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### **Executive Summary**

This “Watershed Chapter”, Appendix D-4 of the Drainage Area Management Plan (DAMP) serves as the Watershed Urban Runoff Management Plan (WURMP) for the **San Clemente 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 San Clemente 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 San Clemente Coastal Streams Watershed is located in the southernmost part of Orange County, approximately 50 miles south of Los Angeles and 65 miles north of San Diego. Prima Deshecha Canada is one of two main streams that flow through the City of San Clemente, ultimately discharging into the Pacific Ocean at Poche Beach. Several small, unnamed drainages, as well as a few larger tributaries, join Prima Deshecha as it makes its way through the watershed. The Segunda Deshecha Canada, the second main stream draining the watershed, flows through the Talega development, along Avenida Pico, under the San Diego Freeway (Interstate 5) and N. El Camino Real, before discharging into the Pacific Ocean at North Beach. The 18-square-mile watershed is almost fully developed and includes parts of the cities of San Clemente, San Juan Capistrano and Dana Point. The Watershed Permittees include the County of Orange, the cities of San Clemente, San Juan Capistrano and Dana Point, 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 San Clemente Coastal Streams Watershed includes parts of the cities of San Clemente, San Juan Capistrano and Dana Point, plus unincorporated areas within the the County of Orange. The Watershed Permittees (the County of Orange, the cities of San Clemente, San Juan Capistrano and Dana Point, and the Orange County Flood Control District) recognize that the San Clemente Coastal Streams and the beach at the stream mouth are suffering from a variety of water resource-related problems, and began 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 the jurisdictional basis of political boundaries.

Based on the experience of the Watershed Permittees, this San Clemente 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), (permit).
- 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 San Clemente Coastal Streams Watershed group at a watershed scale that balances economic, social and environmental constraints
- To identify indicators to track progress

The Watershed Permittees within the watershed have all developed Local Implementation Plans (LIPs) addressing programs and activities implemented and being pursued on a jurisdictional basis. These include the following major initiatives:

- 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 organization of the San Clemente 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. 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. 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 San Clemente 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**); a watershed-based public education effort (discussed in **Sections D-1.3** and **D-3.2**); 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 San Clemente 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 San Clemente 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**

The San Clemente Coastal Streams Watershed is located in the southernmost part of Orange County, approximately 50 miles south of Los Angeles and 65 miles north of San Diego (**Figure D-1**). Prima Deshecha Canada is one of two main streams that flow through the City of San Clemente, ultimately discharging into the Pacific Ocean at Poche Beach. Several small, unnamed drainages, as well as a few larger tributaries, join Prima Deshecha as it makes its way through the watershed. The Prima Deshecha originates near the Prima Deshecha landfill and flows along Camino de los Mares, underneath the San Diego Freeway (Interstate 5) and N. El Camino Real, before discharging into the Pacific Ocean Poche Beach (**Figure D-3**). The Segunda Deshecha Canada, the second main stream draining the watershed, flows through the Talega development, along Avenida Pico, under the San Diego Freeway (Interstate 5) and N. El Camino Real, before discharging into the Pacific Ocean at North Beach (**Figure D-3**). The 18-

square-mile watershed is almost fully developed and includes parts of the cities of San Clemente, San Juan Capistrano and Dana Point (**Figure D-2**).

**Figure D-1 Location Map**

**Figure D-2a School Districts & Cities**

**Figure D-2b Water Providers & Parks**

**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 San Clemente Coastal Streams Watershed is within the jurisdiction of the San Diego Regional Water Quality Control Board (Regional Board). The Regional Board has placed San Clemente Coastal Streams under the Orange County Coastal Streams subunit of the San Juan Hydrologic Basin (designated Hydrologic Sub Area 1.31 and 1.32). The Water Quality Control Plan (Basin Plan) lists Prima Deshecha Canada and Segunda Deshecha Canada as receiving waters.

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

- AGR – agricultural supply
- REC1 – contact water recreation
- REC2 – non-contact water recreation
- WARM – warm freshwater 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, 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 ingestion of water would be 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. The 2002 303(d) list of impaired waters approved by the SWRCB, which could potentially be affected by activities occurring within the San Clemente Coastal Streams Watershed, is shown in **Table D-1**.

