1.0 INTRODUCTION

This Watershed Workplan (Workplan) identifies a schedule of management activities to be undertaken in 2011 by the cities of Dana Point and San Clemente, the County of Orange, and the Orange County Flood Control District (the San Clemente Coastal Streams Watershed Permittees or Watershed Permittees). This Workplan describes the approach taken by the San Clemente Coastal Streams Watershed Permittees to maintain a responsive program in compliance with Directive G of the San Diego Regional Water Quality Control Board's Order (Regional Board Order No. R9-2009-0002[1]).

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. 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 Avenido 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 (open space) and Dana Point. **Figure 1** shows jurisdictional boundaries and existing land use in the San Clemente Coastal Streams Watershed.

The San Clemente Coastal Streams Watershed is within the jurisdiction of the San Diego Regional Water Quality Control Board. The San Diego Regional Board has placed San Clemente Coastal Streams under the San Clemente subunit of the San Juan Hydrologic Basin. The Water Quality Control Plan (Basin Plan)[2] lists Prima Deshecha and Segunda Deshecha as coastal streams draining to the Pacific Ocean. The Basin Plans also designates beneficial uses (the uses of water necessary for the survival and well being of humanity, plants and wildlife) for inland and coastal waters, set narrative and numerical water quality objectives that must be attained or maintained to protect the designated beneficial uses, and describes implementation programs to protect beneficial uses. The designated beneficial uses in the San Clemente Coastal Streams watershed are shown in **Table 1**.

1.2 Watershed Management

Watershed management is the term used for the approach to water quality planning that places an emphasis on the watershed as the planning area and solutions to problems that cut across programs and jurisdictions. Watershed management seeks to build upon existing management programs and resources, but has as its goal of watershed system integrity.

[1] Order No. R9-2009-0002 is available online at: http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/stormwater/oc_stormwater.shtml

[2] The San Diego Region Water Quality Control Plan (Basin Plan) is available online at: http://www.swrcb.ca.gov/sandiego/water_issues/programs/basin_plan/

The County of Orange, in conjunction with the San Clemente Coastal Streams Watershed Permittees, have developed a comprehensive framework for stormwater management, described in the Drainage Area Management Plan (DAMP)[3], which is updated as appropriate in conjunction with the Report of Waste Discharge (ROWD)[4] and each new Municipal Permit's findings and requirements. The DAMP sets forth a model programmatic Countywide approach for urban stormwater management on two basic levels:

- Establishing a baseline set of source control Best Management Practices (BMPs) and activities that are considered proven and cost-effective, and are recommended for inclusion or reference in the Watershed Permittees' Jurisdictional Runoff Management Plans (JRMPs) at the local jurisdictional Municipal Separate Storm Sewer System (MS4) level. The JRMP primarily addresses non-structural and pollution prevention controls applicable to on-site or in the MS4, as well as localized structural BMPs, as required by Order No. R9-2009-0002 and as further determined appropriate by each jurisdiction.

- Establishing a framework for collective action at the multi-jurisdictional watershed level, focusing on solving water quality and beneficial use problems in receiving waters, and documenting issues and progress through a Watershed Workplan.

1.3 Workplan Development

This Workplan primarily address watershed-wide source control initiatives, interjurisdictionally-coordinated structural BMPs, and receiving-water restoration efforts, as required by Directive G of Order No. R9-2009-0002 and as further determined appropriate by the Watershed Permittees.

The purpose for this Workplan is to:

1. Characterize the receiving water quality in the watershed.
2. Identify the highest priority water quality problem(s) in terms of constituents by location in the watershed's receiving waters.
3. Identify the sources of the highest water quality problem(s) within the watershed.
4. Develop a watershed BMP implementation strategy to attain receiving water quality objectives in the identified highest priority water quality problem(s).
5. Develop a strategy to model and monitor improvements in receiving water quality directly resulting from implementation of the BMPs described in this workplan.
6. Establish a schedule for development and implementation of the watershed strategy outlined in this workplan.

This Workplan builds on the considerable work and studies that have been completed collaboratively over a multi-year period. These include the following initiatives:

[3] The Drainage Area Management Plan (DAMP) is available online at: http://www.ocwatersheds.com/DAMP_MapPlan.aspx

[4] The Report of Waste Discharge (ROWD) is available online at: http://www.ocwatersheds.com/ReportsDocuments.aspx#ROWD

1. 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.

2. Since 1997, a multi-jurisdictional effort has been taking place to develop solutions to the watershed-scale problems in San Clemente Coastal Streams.

3. In February 2003, an updated version of the DAMP was provided to the Regional Board, including LIPs. 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.

4. In 2004, RBF Consulting, on behalf of the Orange County Stormwater Program, developed a GIS model for selecting potential BMP retrofit sites. The GIS Model work program identified potential retrofit sites adjacent to or near existing flood control infrastructure under public ownership and which had sufficient space to meet specified siting requirements. In 2005, the GIS model was used to conduct an expanded evaluation of potential retrofit opportunities that considered transportation and excess highway right-of-ways, Southern California Edison (SCE) transmission right-of-way [note: SCE was contacted but declined to consider their transmission right-of-way as available for water quality BMPs], homeowner associations open space, and publicly-owned lands such as regional parks. To further inform the findings of the 2005 Draft Identification of Retrofitting Opportunities Study, RBF conducted a Hydrologic Simulation Program in Fortran (HSPF) water quality modeling study in 2009 to develop recommendations on the types and locations of potential BMP retrofit sites that would achieve the greatest benefit to receiving water quality. Water quality models were developed using HSPF to simulate the hydrologic and water quality processes within two impaired Orange County watersheds, Aliso Creek and Anaheim Bay/Huntington Harbour. The collective findings of these work-in-progress studies are currently being used by the Orange County Transportation Authority (OCTA) in support of their Structural Treatment Best Management Practice (STBMP) Grant Program (Tier 2 Grant Program). The GIS model being developed through this Tier 2 Grant Program will provide a systematic planning tool for evaluating the potential strategic effectiveness and cost-effectiveness of STBMPs.

5. In 2005, the County of Orange, in collaboration with local stakeholders in the southern portion of Orange County—including 12 cities, seven water and wastewater agencies—representing half a million people and working across seven major watersheds and two groundwater basins, developed an Integrated Regional Water Management Plan (IRWMP)[5] to balance the needs of the environment and the demands of a growing population. In addition to continuing to reduce water supply vulnerability, the IRWMP objectives focus on water quality to reduce and prevent pollution, while protecting the beneficial uses of the waters in the region, as well as guarding and restoring the biological diversity and ecosystems of the region's watersheds.

[5] The South Orange County Integrated Regional Water Management Plan (IRWMP) is available online at: http://www.ocwatersheds.com/Documents/FinalSouthOCIRWMPlan1.pdf

6. In 2007 the Southern California Coastal Water Research Project (SCCWRP), a joint-powers public agency that was formed in 1969 to conduct coastal environmental research, initiated an epidemiology and microbial source tracking study, with some monies provided by the City of Dana Point, to assess the risk of swimming-related illnesses following exposure to nonpoint source contaminated waters at three beaches: Doheny Beach in Dana Point, Avalon Bay Beach on Santa Catalina Island and Surfrider Beach in Malibu. These studies will examine several new techniques for measuring traditional fecal indicator bacteria, new species of bacteria, and viruses to determine whether they yield a better relationship to human health outcomes than the indicators presently used in California. The final report is anticipated late 2010 or early 2011.

An integral component in development of this Workplan will be the Receiving Waters and MS4 Discharge Monitoring Program (Monitoring Program) and associated Receiving Waters and MS4 Discharge Monitoring Annual Report (Monitoring Annual Report). The Receiving Waters and MS4 Discharge Monitoring and Reporting Program is intended to meet the following goals:

1. Assess compliance with Order No. R9-2009-002;
2. Measure and improve the effectiveness of the Copermittees' runoff management programs;
3. Assess the chemical, physical, and biological impacts to receiving waters resulting from MS4 discharges;
4. Characterize storm water discharges;
5. Identify sources of specific pollutants;
6. Prioritize drainage and sub-drainage areas that need management actions;
7. Detect and eliminate illicit discharges and illicit connections to the MS4;
8. Assess the overall health of receiving waters; and
9. Provide information to implement required BMP improvements.

The Monitoring Program is submitted to the Regional Board annually on September 1 for concurrence, and the implementation timeframe is October 1 through September 30 of the following year. The 2010-11 Monitoring Program is included in **Appendix A**. The Monitoring Annual Report is due annually on October 1.

The Monitoring Annual Report will include the Monitoring Program data/results, methods of evaluating the data, graphical summaries of the data, and an explanation/discussion of the data for each monitoring program component. The reports will also include a watershed-based analysis of the findings of each monitoring program component as well as identification and analysis of any long-term trends in storm water or receiving water quality.

Further informing future management activities in the San Clemente Coastal Streams watershed and subsequent update of this Workplan is development of a Bacteria or Comprehensive Load Reduction Plan (BLRP or CLRP) for the neighboring San Juan Creek Watershed. The San Juan Creek Watershed Permittees are in the early stages of planning and developing a BLRP/CLRP to determine the best strategy for that watershed, and the findings and BMP studies that are included in that plan can be applied to the management actions in the San Clemente Coastal Streams Watersehd. A BLRP would focus on addressing bacteria, while

a CLRP would address bacteria and potentially other 303(d) listed pollutants for which future Total Maximum Daily Loads (TMDLs) are anticipated, and other local water quality related issues in the region. There are pros and cons to each strategy that are being reviewed and evaluated. Different pollutants and transfer mechanisms require different treatment strategies that may or may not make a CLRP the best strategy for the region. By developing an extensive approach on either a BLRP or CLRP, the Watershed Permittees throughout the region will be able to appropriately coordinate with regulatory drivers (i.e. TMDLs) and plan accordingly with the Regional Board to ensure that the plan provides essential information; thereby improving the understanding of impairments and how to address those impairments. This will result in the ability to effectively meet existing and future TMDL wasteload allocations.

This Workplan will be maintained as a guide for watershed activities, and will be updated annually to reflect current circumstances in the watershed including reprioritization of concerns and addition of new areas of concentrations based on the findings in the prior year's Monitoring Annual Report.

1.4 Governance

The County of Orange will serve as the Lead Watershed Permittee. As Lead Watershed Permittee, the County shall be responsible for coordinating the production of the Workplan and coordinating annual watershed review meetings and public participation/public noticing.

