NEWPORT COAST AND LAGUNA BEACH ASBS PROTECTION PROGRAM

CROSS CONTAMINATION STUDY

APPENDIX A

POLLUTANT LOADING AND SEDIMENT BUDGET ANALYSES REPORT

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ACRONYMS

ASBS	Areas of Special Biological Significance
CCA	Critical Coastal Area
CDFG	California Department of Fish and Game
DAMP	Drainage Area Management Plan
DOC	Dissolved Organic Carbon
EPA	Environmental Protection Agency
HAS	Hydrological Subarea
ICWMP	Integrated Coastal Watershed Management Plan
MMA	Marine Managed Area
MPA	Marine Protected Area
NPDES	National Pollution Discharge Elimination System
NPS	Nonpoint Source
OCCK	Orange County Coastkeeper
OWPP	Ocean Water Protection Program
PCB	Polychlorinated Biphenyl
RMP	Regional Monitoring Program
SARWQCB	Santa Ana Regional Water Quality Control Board
SDRWQCB	San Diego Regional Water Quality Control Board
SVOC	Semi-Volatile Organic Compound
SWQPA	State Water Quality Protection Area
SWRCB	State Water Resources Control Board
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TSS	Total Suspended Solids
RWQCB	Regional Water Quality Control Board
USACE	U.S. Army Corps of Engineers
VOC	Volatile Organic Compound
VSS	Volatile Suspended Solids

1. INTRODUCTION

1.1 Background

The State Water Resources Control Board (SWRCB) along with the nine Regional Water Quality Control Boards (RWQCBs) is responsible for the protection of California's waters and implementation of state and federal water quality regulations. These water quality regulations include the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Temperature Plan) and the Water Quality Control Plan for Ocean Waters of California (Ocean Plan). The Temperature and Ocean Plans established the concept of "areas of special biological significance" (ASBS) for the waters of California. These areas, as designated by the SWRCB, provide *"protection of species or biological communities to the extent that alteration of natural water quality is undesirable."* Each RWQCB is required to recommend areas suitable for the ASBS designation within the respective jurisdiction for approval by the SWRCB.

There are currently 34 ASBS that were designated between 1974 and 1975 (SWRCB 1976). These ASBS include ecological reserves, marine parks, marine reserves, and marine life refuges, marine protected areas (MPAs), which are already protected under the Marine Life Protection Act and managed by the California Department of Fish and Game (CDFG). The official ASBS names are documented in Appendix V of the California Ocean Plan (SWRCB 2001). In January 2003, the term ASBS was changed to State Water Quality Protection Area (SWQPA) as required under the Public Resources Code Section 36750 with the most recent publication of the legal definitions (i.e., legal boundaries) of the SWQPAs in June 2003 (SWRCB 2003). For this document the term ASBS will be used.

The purpose of the ASBS is *"to afford special protection for marine life to the extent that waste discharges are prohibited within the areas."* Prohibited waste discharges include discharge of elevated temperature wastes, point source sewage or industrial process wastes, and nonpoint source discharges (e.g., storm water runoff, silt and urban runoff) to the extent practicable.

In addition to the protections of the ASBS and MPAs, the Critical Coastal Areas (CCAs) Program has been established to coordinate efforts by local stakeholders and governmental agencies in protecting coastal watersheds from polluted runoff. The CCA Program, which is part of California's Nonpoint Source Plan, is a non-regulatory planning tool coordinated by the CCA Committee led by the California Coastal Commission. The program goal is to ensure that NPS management measures are effectively implemented to protect or restore coastal water quality in CCAs. The CCA Program will form teams of local stakeholders and local agencies to develop community-based CCA action plans for addressing polluted runoff

that threaten coastal resources. The action plans will integrate and build on existing local watershed protection and restoration efforts, identify needs and available resources, focus the attention of responsible agencies, and coordinate with other relevant water quality protection programs.

The current list of 101 CCAs was last updated by the CCA Committee in 2002. These CCAs are coastal watershed areas that drain into 303(d) impaired coastal water bodies, where 303(d) impaired waters flow into MPAs or ASBS. Action plans are being developed for four Orange County CCAs: CCA #69 Upper Newport Bay, CCA #70 Newport Beach Marine Life Refuge, CCA #71 Irvine Coast Marine Life Refuge, and CCA #72 Heisler Park.

1.2 Goals and Objectives

The City of Newport in cooperation with the City of Laguna Beach has obtained a SWRCB Proposition 50 grant for the Newport Coast and Laguna Beach ASBS Protection Program (Program) to address the three ASBS areas adjacent to the Cities' jurisdictions:

(1) ASBS 32 – Newport Beach Marine Life Refuge

(2) ASBS 33 - Irvine Coast Marine Life Refuge

(3) ASBS 30 – Heisler Park Ecological Reserve

The goal of the Program is to provide for water quality improvement and habitat restoration across the three ASBS regions and assist conformance with the goals of the California Ocean Plan. The objectives of the Program are to identify and quantify the environmental impacts with the most detrimental effects on water quality and habitats in the ASBS and to prepare an Integrated Coastal Watershed Management Plan (ICWMP). The Program is composed of four components that will be used to achieve the Program goals and objectives.

- Public Use Impact Study
- Laguna Beach Flow and Water Quality Assessment
- Pilot Restoration Experiment
- Cross Contamination Study

This study pertains to one of the components of the Program – the Cross Contamination Study (Study). The Study is being conducted to help achieve the overall Program goals and objectives while the objectives for this Study are: 1) to identify and quantify potential pollutant loadings from the coastal watersheds, 2) to determine potential impacts of these pollutants to the ASBS, and 3) to support the development of an ICWMP.

The Study objectives are being achieved by the following tasks – (1) collect and analyze available data to quantify potential pollutant and sediment loadings to the Study Area, (2) conduct a sediment budget analyses for the Study Area and evaluate sediment erosion/deposition characteristics of the ASBS, (3) produce a pollutant loading report (this report), (4) develop and use a hydrodynamic and water quality model to evaluate potential impacts to the three ASBS from various pollutant and sediment sources, and (5) prepare a cross contamination report.

This report summarizes the data collected for tasks 1 through 3 to identify and quantify pollutants loadings into CCA #69, ASBS 32, ASBS 33, and ASBS 30, as well as to perform a sediment budget analysis. The data collected for this report will be used to assess pollutant loadings into the ASBS and will be used in conjunction with the numerical modeling to assess potential cross contamination of the harbor and creek discharges to the ASBS. The results of the cross contamination study will be provided in the Main Report and Appendix B.

In this report, a brief description of the study area including CCA #69, ASBS 32, ASBS 33, and ASBS 30 is provided in Section 2 and descriptions of the watersheds is provided in Section 3. Monitoring programs for the Study Area from which pollutant loading data are collected and reviewed are summarized in Section 4. Summaries of water quality and pollutant loading data are provided in Sections 5 and 6, respectively. Section 7 contains a summary of the sediment budget analysis conducted to assess whether the ASBS are eroding or accreting. The findings of this report are summarized in Section 8 and references are listed in Section 9.

2. STUDY AREA

The Study Area, shown in Figure 2.1, is comprised of CCA #69, ASBS 32, ASBS, 33, ASBS 30, and the adjacent coastal watersheds. The coastal watersheds are Newport Bay, Newport Coast, and Laguna Canyon Watersheds. CCA #69 is located in Upper Newport Bay within the Newport Bay Watershed. Major discharges to CCA #69 are San Diego Creek, Santa Ana-Delhi Channel, Santa Isabella Channel, and Big Canyon. ASBS 32 and 33 are located along the Newport Coast Watershed. Buck Gully and Morning Canyon drain into ASBS 32. Pelican Point Creek, Pelican Point Middle Creek, Pelican Hill Waterfall Creek, Los Trancos Creek (Crystal Cove Creek), Muddy Creek, and El Moro Canyon discharge into ASBS 33. Laguna Canyon discharges just downcoast to ASBS 30. A summary of watersheds and creeks within the Study Area are shown in Table 2.1.

Table 2.1 Summary of Study Area

Watershed	ASBS	CCA	Creeks	Beach	MMA
Newport Bay	--	69	San Diego Creek		Upper Newport Bay Ecological Reserve and State Marine Park
			Santa Ana Delhi Channel		
			Santa Isabella Channel		
			Big Canyon		
			East Costa Mesa Channel		
				Big Corona Beach	
Newport Coast	32	70	Buck Gully	Little Corona Beach	Robert E. Badham State Park
			Morning Canyon		
	33	71	Pelican Point Creek		Irvine Coast State Marine Park and Crystal Cove State Marine Conservation Area
			Pelican Point Middle Creek		
			Pelican Hill Waterfall Creek		
			Los Trancos Creek		
			Muddy Creek		
			El Moro Canyon		
				Irvine Cove	
				Cameo Cove	
			Emerald Canyon	Emerald Bay Beach	
Laguna Canyon				Crescent Bay Point Beach	Laguna Beach State Marine Park
				Crescent Bay Beach	
				Shaws Cove	
				Fisherman's Cove	
	30	72		Diver's Cove	
				Heisler Park / Rockpile Beach	Heisler Park State Marine Reserve
			Laguna Canyon Channel	Main Beach	Laguna Beach State Marine Park

Figure 2.1 Study Area

2.1 CCA #69 – Upper Newport Bay

CCA #69 consists of the Upper Newport Bay Ecological Reserve and Upper Newport Bay State Marine Park, both MPAs managed by CDFG, as well as the coastal watershed that drains into the reserve. Upper Newport Bay Ecological Reserve is located on 752-acres in the upper portion of Newport Bay, north of Shellmaker Island. The ecological reserve was originally established on 527 acres in 1975 with the expansion to 752 acres by 1982. Upper Newport Bay State Marine Park is located below mean high tide within the ecological reserve. Surrounding the ecological reserve along the north and northwest bluffs is the 140-acre Upper Newport Bay Nature Preserve, which is maintained by the County of Orange.

Upper Newport Bay Ecological Reserve serves as a nesting and feeding habitat for approximately 182 migratory species on the Pacific Flyway and 33 year-round species of birds. The bay is also home to six federally or state threatened and endangered species; 5 bird species (light-footed clapper rail, California least tern, Belding's Savannah sparrow, California brown pelican, American peregrine falcon, and California black rail) and 1 plant species (Saltmarsh bird's beak). Upper Newport Bay is home to 65% of California's light-footed clapper rail population and is believed to be the only successful nesting grounds in the United States. The California least tern, a state and federally listed endangered species, is a seasonal resident between April and early September. The state endangered species Belding's Savannah sparrow and state and federally listed endangered species California Brown Pelican are year-round residents of Upper Newport Bay. The American Peregrine Falcon is a state endangered species that is seen in regularly in the bay. The California black rail is a state threatened species. Saltmarsh bird's beak is a state and federal endangered plant species found in the high marsh habitat of the lower portion of Upper Newport Bay (USACE 2000). The other sensitive bird species include the snowy plover, California coastal gnatcatcher, San Diego cactus wren, and burrowing owl.

Upper Newport Bay is a 303(d) impaired water body with TMDLs for nutrients, sediment, toxic constituents, and fecal coliform. CCA #69 is within the jurisdiction of the Santa Ana Regional Water Quality Control Board (SARWQCB).

2.2 ASBS 32 – Newport Beach Marine Life Refuge

ASBS 32 Newport Beach Marine Life Refuge coincides with the Robert E. Badham State Marine Park (formerly called Newport Beach Marine Life Refuge), which was established in 1968 and is currently administered by CDFG. This ASBS is located along 0.7 miles of coastline (Little Corona Beach) between Poppy Avenue and the eastern boundary of the City of Newport Beach at Cameo Shores Road. ASBS 32 was designated by SWRCB Resolution No. 74-32. This area also corresponds to CCA #70, which was identified where the 303(d) impaired waters of Lower Newport Bay and Buck Gully Creek flows into MMAs or ASBS.

ASBS 32 is backed by sandstone bluffs that are covered with native coastal scrub including lemonadeberry bush, rhus integrifolia, bladderpod, and daises Encelia sp., as well as introduced vegetation. Intertidal habitat includes sandy beach and rocky outcrops. Intertidal biota are reduced in number and diversity, while the offshore reefs are healthy and diverse. Subtidal habitat consists of small patches of rocky reef with sandy bottom (SWRCB 1979b).

2.3 ASBS 33 – Irvine Coast Marine Life Refuge

ASBS 33 Irvine Coast Marine Life Refuge overlaps the CDFG MMA Irvine Coast State Marine Park (formerly called Irvine Coast Marine Life Refuge) located adjacent to ASBS 32 at Cameo Shores Road extending 3.4 miles to the northwestern boundary of the City of Laguna Beach near Abalone Point. ASBS 33 was designated by SWRCB Resolution No. 74-32. Crystal Cove State Marine Conservation Area also overlaps the Irvine Coast State Marine Park, but extends farther offshore and does not provide the same level of protection as the marine park. The watershed that drains into ASBS 33 has been identified as CCA #71, which includes the 303(d) impaired Los Trancos Creek. ASBS 33 falls within the jurisdiction of both the Santa Ana and San Diego RWQCBs.

This stretch of shoreline is comprised of coarse sand beaches with occasional rock outcroppings with rich and diverse plant and animal communities. The coastal bluffs backing ASBS 33 are covered with coastal sage scrub vegetation community. Most flora along the bluffs are native to the Southern California coastline, however there are some introduced species. The subtidal area is sandy with small rocky reefs scattered throughout the refuge. Beds of giant kelp are present, although not in large beds due to the small reefs (SWRCB 1979a).

2.4 ASBS 30 – Heisler Park Ecological Reserve

ASBS 30 Heisler Park Ecological Reserve, which was designated by SWRCB Resolution No. 74-28 (March 21, 1974), is located seaward of Heisler Park along approximately 0.5 miles of coastline between Hawthorne Road and Aster Street in the City of Laguna Beach. ASBS 30 coincides with Heisler Park State Marine Reserve (formerly called Heisler Park Ecological Reserve), which is located within the Laguna Beach State Marine Park (formerly Laguna Beach Marine Life Refuge) and both managed by CDFG. Heisler Park State Marine Reserve was established in 1973 and Laguna Beach State Marine Park established in 1968. CCA #72 is the watershed that drains into Heisler Park State Marine Reserve and Laguna Beach State Marine Park. ASBS 30 is within the SDRWQCB jurisdiction and San Joaquin Hills Hydrologic Sub Area (HAS). The Pacific Ocean shoreline at Heisler Park – North and along the Laguna Canyon Watershed (Main Laguna Beach, Laguna Beach at Ocean Avenue, and Laguna Beach at Laguna Avenue) are 303(d) listed for bacteria indicators.

3. WATERSHED DESCRIPTION

The coastal watersheds in the Study Area are the Newport Bay, Newport Coast, and Laguna Canyon Watersheds, which are shown in Figure 3.1. The Newport Bay Watershed is apart of CCA #69. ASBS 32 and 33 are located along the Newport Coast Watershed and ASBS 30 is located along the Laguna Canyon Watershed. Descriptions of these watersheds are provided below.

3.1 Newport Bay Watershed

The Newport Bay Watershed, shown in Figure 3.2, consists of approximately 154-square miles in the cities of Newport Beach, Irvine, Costa Mesa, Santa Ana, Orange, Tustin, Lake Forest, and Laguna Hills that drain into Upper and Lower Newport Bay, which are divided by Pacific Coast Highway. This watershed coincides with the SARWQCB Newport Bay Management Area. The Newport Bay Watershed is predominantly urbanized, with about 70% urban, 10% agricultural, and 20% vacant land uses (SARWQCB 2004).

CCA #69 is consists of the watersheds for San Diego Creek, Santa Ana Delhi Channel, Santa Isabella Channel, and Big Canyon. The approximate drainages areas for each of these creeks are listed in Table 3.1. San Diego Creek is the largest of these creeks, draining 119-square miles that include Serrano Creek, Borrego Canyon Wash, Agua Chinon Wash, Bee Canyon, Marshburn Channel, Peters Canyon Channel, Barranca Channel, Round Canyon, Lane Channel, San Joaquin Channel, Sand Canyon, and Bonita Channel. San Diego Creek was channelized in the early 1960's by the Orange County Flood Control District.

Table 3.1 CCA #69 Drainage Areas

Watershed	Drainage Area (sq. miles)
San Diego Creek	119
Santa Ana Delhi Channel	17.3
Santa Isabella Channel	~3.1
Big Canyon Creek	2.0

Source: SARWQCB 2004

Figure 3.1 Watersheds in the Study Area

Figure 3.2 Newport Bay Watershed

Upper Newport Bay is listed for metals and pesticides, while Lower Newport Bay is 303(d) listed for metals, pesticides, and priority organics. San Diego Creek Reach 1 is 303(d) listed for fecal coliform and pesticides and Reach 2 is listed for metals and unknown toxicity. Sediment, nutrients, and toxics TMDLs have been developed jointly for both Newport Bay and San Diego Creek, while the fecal coliform TMDL has been developed for Newport Bay.

3.2 Newport Coast Watershed

The Newport Coast Watershed is comprised of the drainage areas for Buck Gully, Morning Canyon, Pelican Point Creek, Pelican Point Middle Creek, Pelican Hill Waterfall Creek, Los Trancos Creek, Muddy Creek, El Moro Canyon, and Emerald Canyon. The drainage areas for theses creeks are listed in Table 3.2. Except for Emerald Canyon, eight of the creeks discharge directly into ASBS 32 or 33. The Newport Coast Watershed is within the Newport Coast Management Area, shown in Figure 3.3, under jurisdiction of the SARWQCB with the exception of El Moro Canyon and Emerald Canyon, which are under the SDRWQCB jurisdiction in the San Juan Watershed Management Area.

Table 3.2 Newport Coast Subwatershed Drainage Areas

Subwatershed	Drainage Area Square Miles (Acres)
Buck Gully	1.97 (1,261)
Morning Canyon	0.60 (387)
Pelican Point Community	0.04 (23)
Pelican Point Creek	No Data
Pelican Point Middle Creek	0.37 (235)
Pelican Point Waterfall Creek	0.22 (143)
Los Trancos Creek	1.85 (1,181)
Muddy Canyon	1.56 (996)
El Moro Canyon	3.35 (2,143)
Emerald Canyon*	2.27 (1,453)

Source: Weston 2007
*Source: City of Laguna Beach 1988

Figure 3.3 Newport Coast Watershed

The watershed area that discharges directly into ASBS 32 is the drainage areas for Buck Gully and Morning Canyon, which comprise CCA #70. Buck Gully, which discharges to Little Corona Beach, drains an area of 1.97 sq. miles (1,261.32 acres). Morning Canyon discharges onto a beach and drains an area of 0.6 sq. miles (387 acres).

Pelican Point Creek, Pelican Point Middle Creek, Pelican Point Waterfall Creek, Los Trancos Creek (also called Crystal Cove Creek), Muddy Creek, and El Moro Canyon flow directly into ASBS 33 and correspond to CCA #71. These creeks discharge into the beach area of Crystal Cove State Park and waters of the Irvine Coast State Marine Park and Crystal Cove State Marine Conservation Area. The watershed draining into ASBS 33 is primarily located within unincorporated area between the City of Newport Beach and Crystal Cove State Park and includes the Newport Coast Planned Community, a residential and commercial community developed by the Irvine Community Development Company. Pelican Point Creek, Pelican Point Middle Creek, and Pelican Point Waterfall Creek drain the Pelican Hill residential area and gold course. Los Trancos Creek (1.85 sq. miles or 1,181 acres) and Muddy Creek (1.56 sq. miles or 996 acres) are second and third largest drainage areas in the ASBS 33 watershed. El Moro Canyon, which is the least developed area, has the largest drainage area of 3.35 sq. miles (2,143 acres) within the Crystal Cove State Park.

Emerald Canyon discharges into Emerald Bay Beach located between ASBS 33 and 30. The 2.27 sq. miles (1,453 acre) drainage area for Emerald Canyon includes Crystal Cove State Park, Laguna Coast Wilderness Park, and an unincorporated area. Emerald Canyon and El Moro Canyon are within the San Joaquin Hills hydrologic subarea (HSA), as part of the SDRWQCB San Juan Management Area.

Buck Gully (below Pacific Coast Highway) and Los Trancos Creek (below Pacific Coast Highway) is 303(d)-listed for total and fecal coliform. In addition, Pelican Point Creek, Los Trancos Creek, and Muddy Creek are in violation of one or more designated beneficial uses (REC1, REC2, and MUN) (SARWQCB 2004). The Pacific Ocean Shoreline upcoast from Emerald Bay in Cameo Cove is 303(d) listed for bacteria indicators (SWRCB 2003).

3.3 Laguna Canyon Watershed

The Laguna Canyon Watershed, shown in Figure 3.4, drains an area of about 9.76 sq. miles (6,246 acres) into Main Beach (M&N 1988). The Laguna Canyon Channel, along with Niguel Creek and Laurel Canyon tributaries, flows through portions of the cities of Aliso Viejo, Laguna Beach, and Laguna Woods. The Laguna Canyon Watershed is part of the Laguna Beach HSA, as part of the SDRWQCB San Juan Management Area.

Figure 3.4 Laguna Canyon Watershed

4. MONITORING PROGRAMS

Water quality data were reviewed and summarized from continuous monitoring programs, as well as field data collection programs. Continuously monitoring is conducted for compliance with Total Maximum Daily Loads (TMDL), National Pollutant Discharge Elimination System (NPDES) permits, and Ocean Water Protection Program (OWPP). Field data collection programs reviewed were the Newport Coast Flow and Water Quality Assessment (Newport Assessment) and Orange County Coastkeeper (OCCK) Citizens Monitoring Projects. A brief summary of these monitoring programs are provided in this section.

4.1 TMDL Monitoring

Sediment, nutrients, and toxics TMDLs have been developed jointly for both Newport Bay and San Diego Creek, while the fecal coliform TMDL has been developed for Newport Bay. Compliance with TMDLs for Newport Bay and San Diego Creek are the responsibility of the County of Orange and the cities of Costa Mesa, Irvine, Laguna Hills, Laguna Woods, Lake Forest, Newport Beach, Orange, Santa Ana, and Tustin. The County of Orange conducts the monitoring and submits reports on behalf of the county and cities. TMDL monitoring requires annual reports for data collected between July and June of each year.