**Table D-1 2002 CWA 303(d) List and TMDL Priority Schedule – San Clemente Coastal Streams Watershed**

<b>Name</b>	<b>Hydro Unit</b>	<b>Pollutant</b>	<b>Potential Sources</b>	<b>TMDL Priority</b>	<b>Estimated Size Affected</b>
Pacific Ocean Shoreline, San Clemente HSA	901.30	Bacteria Indicators	Nonpoint/Point Source	Medium	3.7 Miles <i>Impairment located Poche Beach (large outlet), Ole Hanson Beach Club at Pico Drain, San Clemente City Beach at South Linda Lane, San Clemente City Beach at South Linda Lane, San Clemente City Beach at Lifeguard Headquarters, Under San Clemente Municipal Pier, San Clemente City Beach at Trafalgar Canyon, San Clemente State Beach at Riviera Beach, San Clemente State Beach at Cypress Shores</i>
Prima Deshecha Creek	901.30	Turbidity	Urban runoff/ Storm Sewers Unknown Non-point and Point Sources	Low	1.2 Miles
		Phosphorus	Urban runoff/ Storm Sewers Unknown Non-point and Point Sources	Low	1.2 Miles
Segunda Deshecha Creek	901.30	Phosphorus	Urban runoff/ Storm Sewers Unknown Non-point and Point Sources	Low	0.92 Miles
		Turbidity	Construction/ Land Development Urban Runoff/Storm Sewers Channelization Flow Regulation/Modification Unknown Nonpoint and Point Source	Low	0.92 Miles

### **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 water quality improvement efforts.

Program management of various water quality improvement programs within the San Clemente 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 San Clemente 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, its ultimate needs, responsibilities, and powers must be carefully worked out before its organization and mandate can be established.

A 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.

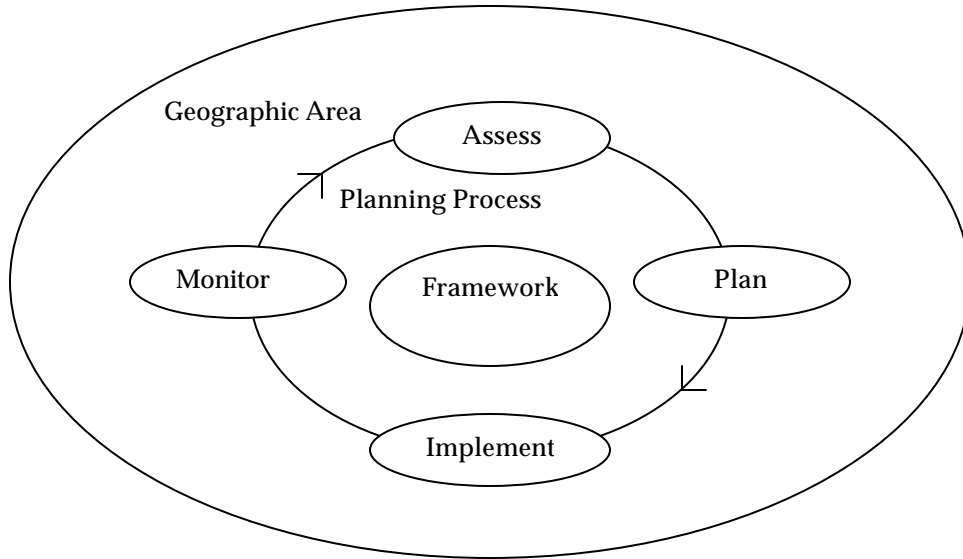
The formation of special task groups, or continued participation of individuals in the process, is vital to the long-term viability of the water quality improvement process (and by extension, watershed management) in the San Clemente Coastal Streams Watershed group. Protection of environmental resources, and not only water quality issues, need 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. 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 San Clemente 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:

**TableD-2 Watershed Management Process**

	<b>Local Implementation Plan</b>	<b>Watershed Chapter</b>
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 permit 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 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. The following section provides additional background for the program.

