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Executive Summary

This “Watershed Chapter”, Appendix D-1 (or Chapter 12) of the Drainage Area Management Plan (DAMP) serves as the Watershed Urban Runoff Management Plan (WURMP) for the **Dana Point Coastal Streams Watershed** in southern Orange County, California. This document was prepared to meet the requirements of, Section J and L of the municipal NPDES Stormwater Permit - Order R9-2002-0001.

The purpose of this document is to present a planning framework to identify the most significant water quality issues related to urban runoff sources that can be addressed at a multi-jurisdictional watershed-scale, to focus jurisdictional pollution prevention and source control programs on local constituents of concern, to identify treatment control opportunities, to incorporate prior data from planning studies, to identify indicators to track progress, and ultimately to develop an integrated plan of action that results in meaningful water quality improvement in the Dana Point Coastal Streams Watershed. The document also describes the numerous existing programs related to water quality and the activities conducted by the Watershed Permittees at the watershed scale.

The Dana Point Coastal Streams Watershed is located in southern Orange County, approximately 50 miles south of Los Angeles and 65 miles north of San Diego. The main tributary of the Dana Point Coastal Streams watershed is Salt Creek, which ultimately drains into the Pacific Ocean. The 6-square-mile watershed is almost fully developed and includes portions of the cities of Dana Point, Laguna Beach, Laguna Niguel, and San Juan Capistrano. Remaining undeveloped areas include open space within the Aliso and Wood Canyons Regional Park in the upper watershed and the Salt Creek Corridor Regional Park in the eastern part of the watershed. Also included in the watershed are a number of coastal drains which discharge to the Pacific Ocean through Dana Point Harbor. A few small, unnamed drainages and larger tributaries (Arroyo Salado Creek and San Juan Canyon Creek) join Salt Creek as it makes its way through the watershed. The Watershed Permittees include the County of Orange, the cities of Dana Point, Laguna Beach, Laguna Niguel, and San Juan Capistrano, and the Orange County Flood Control District.

Section 1.0 describes the environmental setting of the watershed, discusses program coordination between the Watershed Permittees, and outlines the approach taken in plan development. Section 2.0 provides an assessment of current water quality conditions and identifies issues and constituents of concern. Section 3.0 provides the plan of action for the watershed, relating specific constituents of concern to pollution prevention and source control BMPs. It also includes the plan of action for watershed-scale collaborative projects, and public

education and participation. Section 4.0 describes the program effectiveness assessment and potential future revisions of the Watershed Chapter, including an implementation schedule.

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D-1.0 Introduction

The Dana Point Coastal Streams Watershed includes portions of the cities of Dana Point, Laguna Beach, Laguna Niguel, a very small portion of San Juan Capistrano as well as portions of the unincorporated County and Orange County Flood Control District (Watershed Permittees). The Watershed Permittees recognize that certain locations in the Dana Point Coastal Streams Watershed are suffering from a variety of water-resource-related problems and have begun a program to address these problems. It was realized early on that the management of water resources was more appropriately dealt with within the hydrologic boundaries of the watershed, rather than solely on the jurisdictional basis of political boundaries.

Based on the experience of the Watershed Permittees, this Dana Point Coastal Streams Watershed Chapter of the Drainage Area Management Plan has been developed to attain the following multiple objectives:

- To meet the requirements for a Watershed Urban Runoff Management Plan (WURMP) contained in the municipal NPDES stormwater permit (Order R9-2002-0001, Section J).
- To identify the most significant water quality issues and constituents of concern on a watershed scale and relate these to urban sources.
- To focus the pollution prevention and source control programs implemented at an individual jurisdiction level on the identified constituents of concern and to identify any jurisdiction-specific treatment control opportunities.
- To identify the water quality issues that are most appropriately addressed through a multi-jurisdictional watershed-scale approach.
- To incorporate information obtained from prior planning studies.
- To develop an integrated plan of action that results in meaningful water quality improvement in the Dana Point Coastal Streams at a watershed scale and balances economic, social and environmental constraints.
- To identify indicators to track progress.

In order to achieve these objectives, the Watershed Permittees have utilized and built on the considerable work that has been completed collaboratively over a multi-year period in the development of this Dana Point Coastal Streams Watershed Chapter. This includes the following major initiative:

- Since 1990, the Watershed Permittees have developed and implemented common water quality programs within their own jurisdictions in response to the requirements of the municipal National Pollutant Discharge Elimination System (NPDES) stormwater permit.
- In February 2003, an updated version of the Drainage Area Management Plan (2003 DAMP) was provided to the San Diego Regional Water Quality Control Board (Regional Board), including Local Implementation Plans (LIPs – 2003 DAMP Appendix A). The LIPs are detailed plans that focus on specific areas required by the NPDES permits including the legal authority to detect and eliminate pollutant discharges; public education; enhanced standards for new development/significant re-development; implementation of best management practices (BMPs) at municipal facilities, construction sites, and commercial and industrial facilities; and water quality monitoring. The BMPs can, in most cases, be focused on targeted constituents of concern to be identified through the monitoring program.

The Dana Point Coastal Streams Watershed Chapter borrows much of its organization, structure, and terminology from the 2003 DAMP of which it is an appendix:

- Section D-1.0 describes the watershed and environmental setting, the program management coordination between the Watershed Permittees and other stakeholders, and the approach taken to develop the plan.
- Section D-2.0 assesses the water quality information available and identifies the water quality issues and any constituents of concern.
- Section D-3.0 provides the plan of action relating the constituents of concern to specific pollution prevention and source control BMPs at a jurisdictional level as well as any jurisdiction-specific treatment control BMPs. This section also includes the plan of action for watershed-scale collaborative projects. Section 3.0 meets the permit requirement for the inclusion of recommendations
- Section D-4.0 describes the program effectiveness assessment to be undertaken and the future revision of the Watershed Chapter. Water quality outcomes may still be some years away from accurate prediction and achievement, as the state of source identification, pursuit, and treatment are still evolving. However, this section lays the foundation for that outcome and includes an implementation schedule. Section D-4.0 meets the permit requirement for the inclusion of conclusions, which will be forthcoming in future assessments.

In developing the Dana Point Coastal Streams Watershed Chapter, the Watershed Permittees have addressed the specific permit requirements of the Regional Board. These include the expectation of the degree of future land-use changes (illustrated in **Figure D-5**); the assessment of water quality and identification and prioritization of major water quality problems (**Section D-2.0**); a time schedule of short- and long-term activities (**Section D-3.0**); short- and long-term effectiveness assessment strategies (**Section D-4.0**); a watershed-based public education effort (discussed in **Sections D-1.3** and **D-3.2**); a basis for facilitating collaborative “watershed-based” land use planning, which is discussed in **Section D-3.0** and is essentially the purpose of this document.