The San Clemente Coastal Streams Watershed Permittees are also part of the San Juan Creek Watershed and meet with the San Juan Creek Watershed Permittees on a quarterly basis to review and discuss the status of the Workplan and BMP implementation, monitoring, data management and reporting, and review of priorities and necessary refinements.

1.5 Workplan Updates

The Workplan will be updated annually in October after review and consideration of the Monitoring Program Annual Report findings. Each November a draft Workplan will be posted on the OC Watersheds website (www.ocwatersheds.com) for public review and comment. An annual public stakeholder meeting will also be held each November to identify issues of concern among residents in the watershed. The Workplan will be finalized following stakeholder feedback and implementation will begin on January 1 of the following year.

2.0 RECEIVING WATER QUALITY CONCERNS AND PRIORITIES

Pollutants have been observed in the watershed which may impair or threaten designated beneficial and desired uses in the San Clemente Coastal Streams watershed. These pollutants were identified and prioritized through a review of water quality standards and objectives, NPDES wet weather and dry weather reconnaissance monitoring data, pathogen indicator bacteria data for coastal waters collected from the Orange County Health Care Agency, special studies conducted within the watershed, watershed management plans, and discussions with watershed residents, local conservation agents, and government officials.

2.1 Characterization of Receiving Water Quality

Monitoring is a key element of any management program. Monitoring provides data that can be used to inform management decisions about the environment, its resources and the human activities affecting them. Environmental monitoring data documents existing conditions and, if collected over a period of time, provides evidence of changes in these conditions.

The 2010-11 monitoring year marks the first year of implementation of new monitoring program requirements per Order R9-2009-0002. Many of the same monitoring program elements of Order No. R9-2002-0001[6] were carried through to Order R9-2009-0002, with in some cases, changes to monitoring frequencies, analytes, and types of toxicity tests.

2.1.1 NPDES Monitoring – Water Quality Assessment

Per the requirements of Order R9-2009-0002, the interim reporting deadline for the October 2009 to September 2010 monitoring period is January 31, 2011. For this reason, the water quality assessment and associated management strategies identified in this Workplan will be a continuation of those identified in the 2008-09 reporting period.

NPDES monitoring per the requirements of Order R9-2002-0001 emphasized assessing impacts on aquatic resources, documenting long-term trends in water quality, targeting problematic discharge sites for more focused monitoring, and adding additional monitoring elements. The objectives for each monitoring program element are as follows:

Urban stream bioassessment monitoring	Using a “triad” of indicators (bioassessment, chemistry, toxicity), describe impacts on stream communities and the relationship of any impacts to runoff, based on comparisons with reference locations on a year-to-year time frame.
Long-term mass loading monitoring	Using measurements of key urban pollutants, monitor trend in loads over time.
Coastal storm drains outfall monitoring	Using a suite of pathogen indicator bacteria at high priority drain outfalls, track compliance with regulatory standards and any improvements due to BMP implementation.

[6] Order R9-2002-0001 is available online at:
http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/stormwater/docs/oc_permit/2002_0001final.pdf

Coastal receiving water monitoring	Using measure of runoff plume characteristics and extent, as well as measures of a suite of physical, chemical, and biological indicators, improve understanding of the impacts of runoff plumes on nearshore ecosystems.
Dry weather reconnaissance monitoring	Using data from both random and targeted sites, define background dry weather conditions as a basis for identifying candidate sites for further focused source identification work.

See **Figure 2** for a map of all of the monitoring locations in the San Clemente Coastal Streams Watershed.

The purpose of the Watershed Workplan is to focus management efforts on priority constituents of concern. Moreover, the water quality issue currently of greatest public concern is pathogen pollution of beaches and the resulting potential for human health impacts. Consequently, this discussion primarily considers, based upon the findings from analyses of the Wet Weather Monitoring Program - Coastal Storm Drain Outfall data, the impact of stormdrain outfalls on coastal waters. These analyses combined a number of approaches, applied on a regional basis, to identify the most potentially problematic outfalls that were most likely to be exerting an influence on coastal receiving water. This approach goes beyond simple comparisons to regulatory standards to include assessments of the persistence of exceedances of such standards as well as of the statistical strength of the relationship between each stormdrain and its nearby receiving water. These analyses included:

1. Comparing indicator levels in the surfzone receiving waters of each drain to the State's Ocean Water–Contact Sports Standards (also referred to as "AB411" standards);
2. Ranking drains based upon the proportion of total possible exceedances of the AB411 standards over the course of the entire year and within the AB411 season;
3. Plotting indicator levels in the receiving water vs. those in the drain;
4. Ranking drains in terms of the slope of the linear regression of receiving indicator levels vs. those in the drain; and
5. Placing particular emphasis on those monitoring results collected when drains were observed to be flowing to the ocean.

While the major findings for the San Clemente Coastal Streams watershed are summarized below, a more complete discussion of these results, including a comparison of San Clemente Coastal Streams to other regional drains, can be found in **Unified Report Section C-11**[7]. The value of the regional assessment is two-fold. First, the combination of analysis approaches produces a more robust set of conclusions than any single approach would, providing more confidence for targeting management actions at outfalls of most concern. Second, the regional analysis places results from individual drains into a larger context, thus supporting the prioritization effort and ensuring that follow-up efforts at source identification and control are properly targeted.

[7] The Unified Report is available online at: http://www.ocwatersheds.com/DAMP_PEAreports.aspx

Fecal Indicator Bacteria Findings

As in prior years the exceedances of the AB411 standards were predominantly for *Enterococci* (223 in 2311 samples[8]) and less so for fecal coliforms (53 in 2311) and total coliforms (61 in 2311). The number of exceedances of the *Enterococcus* standard were slightly higher in the wet season, with 53% (118 of 223) occurring between November 1, 2008 and March 31, 2009. Finally, for the 214 samples collected from the surfzone during the AB411 season when the discharges from a stormdrain reached the ocean, there were 55 exceedances of the *Enterococcus* standard, 14 of the fecal coliform standard, and 18 exceedances of the total coliform standard.

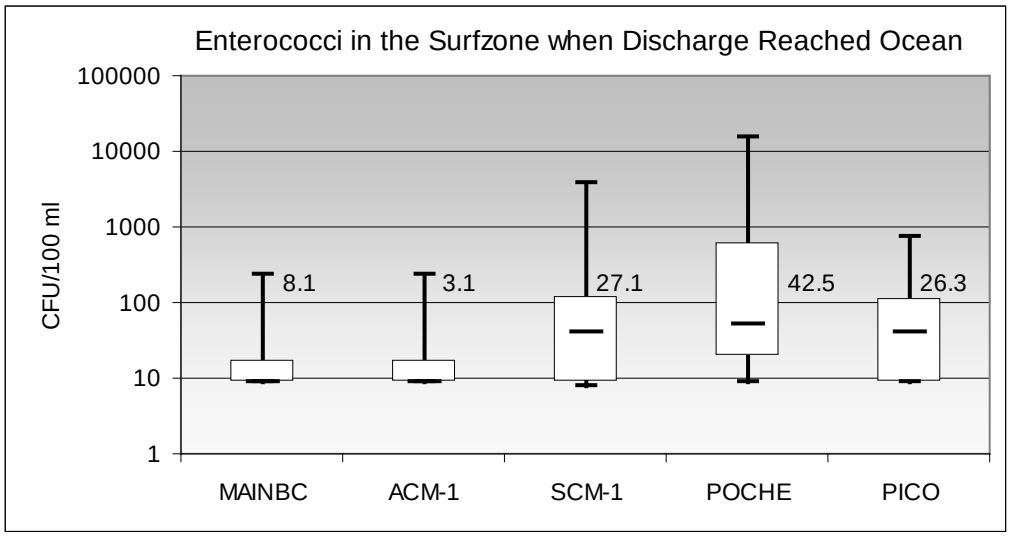
Linear regression was used to evaluate the strength of the relationship between concentrations of fecal indicator bacteria in the discharge from a stormdrain and the concentrations of fecal indicator bacteria in the respective receiving waters. For each sampling, the stormdrain concentration an indicator was plotted against its corresponding receiving water concentration. For each site a plot was created for each indicator (total, coliform, fecal coliform, *Enterococcus*) for each of four conditions (All Year, AB411 Season, All Year-Flows to Ocean Only, AB411 Season-Flows to Ocean Only). The purpose of this analysis was to identify those outfalls that had the most consistent relationship, both for the entire year and during the AB411 season, between the outfall discharge and the receiving water. The assumption underlying this analysis was that the strength of the regression reflected the strength of each drain's influence on its nearby receiving water. It is important to note that a highly significant regression is not, by itself, indicative of a potentially problem drain. A statistically significant regression must be combined with a relatively high proportion of exceedances, particularly in the AB411 season and when the drain is flowing to the ocean.

Taken together, these analyses identified several overall patterns. Compared to the previous two years, there was a smaller proportion this year of surfzone samplings in which at least one ocean water sports contact standard was exceeded:

	% of Sampled Days with a Surfzone Exceedance	
Year	All Year	AB-411 Season
2005-06	12.7	8.0
2006-07	16.2	11.2
2007-08	18.7	13.2
2008-09	12.5	8.0

Three stormdrains showed the most consistent relationships between the concentrations of bacteria in the stormdrains and concentrations of bacteria in the surfzone (as measured by p values); Prima Deshecha, Segunda Deshecha, and Salt Creek (in the neighboring Dana Point Coastal Streams Watershed) channels. The following figure shows the statistics on *Enterococci* in the surfzone near the outlets of five regional flood control channels when the flow from those channels entered the surfzone at the time of sampling (note that POCHE and PICO are in the San Clemente Coastal Streams Watershed). The boxplots show the maximum, minimum, 25th percentile, median, and 75th percentile values for each site. The percentage of samples exceeding the 104 CFU/100 ml standard are noted for each site.

[8] Note that samples in this discussion are inclusive of all samples collected in South Orange County in support of the monitoring program.



The results from all analyses were combined to identify a set of sites of particular interest. High Priority Sites were selected based on a relatively high proportion of exceedances combined with highly significant regressions across all three indicators, and includes POCHE (Prima Deshecha Channel mouth); PICO (Segunda Deshecha Channel mouth), and PIER (San Clemente Pier). Additional subjective weight was given to those drains that ranked highly on these criteria at times when the drain was flowing to the ocean, on the assumption that this condition best represents the times when the drain is impacting the surfzone. Each drain's average discharge rate was considered in assessing its potential to affect the surfzone. Finally one site was selected solely because of the relatively high percentage of sampled days in which a standard was exceeded.

