructural Program	Program Sub-Category	Name of Nonstructural Control	Project Descriptions for Enhanced Nonstructural Controls	Target Source/ Target Audience	Targeted Water Quality Problem	Method of Measure	Lead Agency	Implementation Cost (Approx.)
O&M	Street Maintenance	Infrastructure Priority Re-Evaluation Program	This activity is a review and re-evaluation of existing inspection/cleaning priorities assigned to the catch basins, street, parking lot and other systems located in the ASBS 24 watershed. Prioritization criteria are based on the NPDES permit and are typically based upon historic trash and debris loading to a given system. This prioritization does not take into account the watershed or receiving water body that may be impacted by a given piece of infrastructure. Increased cleaning may be appropriate to meet the requirements of the ASBS Special Protections and General Exception or to provide a streamlined, efficient and effective implementation program for ASBS 24.	Residential, Commercial	Trash/Debris, Sediment	Existing Catch Basin Program Assessment, Other Program Assessments, Inspection Data, Pounds Removed / year	City of Malibu, County	$10K, +$25K/Year, maintenance per existing program
PIPP	Education, Incentives	Enhanced Collaborative Environmentally Friendly Alternative Services Program	This program would look for opportunities to enhance existing environmentally friendly services programs. For example, the LACoMAX could include an ASBS-specific region search and/or the City of Malibu could provide a link to via the Malibu Green Room webpage, with information related to local exchanges, a list of consignment facilities, etc. Programs that may also be enhanced in the future include the Clean Bay Restaurant Certification Program, City of Malibu's EPPP and RCP, and Los Angeles County's Rethink LA Program.	Residential, Commercial	Urban Runoff, Trash	Program-specific metrics will be developed	Los Angeles County, City of Malibu, Malibu Chamber of Commerce	$5K / Year
PIPP	Education	ASBS Signage at Beaches	Educational placards describing the ASBS would be developed and installed along the board walk and/or main public beach accesses along the ASBS. This signage would describe unique features of the ASBS, as well as highlight recommended BMPs for trash management, sediment management, irrigation control, etc.	Residential, Public	Urban Runoff, Trash	# placards installed, # beach visits/year	Los Angeles County, State of California	$20K
O&M	Street Sweeping	Increased Sweeping Frequency	This program would involve a pilot project to adjust the frequency of sweeping on City streets located within the ASBS drainage area from once per month to more frequently, paired with a runoff study to determine pollutant loading. Increasing the sweeping frequency has been shown to increase the potential load reduction associated with metals, sediments, trash, and debris.	Residential, Commercial	Metals, Sediments, Trash	Pounds of debris removed per year % reduction in pollutant loading vs. cost	City of Malibu	$360,000
O&M	Street Sweeping	Equipment Upgrade	As of 2013, the City of Malibu sweeps city streets using motorized mechanical street sweeping equipment. This proposed nonstructural program enhancement would involve either: 1) replacing mechanical street sweepers with enhanced sweeping technologies during the standard end of the equipment life-cycle, or 2) requiring contractors responsible for local sweeping activities to only use vacuum or regenerative air sweeping technologies.	Residential, Commercial	Metals, Sediments, Trash	Increased efficiency and pollutant load reduction for machine operation.	City of Malibu	Additional cost of ~$25K per machine.
PIPP	Education, Incentives	Architectural Copper and Metal Building Material Mitigation Program	This program would offer rebates for architectural copper and zinc mitigation measures. Rebates would be offered for existing structures and could be modeled after the Grass for Cash program. Potential mitigation measures may include: application of sacrificial paint (e.g., copper and zinc oxidation protection paints), downspout diversions, rain barrels and cisterns. Information could be incorporated into existing educational materials and through the ASBS Focused Outreach program, etc.	Residential, Commercial	Metals	# rebates offered, # facilities mitigated	City of Malibu, Los Angeles County	$150K / Year

Potential Nonstructural Program Enhancements to Achieve Additional Wet Weather Load Reductions

Nonstructural Program	Program Sub-Category	Name of Nonstructural Control	Project Descriptions for Enhanced Nonstructural Controls	Target Source/ Target Audience	Targeted Water Quality Problem	Method of Measure	Lead Agency	Implementation Cost (Approx.)
PIPP / Enforcement	City Ordinance, Education, Enforcement	Architectural Copper Ban	Monitoring data of storm water wash off collected from metal building materials have been shown to be associated with elevated copper levels (City of San Diego, 2009 and 2010a). This ordinance would prohibit use of architectural copper for all new developments and re-development projects, especially for buildings and facilities along the ASBS and PCH. This ordinance would likely require significant education and outreach to engineers and architects, as well as residents and general public.	Residential, Commercial	Copper	# brochures distributed, # workshops, Ordinance/Policy, # facilities enforced	City of Malibu	$5K
PIPP / Enforcement	City Ordinance, Education, Enforcement	Zinc Alternative Building Material Ordinance	It is recognized that for maintenance and durability, building materials are often specified as galvanized zinc. Monitoring data collected of storm water wash off from metal building materials have been shown to be associated with elevated zinc levels. This project would evaluate the feasibility and implement a zinc building material policy which would eliminate, reduce, mitigate or control the use of zinc building materials, based upon the findings of a feasibility analysis and stakeholder engagement process.	Residential, Commercial	Zinc	Feasibility analysis, Ordinance/Policy	City of Malibu	$10K + $5K/Year *(outreach)*

APPENDIX D

Enhanced Nonstructural Programs

Quantification Calculations

- Aggressive Street Sweeping
- Building Material Management Program

AGGRESSIVE STREET SWEEPING

Aggressive street sweeping can be highly effective in reducing metals loading (City of San Diego, 2010; Seattle Public Utilities, 2009; City of Portland, 2006) and, to a lesser extent, bacteria (Skinner et al., 2010), while continuing to address trash, debris, and sediment pollution. The County has implemented an aggressive street sweeping program at County Beach parking lots (i.e., sweeping three times per week with enhanced sweeping equipment). Given that these parking lots experience a reduced traffic load compared to the PCH and City streets and have an aggressive sweeping schedule and program, the County's existing parking lot sweeping program is considered to be appropriate for protecting water quality of the ASBS 24 (i.e., program at a high level where adding enhancements may provide diminishing returns). The City currently implements a two-part street sweeping program, including weekly mechanical sweeping along PCH and monthly mechanical sweeping along City-maintained streets. This assessment focuses on quantifying the potential additional water quality benefits that could be realized through enhancements to the sweeping programs associated with City street sweeping programs. Data from the *City of San Diego Targeted Aggressive Street Sweeping Pilot Study Effectiveness Assessment*, which evaluated the effectiveness of three types of street sweepers at two aggressive sweeping frequencies, are used in this section to evaluate the potential load reduction associated with sweeping the PCH and City-maintained streets.

The referenced 2010 City of San Diego report uses debris removal, or collection rate as a metric to assess the relative pollutant load reduction associated with the various aggressive street sweeping programs evaluated. The fine sediments collected in special study bins were weighed, sampled, and analyzed for grain size, metals, pesticides, and other constituents of concern. Daily sweeping data were translated into pounds of debris removed per linear broom mile swept, and pollutant-specific load reduction rates were estimated (City of San Diego, 2010). This method of measure was used to compare the effectiveness of different types of street sweepers at twice-per-week and once-per-week sweeping frequencies.

The 2010 City of San Diego study included detailed analysis of various routes through different types of watersheds (hilly, flat, rural, and urban), including the urban areas of Chollas Creek. The average pounds of debris removal per broom mile for mechanical and vacuum sweepers, at both once and twice a week frequencies for this particular urban route, are presented on Table D-1. The broom mileage data used to produce these sediment removal rates were extracted from the 2010 City of San Diego study (City of San Diego, 2010), which is available on the Think Blue San Diego website. Note that the frequency of sweeping implemented under a few of the existing sweeping programs implemented by the County (3 times/week) and City (once/month) do not perfectly correspond with the available data. Removal rates for these frequencies were extrapolated using the best-fit curves presented on Table D-1 and in Figure D-1.

Table D-1. Sediment Load Reductions Associated with Mechanical and Vacuum Sweeping (City of San Diego, 2010)

Sweeper Technology	Sweeping Frequency	Average Sediment Removal Rate (lb/broom mile)
Mechanical	Once/week[1]	49.4
	Twice/week[1]	30.9
	Once/month[2]	63.3
	Twice/month[2]	58.7
Vacuum	Once/week[1]	80.0
	Twice/week[1]	83.3
	Once/month[2]	77.5
	Twice/month[2]	78.4

[1] Calculated debris removal rate from referenced special study (City of San Diego, 2010).
[2] Calculated using interpolated values.

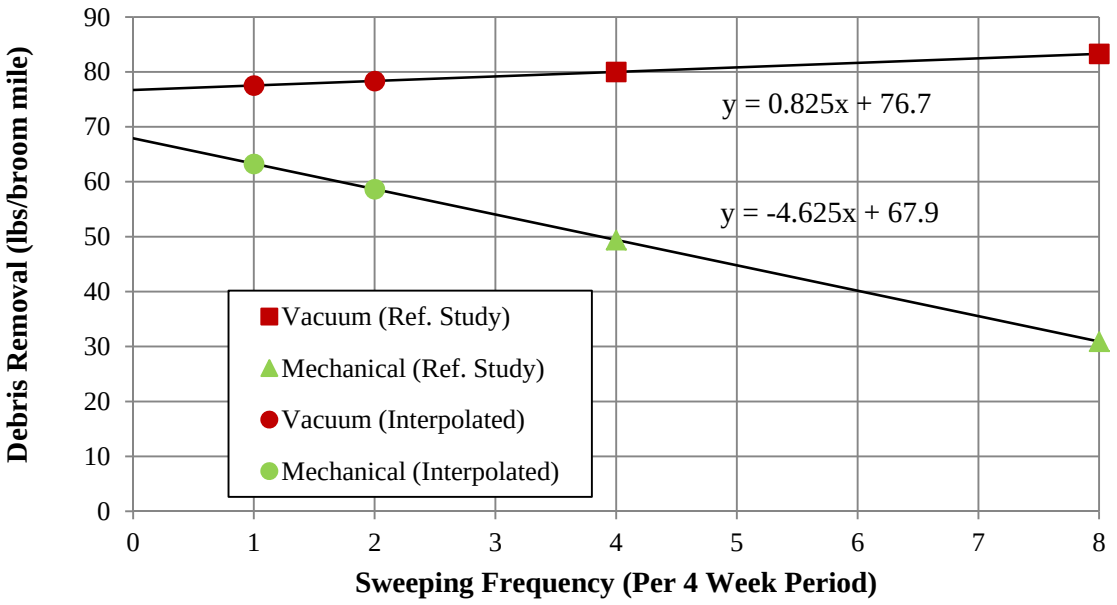

Figure D-1. Sediment Load Reductions Associated with Mechanical and Vacuum Sweeping (City of San Diego, 2010)

The potential debris reductions associated with street sweeping within ASBS 24 were calculated by determining the linear broom miles or path of travel and multiplying that length by the appropriate removal rate. The linear broom miles for each parking lot were determined using GIS information (aerial images, parcel layer, and land use data). Sweeping data for existing programs within the ASBS 24 are presented on Table D-2.

.

Table D-2. Existing Street Sweeping Programs Within ASBS 24

Authority	Beach Name	Acres (acres)	Single Trip Broom Miles (miles)	Yearly Broom Miles at Once/month frequency (miles/year)	Yearly Broom Miles at Twice/Month Frequency (miles/year)	Yearly Broom Miles at Once/Week Frequency (miles/year)
City of Malibu	PCH	-	16	192	384	832
	City Streets	-	59	702	1,404	3,042

The potential debris removal for each sweeping option considered was estimated by multiplying the yearly linear broom mileage by the applicable debris removal rate and results of these calculations are provided on Table D-3.

Table D-3. Potential Debris Removal Summary for Each Sweeping Method

Authority	Machine	Location	Frequency	Broom Miles (miles/ year)	Debris Removal Rate (lb/ miles)	Debris Removal Rate (lb/year)	Debris Removal Rate (kg/year)
City of Malibu	Mechanical	PCH	Once/month	192	63.3	12,149	5,503
			Twice/month	384	58.7	22,541	10,211
			Once/week	832	49.4	41,101	18,619
		City Streets	Once/month	702	63.3	44,419	20,122
			Twice/month	1,404	58.7	8,2415	37,334
			Once/week	3,042	49.4	150,275	68,074
	Vacuum	PCH	Once/month	192	77.5	14,885	6,743
			Twice/month	384	78.4	30,106	13,638
			Once/week	832	80.0	66,560	30,152
		City Streets	Once/month	702	77.5	54,423	24,653
			Twice/month	1,404	78.4	110,074	49,863
			Once/week	3,042	80.0	243,360	110,242

Debris removal includes sediment, organics, and trash. The 2010 San Diego study did not directly correlate debris removal to TSS removal. The potential debris removal calculations for the different street sweeping scenarios are provided to show the comparison between different types of sweepers and sweeping frequencies.

The 2010 San Diego study included monitoring the water quality for three storm events at sites located within the Chollas watershed (Route 3J). For each monitored event, three different street segments were sampled representing sites that had been swept by either a vacuum or mechanical sweeper, once per week and for the three continuous weeks prior to the storm event and an "unswept" site that had been swept once every two months prior to the event (City of San Diego, 2010). A summary of the TSS results and calculated load reductions are provided on Table D-4. .

Table D-4. Summary of Street Sweeping Water Quality Results (City of San Diego, 2010)

Storm Event	Type of Sweeping	TSS (mg/L)	TSS Percent Reduction
Mean of Three Storms	Un-swept (Once/2 months)	927.0	N/A
	Mechanical (Once/week)	243.8	73.7%
	Vacuum (Once/week)	135.8	85.3%

The TSS removal efficiencies shown on Table D-4 can be used in combination with watershed model output data to estimate the transportation land use TSS pollutant load reductions associated with enhancing programs to perform sweeping at a once-per-week frequency with these types of machinery. The estimated TSS load reduction can also be compared to the total TSS load from watershed model data to estimate the overall pollutant load reductions from the street sweeping program.

The load reductions summarized on Table D-4 are based on the 2010 San Diego study and removal efficiencies of mechanical and vacuum sweeping at a once-a-week frequency (City of San Diego, 2010). As part of this study, storm event monitoring samples (wet weather) were not collected for comparison of un-swept sites to sites that were swept at a frequency of once per month or twice per month. However, based on the debris removal data collected in the referenced study and applied to the ASBS 24 watershed (see Table D-3), sweeping less frequently (e.g., once per month or twice per month) would provide less of a load reduction, even though a specific percentage is not provided by this quantification analysis. There is a correlation between TSS and metals in urban storm water runoff (LARWQCB, 2005), and the reductions in TSS load shown on Table D-4 also represent load reductions of metals.