The Dana Point Coastal Streams Watershed Chapter is intended as a living document, one capable of being modified as new information becomes available and problems are addressed. It identifies the current state of knowledge on the issues facing the Dana Point Coastal Streams watershed and also sets the stage for future activities intended to address water quality issues in various streams throughout the watershed. Figures enclosed represent available information in the GIS mapping format and some additional inventory information. The plan of action contained in this Watershed Chapter will be reviewed for effectiveness and applicability on a regular basis. As problems are addressed and the state of knowledge about sources and causes becomes better defined, it is expected that the process will become more streamlined and make more efficient use of limited resources.

D-1.1 Watershed Setting

The Dana Point Coastal Streams Watershed is located in southern Orange County, approximately 50 miles south of Los Angeles and 65 miles north of San Diego (**Figure D-1**). The main tributary of the Dana Point Coastal Streams watershed is Salt Creek, which ultimately drains into the Pacific Ocean. The 6-square-mile watershed is almost fully developed and includes portions of the cities of Dana Point, Laguna Beach, Laguna Niguel, and San Juan Capistrano. Remaining undeveloped areas include open space within the Aliso and Wood Canyons Regional Park in the upper watershed and the Salt Creek Corridor Regional Park in the eastern part of the watershed (**Figure D-2**). Also included in the watershed are a number of coastal drains which discharge to the Pacific Ocean through Dana Point Harbor.

A few small, unnamed drainages and larger tributaries (Arroyo Salado Creek and San Juan Canyon Creek) join Salt Creek as it makes its way through the watershed. The creek originates in the city of Laguna Niguel and flows underneath Marina Hills Drive, Niguel Road, Pacific Island Drive, and lastly, Pacific Coast Highway, before discharging into the Pacific Ocean.

The Dana Point Coastal Streams watershed is the smallest watershed in Orange County and partially encompasses the following jurisdictions (**Figure D-2**): Dana Point, Laguna Beach, Laguna Niguel, San Juan Capistrano, the County of Orange, the Orange County Flood Control District and other governmental agencies (i.e., state, federal, and special districts [water/wastewater districts]).

There are currently four major north-south transportation corridors and one northwest-southeast corridor that provide access to the Dana Point Coastal Streams watershed. Pacific Coast Highway, which is the northwest-southeast corridor, is oriented parallel to the Pacific Ocean. The north-south corridors run parallel to the drainage pattern of the watershed and provide important transportation linkages between the Pacific Ocean and northern Orange County. Major and minor roadways of the Dana Point Coastal Streams watershed are shown on **Figure D-3**.

Figures D-4 and **D-5** show the existing and future planned land uses in the Dana Point Coastal Streams watershed.

Figure D-1 Location Map

Figure D-2a Unified School Districts

Figure D-2b City Boundaries

Figure D-2c Water Providers

Figure D-2d Parks & Open Space

Figure D-3 Major Transportation Routes

Figure D-4 Land Use - Existing

Figure D-5 Land Use - Future

D-1.2 Water Quality Control Plan for the San Diego Region

Beneficial Uses

The Dana Point Coastal Streams watershed is within the jurisdiction of the San Diego Regional Water Quality Control (Regional Board). In addition to Salt Creek, the Water Quality Control Plan (Basin Plan) also lists San Juan Canyon and Arroyo Salado as receiving waters. The following existing beneficial uses are designated in the Basin Plan for Salt Creek, San Juan Canyon, and Arroyo Salado:

- AGR – agricultural supply
- REC2 – non-contact water recreation
- WARM – warm freshwater habitat
- WILD – wildlife habitat

The potential beneficial use of contact water recreation (REC1) is also designated in the Basin Plan for Salt Creek, San Juan Canyon, and Arroyo Salado.

The following existing beneficial uses are designated in the Basin Plan for Dana Point Harbor:

- REC1 – contact water recreation
- REC2 – non-contact water recreation
- COMM – commercial and sport fishing
- IND – industrial service supply
- MAR – marine habitat
- MIGR – migration of aquatic organisms
- NAV – navigation
- RARE – rare, threatened or endangered species habitat
- SHELL – shellfish harvesting
- SPWN – spawning, reproduction and/or early development habitat
- WILD – wildlife habitat

The following is a description of the relevant beneficial use designations:

Agricultural (AGR) – Includes uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

Contact Water Recreation (REC1) – Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include,

but are not limited to, swimming, wading, water-skiing, skin and scuba diving, whitewater activities, fishing, or use of natural hot springs.

Non-Contact Water Recreation (REC2) – Includes uses of water for recreational activities involving proximity to water but not normally involving body contact with water where water ingestion is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beach combing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Warm Freshwater Habitat (WARM) – Includes uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

Wildlife Habitat (WILD) – Includes uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Commercial and Sport Fishing (COMM) – Includes the uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

Industrial Service Supply (IND) – Includes uses of water for industrial activities that do not primarily depend upon water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.

Marine Habitat (MAR) – Includes uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife.

Migration of Aquatic Organisms (MIGR) – Includes uses of water that support habitats necessary for migration, acclimatization between fresh and salt water and other temporary activities by aquatic organisms such as anadromous fish.

Navigation (NAV) – Includes uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

Rare, Threatened or Endangered Species Habitat (RARE) – Includes uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.

Shellfish Harvesting (SHELL) – Includes uses of water that support habitats suitable for the collection of filter feeding shellfish for human consumption, commercial, or sport purposes.

Spawning, Reproduction and/or Early Development Habitat (SPWN) – Includes uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish. This use is applicable only for the protection of anadromous fish.

Impaired Waters

Under section 303(d) of the 1972 Clean Water Act, states, territories, and authorized tribes are required to develop a list of water quality limited segments. These waters do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that these jurisdictions establish priority rankings for water quality impairment on the list and develop action plans, referred to as Total Maximum Daily Loads (TMDL), to improve water quality.

The State Water Resources Control Board (SWRCB) and the Regional Board staff have evaluated each addition, deletion, and change to section 303(d) based on all the data and information available for each water body and pollutant. These recommendations are based upon “all existing and readily available data and information” (40 CFR 130.7(b)(5)). In developing the recommendations, the SWRCB staff used the recommendations and analysis of the Regional Board as the basis of its analysis and solicit public review and comment. Each recommendation to the SWRCB was an independent assessment of each water body and pollutant. SWRCB staff took into account both general considerations (e.g., what factors the SWRCB should consider) and facts relating to individual water bodies and pollutants (e.g., how the Regional Board looked at certain data or the significance of a particular water quality impairment in the region).

