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Executive Summary

This “Watershed Chapter”, Appendix D-3 of the Drainage Area Management Plan (DAMP) serves as the Watershed Urban Runoff Management Plan (WURMP) for the **Laguna Coastal Streams Watershed** in southern Orange County, California. This document was prepared to meet the requirements of, Sections 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 Laguna 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 Laguna Coastal Streams Watershed consists of the Laguna Canyon Creek watershed and several smaller coastal-draining watersheds adjacent to it. This watershed is located in southern Orange County, approximately 50 miles south of Los Angeles and 65 miles north of San Diego. Laguna Canyon Creek runs north to south, directly through the middle of its watershed, and ultimately discharges into the Pacific Ocean at Laguna Beach. The 11-square-mile watershed includes portions of the cities of Aliso Viejo, Laguna Beach, and Laguna Woods. Several other smaller watersheds, including Boat Canyon (IOOP01), Blue Bird Canyon (IOOP02), Rim Rock Canyon (IOOP03), and Hobo Canyon, also drain portions of these cities. This watershed is generally bounded by the eastern boundary of the Emerald Canyon watershed on its west and the western boundary of the Aliso Creek watershed on its east. The remaining undeveloped areas are largely within the Laguna Coast Wilderness Park and the Aliso and Wood Canyons Regional Park. The Laguna Coast Wilderness Park covers most of the western half of the Laguna Canyon Creek watershed, and a small portion of the Aliso and Wood Canyons Regional Park is included in the northeastern part of the watershed. The Watershed Permittees include the Cities of Aliso Viejo, Laguna Beach, and Laguna Woods, the County of Orange 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.

D-1.0 Introduction

The designation of “Laguna Coastal Streams Watershed” actually refers to a group of watersheds draining to the Pacific Ocean within southern Orange County, California. The largest, and namesake for the group, is the Laguna Canyon Creek watershed, which flows through the City of Laguna Beach. Other watersheds within the Laguna Coastal Streams Watershed include Boat Canyon (County ID IOOP01) to the west and Blue Bird Canyon, Rim Rock Canyon, (IOOP02 and IOOP03) and Hobo Canyon to the east. The Laguna Canyon Creek Watershed encompasses portions of the cities of Aliso Viejo, Laguna Beach, and Laguna Woods, plus unincorporated areas within the County of Orange and the Orange County Flood Control District (collectively, the Watershed Permittees).

The Laguna Coastal Streams Watershed has not been impacted with the same water quality problems identified for its larger counterparts to the north and south. However, the citizens of the City of Laguna Beach have long recognized the relationship between beach closures and activities within their watersheds. The Laguna Canyon Creek Watershed, in particular, has a long history of resident involvement in environmental activism and concerns that have developed into a number of comprehensive programs and activities aimed at improving the quality of waters and the general environment.

Based on the experience of the Watershed Permittees, particularly those jurisdictions also dealing with the Aliso Creek watershed and Dana Point Harbor water quality issues, the Laguna 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 National Pollution Discharge Elimination System (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 Laguna Coastal Streams Watershed group at a watershed scale that balances economic, social, and environmental constraints.
- To identify indicators to track progress.

Although the Laguna Coastal Streams group of watersheds is not under any directive dealing with specific pollutants, the Watershed Permittees have all developed Local Implementation Plans (LIPs) addressing programs and activities implemented and being pursued on a jurisdictional basis. The City of Laguna Beach and several foundations and stakeholder groups are also pursuing projects that are intended to have a positive effect on water quality issuing to receiving waters. These include 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 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 Laguna 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 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 and a basis for facilitating collaborative “watershed-based” land use planning. This section also includes the plan of action for watershed-scale collaborative projects. Section D-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. Section D-4.0 meets the permit requirement for the inclusion of conclusions, which will be forthcoming in future assessments.