### **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.

#### *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 are 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 San Clemente Coastal watershed include:
  1. Cascadita Canyon Storm Channel at Via Cascadita
  2. Marquita Storm Channel at Pacific Ocean
  3. Prima Deschecha Channel at Calle Grande Vista
  4. Segunda Deschecha Channel at El Camino Real
- 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 monitoring station, Segunda Deschecha at El Camino Real, is located in the San Clemente 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 San Clemente Coastal Streams Watershed.

- 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 Monitoring 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 San Clemente Coastal Streams Watershed Prima Deschecha Channel at Calle Grande Vista and Segunda Deschecha Channel at El Camino Real were the established monitoring stations.

#### *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 across Orange County were selected. Within the San Clemente Coastal Streams Watershed the established stations are Prima Deschecha at Calle Grande Vista and Segunda Deschecha at El Camino Real.

*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.

### 13225 Directive

On July 3, 2002 the Regional Board issued a directive (13225 Directive) to the County of Orange and City of San Clemente to conduct investigations and report findings, BMP implementation, and implementation plans to the Board. In response to the 13225 Directive a report was submitted to the Board on August 9, 2002. This report includes a comprehensive discussion of all monitoring that has been conducted in the watershed. It also includes a commitment by the County of Orange and City of San Clemente to expand the monitoring program in Prima Deschecha Channel and near its outlet in the Pacific Ocean. The monitoring program focuses on the monitoring of surface water in the watershed, water entering the proposed treatment system near the outlet of the Prima Deschecha Channel, water leaving that treatment system, and water in the Poche Beach surf waters. (See Poche Beach Source Tracking Studies below).

### Pre-NPDES Program

Prior to beginning the NPDES program there was no County or other agency water quality monitoring performed in the San Clemente Coastal Streams Watershed.

### 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 San Clemente Coastal Streams Watershed, there are approximately 45 sample locations **(Figure D-7B)**.

### City of San Clemente

To conduct increased activities necessary to protect local water quality and to comply with the permit issued by the Regional Board, the City adopted a temporary, five-year Urban Runoff Management Fee which is in effect from January 1, 2003 through December 31, 2007. This fee was adopted in compliance with Proposition 218 (California Constitution Article XIII D Section 6) which requires voter approval for such property-related fees. The revenue from this fee is placed in a restricted Clean Ocean Enterprise Fund and can only be used for activities to support implementation of the City's urban runoff management/stormwater permit compliance program.

In July 2003, the City of San Clemente began sampling fifteen locations throughout the San Clemente Coastal Watersheds as part of a dry weather water quality monitoring program. The developers of Talega (a large construction site within the City) are sampling two additional sites at the downstream boundary of their project. The program is being conducted in accordance with the City's LIP and guidance included in the permit issued by the Regional Board. Once collected, the data will help the City in characterizing dry weather flows and detecting illegal discharges into the City's storm drainage system.

### NPDES General Industrial Stormwater Permit

The Prima Deshecha Landfill is located within the San Clemente Coastal Streams Watershed. The landfill is regulated under NPDES Industrial Permit which requires a Stormwater Pollution Prevention Plan (SWPPP) and Water Quality Program. The program conducts 2 storm event samplings at 2 locations within the landfill for the following constituents: pH, total suspended solids, specific conductance, oil and grease, biological oxygen demand, chemical oxygen demand, total kjeldahl nitrogen, orthophosphate, copper, iron, lead, and zinc. In addition visual inspections are conducted throughout the year for authorized and unauthorized non-stormwater discharges. Under the SWPPP, both structural and non-structural BMPs are managed at the active disposal area, the soil borrowing area, and the above-ground storage tanks. There are no numerical limits placed on California landfills, however the State Water Resources Control Board requires testing and installation of BMPs to minimize impacts.

## **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. A report was submitted to the Regional Board, No. R9-

2002-0001, documenting the new monitoring program. The report discusses trends that have been identified in the data to date.

Constituents of Concern

A study is currently underway that is being led by the County to further define the constituents of concern within the San Clemente Coastal Streams Watershed. The existing data 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 Watch 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 Watch List for the San Clemente Coastal Streams Watershed.