4.1.1 Sediment TMDL

The sediment TMDL allocations were last revised in March 1999, subsequently the monitoring program updated in November 1999 (SARWQCB 1999a and c). The sediment TMDL monitoring program includes monitoring of suspended sediment and flow for TMDL compliance and TMDL load allocation. Suspended sediment and flow are monitored at eight locations on a daily basis to quantify fluvial sediment entering Newport Bay from San Diego Creek and Santa Ana-Delhi Channel. The data are used to develop storm-specific sediment concentration curves and sediment transport curves. Flow data, sediment concentration curves, and sediment transport curves are then used to estimate the annual sediment loadings for San Diego Creek and Santa Ana-Delhi Channel.

4.1.2 Nutrient TMDL

Due to continued algal bloom problems in Newport Bay, nutrient TMDLs were approved by Resolution No. 98-9 as amended by Resolution No. 98-100. Load allocations for total nitrogen and total phosphorus were defined for the entire Newport Bay Watershed, as well as load allocations of total nitrogen for San Diego Creek Reach 2 (above Jeffrey Road). No nutrient TMDLs were specified for San Diego Creek Reach 1 (Jeffrey Road to Newport Bay), since the Newport Bay Watershed TMDL should obtain water quality objectives in the creek. A Regional Monitoring Program (RMP) for nutrients was developed to eliminate redundancies in monitoring within the Newport Bay Watershed (County of Orange 2001).

Monitoring stations for evaluating nutrient load and concentrations entering Newport Bay are conducted at nine locations throughout the watershed, which includes the Costa Mesa Channel, Santa Ana-Delhi Channel, and San Diego Creek. Dry weather grab samples or automated samplers are typically collected on a weekly, bi-weekly, or monthly basis. Dry weather samples consist of hourly composite sample over a 24-hour period. Wet weather samples are collected for approximately three storms per year and are collected at 2-hour intervals for a 96-hour period using automatic samplers. Nutrients monitored are ammonia, nitrate, total kjeldahl nitrogen (TKN), phosphate, and orthophosphate. San Diego Creek at Campus Drive and Santa Ana-Delhi Channel are monitored for flow by the County.

4.1.3 Toxic TMDL

The U.S. Environmental Protection Agency (EPA) promulgated toxic TMDLs on June 14, 2002 that covers 14 constituents, organophosphate pesticides – chlorpyrifos and diazinon, organochlorinated compounds – chlordane, dieldrin, DDT, PCBs, and toxaphene, and metals – cadmium, copper, lead, zinc, selenium, chromium, and mercury (EPA 2002). These toxic TMDLs are applicable to specific geographical areas, as summarized in Table 4.1. The TMDL monitoring program for the toxic TMDLs are underdevelopment, however these constituents are monitored under the NPDES monitoring program.

Table 4.1 EPA Promulgated Toxic TMDLs for Newport Bay and San Diego Creek

Waterbody	Organophosphate Pesticides	Organochlorinated Compounds	Metals
San Diego Creek	Chlorpyrifos, Diazinon	Chlordane, Dieldrin, DDT, PCBs, Toxaphene	Cd, Cu, Pb, Se, Zn
Upper Newport Bay	Chlorpyrifos	Chlordane, DDT, PCBs	Cd, Cu, Pb, Se, Zn
Lower Newport Bay	--	Chlordane, Dieldrin, DDT, PCBs	Cu, Pb, Se, Zn
Rhine Channel	--	Chlordane, Dieldrin, DDT, PCBs	Cu, Pb, Se, Zn, Cr, Hg

4.1.4 Fecal Coliform TMDL

The Newport Bay TMDL for fecal coliform was established on April 9, 1999 with Resolution No. 99-10 (SARWQCB 1999b). The fecal coliform TMDL, waste load allocations, and load allocations were established as concentrations (e.g., MPN/100 mL) equivalent to water quality objectives. Fecal coliform TMDL monitoring for compliance is conducted at 35 locations throughout Newport Bay. Three of these locations are for discharges into the bay from San Diego Creek, Santa Ana-Delhi Channel, and Costa Mesa Channel. Samples are taken at a frequency of at least 5 samples per 30-day period and tested for total coliform,

fecal coliform, and enterococci, while reports are submitted on a monthly and annual basis (SARWQCB 1999).

4.2 NPDES Monitoring

The Study Area is regulated by NPDES permits administered by the Santa Ana and San Diego RWQCBs that require the development and implementation of surface water quality protection and management programs. The NPDES permits, SARWQCB Order No. R8-2002-0010, NPDES Permit No. CAS618030 and SDRWQCB Order No. R9-2002-0001, NPDES Permit No. CAS0108740, were first adopted in 1990 and are currently in the Third Term (2002 – 2007). As part of the Orange County Stormwater Program, the County of Orange serves as the principal permittee and submits implementation plans and annual reports to document permit compliance on behalf of the Orange County Flood Control District and incorporated cities of Orange County. The primary planning document for permit compliance is the 2003 Drainage Area Management Plan (DAMP) (County of Orange 2003), with the next revision proposed for 2007. The DAMP outlines the water quality monitoring program to be implemented over the course of the Third Term permit and separates requirements under the Santa Ana and San Diego NPDES permits, which are summarized below.

4.2.1 Santa Ana Region

The water quality monitoring program for the Santa Ana region consists of the following elements: mass emissions, estuary/wetlands, bacteriological/pathogen, bioassessment, dry weather reconnaissance, land use correlations, nutrient TMDL, and toxic TMDL. Most of these monitoring elements continue prior monitoring under the First and Second Term permits, while the bioassessment, bacteriological/pathogen, land use correlations, and toxic TMDL monitoring will be implemented during the Third Term.

Mass emission locations include San Diego Creek, Santa Ana-Delhi Channel, and Costa Mesa Channel. Mass emission samples are collected during dry weather conditions and three storm events per season. Dry weather samples consist of an hourly composite over a 24-hour period. Three to four composite samples are collected per wet weather event over a 96-hour period. Samples are measured for general constituents (pH, electrical conductivity, nitrate, ammonia, TKN, total phosphate, orthophosphate, DOC, TOC, TSS, VSS, oil and grease, chloride, sulfate, and hardness), total recoverable and dissolved metals (cadmium, chromium, lead, nickel, selenium, silver, and zinc), organophosphate pesticides, and toxicity. Priority pollutant scans are conducted on the first flush of the first monitored storm, while bacteriological samples are also collected periodically during auto-sampler servicing. The storm water toxicity is evaluated using three toxicity tests: mysid (*Mysidopis bahia) survival*/growth test for pesticide toxicity, sea urchin (Stronglyocentrotus purpuratus) fertilization and embryo development tests for dissolved metals toxicity, and

fathead minnow (*Pimephales promelas)* survival/growth and *Ceriodaphnia dubia* survival/reproduction.

Under the estuary/wetlands element, receiving waters and tributaries of Newport Bay, Huntington Harbor/Bolsa Bay, and Talbert Marsh are monitored during dry and wet weather conditions. Estuary/Wetlands sites are sampled twice during the dry season (prior to October and after May) and during two storm events. Composite sampling follows the mass emission methodology. Wet weather receiving water samples are analyzed for nutrients, metals, DOC, and organophosphorus pesticides. Toxicity is evaluated using the sea urchin fertilization test, sea urchin embryo development test, and the mysid survival/growth test. Sediment chemistry and sediment toxicity are also monitored for TOC, particle size distribution, metals, organochlorine pesticides, PCBs, organophosphate pesticides, and pyrethroid pesticides.

Bacteriological/pathogen monitoring for total coliform, fecal coliform, and enterococcus began during the 2005-06 reporting period. Sampling locations include San Diego Creek, Santa Ana-Delhi Channel, Costa Mesa Channel, Newport Boulevard, Buck Gully, Pelican Point Creek, Pelican Point Waterfall Creek, and Muddy Creek. Monitoring is conducted during dry weather for the discharge, as well as in the receiving water 25-yards upcoast and downcoast of the discharge.

Bioassessment locations are monitored following the California Stream Bioassessment Procedure and also concurrently sampled for water chemistry and toxicity analyses. The water chemistry analysis tests for the same constituents as the mass emission locations. Toxicity is evaluated using the freshwater organisms, *ceriodaphnia dubia*, *Selanastrum capricornutum*, and *Hyallela azteca,* as well as finhead minnow for Newport Bay watershed sites. Bioassessment locations include Big Canyon Wash and Buck Gully.

Dry weather reconnaissance locations are storm drains that are sampled five times during the dry season (May 1 – September 30). The storm drain along Newport Boulevard that discharges into Lower Newport Bay is one of the dry weather reconnaissance locations. Water quality samples are tested for nitrate, ammonia, reactive phosphorus, total chlorine, phenols, surfactants, dissolved copper and hexavalent chromium, TSS, dissolved metals, oil and grease, indicator bacteria, and organophosphate pesticides.

Land use correlation sites are located in the San Diego Creek watershed. Seven sites are sampled on a monthly basis and during two storm events. Constituents monitored are the same as the mass emission stations.

The nutrient TMDL monitoring occurs in the Newport Bay Watershed under the RMP, which was previously described. A similar program is being developed for the toxic TMDL monitoring.

4.2.2 San Diego Region

The San Diego region water quality monitoring program being implemented over the Third Term consists of the following elements: bioassessment, mass loading, coastal storm drains, coastal receiving waters, and dry weather reconnaissance. Monitoring for the bioassessment, mass loading, and ambient coastal receiving waters monitoring began at the end of 2002, while the coastal storm drain outlet and dry weather monitoring was initiated in 2003.

The bioassessment is conducted twice a year (one spring, one fall) and include concurrent bioassessment, toxicitiy, and water chemistry sampling similar to the methodology under the used for the Santa Ana region. There is one bioassessment location along Laguna Canyon at Highway 133.

Mass loading sites, which include one location along Laguna Canyon, are sampled during three storm events based on three to five composite samples over a 96-hour period. Samples are tested for pH, electrical conductivity, turbidity, nitrate, ammonia, TKN, total phosphate, orthophosphate, dissolved and total organic carbon, total suspended and settable solids, volatile suspended solids, organophosphate pesticides, and total recoverable and dissolved metals (cadmium, copper, chromium, lead, nickel, selenium, silver, and zinc). Toxicity is also periodically monitored using the freshwater organisms, *ceriodaphnia dubia*, *Selanastrum capricornutum*, and *Hyallela azteca*.

Coastal storm drains are monitored weekly for bacteria levels at the storm drain, as well as 25-yards upcoast and downcoast of the discharge into the ocean. Storm drains are not sampled during rainfall or during storm drain diversions. Coastal storm drain outfall within the Study Area are El Moro Creek, Emerald Bay drain, Heisler Park – North (Diver's Cove), and Main Beach Boardwalk.

The ambient coastal receiving waters are monitored to evaluate the effect of urban runoff on ecologically sensitive areas based on water chemistry and toxicity. Water chemistry constituents and toxicity tests are the same as the mass emissions sampling. There are four ambient monitoring locations along the Laguna Canyon Watershed coastline, 2 at Rockpile Beach and 2 at Main Beach.

The dry weather monitoring is used to identify and eliminate illegal discharges and illicit connections to the storm drain system by monitoring 30 random sites and 26 targeted sites. The dry weather monitoring sites are sampled three times between May 1 and September 30 and analyzed for in situ measurements (turbidity, pH, temperature, specific conductance, and dissolved oxygen), chemical measurements (nitrate, ammonia, orthophosphate, total chlorine, phenol, MBAS, and water hardness), and laboratory measurements (TSS, total coliform, fecal coliform, enterococcus, oil and grease, dissolved metals, and

organophosphate pesticides). There are two dry weather monitoring sites one upcoast and one downcoast of Laguna Canyon Channel.

4.3 Ocean Water Protection Program

The County of Orange Health Care Agency/Environmental Health (HCA), along with Orange County Sanitation District and South Orange County Wastewater Authority, conducts bacteria sampling as part of the Ocean Water Protection Program (OWPP). The sampling locations monitored by HCA include beaches for AB411 requirements. There are 4 sampling locations at drainages into Newport Bay (San Diego Creek, Santa Ana Delhi Channel, Big Canyon Creek, and Backbay Drive Drain) and 31 sampling locations within Newport Bay. There are 11 creek sampling locations along the Newport Coastline (Buck Gully, Pelican Point Creek, Pelican Point Middle Creek, Pelican Point Waterfall Creek, Crystal Cove, Muddy Creek, El Moro Creek, Emerald Bay Drain and Broadway Creek). Beach sampling locations along the coastline include Little Corona Beach, Pelican Point, Crystal Cove, Muddy Creek, and El Moro Beach, Emerald Bay, Crescent Bay, and Laguna Main Beach. Weekly samples are tested for total coliform, fecal coliform, and enterococcus.

4.4 Newport Coast Flow and Water Quality Assessment

The Newport Coast Flow and Water Quality Assessment (Newport Assessment) conducted for the City of Newport Beach under a Proposition 13 grant to address key management questions and provide baseline data to assist future management decisions. This assessment involved field data collection and analyses to estimate creek pollutant loadings from eight creeks within the Newport Coast Watershed. Recommendations were also made for prioritizing future management actions.

Field data consisted of creek and ocean sampling locations (Table 4.2) during two dry and three wet weather sampling events occurring between September 2005 and February 2006. The frequency of samples at each location and constituents analyzed varied by sampling event. Measured constituents included general constituents, nutrients, butylins, radio chemistry, metals, oil and grease, organochlorine pesticides, organophosphorus pesticides, residual chlorine, SVOCs, VOCs, synthetic pyrethroids, dioxins, triazine pesticides, bacteria indicators, and toxicity. Flow measurements were also made using hand-held devices and installed gages at Buck Gully, Los Trancos Canyon, and El Moro Canyon. The Newport Assessment also included the Buck Gully Dry Weather Source Investigation and Pelican Point Flow and Water Quality Assessment.

Table 4.2 Newport Assessment Sampling Locations

Creek	Sampling Locations
Buck Gully	7 (BG1 – BG7) and 1 ocean (BGO)
Morning Canyon	2 (MCD and MCU)
Pelican Point Community	1 (PP1)
Pelican Point Middle Creek	1 (PPM)
Pelican Point Waterfall Creek	1 (PPW)
Los Trancos Creek	2 (LTD and LTU)
Muddy Canyon	1 (MCC)
El Moro Canyon	3 (EMD, EMT, and EMU) and 1 ocean (EMO)

Source: City of Newport Beach 2007

Data analyses were conducted using the field data collected. Water chemistry data were compared to water quality objectives for the Ocean Plan and Basin Plan. Flow and load duration curves were developed to estimate annual loadings for dissolved cadmium, copper, lead, and zinc, fecal coliform and enterococcus.

4.5 Orange County Coastkeeper Citizens Monitoring Projects

Orange County Coastkeeper (OCCK) has participated and implemented two citizens monitoring programs: the Santa Ana River Citizens Monitoring Project (OCCK 2004) and the Orange County Coastal Watersheds Citizens Monitoring Project (OCCK 2006). The Santa Ana River Citizens Monitoring Project monitored water quality at 27 locations along seven streams in San Bernardino, Riverside, and Orange County between October 2002 and June 2004. OCCK conducted the monitoring of 18 locations on four streams in Orange County; six of these locations were along San Diego Creek. Measurements for ammonia, nitrate, orthophosphates, pH, dissolved oxygen, and conductivity were taken on a monthly basis during dry months (Apr – Nov) and twice a month during wet months (Dec-Mar). Periodic samples were also analyzed for bacteria and metals.

The Orange County Coastal Watersheds Citizens Monitoring Project conducted water quality measurements at 16 locations throughout the coastal area in Orange County between April 2004 and May 2006. Six of these locations were located along tributaries of San Diego Creek; two locations were sampled along Borrego Creek, Peters Canyon Channel, and Serrano Creek. The Santa Ana-Delhi Channel was also monitored at two locations, MacArthur Blvd and Irvine Ave). Four locations within the Newport Coast

Watershed were monitored; two locations along Buck Gully (Poppy St and Fifth St. and Poppy St. and Ocean Blvd) and two locations along Morning Canyon Creek (Rockford Road and Pacific Ocean). Measurements are taken on a monthly basis during dry months (April – November) and twice a month during wet months (December – March). Samples were analyzed for bacteria (total coliform, enterococcus, and E. coli), ammonia, nitrate, orthophosphate, pH, dissolved oxygen, conductivity, and metals at varying intervals.

5. WATER QUALITY DATA

Available water quality data for creeks that discharge into or near CCA #69 and ASBS 32, 33, and 30 that are collected under the various programs described in Section 4 were reviewed and summarized in this section. As mentioned in Section 4, data were from on-going monitoring programs, as well as field data collection programs. Monitoring locations for the various programs are shown in Figure 5.1. Data from the TMDL and NPDES monitoring programs are based on the annual reports from 2000-01 to 2005-06 (County of Orange 2006). Bacteria data from the OWPP were reviewed through December 2006 (HCA 2007). Data from field data collection programs were from the Newport Assessment (City of Newport Beach 2007) that sampled between September 2005 and February 2006 and OCCK monitoring that occurred between 2002 and 2006 (OCCK 2004 and 2006).

Water quality data are presented in summary tables by creek (Table 5.1). In the tables, summaries are provided for flow, general constituents, bacteria, bioassessment, dissolved metals, pesticides, and other priority pollutants if data were available. General constituents are summarized for ammonia-nitrogen, nitrate, nitrite, total phosphate, orthophosphate, TSS, and turbidity. Bacteria data include total coliform, fecal coliform, enterococcus, and E. coli. Dissolved metals data are summarized for arsenic, cadmium, chromium, copper, lead, nickel, selenium, silver, and zinc. Pesticide data are summarized for organochlorinated pesticides – chlordane, DDT, dieldrin, and toxaphene and organophosphorus pesticides – chlorpyrifos, diazinon, dimethoate, and malathion. Other priority pollutants include synthetic pyrethroids, PCBs, SVOCs, VOCs, butylins, dioxins, and radio chemistry. TMDL and 303(d)-listed constituents are also indicated in the summary table. The summary of the data includes monitoring program, sampling frequency, and data range (minimum, maximum, and average). For bacteria data, the geometric mean is indicated rather than the average. In calculating the average, non-detect results were assumed to be zero, which is consistent with the NPDES reporting.

Figure 5.1 Water Quality Monitoring Locations

Table 5.1 List of Water Quality Data Tables

Watershed	Creek	Summary Table
Upper Newport Bay	San Diego Creek	Table 5.2
	Santa Ana-Delhi Channel	Table 5.3
	Santa Isabella Channel	Table 5.4
	Big Canyon Wash	Table 5.5
	Costa Mesa Channel	Table 5.6
Lower Newport Bay	Newport Boulevard	Table 5.7
Newport Coast	Buck Gully	Table 5.8
	Morning Canyon	Table 5.9
	Pelican Point Creek	Table 5.10
	Pelican Point Middle Creek	Table 5.11
	Pelican Point Waterfall Creek	Table 5.12
	Los Trancos Creek	Table 5.13
	Muddy Creek	Table 5.14
	El Moro Creek	Table 5.15
	Emerald Creek	Table 5.16
Laguna Canyon	Laguna Canyon Channel	Table 5.17
	Laguna Canyon Drains	Table 5.18

5.1 San Diego Creek

TMDL and NPDES monitoring occurs throughout the San Diego Creek Watershed. The downstream monitoring location for San Diego Creek before entering UNB is located at Campus Drive. This monitoring location is a NPDES mass emission, NPDES bacteriological/pathogen, nutrient TMDL, and fecal coliform TMDL monitoring station. A summary of water quality data for San Diego Creek is shown in Table 5.2. Long-term flow, nutrient, and bacteria data have been monitored since July 2000. Metals and pesticides have been monitored since December 2001. NPDES bacteria monitoring began in

September 2005. Testing for priority pollutants occurred in September 2005. Additionally, OCCK sampled San Diego Creek at Michelson Drive between October 2002 and June 2004.

5.2 Santa Ana-Delhi Channel

The Santa Ana-Delhi Channel, which discharges into Upper Newport Bay, is monitored upstream of Irvine Avenue. Water quality data for the Santa Ana-Delhi Channel is summarized in Table 5.3. This channel is a NPDES mass emission, NPDES bacteriological/pathogen, nutrient TMDL, and fecal coliform monitoring location. The time frames of data are similar to San Diego Creek with flow, nutrient, and bacteria data monitored since July 2000. This location was also sampled by OCCK between April 2004 and May 2006.