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Simple Method Model to Estimate Copper Load Reduction Associated with Nonstructional BMP Program

Watershed Parameters

Area	1	ac	
Rainfall	1	inch	
Percent of Resid that have cu	25%		
w/cu material factor	25	times std EMC	
Residential Cu EMS (w/cu)	432.5	ug/L	
Residential Cu EMC	17.3	ug/L	(LARWQCB, 2005)
Open Space Cu EMC	9.1	ug/L	(LARWQCB, 2005)
Transportation Cu EMC	51.9	ug/L	(LARWQCB, 2005)

Land Use	Coverage	Impervious %	**Rv Value**
Residential	50%	35%	0.365
Open Space	40%	3%	0.077
Transportation	10%	75%	0.725

Base Line (Exisiting Conditions No Program)

Calculations:

Land Use	Coverage	Impervious %	**Rv Value**	Cu EMC (ug/L)	Loading (kg/(1-in*1 ac)
Residential Cu EMS (w/cu)	12.5%	35%	0.365	432.5	0.0219
Residential Cu EMC	37.5%	35%	0.365	17.3	0.0026
Open Space Cu EMC	40.0%	3%	0.077	9.1	0.0003
Transportation Cu EMC	10.0%	75%	0.725	51.9	0.0042
Total	**100.0%**				**0.0290**

With Program - Lower End of Reductions Based on Stated Asssumptions

Assumptions:		Results	
Percent of Program Utilization	20.0%	Load Reduction =	6.0%
Load Reduction	40.0%		

Calculations:

Land Use	Coverage	Impervious %	**Rv Value**	Cu EMC (ug/L)	Loading (kg/(1-in*1 ac)
Residential Cu EMS (w/cu)	10.00%	35%	0.365	432.5	0.0175
Residential Cu EMS (w/cu) on Program	2.50%	35%	0.365	259.5	0.0026
Residential Cu EMC	37.5%	35%	0.365	17.3	0.0026
Open Space Cu EMC	40.0%	3%	0.077	9.1	0.0003
Transportation Cu EMC	10.0%	75%	0.725	51.9	0.0042
Total	**100.0%**				**0.0273**

With Program - Upper End of Reductions Based on Stated Asssumptions

Assumptions:		Results	
Percent of Program Utilization	20.0%	Load Reduction =	12.1%
Load Reduction	80.0%		

Calculations:

Land Use	Coverage	Impervious %	**Rv Value**	Cu EMC (ug/L)	Loading (kg/(1-in*1 ac)
Residential Cu EMS (w/cu)	10.00%	35%	0.365	432.5	0.0175
Residential Cu EMS (w/cu) on Program	2.50%	35%	0.365	86.5	0.0009
Residential Cu EMC	37.5%	35%	0.365	17.3	0.0026
Open Space Cu EMC	40.0%	3%	0.077	9.1	0.0003
Transportation Cu EMC	10.0%	75%	0.725	51.9	0.0042
Total	**100.0%**				**0.0255**

LARWQCB (Los Angeles Regional Water Quality Control Board). 2005. Total Maximum Daily Load for Toxic Pollutants in Marina del Rey. October 6, 2005. EMCs were estimated based on LADPW's stormwater data from 1994 to 2000.

APPENDIX E

Preliminary Design Report

Broad Beach Structural BMPs

Prepared for:

City of Malibu
23825 Stuart Ranch Road
Malibu, CA 90265-4861

Broad Beach Road Biofiltration Project

Preliminary Design Report

Prepared by:

Geosyntec consultants

engineers | scientists | innovators

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Project Number LA0245

April 2011

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LIST OF ABBREVIATIONS AND ACRONYMS

BMP	Best Management Practice
CDP	Coastal Development Permit
CEQA	California Environmental Quality Act
ETWU	Estimated Total Water Usage
LACFD	Los Angeles County Fire Department
LCP	Local Coastal Program
LIP	Local Implementation Plan
MAWA	Maximum Applied Water Allowance
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
MSL	Mean Sea Level
NPDES	National Pollutant Discharge Elimination System
OWTS	Onsite Wastewater Treatment System
PAH	Polycyclic Aromatic Hydrocarbon
PCH	Pacific Coast Highway
PDR	Preliminary Design Report
POC	Pollutant of Concern
SWRCB	State Water Resources Control Board

The Broad Beach Road Biofiltration Project (Project) is funded in part by the City of Malibu (City) and in part by the State Water Resources Control Board (SWRCB) through a Proposition 84 Grant Agreement between the two parties. The contents of this document do not necessarily reflect the views and policies of the State Water Resources Control Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

1. INTRODUCTION

The purpose of this report is to present the design basis and the evaluation of design alternatives for the Broad Beach Road Biofiltration Project (Project). This Preliminary Design Report will form the basis for the critical evaluation and selection of the Project design approach.

The Preliminary Design Report (PDR) is intended to document all the relevant studies, evaluations, and calculations for the Broad Beach Road Biofiltration Project and to produce two conceptual design alternatives for the Project. The Project scope of work requires that the PDR include the following:

- Hydrology studies and soils report;
- Groundwater mounding analyses;
- Utility maps and identification of utility interferences;
- Development of two conceptual design alternatives presented at the 10 percent design level;
- Site plans showing proposed improvements, landscaping, and best management practices (BMPs);
- Performance and maintenance for the proposed alternatives;
- Construction cost estimate; and
- Final design recommendations.

This report is presented in 10 sections. Section 1 is this report and Project introduction. Section 2 reviews the existing Project site conditions, including topographic maps and utility maps. Section 3 reviews various regulations and approvals considered in the development of the Project conceptual design. Section 4 presents the results of the soil and groundwater investigation, including the infiltration study and groundwater mounding analysis. Section 5 introduces the Project hydrology evaluation, including a review of site drainage and development of the Project site design capture volume. Section 6 reviews the Project objectives, introduces the proposed BMPs and site improvements, and develops two stormwater improvement alternatives. Section 7 presents construction cost estimates for the two alternatives. Section 8 includes a discussion of the two alternatives, with recommendations. Section 9 defines the

limitations on use of this report. Section 10 presents pertinent references cited in this report.

1.1 Project Description and Background

The city of Malibu was awarded a Proposition 84 grant by the State Water Resources Control Board (SWRCB) for the Broad Beach Road Biofiltration Project. The stated purpose of this grant is for "diverting dry-weather and some stormwater runoff from a series of eight (8) storm drains onto permeable surfaces and into a biofiltration system along a one (1) mile stretch of Broad Beach Road to prevent discharges to Broad Beach." [SWRCB, 2011]. The City of Malibu has contracted with Geosyntec Consultants to prepare studies, develop design documents, provide community outreach, and support the City during construction of this Project.

The Project includes various stormwater BMPs, landscape, and other improvements to eliminate or greatly reduce dry-weather flows, improve stormwater quality through treatment, reduce erosion and sediment tracking, and possibly capture and use stormwater. Overall, the Project will improve runoff quality and reduce wet weather and dry weather flows to Broad Beach.

1.2 Project Objectives

The Project objectives are:

- Eliminate dry weather flows to the storm drain;
- Reduce wet weather flows to storm drain (as feasible);
- Improve water quality of wet weather flows to storm drain (i.e., storm water treatment, pollutant reduction) to the maximum extent practicable (MEP);
- Reduce potable water use for irrigation (as feasible);
- Restore habitat above Broad Beach Road (as feasible);
- Reduce slope erosion (as feasible); and
- Preserve street and visitor parking.

1.3 Terms of Reference

This report was prepared for the City of Malibu (City) by Geosyntec Consultant Team (Geosyntec) in support of the Broad Beach Road Biofiltration Project in the City of Malibu, California. This work was authorized under Agreement executed on October 27, 2011; this report satisfies Task 1.11 of the scope of services. This report was written by Jan Coward and Patrick Galvin, PE, with senior review conducted by Ken Susilo, PE, in accordance with Geosyntec's quality review procedures.

The City project manager for the Project is senior civil engineer Rob DuBoux, Esq., PE.

The Project is funded in part by the City of Malibu and in part by the State Water Resources Control Board through a Proposition 84 Grant Agreement between the two parties.

2. EXISTING SITE CHARACTERISTICS

2.1 General Site Condition and Location

Broad Beach Road, situated between Broad Beach and Pacific Coast Highway (PCH) in Malibu, California, runs parallel to the coastline with a general orientation within the Project area of southeast to northwest. Broad Beach Road is a paved two-lane residential street providing residents access to their homes along the south side of the road and providing parking and beach access for residents and visitors. A mostly unpaved strip along the northern edge of Broad Beach Road varying in width from 10 to 20 feet provides public parking on the north side of the road. This parking strip is separated from PCH by a vegetated hillside which varies in slope from slightly steep to nearly vertical bluffs where the elevation difference between the two roadways is at its greatest. The Project area is located in the western end of Malibu approximately three miles northwest of Point Dume (see Vicinity Map, Figure 2-1).

The Project drainage area encompasses approximately 4,500 linear feet of Broad Beach Road between PCH and Victoria Point Road and extends for the most part from the center line of Broad Beach Road to the top of the hillside between Broad Beach Road and PCH. The total Project drainage area is 12.3 acres.

The Project area is located at the mouth of Trancas Canyon (see Figure 2-2). Trancas Canyon Creek, which drains the 6,233 acre Trancas Canyon watershed, runs to the east of the Project area culminating in a small disturbed coastal lagoon adjacent to the commercial center at the intersection of Trancas Canyon Road and Pacific Coast Highway. The area north of the Project area and west of Trancas Canyon Road drains to Caltrans-owned catch basins along the northern edge of PCH. The Trancas Canyon watershed drainage is not addressed by this Project. With the exception of one area located on PCH, the drainage from PCH is not addressed by this Project.

2.2 Site Topography

The site topography is fairly consistent along the length of Broad Beach Road varying mainly in the elevation difference between Broad Beach Road and PCH and the steepness of the hillside. The Project area, corresponding to the drainage area, encompasses 12.3 acres, approximately 1.6 acres of which is asphalt and concrete paved roadway and parking area. A topographic survey was performed for the Project. The topographic maps are presented in Appendix A.

Broad Beach Road is paved with asphalt and has two lanes, each lane approximately 10 feet wide. The road is crowned at the center line with a lateral slope of roughly two percent. Thus, storm water runoff that lands on the south side of the road flows toward the private residence drains and storm water from the north side of the road flows to the city-owned catch basins. The roadway undulates but is relatively flat except for the western end which reaches a slope of up to five percent. The stretch of road within the Project area has four low points and the roadway elevation varies from 18 to 64 feet above mean sea level measured at roadway center line.

A shoulder area varying in width from roughly 10 to 20 feet lies on the north side of the road along the entire stretch, separating it from the hillside –this area is used for parking by visitors and residents. This area is mostly unpaved, covered by varying materials including gravel, decomposed granite, compacted dirt, sand, and patches of asphalt and concrete. The parking strip follows the same undulating gradient as the roadway in the longitudinal direction and slopes slightly from the toe of the hillside toward the edge of the roadway pavement.

The hillside that separates the parking area and the shoulder along the south side of PCH is relatively steep and in certain areas nearly vertical. The elevation difference from the top of the hillside to the bottom of the hillside varies between 20 and 60 feet. The vertical bluff sections coincide with where the shoulder along PCH is widened to allow for roadside parking.

The entrances to the properties along the south side of Broad Beach Road generally lie at the same elevation as the roadway, or lower.

Existing drainage patterns are described in *Section 5 Hydrology* .

2.3 Utilities

The major utilities within the Project area consist of storm drains, sanitary sewer, potable water, electricity, communication, and natural gas. In support of the development of this preliminary design, the Geosyntec team performed utility research and located existing utilities in the Project area. This work was done using available utility maps and by requesting utility owners to mark their utilities at the Project site. No independent field verification of utilities was conducted. The utility maps are presented in Appendix B.

2.4 Biology

In support of the development of this preliminary design, the Geosyntec team performed a preliminary Biological Assessment of the Project area. The intention of the Biological Assessment was to provide an objective preliminary evaluation of potential impacts of the Project on existing biological resources. The information presented below is a summary of the conclusions and recommendations from this assessment. The preliminary draft of the Biological Assessment report is presented in its entirety in Appendix C.

Based on review of historic vegetation maps, the site is significantly degraded from its historic condition prior to development of Broad Beach. Field surveys found that the vegetation was heavily invaded by naturalized and planted exotic species. The vegetation classifications described below were determined to best characterize the assessment area.

- *Coastal Bluff Scrub (3.1 acres)* - Coastal bluff scrub consists primarily of native plant species, although exotic invasives are present throughout. This vegetation occurs on the upper, steeper bluff slopes between Pacific Coast Highway and the lower landscaped zone along Broad Beach Road.

- *Ornamental Landscaping (4.2 acres)* - Ornamental landscaping consists primarily of exotic vegetation that has been planted and irrigated, including pines, junipers, eucalyptus, bamboo, bougainvilla, and invasive species such as pampas grass. This vegetation dominates the lower slope of the assessment area along Broad Beach Road.

- *Ornamental Landscaping/Coastal Bluff Scrub (1.1 acre)* - This classification represents an integration of native and planted vegetation, with invasive exotics such as iceplant also present throughout.

- *Ornamental Landscaping (Planted Sycamores) (0.2 acre)* - Planted and irrigated sycamores occupy a localized, small area between Broad Beach Road and artificial terraces upslope. These trees may fall under the protection of the City's Native Tree Protection Ordinance because they are native to California.

In general, the area has relatively few wildlife species present or expected to occur, due to its condition as fragmented habitat surrounded by high-traffic roads, frequent human disturbance, construction noise, and dominance of exotic vegetation. The exotic vegetation provides cover and limited nesting habitat for birds, but few food resources for native wildlife. Certain wildlife species, especially goldfinches and crows, were

frequently observed moving between the assessment area and landscaping on residential properties to the south. After the Project design is further advanced, an additional biological assessment will be conducted to specifically address the proposed activities and their potential biological impact on the final Project areas.

2.5 Climate

The climate characteristics of the site reflect the general Mediterranean climate of central coastal regions of California. This climate regime is characterized by cool, wet winters and warm, dry summers with occasional periods of fog. Although infrequent, Malibu is periodically subjected to intense coastal storms.

The average daytime summer temperatures in the area are usually in the 70s to 80s (Fahrenheit). Nighttime low temperatures during the summer are typically in the high 50s to low 60s, while the winter high temperature tends to be in the 60s. Characteristic of Malibu's marine microclimate, the winter low temperatures are in the low 50s. The annual average rainfall in Malibu is about 20 inches. Winter months tend to be wetter than summer months. The wettest month of the year is January with an average rainfall of about 5 inches.

2.6 Hardscape and Landscape

Many Broad Beach Road residents have created gardens across from their residences on city property. These gardens include many non-native invasive or ornamental plants and shrubs. On several parcels, numerous potted plants are also stored along the roadway. Although this property is owned by the city, many homeowners have installed private irrigation systems plumbed back to their residential water services. Irrigation piping runs under the road and was also observed within existing storm drain pipe. The private irrigation of gardens creates uncontrolled and unmanageable dry-weather flows which have been observed during recent site visits.

Residents have also constructed several garden and retaining walls along the hillside. These walls are constructed of a myriad of materials including cobbles, broken concrete, masonry brick, and cast-in-place concrete. Some walls appear to have served as a means of disposal of waste broken concrete from driveway replacements. The parcel-specific variable hardscape and landscape elements have created an inconsistent environmental theme for the neighborhood.

Examples of existing hardscape, landscape, and irrigation systems are presented in Figures 2-3 through 2-9.

3. REGULATORY REQUIREMENTS

3.1 Water Quality

The City storm drains within the Project area ultimately discharge through private drains to private beaches. After passing through a wave wash mixing zone in the Pacific Ocean, flows reach the Pacific Ocean and a designated Area of Special Biological Significance (ASBS 24). The California Ocean Plan [SWRCB, 2009] defines water quality objectives for ocean waters including all ASBS. Since compliance with Ocean Plan's stringent objectives is not always economically feasible nor in the public interest, the Ocean Plan allows the State Water Board to grant exceptions to its provisions as long as the public interest will be served and beneficial uses are protected.

As part of an application for a general exception to Ocean Plan requirements, Special Protections [SWRCB, 2012] have been proposed to fulfill the state mandate for protection of water quality in ASBS and to address the requirements identified in the Ocean Plan. On March 20, 2012 these Special Protections were recommended by the State Water Board as part of an Ocean Plan Exception. According to these Special Protections, the design storm for treatment control BMPs is defined as follows:

> "Design storm – For purposes of these Special Protections, a design storm is defined as the volume of runoff produced from one inch of precipitation per day or, if this definition is inconsistent with the discharger's applicable storm water permit, then the design storm shall be the definition included in the discharger's applicable storm water permit."

The applicable storm water permit in this case is the Los Angeles County National Pollutant Discharge Elimination System (NPDES) Municipal Storm Sewer Systems (MS4) Permit. Since under this permit the Broad Beach project is not considered a new development or a redevelopment, the permit requires that pollutants in stormwater discharge be reduced to the maximum extent practicable (MEP). In Los Angeles County the 0.75 inch design storm event is generally accepted as equivalent to MEP per the MS4 permit. This is also in compliance with the design storm requirements in the proposed revised MS4 Permit [LA RWQCB, 2012]. Since the one inch event is inconsistent with the applicable permit, the conclusion of this study is that the Broad Beach treatment control BMPs should be designed for the 0.75 inch design storm event.