In developing the Laguna 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 (**Section D-2.0**); a time schedule of short- and long-term recommended activities (**Section D-3.0**); short- and long-term effectiveness assessment strategies (**Section D-4.0**); and 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 Laguna 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 Laguna Coastal Streams Watershed and also sets the stage for future activities intended to address water quality issues in various stream reaches of the watershed. Figures enclosed represent available information in the GIS mapping format and some additional inventory information as supplied by the Watershed Permittees. 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

For the purposes of organizing water quality improvement efforts on a watershed-based methodology, the Laguna Coastal Streams Watershed consists of the Laguna Canyon Creek watershed and several smaller coastal-draining watersheds adjacent to it. This watershed is located in southern Orange County, approximately 50 miles south of Los Angeles and 65 miles north of San Diego (**Figure D-1**). Laguna Canyon Creek runs north to south, directly through

the middle of its watershed, and ultimately discharges into the Pacific Ocean at Laguna Beach. The 11-square-mile watershed includes portions of the cities of Aliso Viejo, Laguna Beach, and Laguna Woods. Several other smaller watersheds, including Boat Canyon (IOOP01), Blue Bird Canyon (IOOP02), Rim Rock Canyon (IOOP03), and Hobo Canyon, also drain portions of these cities. This watershed is generally bounded by the eastern boundary of the Emerald Canyon watershed on its west and the western boundary of the Aliso Creek watershed on its east. The remaining undeveloped areas are largely within the Laguna Coast Wilderness Park and the Aliso and Wood Canyons Regional Park. The Laguna Coast Wilderness Park covers most of the western half of the Laguna Canyon Creek watershed, and a small portion of the Aliso and Wood Canyons Regional Park is included in the northeastern part of the watershed (**Figure D-2**).

Laguna Canyon Creek runs parallel to Laguna Canyon Road, underneath the San Joaquin Hills Transportation Corridor, through the city of Laguna Beach, and underneath the Pacific Coast Highway, before emptying into the Pacific Ocean. The creek is joined by a few small, unnamed drainages and larger tributaries as it makes its way through the watershed.

There are currently two major north-south corridors and two east-west corridors that provide access to the Laguna Coastal Streams Watershed. The north-south corridors, Laguna Canyon Road and El Toro Road, link the upper portion of the watershed to the Pacific Ocean. The east-west corridors, San Joaquin Hills Transportation Corridor and the Pacific Coast Highway, bisect the watershed perpendicular to local drainage patterns and parallel to the Pacific Ocean. Major and minor roadways of the Laguna Coastal Streams Watershed are shown on **Figure D-3**.

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 Laguna Coastal Streams Watershed is within the jurisdiction of the San Diego Regional Water Quality Control Board (Regional Board). The Regional Board has placed Laguna Coastal Streams under the Laguna subunit of the San Juan Hydrologic Basin (designated Hydrologic Sub Area 1.13). In addition to Laguna Canyon Creek, the Water Quality Control Plan (Basin Plan) also lists Boat Canyon, Laguna Canyon, Blue Bird Canyon, Rim Rock Canyon, and Hobo Canyon as receiving waters (IOOP01 to IOOP03 + unlisted) tributaries to the Pacific Ocean as receiving waters.

The following existing beneficial uses are designated in the Basin Plan for the receiving waters listed above:

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

The potential beneficial use of contact water recreation (REC1) was also designated in the Basin Plan for the receiving waters listed above.

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, white water 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, tidepool 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.

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. 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) (SWRCB, 2003).

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. Each of these lines of evidence generally needed evidence of the presence of the pollutant(s) that caused or contributed to the adverse condition.

Activities within all of these watersheds have a potential effect on the coastal nearshore zone, which has been identified as having bacterial problems. Beach closures due to exceedance of bacterial standards is a cause of concern to jurisdictions within this group, as well as the residents of the watersheds. The 2002 303(d) list of impaired waters approved by the SWRCB, which could potentially be affected by activities occurring within the Laguna Coastal Streams Watershed, is shown in **Table D-1**.

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

Name	Hydro Unit	Pollutant/Stressor	Source	Priority	Estimated Size Affected
Pacific Ocean Shoreline, Laguna Beach HSA	901.13	Bacteria Indicators	Nonpoint/Point Source	Medium	1.8 Miles <i>Impairment located at Main Laguna Beach, Laguna Beach at Ocean Avenue, Laguna Beach at Laguna Avenue, Laguna Beach at Cleo Street, Arch Cove at Bluebird Canyon Road, Laguna Beach at Dumond Drive.</i>

D-1.3 Watershed Program Management

Program management of various water quality improvement programs within the Laguna 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**).

The Watershed Permittees coordinate the program management of the Laguna 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

Current 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 implement many of the watershed-scale activities and programs that are discussed in this document. This entity could take many forms, among them a Resource Conservation District or a Committee with select powers. 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 group with active input from the watershed stakeholders. The group consists of the County, Laguna Beach, Laguna Woods, and Aliso Viejo. This group will meet at least twice per year and will include public participation.