Table 5.2 Water Quality Data for San Diego Creek

Constituent	Monitoring Program	Sampling Frequency	Data Range (Average)*
Flow			
Mean Daily Discharge	TMDL (SDMF05)	Daily (Jul 00 – present)	0.58 - 3,069.82 (42.05 cfs)
General Chemistry			
Ammonia-Nitrogen**	TMDL (SDMF05)	Weekly (Jul 00 – present)	ND - 1.8 (0.13 mg/L)
	OCCK (SD6)	Monthly or bi-monthly (Oct 02 – Jun 04)	
Nitrate-Nitrogen**	TMDL (SDMF05)	Weekly (Jul 00 – present)	ND - 210 (25.17 mg/L)
	OCCK (SD6)	Monthly or bi-monthly (Oct 02 – Jun 04)	
Orthophosphate**	TMDL (SDMF05)	Weekly (Jul 00 – present)	ND - 0.58 (0.085 mg/L)
	OCCK (SD6)	Monthly or bi-monthly (Oct 02 – Jun 04)	0.16 - 2.8 (0.955 mg/L)
Total Phosphate**	TMDL (SDMF05)	Weekly (Jul 00 – present)	ND - 645 (4.21 mg/L)
TSS**	TMDL (SDMF05)	Weekly (Jul 00 – present)	ND - 900 (81.85 mg/L)
Turbidity	TMDL (SDMF05)	Weekly (Jul 00 – present)	0 - 604 (51.47 NTU)
Bacteria			
Total Coliform	NPDES (SDMF05)	Weekly (Sep 05 – present)	60 - 3,200,000 (6,047 CFU/100 mL)
	TMDL (35)	5 samples/30-days (Apr 00 – present)	2 - 178,000 (436 CFU/100 mL)
	OCCK (SD6)	Monthly or bi-monthly (Oct 02 – Jun 04)	
Fecal Coliform**	NPDES (SDMF05)	Weekly (Sep 05 – present)	9 - 270,000 (223 CFU/100 mL)
	TMDL (35)	5 samples/30-days (Apr 01 – present)	10 - 72,000 (268 CFU/100 mL)
Enterococcus	NPDES (SDMF05)	Weekly (Sep 05 – present)	9 - 78,000 (87 CFU/100 mL)
	TMDL (35)	5 samples/30-days (Apr 00 – present)	2 - 178,000 (127 CFU/100 mL)
E. coli	TMDL (35)	5 samples/30-days (Apr 00 – Mar 01)	10 - 9,208 (147 MPN/100 mL)
	OCCK (SD6)	Monthly or bi-monthly (Oct 02 – Jun 04)	
Dissolved Metals			
Arsenic (As)	NPDES (SDMF05)	Weekly (Dec 01 – present)	ND - 22 (5.27 µg/L)
Cadmium (Cd)**	NPDES (SDMF05)	Weekly (Dec 01 – present)	ND - 19 (0.28 µg/L)
Chromium (Cr)	NPDES (SDMF05)	Weekly (Dec 01 – present)	ND - 19 (0.33 µg/L)
Copper (Cu)**	NPDES (SDMF05)	Weekly (Dec 01 – present)	ND - 53 (6.94 µg/L)
Lead (Pb)**	NPDES (SDMF05)	Weekly (Dec 01 – present)	ND - 16 (0.15 µg/L)
Nickel (Ni)	NPDES (SDMF05)	Weekly (Dec 01 – present)	ND - 17 (4.2 µg/L)
Selenium (Se)**	NPDES (SDMF05)	Weekly (Dec 01 – present)	ND - 29 (16.59 µg/L)
Silver (Ag)	NPDES (SDMF05)	Weekly (Dec 01 – present)	ND - 5.1 (0.068 µg/L)
Zinc (Zn)**	NPDES (SDMF05)	Weekly (Dec 01 – present)	ND - 140 (11.4 µg/L)
Pesticides			
Chlordane**			
DDT**	NPDES (SDMF05)	1 sample (Sep 05)	ND
Dieldrin**	NPDES (SDMF05)	1 sample (Sep 05)	ND
Toxaphene**	NPDES (SDMF05)	1 sample (Sep 05)	ND
Chlorpyrifos**	NPDES (SDMF05)	Weekly (Jul 01 – present)	ND - 48.1 (1.04 ng/L)
Diazinon**	NPDES (SDMF05)	Weekly (Jul 01 – present)	ND - 400 (12.19 ng/L)
Dimethoate	NPDES (SDMF05)	Weekly (May 03 – present)	ND - 276 (10.52 ng/L)
Malathion	NPDES (SDMF05)	Weekly (May 03 – present)	ND - 125 (9.95 ng/L)
PCBs			
PCB-1016**	NPDES (SDMF05)	1 sample (Sep 05)	10 ng/L
SVOCs			
1,2-Dichlorobenzene	NPDES (SDMF05)	1 sample (Sep 05)	ND
1,4-Dichlorobenzene	NPDES (SDMF05)	1 sample (Sep 05)	ND
2,4-Dimethylphenol	NPDES (SDMF05)	1 sample (Sep 05)	ND
bis(2-Ethylhexyl) Phthalate	NPDES (SDMF05)	1 sample (Sep 05)	1,010 ng/L
Butylbenzyl Phthalate	NPDES (SDMF05)	1 sample (Sep 05)	102 ng/L
Diethyl Phthalate	NPDES (SDMF05)	1 sample (Sep 05)	266 ng/L
Dimethyl Phthalate	NPDES (SDMF05)	1 sample (Sep 05)	68.5 ng/L
Di-n-butyl Phthalate	NPDES (SDMF05)	1 sample (Sep 05)	101 ng/L
Di-n-octyl Phthalate	NPDES (SDMF05)	1 sample (Sep 05)	46.8 ng/L
Pentachlorophenol	NPDES (SDMF05)	1 sample (Sep 05)	ND
Phenol	NPDES (SDMF05)	1 sample (Sep 05)	ND
PAHs			
Acenaphthylene	NPDES (SDMF05)	1 sample (Sep 05)	ND
Anthracene	NPDES (SDMF05)	1 sample (Sep 05)	ND
Chrysene	NPDES (SDMF05)	1 sample (Sep 05)	ND
Fluorene	NPDES (SDMF05)	1 sample (Sep 05)	ND
Fluoranthene	NPDES (SDMF05)	1 sample (Sep 05)	ND
Indeno[1,2,3-c,d] pyrene	NPDES (SDMF05)	1 sample (Sep 05)	ND
Naphthalene	NPDES (SDMF05)	1 sample (Sep 05)	ND
Phenanthrene	NPDES (SDMF05)	1 sample (Sep 05)	ND
Pyrene	NPDES (SDMF05)	1 sample (Sep 05)	ND

ND - Not detected or less than minimum detection limit
*Geometric mean for bacteria data
**TMDL established for San Diego Creek (nutrients, sediment, and toxics)

Table 5.3 Water Quality Data for Santa Ana-Delhi Channel

Constituent	Monitoring Program	Sampling Frequency	Data Range (Average)*
Flow			
Mean Daily Discharge	TMDL (SADF01)	Daily (Jul 00 – present)	0.70 - 663.46 (8.57 cfs)
General Chemistry			
Ammonia-Nitrogen**	TMDL (SADF01)	Weekly (Jul 00 – present)	ND - 3.67 (0.22 mg/L)
	OCCK (DEL2)	34 samples (Apr 04 – May 06)	0 - 0.3 (0.08 mg/L)
Nitrate-Nitrogen**	TMDL (SADF01)	Weekly (Jul 00 – present)	ND - 4,100 (36.05 mg/L)
	OCCK (DEL2)	69 samples (Apr 04 – May 06)	0.9 - 29.7 (5.75 mg/L)
Orthophosphate**	TMDL (SADF01)	Weekly (Jul 00 – present)	ND - 0.41 (0.066 mg/L)
	OCCK (DEL2)	70 samples (Apr 04 – May 06)	0 . 1.7 (0.32 mg/L)
Total Phosphate**	TMDL (SADF01)	Weekly (Jul 00 – present)	ND - 3.67 (0.58 mg/L)
TSS	TMDL (SADF01)	Weekly (Jul 00 – present)	ND - 470 (34.18 mg/L)
Turbidity	TMDL (SADF01)	Weekly (Jul 00 – present)	0.55 - 190 (18.37 NTU)
Bacteria			
Total Coliform	NPDES (SADF01)	Weekly (Sep 05 – present)	450 - 22,000,000 (22,486 CFU/100 mL)
	TMDL (34)	5 samples/30-days (Apr 00 – present)	20 - 430,000 (6,421 CFU/100 mL)
	OCCK (DEL2)	35 samples (Apr 04 – May 06)	100 - 241,920 MPN/100 mL
Fecal Coliform	NPDES (SADF01)	Weekly (Sep 05 – present)	40 - 680,000 (1,103 CFU/100 mL)
	TMDL (34)	5 samples/30-days (Apr 01 – present)	10 - 40,000 (717 CFU/100 mL)
Enterococcus	NPDES (SADF01)	Weekly (Sep 05 – present)	9 - 310,000 (205 CFU/100 mL)
	TMDL (34)	5 samples/30-days (Apr 00 – present)	2 - 140,000 (442 CFU/100 mL)
	OCCK (DEL2)	70 samples (Apr 04 – May 06)	78.9 - 4,2419.2 MPN/100 mL
E. coli	TMDL (34)	5 samples/30-days (Apr 00 – Mar 01)	41 - 24,192 (424 MPN/100 mL)
	OCCK (DEL2)	70 samples (Apr 04 – May 06)	10 - 12,590 MPN/100 mL
Bioassessment			
Bioassessment	OCCK (DEL2)	2 sample (Spring 04 and Spring 05)	Poor water quality
Dissolved Metals			
Arsenic (As)	NPDES (SADF01)	Weekly (Jul 00 – present)	ND - 3.2 (1.67 µg/L)
Cadmium (Cd)**	NPDES (SADF01)	Weekly (Jul 00 – present)	ND - 2.1 (0.044 µg/L)
Chromium (Cr)	NPDES (SADF01)	Weekly (Jul 00 – present)	ND - 3.8 (0.26µg/L)
Copper (Cu)**	NPDES (SADF01)	Weekly (Jul 00 – present)	ND - 65 (15.51 µg/L)
Lead (Pb)**	NPDES (SADF01)	Weekly (Jul 00 – present)	ND - 8.2 (0.71 µg/L)
Nickel (Ni)	NPDES (SADF01)	Weekly (Jul 00 – present)	ND - 30 (7.29 µg/L)
Selenium (Se)**	NPDES (SADF01)	Weekly (Jul 00 – present)	ND - 22 (7.58 µg/L)
Silver (Ag)	NPDES (SADF01)	Weekly (Jul 00 – present)	ND - 2 (0.023 µg/L)
Zinc (Zn)**	NPDES (SADF01)	Weekly (Jul 00 – present)	ND - 370 (45.27 µg/L)
Pesticides			
Chlordane**			
DDT**	NPDES (SADF01)	1 sample (Sep 05)	ND
Dieldrin	NPDES (SADF01)	1 sample (Sep 05)	ND
Toxaphene	NPDES (SADF01)	1 sample (Sep 05)	ND
Chlorpyrifos**	NPDES (SADF01)	Weekly (Dec 01 – present)	ND
Diazinon	NPDES (SADF01)	Weekly (Jul 04 – present)	ND - 100 (6.03 ng/L)
Dimethoate	NPDES (SADF01)	Weekly (Jul 04 – present)	ND
Malathion	NPDES (SADF01)	Weekly (Jul 04 – present)	ND - 150 (6.33 ng/L)
PCBs			
PCB-1016**	NPDES (SADF01)	1 sample (Sep 05)	10 ng/L
SVOCs			
1,2-Dichlorobenzene	NPDES (SADF01)	1 sample (Sep 05)	46.4 ng/L
1,4-Dichlorobenzene	NPDES (SADF01)	1 sample (Sep 05)	ND
2,4-Dimethylphenol	NPDES (SADF01)	1 sample (Sep 05)	ND
bis(2-Ethylhexyl) Phthalate	NPDES (SADF01)	1 sample (Sep 05)	13000 ng/L
Butylbenzyl Phthalate	NPDES (SADF01)	1 sample (Sep 05)	2350 ng/L
Diethyl Phthalate	NPDES (SADF01)	1 sample (Sep 05)	210 ng/L
Dimethyl Phthalate	NPDES (SADF01)	1 sample (Sep 05)	396 ng/L
Di-n-butyl Phthalate	NPDES (SADF01)	1 sample (Sep 05)	617 ng/L
Di-n-octyl Phthalate	NPDES (SADF01)	1 sample (Sep 05)	1920 ng/L
Pentachlorophenol	NPDES (SADF01)	1 sample (Sep 05)	257 ng/L
Phenol	NPDES (SADF01)	1 sample (Sep 05)	491 ng/L
PAHs			
Acenaphthylene	NPDES (SADF01)	1 sample (Sep 05)	ND
Anthracene	NPDES (SADF01)	1 sample (Sep 05)	66.8 ng/L
Chrysene	NPDES (SADF01)	1 sample (Sep 05)	804 ng/L
Fluorene	NPDES (SADF01)	1 sample (Sep 05)	28.4 ng/L
Fluoranthene	NPDES (SADF01)	1 sample (Sep 05)	1310 ng/L
Indeno[1,2,3-c,d] pyrene	NPDES (SADF01)	1 sample (Sep 05)	357 ng/L
Naphthalene	NPDES (SADF01)	1 sample (Sep 05)	76.8 ng/L
Phenanthrene	NPDES (SADF01)	1 sample (Sep 05)	491 ng/L
Pyrene	NPDES (SADF01)	1 sample (Sep 05)	1240 ng/L

ND - Not detected or less than minimum detection limit
*Geometric mean for bacteria data
**TMDL established for Upper Newport Bay (nutrients, sediment, fecal coliform, and toxics)

5.3 Santa Isabella Channel

Water quality data for the Santa Isabella Channel upstream from UNB (SIDG03) is presented in Table 5.4. This location was monitored between November 2002 and May 2003 as part of the NPDES 5-year re-evaluation monitoring.

Table 5.4 Water Quality Data for Santa Isabella Channel

Constituent	Monitoring Program	Sampling Frequency	Data Range (Average)*
General Chemistry			
Ammonia-Nitrogen	NPDES (SIDG03)	17 samples (Nov 02 – May 03)	ND - 0.062 (0.014 mg/L)
Nitrate-Nitrogen	NPDES (SIDG03)	17 samples (Nov 02 – May 03)	13 - 23 (18.53 mg/L)
Orthophosphate	NPDES (SIDG03)	17 samples (Nov 02 – May 03)	0.098 - 0.512 (0.161 mg/L)
Total Phosphate	NPDES (SIDG03)	17 samples (Nov 02 – May 03)	0.367 - 398 (23.91 mg/L)
TSS	NPDES (SIDG03)	17 samples (Nov 02 – May 03)	ND - 10 (0.59 mg/L)
Turbidity	NPDES (SIDG03)	17 samples (Nov 02 – May 03)	1.2 - 8 (3.22 NTU)
Dissolved Metals			
Arsenic (As)	NPDES (SIDG03)	16 samples (Nov 02 – May 03)	ND - 2.9 (1.18 µg/L)
Cadmium (Cd)**	NPDES (SIDG03)	16 samples (Nov 02 – May 03)	ND
Chromium (Cr)	NPDES (SIDG03)	16 samples (Nov 02 – May 03)	ND
Copper (Cu)**	NPDES (SIDG03)	16 samples (Nov 02 – May 03)	ND - 11 (3.41 µg/L)
Lead (Pb)**	NPDES (SIDG03)	16 samples (Nov 02 – May 03)	ND
Nickel (Ni)	NPDES (SIDG03)	16 samples (Nov 02 – May 03)	ND - 6.5 (0.41 µg/L)
Selenium (Se)**	NPDES (SIDG03)	16 samples (Nov 02 – May 03)	ND - 6.1 (2.34 µg/L)
Silver (Ag)	NPDES (SIDG03)	16 samples (Nov 02 – May 03)	ND
Zinc (Zn)**	NPDES (SIDG03)	16 samples (Nov 02 – May 03)	ND - 15 (6.06 µg/L)
Pesticides			
Chlordane**			
DDT**			
Dieldrin			
Toxaphene			
Chlorpyrifos**	NPDES (SIDG03)	17 samples (Nov 02 – May 03)	ND - 16 (0.94 ng/L)
Diazinon	NPDES (SIDG03)	17 samples (Nov 02 – May 03)	ND - 810 (51.06 ng/L)
Dimethoate	NPDES (SIDG03)	5 samples (Mar 03 – May 03)	ND
Malathion	NPDES (SIDG03)	5 samples (Mar 03 – May 03)	ND

ND - Not detected or less than minimum detection limit
*Geometric mean for bacteria data
**TMDL established for Upper Newport Bay (nutrients, sediment, fecal coliform, and toxics)

5.4 Big Canyon Wash

Water quality data for the Big Canyon Wash is shown in Table 5.5. This location has been a fecal coliform TMDL monitoring location since April 2000. Big Canyon Wash is also a NPDES bioassessment location since October 2005 that is monitored for bioassessment testing, water chemistry, and toxicity.

Table 5.5 Water Quality Data for Big Canyon Wash

Constituent	Monitoring Program	Sampling Frequency	Data Range (Average)*
General Chemistry			
Ammonia-Nitrogen	NPDES (BCWG04)	2 per year (Oct 05 – present)	ND
Nitrate-Nitrogen	NPDES (BCWG04)	2 per year (Oct 05 – present)	ND - 2.29 (1.15 mg/L)
Orthophosphate	NPDES (BCWG04)	2 per year (Oct 05 – present)	0.2 - 0.47 (0.34 mg/L)
Total Phosphate	NPDES (BCWG04)	2 per year (Oct 05 – present)	0.75 - 1.88 (1.32 mg/L)
TSS	NPDES (BCWG04)	2 per year (Oct 05 – present)	10 (10 mg/L)
Turbidity	NPDES (BCWG04)	2 per year (Oct 05 – present)	3.42 - 5.28 (4.35 NTU)
Bioassessment			
Bioassessment	NPDES (BCWG04)	2 per year (Oct 05 – present)	
Bacteria			
Total Coliform	TMDL (33)	5 samples/30-days (Apr 00 – present)	10 - 52,000 (1,810 CFU/100 mL)
Fecal Coliform	TMDL (33)	5 samples/30-days (Apr 01 – present)	10 - 18,000 (185 CFU/100 mL)
Enterococcus	TMDL (33)	5 samples/30-days (Apr 00 – present)	2 - 23,000 (130 CFU/100 mL)
E. coli	TMDL (33)	5 samples/30-days (Apr 00 – Mar 01)	10 - 5,172 (204 MPN/100 mL)
Dissolved Metals			
Arsenic (As)	NPDES (BCWG04)	2 per year (Oct 05 – present)	2.2 - 2.4 (2.3 µg/L)
Cadmium (Cd)**	NPDES (BCWG04)	2 per year (Oct 05 – present)	ND - 0.64 (0.32 µg/L)
Chromium (Cr)	NPDES (BCWG04)	2 per year (Oct 05 – present)	ND
Copper (Cu)**	NPDES (BCWG04)	2 per year (Oct 05 – present)	1.3 - 1.9 (1.6 µg/L)
Lead (Pb)**	NPDES (BCWG04)	2 per year (Oct 05 – present)	ND - 18 (9 µg/L)
Nickel (Ni)	NPDES (BCWG04)	2 per year (Oct 05 – present)	ND - 20 (10 µg/L)
Selenium (Se)**	NPDES (BCWG04)	2 per year (Oct 05 – present)	25 (25 µg/L)
Silver (Ag)	NPDES (BCWG04)	2 per year (Oct 05 – present)	ND
Zinc (Zn)**	NPDES (BCWG04)	2 per year (Oct 05 – present)	4.6 - 4.9 (4.75 µg/L)
Pesticides			
Chlordane**			
DDT**			
Dieldrin			
Toxaphene			
Chlorpyrifos	NPDES (BCWG04)	2 per year (Oct 05 – present)	ND
Diazinon	NPDES (BCWG04)	2 per year (Oct 05 – present)	ND
Dimethoate	NPDES (BCWG04)	2 per year (Oct 05 – present)	ND
Malathion	NPDES (BCWG04)	2 per year (Oct 05 – present)	ND

ND - Not detected or less than minimum detection limit
*Geometric mean for bacteria data
**TMDL established for Upper Newport Bay (nutrients, sediment, fecal coliform, and toxics)

5.5 Costa Mesa Channel

The Costa Mesa Channel at Highland Drive (CMCG02) is a NPDES mass emission, nutrient TMDL, and NPDES bacteriological/pathogen monitoring station. Water quality data for the Costa Mesa Channel is summarized in Table 5.6. Data have been collected since 2000 with the exception of bacteria data, which began in September 2005.