3.2 Environmental Review

The Project is subject to the requirements of the California Environmental Quality Act (CEQA). CEQA requires that all projects be reviewed and that their environmental impacts be evaluated. The lead agency for the Project is the city of Malibu. On behalf of the city of Malibu, Geosyntec will prepare an Initial Study for the project.

This Project is an environmental improvement project (stormwater quality improvement) and the new constructed facilities will likely be hardscape and landscape improvements and natural water quality treatment facilities such as vegetated swales and biofilters. It is expected that the Initial Study will result in a finding of no impact or no significant impact with mitigation, qualifying the Project for a Negative Declaration or a Mitigated Negative Declaration.

As part of the CEQA process, a Frequently Asked Questions sheet will be published and distributed to the community to inform them of the Project. A public notice will be filed in the local newspaper and a public meeting will be conducted to provide the interested public with the opportunity to comment on the Project plans.

3.3 Coastal Development Permit

The California Coastal Act of 1976 (Div. 20 CA Public Resources Code Sections 30000 et. seq.) was adopted by the California Legislature in 1976 and became effective January 1, 1977. The Coastal Act provides a comprehensive regulatory framework for all new proposed non-exempt "development" (See PRC Sec. 30106 and 30610) within the Coastal Zone of the state of California. Pursuant to Sec. 30500 et. seq. of the Coastal Act each local government is responsible for preparing and adopting a Local Coastal Program (LCP) so as to implement the policies and provisions of the Act within its jurisdictional boundaries. Prior to Certification of an LCP the California Coastal Commission generally retains jurisdiction for the processing of Coastal Development Permits (CDPs) consistent with the Act; following certification of an LCP it becomes the primary responsibility of the Local government to review and approve all new proposed development within the Coastal Zone consistent with the provisions contained within its LCP.

In 2002 the City of Malibu's Local Coastal Program was approved by the California Legislature and became law. Any new non-exempt development proposed within the City of Malibu must apply for and receive a Coastal Development Permit prior to commencement of development (See 13.3 of the Malibu Local Implementation Plan—"LIP"). The LIP and the Malibu Municipal Code provide the primary regulatory framework for review of new development.

The Project is located within the Coastal Zone in the City of Malibu and does propose new development therein; therefore the Project is governed by the City's Certified Local Coastal Program and is required to obtain a Coastal Development Permit prior to Project commencement in addition to other requisite Project entitlements.

3.4 Water Use Guidelines

The Los Angeles County Department of Public Health has established guidelines [Los Angeles County, 2011] for harvesting of rainwater, stormwater, and urban runoff for outdoor non-potable uses such as irrigation. The guidelines have categorized rainwater harvesting systems into four classes, Tier I – IV, depending on the potential water sources, and provide requirements for minimum water quality standard and treatment processes.

- Tier I – On-site collection of rainwater in rain barrels for on-site use in gravity flow systems.
- Tier II - On-site collection of rainwater in cisterns for on-site use.
- Tier III - On-site or off-site collection of rainwater, stormwater, and urban runoff in cisterns for on-site or off-site use. (Excludes water collected from locations zoned for high use transportation corridors, industrial, agricultural or manufacturing uses).
- Tier IV - On-site or off-site collection of rainwater, stormwater, and urban runoff in cisterns for on-site or off-site use. (Includes water collected from locations zoned for high use transportation corridors, industrial, agricultural or manufacturing uses).

Any rainwater harvesting systems based on storage of runoff from Broad Beach Road in underground cisterns would most likely be regulated under Tier III, due to the presence of urban (dry-weather) runoff generated from irrigation of the hillside.

For Tier III systems, if captured runoff is to be used for spray irrigation, irrigation water must be disinfected by chlorination or an equivalent technology. For drip or sub-surface irrigation, Tier III systems require only pre-screening (sediment filtration) of irrigation water. Project biofilters are anticipated to satisfy pre-screening requirements.

4. GEOTECHNICAL AND GROUNDWATER INVESTIGATIONS

4.1 General

To support the development of the preliminary design, Geosyntec performed geotechnical and groundwater investigations for the Project area. The information presented below is a summary of the investigations and the conclusions and recommendations from the Geotechnical and Groundwater Studies Report [Geosyntec, 2012]. The report in its entirety is included on a CD in Appendix D.

4.2 Purpose and Objectives

The Geotechnical and Groundwater investigations focused on the evaluation of subgrade soils along the Project alignment for the purpose of providing design input. This included assessment of groundwater conditions and infiltration potential. Geosyntec's scope of work consisted primarily of the following tasks:

- Gathering available geotechnical and geologic information;
- Performing a geotechnical field investigation consisting of six hollow-stem auger borings and six Geoprobe soundings;
- Performing a constant head infiltration test in the vadose zone and in saturated zones at the locations of the six Geoprobe soundings;
- Constructing temporary piezometers and monitoring groundwater elevations at select Geoprobe locations;
- Conducting laboratory testing of selected soil samples obtained from the borings and analytical testing of groundwater samples; and
- Conducting geotechnical engineering analysis.

4.3 Summary of Existing Conditions

4.3.1 Surface and Subsurface Conditions

To the north, the site is bounded by a predominantly vegetated bluff slope that extends up to the relict marine terraced platform on which Pacific Coast Highway is located. However, localized portions of the adjacent slope are devoid of vegetation and expose the rilled granular material of the marine terrace bluff. Exploratory borings encountered

artificial fill, Quaternary Terrace deposits, and the Tertiary age Trancas Formation at depth.

Artificial fill deposits were encountered in five of the six explorations along Broad Beach Road. In general, the fill deposits consist of brown sands with varying amounts of gravel and clay. Within the limits of the explorations, artificial fills extended from the ground surface to maximum depths of four feet.

Quaternary-age terrace deposits were encountered within all of the 12 explorations performed for the investigation at the ground surface or underlying the artificial fill. The terrace deposits generally range in composition from brown to reddish brown, clayey to gravelly sand, to light brown to tan, silty sand. Within the older, upper terrace bluff (Qt), densities generally increase with depth from medium dense to very dense.

Along the terrace surface underlying Broad Beach Road, the densities generally ranged from medium dense to dense. A subset of these terrace deposits, identified as the "Beach Sands" or Qb is present at a number of the investigation locations along Broad Beach Road. This deposit identified separately from other terrace deposits due to its characteristic fine sand and relatively low fines content (20 percent).

At the location of Broad Beach Road, the beach sand is typically less than approximately 10 feet thick. Based on information from other investigations between Broad Beach Road and the ocean this thickness increases to 10-15 feet typically.

The Tertiary age Trancas Formation underlies the entire site at depth and was encountered in nine of the explorations –this formation generally consists of a hard, gray fat claystone. Along Broad Beach Road, the Trancas Formation was encountered beneath the terrace deposits at an elevation of +18 feet mean seal level (MSL) at the west end of the Project area and slopes down to an elevation of -5 feet MSL at the east end. It is anticipated that the erosional unconformity between the overlying terrace deposits and the Trancas Formation slopes up to the north beneath Pacific Coast Highway and slopes down towards the beach on the south.

Dozens of single family residences are present along the south side of Broad Beach Road along the Project alignment. Review of numerous foundation reports for these structures indicates that while some are founded on the Trancas formation using deep foundations other structures and appurtenances may be founded on the beach sands using shallow foundations.

4.3.2 Groundwater

The investigations performed by Geosyntec indicate that the groundwater gradient in the Beach Sands is typically from north to south (i.e., toward the ocean). It is expected that water that infiltrates at the surface along Broad Beach Road will flow within the Beach Sands toward the ocean along the sloping unconformity between the Trancas formation and Beach Sand. Additional flow infiltrated by this Project may raise groundwater elevations within the Beach Sand.

The measured static groundwater elevation varied along the alignment of Broad Beach Road from approximately 7.0 to approximately 20.5 ft above MSL. In general, the observed groundwater elevations are assumed to represent a dry-weather condition although "wet year" and "wet-weather" conditions are assumed to be within a few feet of these conditions as indicated by observations. The groundwater elevations recorded remained fairly constant over the monitoring period, suggesting that there is no significant tidal influence at these locations.

In conversations with Broad Beach residents, concerns were expressed regarding making changes that potentially increase infiltration and consequentially raise groundwater levels. Some homes have basements and at least one homeowner has observed water, presumably groundwater, leaking into the basement.

4.3.3 Onsite Wastewater Treatment Systems

Onsite wastewater treatment systems (OWTS), such as septic systems, for the residences along the south side of Broad Beach discharge to leach fields that are in some areas located in the backyards between the homes and the dunes, in the courtyard area between the garage and the house, or between the house and Broad Beach Road. Based on analysis of groundwater samples carried out for this Project, it appears that the locations sampled are generally unaffected by the operation of the OWTS's.

4.4 Findings

The California Department of Transportation (Caltrans) Stormwater Quality Handbook: Project Planning and Design Guide [Caltrans, 2007] and the Los Angeles County Department of Public Works Stormwater Best Management Practice Design and Maintenance Manual [LADPW, 2009] both present guidelines related to the siting of infiltration BMPs. The criterion for selection of an appropriate site for infiltration trenches contained in these documents were used as primary screening criteria for selection of appropriate locations for Project infiltration features.

Based on the results of the investigations and evaluations, from a geotechnical viewpoint, the proposed stormwater best management practices and streetscape improvements are feasible as long as direct infiltration is not included as a Project feature. While infiltration rates in some areas are within the acceptable ranges, the following design criteria restrict the use of infiltration:

- The shallow groundwater and a shallow confining layer will impose significant constraints on the geometry of infiltration facilities.

- Typically the invert of infiltration features would be approximately five feet below grade, which in areas of shallow groundwater would violate the criteria of a 10-foot separation from groundwater provided in Caltrans [2007] and CASQA [2003].

- Dozens of OWTS are potentially present within 50 feet of the proposed infiltration facilities. Operation of infiltration facilities within 100 feet of septic system or a leach field violates the Caltrans [2007] criteria.

- Structural foundations are present within 100 feet down gradient of the location of the proposed features. This violates the Caltrans [2007] criteria. Infiltration will produce an increase in groundwater elevations (however minor or temporary) in the beach sand unit where some unknown number of these foundations is located. Evaluations indicate that, for some areas, there is potential for liquefaction in the current groundwater configuration and an increased risk for liquefaction under mounded groundwater conditions. This is of particular concern for foundations within the beach sand. The impact on individual structures is difficult to assess given that they are so numerous and have such a variety of foundation systems and soil conditions.

The following proposed Project components are feasible from a geotechnical perspective:

- Biofiltration with underdrains and impermeable geo-membranes;

- Permeable pavements with no infiltration to subgrade; and

- Vegetated swales.

The following proposed Project components are not feasible from a geotechnical perspective:

- Biofiltration including infiltration; and
- Permeable pavements with infiltration to subgrade.

Limited equilibrium slope stability analyses indicate that existing slopes are stable under current conditions and are not a constraint on Project design in their current configuration.

With the stated limitations on infiltration and given the presence of only minimally liquefiable deposits along the alignment of the proposed BMPs, liquefaction of subgrade soils is not a constraint on the design of proposed drainage features and appurtenant structures.

4.5 Design and Construction Recommendations

The Geotechnical and Groundwater Studies Report includes geotechnical recommendations for proposed construction in the following areas:

(1) Drainage features, including biofiltration features and permeable pavements;
(2) Foundation design; and
(3) Earthwork.

A copy of the Geotechnical and Groundwater Studies Report is included as Appendix D.

5. HYDROLOGY

5.1 General

This section presents an analysis of the existing Project area hydrologic conditions and is intended to:

- Describe the existing hydrologic conditions including drainage infrastructure, catchment boundaries, soils, climate, and flow pattern; and
- Present the hydrologic basis for proposed stormwater BMPs.

5.2 Existing Hydrologic Conditions

5.2.1 General

The watershed associated with the Project site is roughly bounded on the north by the top of the hillside along the south side of PCH and on the south by the center line of Broad Beach Road, and has a total area of 12.3 acres. The watershed encompasses approximately 4,500 feet of Broad Beach Road. The total impervious area is estimated to be 1.5 acres consisting mainly of the asphalt pavement on Broad Beach Road area and PCH; however, there are also patches of concrete and asphalt along the roadside parking strip. There are eight catchment areas and ten City catch basins within the Project area. Drainage maps showing the catchment boundaries, drainage infrastructure, flow patterns, and pervious and impervious areas are presented in Appendix E.

5.2.2 Drainage Infrastructure and Flow Patterns

Broad Beach Road has local depressions and is crowned so that runoff from the northern half of the roadway flows toward the hillside, and runoff from the southern half flows toward the homes where it is typically collected in trench drains at the top or bottom of each resident's driveway. Hillside runoff (in which gullies and surface erosion were observed) and roadway runoff comingle on the mostly unpaved roadside parking strip to the north. The parking area is typically at its lowest elevation closest to the roadway. This directs the surface runoff along the road edge towards the catch basins.

The catch basins for Catchments 1 to 7 are located along the north side of Broad Beach Road are recessed into the hillside with a local depression in the area immediately in front of the inlet. Catchment 8 drains to a storm drain inlet, and although technically not a catch basin, it is referred to such in this report (see Appendix E).

As shown in Appendix E, within the vicinity of the low point of Catchment 5A there are three City catch basins; CB5A, CB5B, and CB5C. The outfalls from all three catch basins feed to the same storm drain. CB5A drains Catchment 5A. CB5B receives only flow from a non-City-owned storm drains that run down the hillside and no direct runoff from the Project area. CB5C drains only an area of a few hundred square feet of the southern half of Broad Beach Road.

The catch basin curb inlets typically have approximately 17 inch openings with varying widths. The distance from inlet invert to catch basin bottom varies from 2 to 4 feet.

Runoff from PCH and adjacent roadside areas flows toward slope drain inlets on both sides of PCH. With one exception, slope drains along the southern side of PCH drop directly into the catch basins along the northern side of Broad Beach Road. These flows are conveyed in Caltrans-owned buried pipes (slope drains) to the below-grade catch basins. As this is not part of the City MS4, it is not addressed by this Project. From the catch basins, water flows through storm drain pipes that cross under Broad Beach Road and tie into private storm drains at the residential property lines prior to discharge to the outfall points on the ocean side of the homes.

The exception to the description above is one slope drain in the western end of the Project area that drains 0.6 acres of PCH, including the road shoulder. This drain daylights at the bottom of the embankment slope; runoff from PCH comingles with surface runoff from Broad Beach Road prior to entering the catch basin.

Delineation of the eight catchment boundaries was carried out based on the following information:

- Topographic maps based on a survey performed for the Project;
- Topographic data (GIS) and aerial photos from Los Angeles County; and
- Field observations and measurements.

5.3 Stormwater Quality Design Volume

5.3.1 Technical Approach

The stormwater quality design volume per catchment was calculated using the methodology described in the Los Angeles County Department of Public Works' *Development Planning for Stormwater Management, A Manual for the Standard Urban Stormwater Mitigation Plan, Appendix A, Volume and Flow Rate Calculations,* issued

on September 2002. The design storm event is the 0.75 inch 24-hour storm event which complies with the sizing requirements in the Los Angeles County NPDES MS4 Permit for structural and treatment control BMPs for new development and redevelopment projects. This is consistent with the recommendations in the *City of Malibu Local Coastal Program Local Implementation Plan* and in the Special Protections of the proposed General Exception to the Ocean Plan. Although the Project is a storm water quality improvement project and does not formally qualify as new development or redevelopment, this design criterion was selected for the Project.

The catchments correspond to the tributary areas for the catch basins.

The runoff coefficient curve for the pervious surfaces within the tributary area was selected based on soil maps from Los Angeles County Department of Public Works Water Resources Division. The soils in the Malibu area are identified as soil ID No. 038 [Los Angeles County GIS Data Portal, 2011].