The Orange County portion of the watershed management group will be established to continue coordination between the Watershed Permittees in the watershed and to engage the public. Given the strong implementation orientation of these groups, 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. It may also be appropriate to involve Caltrans as part of the group.

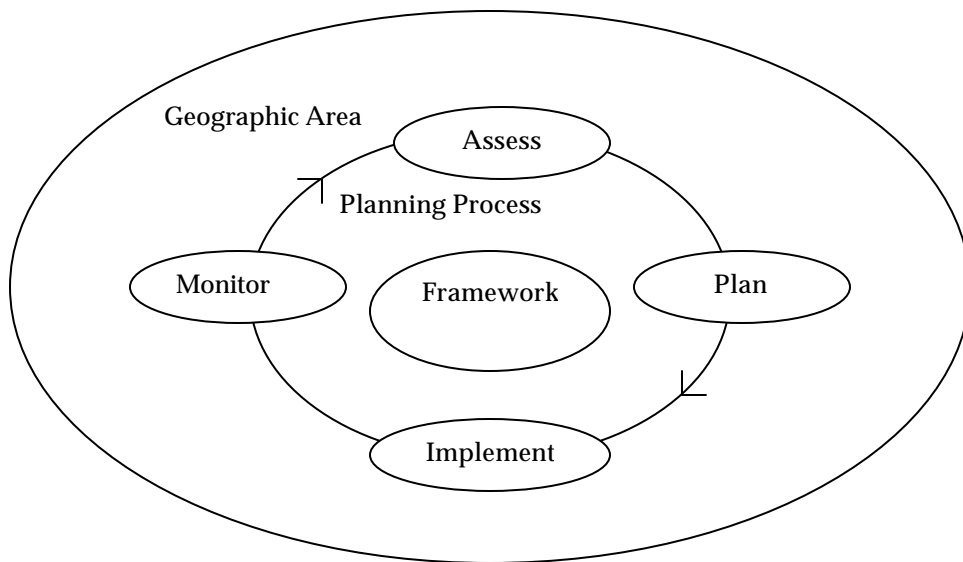
The formation of special task groups or continued participation of individuals in the process is vital to the long-term viability of the water quality improvement process (and by extension, watershed management) in the Laguna Coastal Streams Watershed group. Consideration of protection of environmental resources, and not only water quality issues, needs to be constantly integrated into this process. The interdependency of many resources requires that 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 the Laguna Coastal Streams Watershed. 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 Laguna Coastal Streams Watershed Chapter recognizes that the Local Implementation Plan 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 Processes

	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 WatershedPermittees	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 through the LIP. 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 starting in November 2004, which will include a water quality assessment and revisions to the listed water quality improvement initiatives.

D-2.0 Water Quality Assessment

The NPDES permit includes the requirement to monitor and assess the water quality associated with urban runoff. Within the Laguna Coastal Streams Watershed there have been one major initiative to monitor and assess the water quality:

- The NPDES Program began in 1990 and is anticipated to continue into the foreseeable future.

D-2.1 Water Quality Monitoring and Assessment

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 County-wide urban stormwater management program.

First Term Permit

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 were conducted in the field. The annual evaluation of each station included two dry-weather samplings and one storm sampling. Field screening monitoring stations within the Laguna Coastal Streams Watershed include Laguna Canyon Channel at Woodland Park.
- 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. One, Laguna Canyon Channel at Woodland, is located in the Laguna Coastal Streams Watershed.

- Harbor/Bay 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. No Harbor/Bay Monitoring is directly associated with the Laguna Coastal Streams Watershed. In addition sediment sampling was conducted semiannually from designated channels and several bays and harbors. Samples were evaluated for metals, pesticides, herbicides, PCBs, and PAHs.

Second Term Permit

The First Permit Term monitoring program was continued into the second permit term. However, in 1999, 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 CARs were prioritized and additional monitoring stations selected to gather data at those sites. In the Laguna Coastal Streams Watershed there was no station established for this element of the program.

Third Term Permit

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 Program Elements. 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 were selected across Orange County. Within the Laguna Coastal Streams Watershed, the established station is Laguna Canyon Channel at Woodland.

Coastal Storm Drains – based on a suite of bacterial indicators. Includes 36 sites.

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.

Pre-NPDES Program

Prior to the beginning of the NPDES program, the Laguna Canyon Channel site at Woodland Avenue was monitored. The monitoring consisted of nutrients, total lead, copper, zinc, cadmium and chromium.

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 Laguna Coastal Streams Watershed, there are approximately 48 sample locations **(Figure D-7B)**.