Table 5.6 Water Quality Data for Costa Mesa Channel

Constituent	Monitoring Program	Sampling Frequency	Data Range (Average)*
Flow			
Mean Daily Discharge	TMDL (CMCG02)	Daily (Jul 05 – present)	0.00 - 13.00 (0.35 cfs)
General Chemistry			
Ammonia-Nitrogen	TMDL (CMCG02)	Weekly (Oct 00 – present)	ND - 5.64 (0.30 mg/L)
Nitrate-Nitrogen	TMDL (CMCG02)	Weekly (Oct 00 – present)	ND - 280 (5.36 mg/L)
Orthophosphate	TMDL (CMCG02)	Weekly (Oct 00 – present)	ND - 383 (1.57 mg/L)
Total Phosphate	TMDL (CMCG02)	Weekly (Oct 00 – present)	0.092 - 19.9 (1.72 mg/L)
TSS	TMDL (CMCG02)	Weekly (Oct 00 – present)	ND - 1450 (40.82 mg/L)
Turbidity	TMDL (CMCG02)	Weekly (Oct 00 – present)	1.0 - 638 (21.47 NTU)
Bacteria			
Total Coliform	NPDES (CMCG02)	Weekly (Sep 05 – present)	2,800 - 69,000,000 (202,158 MPN/100 mL)
Fecal Coliform	NPDES (CMCG02)	Weekly (Sep 05 – present)	99 - 105,000 (4,243 MPN/100 mL)
Enterococcus	NPDES (CMCG02)	Weekly (Sep 05 – present)	230 - 26,000 (2,787 MPN/100 mL)
Dissolved Metals			
Arsenic (As)	NPDES (CMCG02)	Weekly (Oct 00 – present)	ND - 8 (1.52 µg/L)
Cadmium (Cd)**	NPDES (CMCG02)	Weekly (Oct 00 – present)	ND - 10 (0.063 µg/L)
Chromium (Cr)	NPDES (CMCG02)	Weekly (Oct 00 – present)	ND - 38 (0.36 µg/L)
Copper (Cu)**	NPDES (CMCG02)	Weekly (Oct 00 – present)	ND - 86 (17.44 µg/L)
Lead (Pb)**	NPDES (CMCG02)	Weekly (Oct 00 – present)	ND - 10 (0.44 µg/L)
Nickel (Ni)	NPDES (CMCG02)	Weekly (Oct 00 – present)	ND - 95 (4.44 µg/L)
Selenium (Se)**	NPDES (CMCG02)	Weekly (Oct 00 – present)	ND - 10 (0.84 µg/L)
Silver (Ag)	NPDES (CMCG02)	Weekly (Oct 00 – present)	ND - 8.3 (0.057 µg/L)
Zinc (Zn)**	NPDES (CMCG02)	Weekly (Oct 00 – present)	ND - 470 (47.57 µg/L)
Pesticides			
Chlordane**			
DDT**	NPDES (CMCG02)	1 sample (Sep 05)	ND
Dieldrin	NPDES (CMCG02)	1 sample (Sep 05)	ND
Toxaphene	NPDES (CMCG02)	1 sample (Sep 05)	ND
Chlorpyrifos	NPDES (CMCG02)	Weekly (Jul 01 – present)	ND - 60 (0.29 ng/L)
Diazinon	NPDES (CMCG02)	Weekly (Jul 01 – present)	ND - 4820 (113.39 ng/L)
Dimethoate	NPDES (CMCG02)	Weekly (Mar 03 – present)	ND - 1390 (10.86 ng/L)
Malathion	NPDES (CMCG02)	Weekly (Mar 03 – present)	ND - 1560 (28.75 ng/L)
PCBs			
PCB-1016**	NPDES (CMCG02)	1 sample (Sep 05)	10 ng/L
SVOCs			
1,2-Dichlorobenzene	NPDES (CMCG02)	1 sample (Sep 05)	ND
1,4-Dichlorobenzene	NPDES (CMCG02)	1 sample (Sep 05)	ND
2,4-Dimethylphenol	NPDES (CMCG02)	1 sample (Sep 05)	235 ng/L
bis(2-Ethylhexyl) Phthalate	NPDES (CMCG02)	1 sample (Sep 05)	3480 ng/L
Butylbenzyl Phthalate	NPDES (CMCG02)	1 sample (Sep 05)	732 ng/L
Diethyl Phthalate	NPDES (CMCG02)	1 sample (Sep 05)	445 ng/L
Dimethyl Phthalate	NPDES (CMCG02)	1 sample (Sep 05)	254 ng/L
Di-n-butyl Phthalate	NPDES (CMCG02)	1 sample (Sep 05)	263 ng/L
Di-n-octyl Phthalate	NPDES (CMCG02)	1 sample (Sep 05)	631 ng/L
Pentachlorophenol	NPDES (CMCG02)	1 sample (Sep 05)	208 ng/L
Phenol	NPDES (CMCG02)	1 sample (Sep 05)	489 ng/L
PAHs			
Acenaphthylene	NPDES (CMCG02)	1 sample (Sep 05)	10.1 ng/L
Anthracene	NPDES (CMCG02)	1 sample (Sep 05)	13.3 ng/L
Chrysene	NPDES (CMCG02)	1 sample (Sep 05)	108 ng/L
Fluorene	NPDES (CMCG02)	1 sample (Sep 05)	9.6 ng/L
Fluoranthene	NPDES (CMCG02)	1 sample (Sep 05)	160 ng/L
Indeno[1,2,3-c,d] pyrene	NPDES (CMCG02)	1 sample (Sep 05)	51.8 ng/L
Naphthalene	NPDES (CMCG02)	1 sample (Sep 05)	47.1 ng/L
Phenanthrene	NPDES (CMCG02)	1 sample (Sep 05)	86.1 ng/L
Pyrene	NPDES (CMCG02)	1 sample (Sep 05)	146 ng/L

ND - Not detected or less than minimum detection limit
*Geometric mean for bacteria data
**TMDL established for Upper Newport Bay (nutrients, sediment, fecal coliform, and toxics)

5.6 Newport Boulevard

Water quality data for the storm drain along Newport Boulevard (CM15NB) is summarized in Table 5.7. Monitoring of this NPDES targeted dry weather reconnaissance site began in May 2006.

Table 5.7 Water Quality Data for Newport Boulevard Storm Drain

Constituent	Monitoring Program	Frequency	Data Range (Average)*
General Chemistry			
Ammonia-Nitrogen	NPDES (CM15NB)	5 event b/w May 1 - Sep 30 (May 06 - present)	0.05 - 0.4 (0.2 mg/L)
Nitrate-Nitrogen	NPDES (CM15NB)	5 event b/w May 1 - Sep 30 (May 06 - present)	0.5 - 2 (1.42 mg/L)
TSS	NPDES (CM15NB)	5 event b/w May 1 - Sep 30 (May 06 - present)	ND - 27 (8.75 mg/L)
Turbidity	NPDES (CM15NB)	5 event b/w May 1 - Sep 30 (May 06 - present)	3.53 - 10.1 (6.56 NTU)
Bacteria			
Total Coliform	NPDES (CM15NB)	5 event b/w May 1 - Sep 30 (May 06 - present)	44,000 - 260,000 (93,139 CFU/100 mL)
Fecal Coliform	NPDES (CM15NB)	5 event b/w May 1 - Sep 30 (May 06 - present)	12,000 - 33,000 (16,470 CFU/100 mL)
Enterococcus	NPDES (CM15NB)	5 event b/w May 1 - Sep 30 (May 06 - present)	1,300 - 40,000 (4,834 CFU/100 mL)
Dissolved Metals			
Cadmium (Cd)	NPDES (CM15NB)	5 event b/w May 1 - Sep 30 (May 06 - present)	ND - 1 (0.25 µg/L)
Chromium (Cr)	NPDES (CM15NB)	5 event b/w May 1 - Sep 30 (May 06 - present)	ND - 0.58 (0.275 µg/L)
Copper (Cu)**	NPDES (CM15NB)	5 event b/w May 1 - Sep 30 (May 06 - present)	3.6 - 14 (8.6 µg/L)
Lead (Pb)**	NPDES (CM15NB)	5 event b/w May 1 - Sep 30 (May 06 - present)	ND - 6.1 (1.74 µg/L)
Nickel (Ni)	NPDES (CM15NB)	5 event b/w May 1 - Sep 30 (May 06 - present)	3.6 - 13 (8.73 µg/L)
Selenium (Se)**			
Silver (Ag)	NPDES (CM15NB)	5 event b/w May 1 - Sep 30 (May 06 - present)	ND
Zinc (Zn)**	NPDES (CM15NB)	5 event b/w May 1 - Sep 30 (May 06 - present)	16 - 60 (37.75 µg/L)
Pesticides			
Chlordane**			
DDT**			
Dieldrin**			
Toxaphene			
Chlorpyrifos	NPDES (CM15NB)	5 event b/w May 1 - Sep 30 (May 06 - present)	ND
Diazinon	NPDES (CM15NB)	5 event b/w May 1 - Sep 30 (May 06 - present)	ND
Dimethoate	NPDES (CM15NB)	5 event b/w May 1 - Sep 30 (May 06 - present)	ND
Malathion	NPDES (CM15NB)	5 event b/w May 1 - Sep 30 (May 06 - present)	ND

ND - Not detected or less than minimum detection limit
*Geometric mean for bacteria data
**TMDL established for Lower Newport Bay (nutrients, sediment, fecal coliform, and toxics)

5.7 Buck Gully

Data for Buck Gully were available from the on-going monitoring NPDES and OWPP programs and the two prior field data collection programs. Water quality data for Buck Gully are summarized in Table 5.8. A NPDES bioassessment site is located along Buck Gully, where sampling began in October 2005. Buck Gully has been sampled under the OWPP for total and fecal coliform since July 1996 and enterococcus since March 1999. The Newport Assessment sampled the downstream end of Buck Gully between September 2005 and February 2006. Flow data were also collected during the Newport Assessment between January 2005 and March 2006. OCCK sampled Buck Gully near Poppy St. and Ocean Blvd between April 2004 and May 2006.

Table 5.8 Water Quality Data for Buck Gully

Constituent	Monitoring Program	Frequency	Data Range (Average)*
Flow			
Flow	Newport (BG1)	Hourly (Jan 05 – Mar 06)	0.18 - 6.7 (0.63 cfs)
General Chemistry			
Ammonia-Nitrogen	NPDES (BGH01)	2 per year (Oct 05 – present)	ND
	Newport (BG1)	5 samples (Sep 05 – Feb 06)	ND - 0.09 (0.036 mg/L)
	OCCK (BG2)	37 samples (Apr 04 – May 06)	0 - 0.16 (0.05 mg/L)
Nitrate-Nitrogen	NPDES (BGH01)	2 per year (Oct 05 – present)	ND - 0.48 (0.4 mg/L)
	Newport (BG1)	5 samples (Sep 05 – Feb 06)	0.08 - 1.94 (0.78 mg/L)
	OCCK (BG2)	74 samples (Apr 04 – May 06)	0 - 9.5 (2.27 mg/L)
Nitrite-Nitrogen	Newport (BG1)	5 samples (Sep 05 – Feb 06)	ND - 0.3 (0.14 mg/L)
Orthophosphate	NPDES (BGH01)	2 per year (Oct 05 – present)	0.03 - 0.04 (0.035 mg/L)
	Newport (BG1)	5 samples (Sep 05 – Feb 06)	ND - 0.18 (0.12 mg/L)
	OCCK (BG2)	71 samples (Apr 04 – May 06)	0.12 - 0.98 (0.35 mg/L)
Total Phosphorus	NPDES (BGH01)	2 per year (Oct 05 – present)	0.17 - 0.18 (0.175 mg/L)
	Newport (BG1)	5 samples (Sep 05 – Feb 06)	ND - 0.28 (0.14 mg/L)
TSS	NPDES (BGH01)	2 per year (Oct 05 – present)	ND - 5 (2.5 mg/L)
	Newport (BG1)	5 samples (Sep 05 – Feb 06)	ND - 200 (80.6 mg/L)
Turbidity	NPDES (BGH01)	2 per year (Oct 05 – present)	0.95 - 1.04 (0.995 NTU)
	Newport (BG1)	5 samples (Sep 05 – Feb 06)	1.5 - 97.5 (44.96 NTU)
Bacteria			
Total Coliform**	NPDES (BGC)	Weekly (Sep 05 – present)	240 - 22,000 (2,579 CFU/100 mL)
	OWPP (CNBBG)	Weekly (Jan 94 – present)	10 - 160,000 (2,496 MPN/100 mL)
	Newport (BG1)	5 samples (Sep 05 – Feb 06)	170 - 130,000 (4,656 MPN/100 mL)
	OCCK (BG2)	34 samples (Apr 04 – May 06)	158 - 24,192 MPN/100 mL
Fecal Coliform**	NPDES (BGC)	Weekly (Sep 05 – present)	40 - 2,100 (274 CFU/100 mL)
	OWPP (CNBBG)	Weekly (Jan 94 – present)	10 - 517,720 (483 MPN/100 mL)
	Newport (BG1)	5 samples (Sep 05 – Feb 06)	40 - 30,000 (1,124 MPN/100 mL)
Enterococcus	NPDES (BGC)	Weekly (Sep 05 – present)	9 - 3,400 (362 CFU/100 mL)
	OWPP (CNBBG)	Weekly (Mar 99 – present)	6 - 24,192 (334 MPN/100 mL)
	Newport (BG1)	5 samples (Sep 05 – Feb 06)	108 - 7,027 (537 MPN/100 mL)
	OCCK (BG2)	11 samples (Apr 04 – May 06)	10 - 2,280 MPN/100 mL
E. coli	Newport (BG1)	5 samples (Sep 05 – Feb 06)	63 - 8,624 (773 MPN/100 mL)
	OCCK (BG2)	31 samples (Apr 04 – May 06)	10 - 2,280 MPN/100 mL
Bioassessment			
Bioassessment	NPDES (BGH01)	2 per year (Oct 05 – present)	Poor water quality
	Newport (BG1)	1 sample (Spring 2005)	Poor water quality
Dissolved Metals			
Arsenic (As)	NPDES (BGH01)	2 per year (Oct 05 – present)	1.2 - 1.3 (1.25 µg/L)
	Newport (BG1)	6 samples (Sep 05 – Feb 06)	ND - 3.73 (1.70 µg/L)
Cadmium (Cd)	NPDES (BGH01)	2 per year (Oct 05 – present)	1.2 (1.2 µg/L)
	Newport (BG1)	6 samples (Sep 05 – Feb 06)	0.24 - 6.39 (2.99 µg/L)
Chromium (Cr)	NPDES (BGH01)	2 per year (Oct 05 – present)	ND
	Newport (BG1)	6 samples (Sep 05 – Feb 06)	ND - 3.07 (1.60 µg/L)
Copper (Cu)	NPDES (BGH01)	2 per year (Oct 05 – present)	1.6 (1.6 µg/L)
	Newport (BG1)	6 samples (Sep 05 – Feb 06)	0.31 - 25.4 (10.64 µg/L)
Lead (Pb)	NPDES (BGH01)	2 per year (Oct 05 – present)	ND - 35 (17.5 µg/L)
	Newport (BG1)	6 samples (Sep 05 – Feb 06)	ND - 0.08 (0.022 µg/L)
Nickel (Ni)	NPDES (BGH01)	2 per year (Oct 05 – present)	ND - 34 (17 µg/L)
	Newport (BG1)	6 samples (Sep 05 – Feb 06)	ND - 22.3 (12.21 µg/L)
Selenium (Se)	NPDES (BGH01)	2 per year (Oct 05 – present)	39 - 69 (54 µg/L)
	Newport (BG1)	6 samples (Sep 05 – Feb 06)	ND - 80 (44.38 µg/L)
Silver (Ag)	NPDES (BGH01)	2 per year (Oct 05 – present)	ND
	Newport (BG1)	6 samples (Sep 05 – Feb 06)	ND - 0.17 (0.028 µg/L)
Zinc (Zn)	NPDES (BGH01)	2 per year (Oct 05 – present)	2.3 - 4.1 (3.2 µg/L)
	Newport (BG1)	6 samples (Sep 05 – Feb 06)	0.15 - 27.6 (15.41 µg/L)

Table 5.8 Water Quality Data for Buck Gully (Cont.)

Constituent	Monitoring Program	Frequency	Data Range (Average)*
Pesticides			
Chlordane	Newport (BG1)	2 samples (Sep 05 – Oct 05)	ND
DDT	Newport (BG1)	2 samples (Sep 05 – Oct 05)	ND
Dieldrin	Newport (BG1)	2 samples (Sep 05 – Oct 05)	ND
Toxaphene	Newport (BG1)	2 samples (Sep 05 – Oct 05)	ND
Chlorpyrifos	NPDES (BGH01)	2 per year (Oct 05 – present)	ND
	Newport (BG1)	7 samples (Sep 05 – Feb 06)	ND
Diazinon	NPDES (BGH01)	2 per year (Oct 05 – present)	ND
	Newport (BG1)	7 samples (Sep 05 – Feb 06)	ND - 14.6 (2.09 ng/L)
Dimethoate	NPDES (BGH01)	2 per year (Oct 05 – present)	ND
	Newport (BG1)	7 samples (Sep 05 – Feb 06)	ND
Malathion	NPDES (BGH01)	2 per year (Oct 05 – present)	ND
	Newport (BG1)	7 samples (Sep 05 – Feb 06)	ND - 148 (48.29 ng/L)
Triazine Pesticides	Newport (BG1)	2 samples (Sep 05 – Oct 05)	ND
Synthetic Pyrethroids			
Bifenthrin	Newport (BG1)	4 samples (Sep 05 – Feb 06)	ND - 39.7 (20.45 ng/L)
PCBs			
Total Detectable PCBs	Newport (BG1)	2 samples (Sep 05 – Oct 05)	0 ng/L
SVOCs			
1,4-Dichlorobenzene	Newport (BG1)	2 samples (Sep 05 – Oct 05)	93.5 - 405 (249.25 ng/L)
bis(2-Ethylhexyl) Phthalate	Newport (BG1)	2 samples (Sep 05 – Oct 05)	370 - 4510 (2440 ng/L)
Butylbenzyl Phthalate	Newport (BG1)	2 samples (Sep 05 – Oct 05)	ND - 221 (110.5 ng/L)
Diethyl Phthalate	Newport (BG1)	2 samples (Sep 05 – Oct 05)	299 - 473 (386 ng/L)
Dimethyl Phthalate	Newport (BG1)	2 samples (Sep 05 – Oct 05)	48.2 - 260 (154.1 ng/L)
Di-n-butyl Phthalate	Newport (BG1)	2 samples (Sep 05 – Oct 05)	53 - 131 (92 ng/L)
Di-n-octyl Phthalate	Newport (BG1)	2 samples (Sep 05 – Oct 05)	ND - 151 (75.5 ng/L)
2-Methyl-4,6-dinitrophenol	Newport (BG1)	2 samples (Sep 05 – Oct 05)	ND
Pentachlorophenol	Newport (BG1)	2 samples (Sep 05 – Oct 05)	ND
Phenol	Newport (BG1)	2 samples (Sep 05 – Oct 05)	ND - 147 (73.5 ng/L)
Total Detectable PAHs	Newport (BG1)	2 samples (Sep 05 – Oct 05)	0 - 350.8 (175.4 ng/L)
VOCs			
Acetone	Newport (BG1)	2 samples (Sep 05 – Oct 05)	ND - 11 (5.5 µg/L)
Butyltins			
Organotins	Newport (BG1)	2 samples (Sep 05 – Oct 05)	ND
Dioxins			
Total TCDD Equivalents	Newport (BG1)	2 samples (Sep 05 – Oct 05)	0.6039 - 2.62 (1.61 pg/L)
Radio Chemistry			
Gross Alpha	Newport (BG1)	2 samples (Sep 05 – Oct 05)	6.99 - 23.2 (15.1 pCi/L)
Gross Beta	Newport (BG1)	2 samples (Sep 05 – Oct 05)	7.26 - 7.78 (7.52 pCi/L)

ND - Not detected or less than minimum detection limit
*Geometric mean for bacteria data
**303(d) listed constituent

5.8 Morning Canyon

Water quality data for Morning Canyon is summarized in Table 5.9. Data are from two prior field sampling studies. The Newport Assessment sampled along Morning Canyon between September 2005 and February 2006. Between April 2004 and May 2006, OCCK sampled near the outlet of Morning Canyon.

Table 5.9 Water Quality Data for Morning Canyon

Constituent	Monitoring Program	Frequency	Data Range (Average)*
General Chemistry			
Ammonia-Nitrogen	Newport (MCD)	4 samples (Sep 05 – Feb 06)	0.01 - 0.41 (0.22 mg/L)
	OCCK (MC2)	36 samples (Apr 04 – May 06)	0 - 0.41 (0.06 mg/L)
Nitrate-Nitrogen	Newport (MCD)	4 samples (Sep 05 – Feb 06)	0.63 - 1.73 (1.28 mg/L)
	OCCK (MC2)	82 samples (Apr 04 – May 06)	0 - 35.5 (3.24 mg/L)
Nitrite-Nitrogen	Newport (MCD)	4 samples (Sep 05 – Feb 06)	0.04 - 0.27 (0.13 mg/L)
Orthophosphate	Newport (MCD)	4 samples (Sep 05 – Feb 06)	ND - 0.54 (0.26 mg/L)
	OCCK (MC2)	36 samples (Apr 04 – May 06)	0 - 1.89 (0.69 mg/L)
Total Phosphate	Newport (MCD)	4 samples (Sep 05 – Feb 06)	ND - 1.14 (0.59 mg/L)
TSS	Newport (MCD)	4 samples (Sep 05 – Feb 06)	ND - 1,530 (452.18 mg/L)
Turbidity	Newport (MCD)	4 samples (Sep 05 – Feb 06)	1.7 - 2,040 (575.58 NTU)
Bacteria			
Total Coliform	Newport (MCD)	4 samples (Sep 05 – Feb 06)	2,300 - 30,000 (11,320 MPN/100 mL)
	OCCK (MC2)	33 samples (Apr 04 – May 06)	2,030 - 198,630 MPN/100 mL
Fecal Coliform	Newport (MCD)	4 samples (Sep 05 – Feb 06)	40 - 13,000 (675 MPN/100 mL)
Enterococcus	Newport (MCD)	4 samples (Sep 05 – Feb 06)	480 - 16,071 (2,424 MPN/100 mL)
	OCCK (MC2)	15 samples (Apr 04 – May 06)	131.3 - 2,419.2 MPN/100 mL
E. coli	Newport (MCD)	4 samples (Sep 05 – Feb 06)	135 - 16,640 (991 MPN/100 mL)
	OCCK (MC2)	34 samples (Apr 04 – May 06)	84 - 2,650 MPN/100 mL
Bioassessment			
Bioassessment	Newport (MCD)	4 Assessments (04 – 05)	Poor water quality
Dissolved Metals			
Arsenic (As)	Newport (MCD)	4 samples (Sep 05 – Feb 06)	1.46 - 4.51 (3.23 µg/L)
Cadmium (Cd)	Newport (MCD)	4 samples (Sep 05 – Feb 06)	4.36 - 26.2 (16.59 µg/L)
Chromium (Cr)	Newport (MCD)	4 samples (Sep 05 – Feb 06)	0.79 - 6.31 (2.71 µg/L)
Copper (Cu)	Newport (MCD)	4 samples (Sep 05 – Feb 06)	12.6 - 27.7 (20.08 µg/L)
Lead (Pb)	Newport (MCD)	4 samples (Sep 05 – Feb 06)	ND - 0.16 (0.08 µg/L)
Nickel (Ni)	Newport (MCD)	4 samples (Sep 05 – Feb 06)	29.9 - 89.6 (58.88 µg/L)
Selenium (Se)	Newport (MCD)	4 samples (Sep 05 – Feb 06)	19.3 - 109 (50.63 µg/L)
Silver (Ag)	Newport (MCD)	4 samples (Sep 05 – Feb 06)	ND
Zinc (Zn)	Newport (MCD)	4 samples (Sep 05 – Feb 06)	15.5 - 307 (142.68 µg/L)
Pesticides			
Chlorpyrifos	Newport (MCD)	4 samples (Sep 05 – Feb 06)	ND
Diazinon	Newport (MCD)	4 samples (Sep 05 – Feb 06)	ND - 25.3 (8.55 ng/L)
Dimethoate	Newport (MCD)	4 samples (Sep 05 – Feb 06)	ND
Malathion	Newport (MCD)	4 samples (Sep 05 – Feb 06)	ND - 1,150 (376.80 ng/L)

ND - Not detected or less than minimum detection limit
*Geometric mean for bacteria data

5.9 Pelican Point Creek

Water quality data for Pelican Point Creek are summarized in Table 5.10. Pelican Point Creek has been continuously monitored for bacteria under the NPDES bacteriological/pathogen monitoring since September 2005 and OWPP since July 1994. Other water quality data in the Pelican Point Creek watershed was collected during the Newport Assessment between September 2005 and February 2006. The Newport Assessment sampling location (PP1) is a storm drain located upcoast from Pelican Point Creek.