**Table D-3 Monitoring for San Clemente Coastal Streams Watershed**

Name	Pollutant / Stressor	Estimated Size Affected
Prima Deschecha Channel	Cadmium, nickel	1.2 miles
Orange County Coastline, HSA	Trash	

**Figure D-7A** includes a GIS map that shows the 303(d) listed receiving waters within the San Clemente Coastal Watershed, color coded by constituent of concern as well as the identified receiving waters. **Figure D-7B** shows the subwatersheds for the MS4s and the monitoring locations within San Clemente Coastal Watershed.

**D-2.3 Identification and Prioritization of Major Water Quality Problems**

Bacteria

Bacteria continue to be a major identified water quality problem 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.

*Countywide Source Tracking Studies*

One such study being conducted jointly by the County of Orange and the City of Laguna Niguel will serve all the watersheds as local information in the agenda to identify indicator bacteria sources. The source tracking study is located in an urban subwatershed in the Aliso Creek watershed and is focusing on the question of the actual contribution of wildlife to the bacterial problem. The results generated by Dr. Sunny Jang during the 8<sup>th</sup> 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. It must be recommended that continued source identification be pursued, and its results interpreted and made use of in an intelligent manner. 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 San Clemente 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 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, 2003.

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. It should be noted that within the San Clemente Coastal Streams Watershed, the City of San Clemente has jurisdiction over a significant portion of the watershed. Therefore, the Plan of Action for this watershed is largely based on the San Clemente LIP.

The following describes the plan of action at the jurisdiction and watershed cooperative 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 San Clemente 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 priority 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 San Clemente Coastal Streams Watershed, municipal sites largely consist of storm drains, parks, open space, and beach access. The main activities that would be expected at these sites include recreational use including walking, picnicking, and bike riding.

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

Future revisions of the City 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 San Clemente 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.

#### 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 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.

#### 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 San Juan Creek watershed, the streams are showing erosion behavior. Therefore, it is assumed at this point in time that hydro-modification is 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. The results of the Los Angeles County analysis will be incorporated and related to other watersheds in Southern California. This study is in 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

Investigation of illicit discharges and illegal connections is currently described in the 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. A study on illicit discharges and illegal connections is currently underway.

#### City of San Clemente

The City of San Clemente is participating in the permittee public education/outreach program. Additionally, the City is also participating in local outreach activities such as educating 100 percent of 2<sup>nd</sup> and 3<sup>rd</sup> grade students about urban runoff and water usage, providing a booth for the San Clemente Ocean Festival, and drafting articles for the City's quarterly publications. The City is currently in the process of hiring a consultant to assist with public education efforts to supplement the countywide program developed by the Watershed Permittees. It is anticipated that the expanded program will include comprehensive updates to the City's water quality website, videos for display during City Council meetings, volunteer opportunities, additional trainings for City employees and interested public and bi-monthly press releases.

#### San Juan Capistrano

The City of San Juan Capistrano has a multitude of local public education and participation events that relate to the broader watershed scale. The city has printed materials covering water quality and pollution prevention online, in the city business newsletter, as a water bill insert, and quarterly in the "Town Happenings" newsletter. The city has taken education and participation in watershed environmental quality seriously and provided outreach through several venues including booths and activities to teach and distribute materials about water quality, pollution prevention, recycling, composting and cleaning up pet waste.

#### *Booths:*

- Annual Earth Day event, during which various public education materials are distributed, exhibits and demonstrations (such as the enviroscape model) shown. Event participators include O.C.vector control, O.C.Health, O.C. Used Oil program, Dana Point Ocean Institute, San Juan Capistrano water conservation, CR & R disposal, composting distribution and educational materials.

- 4 annual concerts at the Park: the city has a water quality public education booth at the concerts. Public education materials are distributed to the public regarding pollution prevention, recycling, composting with stress on pet waste pick up.
- Annual 4<sup>th</sup> of July: the city has a water quality public education booth at the 4<sup>th</sup> of July event. Public education materials are distributed to the public regarding pollution prevention, recycling, composting with stress on pet waste pick up.
- Annual creek clean up day: On the coastal clean up day, the city hosts a creek clean up day, during which volunteers enter the creek and remove trash and recycled material. A public education booth is also set up and material shared with the volunteers.
- Annual Children Water Festival: The city participates annually in the children water festival, during which children are shown using the Enviroscape model how urban runoff impacts the creeks and the ocean.