5.3.2 Stormwater Quality Design Volume Calculation

Stormwater Quality Design Volume (SWQDv) was calculated using the following equation:

$$SWQDv\ (ft^3) = (2{,}722.5\ ft/acre) * [(A_I)(0.9) + (A_P + A_U)(C_U)]$$

Where:

A_C = Catchment Total Area (acres) = $A_I + A_P$

A_I = Impervious Area (acres)

A_P = Pervious Area (acres)

A_U = Contributing Undeveloped Upstream Area (acres)

C_U = Undeveloped Runoff Coefficient (-)

Values for A_I, and A_P were determined using the available topographic maps and aerial photos. A_I includes all paved area and A_P includes the remaining area. A_U was determined to be zero for all catchments. C_U was assigned the value of 0.1 based on the runoff coefficient curve for soil no. 038 [LADPW, 2006]. The calculated design volumes are presented in Table 5-1.

6. CONCEPTUAL DESIGN ALTERNATIVES

This section begins with a review of the Project objectives and a discussion of how those objectives are satisfied. Following this, each proposed stormwater BMP or improvement is presented. Finally, two stormwater alternatives are developed and described in detail.

6.1 Project Objectives and Stormwater Alternatives Development

As stated in Section 1, the goals for the Project are to:

1. Eliminate dry-weather flows to the storm drain;
2. Reduce wet weather flows to storm drain (as feasible);
3. Improve water quality of wet weather flows to storm drain (i.e., storm water treatment, pollutant reduction) to the maximum extent practicable (MEP);
4. Reduce potable water use for irrigation (as feasible);
5. Restore habitat above Broad Beach Road (as feasible);
6. Reduce slope erosion (as feasible); and
7. Preserve street and visitor parking.

In addition, feedback from the residents has indicated a preference that the constructed project should not create or perpetuate the existing condition of highly variable parking and landscape/hardscape elements. The Project should be consistent with the rustic natural environment that currently exists along portions of Broad Beach Road. Therefore, we have created an additional objective (new Objective 8) which is to ensure that proposed improvements are consistent with the neighborhood landscape theme of a rustic natural environment.

To address these objectives, Geosyntec developed two stormwater management alternatives. A discussion of each objective and how it is satisfied by the alternatives is provided below.

Objective 1: Eliminate dry-weather flows to the storm drain. It is assumed that the primary dry-weather flows that occur within the Project area are related to irrigation runoff. All the residences are located on the south side of Broad Beach Road and any residential runoff from irrigation, pavement cleaning, car washing, etc. is captured by

private drains owned by each residence. Many residents have installed separate private irrigation systems on the north side of the street, on city of Malibu property and within the Project area. To eliminate dry-weather flows, these irrigation systems will be removed and city-operated water-efficient irrigation will be installed in place of these private systems. High-water-use ornamental and exotic plants will be removed and replaced with drought-tolerant native species, reducing the need for frequent irrigation during the dry season.

Objective 2: Reduce wet-weather flows to storm drain (as feasible). This objective is focused on water storage, use, and/or infiltration as a means of reducing discharge to the storm drains. Alternative 2 includes a water use option to reduce wet-weather flow. The soil and groundwater investigation specifically recommended no infiltration for this project, primarily due to the proximity to OWTS, low depth to groundwater, and concern for water intrusion in basements; therefore, infiltration is not considered an option for wet-weather flow reduction.

Objective 3: Improve water quality of wet-weather flows to storm drain (i.e., storm water treatment, pollutant reduction) to the MEP. This objective is met by several proposed Project elements. First, the roadway parking strip is proposed to be paved using concrete interlocking pavers. The construction of these pavers will not enhance stormwater infiltration (see Objective 2 above) but will reduce tracking of sediment from the currently soil/gravel parking strip to the proposed paved parking strip. Second, the parking strip area between the road and the toe of the embankment would be regraded to direct stormwater sheet flow away from the road and to vegetated swales located at the toe of the embankment. Vegetated swales will provide stormwater quality improvement. Third, garden walls (slough walls) and retaining walls are planned for various areas along the toe of the embankment, reducing erosion from the hillside and improving stormwater quality. Fourth, biofilters are proposed to treat wet-weather flows prior to discharge to the existing catch basins. Fifth, for Alternative 2, stormwater capture, storage, and use for irrigation are proposed. This provides a viable use option for a portion of the Project stormwater, if site conditions warrant use for irrigation. If site conditions do not support irrigation, the water will be discharged to and treated by the proposed biofilters, improving stormwater quality prior to discharge.

Objective 4: Reduce potable water use for irrigation (as feasible). This objective is satisfied by the removal of the numerous privately-owned irrigation systems on city property and installing a city-managed low water use irrigation system. The removal of non-native exotic plant species and replacement with native drought tolerant species also reduces potable water use for irrigation. Finally, for Alternative 2, captured

stormwater is proposed to be used to replace potable water, for a portion of the Project area irrigation needs.

Objective 5: Restore habitat above Broad Beach Road (as feasible). The Project budget will support removal of invasive and non-native exotic species for portions of the Project area and planting of native species in areas disturbed by construction. These plantings will provide partial habitat restoration of the areas above Broad Beach Road, reducing water usage and reducing hillside erosion.

Objective 6: Reduce slope erosion (as feasible). As stated under Objective 5 above, the partial habitat restoration included in the Project will reduce slope erosion. The proposed garden walls and retaining walls will further reduce slope erosion.

Objective 7: Preserve street and visitor parking. Currently, the only visitor parking available for beach-goers or residential visitors is along the north side of Broad Beach Road. The proposed storm water improvements (i.e., swales and biofilters) have been set back from the road such that the parallel parking opportunities along the full stretch of Broad Beach Road are unchanged.

Objective 8: Proposed Project improvements should preserve and enhance the rustic landscape/hardscape theme for the neighborhood. This objective is met by the proposed landscape and hardscape elements. The landscape architect has developed a rural neighborhood theme which is carried through all the proposed stormwater improvements including pavers, garden and retaining walls, vegetated swales, biofilters, and plantings.

6.2 BMPs and Stormwater Improvements

6.2.1 General

This section provides descriptions of the proposed stormwater BMPs and stormwater improvements and identifies how they would function to meet the Project objectives. An overview of proposed BMPs and improvements to be included in each alternative is presented in Table 6-1.

6.2.2 Biofiltration

Biofiltration systems will be used as the primary treatment control BMP for treatment of stormwater and dry-weather runoff from the Project area. Biofiltration systems, sometimes referred to as bioretention systems, are landscaped shallow depressions that capture and filter stormwater and dry-weather runoff. These facilities function as soil-

and plant-based filtration devices that remove pollutants through a variety of physical, biological, and chemical treatment processes. Biofilters typically consist of a surface ponding area, mulch layer, planting soils, and plantings. As water flows across the plantings and passes down through the organic-rich planting soil, pollutants are filtered, adsorbed, and biodegraded by the soil and plants. These systems provide a fairly high level of treatment. Because infiltration is unacceptable for this Project, biofilters will be designed with a lower impermeable membrane and a perforated underdrain to collect the treated water. The underdrain will connect to a collector pipe which will convey the treated water to a nearby catch basin. The outlet of the collector pipe in the catch basin will be located to facilitate sampling of biofilter effluent. Alternatively, an access point will be installed along the collector pipe to allow for effluent sampling. Typical cross-sections and details for the biofilters proposed for Broad Beach are shown in Figure 6-1.

Where sediment, trash and debris is expected in site runoff and a vegetated swale is not provided for water pretreatment, a pretreatment forebay will be included upstream of the biofilters. A forebay will reduce the rate of clogging of the biofilter and facilitate maintenance.

For this Project, the biofilters will not be designed to retain and infiltrate water - most water will flow through the filters and be discharged. However, low flows (i.e., dry-weather flows) may be partially or fully retained in the filter media. These relatively small water volumes are expected to be ultimately reduced by evapotranspiration.

The Project biofilters are designed to capture and treat the design capture volume during a storm event. A description of the biofilter sizing methodology for this Project is included in Appendix F. The calculated values for the required biofilter media surface area (A_{media}) for the two alternatives described later in this section are presented in Table 6-1.

6.2.3 Vegetated Swales

At present, stormwater flows off the embankment and towards a low elevation flow line between the street and the parking strip. The area between the edge of road pavement and the toe of the embankment will be graded to cause stormwater to flow off the road and off the parking strip to the embankment toe. A vegetated swale will be installed along the embankment toe, parallel to the road and will convey stormwater to storage or biofilter treatment facilities. Vegetated swales are an effective stormwater pretreatment BMP to filter out trash, debris, and coarse sediments - they also provide aesthetic enhancement for the area. The installation of vegetated swales will reduce pollutant loading and clogging on the downstream biofilters, extending the biofilter media life.

Vegetated swales are sloped and are not designed to pond water. Therefore, infiltration of water through vegetated swales is insignificant and it should not be necessary to install impermeable liners under the swales.

6.2.4 Water Collection, Storage, and Use or Treatment

Stormwater runoff can be collected in below-ground enclosed storage facilities (cisterns) and used for landscape irrigation, as required. Runoff would be conveyed in swales and gravity drain into systems of vaults, tanks, or pipes to store the water until needed. When needed, the water can be pumped from the underground storage and conveyed in pressurized pipes for use in drip irrigation. Drip irrigation is selected as the most viable use option. This site would be classified as a Tier III system under Los Angeles County requirements for rainwater and stormwater harvesting systems. Drip irrigation requires only sediment filtration prior to water use. Spray irrigation requires water disinfection, which adds an unattractive level of complexity to this stormwater use application.

If stored water cannot be used for landscape irrigation due to lack of irrigation water demand, the water would be pumped and discharged to biofilters after the storm peak had passed and the surface stormwater had been filtered and discharged. In this way, the biofilters can be used to filter stored water during times when the filters are otherwise not in use.

Local residents have expressed concern regarding underground storage of stormwater and the potential for leakage and infiltration of this water, possibly exacerbating a high groundwater condition in the neighborhood. Should stormwater storage be implemented, various technologies such as impermeable lining systems could be employed to provide additional assurance against leakage of stored water.

6.2.5 Concrete Pavers

The majority of the parking strip that runs parallel to Broad Beach Road is unpaved – the existing surface varies, including sand, soil, decomposed granite, and various types of gravel. This parking strip is commonly used for parking by residential visitors, workers, and beachgoers. Surface erosion of the unpaved parking surfaces can reduce stormwater quality. Sediment tracking from parking areas to the roadway mobilizes sediment and can reduce stormwater quality. This condition is exacerbated by muddy and wet conditions during storm events. The installation of pavers from the edge of road to form an approximately 10 foot wide parking strip is proposed. Pavers would provide a uniform surface for parking and greatly reduce erosion and sediment tracking. Paver selection and design will be made to reduce stormwater infiltration to the extent

possible. In any event, the minor infiltration through paver system is expected to be significantly less than the existing condition where stormwater infiltrates through unpaved ground.

6.2.6 Retaining and Garden Walls

Retaining walls (structural walls) and garden walls (non-structural slough walls) are proposed for various locations along the hillside. The walls fulfill three purposes. First, installation of walls in designated locations will allow for the embankment to be cut back, opening up needed areas for biofilter installation. Second, the walls reduce soil erosion and sloughing from the hillside, which is a key contributor to sediment in stormwater. Third, the installation of walls creates a uniform hardscape theme across the neighborhood. Existing retaining walls are not engineered, are often ineffective for erosion reduction, and are constructed of a myriad of materials including cobbles, broken concrete, masonry brick, and cast-in-place concrete.

6.2.7 Irrigation System Removal/Replacement

A key element to reducing or eliminating dry-weather flows is the removal of privately-owned irrigation systems on the north side of the road. Although this property is owned by the city, homeowners have installed private irrigation systems plumbed back to their water services and have created private gardens and landscapes on city property. The private irrigation of gardens creates uncontrolled and unmanageable dry-weather flows which have been observed during recent site visits. Private systems would be removed and replaced with water-efficient low-volume irrigation controlled by city-controlled, automated evapotranspiration controllers. Water would be provided by the city and water use would be managed by the city. We recognize the communication efforts that will be required to implement the removal of these private irrigation systems. An estimate of annual water use for Broad Beach Road irrigation is provided in Appendix G.

6.2.8 Habitat Restoration

As mentioned above, many Broad Beach Road residents have created gardens across from their residences on city property. These gardens include many non-native invasive or ornamental plants and shrubs, most which require frequent irrigation. To reduce irrigation requirements and reduce the erosion potential, high water-demand ornamental plants and shrubs within 20 feet of the toe of embankment slope would be removed and replaced with more drought-tolerant, native species plants and shrubs. This will allow the city to manage irrigation (and reduce or eliminate dry-weather flows) and reduce potable water use on the hillside. Areas disturbed by construction will be revegetated

with appropriate species. Other ornamental or exotic species will be removed, depending on proximity to the roadway and the plant-specific water consumption requirements. The creation of a more uniform native species plant/shrub environment furthers the objective of creating a more uniform landscape theme for the neighborhood. Again, we recognize the communication efforts that will be required to implement the removal of nonnative species that were planted by residents.

6.3 Stormwater Alternative 1

Stormwater Alternative 1 is comprised of a combination of BMPs and improvements including stormwater conveyance and treatment BMPs, retaining and garden walls, parking strip pavers, irrigation, and landscape improvements. Alternative 1 is differentiated from Alternative 2 in that Alternative 1 contains no stormwater storage or use options – in Alternative 1, all stormwater up to the design storm event is captured, treated, and discharged. A flow diagram illustrating the stormwater management principles for Alternative 1 is presented in Figure 6-2. In the subsections below, the specific application of these BMPs and improvements are addressed, as are issues related to parking, utilities, and operation and maintenance. The general layout and features of Alternative 1 are shown on Figures 6-4 through 6-14.

6.3.1 Stormwater Management Improvements

For Catchments 2 to 7 runoff will be collected from the road, parking strip and embankment and transported in vegetated swales that drain to biofilters located upstream of the catch basins. The swales will provide pretreatment while primary treatment will occur in the biofilters.

The swales will run along the toe of the hillside slope intercepting hillside runoff. The parking area will be regraded such that both the road and the parking area drain toward the swales. The swales will serve to channelize flow to the biofilters and will widen at the biofilters entrance to create sheet flow into the biofilter.

Biofilters will be located between the toe of the slope and the paved parking area. In some cases cuts will be made into the hillside to create more available filter area. Filtered water will be collected in underdrains that connect to collector pipes, discharging to the existing catch basins, or to the storm drains if more feasible. When the ponding capacity of the biofilters is exceeded, overflow will occur over a weir located at the end of the biofilter closest to the catch basin and then surface flow to the catch basin inlet. The top of weir elevation will be the same as the water surface elevation corresponding to the biofilter design ponding depth.

Locating adequately sized biofilters in Catchment 1 and the eastern part (east of CB8) of Catchment 8 was not deemed feasible due to lack of area and other logistical constraints such as utilities, parking, and steep slopes. For these two catchments, runoff is diverted to other areas where adequate area for treatment is available.

Runoff from Catchment 1 is diverted via gravity flow from catch basin CB1 to a biofilter in Catchment 2. The diversion structure will be designed to divert low flows while during high runoff events (in excess of design storm) water will overflow to catch basin CB1.

Runoff from Catchment 8 will be captured in a new wet sump adjacent to storm drain inlet CB8 and pumped to a biofilter in the western end of Catchment 8. The wet sump will be designed to receive and pump flows up to the design storm – events in excess of the design storm will overflow to CB8. A submersible pump can be used for this application. Noise levels outside of the sump are expected to be imperceptible to residents.

In general, the biofilters are sized for the design capture volume generated in their immediate tributary area. However, the biofilters in Catchment 2 and 8 are sized for both direct catchment runoff as well as the diverted runoff from other areas.

The proposed stormwater system improvements do not significantly alter the existing drainage patterns. Hillside and roadway runoff patterns are generally unchanged; however, regrading of the Broad Beach Road parking strip will concentrate flow along the toe of the slope instead of along the road pavement edge. Biofilters and swales are sited in order to maintain flood paths to existing catch basins.