Table 5.10 Water Quality Data for Pelican Point Creek

Constituent	Monitoring Program	Frequency	Data Range (Average)*
General Chemistry			
Ammonia-N	Newport (PP1)	4 samples (Sep 05 – Feb 06)	0.11 - 0.77 (0.46 mg/L)
Nitrate-N	Newport (PP1)	4 samples (Sep 05 – Feb 06)	1.15 - 3.66 (1.99 mg/L)
Nitrite-N	Newport (PP1)	4 samples (Sep 05 – Feb 06)	0.04 - 0.36 (0.15 mg/L)
Orthophosphate	Newport (PP1)	4 samples (Sep 05 – Feb 06)	0.131 - 0.581 (0.329 mg/L)
Total Phosphorus	Newport (PP1)	4 samples (Sep 05 – Feb 06)	0.5 - 0.62 (0.55 mg/L)
TSS	Newport (PP1)	4 samples (Sep 05 – Feb 06)	18 - 339 (121.38 mg/L)
Turbidity	Newport (PP1)	4 samples (Sep 05 – Feb 06)	2.6 - 133 (53.45 NTU)
Bacteria			
Total Coliform	NPDES (PPC)	Weekly (Sep 05 – present)	1,600 - 210,000 (11,861 CFU/100 mL)
	OWPP (CNBPP)	Weekly (Jul 94 – present)	10 - 1,600,000 (9,597 MPN/100 mL)
	Newport (PP1)	4 samples (Sep 05 – Feb 06)	3,000 - 30,000 (14,637 MPN/100mL)
Fecal Coliform	NPDES (PPC)	Weekly (Sep 05 – present)	20 - 131,000 (865 CFU/100 mL)
	OWPP (CNBPP)	Weekly (Jul 94 – present)	10 - 1,600,000 (1,873 MPN/100 mL)
	Newport (PP1)	4 samples (Sep 05 – Feb 06)	500 - 11,000 (1,779 MPN/100 mL)
Enterococcus	NPDES (PPC)	Weekly (Sep 05 – present)	9 - 41,000 (834 CFU/100 mL)
	OWPP (CNBPP)	Weekly (Mar 99 – present)	2 - 33,000 (1,464 MPN/100 mL)
	Newport (PP1)	4 samples (Sep 05 – Feb 06)	798 - 10,426 (4,813 MPN/100 mL)
E. coli	Newport (PP1)	4 samples (Sep 05 – Feb 06)	327 - 3,654 (907 MPN/100 mL)
Dissolved Metals			
Arsenic (As)	Newport (PP1)	4 samples (Sep 05 – Feb 06)	ND - 2.62 (1.69 µg/L)
Cadmium (Cd)	Newport (PP1)	4 samples (Sep 05 – Feb 06)	0.34 - 2.82 (1.47 µg/L)
Chromium (Cr)	Newport (PP1)	4 samples (Sep 05 – Feb 06)	0.64 - 2.01 (1.37 µg/L)
Copper (Cu)	Newport (PP1)	4 samples (Sep 05 – Feb 06)	6.55 - 45.4 (26.24 µg/L)
Lead (Pb)	Newport (PP1)	4 samples (Sep 05 – Feb 06)	ND - 1.86 (0.73 µg/L)
Nickel (Ni)	Newport (PP1)	4 samples (Sep 05 – Feb 06)	4.43 - 11.9 (8.78 µg/L)
Selenium (Se)	Newport (PP1)	4 samples (Sep 05 – Feb 06)	1.81 - 16.9 (7.93 µg/L)
Silver (Ag)	Newport (PP1)	4 samples (Sep 05 – Feb 06)	ND
Zinc (Zn)	Newport (PP1)	4 samples (Sep 05 – Feb 06)	11.7 - 74.1 (32.4 µg/L)
Pesticides			
Chlorpyrifos	Newport (PP1)	4 samples (Sep 05 – Feb 06)	ND
Diazinon	Newport (PP1)	4 samples (Sep 05 – Feb 06)	ND
Dimethoate	Newport (PP1)	4 samples (Sep 05 – Feb 06)	ND
Malathion	Newport (PP1)	4 samples (Sep 05 – Feb 06)	ND - 297 (97.58 ng/L)

PP1 - Storm drain upcoast from Pelican Point Creek
ND - Not detected or less than minimum detection limit
*Geometric mean for bacteria data

5.10 Pelican Point Middle Creek

Pelican Point Middle Creek has been monitored for bacteria under the OWPP since November 2004 and was also sampled during the Newport Assessment between September 2005 and February 2006. Water quality data for Pelican Point Middle Creek is summarized in Table 5.11.

Table 5.11 Water Quality Data for Pelican Point Middle Creek

Constituent	Monitoring Program	Frequency	Data Range (Average)*
General Chemistry			
Ammonia-N	Newport (PPM)	4 samples (Sep 05 – Feb 06)	0.11 - 0.48 (0.3 mg/L)
Nitrate-N	Newport (PPM)	4 samples (Sep 05 – Feb 06)	ND - 1.77 (0.84 mg/L)
Nitrite-N	Newport (PPM)	4 samples (Sep 05 – Feb 06)	ND - 0.1 (0.05 mg/L)
Orthophosphate	Newport (PPM)	4 samples (Sep 05 – Feb 06)	ND - 0.17 (0.06 mg/L)
Total Phosphorus	Newport (PPM)	4 samples (Sep 05 – Feb 06)	0.043 - 0.75 (0.4 mg/L)
TSS	Newport (PPM)	4 samples (Sep 05 – Feb 06)	ND - 248 (89.95 mg/L)
Turbidity	Newport (PPM)	4 samples (Sep 05 – Feb 06)	2.5 - 375 (112.33 NTU)
Bacteria			
Total Coliform	OWPP (CNBPM)	Weekly (Nov 94 – present)	10 - 90,000 (1,490 MPN/100 mL)
	Newport (PPM)	4 samples (Sep 05 – Feb 06)	270 - 140,000 (4,566 MPN/100 mL)
Fecal Coliform	OWPP (CNBPM)	Weekly (Nov 94 – present)	10 - 198,628 (151 MPN/100 mL)
	Newport (PPM)	4 samples (Sep 05 – Feb 06)	20 - 50,000 (562 MPN/100 mL)
Enterococcus	OWPP (CNBPM)	Weekly (Mar 99 – present)	1 - 25,800 (285 MPN/100 mL)
	Newport (PPM)	4 samples (Sep 05 – Feb 06)	74 - 18,501 (934 MPN/100 mL)
E. coli	Newport (PPM)	4 samples (Sep 05 – Feb 06)	10 - 21,426 (394 MPN/100 mL)
Dissolved Metals			
Arsenic (As)	Newport (PPM)	4 samples (Sep 05 – Feb 06)	ND - 4.91 (2.5 µg/L)
Cadmium (Cd)	Newport (PPM)	4 samples (Sep 05 – Feb 06)	4.17 - 81.4 (28.34 µg/L)
Chromium (Cr)	Newport (PPM)	4 samples (Sep 05 – Feb 06)	0.99 - 8.46 (4.11 µg/L)
Copper (Cu)	Newport (PPM)	4 samples (Sep 05 – Feb 06)	10.9 - 35.1 (17.93 µg/L)
Lead (Pb)	Newport (PPM)	4 samples (Sep 05 – Feb 06)	ND - 1.88 (0.57 µg/L)
Nickel (Ni)	Newport (PPM)	4 samples (Sep 05 – Feb 06)	20.3 - 74.6 (53.88 µg/L)
Selenium (Se)	Newport (PPM)	4 samples (Sep 05 – Feb 06)	5.9 - 23.1 (13.41 µg/L)
Silver (Ag)	Newport (PPM)	4 samples (Sep 05 – Feb 06)	ND
Zinc (Zn)	Newport (PPM)	4 samples (Sep 05 – Feb 06)	16.5 - 67.1 (36.95 µg/L)
Pesticides			
Chlorpyrifos	Newport (PPM)	4 samples (Sep 05 – Feb 06)	ND
Diazinon	Newport (PPM)	4 samples (Sep 05 – Feb 06)	ND
Dimethoate	Newport (PPM)	4 samples (Sep 05 – Feb 06)	ND
Malathion	Newport (PPM)	4 samples (Sep 05 – Feb 06)	ND - 158 (70 ng/L)

ND - Not detected or less than minimum detection limit
*Geometric mean for bacteria data

5.11 Pelican Point Waterfall Creek

Table 5.12 summarizes the water quality data for Pelican Point Waterfall Creek. Pelican Point Waterfall Creek has been a NPDES bacteriological/pathogen monitoring station since September 2005. Bacteria levels have been also been monitored under the OWPP since

December 1995. Additional sampling of Pelican Point Waterfall Creek was conducted during the Newport Assessment between September 2005 and February 2006.

Table 5.12 Water Quality Data for Pelican Point Waterfall Creek

Constituent	Monitoring Program	Frequency	Data Range (Average)*
General Chemistry			
Ammonia-N	Newport (PPW)	3 samples (Oct 05 – Feb 06)	0.26 - 0.56 (0.44 mg/L)
Nitrate-N	Newport (PPW)	3 samples (Oct 05 – Feb 06)	0.84 - 1.75 (1.20 mg/L)
Nitrite-N	Newport (PPW)	3 samples (Oct 05 – Feb 06)	0.04 - 0.29 (0.153 mg/L)
Orthophosphate	Newport (PPW)	3 samples (Oct 05 – Feb 06)	0.048 - 0.159 (0.106 mg/L)
Total Phosphorus	Newport (PPW)	3 samples (Oct 05 – Feb 06)	0.27 - 0.35 (0.318 mg/L)
TSS	Newport (PPW)	3 samples (Oct 05 – Feb 06)	68 - 612 (276.67 mg/L)
Turbidity	Newport (PPW)	3 samples (Oct 05 – Feb 06)	67.7 - 255 (125.23 NTU)
Bacteria			
Total Coliform	NPDES (WFC)	Weekly (Sep 05 – present)	9 - 6,100 (321 CFU/100 mL)
	OWPP (CNBPW)	Weekly (Dec 95 – present)	10 - 27,800 (827 MPN/100 mL)
	Newport (PPW)	3 samples (Oct 05 – Feb 06)	22,000 - 110,000 (60,166 MPN/100 mL)
Fecal Coliform	NPDES (WFC)	Weekly (Sep 05 – present)	9 - 510 (33 CFU/100 mL)
	Newport (PPW)	3 samples (Oct 05 – Feb 06)	2,300 - 90,000 (12,305 MPN/100 mL)
Enterococcus	NPDES (WFC)	Weekly (Sep 05 – present)	9 - 1,230 (103 CFU/100 mL)
	OWPP (CNBPW)	Weekly (Mar 99 – present)	2 - 36,540 (114 MPN/100 mL)
	Newport (PPW)	3 samples (Oct 05 – Feb 06)	2,495 - 12,229 (5,612 MPN/100 mL)
E. coli	Newport (PPW)	3 samples (Oct 05 – Feb 06)	1,725 - 38,732 (5,124 MPN/100 mL)
Dissolved Metals			
Arsenic (As)	Newport (PPW)	3 samples (Oct 05 – Feb 06)	0.97 - 3.38 (1.9 µg/L)
Cadmium (Cd)	Newport (PPW)	3 samples (Oct 05 – Feb 06)	1.84 - 13.9 (9.11 µg/L)
Chromium (Cr)	Newport (PPW)	3 samples (Oct 05 – Feb 06)	1.19 - 1.31 (1.23 µg/L)
Copper (Cu)	Newport (PPW)	3 samples (Oct 05 – Feb 06)	8.31 - 20.2 (13.6 µg/L)
Lead (Pb)	Newport (PPW)	3 samples (Oct 05 – Feb 06)	0.07 - 0.77 (0.3 µg/L)
Nickel (Ni)	Newport (PPW)	3 samples (Oct 05 – Feb 06)	15 - 76.5 (45.5 µg/L)
Selenium (Se)	Newport (PPW)	3 samples (Oct 05 – Feb 06)	0.8 - 3.02 (1.95 µg/L)
Silver (Ag)	Newport (PPW)	3 samples (Oct 05 – Feb 06)	ND
Zinc (Zn)	Newport (PPW)	3 samples (Oct 05 – Feb 06)	31.7 - 74.4 (52.57 µg/L)
Pesticides			
Chlorpyrifos	Newport (PPW)	3 samples (Oct 05 – Feb 06)	ND
Diazinon	Newport (PPW)	3 samples (Oct 05 – Feb 06)	ND
Dimethoate	Newport (PPW)	3 samples (Oct 05 – Feb 06)	ND
Malathion	Newport (PPW)	3 samples (Oct 05 – Feb 06)	ND

ND - Not detected or less than minimum detection limit
*Geometric mean for bacteria data

5.12 Los Trancos Creek

Los Trancos Creek has been monitored for bacteria under the OWPP since January 1994 and was also sampled once in October 2005 during the Newport Assessment. Water quality data for Los Trancos Creek is summarized in Table 5.13.

Table 5.13 Water Quality Data for Los Trancos Creek

Constituent	Monitoring Program	Frequency	Data Range (Average)*
General Chemistry			
Ammonia-N	Newport (LTD)	1 sample (Oct 05)	0.13 mg/L
Nitrate-N	Newport (LTD)	1 sample (Oct 05)	1.32 mg/L
Nitrite-N	Newport (LTD)	1 sample (Oct 05)	0.06 mg/L
Orthophosphate	Newport (LTD)	1 sample (Oct 05)	0.03 mg/L
Total Phosphorus	Newport (LTD)	1 sample (Oct 05)	0.333 mg/L
TSS	Newport (LTD)	1 sample (Oct 05)	1,600 mg/L
Turbidity	Newport (LTD)	1 sample (Oct 05)	943 NTU
Bacteria			
Total Coliform**	OWPP (CNBCC)	Weekly (Jan 94 – present)	10 - 160,000 (2,401 MPN/100 mL)
	Newport (LTD)	1 sample (Oct 05)	23,000 MPN/100 mL
Fecal Coliform**	OWPP (CNBCC)	Weekly (Jan 94 – present)	10 - 241,920 (558 MPN/100 mL)
	Newport (LTD)	1 sample (Oct 05)	23,000 MPN/100 mL
Enterococcus	OWPP (CNBCC)	Weekly (Mar 99 – present)	2 - 24,192 (246 MPN/100 mL)
	Newport (LTD)	1 sample (Oct 05)	12,112 MPN/100 mL
E. coli	Newport (LTD)	1 sample (Oct 05)	21,872 MPN/100 mL
Dissolved Metals			
Arsenic (As)	Newport (LTD)	1 sample (Oct 05)	3.52 µg/L
Cadmium (Cd)	Newport (LTD)	1 sample (Oct 05)	0.96 µg/L
Chromium (Cr)	Newport (LTD)	1 sample (Oct 05)	0.6 µg/L
Copper (Cu)	Newport (LTD)	1 sample (Oct 05)	3.44 µg/L
Lead (Pb)	Newport (LTD)	1 sample (Oct 05)	0.09 µg/L
Nickel (Ni)	Newport (LTD)	1 sample (Oct 05)	10.7 µg/L
Selenium (Se)	Newport (LTD)	1 sample (Oct 05)	14.5 µg/L
Silver (Ag)	Newport (LTD)	1 sample (Oct 05)	ND
Zinc (Zn)	Newport (LTD)	1 sample (Oct 05)	8.69 µg/L
Pesticides			
Chlorpyrifos	Newport (LTD)	1 sample (Oct 05)	ND
Diazinon	Newport (LTD)	1 sample (Oct 05)	ND
Dimethoate	Newport (LTD)	1 sample (Oct 05)	ND
Malathion	Newport (LTD)	1 sample (Oct 05)	79 ng/L

ND - Not detected or less than minimum detection limit
*Geometric mean for bacteria data
**303(d) listed constituent

5.13 Muddy Creek

Muddy Creek is continuously monitored for bacteria under the NPDES bacteriological/ pathogen monitoring since September 2005 and the OWPP since July 1996. Additional water quality data from two events were collected in September and October 2005 during the Newport Assessment. Water quality data for Muddy Creek are summarized in Table 5.14.

Table 5.14 Water Quality Data for Muddy Creek

Constituent	Monitoring Program	Frequency	Data Range (Average)*
General Chemistry			
Ammonia-N	Newport (MCC)	2 samples (Sep 05 – Oct 05)	ND - 0.14 (0.07 mg/L)
Nitrate-N	Newport (MCC)	2 samples (Sep 05 – Oct 05)	0.18 - 1.42 (0.8 mg/L)
Nitrite-N	Newport (MCC)	2 samples (Sep 05 – Oct 05)	ND - 0.04 (0.02 mg/L)
Orthophosphate	Newport (MCC)	2 samples (Sep 05 – Oct 05)	ND - 0.035 (0.0175 mg/L)
Total Phosphorus	Newport (MCC)	2 samples (Sep 05 – Oct 05)	ND - 0.393 (0.12 mg/L)
TSS	Newport (MCC)	2 samples (Sep 05 – Oct 05)	5.3 - 143 (74.15 mg/L)
Turbidity	Newport (MCC)	2 samples (Sep 05 – Oct 05)	ND - 100 (50 NTU)
Bacteria			
Total Coliform	NPDES (MCD)	Weekly (Sep 05 – present)	200 - 46,000 (2,477 CFU/100 mL)
	OWPP (CNBMC)	Weekly (Jul 96 – present)	10 - 160,000 (1,418 MPN/100 mL)
	Newport (MCC)	2 samples (Sep 05 – Oct 05)	5,000 - 130,000 (25,495 MPN/100 mL)
Fecal Coliform	NPDES (MCD)	Weekly (Sep 05 – present)	9 - 6,000 (195 CFU/100 mL)
	OWPP (CNBMC)	Weekly (Jul 96 – present)	1 - 241,920 (285 MPN/100 mL)
	Newport (MCC)	2 samples (Sep 05 – Oct 05)	800 - 30,000 (4,899 MPN/100 mL)
Enterococcus	NPDES (MCD)	Weekly (Sep 05 – present)	9 - 9,700 (152 CFU/100 mL)
	OWPP (CNBMC)	Weekly (Mar 99 – present)	2 - 36,540 (236 MPN/100 mL)
	Newport (MCC)	2 samples (Sep 05 – Oct 05)	132 - 9,881 (1,142 MPN/100 mL)
E. coli	Newport (MCC)	2 samples (Sep 05 – Oct 05)	243 - 9,097 (1,487 MPN/100 mL)
Dissolved Metals			
Arsenic (As)	Newport (MCC)	2 samples (Sep 05 – Oct 05)	ND - 3.81 (1.91 µg/L)
Cadmium (Cd)	Newport (MCC)	2 samples (Sep 05 – Oct 05)	0.82 - 1.11 (0.97 µg/L)
Chromium (Cr)	Newport (MCC)	2 samples (Sep 05 – Oct 05)	1.1 - 4.34 (2.72 µg/L)
Copper (Cu)	Newport (MCC)	2 samples (Sep 05 – Oct 05)	5.7 - 7.16 (6.43 µg/L)
Lead (Pb)	Newport (MCC)	2 samples (Sep 05 – Oct 05)	ND - 0.13 (0.065 µg/L)
Nickel (Ni)	Newport (MCC)	2 samples (Sep 05 – Oct 05)	14.7 - 27.2 (20.95 µg/L)
Selenium (Se)	Newport (MCC)	2 samples (Sep 05 – Oct 05)	4.52 - 19.7 (12.11 µg/L)
Silver (Ag)	Newport (MCC)	2 samples (Sep 05 – Oct 05)	ND
Zinc (Zn)	Newport (MCC)	2 samples (Sep 05 – Oct 05)	6.6 - 16.1 (11.35 µg/L)
Pesticides			
Chlorpyrifos	Newport (MCC)	2 samples (Sep 05 – Oct 05)	ND
Diazinon	Newport (MCC)	2 samples (Sep 05 – Oct 05)	25.1 - 53.1 (39.1 ng/L)
Dimethoate	Newport (MCC)	2 samples (Sep 05 – Oct 05)	ND
Malathion	Newport (MCC)	2 samples (Sep 05 – Oct 05)	ND - 80.9 (40.5 ng/L)

ND - Not detected or less than minimum detection limit
*Geometric mean for bacteria data

5.14 El Moro Canyon

Water quality data for El Moro Creek are summarized in Table 5.15. El Moro Canyon is continuously monitored for bacteria under the NPDES bacteriological/pathogen monitoring since January 2003 and the OWPP since January 1986. El Moro Canyon was also sampled during two events in September and October 2005 during the Newport Assessment during the Newport Assessment.