The San Clemente Pier stormdrain makes the list of High Priority Sites for the second consecutive year due to the high proportion (7 of 35 - 20%) of sampled days during the AB411 season in which at least one AB411 single sample standard was exceeded in the surfzone. The high percentage of exceedances in the surfzone however does not appear to be attributable to the stormdrain discharge. The stormdrain discharge was observed to reach the surfzone in only 6 of the 45 samplings conducted throughout the year. On only 1 of those 6 days was a single sample standard exceeded. In addition, exceedances of standards were seen in 8 of the 39 samplings that were conducted when no discharge to the ocean was observed.

The receiving waters of the Segunda Deshecha channel (PICO) in San Clemente have continued to a high proportion of AB411 single sample standard exceedances and a strong statistical relationship between the concentration of all three indicators in the stormdrain relative to those in its the receiving waters. The system for dry-weather diversion to the sanitary sewer was operational for a portion of the last year. Once it is fully operational conditions in the surfzone should improve during the AB411 season.

At Poche Beach (POCHE) the receiving waters near the stormdrain–surfzone interfaces have also continued to show high exceedance rates and strong regression relationships for all three indictors. Operational testing of the ultraviolet treatment system in lower Prima Deshecha Channel is on-going.

2.1.2 Special Studies

Monitoring for the core structure of the regulatory permits provides valuable information in that it gages the relative success of management actions in terms of compliance with the water quality standards. The information provides input into areas that may need attention or show where decisions made have produced positive results. Sometimes however, the limitations of the core monitoring programs do not address issues or areas of concern. To address this type of challenge two special studies were initiated; one to assess the origin of fecal indicator bacteria at a beach with a history of bacteria problems, and the other to assess the prevalence of trace metals in runoff from presumably unknown sources.

The first special study was designed to answer questions about the origin of fecal indicator bacteria impairments along Doheny State Beach from San Juan Creek. A study completed in 2009 by the watershed stakeholders examined the contributions of multiple fecal indicator bacteria sources on a mass balance basis. The objective of the study was to determine the spatial and temporal extent of fecal indicator bacteria contamination in San Juan Creek and the Pacific Ocean nearshore while taking into account contributions from the bird population, sediment sources, and runoff from the watershed. The study was conducted for a stakeholder advisory committee in an effort to inform the management decision and provide meaningful data that could produce measurable benefits. Some of the results from the study were:

1. Three sources account for 57.6% of the variability and 98.4% of the overall sampled bacteria loading from the watershed. The native bird population accounts for the single largest percentage of fecal indicator bacteria variability and mass contribution in dry weather flows to the Pacific Ocean Shoreline at Doheny State Beach. The birds in San Juan Creek contributed 82.3% of the total Enterococcus mass colony forming units (CFU) discharged to the Pacific Ocean, followed by influences from sediment bound bacteria resuspension contributing 13.4% of the total mass, and the impaired section of San Clemente Coastal Streams, the lowest one mile reach, contributing 2.70% of the Enterococcus mass.

2. The main sources of fecal indicator bacteria in San Juan Creek appear to be concentrated at the pond at the mouth of San Juan Creek and not from the lower watershed. Fecal coliform and enterococcus concentrations were highest at the pond and lowest at the furthest upstream sampling site. Also, fecal indicator bacteria levels at the pond exceeded creek levels by almost two orders of magnitude in terms of both the spatial and temporal variability.

As indicated in Section 1.3 above, the final Report of the SCCWRP Epidemiological and Microbial Source Tracking Study is anticipated late 2010 or early 2011.

The second special study conducted in the watershed addresses an issue of trace metals in runoff. Characterization of receiving waters includes understanding the nature of sources in runoff from tributaries and smaller watersheds. Cadmium and nickel in runoff represented a significant management challenge in terms of source identification in that an identifiable anthropogenic discharge source capable of producing levels consistent with results was difficult to locate. An effort to address this issue was initiated by managers with the intent on prohibiting or minimizing the discharge. The special study conducted for this effort applied a holistic approach to source identification by combining a re-examination of historic data to evaluate relationships and patterns in the data, field reconnaissance, assessing alternative academic disciplines, and non-conventional methods of data collection.

The findings from the study strongly indicate that at least two, perhaps more, trace metal constituents originate from native soils. The soil characteristics of the region dictate that nonanthropogenic contributions of certain trace metals and perhaps additional constituents should be reasonably expected to appear in runoff given that the type and era of the geologic formations determines the natural variability in surface waters. Some of the specific results from this study include:

1. Native soils in the region are characterized by tertiary marine sedimentary formations exhibiting very strongly acidic conditions as a result of historic geothermal activity.

2. The overall magnitude of trace metals in runoff appears to be governed by the type of geology and the native soil properties.

Continuing efforts are in progress to understand the relationship between natural pollutants in surface waters and the geologic origins. This effort also includes understanding the natural limits that could be expected in the absence of any human activities. The goal of this work is to support the watershed managers with the technical issues, but also to begin to help provide the foundation for future management decisions with other waterbodies.

2.2 High Priority Water Quality Concerns and Potential Sources

High priority water quality problems in the San Clemente Coastal Streams Watershed were identified through regional monitoring and regulatory directives and includes 303(d) listed impairments, TMDL constituents, persistent Numeric Action Levels (NAL) exceedances as identified in Order R9-2009-0002, and other local issues of concern.

Potential sources of these high priority water quality concerns are discussed below.[9] Sources may be natural in origin or anthropogenic, meaning they are caused by the activities of humans. Special studies, such as the two discussed in **Section 2.1.2**, have aided in determining the source of several pollutants; however, future investigations are warranted to continue to hone in on the exact origin of pollutants of concern in the San Clemente Coastal Streams watershed. Directive C of Order R9-2009-0002, Non-stormwater Dry Weather Action Levels, requires specific monitoring and source investigations when certain constituents exceed levels stipulated in the permit. The findings of these source investigations will help guide management activities in future iterations of this Workplan.

2.2.1 303(d) Listed Waterbodies

Under Section 303(d) of the 1972 Clean Water Act (CWA), 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 portion of the 2006 303(d) list[10] pertaining to the San Clemente Coastal Streams watershed is shown in **Table 2**. This table

[9] Discussion on potential sources all come from the Water Quality Control Plan for the San Diego Basin ("Basin Plan") unless otherwise referenced. [Basin Plan Reference: September 8, 1994 (with amendments effective prior to April 25, 2007). San Diego Regional Water Quality Control Board. Available at: http://www.swrcb.ca.gov/sandiego/water_issues/programs/basin_plan/]

includes the pollutant/stressor and source for each listed segment. A description of each pollutant and possible sources is also provided below. **Figure 3** illustrates which water segments in the San Clemente Coastal Streams Watershed are included in a TMDL and/or 303(d) list.

Bacteria TMDL

In late 2003, the San Diego Regional Board initiated a project to develop bacteria TMDLs based on data in the 2002 CWA Section 303(d) List of Water Quality Limited Segments indicating that the greatest cause of impairments to waters in the San Diego Region was elevated bacteria levels. Elevated bacteria levels remain the greatest cause of impairments to waters in the San Diego Region on the 2010 303(d) List. The San Diego Regional Board identified waterbodies with bacteria impairments as one of its highest regional priorities for the development of TMDLs. The first bacteria TMDL project developed to address bacteria impaired waters listed on the 2002 303(d) List was known as TMDL for Indicator Bacteria, Project I – Beaches and Creeks in the San Diego Region, or Bacteria TMDLs Project I. Bacteria TMDLs Project I was adopted by the San Diego Regional Board on February 10, 2010. State Board and EPA approvals are pending.

Bacteria continue to be a major identified water quality problem with a high priority for the Watershed Permittees due to the impact on beneficial uses and pending TMDL. Sources of indicator bacteria may be:

- Environmental – soils, decaying vegetation,
- Animal wastes – birds, dogs, cats, horses, bats, rabbits, opossums, raccoons
- Humans – shedding from body (most common source in this category), sewer overflows, homeless encampments

Storm water and dry weather urban runoff may contain significant concentrations of indicator bacteria from these sources. Some stormdrains discharge directly to coastal areas where body contact recreation does occur or can potentially occur. The State of California has adopted standards for evaluating the safety of ocean water with respect to indicator bacteria, the California Ocean Water –Contact Sports Standards (California Code of Regulations Title 10 and the California Health and Safety Code[11]).

Turbidity

The turbidity of water is attributable to suspended and colloidal matter, the effect of which is to disturb clearness and diminish the penetration of light. High turbidity levels can adversely affect the use of water for drinking. By interfering with the penetration of light, turbidity can adversely affect photosynthesis which aquatic organisms depend upon for survival. High concentrations of particulate matter that produce turbidity can be directly lethal to aquatic life.

[10] The 2010 list is currently pending EPA approval.
[11] California Code of Regulations, Title 17, Group 10 is available online at: http://www.cdph.ca.gov/healthinfo/environhealth/water/Documents/Beaches/Regulations-OceanBeaches.pdf

Total Phosphorus

Phosphorus is a nutrient more often associated with the particulate component of stormwater runoff, since it readily adsorbs, or attaches, to sediment. Also necessary for plant growth, excess phosphorous becomes a pollutant typically more problematic in freshwater ecosystems than in estuarine ecosystems. The major source of phosphorus in an urban setting is fertilizer. Phosphorus can also be released into water during the construction phase of development. Some soluble phosphorus can be traced to septic systems; however, the use of low phosphorus detergents has significantly reduced this source.[12] Levels of phosphorus in some natural steams can exceed water quality objectives, but typically are much less than levels observed in urban runoff. Natural sources of total phosphorus in the watershed may be attributed to decomposing organic material, sediments, wildlife feces, and groundwater chemistry.

2.2.2 NAL General Constituents and Priority Pollutants

Order R9-2009-0002 requires the Watershed Permittees to effectively prohibit all types of unauthorized discharges of non-storm water into its MS4. Historically pollutants have been identified as present in dry weather non-storm water discharges from the MS4s through 303(d) listings and monitoring conducted by the Watershed Permittees under Order No. R9-2002-0001.

Action levels in Order R9-2009-0002 are based upon numeric or narrative water quality objectives and criteria as defined in the Basin Plan, the Water Quality Control Plan for Ocean Waters of California (Ocean Plan)[13], and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP)[14]. An exceedance of an action level requires specified responsive action by the Watershed Permittees. Exceedances of non-storm water action levels do not alone constitute a violation of the Order.