Some data, for purposes of developing the section 303(d) list, were sufficient by themselves to demonstrate standards attainment. Examples of these listing factors are (1) numeric data exceeding numeric water quality objectives, maximum contaminant levels, or California/National Toxics Rule water quality criteria and (2) use of numeric evaluation values focused on protection of consumption of aquatic species. Other data types required that multiple lines of evidence be used for listing and de-listing. The listing factors that required multiple lines of evidence were (1) toxicity, (2) health advisories, (3) nuisance, (4) beach postings, (5) adverse biological response, and (6) degradation of aquatic life populations or communities.

The 2002 303(d) list of impaired waters approved by the SWRCB, which could potentially be affected by activities occurring within the Dana Point Coastal Streams watershed, is shown in **Table D-1**.

Table D-1 2002 303(d) List and TMDL Priority Schedule – Dana Point Coastal Streams Watershed

Name	Hydro Unit	Pollutant/Stressor	Source	Priority	Estimated Size Affected	Proposed TMDL Completion
Pacific Ocean Shoreline, Dana Point HSA	901.13	Bacteria Indicators	Nonpoint/Point Source	Medium	2 Miles <i>Impairment located at Aliso Beach at West Street, Aliso Beach at Table Rock Drive, 1000 Steps Beach at Pacific Coast Hwy (Hospital, 9th Ave), Salt Creek (large outlet), Salt Creek Beach at Salt Creek service road, Salt Creek Beach at Dana Strand Road.</i>	
Dana Point Harbor	901.14	Bacteria Indicators	Urban Runoff/Storm Sewers Marinas and Recreational Boating Unknown Nonpoint Source Unknown point source	Medium	119 Acres <i>Impairment located at Baby Beach</i>	

D-1.3 Watershed Program Management

The programs and activities conducted by the Watershed Permittees in pursuit of water quality improvement required the establishment of several coordination entities. These entities oversee the activities of watershed-scale programs, and make decisions on the future direction of efforts.

Program management of various water quality improvement programs within the Dana Point Coastal Streams watershed occurs at two distinct levels: (1) activities conducted by the Watershed Permittees individually in implementing jurisdictional programs in their LIPs based on the model programs in the DAMP in compliance with the municipal NPDES stormwater permits and (2) activities conducted by the Watershed Permittees and others collectively to address specific water quality issues on a watershed scale identified through the Water Quality Planning Process (see **2003 DAMP Section 3** and **Section D-1.4**), and other planning initiatives.

The Watershed Permittees coordinate the program management of the Dana Point Coastal Streams watershed through the program agreements and coordination meetings, which are described below.

NPDES Coordination

The Orange County Stormwater Program is underpinned by an Implementation Agreement between the County of Orange, the Orange County Flood Control District, and the 34 cities of Orange County. The Agreement provides a funding formula and budgeting process for shared countywide costs and monitoring costs by Regional Board area.

The Orange County Stormwater Program also has an extensive committee structure that is described in the DAMP (**2003 DAMP Section 2**) and in the LIPs of the Watershed Permittees (**2003 DAMP Appendix A-2**). Each of the Watershed Permittees participates in the General Permittee meeting and, selectively, in the other oversight and technical committees.

Watershed Management Framework

County-led efforts are focusing on the establishment of a long-term Watershed Management Framework. The entity evolving from this Framework will be necessary to take the many plans and projects developed collaboratively by the watershed stakeholders and bring them to fruition. It could take many forms, among them a Resource Conservation District, a Committee with select powers or coordination through the existing Dana Point Harbor water Quality Committee. Because the process of watershed management is new and differs so much from watershed to watershed, there is no standard structure for this entity. Therefore, responsibilities, and powers must be carefully worked out before its organization and mandate

can be established. Currently, the County of Orange is leading the transition to this new management structure with active input from the watershed stakeholders. It may also be appropriate to involve Caltrans as part of the group.

It is the intent of the Watershed Permittees to form a watershed management group that will include public participation. Given the strong implementation orientation of the management group, it is expected that members of the public may choose to participate on an advisory basis, or in sub-committees formed for specific tasks, rather than as regular members of the group. It is also expected that continued media dissemination on the meeting times and locations of the group will be a standard feature. Within the City of Dana Point, there exists a Water Quality Committee. This group may be expanded to include the entire watershed.

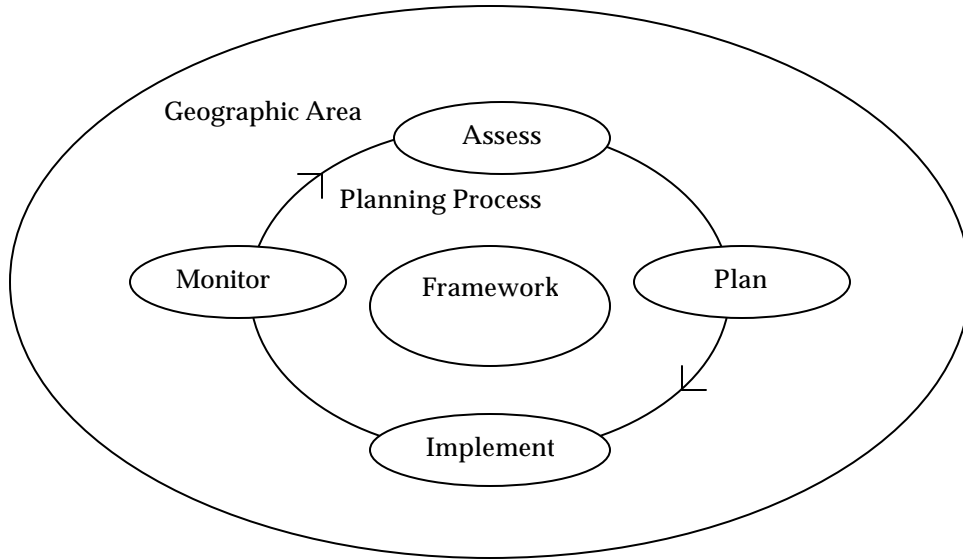
The formation of special task groups, or continued participation of individuals in the process, is vital to the long-term viability of the water quality improvement process (and by extension, watershed management) in the Dana Point Coastal Streams Watershed. Protection of environmental resources, and not only water quality issues, needs to be constantly integrated into this process. The interdependency of many resources requires than public understanding of potential issues related to single-purpose projects must be sought and integrated into the planning process.