Table 5.15 Water Quality Data for El Moro Canyon

Constituent	Monitoring Program	Frequency	Data Range (Average)*
General Chemistry			
Ammonia-N	Newport (EMD)	5 samples (Sep 05 – Feb 06)	0.01 - 0.06 (0.026 mg/L)
Nitrate-N	Newport (EMD)	5 samples (Sep 05 – Feb 06)	ND - 0.9 (0.38 mg/L)
Nitrite-N	Newport (EMD)	5 samples (Sep 05 – Feb 06)	ND - 0.05 (0.01 mg/L)
Orthophosphate	Newport (EMD)	5 samples (Sep 05 – Feb 06)	ND - 0.28 (0.13 mg/L)
Total Phosphorus	Newport (EMD)	5 samples (Sep 05 – Feb 06)	ND - 0.41 (0.18 mg/L)
TSS	Newport (EMD)	5 samples (Sep 05 – Feb 06)	ND - 41.7 (13.3 mg/L)
Turbidity	Newport (EMD)	5 samples (Sep 05 – Feb 06)	ND - 20.1 (7.26 NTU)
Bacteria			
Total Coliform	NPDES (ELMORO)	Weekly (Jan 03 – present)	10 - 93,000 (2,617 CFU/100 mL)
	OWPP (CNB45)	Weekly (Jan 86 – present)	10 - 199,863 (3,188 MPN/100 mL)
	Newport (EMD)	5 samples (Sep 05 – Feb 06)	500 - 28,000 (3,289 MPN/100 mL)
Fecal Coliform	NPDES (ELMORO)	Weekly (Jan 03 – present)	10 - 68,000 (417 CFU/100 mL)
	OWPP (CNB45)	Weekly (Jan 86 – present)	10 - 90,000 (334 MPN/100 mL)
	Newport (EMD)	5 samples (Sep 05 – Feb 06)	40 - 8,000 (398 MPN/100 mL)
Enterococcus	NPDES (ELMORO)	Weekly (Jan 03 – present)	9 - 32,000 (441 CFU/100 mL)
	OWPP (CNB45)	Weekly (Mar 99 – present)	4 - 24,192 (406 MPN/100 mL)
	Newport (EMD)	5 samples (Sep 05 – Feb 06)	10 - 6,695 (170 MPN/100 mL)
E. coli	Newport (EMD)	5 samples (Sep 05 – Feb 06)	10 - 4,284 (297 MPN/100 mL)
Dissolved Metals			
Arsenic (As)	Newport (EMD)	5 samples (Sep 05 – Feb 06)	0.52 - 3.95 (2.08 µg/L)
Cadmium (Cd)	Newport (EMD)	5 samples (Sep 05 – Feb 06)	0.87 - 4.16 (2.32 µg/L)
Chromium (Cr)	Newport (EMD)	5 samples (Sep 05 – Feb 06)	1.33 - 9.2 (3.68 µg/L)
Copper (Cu)	Newport (EMD)	5 samples (Sep 05 – Feb 06)	5.26 - 10.3 (7.21 µg/L)
Lead (Pb)	Newport (EMD)	5 samples (Sep 05 – Feb 06)	ND - 0.11 (0.036 µg/L)
Nickel (Ni)	Newport (EMD)	5 samples (Sep 05 – Feb 06)	13.2 - 17.7 (15.64 µg/L)
Selenium (Se)	Newport (EMD)	5 samples (Sep 05 – Feb 06)	4.69 - 11.2 (7.11 µg/L)
Silver (Ag)	Newport (EMD)	5 samples (Sep 05 – Feb 06)	ND - 0.12 (0.024 µg/L)
Zinc (Zn)	Newport (EMD)	5 samples (Sep 05 – Feb 06)	9.6 - 27.4 (15.79 µg/L)
Pesticides			
Chlordane	Newport (EMD)	2 samples (Sep 05 – Oct 05)	ND
DDT	Newport (EMD)	2 samples (Sep 05 – Oct 05)	ND
Dieldrin	Newport (EMD)	2 samples (Sep 05 – Oct 05)	ND
Toxaphene	Newport (EMD)	2 samples (Sep 05 – Oct 05)	ND
Chlorpyrifos	Newport (EMD)	5 samples (Sep 05 – Feb 06)	ND
Diazinon	Newport (EMD)	5 samples (Sep 05 – Feb 06)	ND
Dimethoate	Newport (EMD)	5 samples (Sep 05 – Feb 06)	ND
Malathion	Newport (EMD)	5 samples (Sep 05 – Feb 06)	ND
Triazine Pesticides	Newport (EMD)	2 samples (Sep 05 – Oct 05)	ND
Synthetic Pyrethroids			
Bifenthrin	Newport (EMD)	4 samples (Sep 05 – Feb 06)	ND
PCBs			
Total Detectable PCBs	Newport (EMD)	2 samples (Sep 05 – Oct 05)	0 ng/L
SVOCs			
1,4-Dichlorobenzene	Newport (EMD)	2 samples (Sep 05 – Oct 05)	62.6 - 422 (242.3 ng/L)
bis(2-Ethylhexyl) Phthalate	Newport (EMD)	2 samples (Sep 05 – Oct 05)	379 - 2690 (1534.5 ng/L)
Butylbenzyl Phthalate	Newport (EMD)	2 samples (Sep 05 – Oct 05)	ND - 41 (20.5 ng/L)
Diethyl Phthalate	Newport (EMD)	2 samples (Sep 05 – Oct 05)	89.5 - 124 (106.75 ng/L)
Dimethyl Phthalate	Newport (EMD)	2 samples (Sep 05 – Oct 05)	56.7 - 188 (122.35 ng/L)
Di-n-butyl Phthalate	Newport (EMD)	2 samples (Sep 05 – Oct 05)	49.1 - 58.7 (53.9 ng/L)
Di-n-octyl Phthalate	Newport (EMD)	2 samples (Sep 05 – Oct 05)	ND - 39.5 (19.75 ng/L)
2-Methyl-4,6-dinitrophenol	Newport (EMD)	2 samples (Sep 05 – Oct 05)	ND
Pentachlorophenol	Newport (EMD)	2 samples (Sep 05 – Oct 05)	ND
Phenol	Newport (EMD)	2 samples (Sep 05 – Oct 05)	ND - 208 (104 ng/L)
Total Detectable PAHs	Newport (EMD)	2 samples (Sep 05 – Oct 05)	0 - 452.8 (226.4 ng/L)
VOCs			
Acetone	Newport (EMD)	2 samples (Sep 05 – Oct 05)	12 - 13 (12.5 µg/L)
Butyltins			
Organotins	Newport (EMD)	2 samples (Sep 05 – Oct 05)	ND
Dioxins			
Total TCDD Equivalents	Newport (EMD)	2 samples (Sep 05 – Oct 05)	0 - 1.43 (0.715 pg/L)
Radio Chemistry			
Gross Alpha	Newport (EMD)	2 samples (Sep 05 – Oct 05)	6.01 - 16.8 (11.41 pCi/L)
Gross Beta	Newport (EMD)	2 samples (Sep 05 – Oct 05)	0 - 15.9 (7.95 pCi/L)

ND - Not detected or less than minimum detection limit
*Geometric mean for bacteria data

5.15 Emerald Canyon

Water quality data for Emerald Canyon consists of bacteria indicator data collected from the on-going NPDES and OWPP monitoring, as summarized in Table 5.16. This is a NPDES coastal storm drain outlet that samples the storm drain, as well as upcoast and downcoast of the storm drain, since January 2003. Emerald Canyon has been monitored under the OWPP since June 1997.

Table 5.16 Water Quality Data for Emerald Canyon

Constituent	Monitoring Program	Frequency	Data Range (Geometric Mean)
Bacteria			
Total Coliform	NPDES (EMRLD)	Weekly (Jan 03 – present)	20 - 680,000 (12,711 CFU/100 mL)
	OWPP (CLBEB)	Weekly (Jun 97 – present)	20 - 1,600,000 (20,429 MPN/100 mL)
Fecal Coliform	NPDES (EMRLD)	Weekly (Jan 03 – present)	20 - 58,000 (1,646 CFU/100 mL)
	OWPP (CLBEB)	Weekly (Jun 97 – present)	20 - 3,000,000 (7,715 MPN/100 mL)
Enterococcus	NPDES (EMRLD)	Weekly (Jan 03 – present)	10 - 44,000 (1,920 CFU/100 mL)
	OWPP (CLBEB)	Weekly (Mar 99 – present)	10 - 36,600 (3,462 MPN/100 mL)

5.16 Laguna Canyon Channel

Laguna Canyon Channel is monitored under the NPDES and OWPP. The data are summarized in Table 5.17. Laguna Canyon Channel has been a NPDES mass emission and bioassessment monitoring location since 2002 and a NPDES coastal storm drain site since January 2003. Under the OWPP, bacteria data have been collected since January 1986.

Additional water quality data are available for storm drains upcoast and downcoast from Laguna Canyon Channel. The NPDES data from these storm drains are summarized in Table 5.18. The NPDES data are from two dry weather reconnaissance locations and one coastal storm drain.

Table 5.17 Water Quality Data for Laguna Canyon Channel

Constituent	Monitoring Program	Frequency	Data Range (Average)*
General Chemistry			
Ammonia-Nitrogen	NPDES (LC-133)	1 Fall, 1 Spring (Nov 02 – present)	0.05 - 0.3 (0.038 mg/L)
	NPDES (LCWI02)	3 Storms Annually (2002 – present)	0.05 - 1.4 (0.11 mg/L)
Nitrate-Nitrogen	NPDES (LC-133)	1 Fall, 1 Spring (Nov 02 – present)	0.48 - 1.2 (0.76 mg/L)
	NPDES (LCWI02)	3 Storms Annually (2002 – present)	0.44 - 15 (2.71 mg/L)
Orthophosphate	NPDES (LC-133)	1 Fall, 1 Spring (Nov 02 – present)	0.16 - 0.65 (0.255 mg/L)
	NPDES (LCWI02)	3 Storms Annually (2002 – present)	0.087 - 0.82 (0.3 mg/L)
Total Phosphorus	NPDES (LC-133)	1 Fall, 1 Spring (Nov 02 – present)	0.581 - 1.32 (0.802 mg/L)
	NPDES (LCWI02)	3 Storms Annually (2002 – present)	0.368 - 30.4 (2.11 mg/L)
TSS	NPDES (LC-133)	1 Fall, 1 Spring (Nov 02 – present)	ND - 13 (2.25 mg/L)
	NPDES (LCWI02)	3 Storms Annually (2002 – present)	5 - 6250 (542.87 mg/L)
Turbidity	NPDES (LC-133)	1 Fall, 1 Spring (Nov 02 – present)	0.64 - 7.7 (2.18 NTU)
	NPDES (LCWI02)	3 Storms Annually (2002 – present)	0.7 - 1320 (121.81 NTU)
Bacteria			
Total Coliform**	NPDES (MAINBC)	Weekly (Jan 03 – present)	630 -8,200,000 (9,200 CFU/100 mL)
	OWPP (CLBBC)	Weekly (Jan 86 – present)	20 - 16,000,000 (12,319 MPN/100 mL)
Fecal Coliform**	NPDES (MAINBC)	Weekly (Jan 03 – present)	30 - 56,000 (986 CFU/100 mL)
	OWPP (CLBBC)	Weekly (Jan 86 – present)	10 - 1,600,000 (3,443 MPN/100 mL)
Enterococcus**	NPDES (MAINBC)	Weekly (Jan 03 – present)	9 - 167,000 (769 CFU/100 mL)
	OWPP (CLBBC)	Weekly (Mar 99 – present)	10 - 25,600 (997 MPN/100 mL)
Bioassessment			
Bioassessment	NPDES (LC-133)	1 Fall, 1 Spring (Nov 02 – present)	Very Poor - Poor
Toxicity	NPDES (LC-133)	1 Fall, 1 Spring (Jun 03 – present)	
	NPDES (LCWI02)	1 Storm Annually (Nov 02 – present)	
Dissolved Metals			
Arsenic (As)	NPDES (LC-133)	2 samples (Nov 02 –Jun 03)	2 - 3 (2.5 µg/L)
	NPDES (LCWI02)	2 samples (Dec 02)	ND - 5.6 (2.8 µg/L)
Cadmium (Cd)	NPDES (LC-133)	1 Fall, 1 Spring (Nov 02 – present)	ND
	NPDES (LCWI02)	3 Storms Annually (Dec 02 – present)	ND - 1.7 (0.039 µg/L)
Chromium (Cr)	NPDES (LC-133)	1 Fall, 1 Spring (Nov 02 – present)	ND
	NPDES (LCWI02)	3 Storms Annually (Dec 02 – present)	ND - 17 (0.62 µg/L)
Copper (Cu)	NPDES (LC-133)	1 Fall, 1 Spring (Nov 02 – present)	ND - 3.8 (1.43 µg/L)
	NPDES (LCWI02)	3 Storms Annually (Dec 02 – present)	2 - 91 (9.67 µg/L)
Lead (Pb)	NPDES (LC-133)	1 Fall, 1 Spring (Nov 02 – present)	ND
	NPDES (LCWI02)	3 Storms Annually (Dec 02 – present)	ND - 7.3 (0.55 µg/L)
Nickel (Ni)	NPDES (LC-133)	1 Fall, 1 Spring (Nov 02 – present)	ND - 9.5 (5.31 µg/L)
	NPDES (LCWI02)	3 Storms Annually (Dec 02 – present)	ND - 28 (4.17 µg/L)
Selenium (Se)	NPDES (LC-133)	2 samples (Nov 02 –Jun 03)	ND
	NPDES (LCWI02)	2 samples (Dec 02)	ND
Silver (Ag)	NPDES (LC-133)	1 Fall, 1 Spring (Nov 02 – present)	ND
	NPDES (LCWI02)	3 Storms Annually (Dec 02 – present)	ND
Zinc (Zn)	NPDES (LC-133)	1 Fall, 1 Spring (Nov 02 – present)	ND - 150 (21.59 µg/L)
	NPDES (LCWI02)	3 Storms Annually (Dec 02 – present)	ND - 250 (24.98 µg/L)
Pesticides			
Chlorpyrifos	NPDES (LC-133)	1 Fall, 1 Spring (Nov 02 – present)	ND
	NPDES (LCWI02)	3 Storms Annually (Dec 02 – present)	ND
Diazinon	NPDES (LC-133)	1 Fall, 1 Spring (Nov 02 – present)	ND
	NPDES (LCWI02)	3 Storms Annually (Dec 02 – present)	ND - 247 (25.97 ng/L)
Dimethoate	NPDES (LC-133)	1 Fall, 1 Spring (Nov 02 – present)	ND
	NPDES (LCWI02)	3 Storms Annually (Dec 02 – present)	ND
Malathion	NPDES (LC-133)	1 Fall, 1 Spring (Oct 03 – present)	ND
	NPDES (LCWI02)	3 Storms Annually (Apr 03 – present)	ND - 201 (10.64 ng/L)

ND - Not detected or less than minimum detection limit
*Geometric mean for bacteria data
**303(d)-listed for bacteria indicators - Pacific Ocean Shoreline Laguna Beach HAS

Table 5.18 Water Quality Data for Laguna Canyon Storm Drains

Constituent	Monitoring Program	Frequency	Data Range (Average)*
General Chemistry			
Ammonia-Nitrogen	NPDES (LBHPSE12)	5 Samples b/w May and Sep (May 05 – present)	0.02 - 4.8 (0.61 mg/L)
	NPDES (LBI00P02)	3 Samples b/w May and Sep (Jun 03 – present)	ND - 0.14 (0.064 mg/L)
Nitrate-Nitrogen	NPDES (LBHPSE12)	5 Samples b/w May and Sep (May 05 – present)	1.2 - 2.8 (2.08 mg/L)
	NPDES (LBI00P02)	3 Samples b/w May and Sep (Jun 03 – present)	1.5 - 3.7 (2.61 mg/L)
TSS	NPDES (LBHPSE12)	5 Samples b/w May and Sep (May 05 – present)	ND - 7 (1.44 mg/L)
	NPDES (LBI00P02)	3 Samples b/w May and Sep (Jun 03 – present)	ND - 20 (5.57 mg/L)
Turbidity	NPDES (LBHPSE12)	5 Samples b/w May and Sep (May 05 – present)	1.39 - 70.1 (9.98 NTU)
	NPDES (LBI00P02)	3 Samples b/w May and Sep (Jun 03 – present)	0.74 - 11.3 (3.9 NTU)
Bacteria			
Total Coliform**	NPDES (HEISLR)	Weekly (Jan 03 – present)	9 - 8,600,000 (543 CFU/100 mL)
	NPDES (LBHPSE12)	5 Samples b/w May and Sep (May 05 – present)	15,000 - 360,000 (61,754 CFU/100 mL)
	NPDES (LBI00P02)	3 Samples b/w May and Sep (Jun 03 – present)	630 - 25,000 (13,136 CFU/100 mL)
Fecal Coliform**	NPDES (HEISLR)	Weekly (Jan 03 – present)	9 - 5,800 (23 CFU/100 mL)
	NPDES (LBHPSE12)	5 Samples b/w May and Sep (May 05 – present)	2,100 - 130,000 (17,853 CFU/100 mL)
	NPDES (LBI00P02)	3 Samples b/w May and Sep (Jun 03 – present)	630 - 10,000 (3,119 CFU/100 mL)
Enterococcus**	NPDES (HEISLR)	Weekly (Jan 03 – present)	9 - 11,400 (63 CFU/100 mL)
	NPDES (LBHPSE12)	5 Samples b/w May and Sep (May 05 – present)	2,300 - 107,000 (10,479 CFU/100 mL)
	NPDES (LBI00P02)	3 Samples b/w May and Sep (Jun 03 – present)	1,700 - 6,100 (3,282 CFU/100 mL)
Dissolved Metals			
Cadmium (Cd)	NPDES (LBHPSE12)	5 Samples b/w May and Sep (May 05 – present)	ND
	NPDES (LBI00P02)	3 Samples b/w May and Sep (Jun 03 – present)	ND - 0.72 (0.24 µg/L)
Chromium (Cr)	NPDES (LBHPSE12)	5 Samples b/w May and Sep (May 05 – present)	0.81 - 1.8 (1.37 µg/L)
	NPDES (LBI00P02)	3 Samples b/w May and Sep (Jun 03 – present)	ND
Copper (Cu)	NPDES (LBHPSE12)	5 Samples b/w May and Sep (May 05 – present)	3.6 - 13 (8.09 µg/L)
	NPDES (LBI00P02)	3 Samples b/w May and Sep (Jun 03 – present)	3.8 - 15 (8.88 µg/L)
Lead (Pb)	NPDES (LBHPSE12)	5 Samples b/w May and Sep (May 05 – present)	ND - 1.7 (0.32 µg/L)
	NPDES (LBI00P02)	3 Samples b/w May and Sep (Jun 03 – present)	ND
Nickel (Ni)	NPDES (LBHPSE12)	5 Samples b/w May and Sep (May 05 – present)	4.3 - 9.5 (6.03 µg/L)
	NPDES (LBI00P02)	3 Samples b/w May and Sep (Jun 03 – present)	12 - 33 (22.5 µg/L)
Silver (Ag)	NPDES (LBHPSE12)	5 Samples b/w May and Sep (May 05 – present)	ND
	NPDES (LBI00P02)	3 Samples b/w May and Sep (Jun 03 – present)	ND
Zinc (Zn)	NPDES (LBHPSE12)	5 Samples b/w May and Sep (May 05 – present)	8.3 - 21 (15.9 µg/L)
	NPDES (LBI00P02)	3 Samples b/w May and Sep (Jun 03 – present)	6.1 - 26 (15.3 µg/L)
Pesticides			
Chlorpyrifos	NPDES (LBHPSE12)	5 Samples b/w May and Sep (Jul 05 – present)	ND - 30 (5.63 ng/L)
	NPDES (LBI00P02)	3 Samples b/w May and Sep (Jun 03 – present)	ND
Diazinon	NPDES (LBHPSE12)	5 Samples b/w May and Sep (Jul 05 – present)	ND - 17 (2.13 ng/L)
	NPDES (LBI00P02)	3 Samples b/w May and Sep (Jun 03 – present)	ND
Dimethoate	NPDES (LBHPSE12)	5 Samples b/w May and Sep (Jul 05 – present)	ND
	NPDES (LBI00P02)	3 Samples b/w May and Sep (Jun 03 – present)	ND
Malathion	NPDES (LBHPSE12)	5 Samples b/w May and Sep (Jul 05 – present)	ND - 8740 (1112 ng/L)
	NPDES (LBI00P02)	3 Samples b/w May and Sep (Jun 03 – present)	ND

ND - Not detected or less than minimum detection limit
*Geometric mean for bacteria data
**303(d)-listed for bacteria indicators - Pacific Ocean Shoreline Laguna Beach HAS

6. POLLUTANT LOADING

Available pollutant loading data for the creeks that discharge into or near CCA #69 and ASBS 32, 33, and 30 were also reviewed and summarized. Data from the TMDL and NPDES monitoring programs are based on the annual reports from 2000-01 to 2005-06. TMDL and NPDES annual loading estimates are based on the reporting year between July and June. Pollutant loads were also determined from the Newport Assessment that sampled between September 2005 and February 2006. Annual dry, wet, and total bacteria and metal loads were estimated from March 15, 2005 through March 15, 2006. These annual loads were based on empirically derived flows based on drainage area.

Pollutant loading data for dry season, wet season, and total annual loads are presented in summary tables by creek (Table 6.1). In the tables, summaries are provided for flow, general constituents, bacteria, and metals if data were available. TMDL and 303(d)-listed constituents are also indicated in the summary table. The summary of the data includes monitoring program, sampling frequency, and data range (minimum, maximum, and average).

Table 6.1 List of Pollutant Loading Data Tables

WATERSHED	CREEK	SUMMARY TABLE
Upper Newport Bay	San Diego Creek	Table 6.2
	Santa Ana-Delhi Channel	Table 6.3
	Costa Mesa Channel	Table 6.4
Newport Coast	Buck Gully	Table 6.5
	Morning Canyon	Table 6.6
	Pelican Point Creek	Table 6.7
	Pelican Point Middle Creek	Table 6.8
	Pelican Point Waterfall Creek	Table 6.9
	Los Trancos Creek	Table 6.10
	Muddy Creek	Table 6.11
	El Moro Creek	Table 6.12
Laguna Canyon	Laguna Canyon Channel	Table 6.13

6.1 San Diego Creek

Pollutant loadings for San Diego Creek are determined for TMDL and NPDES purposes and are summarized in Table 6.2. The data includes concurrent flow and water quality monitored for the following storm events: October 10 – 14, 2000; January 8 – 12, 2001; January 24 – 28, 2001; March 6 -7, 2001; November 29 – December 2, 2001; February 17 – 21, 2002; March 7 – 11, 2002; November 8 – 12, 2002; February 11 – 15, 2003; February 2 – 6, 2004; April 17 – 20, 2004; December 28, 2004 – January 2, 2005; February 11 – 15, 2005; May 5 – 9, 2005; October 16 – 20, 2005; and February 27 – March 4, 2006.