NAL monitoring will begin on May 1, 2011. Action levels for general constituents and priority pollutants include the following:

Action levels for discharges to inland surface waters:

General Constituents	Priority Pollutants
Fecal Coliform	Cadmium
Enterococci	Copper
Turbidity	Chromium III
pH	Chromium VI (hexavalent)
Dissolved Oxygen	Lead Nickel
Total Nitrogen	Silver
Total Phosphorus	Zinc
Methylene Blue Active Substances (MBAS)	

[12] Ibid.

[13] State Water Resources Control Board. 2001. Water Quality Control Plan for Ocean Waters of California (Ocean Plan). Available at: http://www.epa.gov/waterscience/standards/wqslibrary/ca/ca_9_wqcp_waters.pdf

[14] State Water Resources Control Board. 2005. Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California. Available at: http://www.swrcb.ca.gov/water_issues/programs/state_implementation_policy/docs/final.pdf

Action levels for discharges to bays, harbors and lagoons/estuaries:

General Constituents
Fecal Coliform
Enterococci
Turbidity
pH
Cadmium
Copper
Chromium III
Chromium VI (hexavalent)
Lead Nickel
Silver
Zinc

Action levels for discharges to the surf zone:

General Constituents
Total Coliform
Fecal Coliform
Enterococci

Fecal Indicator Bacteria (FIB)

Please refer to **Section 2.2.1** for a discussion of potential sources of fecal indicator bacteria (total coliform, fecal coliform, and Enterococci).

Turbidity

Please refer to **Section 2.2.1** for a discussion of potential sources of turbidity.

Total Phosphorus

Please refer to **Section 2.2.1** for a discussion of potential sources of total phosphorus.

pH

The hydrogen ion concentration of water is called "pH." The acidity or alkalinity of water is measured by the pH factor. The pH scale ranges from 1 to 14, with 1 to 6.9 being acid, 7.1 to 14 being alkaline, and 7.0 being neutral. Ranges (pH) of 6.5 to 9.0 are considered harmless. A change of one point on this scale represents a ten-fold increase in acidity or alkalinity. Many pollutants as well as naturally occurring constituents can alter the pH, raising or lowering it excessively. In some cases even small changes in pH can harm aquatic biota. The pH changes can alter the chemical form of certain constituents, thereby increasing their bioavailability and toxicity. For example, a decrease in pH can result in an increase in dissolved metal concentrations. The concentration of unionized ammonia (the toxic form of ammonia) is a function of the concentration of total ammonia, water temperature, and pH. Ammonia, which is a major component of sewage discharges, can be completely safe at pH 7.0 and extremely toxic to fish at pH 8.5 for the same total ammonia concentration.

Dissolved Oxygen

Adequate dissolved oxygen levels are vital for aquatic life. Depression of dissolved oxygen levels can lead to fish kills and odors resulting from anaerobic decomposition. The solubility of oxygen in water is a function of water temperature and dissolved solids concentration.

Total Nitrogen

Nitrogen is a nutrient associated with the soluble component of stormwater runoff. Although necessary for plant growth, excess nitrogen in water becomes a pollutant and stimulates growth of algae and other less-desirable plants. Nitrogen enrichment is typically more problematic in estuarine ecosystems. Major sources in an urban setting include fertilizers, septic systems, and atmospheric deposition.[15] Natural sources of total nitrogen in the watershed may be attributed to decomposing organic material, sediments, wildlife feces, and groundwater chemistry.

Methylene Blue Active Substances (MBAS)

MBAS test measures the presence of anionic surfactant (commercial detergent) in water. Positive test results can be used to indicate the presence of domestic wastewater.

Metals

Metals in the environment can originate from many sources both natural in origin and introduced by human activities. Sources of metals include the transportation system, architectural uses, atmospheric deposition, aging plumbing systems, and native soils. The transportation system is a significant anthropogenic source of metals in stormwater runoff to urban streams. Cadmium, copper, cobalt, iron, nickel, lead and zinc are deposited into the environment by vehicle exhaust, brake linings, tire balancing weights, battery terminals, tire wear and engine wear. They accumulate on roads, waiting to be washed into storm drains with the next rainfall. Pollutant concentrations in roadway runoff are positively correlated with traffic volume. All cars, even the cleanest vehicles, shed small amounts of metals, fluids, and other pollutants. Galvanized metal rooftops, gutters and downspouts, and moss killer (fungicides) are also a source of zinc in stormwater. Atmospheric deposition, which is the process of particulate bound metals settling out of the air, includes sources from vehicle exhaust, high winds carrying fine sediments, roadway dust, the burning of coal for industrial and energy producing needs is a significant source for several metals including copper, zinc, cadmium, and mercury.[16] Lithogenic geology, as previously discussed in **Section 2.1.2,** has been determined to be a significant natural source of metals and the findings of the trace metal special study strongly indicate that at least two, perhaps more, constituents originate from native soils.

[15] Delaware Department of Natural Resources. April 2010. Urban Stormwater Runoff Fact Sheet. Available at: http://www.dnrec.state.de.us/water2000/Sections/Watershed/ws/fact_nc_urban_stormwater.pdf

[16] Oregon Environmental Council. December 2007. Stormwater Solutions: Turning Oregon's Rain Back Into a Resource. Available at: http://www.oeconline.org/resources/publications/reportsandstudies/sstreport

2.2.3 Local Issues of Concern

The San Clemente Coastal Streams Watershed Permittees recognize that irrigation runoff is a transport mechanism for fecal bacteria during dry weather and are working conjointly with local water purveyors to curb irrigation and excess urban runoff. The watershed permittees are working to increase the general awareness of the connection between outdoor water conservation and the prevention of water pollution. Prohibitions of irrigation runoff and limited watering days can decrease the number of opportunities for runoff, as can requirements for containment of washwater.

2.3 Prioritization of Water Quality Problems

The Watershed Permittees have prioritized *High Priority Water Quality Concerns* based on the following criteria:

1. Receiving waters subject to an approved TMDL are classified as “high priority pollutants.”
2. 2006 303(d) listed waterbodies with known and suspected anthropogenic sources as well as NAL general constituents and priority pollutants are classified as “medium priority pollutants.”
3. 2006 303(d) listed waterbodies with known and suspected natural sources as well as listed waterbodes on the pending 2010 303(d) list are classified as “low priority pollutants.”

A summary of priority pollutants and known and suspected sources are included in **Table 3**.

3.0 BMP SELECTION AND IMPLEMENTATION

The Watershed Permittees are developing and implementing BMPs (defined as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent, eliminate, or reduce the pollution of waters of the receiving waters. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff spillage or leaks, sludge or waste disposal, or drainage from raw material storage)[17] within the San Clemente Coastal Streams Watershed.

The common emphasis of BMP-based management approaches is to promote the concept and practice of preventing pollution at the source. However, such an approach does not preclude runoff treatment and, indeed, the DAMP explicitly recognizes that while the emphasis is on Pollution Prevention BMPs, the Watershed Permittees' approach to water quality management includes complementary Source Control BMPs and Treatment Control BMPs. These BMPs can be described as:

- *Pollution Prevention BMPs* – any practice that reduces or eliminates the creation of pollutants;

- *Source Control BMPs* – any practice that prevents pollution by reducing pollutants at their source; and

- *Treatment Control BMPs* – any practice that removes pollutants from runoff.

3.1 BMP Selection and Implementation

In the San Clemente Coastal Streams Watershed, enhanced BMPs, which generally target particular constituents of concern and are typically source control or treatment control BMPs, are being implemented to address priority pollutants in dry and wet weather runoff from the urbanized areas of the watershed. Examples of enhanced BMPs currently implemented include:

- *Treatment Systems* - a treat and release BMP that addresses pollutants of concern, but is not a biotreatment BMP. Examples include sand filters, cartridge media filters and disinfection treatment, such as ozone or UV light. Dry weather diversions all also included in this category.

- *Channel Restoration/Retrofitting* - While the Clean Water Act established an interim goal of attaining a level of water quality (which provides for the protection and propagation of fish, shellfish and wildlife, and for recreation in and on water), its overarching objective is to restore and maintain the chemical, physical and biological integrity of the nation's waters. Projects with ecological integrity outcomes necessarily have to be considered in the context of water quality management because restoring biological function enhances a stream's contaminant assimilative capacity. In addition, restoration in the context of Workplan also applies to projects that contribute to the restoration of a more natural watershed hydrologic regime. These efforts can lead to more stable channel morphology

[17] Stormwater Quality Task Force. January 2003. California Storm Water Best Management Practice Handbooks. Prepared by: Camp Dresser & McKee, Larry Walker Associates, Uribe and Associates, and Resources Planning Associates.

and the elimination of the dry weather runoff that sustains the flux of bacteria through the creek system in dry weather.

- *Landscape Retrofits* - Structural landscape BMPs can include weather-based irrigation controllers (aka SmarTimers), Edgescaping where existing irrigated lawn area along the edge of a public sidewalk, street curb, driveway and/or private walkway is replaced with lower impact landscaping and permeable ground covering, and other irrigation enhancements & adjustments to further improve water efficiency and reduce runoff by eliminating overspray onto pavements and improve distribution uniformity.

- *Catchbasin Retrofits* - Structural catchbasin BMP retrofits can include catch basin gates and in line baskets or filters. The debris gates are designed to remain closed during low flow conditions but open during high storm flows in order to prevent flooding. The gates keep debris out of the MS4 and within reach of street sweepers.

- *Water Conservation* - The San Clemente Coastal Streams Watershed Permittees recognize that irrigation runoff is a transport mechanism for fecal bacteria during dry weather and are working conjointly with local water purveyors to curb irrigation and excess urban runoff. The watershed permittees are working to increase the general awareness of the connection between outdoor water conservation and the prevention of water pollution. Prohibitions of irrigation runoff and limited watering days can decrease the number of opportunities for runoff, as can requirements for containment of washwater.

- *Watershed Based Education* - Public education is a key component of the municipal stormwater program. The goals of the program are to (1) measurably increase the knowledge of target communities; (2) measurably change behavior of target communities, and (3) reach all residents. In addition to outreach to the general public, the Orange County Stormwater Program—of which the Watershed Permittees are a part of—developed a School Education Outreach Program. Today's children are tomorrow's adults, and the earlier they learn about protecting the environment, the less likely they will be as adults to engage in pollution causing behaviors. Children can also share information they learn in school with their parents and other relatives. Children are excellent "watchdogs" when it comes to their parents' activities, and they are likely to try to correct a parent's polluting behavior.