6.3.2 Landscape, Hardscape, and Irrigation

Alternative 1 includes construction of garden and retaining walls and parking strip pavers, removal/modification of some of the existing garden and retaining walls, removal of all private irrigation systems and replacement with city-controlled, water-efficient irrigation systems, and replacement of exotic, ornamental, and invasive plant species. This alternative also includes replanting in areas disturbed by construction. The general plan indicating the Project areas where hardscape, irrigation, and planting improvements will be made is shown on Figures 6-4 through 6-14.

Selective plant material will be removed from the Project area to help create consistent landscape theme, reduce irrigation water use, and facilitate Coastal Bluff Scrub Habitat Restoration. The specific criteria applied to each area to determine which existing ornamental, exotic, or invasive plant species should be replaced are as follows:

- Invasive plant species will be removed from the first 20 feet of the Project slopes and parkway to the extent practical;
- Vegetation will be removed from existing utility setbacks;
- Vegetation will be removed from Project improvement areas including biofilter areas, vegetated swales, retaining walls, garden walls, parking areas, and concrete swales and gutters;
- Vegetation will be removed in locations where conflicts occur with the proposed slope irrigation improvements and proper system operations;
- Native vegetation that constitutes a high fire risk per Los Angeles County Fire Department Fuel Modification Plan will be removed;
- Trees with invasive roots will be removed that are located within 10 feet of proposed Project retaining walls, garden walls, and biofiltration areas; and
- Selective ornamental vegetation that is high water use will be removed.

The proposed irrigation system for the Project will be a low water use system featuring a smart weather based controller combined with low volume drip, bubbler and overhead rotary stream spray heads. The smart controller will allow for daily automatic adjustments to the watering schedule based on real time weather data. Flow sensing devices allow for system shut-down and delays in response to rain events and system failures. Low volume point to point irrigation using drip and bubbler systems provide for maximum water use efficiency. Rotary stream heads provide additional water savings with 30% increased efficiency over traditional spray heads. The estimated total water usage (ETWU) for the Project is approximately 740,000 gallons per year. This represents about 50% of the maximum applied water allowance (MAWA) for the proposed design.

Feedback from a conversation with one of the Broad Beach homeowners indicates that some of the existing irrigation systems may have been installed to serve as fire protection. This has not been confirmed but the need for fire protection will be evaluated during the design phase and more information will be solicited from the Broad Beach homeowners. The final design will comply with existing code and fuel modification requirements including the following:

- All proposed landscape and irrigation improvements will be implemented per the Los Angeles County Fire Department (LACFD) Fuel Modification Plan

Guidelines [LACFD, 2011] to create the desired defensible space around all combustible structures in a fire environment.

- All proposed landscape improvement plant species are subject to LACFD approval and will be inherently fire resistant and spaced appropriately.

- Existing native vegetation and ornamental plantings within the project fuel modification zones will be modified by thinning and removal of species constituting a high fire risk (refer to the LACFD Undesirable Plant List).

- Routine fuel modification maintenance will be regularly performed in all zones. Maintenance includes irrigation, pruning, thinning and annual removal of weeds, dead materials and other undesirable flammable vegetation required to keep the area in a fire safe condition. (Refer to the LACFD Fuel Modification Plan Maintenance and Long Term Maintenance sections)

The proposed planting for the Project will consist of native and drought tolerant grass species for the biofilter areas and vegetated swales. This vegetation provides water quality improvements for Project runoff and creates a distinct theme for the Project parkway. The slope planting will consist of a combination of drought-tolerant shrubs to enhance the existing plant material to create a more consistent landscape theme combined with Coastal Bluff Scrub species to facilitate native slope habitat restoration.

The proposed hardscape improvements for the project will include an interlocking concrete paver parking area, concrete veneer retaining walls and dry stacked boulder garden/slough walls. These elements will be installed throughout the project construction limits creating a consistent rural neighborhood theme and materials palette for the project. Miscellaneous existing garden/slough walls will be removed and either omitted or replaced with project theme walls as needed to construct the proposed biofiltration areas and vegetated swales. Existing retaining walls that are required due to existing grade and are structurally sound will remain and be enhanced with the project theme veneer so that all walls are consistent.

A plant palette exhibit and a materials exhibit for pavers and wall veneers are included in Appendix H. The exhibits present several different options.

6.3.3 Parking Considerations

The proposed improvements will allow for parallel parking along the entire stretch of roadway within the Project boundaries, similar to the current-day parking locations.

The installation of pavers will improve parking conditions in several areas where the surface is uneven due to ditches and erosion.

6.3.4 Utility Considerations

Existing utilities have been identified both by review of historical maps and by marking on Broad Beach Road by the utility owners. The preliminary design of BMPs and improvements has been developed in consideration of all known utilities and no significant utility conflicts are known. Prior to construction of the Project, the city of Malibu's contractor will be required to mark and locate all utilities within the Project area and to field verify locations of utilities that could be threatened by the work.

Los Angeles County owns a sewer line that runs along Broad Beach Road, between the road edge and the embankment. A sewage pumping station is located in Catchment 1. In some areas, this sewer line will be located under the proposed location of parking strip pavers. The depth of this utility will need to be verified to ensure it is protected during grading and subgrade improvement work.

The Gas Company owns a gas line that also runs parallel to the road between the sewer line and the road. Similar to the sewer line, this gas line will be under the parking strip where pavers are proposed. The depth of this utility will also need to be field verified to ensure it is protected during construction.

There are electrical transformers owned by Southern California Edison located along the north side of Broad Beach Road within the Project area. Electrical laterals traverse the parking area. We have not identified any significant conflicts between the electrical lines and the proposed construction. Locations and depths can be verified prior to construction. Vegetation will need to be removed around the existing transformers.

Charter Communications owns communications lines that primarily run along the south side of the road, outside of the Project area. We have identified several communications lines that cross the road to roadside amplifier boxes. These crossings are within the Project area but do not pose a conflict for the proposed work.

The Los Angeles County Waterworks owns a water main that is located near the road centerline and provides water to residents and to two hydrants located along the north side of the road within the Project area. These water supply lines are marked and do not pose a conflict for the proposed work. During design, coordination with the local fire department will be required to identify parking restrictions in front of fire hydrants. Currently, there are no posted parking restrictions in this area; however, we expect that

the fire department may impose parking prohibitions in certain areas to ensure emergency hydrant access.

No telephone utilities were identified in the Project area.

6.3.5 Performance

The proposed configuration of treatment control BMPs and improvements will be designed to treat 100% of the runoff generated within the Project tributary area for storm events equal to or less than the design storm. Using vegetated swales and biofilters, pollutant removal treatment effectiveness is predicted to be medium to high. It is our expectation that, barring an unforeseen water line break, all dry-weather runoff will be treated by the biofilter system. Dry-weather runoff should be substantially reduced or even eliminated by the removal of private irrigation systems and the installation of new water efficient irrigation with smart controllers. Other than irrigation runoff, there are no other known sources of dry-weather runoff within the Project area.

Retaining walls, garden walls, and parking strip pavers will all reduce erosion and sediment transport in runoff. Pavers will also reduce sediment tracking from the parking strip to the roadway. New plantings of native species will also reduce erosion.

Potable water use will be reduced by elimination of the numerous private irrigation systems and installation of new water-efficient irrigation and smart irrigation controllers.

6.3.6 Operation and Maintenance

The following is a description of anticipated operation and maintenance requirements for the proposed BMPs and improvements.

Vegetated swales will require periodic removal of accumulated trash and debris. Removal of accumulated sediment and revegetation may also be required. Weed removal, trimming, and pruning are also necessary. Vegetated swales will require some minimal irrigation during dry months.

Biofilters will require periodic removal of accumulated trash and debris. If sediment removal is required, replacement of mulch and vegetation may also be necessary. Occasional pruning of shrubs and cleanup of leaves and organic waste may be required. Periodic replacement or addition of planting material and mulch will be needed to sustain the biofilter's treatment effectiveness. Minimal biofilter irrigation will be

needed, especially during dry months. Irrigation needs will significantly diminish after plants become established.

Irrigation system maintenance will include periodic inspections of system performance and verification that dry weather flows are eliminated. Damaged sprinkler piping, sprinkler heads, and drip emitters will require replacement. Verification of proper operation of irrigation controllers will be required. The total water usage for the first year is estimated at 740,000 gallons. The yearly cost for this water usage is roughly $5,500 based on current water rates (see water usage and cost calculations in Appendix G). Water usage, and consequentially water costs, can be reduced after plants are established.

Areas that have been revegetated due to replacement of inappropriate species or in areas disturbed by construction will require inspection and landscape maintenance to ensure that plants are properly established and the plant health is sustained.

The wet sump in Catchment 8 and the pumping system will require periodic inspection and verification of proper operation. Pump maintenance will be minimal. Electricity to run this pump represents a trivial expense.

6.4 Stormwater Alternative 2

Stormwater Alternative 2 has many common elements to Alternative 1. The primary difference between the alternatives is that Alternative 2 includes collection and storage of runoff in underground cisterns. The collected water from the two proposed cisterns can be pumped for irrigation use or pumped to biofilters for treatment after the storm peak has passed. This storage and off-peak treatment permits more efficient use of the biofilters and results in a smaller Project biofilters footprint. In the subsections below, the proposed BMPs and improvements are presented. A flow diagram illustrating the stormwater management principles for Alternative 2 is presented in Figure 6-3. The general layout and features of Alternative 2 are shown on Figures 6-4 through 6-14.

6.4.1 Stormwater Management Improvements

As previously stated, stormwater management BMPs and improvements for Alternative 2 are similar to Alternative 1. However, Alternative 2 collects surface runoff from Catchment 1, part of Catchment 2, and Catchment 8 and stores this water in two underground stormwater cisterns. The cisterns are proposed to be constructed of a system of buried pipe that functions like a storage tank and is specifically manufactured for underground water storage. One cistern is located within Catchment 8 – all the runoff from Catchment 8 drains to swales, flows to a drain inlet, and is conveyed to the

cistern. The total storage for the Catchment 8 cistern is 520 cubic feet. When storage capacity is exceeded, runoff will overflow to the existing storm drain inlet. Refer to Figure 6-5 for the proposed location of the storage system.

Stormwater in Catchment 1 and the western portion of Catchment 2 is captured in swales and gutters and flows to two drain inlets that are routed to a cistern located in Catchment 2, for storage. The total storage for this cistern is 2,080 cubic feet. Refer to Figures 6-11 and 6-12 for the proposed location of the storage system. When storage capacity is exceeded, runoff will overflow to the existing storm drain outfall from catch basins CB1 and CB2.

Residents have expressed concern that underground water storage facilities could leak, causing groundwater mounding and potentially exacerbating a high water table condition under their homes. If the manufactured cistern system is not determined to be sufficiently reliable for water storage, a system of synthetic liners can be considered to provide additional assurance that the water storage systems do not leak and infiltrate water to the subsurface.

Each of the two cisterns will be constructed with a wet sump to evacuate the stored water. Stored water can either be directed to biofilters located in Catchments 2 and 7 or water can be used for landscape irrigation. Each wet sump would be fitted with two pumps, one for landscape (a higher pressure, higher flow application) and one for water transfer to the biofilters (a lower pressure, lower flow application). Submersible pump noise is expected to be imperceptible to residents. Pumps would be controlled by a smart stormwater controller that assesses the volume of water in the cisterns, evaluates current climatic conditions and the forecast for future storms, assesses the need for irrigation based on evapotranspiration data, and controls each pump appropriately.

For portions of Catchment 2 and Catchments 3-7, the BMPs and improvements proposed are the same as Alternative 1. Refer to Figures 6-4 through 6-14 for details.

The Project benefits of stormwater storage are that there is approximately 2,600 cubic feet (approximately 19,500 gallons) of stored water available for irrigation. If irrigation is not needed, which is often the case in the winter, the water can be stored and discharged to the biofilters after the storm peak as passed, allowing the biofilters to be used more efficiently and resulting in a reduced area footprint for the biofilters. The reduced biofilter area for Alternative 2 is nearly 1,900 square feet (refer to Table 6-1) less than Alternative 1. The layout of Alternative 2 increases vegetated swale length by approximately 300 linear feet.

6.4.2 Landscape, Hardscape, and Irrigation

Landscape elements are similar between Alternatives 1 and 2. Hardscape elements are similar between the Alternatives with the exception that Alternative 2 has a smaller Catchment 2 retaining wall, due to the smaller biofilter area required. Alternative 2 has the same irrigation plan as Alternative 1 supplemented by an additional parallel drip irrigation system to support the use of stored stormwater. To avoid cross connection concerns, it is necessary to have completely independent irrigation systems supplied by potable water and supplied by stormwater.

6.4.3 Parking Considerations

There is no difference between Alternative 1 and Alternative 2 with regard to parking on Broad Beach Road.

6.4.4 Utility Considerations

The utility considerations unique to Alternative 2 are related to the underground storage of stormwater. Stormwater from Catchment 1 and a portion of Catchment 2 will be stored in a large diameter buried pipe located in Catchment 2. The pipe will require an excavation of up to approximately eight feet in depth. We have considered the need for shoring during this installation. The pipe location should not conflict with any existing utilities. For Catchment 8, the underground storage pipe installation will require an excavation to a depth of approximately six feet. This will likely require shoring, careful location of the adjacent sewer line, and ultimately replacement of the toe-of-slope swale.

6.4.5 Performance

Stored stormwater that is used for irrigation represents a net reduction in discharge to the ocean. That is consistent with the Project objectives. Furthermore, the stored water used for irrigation replaces potable water. The proposed storage systems have a capacity to store roughly one-third of the total design capture volume for the Project area. The performance of vegetated swales, biofilters, and landscape and hardscape elements is similar to Alternative 1.

6.4.6 Operation and Maintenance

The operation and maintenance items for Alternative 2 are similar to Alternative 1 with a few minor exceptions. The parallel drip irrigation system for stormwater irrigation use would require periodic maintenance. The submersible pumps found in the cisterns

would require periodic inspection and occasional maintenance. The cost of electricity for pumping is considered trivial.

The total water usage for the first year is estimated at 715,000 gallons: 625,000 gallons for slope vegetation and 90,000 gallons for biofilter and swale vegetation.

Potable water use would be reduced for Alternative 2, due to use of stored water for irrigation. The cisterns will store approximately 2,600 cubic feet with equates to approximately 19,500 gallons. Water from the cisterns will be used to irrigate the biofilters and the vegetated swales. Although difficult to predict how much stormwater will substitute for potable water, we believe it is reasonable to expect that stormwater use for irrigation may replace between 5 and 10 percent of potable water use.

The yearly average cost for water usage is estimated to vary between $4,400 and $5,200 based on current water rates (see water usage and cost calculations in Appendix G). Assuming that 50% of the irrigation demand for the biofilters and vegetated swales is supplied by cistern water, the yearly average cost is estimated to be $4,800, roughly $700/yr less than Alternative 1. The amount of irrigation water for biofilters and vegetated swales supplied by cistern water can potentially reach 100%; however, this is unlikely since the demand will be greatest during dry periods when supply is low. These costs represent water usage for the first year. Water usage, and consequentially water costs, can be reduced after plants are established.

7. CONSTRUCTION COST ESTIMATE

Cost estimates were developed for the two proposed design alternatives for this 10 percent design level. The estimates represent solely contractor costs and do not include oversight, independent testing, construction management, or documentation. A 20 percent contingency was applied to each estimate. For this conceptual design, the costs were not escalated to spring of 2013, the predicted construction start date.

The following is a list of the various cost resources used in the development of the cost estimates:

- The Geosyntec team's experience on similar projects;
- Cost data for two recent, similar projects constructed in Malibu;
- Vendor quotes; and
- RS Means cost guide.

Through an iterative process the scope of construction was modified (reduced) in order to generally meet the Grant construction budget which is $1,675,836. Estimated construction costs correspond only to the improvements in the Project area that fall within the limits of construction on Figures 6-6 and 6-11, unless otherwise noted on the figures.

The estimate of construction costs for the two alternatives are:

Alternative 1 - $1,625,000

Alternative 2 - $1,688,000

A summary table of the primary cost items is presented in Table 7-1. Detailed cost estimates are presented in Appendix I.