It is expected that one of the functions of the management group will be the continued education of the participants and general public on the progress of water quality improvement efforts. The means by which to disseminate information may take the same form as that established by the Corps of Engineers Watershed Management Study in adjacent watersheds. Depending on the nature of the information, a suitable venue may take the form of general public education meetings, presentations at the regularly scheduled meetings of the group, or distribution by other means such as newspapers, television, or ad campaigns. This will be up to the group to determine and may change dramatically during the course of future efforts.

D-1.4 Plan Development

The approach taken to develop the Dana Point Coastal Streams Watershed Chapter recognizes that the LIP and this Watershed Chapter represent the principal planning documents for two separate but nonetheless similar and highly interdependent water quality planning processes targeting the control of pollutants in urban runoff. These iterative processes can be represented in each case as shown in the figure below.

Figure D-6 Water Quality Planning Process



The processes are characterized as indicated below:

Table D-2 Watershed Management Process

	Local Implementation Plan	Watershed Chapter
Geographic Area Covered by Plan	Defined by political (city/county) boundaries	Defined by hydrologic boundaries
Planning Process	Focused on reducing discharges of pollutants in urban runoff and stormwater pollution on a uniform countywide basis. Directed by DAMP/LIP in conformance with NPDES permits requirements	Focused on improving local receiving water quality where it is adversely impacted by urban runoff and stormwater pollution. Directed by NPDES permit requirements and 303(d) list/TMDLs
Framework	Directed by Orange County Stormwater Program committee structure and Regional Board review. Public consultation principally through CEQA process/Regional Board review	Directed by municipal and public agency stakeholders. Characterized by public participation.
Assessment	Based on information from countywide municipal and regional cooperative investigations of stormwater and receiving water quality. Assessments are undertaken on an annual and 5 year basis.	Based on information from watershed specific investigations. Assessments are undertaken on an annual basis.
Planning	Broad based approach with emphasis on well established pollution prevention and source control measures	Pollutant specific approach with emphasis on treatment controls and consideration of innovative regional solutions
Implementation	Individually by the Watershed Permittees	Individually and collaboratively by Watershed Permittees and other agencies
Monitoring	Considers pollutant load reduction	Considers beneficial use attainment

Based upon the annual watershed assessment, the Watershed Permittees and other participating jurisdictions will work together to address the priority water quality issues identified through this watershed planning process. It is anticipated that water quality issues that are determined to be specific to a jurisdiction would be referred to that jurisdiction and thereafter be addressed as a jurisdictional program initiative. Alternatively, the issue may originate from multiple jurisdictions within the watershed. In this instance, the problem would be addressed as a watershed cooperative effort.

Updates to this program will be the subject of annual reporting, which will include a water quality assessment and revisions to the listed water quality improvement initiatives.

D-2.0 Water Quality Assessment

Within the Dana Point Coastal Streams Watershed, the following initiatives have been undertaken to monitor and assess the water quality:

- The NPDES Program began in 1990 and is anticipated to continue into the foreseeable future.
- The Bight 98 and Bight 03 studies (which included Dana Point Harbor).
- Coastal monitoring conducted by OCHCA

The following section provides additional background for these program.

D-2.1 Water Quality Monitoring and Assessment Programs

NPDES Monitoring and Assessment Program

NPDES permits are issued for a five-year term and are issued on an area-wide basis. The first municipal NPDES Stormwater Permit was for the period 1990-1996; the Second Term Permit covered 1996-2002; and the Third Term Permit covers 2002-2007. Each of the permits has required the development and implementation of a monitoring program to support an effective Countywide urban stormwater management program.

First Permit Term

The monitoring program for the First Term Permit consisted of four elements. These elements were Field Screening, Channel Monitoring, Harbor/Bay Monitoring, and Sediment Sampling.

- Field screening was performed to detect the presence of illegal discharges or illicit connections. Physical and chemical analyses are conducted in the field. The annual evaluation of each station included two dry-weather samplings and one storm sampling. No field screening monitoring stations were established within the Dana Point Coastal Streams watershed.
- Channel monitoring focuses on specific watercourses with beneficial uses identified in the Basin Plan. Stations were monitored monthly and/or during storms. Samples are collected using automatic samplers. Samples were analyzed for pH, electrical conductivity, turbidity, nutrients, total suspended solids, volatile suspended solids, and total recoverable metals. None were located in the Dana Point Coastal Streams Watershed.

- Harbor/Bay sites for this element of the program are within the Dana Point Harbor areas. Sites were monitored semiannually and during storms. The monitoring included sampling for nutrients in the water column and trace metals and organics in the sediment. Sample locations included East Basin, West Basin, Launch Ramp, Near the Shipyard, and at the Harbor Entrance.
- Sediment sampling was conducted semiannually from designated channels and several bays and harbors. Samples were evaluated for metals, pesticides, herbicides, PCBs, and PAHs.

Second Permit Term

The First Term Permit monitoring program was continued into the second permit term. However, toward the end of this term the 99-04 Plan was developed and implemented. This plan revised the geographic focus of the monitoring effort by designating “warm spots” where constituents are substantially above system-wide averages) and “Critical Aquatic Resources” or CARs.

The monitoring objective for the Warm Spot segment of the program was to detect changes in the levels of the identified constituents over the long term. The CARs were prioritized and additional monitoring stations selected to gather data at those sites. A total of 7 monitoring stations were established. In the Dana Point Coastal Streams watershed, there was no station established for this element of the program.

Third Permit Term

This current permit period is the most comprehensive monitoring effort to date. It extends the monitoring program to a broader range of locations and to a wider array of methods for measuring impacts. Investigation of the effects of stormwater plumes on the nearshore marine environment has been added to the program. Inland, the new plan is expanding to include bioassessment of creeks, along with more consistent use of toxicity testing. The bioassessment, toxicity testing, and measurement of chemical parameters is referred to as the “triad” approach. Three kinds of monitoring are considered for this plan.

- Core Monitoring – routine and related to small-scale or site-specific problems and processes
- Regional Monitoring – periodic, collaborative, and larger-scale surveys
- Special Studies – tightly focused and relatively short-term studies

The following is a list of the four Monitoring Program Elements required in addition to Receiving Waters Monitoring in the Third Term Permit. Each of the 3 types of monitoring listed above are considered and incorporated as appropriate into each of the program elements.

Urban Stream Bioassessment – includes 12 sites plus 3 reference sites.

Long-Term Mass Loading – includes measurements of key pollutants at 6 sites. Monitoring sites include the sites designated in the 99-04 monitoring program plus additional sites. A total of 6 stations across Orange County were selected. None are located within the Dana Point Coastal Streams Watershed.

Coastal Storm Drains – based on a suite of bacterial indicators. Includes 36 sites with a number of coastal drains in the Dana Point Coastal Streams Watershed.