Figure 4 is a map of currently implemented BMPs and BMPs scheduled for implementation in 2011 and **Table 4** summarizes these BMPs in the San Clemente Coastal Streams Watershed. A detailed description of each of these BMPs is provided in **Appendix B**.

For the selection and implementation of future BMPs, the Watershed Permittees anticipate using an iterative BMP planning process based upon the known effectiveness of existing BMPs being used in the watershed and throughout the region, load reduction targets for established watershed TMDLs, and water quality objectives for 303(d) listed constituents and other pollutants of concern in the watershed. This strategy is being employed as part of Bacteria Load Reduction Plan (BLRP) development for the Aliso Creek Watershed. Work has included a literature review of the effectiveness of fecal indicator bacteria BMPs, a feasibility cost-benefit analysis of these BMPs, and development of a future BMP planning load reduction spreadsheet tool. A BLRP development guide is planned as part of project work which will serve as model for

BLRP or CLRP development in the San Clemente Coastal Streams Watershed and other watersheds in Orange County.

The OCTA Tier 2 Grant Program GIS model (see **Section 1.3** item 4), which is being developed with information from preliminary Copermittee retrofit studies, will also offer a planning tool for evaluating the potential strategic effectiveness and cost-effectiveness of BMPs. Incorporation of the retrofit studies as a structural control BMP into this Watershed Workplan will ensure that water quality issues are addressed on a regional or watershed scale, and that BMPs are implemented in a manner that will provide the greatest amount of pollutant reduction.

3.2 BMP Effectiveness Assessment

Effectiveness Assessment is the process of evaluating whether programs are resulting in desired outcomes. Outcomes are the measures used to characterize results associated with implementing stormwater management programs. They are essential to effectiveness assessment because they define specific, measurable endpoints by which stormwater programs can be targeted, evaluated, and periodically modified.

The Watershed Permittees apply the California Stormwater Quality Association's (CASQA) approach to assess effectiveness, which utilizes a series of six categories of outcomes, referred to as outcome levels, to establish a logical and consistent organizational scheme for assessing and relating individual outcomes. An additional layer of structure is provided by grouping them in three general areas of assessment activity: 1) Implementation Assessment; 2) Target Audience and Source Assessment; and, 3) Urban Runoff and Receiving Water Assessment. The relationship of assessment types to the six outcome levels is illustrated in **Figure 5**. It is important to note that these six outcome levels illustrate a natural progression from program implementation to receiving water conditions, and although it may appear that the higher numbered levels have greater relative importance, this is not the case. Each outcome level is individually necessary to support effective management decisions.[18]

Progress toward the achievement of outcomes is evaluated through the use of Assessment Measures. Assessment measures may be qualitative (e.g. a judgment regarding the degree of BMP implementation at a facility) or quantitative (e.g. % reduction in a constituent level). Key attributes of assessment measures include:

- Measurability (statistically measurable on a frequent basis)
- Relevance (significant, demonstrable relation to strategy and objectives)
- Reliability (easily documented and reproducible)
- Availability (based upon data obtainable at reasonable cost)
- Scientific Validity (based on sound science)
- Replicability (capable of being regularly updated)
- Appropriately Focused (ideally measures outcomes, not inputs or outputs)

Effectiveness Assessment involves confirmation of outcomes, an interim process of evaluation (principally through comparison) of assessment measures, and communication of progress.

[18] Van Rhyn, Jon; Ashby, Karen; and Brosseau, Geoff. "Methods and activities to gauge effectiveness and make improvements." Stormwater. September 2010: 32-37.

Section 3 of the current DAMP describes the general methodology and challenges for examining new BMP retrofit opportunities, BMP selection and implementation, and assessment of BMP effectiveness to direct iterative program improvements at both the local and watershed programmatic levels to the maximum extent practicable. The BMP selection and effectiveness assessment process may include, but is not limited to, input from the following factors and information sources, as available and applicable:

- Beneficial Use assessment;
- Water quality and flow data and modeling;
- Cost and cost/benefit;
- A Acceptability by the community;
- Ease or difficulty of implementation;
- Technical feasibility;
- Maintenance requirements;
- Pollutant prevention/removal performance;
- Multiple resource benefits or impacts;
- review of technical literature (such as the ASCE/EPA databases);
- A review of existing control programs;
- Demonstration or research projects by City or other entities;
- Input from vendors, consulting firms, other municipalities, or other agencies;
- User and operational/maintenance staff feedback; and
- Opinion surveys.

4.0 ACRONYMS AND GLOSSARY

4.1 Acronyms

BMP	Best Management Practice
Basin Plan	Water Quality Control Plan for the San Diego Basin
BLRP	Bacteria Load Reduction Plan
CASQA	California Stormwater Quality Association
CEQA	California Environmental Quality Act
CFU	Colony Forming Units
CLRP	Comprehensive Load Reduction Plan
Copermittees	County of Orange, the 11 incorporated cities within the County of Orange in the San Diego Region, and the Orange County Flood Control District
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWC	California Water Code
DAMP	Drainage Area Management Plan
GIS	Geographic Information System
HSPF	Hydrologic Simulation Program in Fortran
IRWMP	Integrated Regional Water Management Plan
JRMP	Jurisdictional Runoff Management Plan
LID	Low Impact Development
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
NAL	Numeric Action Level
NPDES	National Pollutant Discharge Elimination System
Ocean Plan	Water Quality Control Plan for Ocean Waters of California
OCTA	Orange County Transportation Authority
Regional Board	California Regional Water Quality Control Board, San Diego Region
ROWD	Orange County Copermittees' Report of Waste Discharge (application for NPDES reissuance)
SCCWRP	Southern California Coastal Water Research Project
SCE	Southern California Edison
SIP	State Implementation Policy; State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California
State Board	State Water Resources Control Board

STBMP	Structural Treatment Best Management Practice
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency

4.1 Glossary[19]

Beneficial Uses - The uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote tangible and intangible economic, social, and environmental goals. "Beneficial Uses" of the waters of the State that may be protected include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the surface or ground water on or after November 28, 1975; and potential beneficial uses are uses that would probably develop in future years through the implementation of various control measures. "Beneficial Uses" are equivalent to "Designated Uses" under federal law. [California Water Code Section 13050(f)].

Best Management Practices (BMPs) - Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of municipal storm water permits, BMPs are typically used in place of numeric effluent limits.

Clean Water Act Section 402(p) [33 USC 1342(p)] - The federal statute requiring municipal and industrial dischargers to obtain NPDES permits for their discharges of storm water.

Clean Water Act Section 303(d) Water Body - An impaired water body in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA. The discharge of runoff to these water bodies by the Copermittees is significant because these discharges can cause or contribute to violations of applicable water quality standards.

Dry Season – May 1 through September 30 of each year.

MS4 - conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting or conveying storm water; (iii)

[19] Definitions are derived from Attachment C of Order 2009-2009-002.

Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.

National Pollutant Discharge Elimination System (NPDES) - The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the CWA.

Non-Storm Water - All discharges to and from a MS4 that do not originate from precipitation events (i.e., all discharges from a MS4 other than storm water). Non-storm water includes illicit discharges, non-prohibited discharges, and NPDES permitted discharges.

Point Source - Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

Pollutant - Any agent that may cause or contribute to the degradation of water quality such that a condition of pollution or contamination is created or aggravated.

Pollution - As defined in the Porter-Cologne Water Quality Control Act: “the alteration of the quality of the waters of the State by waste, to a degree that unreasonably affects the either of the following: 1) The waters for beneficial uses; or 2) Facilities that serve these beneficial uses.” Pollution may include contamination.

Pollutants of Concern – Pollutants for which water bodies are listed as impaired under CWA section 303(d), pollutants associated with the land use type of a development, and/or pollutants commonly associated with runoff. Pollutants commonly associated with runoff include total suspended solids; sediment; pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc, and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (decaying vegetation, animal waste, and anthropogenic litter).

Pollution Prevention - Pollution prevention is defined as practices and processes that reduce or eliminate the generation of pollutants, in contrast to source control BMPs, treatment control BMPs, or disposal.

Receiving Waters – Waters of the United States.

Runoff - All flows in a storm water conveyance system that consists of the following components: (1) storm water (wet weather flows) and (2) non-storm water including dry weather flows.

Shared Treatment Control BMP - BMPs used by multiple developments to infiltrate, filter, or treat the required volume or flow prior to discharge to a receiving water. This could include, for example, a treatment BMP at the end of an enclosed storm drain that collects runoff from several commercial developments.

Source Control BMP – Land use or site planning practices, or structural or nonstructural measures that aim to prevent runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between pollutants and runoff.

Storm Water – Per 40 CFR 122.26(b)(13), means storm water runoff, snowmelt runoff and surface runoff and drainage. Surface runoff and drainage pertains to runoff and drainage resulting from precipitation events.

Total Maximum Daily Load (TMDL) - The maximum amount of a pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain water quality standards. Under CWA section 303(d), TMDLs must be developed for all water bodies that do not meet water quality standards after application of technology based controls.

Water Quality Objective - Numerical or narrative limits on constituents or characteristics of water designated to protect designated beneficial uses of the water. [California Water Code Section 13050 (h)]. California's water quality objectives are established by the State and Regional Water Boards in the Water Quality Control Plans. Numeric or narrative limits for pollutants or characteristics of water designed to protect the beneficial uses of the water. In other words, a water quality objective is the maximum concentration of a pollutant that can exist in a receiving water and still generally ensure that the beneficial uses of the receiving water remain protected (i.e., not impaired). Since water quality objectives are designed specifically to protect the beneficial uses, when the objectives are violated the beneficial uses are, by definition, no longer protected and become impaired. This is a fundamental concept under the Porter Cologne Act. Equally fundamental is Porter Cologne's definition of pollution. A condition of pollution exists when the water quality needed to support designated beneficial uses has become unreasonably affected or impaired; in other words, when the water quality objectives have been violated. These underlying definitions (regarding beneficial use protection) are the reason why all waste discharge requirements implementing the federal NPDES regulations require compliance with water quality objectives. (Water quality objectives are also called water quality criteria in the CWA.)

Water Quality Standards - The beneficial uses (e.g., swimming, fishing, municipal drinking water supply, etc.,) of water and the water quality objectives necessary to protect those uses.

Waters of the State - Any water, surface or underground, including saline waters within the boundaries of the State [CWC section 13050 (e)]. The definition of the Waters of the State is broader than that for the Waters of the United States in that all water in the State is considered to be a Waters of the State regardless of circumstances or condition. Under this definition, a MS4 is always considered to be a Waters of the State.