*Activities:*

- City staff performs regular presentations to community groups regarding water quality issues, such as the Chamber of commerce, Kiwanis, Rotary International, and others.
- In addition to the Public education outreach, the city has a very aggressive staff training, starting with monthly water quality articles in the City's employees newsletter, followed by regular training. The City developed an employee water quality employee manual that was distributed to all employees. In addition, a water quality answer flyer was also distributed to all employees to help them assist the public as it relates to water quality.
- The City has hosted and will continue hosting water quality workshops for businesses, such as food facilities, hazardous waste generators, home owner associations, shopping center owners and property managers, and others.
- The City of San Juan Capistrano set up and is chairing the Equestrian Water Task Force, to develop guidelines and Best Management Practices for the equestrian community to deal with water quality issues. The result of the task force will be shared county wide.
- The City has formed the "Water Quality and Watershed Management Committee", formed by the City's mayor and a council member, city manager, all department heads, a county of Orange representative and the City's NPDES coordinator. This committee meets every other month and reviews all the water quality issues that the city is involved in and water quality issues at the watershed level.

**Figure D-8 Commercial and Industrial Sites**

**Figure D-9 Municipal Sites and Priority Construction Sites**

### 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
- 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 are 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.

### Retrofitting

#### *Prima Deshecha Cañada Channel Ultraviolet Radiation Treatment*

A retrofit project is in the design phase near the outlet of the Prima Deshecha Cañada Channel. This project will treat the water in the channel with ultraviolet radiation in order to reduce the bacteria levels of the water the leaves the channel system and is conveyed into the Pacific Ocean. This project is in the design phase, and equipment delivery is expected late summer 2003.

Additional retrofit opportunities in this watershed will be assessed over the next 12 months.

### **D-3.2 Watershed Cooperative Efforts**

#### Poche Beach Source Tracking Studies

Poche Beach is located at the mouth of the Prima Deshecha Creek, which lies just south of Dana Point. The beach has been routinely posted for exceedances of the AB411 fecal indicator bacteria standard when tested in the surf zone. In 2001 Poche Beach was provided Proposition 13 funds through the Clean Beaches Initiative to improve water quality through research and presentation of BMP alternatives to reduce bacterial contamination. The Regional Board issued a 13225 Directive on July 3, 2002 mandating that a source tracking study, BMP study findings and an implementation schedule of the UV installation be provided to the Regional Board. Installation of the UV treatment BMP is scheduled for summer 2003 and summer 2004. The source tracking investigation is a collaborative effort between the University of California Irvine, SCCWRP, County of Orange Health Care Agency, Regional Board, City of San Clemente, and County of Orange. This group has begun with planning the source identification investigation. The Poche Beach UV installation project is sponsored jointly by Orange County and the City of San Clemente. Details of this project will be included in future LIP revisions.

#### Watershed-Wide Public Education

The goal of watershed-wide public education is to spread knowledge of the water quality protection practices to municipalities, agencies, businesses owners and employees, individuals, and other interest groups within the San Clemente watershed. Education is intended to both pass on knowledge of the issues facing San Clemente 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 focus on the constituents of concern within the

San Clemente 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 San Clemente watershed.

Adult environmental education through courses and public events has lead to positive outcomes on the constituents of concern in the San Clemente 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 San Clemente Watershed should incorporate experts and agencies to explain new information and answer questions. The focus of continuing public education efforts within the San Clemente 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 San Clemente watershed, with a focus on the watersheds constituents of concern; bacteria, phosphorus, and toxin (resulting from pesticide and fertilizer over-application or misuse) contamination.

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. 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 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.

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 San Clemente 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, the Watershed Permittees can make available scientists, biologists, and others knowledgeable on watershed planning, for public speaking programs at special events. 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.

#### **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 San Clemente 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 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.