8. DISCUSSION AND RECOMMENDATION

Alternatives 1 and 2 both generally satisfy the Project objectives. Each alternative eliminates or at least substantially reduces dry-weather flows. Both alternatives reduce erosion and sediment tracking through hardscape and landscape improvements. Both alternatives provide stormwater treatment and associated improvements in water quality for water discharged to Broad Beach. Both alternatives provide habitat restoration and reductions in potable water use related to planting of drought tolerant species. Both alternatives include consistent hardscape and landscape themes and carry these themes throughout the Project area.

The stormwater management elements that are different between the two alternatives are:

1. Reduction of potable water for irrigation; and

2. Volume of water discharged to Broad Beach.

Alternative 2 is a partial capture and treat alternative. Alternative 2 provides storage for approximately one-third of the design capture volume of runoff and either uses that water for irrigation or treats the stored water after the storm has passed, allowing for more efficient use of biofilters. This capture and use strategy reduces potable water needed for irrigation and reduces the volume of treated water discharged to Broad Beach. The capture and use strategy is progressive and demonstrates leadership and innovation by the city of Malibu.

The challenges related to Alternative 2 are that water storage and use adds additional cost, as compared to Alternative 1. The need for pumping systems increases the Project complexity and maintenance costs are also slightly higher (primarily related to maintaining a separate irrigation system). Finally, there may be a perception by the local residents that there is a risk of stormwater leakage from the cisterns, potentially causing undesirable infiltration.

Geosyntec believes both Alternatives are viable and attractive stormwater management approaches for Broad Beach Road. However, Geosyntec believes that Alternative 2 goes further to meet the goals of the grant by promoting a greater reduction of wet weather flow to the storm drain and by reducing potable water use for irrigation; Geosyntec therefore recommends Alternative 2.

9. LIMITATIONS

This Preliminary Design Report was developed in accordance with the scope of work, purpose, terms, and conditions described in the Terms of Reference, described in Section 1.

The conclusions contained in this investigation are based on the conditions as observed by Geosyntec personnel and as reported by relevant agencies and other named sources at the time the investigation was performed.

No warranty, expressed or implied, is made regarding the professional opinions expressed in this report or concerning the completeness of the data presented to us. If actual conditions are found to differ from those described in the report, or if new information regarding the site is obtained, Geosyntec should be notified and additional recommendations, if required, will be provided.

Geosyntec is not liable for any use of the information contained in this report by persons other than the City of Malibu as intended for the subject Project.

10. REFERENCES

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TABLES

Table 5-1. Areas and Stormwater Quality Design Volume per Catchment

Catchment No.	Catchment Section	A_C (ac)	A_I (ac)	A_P (ac)	A_U (ac)	C_U (-)	SWQDv (ft^3)
1		2.34	0.53	1.81	0	0.1	1788
2	west	0.57	0.05	0.53	0	0.1	254
	east	1.61	0.15	1.46	0	0.1	766
3		0.75	0.09	0.66	0	0.1	395
4		1.48	0.11	1.37	0	0.1	644
5A	west	0.85	0.10	0.75	0	0.1	457
	east	1.70	0.13	1.57	0	0.1	734
6		1.08	0.11	0.96	0	0.1	534
7	west	0.76	0.09	0.67	0	0.1	406
	east	0.31	0.03	0.28	0	0.1	145
8		0.82	0.13	0.69	0	0.1	514
Total		**12.27**	**1.51**	**10.75**			**6637**

Table 6-1. Proposed BMPs and Improvements for each Alternative per Catchment

Catchment No.	Biofilters	Vegetated Swales (incl. grading)	Water Storage and Use or Treatment	Concrete Pavers	Retaining and Garden Walls	Irrigation System Removal/ Replacement	Habitat Restoration
1			Alt. 2	Both Alt.	Both Alt.[1]	Both Alt.	Both Alt.
2	Both Alt.	Both Alt.	Alt. 2	Both Alt.	Both Alt.	Both Alt.	Both Alt.
3	Both Alt.	Both Alt.		Both Alt.	Both Alt.	Both Alt.	Both Alt.
4	Both Alt.	Both Alt.		Both Alt.	Both Alt.	Both Alt.	Both Alt.
5A	Both Alt.	Both Alt.		Both Alt.	Both Alt.	Both Alt.	Both Alt.
6	Both Alt.	Both Alt.		Both Alt.	Both Alt.	Both Alt.	Both Alt.
7	Both Alt.	Both Alt.		Both Alt.	Both Alt.	Both Alt.	Both Alt.
8	Alt. 1	Alt. 2	Alt. 2	Both Alt.	Both Alt.	Both Alt.	Both Alt.

[1] Walls are not proposed for Catchment 1. However, a concrete swale along the slope will function as a slough wall.

Table 6-2. Design Biofilter Volume (Bv) and Biofilter Media Surface Area (A_{media}) for Alternatives 1 and 2

Catchment No.	Catchment Section	Alternative 1		Alternative 2	
		Bv (ft^3)	**A_{media} (ft^2)**	**Bv (ft^3)**	**A_{media} (ft^2)**
1					
2	west	3063	1541		
	east	1149	541	1149	541
3		593	326	593	326
4		966	448	966	448
5A	west	685	334	685	334
	east	1101	560	1101	560
6		801	365	801	365
7	west	608	268	608	268
	east	218	107	218	107
8	west	771	350		
Total		**9956**	**4840**	**6122**	**2949**

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Table 7-1. Summary of Construction Cost Estimates for Alternatives 1 and 2

Total Construction Costs	Alt. 1	Alt. 2	Notes
Biofilters	$159,000	$96,000	
Vegetated Swale	$31,000	$34,000	
Planting of Slope	$38,000	$38,000	
Irrigation	$150,000	$156,000	
Walls (new and existing)	$169,000	$116,000	
Concrete Interlocking Pavers	$528,000	$527,000	
Diversion and Storage Structures - Catchment 2	$3,000	$124,000	Alt. 1 does not include storage
Diversion and Storage Structures - Catchment 8	$43,000	$77,000	Alt. 1 does not include storage
Maintenance of planting and irrigation	$8,000	$8,000	3 month maintenance period
Demolition of hardscape/landscape	$34,000	$34,000	
SUBTOTAL 1	*$1,163,000*	*$1,210,000*	
Mobilization & Demobilization	$116,000	$121,000	10% of Subtotal 1
Bonds	$35,000	$36,000	3% of Subtotal 1
Traffic Control	$20,000	$20,000	
SWPPP	$20,000	$20,000	
SUBTOTAL 2	*$1,354,000*	*$1,407,000*	
Contingency	$271,000	$281,000	20% of Subtotal 2
Total Construction Cost	**$1,625,000**	**$1,688,000**	