Waters of the United States - As defined in the 40 CFR 122.2, the Waters of the U.S. are defined as: "(a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (b) All interstate waters, including interstate "wetlands;" (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet

meadows, playa lakes, or natural ponds the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as waters of the United States under this definition: (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition; (f) The territorial seas; and (g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA."

Watershed - That geographical area which drains to a specified point on a water course, usually a confluence of streams or rivers (also known as drainage area, catchment, or river basin).

Watershed Runoff Management Plan (WRMP) – A written description of the specific watershed runoff management measures and programs that each watershed group of Copermittees will implement to comply with this Order and ensure that storm water pollutant discharges in runoff are reduced to the MEP and do not cause or contribute to violation of water quality standards.

WDRs – Waste Discharge Requirements

Wet Season – October 1 through April 30 of each year.

Table 1: Designated Beneficial Uses – San Clemente Coastal Streams

Inland Surface Water	AGR	REC-1	REC-2	WARM	WILD
Prima Desheca Canada	●	○	●	●	●
Segunda Desheca Canada	●	○	●	●	●
Unnamed Intermittent Coastal Streams	●	○	●	●	●

Existing - ● Potential - ○

Agricultural Supply (**AGR**) – Includes uses of water for farming, horticulture or ranching.

Contact Water Recreation (**REC-1**) – Includes uses of water for recreational activities involving body contact where ingestion of water is reasonably possible.

Non-Contact Water Recreation (**REC-2**) – Includes uses of water for recreational activities involving proximity to water.

Warm Freshwater Habitat (**WARM**) – Includes uses of water that support warm water ecosystems.

Wildlife Habitat (**WILD**) – Includes uses of water that support terrestrial ecosystems.

Source: http://www.waterboards.ca.gov/sandiego/programs/basinplan.html

Table 2: 2006 303(d) List and TMDL Priority Schedule – San Clemente Coastal Streams Watershed

Type	Name	CalWater Watershed	Pollutant/Stressor	Source	Priority	Estimated Size Affected	Proposed TMDL Completion
R	Prima Deshecha	90130000	Phosphorus, Turbidity	Urban Runoff/Storm Sewers Unknown Nonpoint Source Unknown Point Source		1.2 Miles	2019
R	Segunda Deshecha Creek	90130000	Phosphorus Turbidity	Urban Runoff/Storm Sewers Unknown Nonpoint Source Unknown Point Source Construction/Land Development Channelization Flow Regulation/Modification	Low	0.92 Mile 0.92 Mile	2019 2019
C	Pacific Ocean Shoreline, San Clemente HA	90130000	Bacteria Indicators *Impairment located at Poche Beach (large outlet), Ole Hanson Beach Club Beach at Pico Drain, San Clemente City Beach at El Portal St. Stairs, San Clemente City Beach at Mariposa St., San Clemente City Beach at Linda Lane, San Clemente City Beach at South Linda Lane, San Clemente City Beach at Lifeguard Headquarters, Under San*	Nonpoint/Point Source	Medium	3.7 Miles	2005

			Clemente Municipal Pier, San Clemente City Beach at Trafalgar Canyon (Trafalgar Ln.), San Clemente State Beach at Riviera Beach, San Clemente State Beach at Cypress Shores.				

(Note: R – Rivers; E – Estuary; C – Coastal Shoreline/Beaches)

Table 3: Priority Pollutants and Sources

Priority	Pollutant	Anthropogenic Sources	Natural Sources
HIGH	Indicator bacteria	Pet feces, sewer spills, food wastes, manure, decomposing landscape litter	Wildlife feces, biofilms, decomposing organic material, sediments
MEDIUM	Turbidity		Suspended colloidal matter
MEDIUM	pH	Atmospheric acid deposition	
MEDIUM	Dissolved Oxygen	Fertilizer runoff, untreated sewage	Excess organic matter, increased water temperatures
MEDIUM	Total Nitrogen	Fertilizers, cleaning products, recycled water	Decomposing organic material, sediments, wildlife feces, groundwater chemistry
MEDIUM	Total Phosphorus	Fertilizers, cleaning products, recycled water	Decomposing organic material, sediments, wildlife feces, groundwater chemistry
MEDIUM	MBAS	Anionic surfactants	
MEDIUM	Metals	Atmospheric deposition, automotive byproducts, architectural uses, aging plumbing systems	Lithogenic geology of native soils
LOW	Toxicity	Automotive byproducts, pesticides	Groundwater chemistry

Table 4: San Clemente Coastal Streams Watershed – Enhanced BMPs

BMP	Date Constructed	Lead Entity(ies)	Pollutants Addressed									
			Bacteria	Metals	Nutrients	Nuisance Flow	Hydrocarbons /Oil & Grease	Organic Debris	Particulates/ Sediment	Pesticides	TDS/TSS	Trash/ Floatables
TREATMENT SYSTEMS												
Dry Weather Diversions (several throughout San Clemente)		San Clemente	X	X	X	X	X	X	X	X	X	X
Poche Clean Beach Project	May 2009	County of Orange	X		X						X	