Coastal Receiving Waters – uses a measure of runoff plume characteristics. Stations include three sites in Dana Point Harbor. Testing will be done semi-annually and during two storms per year.

This monitoring program superceded the 99-04 monitoring programs.

Pre-NPDES

Prior to the beginning of the NPDES program, no water quality monitoring was being performed in the Dana Point Coastal Streams Watershed.

Bight Study

This study effort was led by the Southern California Coastal Water Research Project (SCCWRP) the U.S. EPA and the California State Water Resources Control Board and included the collaboration of many agencies. The study report for Bight 98 was released in March 2003 and presents detailed findings of 5 years of study of the marine environment from Point Conception to Baja California including data from Dana Point Harbor. The project developed and implemented a monitoring program for the Southern California Bight. Future efforts in Bight 03 will provide the opportunity to address questions not studied in the original project as well as to add new indicators, such as bacteriological measures, to the monitoring program to allow for the assessment of human health questions.

Orange County Health Care Agency

Over the past 40 years, the Health Care Agency (also known as Environmental Health) and local sanitation agencies (Orange County Sanitation District and South Orange County Wastewater Authority) have been testing the coastal waters in Orange County for bacteria that

indicate possible presence of human disease-causing organisms. Samples are collected weekly at approximately 150 ocean, bay, and drainage locations throughout coastal Orange County. Within the Dana Point Coastal Streams watershed, there are approximately 117 sample locations (**Figure D-7B**).

Local Monitoring

In addition to the monitoring performed as part of the NPDES program, the City of Dana Point performed weekly monitoring in November 2001 of bacterial indicators. The purpose of this effort was to provide design information for a proposed treatment center at the Salt Creek outlet.

D-2.2 Water Quality Assessment

NPDES Monitoring and Assessment Program

The monitoring program for the Third Term Permit Period is in its early stages and no assessment has yet been made of that data in response to Order No. R9-2002-0001, a report was submitted documenting the new monitoring program. The report discusses trends that have been identified in the data gathered to date.

Bight Study

The Bight studies have been completed for 1994 and 1998. Some of the findings of these studies include:

- Pollutants accumulate in sediments, which become a source of contamination to marine food webs. Sediment contamination is widespread, but mostly at levels not expected to cause adverse biological impacts.
- Fish populations were healthy.
- 96% of the shoreline met water quality standards during dry weather.
- 58% of the shoreline failed water quality standards during wet weather.
- Beaches near flowing storm drains had poor water quality regardless of the weather.

EPA TMDL Efforts

A bacterial TMDL is currently under development for the beaches within Dana Point (Hydrologic Units 901.13 and 901.14). It is expected to be available for review in late 2003 – early 2004.

Exhibit D-7 includes a GIS map that shows the 303(d) listed receiving waters within the Dana Point Coastal Streams Watershed, color coded by constituent of concern. This map also identifies the receiving waters as well as the subwatersheds within the watershed.

Constituents of Concern

A study is currently underway that is being led by the County to further define the constituents of concern within the Dana Point Coastal Streams Watershed. The existing data produced through the NPDES monitoring program is currently under assessment. As additional constituents of concern are identified, the Watershed Permittees will address those concerns.

Monitoring List

In addition to the 303(d) list discussed in Section 1.2, a Monitoring List has been developed by the Regional Water Quality Control Board. This list indicates those waterbodies that are being monitored or investigated for potential pollutants of concern but have not been included on the 303(d) list. Trash is a potential constituent of concern identified on this list for the Orange County shoreline.

Figure D-7A includes a GIS map that shows the identified receiving waters. **Figure D-7B** shows the subwatersheds and the monitoring locations within the Dana Point Coastal Streams Watershed.

D-2.3 Identification and Prioritization of Major Water Quality Problems

Bacteria

Bacteria continue to be a pollutant of concern with a high priority for the Watershed Permittees due to the impact on beneficial uses at beaches.

In addition to the efforts undertaken under the NPDES Program, there are also several ongoing studies related to understanding bacteriological data and the sources. These studies are being undertaken as part of the watershed cooperative efforts. The findings will be used to further the process of addressing bacteria and source tracking.

Source Tracking Studies

The County of Orange and the City of Laguna Niguel have been cooperating on a source tracking study within an urban subwatershed in the Aliso Creek watershed that focuses on the question of the actual contribution of wildlife to the bacterial problem. The results generated by Dr. Sunny Jiang during the 8th term of the Aliso Creek 13225 Directive indicate few, if any, human sources of bacteria. However, elimination of wildlife sources of bacteria is simply not possible. The development of the source tracking program to establish “background” bacterial levels due to wildlife, and those due to human sources, provides the means to direct resources to the appropriate and achievable areas of bacterial reduction, rather than directing funds at a program that yields little real reduction. It is recommended that if continued source tracking and monitoring indicates a human source, appropriate resources can be directed to that individual problem area. The results from this study within the Aliso Creek watershed may have a broader application to other watersheds, such as the Dana Point Coastal Streams Watershed.

The science behind source tracking is still evolving and the best methods for field application and study have yet to be decided. Seven organizations (Southern California Coastal Water Research Project [SCCWRP], National Water Research Institute, State of California Water Resources Control Board, USEPA, Southern California Stormwater Monitoring Coalition (which includes the County of Orange representing the Orange County Stormwater Program), Orange County Sanitation District, and City of Santa Barbara) are cooperating to conduct a comparative evaluation of microbiological source tracking methods. A recent study conducted by a collaboration of 22 researchers investigated the accuracy and effectiveness of adapting several microbiological methods to characterize bacteria and their sources from the water column. Publication of the final report is anticipated in the *Journal of Water and Health* in December, 2003.

Figure D-7A Receiving Waters

Figure D-7B Subwatersheds & Monitoring Locations

D-3.0 Plan of Action

The Watershed Permittees have developed and are in the process of implementing pollution prevention and source control programs within their jurisdictions. However, beyond the programs implemented at the jurisdictional level, the Watershed Permittees recognize that certain issues need to be addressed at a watershed scale utilizing a cross-jurisdictional approach. The following describes the plan of action at both levels.

D-3.1 Jurisdictional Program

Each Watershed Permittee LIP provides details of the implementation of the local jurisdictional plan. This section focuses on those activities specific to the Dana Point Coastal Streams Watershed. The following figures are provided:

- Figure D-8 – a map displaying the inventoried commercial and industrial sites.
- Figure D-9 – a map displaying the inventoried municipal sites and residential areas as well as construction areas.

Existing Development Program

Each Watershed Permittee LIP contains an inventory of municipal, commercial, industrial, residential, and commercial sites subject to program directives. In the Dana Point Coastal Streams Watershed, municipal sites largely consist of storm drains, parks, open space, and beach access. The main activities that would be expected at each of these sites include recreational use including walking, picnicking, and bike riding.