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 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.

EPA Total Maximum Daily Load (TMDL) Efforts

A bacterial TMDL is currently under development for the beach within Laguna Beach (Hydrologic Units 901.12). It is expected to be available for review in late 2003 – early 2004.

Constituents of Concern

A study is currently underway that is being led by the County to further define the constituents of concern within the Laguna 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 2002 Monitoring List has been developed by the State Water Resources 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. The following table shows the Monitoring List for the Laguna Coastal Streams Watershed.

Table D-3 2002 Monitoring List for Laguna Coastal Streams Watershed

Type	Name	Pollutant / Stressor	Estimated Size Affected
	Laguna Lakes	Bacteria Indicators	8.4 acres
C	Orange County Coastline	Trash	

Figure D-7A includes a GIS map that shows the 303(d) listed ocean reaches as well as the identified receiving waters. **Figure D-7B** shows the subwatersheds and the monitoring locations within the Laguna 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 impacts on beaches downstream of the creek mouths.

There are several ongoing studies related to understanding bacteriological data and the sources within southern Orange County. 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. 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 Laguna 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, 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.

Scientists at SCCWRP are currently conducting two further studies into the development of new source tracking methods. The first study is in the first of three years. Researchers are working on method development in three target areas: immunomagnetic separation, polymerase chain reaction (PCR) segment amplification and chromatogenic signal detection. Method development is expected to continue through the end of 2003. The second study is a comparative evaluation of molecular biological techniques. The goal is to develop source tracking methods able to differentiate between sources of enterococcus and researchers are collaborating with researchers at two major academic institutions to develop methods to detect and quantify human pathogenic viruses in recreational waters. This project is in the first of four years. Efforts at this point are being focused on developing and testing appropriate PCR primers and restriction enzymes to analyze the samples for different genetic fragments that are specific to human pathogenic viruses and to an array of sources for the enterococcus bacteria.

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, there is an agreement among the Watershed Permittees 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 LIP provides details of the implementation of the local jurisdictional plan. This section focuses on those activities specific to the Laguna 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 and construction areas.

Existing Development Program

Each city LIP contains an inventory of municipal, commercial, industrial, residential, and commercial sites subject to program directives. In the Laguna 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) within the Laguna Coastal Streams Watershed is also within a single jurisdictional boundary, measures directed at management of CIAs and HOAs are contained within each LIP.

Future revisions of the Watershed Permittees LIP 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 Laguna Coastal Streams Watershed. 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 city LIP contains information related to new development and construction areas. This information includes a review of the General Plan; to include the requirement for a Water Quality Management Plan (WQMP); revision of the CEQA Environmental Review Process; and an update of the Review, Approval, and Permitting Process. 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, those 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 County-wide 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 JURMP/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
- Dry Weather Diversion Plan for Laguna Coastal Streams 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:

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

Restoration Projects

Laguna Canyon Creek Habitat Restoration Project

The City of Laguna Beach is evaluating the possibility to restore approximately 4,000 linear feet of the Laguna Creek. Potential restoration activities may include (1) removal of debris and trash and replacement with a more natural channel configuration constructed of permeable, vegetation-holding materials; (2) re-grading of the site; and (3) revegetation of the corridor with native riparian species. The project is also intended to contain a public education component that integrates public outreach and education of outlying neighborhoods, as well as of visitors to the restoration site. The performance criteria include habitat expansion and quality.

The City of Laguna Beach also constructed a small wetlands restoration project that has incidental water quality improvement benefits, among them, water polishing and sediment and nutrient retention. Performance criteria include habitat expansion and quality.

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. Those mitigation projects are listed below.

Table D-4 Mitigation Projects in the Laguna Coastal Streams Watershed

Project	City/Sub-Watershed	Status	Performance Measures
Stable Property Project (0.25 acre)	Laguna Canyon	Completed. In maintenance	Habitat and Biological Indicators

Retrofitting

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

Table D-5 Retrofit Projects in the Laguna Coastal Streams Watershed

Project	City/Sub-Watershed	Status	Performance Measures
Nuisance water division with CDS storm drains	Laguna Beach		Flow
Catch Basin Inserts with fossil fuel filters	Laguna Woods/ IO2P13	Constructed Spring 03	Trash, Sediment, Petroleum
Laguna Audubon Basin (see below)	Aliso Viejo/ IO2B01	Constructed	TSS, lead, zinc, copper, nutrients, BOD, COD.

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.