Additional loading data include seasonal, monthly, and annual loads. Seasonal and annual nutrient loads for San Diego Creek at Campus Drive were computed for the 1977-78 to 1998-99 seasons with the exception of the 1990-91 wet and annual loads (County of Orange 2000). Nutrient loads were based on long-term flow and nutrient data. A rainfall-runoff regression model developed from rain and flow data was used to fill gaps in flow data. Annual wet season nutrient loads have also been determined for the 2000-01 to 2003-04 seasons. Beginning in July 2005, nutrient loads for nutrient TMDL compliance are reported on a monthly basis. Annual sediment and flow data were determined between the 1998-99 and 2005-06 season for sediment TMDL compliance. Annual wet weather metal loadings between 2000-01 and 2003-04 were determined for copper, lead, and zinc.

6.2 Santa Ana-Delhi Channel

Pollutant loading data for the Santa Ana-Delhi Channel are summarized in Table 6.3. The data includes concurrent flow and water quality monitored for the following storm events: October 27 – 31, 2000; January 8 – 12, 2001; January 24 – 28, 2001; March 6 – 10, 2001; November 29 – December 3, 2001; December 14 – 18, 2001; February 17 – 21, 2002; March 7 – 11, 2002; November 8 – 12, 2002; February 11 – 15, 2003; January 2, 2004; February 25 – March 2, 2004; April 17 – 18, 2004; October 26 – 30, 2004; December 25, 2004; December 28, 2004 – January 1, 2005; February 10 – 15, 2005; October 16 – 20, 2005; and February 27 – March 4, 2006.

Additional loading data include seasonal, monthly, and annual loads. Annual flow volumes have been monitored since the 1998-99 season for sediment TMDL requirements. Annual wet weather loads for nutrients and selected metals were determined between the 2000-01 and 2003-04 seasons.

6.3 Santa Isabella Channel

There is no pollutant loading data for Santa Isabella Channel.

Table 6.2 Pollutant Loading Data for San Diego Creek

Constituent	Monitoring Program	Sampling Frequency	Data Range (Average)
Flow			
Volume			
Dry Season	Nutrient TMDL	Annually (1977-78 to 1998-99)	4,161 - 16,161 (8,044 acre-ft)
Wet Season	Nutrient TMDL	Annually (1977-78 to 1998-99)*	10, 272 - 79,159 (28,492 acre-ft)
Total	Nutrient TMDL	Annually (1977-78 to 1998-99)*	17,337 - 90,420 (36,536 acre-ft)
	Sediment TMDL	Annually (1998-99 to 2005-06)	10,610 - 75,860 (27,229 acre-ft)
General Chemistry			
Ammonia			
Dry Season	Nutrient TMDL	Annually (1977-78 to 1998-99)	0.5 - 66.5 (15 tons)
Wet Season	Nutrient TMDL	Annually (1977-78 to 1998-99)*	1.5 - 81 (11.1 tons)
	NPDES	3 events/season (Nov 02 – present)	0.089 - 1.66 (0.73 tons)
Total	Nutrient TMDL	Annually (1977-78 to 1998-99)*	3.5 - 92.5 (26.7 tons)
Nitrate			
Dry Season	Nutrient TMDL	Annually (1977-78 to 1998-99)	301 - 1,557 (813 tons)
Wet Season	Nutrient TMDL	Annually (1977-78 to 1998-99)*	292 - 2,222 (823 tons)
	NPDES	Annually (2000-01 to 2003-04)	114.7 - 560 (368 tons)
	NPDES	3 events/season (Oct 00 – present)	0.010 - 109.38 (34.74 tons)
Total	Nutrient TMDL	Annually (1977-78 to 1998-99)*	640 - 2,913 (1,654 tons)
Total Nitrogen**			
Dry Season	Nutrient TMDL	Annually (1977-78 to 1998-99)	79 - 443.5 (214.6 tons)
Wet Season	Nutrient TMDL	Annually (1977-78 to 1998-99)*	81 - 603 (218.6 tons)
Total	Nutrient TMDL	Annually (1977-78 to 1998-99)*	177.5 - 899.5 (438.2 tons)
	Nutrient TMDL	Monthly (Jul 05 – present)	2.65 - 25.6 (7.4 tons)
Total Phosphorus**			
Dry Season	Nutrient TMDL	Annually (1977-78 to 1998-99)	1.5 - 30 (8.7 tons)
Wet Season	Nutrient TMDL	Annually (1977-78 to 1998-99)*	4.5 - 150 (35.4 tons)
	NPDES	Annually (2000-01 to 2003-04)	22.2 - 124.3 (79 tons)
	NPDES	3 events/season (Oct 00 – present)	0.0005 - 29.09 (6.50 tons)
Total	Nutrient TMDL	Annually (1977-78 to 1998-99)*	6.5 - 154.5 (44 tons)
	Nutrient TMDL	Monthly (Jul 05 – present)	233 - 5,264 (1,468 lbs)
TSS**			
Wet Season	NPDES	Annually (2000-01 to 2003-04)	5,294.7 - 22,940 (11,002 tons)
	NPDES	3 events/season (Oct 00 – present)	0.032 - 6,366 (722.31 tons)
Total	Sediment TMDL	Annually (1998-99 to 2005-06)	5,640 - 165,810 (49,617 tons)
Metals			
Arsenic			
Wet Season	NPDES	2 event/season (Nov 02 – present)	0.41 - 67.4 (31.76 lbs)
Cadmium**			
Wet Season	NPDES	2 event/season (Nov 02 – present)	0.02 - 13.8 (6.28 lbs)
Chromium			
Wet Season	NPDES	2 event/season (Nov 02 – present)	0.11 - 125 (49.54 lbs)
Copper**			
Wet Season	NPDES	Annually (2000-01 to 2003-04)	450 - 2,526 (1,580 lbs)
	NPDES	3 events/season (Oct 00 – present)	
Lead**			
Wet Season	NPDES	Annually (2000-01 to 2003-04)	282 - 1,436 (936 lbs)
	NPDES	3 events/season (Oct 00 – present)	0 - 263.85 (36.31 lbs)
Selenium**			
Wet Season	NPDES	2 event/season (Nov 02 – present)	0.69 - 23.89 (13.14 lbs)
Silver			
Wet Season	NPDES	2 event/season (Nov 02 – present)	0.02 - 12.34 (6.14 lbs)
Zinc**			
Wet Season	NPDES	Annually (2000-01 to 2003-04)	1,554 - 8,605 (5,718 lbs)
	NPDES	3 events/season (Oct 00 – present)	0 - 2,360.8 (374.25 lbs)

*No data for 1990-91 season
**TMDL established for San Diego Creek (nutrients, sediment, and toxics)

Table 6.3 Pollutant Loading Data for Santa Ana-Delhi Channel

Constituent	Monitoring Program	Sampling Frequency	Data Range (Average)
Flow			
Volume			
Wet Season	NPDES	Annually (2000-01 to 2004-05)	1,289 - 11,140 (4,945 acre-ft)
Total	Sediment TMDL	Annually (1998-99 to 2005-06)	2,890 - 11,140 (5,261 acre-ft)
General Chemistry			
Ammonia			
Wet Season	NPDES	3 events/season (Nov 02 – present)	0.058 - 0.41 (0.18 tons)
Nitrate			
Wet Season	NPDES	Annually (2000-01 to 2003-04)	9.3 - 54.5 (31.75 tons)
	NPDES	3 events/season (Oct 00 – present)	0.033 - 12.16 (3.0 tons)
Total Nitrogen**			
Total	Nutrient TMDL	Monthly (Jul 05 – present)	0.55 - 6.6 (1.34 tons)
Total Phosphorus**			
Wet Season	NPDES	Annually (2000-01 to 2003-04)	2.2 - 13.1 (8.18 tons)
	NPDES	3 events/season (Oct 00 – present)	0.023 - 2.37 (0.59 tons)
Total	Nutrient TMDL	Monthly (Jul 05 – present)	0.0074 - 0.18 (0.063 tons)
TSS**			
Wet Season	NPDES	Annually (2000-01 to 2003-04)	204.5 - 1,295.2 (833.33 tons)
	NPDES	3 events/season (Oct 00 – present)	0.027 - 235.14 (40.1 tons)
Total	Sediment TMDL	Annually (2000-01 to 2005-06)	223 - 1,889 (788.33 tons)
Metals			
Arsenic			
Wet Season	NPDES	1 event/season (Nov 02 – present)	0.81 - 4.44 (2.63 lbs)
Cadmium**			
Wet Season	NPDES	1 event/season (Nov 02 – present)	0.13 - 1.08 (0.55 lbs)
Chromium			
Wet Season	NPDES	1 event/season (Nov 02 – present)	1.09 - 8.63 (4.35 lbs)
Copper**			
Wet Season	NPDES	Annually (2000-01 to 2003-04)	108 - 591 (359.5 lbs)
	NPDES	3 events/season (Oct 00 – present)	0.3 - 118.9 (29.15 lbs)
Lead**			
Wet Season	NPDES	Annually (2000-01 to 2003-04)	64 - 397 (246 lbs)
	NPDES	3 events/season (Oct 00 – present)	0.1 - 74.23 (11.9 lbs)
Selenium**			
Wet Season	NPDES	1 event/season (Nov 02 – present)	0.98 - 2.97 (1.93 lbs)
Silver			
Wet Season	NPDES	1 event/season (Nov 02 – present)	0.07 - 2.15 (0.9 lbs)
Zinc**			
Wet Season	NPDES	Annually (2000-01 to 2003-04)	404 - 2,402 (1,494 lbs)
	NPDES	3 events/season (Oct 00 – present)	1.1 - 502.4 (100.16 lbs)

**TMDL established for Upper Newport Bay (nutrients, sediment, fecal coliform, and toxics)

6.4 Big Canyon Wash

There is no pollutant loading data for Big Canyon Wash.

6.5 Costa Mesa Channel

Pollutant loading data for the Costa Mesa Channel are report TMDL and NPDES purpose. The data are summarized in Table 6.4. The loading data have been reported for one wet weather event that occurred February 27 – March 2, 2006. Additionally, monthly total nitrogen and total phosphorus loads have been computed since July 2005.

Table 6.4 Pollutant Loading Data for Costa Mesa Channel

Constituent	Monitoring Program	Sampling Frequency	Data Range (Average)
Flow			
Volume			
Wet Season	NPDES	3 events/season (Feb 06 – present)	17 acre-ft
General Chemistry			
Ammonia			
Wet Season	NPDES	3 events/season (Feb 06 – present)	0.008 tons
Nitrate			
Wet Season	NPDES	3 events/season (Feb 06 – present)	0.076 tons
Total Nitrogen**			
Total	Nutrient TMDL	Monthly (Jul 05 – present)	0.008 - 0.119 (0.04 tons)
Total Phosphorus**			
Wet Season	NPDES	3 events/season (Feb 06 – present)	0.027 tons
Total	Nutrient TMDL	Monthly (Jul 05 – present)	0.0016 - 0.03 (0.009 tons)
TSS**			
Wet Season	NPDES	3 events/season (Feb 06 – present)	0.92 tons
Metals			
Arsenic			
Wet Season	NPDES	3 events/season (Feb 06 – present)	0.07 lbs
Cadmium**			
Wet Season	NPDES	3 events/season (Feb 06 – present)	0.01 lbs
Chromium			
Wet Season	NPDES	3 events/season (Feb 06 – present)	0.11 lbs
Copper**			
Wet Season	NPDES	3 events/season (Feb 06 – present)	1.23 lbs
Lead**			
Wet Season	NPDES	3 events/season (Feb 06 – present)	0.21 lbs
Nickel			
Wet Season	NPDES	3 events/season (Feb 06 – present)	0.19 lbs
Selenium**			
Wet Season	NPDES	3 events/season (Feb 06 – present)	0.01 lbs
Silver			
Wet Season	NPDES	3 events/season (Feb 06 – present)	0.01 lbs
Zinc**			
Wet Season	NPDES	3 events/season (Feb 06 – present)	4.27 lbs

**TMDL established for Upper Newport Bay (nutrients, sediment, fecal coliform, and toxics)

6.6 Newport Boulevard

There is no pollutant loading data for the storm drain along Newport Boulevard.

6.7 Buck Gully

Pollutant loads for fecal coliform, enterococcus, cadmium, copper, lead, and zinc were determined from the Newport Assessment, as summarized in Table 6.5. Concurrent flow and water quality measurements were made for two dry weather sampling events (September 27 – 28, 2005 and February 13, 2006) and three wet weather sampling events (October 16 – 17, 2005; February 18 – 19, 2006; and February 27 – 28, 2006). However, load calculations were based on analytical estimated flows.

6.8 Morning Canyon

Pollutant loading data for Morning Canyon from the Newport Assessment are summarized in Table 6.6. The annual dry season load calculation was based on one water quality sample, while the annual wet season load calculation was based on three water quality samples. Both load calculations were based on analytical estimated flows.

6.9 Pelican Point Creek

Table 6.7 shows the pollutant loading data for Pelican Point Creek. The pollutant loads were estimated from water quality of a storm drain located upcoast from Pelican Point Creek and analytical estimated flows.

6.10 Pelican Point Middle Creek

Data of pollutant loads from Pelican Point Middle Creek are summarized in Table 6.8. The pollutant loading data are based in one dry weather and three wet weather sampling events and analytically estimated flows.

6.11 Pelican Point Waterfall Creek

The annual wet and total loadings from Pelican Point Waterfall Creek are summarized in Table 6.9. The annual dry season loadings were not determined since this creek only flows during wet weather. The wet weather load was estimated using water quality data from 3 sampling events and analytically estimated flows.

Table 6.5 Pollutant Loading Data for Buck Gully

Constituent	Monitoring Program	Sampling Frequency	Annual Load*
Bacteria			
Fecal Coliform**			
Dry Season	Newport (BG1)	2 samples (Sep 05 – Feb 06)	11.67 log MPN
Wet Season		3 samples (Oct 05 – Feb 06)	12.61 log MPN
Total		5 samples (Sep 05 – Feb 06)	12.66 log MPN
Enterococcus			
Dry Season	Newport (BG1)	2 samples (Sep 05 – Feb 06)	11.77 log MPN
Wet Season		3 samples (Oct 05 – Feb 06)	12.27 log MPN
Total		5 samples (Sep 05 – Feb 06)	12.39 log MPN
Metals			
Cadmium, total			
Dry Season	Newport (BG1)	2 samples (Sep 05 – Feb 06)	4.76 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	1.45 lbs
Total		5 samples (Sep 05 – Feb 06)	6.21 lbs
Cadmium, dissolved			
Dry Season	Newport (BG1)	2 samples (Sep 05 – Feb 06)	2.89 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	0.61 lbs
Total		5 samples (Sep 05 – Feb 06)	3.50 lbs
Copper, total			
Dry Season	Newport (BG1)	2 samples (Sep 05 – Feb 06)	4.66 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	4.79 lbs
Total		5 samples (Sep 05 – Feb 06)	9.45 lbs
Copper, dissolved			
Dry Season	Newport (BG1)	2 samples (Sep 05 – Feb 06)	7.77 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	1.78 lbs
Total		5 samples (Sep 05 – Feb 06)	9.55 lbs
Lead, total			
Dry Season	Newport (BG1)	2 samples (Sep 05 – Feb 06)	0.03 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	0.276 lbs
Total		5 samples (Sep 05 – Feb 06)	0.30 lbs
Lead, dissolved			
Dry Season	Newport (BG1)	2 samples (Sep 05 – Feb 06)	0.02 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	0.01 lbs
Total		5 samples (Sep 05 – Feb 06)	0.03 lbs
Zinc, total			
Dry Season	Newport (BG1)	2 samples (Sep 05 – Feb 06)	16.76 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	7.212 lbs
Total		5 samples (Sep 05 – Feb 06)	23.97 lbs
Zinc, dissolved			
Dry Season	Newport (BG1)	2 samples (Sep 05 – Feb 06)	16.45 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	4.95 lbs
Total		5 samples (Sep 05 – Feb 06)	21.40 lbs

*Annual = March 15, 2005 - March 15, 2006
**303(d) listed constituent

Table 6.6 Pollutant Loading Data for Morning Canyon

Constituent	Monitoring Program	Sampling Frequency	Annual Load*
Bacteria			
Fecal Coliform			
Dry Season	Newport (MCD)	1 samples (Sep 05)	10.63 log MPN
Wet Season		3 samples (Oct 05 – Feb 06)	11.30 log MPN
Total		4 samples (Sep 05 – Feb 06)	11.39 log MPN
Enterococcus			
Dry Season	Newport (MCD)	1 samples (Sep 05)	11.71 log MPN
Wet Season		3 samples (Oct 05 – Feb 06)	11.75 log MPN
Total		4 samples (Sep 05 – Feb 06)	12.03 log MPN
Metals			
Cadmium, dissolved			
Dry Season	Newport (MCD)	1 samples (Sep 05)	6.19 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	0.65 lbs
Total		4 samples (Sep 05 – Feb 06)	6.84 lbs
Copper, dissolved			
Dry Season	Newport (MCD)	1 samples (Sep 05)	3.55 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	1.38 lbs
Total		4 samples (Sep 05 – Feb 06)	4.92 lbs
Lead, dissolved			
Dry Season	Newport (MCD)	1 samples (Sep 05)	0.01 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	0.01 lbs
Total		4 samples (Sep 05 – Feb 06)	0.01 lbs
Zinc, dissolved			
Dry Season	Newport (MCD)	1 samples (Sep 05)	12.10 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	10.84 lbs
Total		4 samples (Sep 05 – Feb 06)	22.95 lbs

*Annual = March 15, 2005 - March 15, 2006

Table 6.7 Pollutant Loading Data for Pelican Point Creek

Constituent	Monitoring Program	Sampling Frequency	Annual Load*
Bacteria			
Fecal Coliform			
Dry Season	Newport (PP1)	1 samples (Sep 05)	10.95 log MPN
Wet Season		3 samples (Oct 05 – Feb 06)	10.28 log MPN
Total		4 samples (Sep 05 – Feb 06)	11.03 log MPN
Enterococcus			
Dry Season	Newport (PP1)	1 samples (Sep 05)	10.70 log MPN
Wet Season		3 samples (Oct 05 – Feb 06)	11.09 log MPN
Total		4 samples (Sep 05 – Feb 06)	11.24 log MPN
Metals			
Cadmium, dissolved			
Dry Season	Newport (PP1)	1 samples (Sep 05)	0.04 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	0.00 lbs
Total		4 samples (Sep 05 – Feb 06)	0.04 lbs
Copper, dissolved			
Dry Season	Newport (PP1)	1 samples (Sep 05)	0.09 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	0.09 lbs
Total		4 samples (Sep 05 – Feb 06)	0.18 lbs
Lead, dissolved			
Dry Season	Newport (PP1)	1 samples (Sep 05)	0.00 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	0.00 lbs
Total		4 samples (Sep 05 – Feb 06)	0.00 lbs
Zinc, dissolved			
Dry Season	Newport (PP1)	1 samples (Sep 05)	0.16 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	0.10 lbs
Total		4 samples (Sep 05 – Feb 06)	0.26 lbs

PP1 - Storm drain upcoast from Pelican Point Creek
*Annual = March 15, 2005 - March 15, 2006

Table 6.8 Pollutant Loading Data for Pelican Point Middle Creek

Constituent	Monitoring Program	Sampling Frequency	Annual Load*
Bacteria			
Fecal Coliform			
Dry Season	Newport (PPM)	1 samples (Sep 05)	9.81 log MPN
Wet Season		3 samples (Oct 05 – Feb 06)	11.88 log MPN
Total		4 samples (Sep 05 – Feb 06)	11.88 log MPN
Enterococcus			
Dry Season	Newport (PPM)	1 samples (Sep 05)	10.68 log MPN
Wet Season		3 samples (Oct 05 – Feb 06)	11.69 log MPN
Total		4 samples (Sep 05 – Feb 06)	11.73 log MPN
Metals			
Cadmium, dissolved			
Dry Season	Newport (PPM)	1 samples (Sep 05)	11.69 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	0.26 lbs
Total		4 samples (Sep 05 – Feb 06)	11.95 lbs
Copper, dissolved			
Dry Season	Newport (PPM)	1 samples (Sep 05)	5.04 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	0.41 lbs
Total		4 samples (Sep 05 – Feb 06)	5.45 lbs
Lead, dissolved			
Dry Season	Newport (PPM)	1 samples (Sep 05)	0.27 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	0.00 lbs
Total		4 samples (Sep 05 – Feb 06)	0.27 lbs
Zinc, dissolved			
Dry Season	Newport (PPM)	1 samples (Sep 05)	9.63 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	1.07 lbs
Total		4 samples (Sep 05 – Feb 06)	10.70 lbs

*Annual = March 15, 2005 - March 15, 2006

Table 6.9 Pollutant Loading Data for Pelican Point Waterfall Creek

Constituent	Monitoring Program	Sampling Frequency	Annual Load*
Bacteria			
Fecal Coliform			
Dry Season	Newport (PPW)		**
Wet Season		3 samples (Oct 05 – Feb 06)	11.92 log MPN
Total		4 samples (Sep 05 – Feb 06)	11.92 log MPN
Enterococcus			
Dry Season	Newport (PPW)		**
Wet Season		3 samples (Oct 05 – Feb 06)	11.69 log MPN
Total		4 samples (Sep 05 – Feb 06)	11.73 log MPN
Metals			
Cadmium, dissolved			
Dry Season	Newport (PPW)		**
Wet Season		3 samples (Oct 05 – Feb 06)	0.26 lbs
Total		4 samples (Sep 05 – Feb 06)	0.24 lbs
Copper, dissolved			
Dry Season	Newport (PPW)		**
Wet Season		3 samples (Oct 05 – Feb 06)	0.41 lbs
Total		4 samples (Sep 05 – Feb 06)	0.25 lbs
Lead, dissolved			
Dry Season	Newport (PPW)		**
Wet Season		3 samples (Oct 05 – Feb 06)	0.00 lbs
Total		4 samples (Sep 05 – Feb 06)	0.00 lbs
Zinc, dissolved			
Dry Season	Newport (PPW)		**
Wet Season		3 samples (Oct 05 – Feb 06)	1.07 lbs
Total		4 samples (Sep 05 – Feb 06)	1.05 lbs

*Annual = March 15, 2005 - March 15, 2006
**No dry weather flow

6.12 Los Trancos Creek

Pollutant loading data for Los Trancos Creek are shown in Table 6.10. No dry weather loads were determined since dry weather flows are diverted. The wet weather load was estimated using water quality data from 3 sampling events and analytically estimated flows.