Because each Common Interest Area (CIA) contained within the Dana Point Coastal Streams Watershed is also contained within a single Watershed Permittee jurisdictional boundary, measures directed at management of CIAs and HOAs are contained within each LIP.

Future revisions of the Watershed Permittees' LIPs will contain a description of the Designated Minimum BMPs that apply to each of these sites, as well as the inspection and public education program that relates to the sites. Significant focus will be placed on those BMPs identified in the LIP that target the specific constituents of concern for the Dana Point Coastal Streams Watershed, notably, this time, bacterial indicators and trash. For each BMP listed, the training and public education associated with that BMP would also have a likelihood of contributing significantly to the reduction of the constituents of concern.

Figure D-8 Commercial and Industrial Sites

Figure D-9 Municipal Sites and Priority Construction Sites

New Development and Construction Areas

Each Watershed Permittee LIP contains information related to new development and construction areas. This information includes a review of the General Plan; revision of the CEQA Environmental Review Process; and an update of the Review, Approval, and Permitting Process to include the requirement for a Water Quality Management Plan (WQMP). A map (**Figure D-9**) showing the priority construction sites for the entire watershed was included in the previous section. The LIP discusses the inclusion of routine non-structural and structural source control BMPs, site design BMPs that focus on pollution prevention, and treatment control BMPs in the WQMP. At least one treatment control BMP is required at all priority projects. There will be a significant focus on those BMPs that target the constituents of concern in the watershed if, and as, they are identified.

Watershed-Wide Land Use Planning

One of the most important responsibilities of local government is to provide a decision making and approval processing framework for the new development and re-development that occurs within its boundaries. This primacy in land use planning enables jurisdictions to control the types and intensities of particular activities that may be allowed within specified geographic areas and consequently land use decisions can play an important role in addressing *point and nonpoint sources* of pollution.

State law requires that each jurisdiction adopt a comprehensive, long-term general plan to guide the physical development of its community. The General Plan is the official document that outlines the long term plans and policies regarding the location of housing, business, industry, roads, parks, and other land uses. Additionally, the General Plan addresses broad issues such as provision of infrastructure and conservation of natural resources. It reflects the community's long-term vision and the community's needs.

The Watershed Permittees are required by the area-wide NPDES permit to minimize short and long-term impacts on receiving water quality from new development and redevelopment. Further, with regard to their general plans specifically, the Watershed Permittees must at a minimum review and update their general plans as necessary to ensure watershed and stormwater quality and quantity are considered (see Section 7.4 DAMP).

Upon completion of the necessary general plan updates, the Watershed Permittees will have common plan elements addressing urban and stormwater runoff management and water quality protection. These common elements will provide the basis for collaborative watershed-

based land use planning. The schedule for the process of plan update is discussed in Section A-7.0 of each jurisdiction's LIP.

The mechanisms used to facilitate watershed-based land use planning relate to the use of the water quality assessment findings to inform decision making and the dissemination of this information.

The annual watershed-based water quality assessment will provide a major part of the informational basis for all watershed activities initiated by the Watershed Permittees, including land use planning. On an annual basis, or as key findings are developed, information, and/or recommendations will developed during the water quality assessment process and distributed to each jurisdiction's planning department for consideration by land use decision makers to ensure that water quality issues are addressed.

The Watershed Permittees will establish mechanisms, such as meetings and internet based resources, as they determine necessary to ensure effective communication with staff both jurisdictionally and on an inter-jurisdictional basis. In both instances, the purpose of the meetings will be to facilitate the exchange of watershed-specific information and to explore the collaborative development of water quality management and protection initiatives.

BMP Effectiveness Investigations

The Watershed Permittees, together with the Permittees Countywide, are currently coordinating with one another on a BMP effectiveness study. In addition, there are several other studies underway that are testing the efficacy and cost-effectiveness of various water quality improvement measures. It is anticipated that these studies will result in proposed modifications to the list of recommended BMPs and other measures contained in the 2003 DAMP and later incorporated into the LIPs. Studies directed at all jurisdictions within the watershed that are currently underway include the following:

- BMP Effectiveness Study/Orange County
- Trash and Debris BMP Evaluation
- Erosion Control BMP Effectiveness Evaluation
- Septic System Assessment on Stormwater Quality Evaluation
- Portable Toilet Oversight Program Evaluation
- Fats, Oils, and Grease (FOG) Program for Restaurants Evaluation

- Bacterial “Warm Spot” Elimination for City Storm Drains Evaluation

Ongoing BMP evaluation of a non-traditional nature includes:

- Conducting surveys to determine if public outreach efforts have having the desired effect of increasing household awareness of water quality issues.
- Monitoring oil delivery to household hazardous waste collection centers.
- Monitoring materials removed from catch basins, retarding structures, and the like.

Table D-3 Watershed BMP Short-Term Effectiveness Studies

Project	Site	Performance Measures
County of Orange BMPs for Baby Beach --Decomposed granite swale combined with Stormceptor	Dana Point Harbor-- Ocean Institute Parking Lot	Bacteria- 1 year study final report expected by Dec 2003

Mitigation Projects

Mitigation is typically required as compensation for impacts to biological resources regulated under the CDFG 1601-1603 Streambank Alteration program or the U.S. Army Corps of Engineers’ Clean Water Act Section 404 program. There are no mitigation projects in the Dana Point Coastal Streams Watershed.

Retrofitting

The following table indicates the retrofitting opportunities that have been taken or are underway within the Dana Point Coastal Streams watershed. Those projects that are underway can reasonably be expected to be completed within the Third Term Permit period.

Table D-4 Retrofit Projects in the Dana Point Coastal Streams Watershed

Project	City/Sub-Watershed	Status	Performance Measures
See Stormceptor in Table D-2			
See Baby Beach Retrofit below			
Catch Basin Insert Program BMP Low Flow Diversions (with CDS inserts yes/no)	City of Dana Point		
Camino De Estrella Diversion* (no CDS)	City of Dana Point - Pacific Ocean/ Capistrano County Beach	Installed	Trash, Debris, Bacteria
Beach Road Diversions* (Eight Total) (no CDS)	City of Dana Point - Pacific Ocean/ Capistrano County Beach	Installed	Trash Debris, Bacteria
Alipaz Storm Drain Diversion* with CDS	City of Dana Point - San Juan Creek/ Doheny State Beach	Installed	Trash Debris, Bacteria
North Beach Creek Storm Drain Diversion* with CDS	City of Dana Point - San Juan Creek/ Doheny State Beach	Installed	Trash Debris, Bacteria
Del Obispo Storm Drain Diversion* with CDS	City of Dana Point - San Juan Creek/ Doheny State Beach	Installed	Trash Debris, Bacteria

*The low flows are diverted using South Coast Water District or the City of San Juan Capistrano collection systems. The flows are directed to a wastewater treatment plant owned and operated by the South Orange County Wastewater Authority (SOCWA) for treatment.