Figure 1: San Clemente Coastal Streams Watershed Land Use

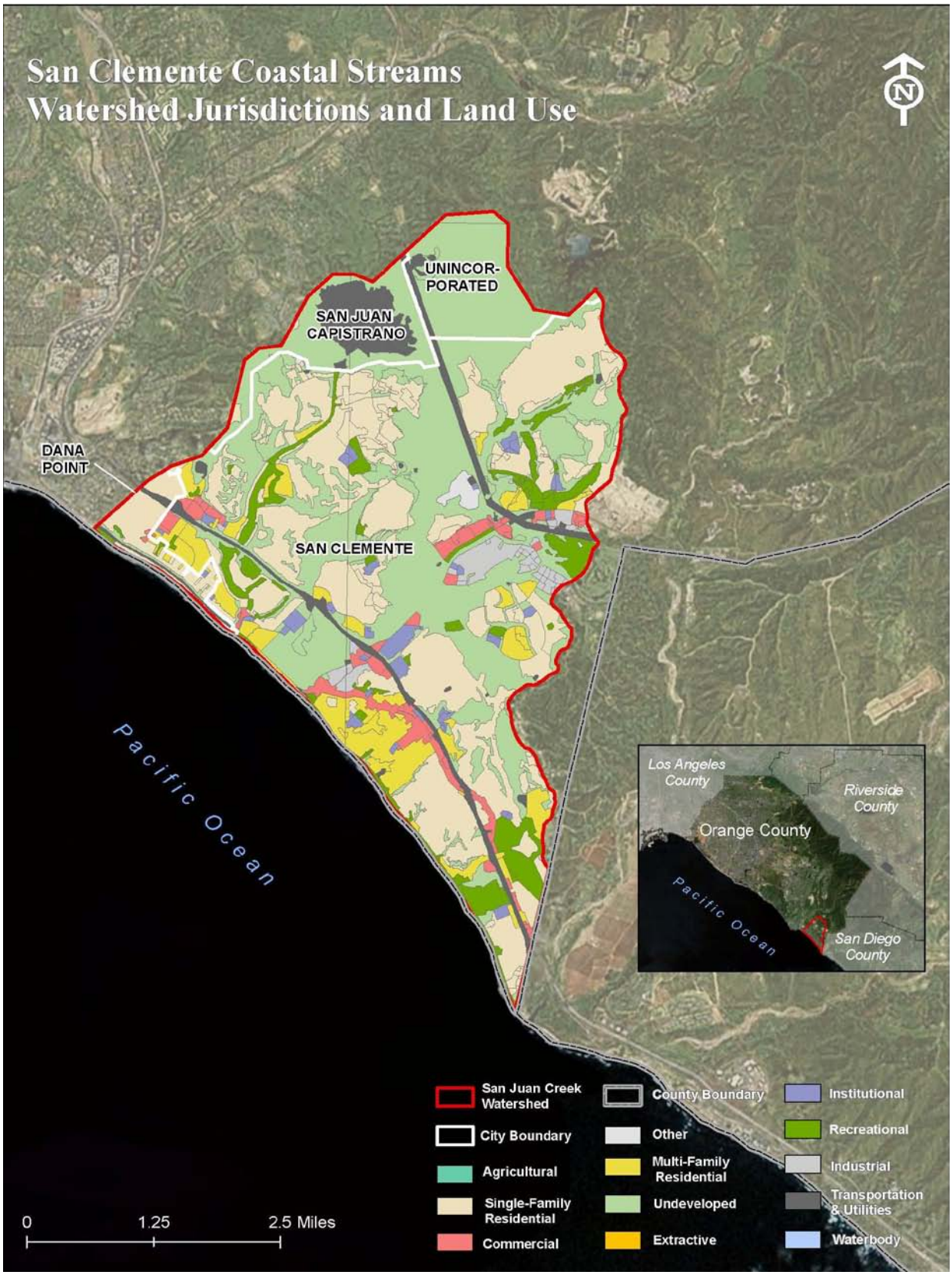


Figure 2: San Clemente Coastal Streams Watershed Monitoring Sites

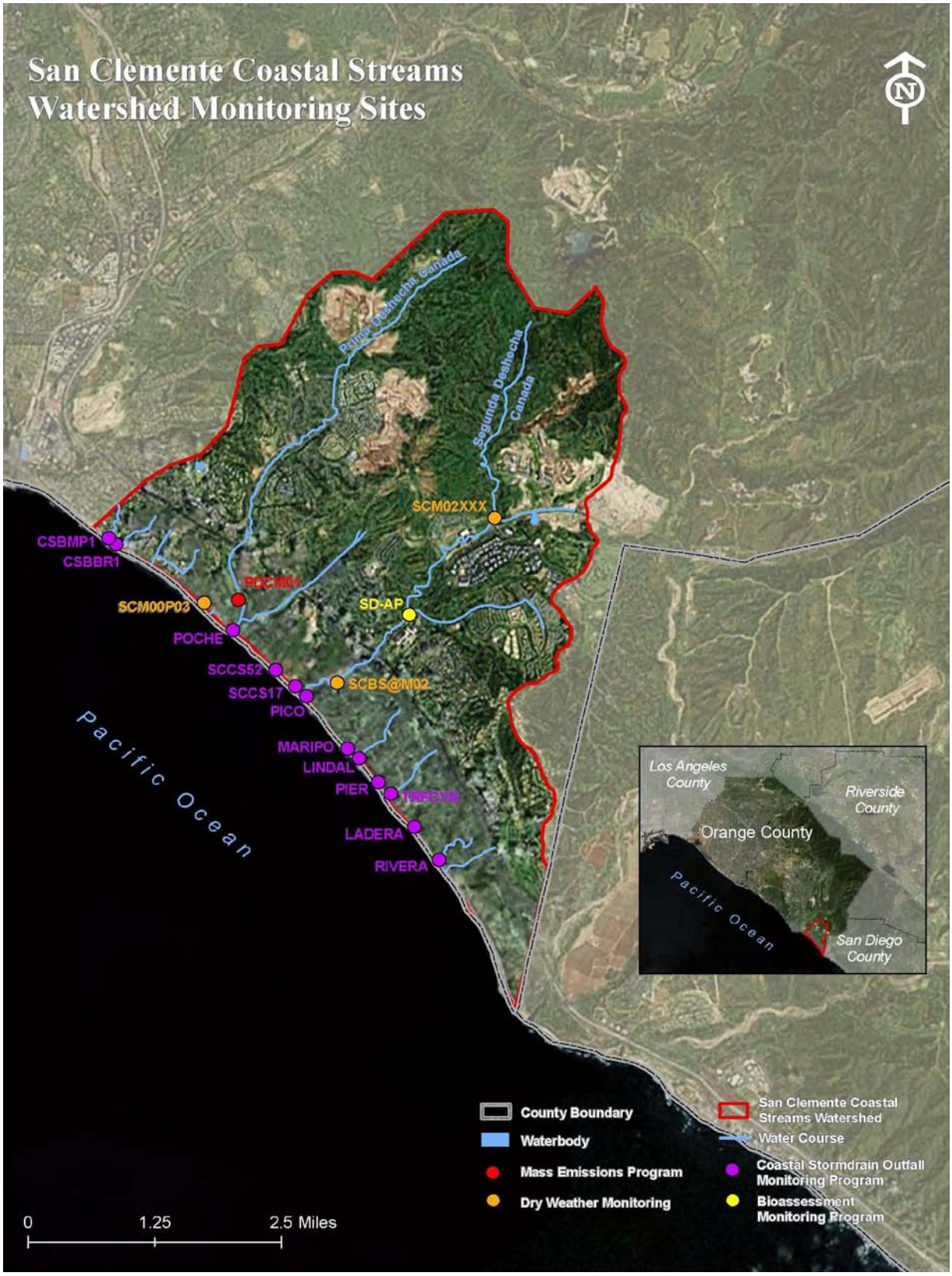


Figure 3: San Clemente Coastal Streams Watershed TMDL and 303(d) Listed Water Bodies

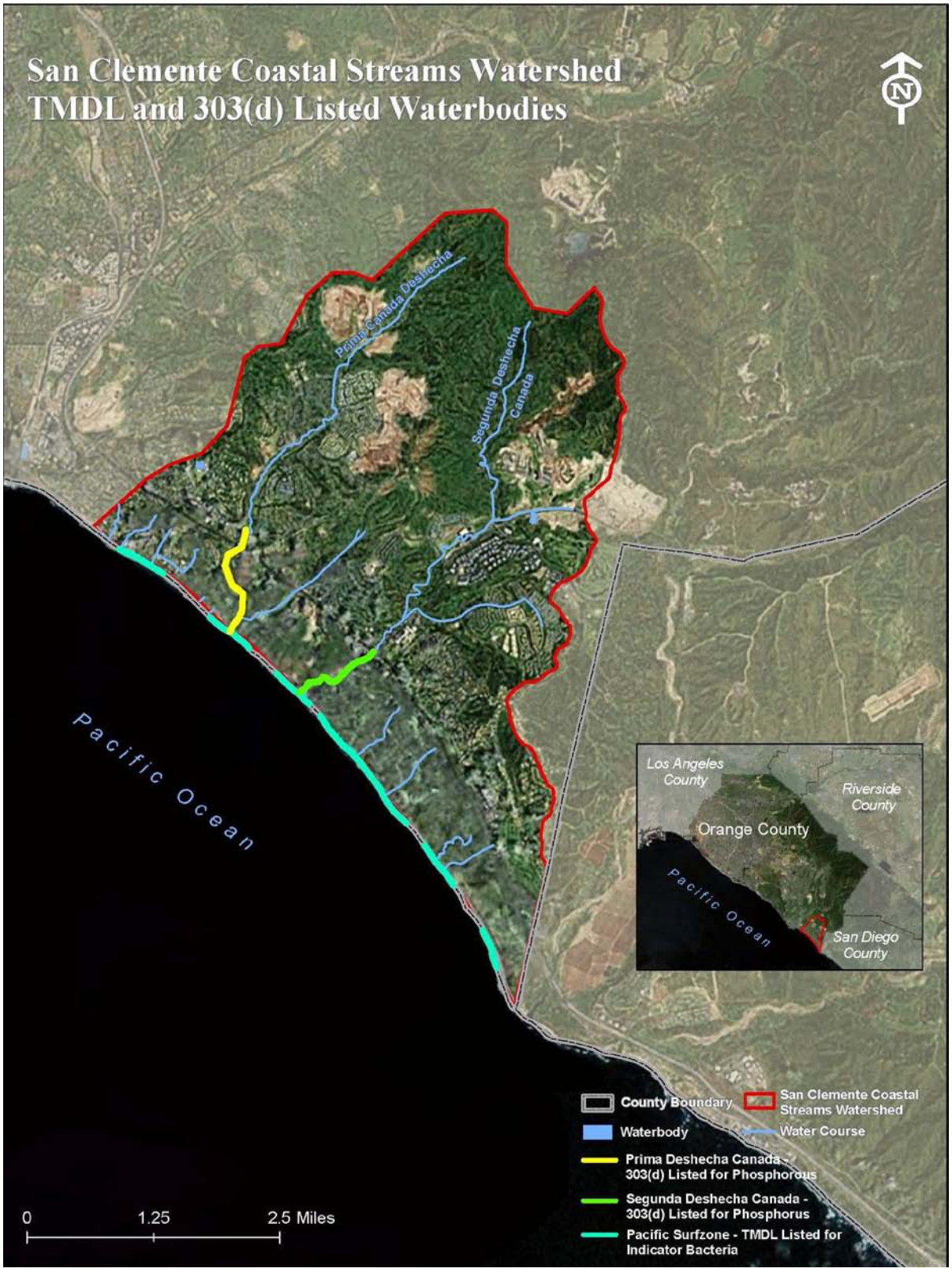


Figure 4: San Clemente Coastal Streams Watershed BMP Sites

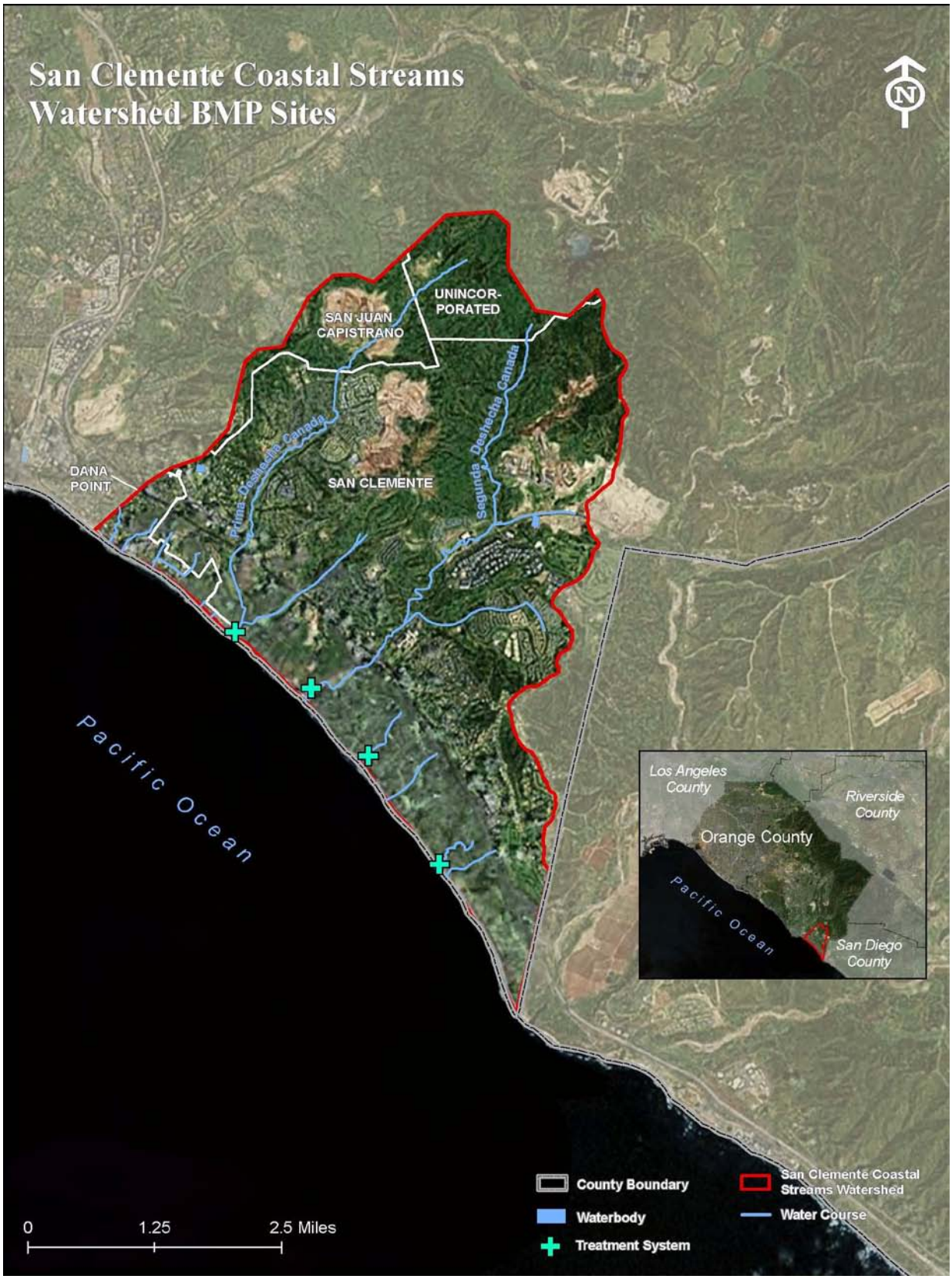
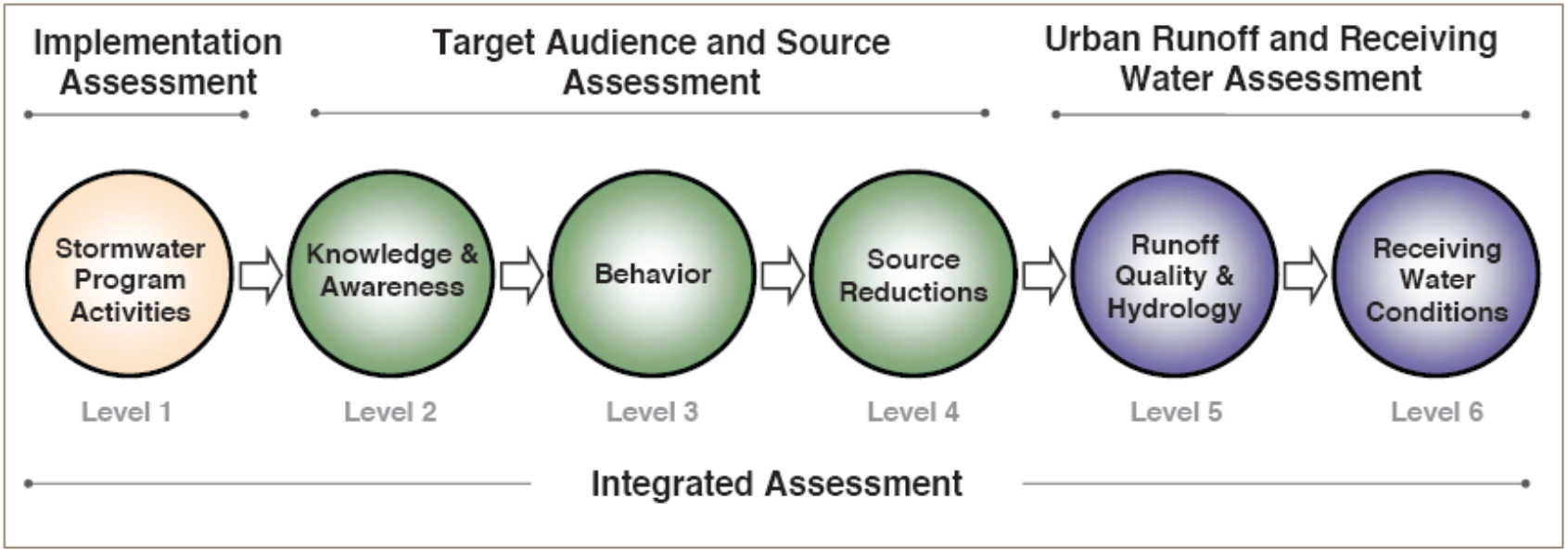