Table 6.10 Pollutant Loading Data for Los Trancos Creek

Constituent	Monitoring Program	Sampling Frequency	Annual Load*
Bacteria			
Fecal Coliform**			
Dry Season	Newport (LTD)	Dry Weather Flow Diverted	
Wet Season		4 samples (Oct 05 – Feb 06)	13.24 log MPN
Total		4 samples (Oct 05 – Feb 06)	13.24 log MPN
Enterococcus			
Dry Season	Newport (LTD)	Dry Weather Flow Diverted	
Wet Season		4 samples (Oct 05 – Feb 06)	12.97 log MPN
Total		4 samples (Oct 05 – Feb 06)	12.97 log MPN
Metals			
Cadmium, dissolved			
Dry Season	Newport (LTD)	Dry Weather Flow Diverted	
Wet Season		4 samples (Oct 05 – Feb 06)	1.09 lbs
Total		4 samples (Oct 05 – Feb 06)	1.09 lbs
Copper, dissolved			
Dry Season	Newport (LTD)	Dry Weather Flow Diverted	
Wet Season		4 samples (Oct 05 – Feb 06)	1.55 lbs
Total		4 samples (Oct 05 – Feb 06)	1.55 lbs
Lead, dissolved			
Dry Season	Newport (LTD)	Dry Weather Flow Diverted	
Wet Season		4 samples (Oct 05 – Feb 06)	0.00 lbs
Total		4 samples (Oct 05 – Feb 06)	0.00 lbs
Zinc, dissolved			
Dry Season	Newport (LTD)	Dry Weather Flow Diverted	
Wet Season		4 samples (Oct 05 – Feb 06)	2.87 lbs
Total		4 samples (Oct 05 – Feb 06)	2.87 lbs

*Annual = March 15, 2005 - March 15, 2006
**303(d) listed constituent

6.13 Muddy Creek

Annual wet and total pollutant loads from Muddy Creek are summarized in Table 6.11. No dry weather loads were determined since dry weather flows are diverted. The wet weather load was estimated using water quality data from 3 sampling events and analytically estimated flows.

Table 6.11 Pollutant Loading Data for Muddy Creek

Constituent	Monitoring Program	Sampling Frequency	Annual Load*
Bacteria			
Fecal Coliform			
Dry Season	Newport (MCC)	Dry Weather Flow Diverted	
Wet Season		3 samples (Oct 05 – Feb 06)	13.29 log MPN
Total		3 samples (Oct 05 – Feb 06)	13.29 log MPN
Enterococcus			
Dry Season	Newport (MCC)		**
Wet Season		3 samples (Oct 05 – Feb 06)	12.80 log MPN
Total		3 samples (Oct 05 – Feb 06)	12.80 log MPN
Metals			
Cadmium, dissolved			
Dry Season	Newport (MCC)	Dry Weather Flow Diverted	
Wet Season		3 samples (Oct 05 – Feb 06)	0.22 lbs
Total		3 samples (Oct 05 – Feb 06)	0.22 lbs
Copper, dissolved			
Dry Season	Newport (MCC)		**
Wet Season		3 samples (Oct 05 – Feb 06)	0.72 lbs
Total		3 samples (Oct 05 – Feb 06)	0.72 lbs
Lead, dissolved			
Dry Season	Newport (MCC)	Dry Weather Flow Diverted	
Wet Season		3 samples (Oct 05 – Feb 06)	0.00 lbs
Total		3 samples (Oct 05 – Feb 06)	0.00 lbs
Zinc, dissolved			
Dry Season	Newport (MCC)	Dry Weather Flow Diverted	
Wet Season		3 samples (Oct 05 – Feb 06)	1.78 lbs
Total		3 samples (Oct 05 – Feb 06)	1.78 lbs

*Annual = March 15, 2005 - March 15, 2006

6.14 El Moro Creek

Table 6.12 summarizes the pollutant loads for bacteria and metals determined for the Newport Assessment. The load calculations were based on two dry weather and three wet weather sampling events. Pollutant loads were determined based on both empirically estimated flows and measured flows.

Table 6.12 Pollutant Loading Data for El Moro Creek

Constituent	Monitoring Program	Sampling Frequency	Annual Load* Model Flow/Measured Flow
Bacteria			
Fecal Coliform			
Dry Season	Newport (EMD)	2 samples (Sep 05 – Feb 06)	11.38 / 9.93 log MPN
Wet Season		3 samples (Oct 05 – Feb 06)	12.26 / 11.92 log MPN
Total		5 samples (Sep 05 – Feb 06)	12.31 / 11.92 log MPN
Enterococcus			
Dry Season	Newport (EMD)	2 samples (Sep 05 – Feb 06)	11.02 / 9.81 log MPN
Wet Season		3 samples (Oct 05 – Feb 06)	11.86 / 11.84 log MPN
Total		5 samples (Sep 05 – Feb 06)	11.92 / 11.85 log MPN
Metals			
Cadmium, total			
Dry Season	Newport (EMD)	2 samples (Sep 05 – Feb 06)	2.21 / ND lbs
Wet Season		3 samples (Oct 05 – Feb 06)	0.661 / ND lbs
Total		5 samples (Sep 05 – Feb 06)	2.88 / ND lbs
Cadmium, dissolved			
Dry Season	Newport (EMD)	2 samples (Sep 05 – Feb 06)	2.32 / 0.13 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	0.61 / 0.04 lbs
Total		5 samples (Sep 05 – Feb 06)	2.93 / 0.17 lbs
Copper, total			
Dry Season	Newport (EMD)	2 samples (Sep 05 – Feb 06)	3.82 / ND lbs
Wet Season		3 samples (Oct 05 – Feb 06)	3.352 / ND lbs
Total		5 samples (Sep 05 – Feb 06)	7.17 / ND lbs
Copper, dissolved			
Dry Season	Newport (EMD)	2 samples (Sep 05 – Feb 06)	7.42 / 0.29 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	2.56 / 0.24 lbs
Total		5 samples (Sep 05 – Feb 06)	9.98 / 0.52 lbs
Lead, total			
Dry Season	Newport (EMD)	2 samples (Sep 05 – Feb 06)	0.05 / ND lbs
Wet Season		3 samples (Oct 05 – Feb 06)	0.311 / ND lbs
Total		5 samples (Sep 05 – Feb 06)	0.36 / ND lbs
Lead, dissolved			
Dry Season	Newport (EMD)	2 samples (Sep 05 – Feb 06)	0.03 / 0.00 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	0.02 / 0.00 lbs
Total		5 samples (Sep 05 – Feb 06)	0.05 / 0.00 lbs
Zinc, total			
Dry Season	Newport (EMD)	2 samples (Sep 05 – Feb 06)	13.79 / ND lbs
Wet Season		3 samples (Oct 05 – Feb 06)	8.41 / ND lbs
Total		5 samples (Sep 05 – Feb 06)	22.20 / ND lbs
Zinc, dissolved			
Dry Season	Newport (EMD)	2 samples (Sep 05 – Feb 06)	12.72 / 0.46 lbs
Wet Season		3 samples (Oct 05 – Feb 06)	6.31 / 0.63 lbs
Total		5 samples (Sep 05 – Feb 06)	19.03 / 1.09 lbs

*Annual = March 15, 2005 - March 15, 2006
ND - No Data

6.15 Emerald Creek

There is no pollutant loading data for Emerald Creek.

6.16 Laguna Canyon Channel

Pollutant loading data for Laguna Canyon Channel are determined for the annual NPDES reports since the 2005-06 report. Data for one wet weather event (December 31, 2005 – January 4, 2006) is listed in Table 6.13.

Table 6.13 Pollutant Loading Data for Laguna Canyon Channel

Constituent	Monitoring Program	Sampling Frequency	Annual Load
Flow			
Volume			
Wet Season	NPDES	3 events/season (Dec 05 – present)	80 acre-ft
General Chemistry			
Ammonia			
Wet Season	NPDES	3 events/season (Dec 05 – present)	0.027 tons
Nitrate			
Wet Season	NPDES	3 events/season (Dec 05 – present)	0.471 tons
Total Phosphorus			
Wet Season	NPDES	3 events/season (Dec 05 – present)	0.15 tons
TSS			
Wet Season	NPDES	3 events/season (Dec 05 – present)	8.27 tons
Metals			
Cadmium			
Wet Season	NPDES	3 events/season (Dec 05 – present)	0.05 lbs
Chromium			
Wet Season	NPDES	3 events/season (Dec 05 – present)	0.90 lbs
Copper			
Wet Season	NPDES	3 events/season (Dec 05 – present)	2.23 lbs
Lead			
Wet Season	NPDES	3 events/season (Dec 05 – present)	0.81 lbs
Nickel			
Wet Season	NPDES	3 events/season (Dec 05 – present)	1.55 lbs
Silver			
Wet Season	NPDES	3 events/season (Dec 05 – present)	0.05 lbs
Zinc			
Wet Season	NPDES	3 events/season (Dec 05 – present)	6.2 lbs

303(d)-listed for bacteria indicators - Pacific Ocean Shoreline Laguna Beach HAS

7. SEDIMENT BUDGET ANALYSIS

7.1 Overview

A sediment budget analysis was conducted to 1) determine the sediment deposition or erosion characteristics within or near to ASBS 30, 32, and 33 and 2) identify the major sediment sources of each ASBS (e.g., creeks or bluff erosion). A sediment budget analysis is an attempt to quantify sediment fluxes into and out of a control volume, such as a littoral cell. A schematic of a sediment budget for a littoral cell is shown in Figure 7.1. A littoral cell is a body of sediment within the control boundaries (i.e., a quantity of sediment in a hypothetical box in which sediment can move into and out of along each face of the box). The control boundaries are the landward (coastal bluffs) and offshore seaward limits (shorebase) of reversible seasonal movements, a layer beneath the movable sand (cell floor), and fixed end planes (upcoast and downcoast) across which the longshore transport occurs. Sediment sources into a littoral cell are bluff erosion (Qb), watershed sources from creeks (Qw), and artificial flux (Qa) such as beach nourishment. Sediment can also be either gained or lost from the offshore (Qs), as well as upcoast or downcoast longshore transport (Qn).

7.2 Laguna Beach Mini Littoral Cells

ASBS 30, 32, and 33 overlie the littoral region referred to as the Laguna Beach Mini Littoral Cells that extends 14.3 miles in a northwest-southeast direction from the Newport Harbor entrance to Dana Point. This stretch of coastline is composed of a series of small pocket beaches bounded by natural headland reefs or rock noses extending out to the surf zone. High seacliffs back these beaches, with occasional revetment and seawall structures to protect from bluff toe erosion.

A sediment budget for the Laguna Beach Mini Littoral Cells was performed by Everts Coastal in 1997 and reported by USACE in the 2002 Coast of California Storm and Tidal Wave Study for the South Coast Region, Orange County (USACE 2002). The study provided a long term, historical sediment budget from 1927 to 1984 for the entire littoral cell, as well as intermediate results for 24 mini cells. The current sediment budget analysis is based on applying those results to the ASBS regions.

The mini cells overlapping the ASBS are shown in Figure 7.2. The sediment budget for ASBS 32 is overlaid by the mini cells called Little Corona Beach and East Corona Coast littoral mini cells. The sediment budget for ASBS 33 is overlaid by the Crystal Cove mini cell. The sediment budget for ASBS 30 is overlaid by the Divers Cove and Rockpile Beach mini cells. The mini cells and ASBS boundaries have some general features in common but are not exactly aligned. Within the time scale of the sediment budget, effectively all of the

Figure 7.1 Schematic for Sediment Budget

Figure 7.2 Laguna Beach Mini Littoral Cells

material that moved offshore across the shorebase was retained within the ASBS regions in depths shallower than the 100-foot isobath, which represents the ASBS seaward boundary. The littoral cell landward boundary is the back beach or toe of the bluffs, while the landward ASBS boundary is the shoreline (e.g., mean high tide); these boundaries are separated by the beach width. Despite these discrepancies, the sediment budget for the mini cells is suitable to generalize the movement of sediment over the ASBS.

General results from the overall Laguna Beach Mini Littoral Cells were:

- Bluff and watershed contributions are the main sand source and are of similar order of magnitude
- Very little sand comes from the northwest boundary (Newport Harbor entrance)
- Net littoral transport is to the southeast with approximately 15,000 cy/yr exiting at Dana Point
- Most mini cells are accreting, acquiring tens to hundreds of cubic yard of sand annually
- Almost all the mini cells are losing material offshore across the shorebase
- Almost all the mini cells are losing material to the cell floor due to sea level rise and slow retreat of the back beach line

The dominant sinks and sources for each of the mini littoral cells containing the ASBS are summarized in Table 7.1. The table also indicates whether each of the mini cells is accreting or eroding. It can be seen that most of the sand flux into and out of each mini cell is from longhsore transport, which has a net downcoast direction. In other words, sand comes from the mini cell directly upcoast and moves out to the downcoast mini cell. An exception to note is the case of the Crystal Cove mini cell in ASBS 33, where the bluff, watershed, and longshore contributions are similar, and most of the sand moves offshore across the shorebase.

Table 7.1 Summary of Sediment Budget for the Mini Littoral Cells within the ASBS Regions

ASBS #	Littoral Mini cell	Condition	Dominant Source	Dominant Sink
	Big Corona Beach	Accreting	Shorebase	Longshore
32	Little Corona Beach	Accreting	Longshore	Longshore
32	East Corona Coast	Accreting	Longshore	Longshore
33	Crystal Cove	Accreting	Bluff, watershed, longshore	Shorebase
	Irvine Cove	Eroding	Bluff and longshore	Shorebase
	Emerald Bay	Eroding	Watershed	Longshore
	Crescent Bay	Accreting	Longshore	Longshore
	Shaws Cove	Stable	Longshore	Longshore
30	Divers Cove	Accreting	Longshore	Shorebase and longshore
30	Rockpile	Eroding	Longshore	Longshore
	Main Beach	Accreting	Watershed	Shorebase and longshore

Reference: Everts Coastal, 1997

Typically if a region is accreting, the shoreline becomes wider and the sediment layer over the bottom becomes thicker. Eroding regions have narrowing beach widths and thinning sediment layers. Sediment transport within the ASBS mini cells are relatively balanced at the critical cell volume, which means that additional sand does not widen beach significantly, instead it just moves offshore or along shore to the next cell downcoast. This is exemplified by the relatively stable nature of beach widths within the Laguna Beach Mini Littoral Cells.

7.3 Sediment Budgets for ASBS

The sediment budgets for ASBS 32 (Newport Beach), ASBS 33 (Irvine Coast) and ASBS 30 (Heisler Park) were calculated based on Evert's (1997) analyses for the Laguna Beach Mini Littoral Cells. As shown in Figures 7.1 and 7.2, each of the three ASBS may overlay several mini littoral cells. In addition, the offshore extent of the ASBS is much farther offshore than the littoral cells. Evert (1997) provided sediment fluxes (Qn, Qa, Qb, Qw, and Qs) to each of the mini littoral cells. These fluxes estimates were used to construct the sediment budget for the ASBS with an assumption that the offshore flux (Qs) for the mini littoral cells will deposit on the corresponding ASBS. This assumption is based on the fact that the offshore boundary of the ASBS is in deep water; hence any offshore sediment transport beyond the offshore boundary is unlikely. With this assumption and the sediment fluxes provided by Everts, the sediment budget for the ASBS are summarized in Table 7.2.

Table 7.2 Sediment Budgets for ASBS 32, 33, and 30

ASBS	Condition	Volume (cy/yr)	Rate (mm/yr)
32 – Newport Beach	Accreting	187	0.2
33 – Irvine Coast	Accreting	4,270	0.9
30 – Heisler Park	Accreting	320	1.9

As shown in Table 7.2, all three ASBS are accreting with a rate of 187, 4,270, and 320 cy/yr for ASBS 32, 33, and 30, respectively. If the accreted sediments are distributed uniformly over the entire ASBS area, the underlying bed in ASBS 32, 33 and 30 will accrete at a rate of 0.2, 0.9 and 1.2 mm/yr, respectively. With the accuracy for typical sediment budget analyses, these accretion rates are in the noise of the data. Hence, one can conclude that these ASBS areas are relatively stable in terms of sediment erosion or accretion.

7.4 Future Conditions

The sediment budget analysis presented above was based on historical data. Changes along the shoreline in the future may impact the sediment fluxes into or out of the ASBS and hence change the arresting nature of these areas. In this section, potential impact of changes in sediment sources to the littoral cells are discussed. These changes impact both the net sediment budget and specifically the expected depth of sand cover over bottom habitat.

Erosion Control Structures, Sediment Traps and Dams: An increase in erosion control structures and sediment traps within the watersheds of the Laguna Beach Mini Littoral Cells would decrease the sediment yield to the littoral systems. As sediment becomes trapped behind the structures, it cannot be delivered to the beach. This would result in a deficit to the system, decreasing the volume retained, leading to decreased beach widths and more exposed hard substrate as the thickness of the sand cover is reduced.

Bluff Armoring: Ocean bluff armoring in the form of seawalls would impact the sediment budget in two ways. First, the seawall would eliminate an eroding bluff as a source of sand from the littoral cell. Second, by fixing the base of the back beach line, assuming a continued relative sea level rise, the negative sand flux through the floor of the littoral cell would be increased. Sand would be lost from the system through the cell floor, permanently joining the substrate beneath the active littoral cell. These reductions in flux would reduce the volumes contributed to the littoral cell, resulting in a deficit to the system. Beach widths would decrease and more hard substrate would become exposed as the thickness of the sand cover is reduced.

Relative Sea Level Rise: Historic sea level rise relative to the land around Newport Beach and Laguna Beach has been approximately 0.008 feet per year from 1958 to 1976. This value is stable along the coast without any significant trends (City of Laguna Beach 1988; Pendleton et. al 2005; and Hicks et. al. 1988). Relative sea level rise in combination with back beach erosion has resulted in a net loss of sand from the mini cells. If the future rate of relative sea level rise doubles, which is within predicted ranges, the negative flux across the floor of the littoral cell is expected to quadruple (Everts 1997), removing sediment from the littoral cell. As the sea level rises, the shoreline will likely retreat as well.

Development and Construction: During times of active construction and development sand flux to the littoral cell can be expected to increase significantly. After construction has ended and landscaping has taken hold the future sand flux to the littoral cell would decrease. Paving, structures and lawns all reduce sediment yield to streams thereby reducing sand yield to the littoral cell. As the region becomes more developed, beaches will likely become narrower. Also, the littoral cell will become thinner, exposing more hard substrate to wave action.

8. SUMMARY

The Cross Contamination Study is being conducted to identify and quantify potential pollutant loadings from the coastal watersheds, to determine potential impacts of these pollutants to the ASBS, and to support the development of an ICWMP. This report summarizes the data collected to identify and quantify pollutants loadings into CCA #69, ASBS 32, ASBS 33, and ASBS 30, as well as to perform a sediment budget analysis. CCA #69 is located in Upper Newport Bay within the Newport Bay Watershed. Major discharges to CCA #69 are San Diego Creek, Santa Ana-Delhi Channel, Santa Isabella Channel, and Big Canyon. ASBS 32 and 33 are located along the Newport Coast Watershed. Buck Gully and Morning Canyon drain into ASBS 32. Pelican Point Creek, Pelican Point Middle Creek, Pelican Hill Waterfall Creek, Los Trancos Creek, Muddy Creek, and El Moro Canyon discharge into ASBS 33. Laguna Canyon discharges just downcoast to ASBS 30.

Water quality and loading data were reviewed and summarized from continuous monitoring programs for compliance with TMDL, NPDES permits, and OWPP, as well as field data collection programs from the Newport Assessment and OCCK Citizens Monitoring Projects. Water quality data included general constituents, bacteria, metals, pesticides, and other priority pollutants. A summary of the types of water quality and pollutant loading data for the creeks discharging into Newport Bay and the ASBS shoreline are provided in Table 8.1. The data varied for each monitoring location in period of record and monitoring frequency.

The data collected for this report will be used in conjunction with the numerical modeling to assess potential cross contamination of the harbor and creek discharges to the ASBS. The methodologies to apply the loading data and results of the cross contamination study will be provided in a separate report.

Table 8.1 Summary of Water Quality and Pollutant Loading Data

Creek	Type of Data
San Diego Creek	Dry and wet weather water quality, flow data, wet weather loading
Santa Ana-Delhi Channel	Dry and wet weather water quality data, flow, wet weather loading
Santa Isabella Channel	Dry and wet weather water quality
Big Canyon Wash	Dry and wet weather water quality
Costa Mesa Channel	Dry and wet weather water quality, flow, wet weather loading
Newport Boulevard	Dry weather water quality
Buck Gully	Dry and wet weather water quality, flow, annual dry and wet weather loading
Morning Canyon	Dry and wet weather water quality, annual dry and wet weather loading
Pelican Point Creek	Dry and wet weather water quality, annual dry and wet weather loading
Pelican Point Middle Creek	Dry and wet weather water quality, annual dry and wet weather loading
Pelican Point Waterfall Creek	Wet weather water quality, annual wet weather loading
Los Trancos Creek	Dry weather flows diverted, wet weather water quality
Muddy Canyon	Dry weather flows diverted, wet weather water quality
El Moro Canyon	Dry and wet weather water quality, annual dry and wet weather loading
Emerald Canyon	Bacteria data
Laguna Canyon	Dry and wet weather water quality, annual wet weather loading

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