FIGURES

Figure 2-1. Vicinity map of Project area

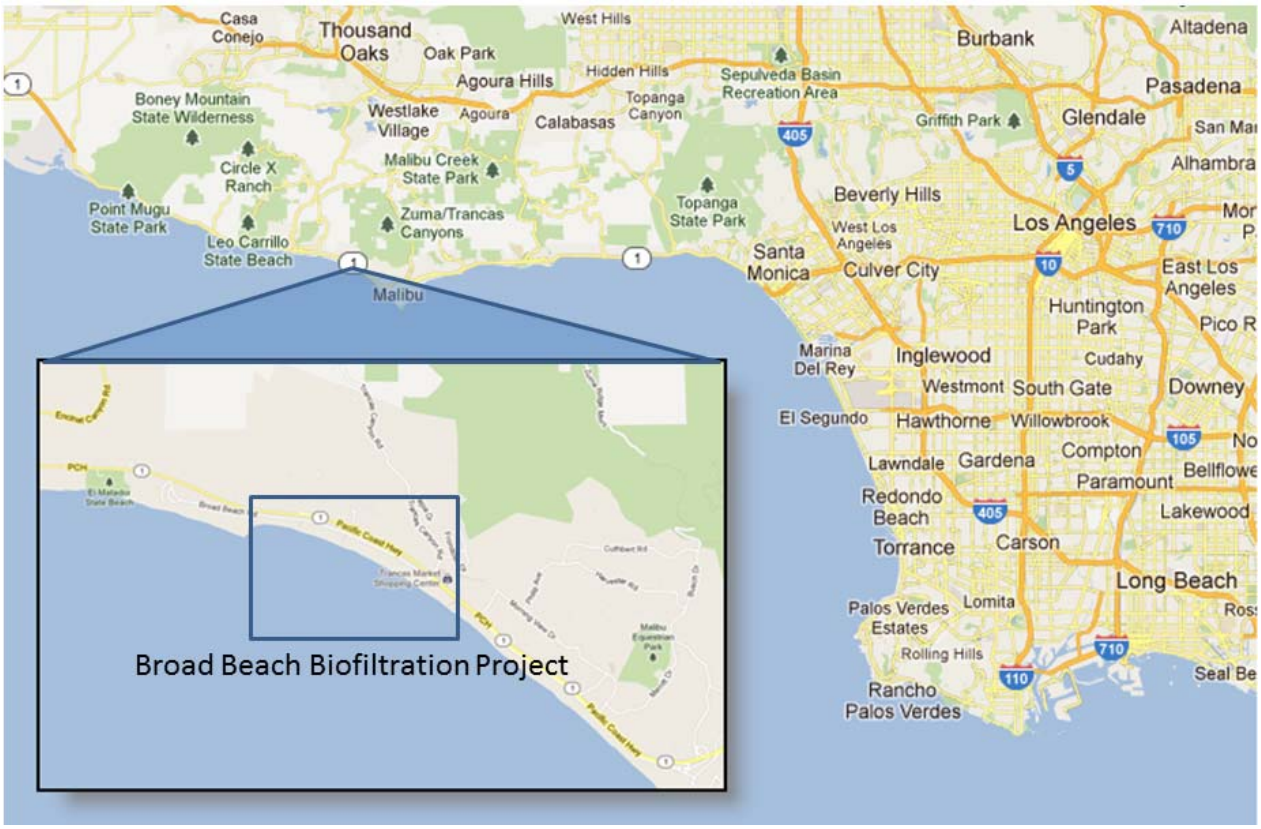


Figure 2-2. Location map of Project area

Figure 2-3. Private irrigation system contributing to dry-weather runoff

Figure 2-4. Private irrigation piping in storm drain

Figure 2-5. Unpaved parking strip with potted plants

Figure 2-6. Cast in place concrete retaining wall with parking apron

Figure 2-7. Privately constructed waste concrete hardscape

Figure 2-8. Brick retaining wall

Figure 2-9. Treated wood retaining wall

Figure 6-1. Typical biofilter cross-sections and details

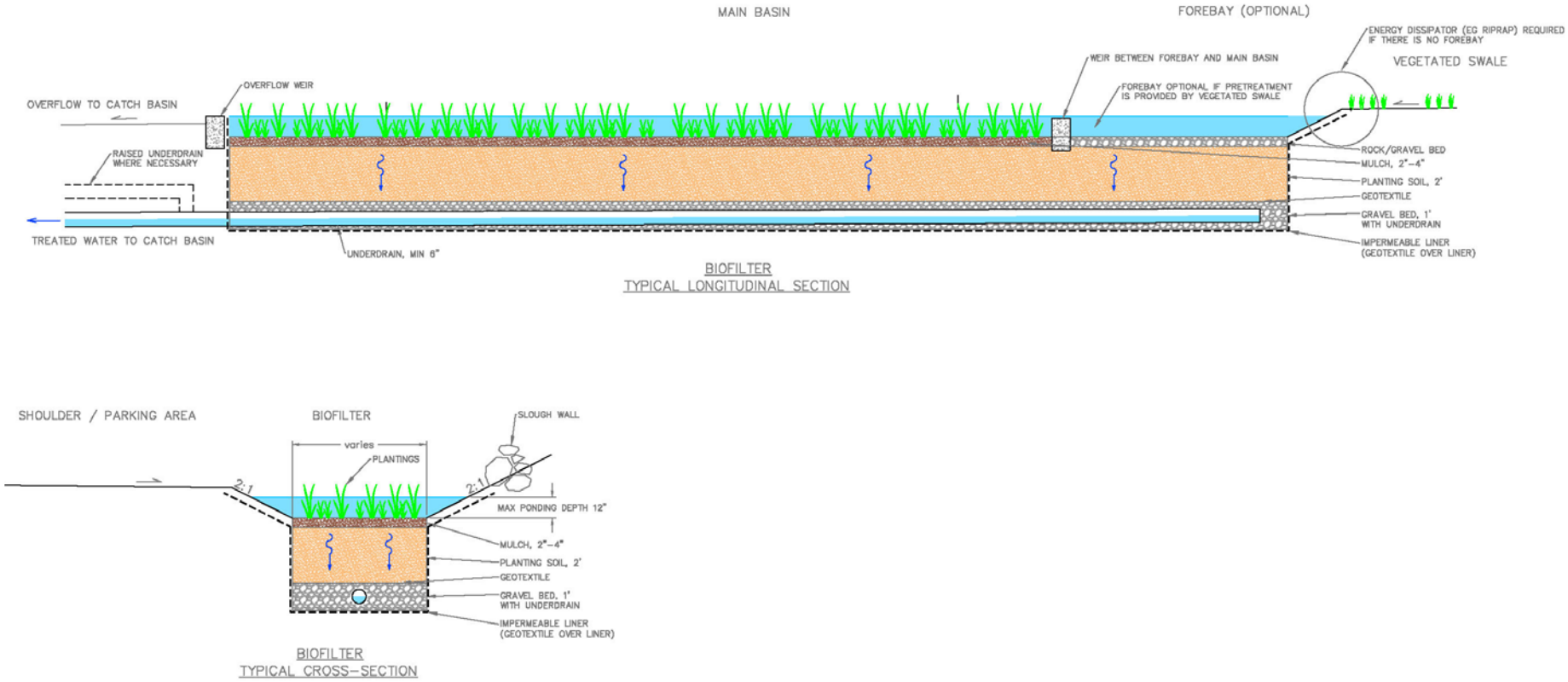


Figure 6-2. Flow diagram for Alternative 1

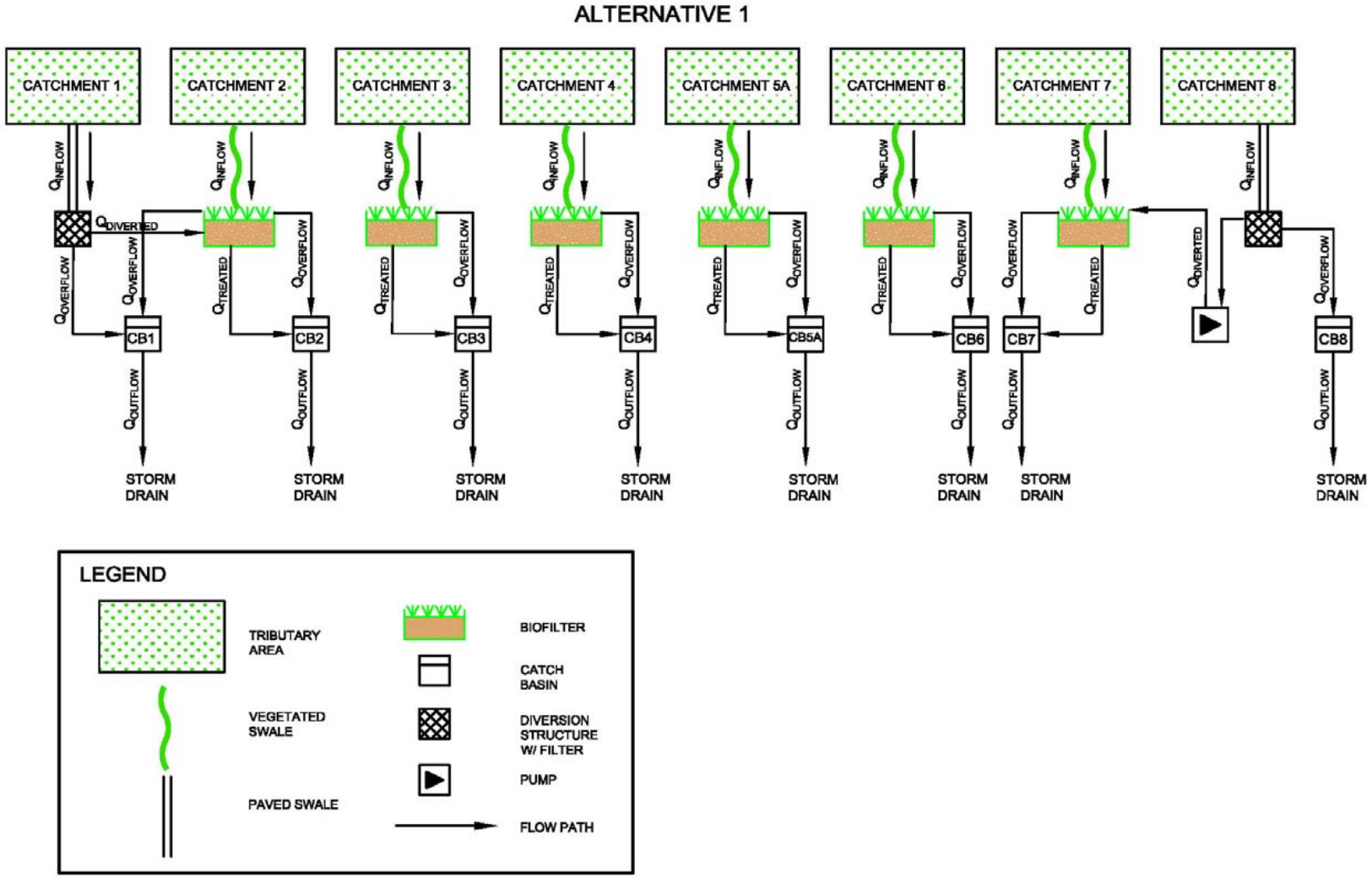
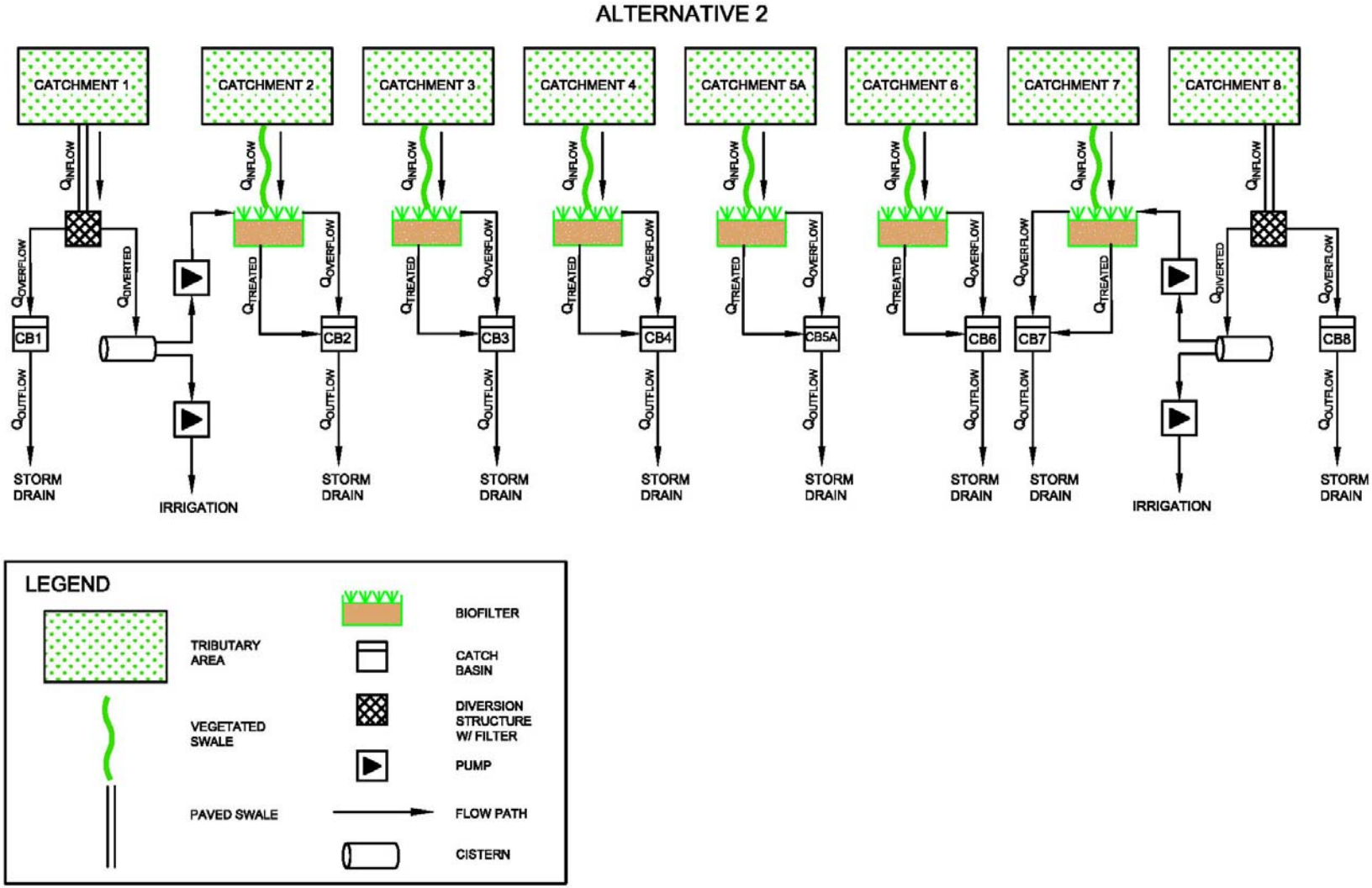
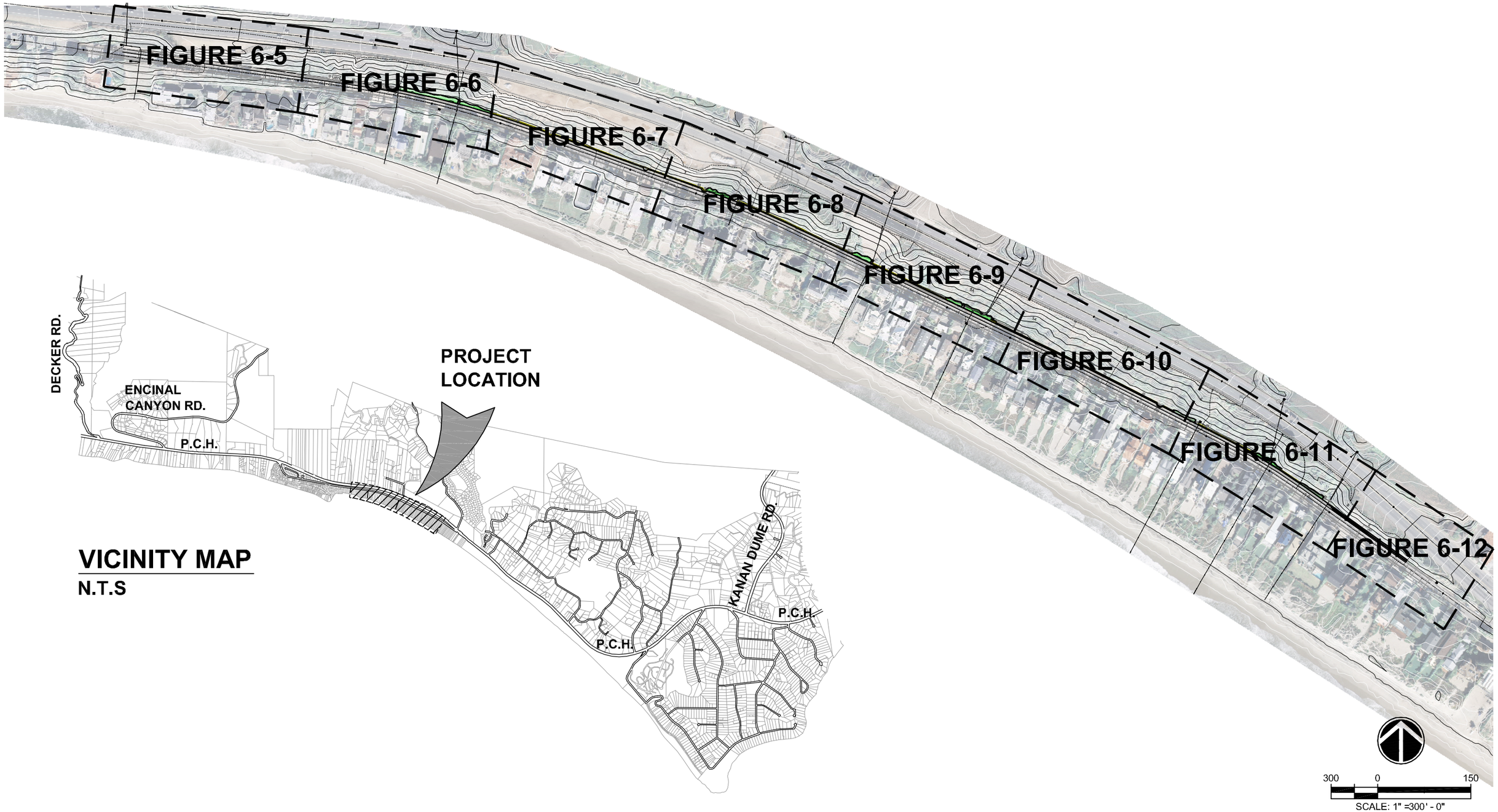


Figure 6-3. Flow diagram for Alternative 2





VICINITY MAP
N.T.S

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Figure 6-4

Pacific Coast Highway

WESTERN PROJECT BOUNDARY

1

REMOVE INVASIVE VEGETATION
FROM SLOPES AND PARKWAYS
WHERE FEASIBLE (TYP).

Broad Beach Road

REMOVE HOMEOWNER POTS.
REMOVE INVASIVE VEGETATION
FROM SLOPES AND PARKWAYS
WHERE FEASIBLE (TYP.)

NARROW SHOULDER, PARKING ONLY.
FUTURE CONSTRUCTION IMPROVEMENTS
INCLUDE A 10' WIDE CONCRETE PAVER PARKING
AREA AND A ROLLED EDGE CONCRETE SWALE

MATCHLINE SEE FIGURE 6-6

FUTURE CONSTRUCTION IMPROVEMENTS

(These areas are to be completed under separate funding at a later date)

- 10' Wide Concrete Paver Parking Area
- Rolled Edge Concrete Swale
- Concrete Swale

NOTE: Selective vegetation removal and site clean-up shall occur within the entire project boundary as part of this construction scope-of-work and budget.

20 0 40

SCALE: 1" = 40' - 0"

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Figure 6-5

Pacific Coast Highway

MATCHLINE SEE FIGURE 6-5

MATCHLINE SEE FIGURE 6-7

1

2

NOT A PART OF CONSTRUCTION IMPROVEMENTS. TO BE COMPLETED UNDER SEPARATE FUNDING AT A LATER DATE

START OF CONSTRUCTION IMPROVEMENTS

CB1

CB2

1,538 ft²

585 ft²

Broad Beach Road

EXISTING UTILITIES, REMOVE EXISTING VEGETATION FROM UTILITY SETBACKS (TYP.)

SEWER LIFT STATION, REMOVE EXISTING VEGETATION FROM UTILITY SETBACKS (TYP.)

BIOFILTER REQUIRED FOR ALTERNATIVE 1 ONLY. REPLACE BIOFILTER WITH VEGETATED SWALE FOR ALTERNATIVE 2.

ALTERNATIVE 2
NO BIOFILTER REQUIRED. STORAGE TANK WITH PUMP TO IRRIGATION SYSTEM AND/OR EASTERN BIOFILTER.

LEGEND:

- 10' Wide Concrete Paver Parking Area
- Rolled Edge Concrete Swale
- Vegetated Biofilter
- Vegetated Swale
- Alternative 2 Storage Tank
- Wall
- Catchment Area Boundary
- Existing Catch Basin

FUTURE CONSTRUCTION IMPROVEMENTS

(These areas are to be completed under separate funding at a later date)

- 10' Wide Concrete Paver Parking Area
- Rolled Edge Concrete Swale
- Concrete Swale

NOTE: Selective vegetation removal and site clean-up shall occur within the entire project boundary as part of this construction scope-of-work and budget.

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SCALE: 1" = 40' - 0"

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Figure 6-6

Pacific Coast Highway

MATCHLINE SEE FIGURE 6-6

MATCHLINE SEE FIGURE 6-8

EXISTING LEDGE STONE WALL TO REMAIN

2

3

Broad Beach Road

EXISTING PALMS TO REMAIN AS FEASIBLE

REMOVE STACKED CONCRETE RUBBLE WALLS, STAIRS AND SELECTIVE VEGETATION (TYP.)

NOTE: Selective vegetation removal and site clean-up shall occur within the entire project boundary as part of this construction scope-of-work and budget.

LEGEND:

- 10' Wide Concrete Paver Parking Area
- Rolled Edge Concrete Swale
- Vegetated Biofilter
- Vegetated Swale
- Alternative 2 Storage Tank
- Wall
- Catchment Area Boundary
- Existing Catch Basin

20 0 40

SCALE: 1" = 40' - 0"

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Figure 6-7

MATCHLINE SEE FIGURE 6-7

MATCHLINE SEE FIGURE 6-9

Pacific Coast Highway

REMOVE EXISTING PARKING PAVING AND WALL (TYP.)

SEE SHEET 9 FOR ENLARGEMENT

3

4

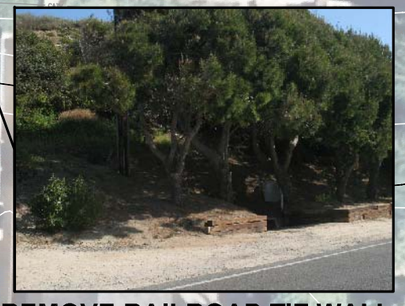
CB3

171 ft²

147 ft²

REMOVE HOMEOWNER POTS, BOXED TREES AND SELECTIVE VEGETATION (TYP.)

Broad Beach Road



REMOVE RAILROAD TIE WALL AND STAIRS (TYP.)

LEGEND:

- 10' Wide Concrete Paver Parking Area
- Rolled Edge Concrete Swale
- Vegetated Biofilter
- Vegetated Swale
- Alternative 2 Storage Tank
- Wall
- Catchment Area Boundary
- Existing Catch Basin

NOTE: Selective vegetation removal and site clean-up shall occur within the entire project boundary as part of this construction scope-of-work and budget.

20 0 40

SCALE: 1" = 40' - 0"

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Figure 6-8

Pacific Coast Highway

MATCHLINE SEE FIGURE 6-8

MATCHLINE SEE FIGURE 6-10

4

5A

SEE SHEET 10 FOR ENLARGEMENT

REMOVE CONCRETE PAVING (TYP.). EXISTING WALL TO REMAIN - ADD STONE VENEER TO MATCH PROPOSED WALLS.

CB4

468 ft²

CB5A

354 ft²

163 ft²

CB5B

408 ft²

Broad Beach Road

REMOVE STACKED CONCRETE RUBBLE WALL AND SELECTIVE VEGETATION (TYP.)

NOTE: Selective vegetation removal and site clean-up shall occur within the entire project boundary as part of this construction scope-of-work and budget.