Further retrofit opportunities will be assessed based on the results of the Retrofit Opportunities Assessment study that is currently underway. This assessment will be performed over the next 12 months.

Baby Beach Retrofit

This project is being undertaken at Baby Beach in Dana Point Harbor in order to address the high levels of bacteria indicators that routinely result in beach postings. Numerous BMPs have been implemented including storm drain diversions, pier netting to discourage bird nesting, expedited trash collections, and public education with signage. These BMPs have not resolved

the bacteria problems. In order to further study the source 3 studies were conducted. The studies included (1) data collection and analyzing of historic water quality information, (2) a circulation study and (3) special bacteriological studies. The results of these studies indicate 4 primary sources for which BMPs could be implemented. These include (1) contaminated discharges of urban runoff from storm drains, (2) bacteria resident in beach sediments, (3) limited near-beach circulation, and (4) bacteria contamination from local birds. With the Clean Beach Initiatives Grant money, 3 BMPs have been implemented. These include (1) eliminating dry-season runoff through irrigation controllers, (2) artificial circulation of the water and (3) netting, trash collection, and public education aimed at reducing the bird population.

D-3.2 Watershed Cooperative Efforts

Watershed-Wide Public Education

The goal of watershed-wide public education is to spread knowledge of the watershed planning process to municipalities, agencies, businesses owners and employees, individuals, and other interest groups within the Dana Point Coastal watershed. Education is intended to both pass on knowledge of the issues facing Dana Point Coastal and its watershed and to encourage activities that will promote improvement of water quality.

Water quality education will occur within three distinct geographic areas: Countywide, watershed-scale, and jurisdictional. One clear distinction that sets watershed-scale efforts apart is the need to focus on the constituents of concern within the Dana Point Coastal watershed. While continuing public education efforts reflect the evolving state of knowledge by residents and visitors, the primary goal of watershed-wide public education is to provide the larger environmental picture and enhance the sense of land and water stewardship by adding to the knowledge base of individuals. The ultimate goal of education is to encourage action and changes in the habits and behavior of those that work and live within the watershed.

Environmental education efforts at the watershed scale are novel and should be organized to include participation from many broad groups within the watershed such as municipal agencies, military, hospitals, schools, city and federal government, businesses, and residences. Watershed-wide efforts will focus on education at all these levels.

Additional public education materials will continue to be developed by the County. These will be used to support outreach strategies for local efforts that watershed groups are best positioned to implement, such as at festivals, markets, and fairs.

Public education through school activities is an additional source of education of all residents. School children take home the messages they learn and educate other members of the

household. Volunteer or mandated school curricula that include activities and scientific investigations that lead to sound environmental behaviors will be encouraged at all levels of school education. Currently volunteer efforts by educators within several cities have introduced environmentally oriented classroom and field activities that promote environmental stewardship and further public participation. Public involvement in the pursuit of funding for these programs is a long-term effort, and is being encouraged at schools throughout the Dana Point Coastal watershed.

Adult environmental education through courses and public events has lead to positive outcomes on the constituents of concern in the Dana Point Coastal watershed. The Master Gardener program and the University of California's Agricultural Extension Integrated Pest Management programs provide classes and distribute information to the public, municipal employees, and landscape firms on biologically effective and appropriate pest management and fertilization techniques.

Environmental Education Survey

One outcome of the recognition of the role of public education in water quality improvement efforts was the formation of the Orange County Stormwater Public Education Committee, composed of the County of Orange and its 34 cities. In 2003, a survey designed to serve as a "baseline" upon which changes in public knowledge, behaviors, and public opinion can be periodically measured was conducted.

The survey results indicate the need for further public education on water quality issues. While many respondents understand the connection between pollution and beach closures, few make the connection between local urban runoff and beach closures. Furthermore, most believe that urban runoff flows into sewer systems, and not necessarily down storm drains that lead into natural channels or the beach. Public focus seems to be more on oil and grease than on activities such as sweeping, gardening, landscaping, car washing, or other everyday activities. When asked about information dissemination, the public believes that biologists and scientists are the most credible people for spreading messages about the effects of urban runoff pollution on the environment.

Focused education in communities such as the Dana Point Coastal Watershed should incorporate experts and agencies to explain new information and answer questions. The focus of continuing public education efforts within the Dana Point Coastal watershed will reflect the changing state of knowledge of residents and visitors. Based on the findings of the 2003 survey, public education initiatives will have the following areas of emphasis:

- Explanation of the link between urban runoff and stream pollution and beach closures.
- Explanation of the separate function of the storm drain and sanitary sewer systems.
- Identification of the principal causes of stream and ocean pollution.
- Explanation of the potential link between urban runoff and the environment.
- Explanation that all residents and visitors to the watershed affect water quality through their actions.
- Explanation of the value of carefully selecting and applying fertilizer and pesticides.
- Explanation of the importance of pet waste clean-up.
- Expansion of the range of “message sources” from storm drain stenciling and newspaper articles to other types of media.

Watershed-Wide Public Participation

A “watershed” scale education effort is not only to impart important environmental information but also to engage individuals, groups, businesses, and agencies in pollution prevention programs and clean up activities that promote water quality improvement and watershed health. While initial participation may occur at organized events, the goal is to empower individuals to identify and change their activities that could result in detrimental impacts on the Dana Point Coastal watershed, with a focus on the watersheds constituents of concern; bacteria, phosphorus, and toxin (resulting from pesticide and fertilizer over-application or misuse) contamination.

Public participation on watershed planning has been sought by inquiry at public events, notably watershed workshops, and at the regularly scheduled meetings of the Dana Point Coastal Watershed Group sponsored by the County of Orange’s Public Facilities and Resources Department. Public participation in the Group has been voluntary and influential on policy, funding, and project implementation in the Dana Point Coastal watershed.

City-based participation in events at the watershed scale, such as sponsorship of the “Trails for All” event and others, encourages attendees to learn about water quality issues and further fosters participation by individuals and groups in events with a similar outcome. Collaboration allows coalescence around the constituents of concern in the watershed and has the effect of changing passive acceptance of messages to community or individual action. The Watershed

Permittees conduct local pollution prevention public education activities to improve water quality. These programs are intended to compliment the county-wide program. These activities are discussed in each city's LIP.