The Laguna Audubon Basin (I02B01) completed in 1993, is a Regional facility located at the downstream end the Aliso Viejo canyon. The flood control facility now offers low flow diverters water quality improvements for water discharged to Laguna Creek Watershed.

Figure D-10 Laguna Audubon Basin



In late 1992 a BMP effectiveness evaluation was conducted on the Laguna Audubon Basin. The evaluation entailed monthly dry-weather monitoring of the influent urban runoff and the discharge from the basin to Laguna Canyon Wash. Although the amount of data was limited, the results suggest that the basin is effective, during dry-weather conditions, in reducing suspended particulates and associated adsorbed pollutants.

D-3.2 Watershed Cooperative Efforts

Watershed-Wide Public Education

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

Water quality education will occur at three distinct geographic scales: Countywide, watershed-scale, and jurisdictional. Watershed-scale efforts would, and as, these are identified, focus on the constituents of concern within the Laguna Coastal Streams 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. 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.

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 Laguna Coastal Streams Watershed.

Adult environmental education through courses and public events has led to positive outcomes on the constituents of concern in the Laguna Coastal Streams 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 Laguna Coastal Streams Watershed should incorporate experts and agencies to explain new information and answer questions. The focus of continuing public education efforts within the Laguna Coastal Streams 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 Laguna Coastal Streams Watershed, with a focus on the watershed's 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 Laguna Coastal Streams 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 Laguna Coastal Streams 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 has the effect of changing passive acceptance of messages to community or individual action.

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. A Future 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.

Participation in the clean up of animal wastes, discarded organic materials, yard and landscaping waste, and unused fertilizer and pesticides contributes to improvement of individual pollutant impairments, as well as overall water quality in the Laguna Coastal Streams Watershed. Even clean up of materials that do not constitute designated impairments contributes to the general aesthetic quality of the environment and fosters the development of an environmental ethic on the part of individuals that leads to consistent behaviors that positively contribute to the improvement of water quality over the entire spectrum of constituents.

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.

Coastal Greenbelt Authority

This Authority was established in 1991 with the following responsibilities:

- Producing a master plan for facilities and resource management for Laguna Coast Wilderness Park.
- Producing a master plan for facilities and resource management for Aliso & Wood Canyons Wilderness Park.
- Monitoring regional park operations to ensure consistency with the adopted facilities and management plan.
- Fostering volunteer assistance within the regional park.
- Recommending to the Board of Supervisors and the City Council parcels to be purchased for either park.

This authority consists one County official, one Laguna Beach official, two public members, one non-voting member from the State Department of Fish and Game, and one non-voting member appointed by the City Councils from the Cities of Irvine, Aliso Viejo, Laguna Hills, Laguna Niguel, Laguna Woods, and Newport Beach.

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 Laguna 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

SCCWRP is conducting a Peak Discharge Impact Study to assess the potential cause and effect relationships between stream erosion in natural ephemeral drainage systems and urbanization in watersheds in Los Angeles County, California. The results of the Los Angeles County analysis will be incorporated and related to other watersheds in Southern California. This study is at the initial stages where representative sites are being selected. As of July 2003, three sites have been tentatively selected in the northern portion of Orange County. Once site selection is complete, reconnaissance surveys will be completed to assess the existing conditions of each site.

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.

Sewer Pipe Monitoring

A countywide study involving the cities, water districts, and Orange County Sanitation District (OCSD) is currently managing an exfiltration research project on sanitary sewers. The purpose of the project is to provide a response to the Waste Discharge Requirements (WDR) of the Santa Ana Regional Water Quality Control Board Order No. R8-2002-0014. The WDR Steering Committee is made up of OCSD and several of its local satellite cities and sewer agencies named in the Order.

The objectives of the exfiltration research are the following:

- To conduct a global literature search to see if others have developed methods that can be applied.
- To develop a prototype best practice methodology to measure and report exfiltration from sewer lines based on viewing closed circuit TV (CCTV) data.
- To identify the primary factors affecting sewer exfiltration for which appropriate remedial action can be recommended.

Field activities will be conducted during the summer of 2003, with an interim report to be presented to OCSD's WDR Steering Committee and named cities and agencies in the WDR Order in September. When this is complete, results will be assessed and incorporated as possible.

D-4.0 Program Effectiveness Assessment

A principle objective of the Watershed Chapter is to present an integrated plan of action that results in meaningful water quality improvement in the Laguna 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 Governance 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 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 protection of existing water quality or 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 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.