LEGEND:

- 10' Wide Concrete Paver Parking Area
- Rolled Edge Concrete Swale
- Vegetated Biofilter
- Vegetated Swale
- Alternative 2 Storage Tank
- Wall
- Catchment Area Boundary
- Existing Catch Basin

20 0 40

SCALE: 1" = 40' - 0"

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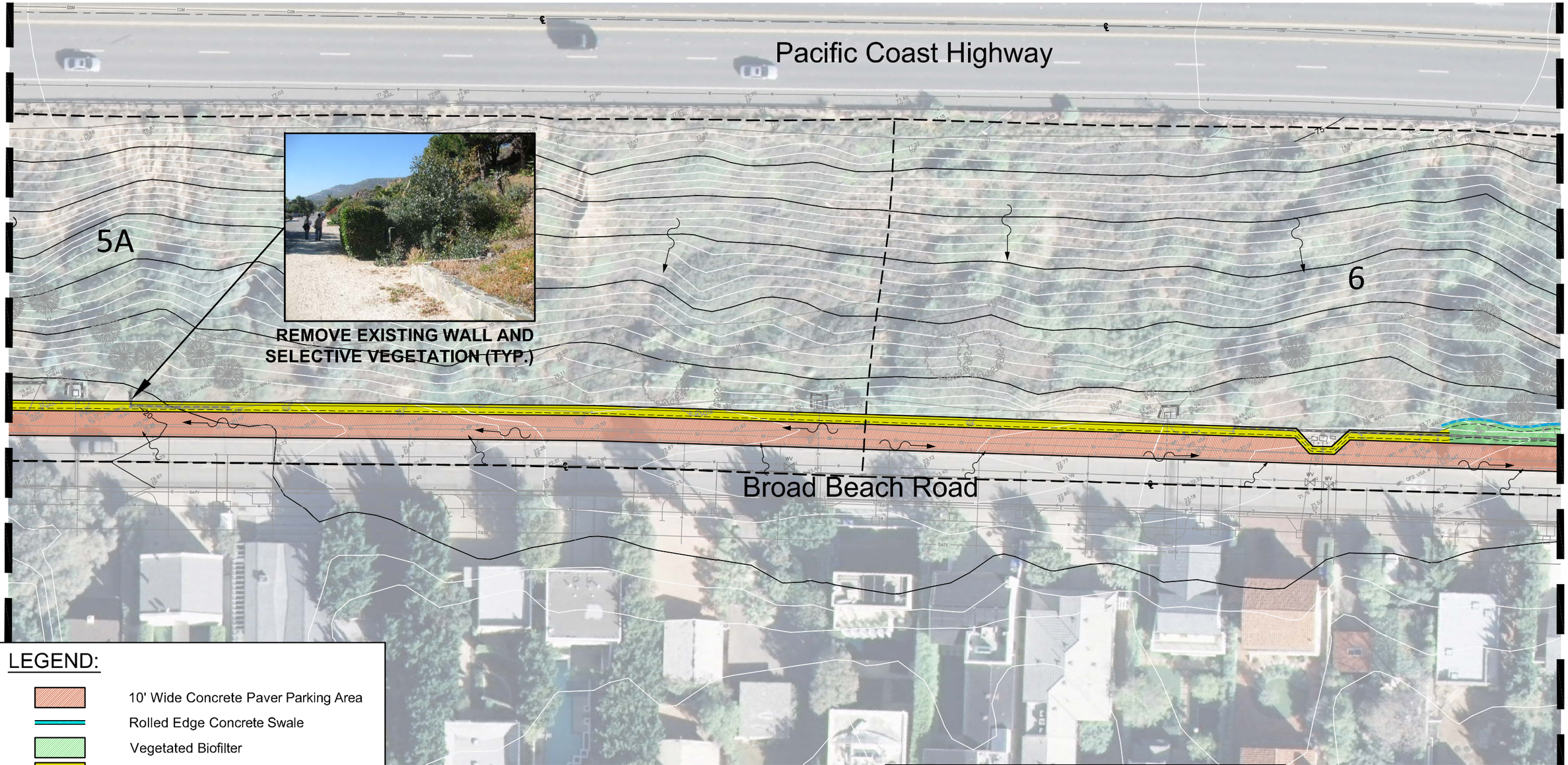
Figure 6-9



LEGEND:

- 10' Wide Concrete Paver Parking Area
- Rolled Edge Concrete Swale
- Vegetated Biofilter
- Vegetated Swale
- Alternative 2 Storage Tank
- Wall
- Catchment Area Boundary
- Existing Catch Basin

NOTE: Selective vegetation removal and site clean-up shall occur within the entire project boundary as part of this construction scope-of-work and budget.

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Figure 6-10

Pacific Coast Highway

EXISTING BRICK RETAINING WALL TO REMAIN. ADD STONE VENEER TO MATCH PROPOSED WALLS. REMOVE SELECTIVE VEGETATION (TYP.)

START OF CONSTRUCTION IMPROVEMENTS

NOT A PART OF CONSTRUCTION IMPROVEMENTS - TO BE COMPLETED AT A LATER DATE UNDER SEPARATE FUNDING

6

7

8

CB6

CB7

CB8

400 ft²

272 ft²

144 ft²

376 ft²

Broad Beach Road

MATCHLINE SEE FIGURE 6-10

MATCHLINE SEE FIGURE 6-12

BIOFILTER REQUIRED FOR ALTERNATIVE 1 ONLY. REPLACE BIOFILTER WITH VEGETATED SWALE FOR ALTERNATIVE 2 (TO BE CONSTRUCTED AT A LATER DATE UNDER SEPARATE FUNDING).

ALTERNATIVES 1 & 2
NEW DIVERSION STRUCTURE, DIVERSION PIPES, PUMP AND UNDERGROUND STORAGE TANK (ALTERNATIVE 2 ONLY) - TO BE CONSTRUCTED AS PART OF THIS PROJECT AND BUDGET.

LEGEND:

- 10' Wide Concrete Paver Parking Area
- Rolled Edge Concrete Swale
- Vegetated Biofilter
- Vegetated Swale
- Alternative 2 Storage Tank
- Wall
- Catchment Area Boundary
- Existing Catch Basin

FUTURE CONSTRUCTION IMPROVEMENTS

(These areas are to be completed under separate funding at a later date)

- 10' Wide Concrete Paver Parking Area
- Rolled Edge Concrete Swale
- Concrete Swale

NOTE: Selective vegetation removal and site clean-up shall occur within the entire project boundary as part of this construction scope-of-work and budget.

20 0 40

SCALE: 1" = 40' - 0"

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Figure 6-11

Pacific Coast Highway

MATCHLINE SEE FIGURE 6-11

EASTERN PROJECT BOUNDARY

Broad Beach Road

NARROW SHOULDER, PARKING ONLY.
FUTURE CONSTRUCTION
IMPROVEMENTS INCLUDE A 10' WIDE
CONCRETE PAVER PARKING AREA
WITH A CENTER CONCRETE SWALE

NEW UNDERGROUND STORAGE TANK
TO BE CONSTRUCTED AS PART OF
THIS PROJECT AND BUDGET.

FUTURE CONSTRUCTION IMPROVEMENTS

(These areas are to be completed under separate funding at a later date)

- 10' Wide Concrete Paver Parking Area
- Rolled Edge Concrete Swale
- Concrete Swale

NOTE: Selective vegetation removal and site clean-up shall occur within the entire project boundary as part of this construction scope-of-work and budget.

20 0 40

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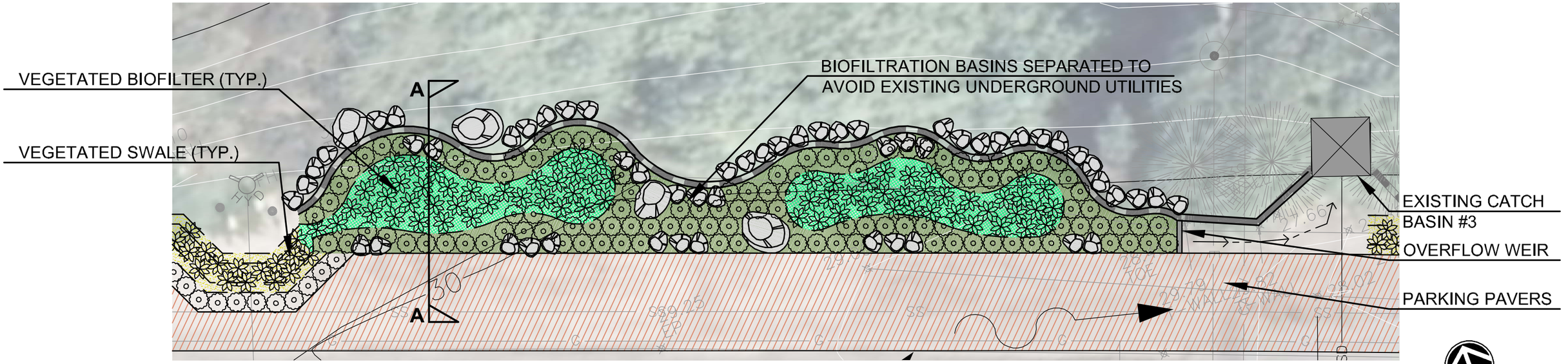
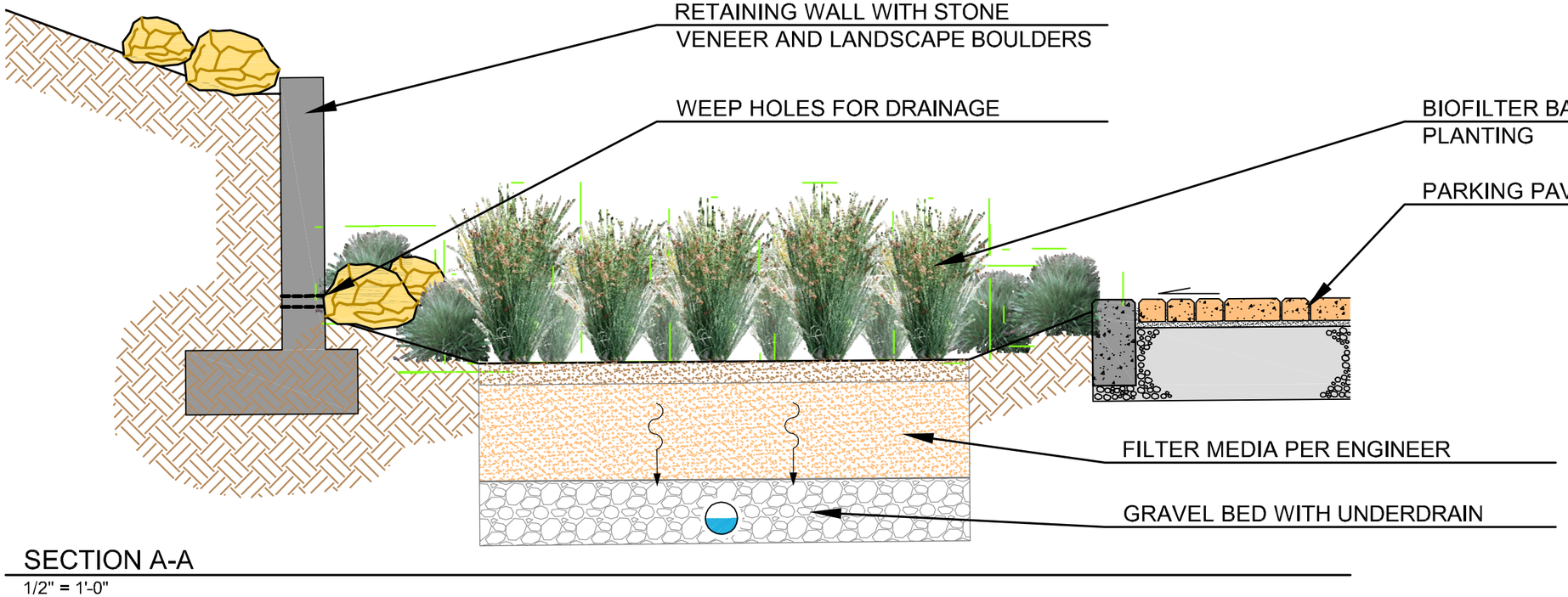
Figure 6-12



PLAN VIEW

SCALE: 1" = 10'-0"



SECTION A-A

1/2" = 1'-0"

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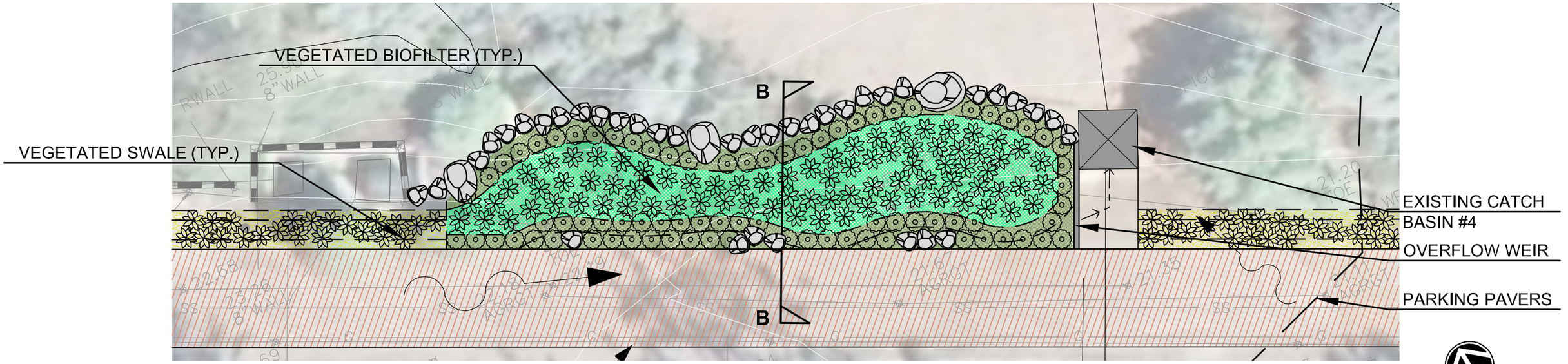
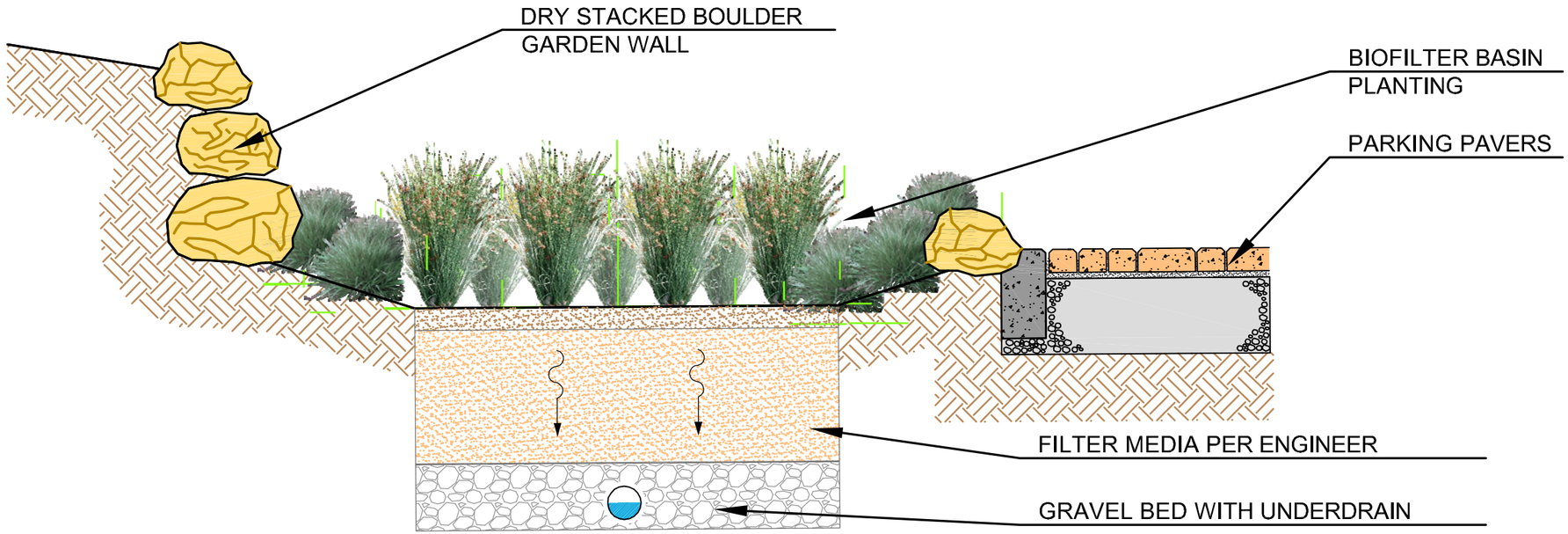
Figure 6-13



PLAN VIEW

SCALE: 1" = 10'-0"



SECTION B-B

1/2" = 1'-0"

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Figure 6-14