Participation by businesses in local partnerships may also yield positive effects at the watershed scale. Business participation and potential sponsorship of local events may have a positive effect on both the business and also the individual participants. For instance, the sponsorship of a home improvement center in education on integrated pest management techniques may encourage both smaller landscaping firms and individuals to carry forward that education and apply it within their service area or at home. The Business Education Awards Program is another venue for business participation.

Direct public participation in the improvement of the creek and its watershed is encouraged by the organization of annual or bi-annual "Clean Up" days. Typically, volunteers collect thousands of pounds of debris that would otherwise make its way into watercourses and eventually the ocean, and properly dispose of the waste.

Finally, participation by individuals, such as scientists, biologists, and others knowledgeable on watershed planning, in public speaking programs such as the "Speaker's Bureau" encourages the dissemination of knowledge of watershed issues. The speakers can be specifically chosen for their knowledge of how behaviors and activities impact water quality and what the attendees may do to promote improvement.

Dana Point Harbor

Currently in the planning stages is a project to renovate the Dana Point Harbor. This project has involved significant coordination among the cities and other stakeholders via project meetings. The project is being designed to include several water quality BMP features.

Also related to Harbor activities is the July 24, 2003 request issued by the San Diego Regional Water Quality Control Board (SDRWQCB) for technical studies in San Diego Bay, Mission Bay, Oceanside Harbor, Del Mar Boat Basin and Dana Point Harbor. This request focuses on a report that details a proposed coordinated comprehensive water quality monitoring program covering all 5 harbors in the Region 9 area. SDRWQCB recommends that this effort be coordinated through the Southern California Coastal Water Research Project (SCCWRP) based on their considerable experience in developing regional coastal monitoring programs. Much of this experience was developed through the Bight Study, which was discussed in previous sections.

Thousand Steps

The City of Laguna Beach is developing a water quality improvement project for a storm drain at Thousand Steps Beach. Collaboration on the project is taking place with the beach owner.

Hydro-Modification

There is a need to protect natural channels from hydro-modification and losses of beach sand replenishment. Urban development of a landscape increases the percentage of impervious area. Studies have shown that starting with at least 5% impervious area, the hydrograph for urban streams begins to change. Typical changes in the hydrology include sharper runoff peaks and higher sustained volumes. This may impact stream structure, causing bank erosion and scouring. As the percentage of impervious area increases, the storm water washes across pavement and ceases to carry the sediment load that replenishes the beach sand. The storm event runoff carries pollutants from the washed surfaces to the stream channel, often impacting the stream ecology, wildlife habitat, and downstream human recreation opportunities.

Within the Dana Point Coastal Streams Watershed, the streams are not showing significant erosion behavior. Therefore, it is assumed at this point in time that hydro-modification is not an issue of concern in this watershed.

Peak Discharge Impact Study

There is a need to protect natural channels from hydro-modification and losses of beach sand replenishment. Urban development of a landscape increases the percentage of impervious area. Studies have shown that starting with at least 5% impervious area, the hydrograph for urban streams begins to change. Typical changes in the hydrology include sharper runoff peaks and higher sustained volumes. This may impact stream structure, causing bank erosion and scouring. As the percentage of impervious area increases, the storm water washes across pavement and ceases to carry the sediment load that replenishes the beach sand. The storm event runoff carries pollutants from the washed surfaces to the stream channel, often impacting the stream ecology, wildlife habitat, and downstream human recreation opportunities.

Illicit Discharge/Illegal Connection (ID/IC) Investigation

Investigations of illicit discharges and illegal connections is currently included in each LIP. Illicit discharges and illegal connections to city storm drains are being dealt with by individual jurisdictions, and information on this program is contained within each LIP. If a problem is

identified that crosses jurisdictional boundaries, it will be collaborated on between the Watershed Permittees.

D-4.0 Program Effectiveness Assessment

A principle objective of the Watershed Chapter is to present an integrated plan of action that result in meaningful water quality improvement in the Dana Point Coastal Streams Watershed while balancing economic, social and environmental constraints. The program effectiveness assessment strategy requires the identification and thereafter annual consideration of measures that indicate whether progress is being made toward attainment of this objective and the other program objectives discussed in Section D-1.0. In considering program approaches to program assessment, it is recognized that both short- and long-term strategies are needed to assess the effectiveness of the Watershed Chapter.

D-4.1 Short Term Strategy

The short-term strategy initially focuses on the implementation of the watershed planning framework and the outcomes that are expected to be achieved within the first 5-year Permit period (2002-2007). The programmatic activity to be discussed in the first annual report will therefore specifically relate to:

- The meetings of a Watershed Management Group and the actions arising from its deliberations;
- The extent of public participation in watershed issues, through Permittee and public interaction at watershed events, annual/semi-annual “Clean Up Days”, and other activities;
- Education of the public regarding water quality issues;
- Modification of jurisdictional plans and policies to reflect potential impacts to water quality at watershed-scale.

In addition, annual results from the water quality assessment will be integrated into the evaluation of program effectiveness in successive years. It is anticipated that this information will, towards the end of the first permit term, start to inform the Watershed Permittees as to whether specific programmatic initiatives are contributing or are capable of contributing towards the attainment of the Watershed Chapter’s objectives. Direct methods (water quality data) of assessment to be considered in the short term strategy will include relevant findings from the monitoring initiatives detailed in D-2.1 and any individual investigations of BMP performance. The findings from evaluations of non-structural BMP initiatives (indirect measures i.e non-water quality indicators of BMP performance), documented in the Watershed

Permittees Annual Progress Reports, will be presented in the watershed annual report where appropriate. It is anticipated that the emphasis of the short-term strategy will be on jurisdictional programs

D-4.2 Long-term Strategy

Long term strategies for assessing effectiveness apply to programs and activities conducted with the expectation that outcomes will occur outside of the 5-year Permit period (2007 on). Long-term assessment strategies focus on direct measures of performance that will validate the long-term progress of the Watershed Chapter towards achieving improvements in receiving water quality impacted by urban runoff and urban stormwater discharges. The long-term strategy includes consideration of the findings from the water quality monitoring initiatives discussed at D-2.1 principally related to the detection of improvements in receiving water quality and reductions in pollutant loading. The emphasis of the long-term strategy will be on watershed cooperative efforts and the overall success of the Watershed Chapter in realizing its objectives.

D-4.3 Review of Management Program

In each future year the short-term and long-term effectiveness assessment strategies will be used to verify and ultimately validate the implementation of the watershed program. It is expected that the program objective and supporting management actions will be revised as the program evolves. Specifically, the annual assessment of effectiveness will be used to inform and direct the watershed planning process to ensure cost effective water quality improvement.