Figure 5: Relationship of Assessment Types to the Six Outcome Levels



APPENDIX A

RECEIVING WATERS AND MS4 DISCHARGE MONITORING PROGRAM

APPENDIX B

BMP WORKSHEETS

Poche Clean Beach Project

Watershed:	San Clemente
Lead Entity:	County of Orange
Date Constructed:	May 2009
Pollutants Addressed:	Fecal indicator bacterial Total dissolved solids Total suspended solids Nutrients

BMP Objectives:	The objective of Poche Clean Beach Project is to reduce the bacteria loading which contributes to frequent exceedances of AB411 bacteria standards and corresponding extended water quality advisory posting at Poche Beach. Poche Beach has been identified as one of the ten worst beaches in California by Heal the Bay. The treatment facility is anticipated to treat dry weather urban runoff from the Prima Deshecha Channel (M01) before discharging treated water to the surf zone, thereby reducing the extent of bacteria standard exceedances.
BMP Description:	The 0.5 million gallon per day (MGD) facility will divert dry weather urban runoff via an inflatable gate within the channel, with flows of up to 800 gallons per minute (gpm) subject to wet well screening, sand filtration, and ultraviolet (UV) light disinfection before discharging back into the channel. The $2.3M facility was constructed with the funding support of the State Clean Beaches Initiatives Program, along with co-sponsors the City of San Clemente, the County of Orange, and the Miocean public interest group.
Operations & Maintenance:	Facility operations will be conducted by the South Coast Water District on behalf of the County. Operational costs will be shared by the County and the City of San Clemente through a cost share agreement.
Monitoring/Performance Standards:	BMP performance metrics will include: 1) the bacterial removal efficiency of the treatment facility; and 2) the reduction of frequency and duration of AB411 bacteria quality standard exceedances at the Poche Beach surfzone. Monitoring plan emphasis will be on fecal indicator bacteria (total coliform, fecal coliform, enterococcus). Target treatment facility outflow concentrations are less than detectable (>9 CFU/100ml) for all three indicator bacteria, while target surfzone concentrations are for less than the AB411 geomean standards (total coliform 1000 CFU/100ml, fecal coliform 200 CFU/100ml, enterococcus 35 CFU/100ml). Another important performance metric would be the extent of water quality advisory posting, based on Beach Mile Days posted. Other water quality parameters include turbidity, UV absorbance, cadmium, copper, and zinc.

Poche Clean Beach Project	
BMP Effectiveness Assessment	Project weekly monitoring initiated in August 2010 and is expected to continue through July 2011. Monitoring stations include: 1) treatment facility influent and effluent, to determine treatment efficiency; and 2) four stations downstream and in the surfzone, to determine whether treatment benefits are being delivered to the beach or being degraded enroute. Effluent monitoring of selected metals is also being performed to verify that treated runoff concentrations are not injurious to aquatic life. Monthly filter backwash sampling will also be performed to assure sanitary discharge permit compliance with metals and other contaminant limits. Project monitoring initiated in August 2010 and is expected to continue through July 2011. A final performance evaluation report is expected to be completed by the end of 2011. The expectation is that the project will result in a reduction of days in which Poche Beach is posted as exceeding AB411 standards. Through the first seven weeks of monitoring, PCBP removal efficiencies averaged 95.5% for enterococcus and 96.8% for fecal coliform.
Location	The project is located along the western boundary of Pacific Coast Highway as it intersects Camino Capistrano, between the San Clemente and Dana Point city borders in southern Orange County, California. Lat 33° 26’ 29.94” Long 117° 38 ‘42.88”

Segunda Deshecha Cañada (M02)
Urban Runoff Treatment Facility

Watershed:	Segunda Deshecha Cañada	
Lead Entity:	City of San Clemente	
Date Constructed:	2008	
Pollutants Addressed:	Fecal Indicator Bacteria Total Suspended Solids Trace Metals	
BMP Objectives:	The treatment system is designed to divert and filter up to 1 million gallons per day (mgd) of urban runoff from the Segunda Deshecha Cañada (M02) channel to the sanitary sewer. The main objective of the treatment diversion is to decrease bacteria and other pollutant loadings at San Clemente's North Beach.	
BMP Description:	The City collects dry weather urban runoff from the 4,800-acre M02 watershed and conveys flows to a pressure sand filtration system for treatment. The treated effluent is discharged to the City's land outfall combining with the secondary treated wastewater for ocean disposal.	
Operations & Maintenance:	The City's Sewer Division assumes ongoing operations and maintenance activities which includes a regularly scheduled program to clean turbidity drain lines and meters plus unscheduled periodic mechanical maintenance and algae cleaning at the pump station itself.	
Monitoring/Performance Standards:	The County of Orange Coastal Storm Drain Outfall (CSDO) program monitors bacteria levels at the M02 channel outlet as well as the surf zone. The success of the facility is measured by comparing the M02 channel outlet and surf zone water quality monitoring data during system operation to the historical water quality monitoring data collected by the County of Orange.	

Pier Bowl Vortex Separator

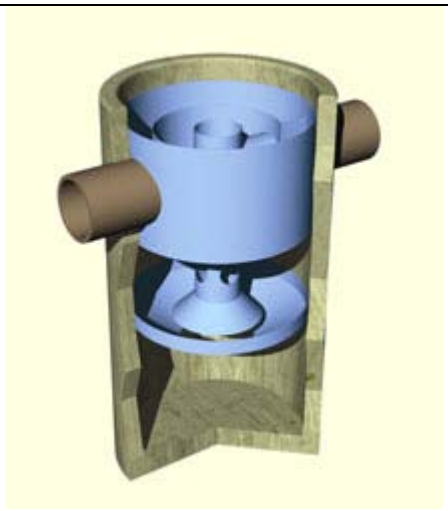
Watershed:	San Clemente Coastal Streams
Lead Entity:	City of San Clemente
Date Constructed:	2006
Pollutants Addressed:	Trash & Debris Sediment Oil/Grease

BMP Objectives:	The unit is designed to capture settleable solids, floatables, and oil and grease.
BMP Description:	The unit operates by creating a spiral flow pattern that separates oils, trash, and floatable debris. Pollutants are trapped for later collection.
Operations & Maintenance:	The City's Sewer Division assumes responsibility for ongoing operations and maintenance. Cleaning is performed monthly with use of a vacuum truck to clear the system of accumulated debris.
Monitoring/Performance Standards:	Manufacturer's performance standards state a greater than 80% removal of grits and silts down to a particle size of 150 microns with a minimum specific gravity of 2.65 and a greater than 80% removal of light oil with a maximum viscosity of 5.5.

Mariposa Beach Access Vortex Separator

Watershed:	San Clemente Coastal Streams	
Lead Entity:	City of San Clemente	
Date Constructed:	2006	
Pollutants Addressed:	Trash & Debris Sediment Oil/Grease	
BMP Objectives:	The unit is designed to capture settleable solids, floatables, and oil and grease.	
BMP Description:	The unit operates by creating a spiral flow pattern that separates oils, trash, and floatable debris. Pollutants are trapped for later collection.	
Operations & Maintenance:	The City's Sewer Division assumes responsibility for ongoing operations and maintenance. Cleaning is performed monthly with use of a vacuum truck to clear the system of accumulated debris.	
Monitoring/Performance Standards:	Manufacturer's performance standards state a greater than 80% removal of grits and silts down to a particle size of 150 microns with a minimum specific gravity of 2.65 and a greater than 80% removal of light oil with a maximum viscosity of 5.5.	

El Portal Beach Access Vortex Separator

Watershed:	San Clemente Coastal Streams	
Lead Entity:	City of San Clemente	
Date Constructed:	2006	
Pollutants Addressed:	Trash & Debris Sediment Oil/Grease	
BMP Objectives:	The unit is designed to capture settleable solids, floatables, and oil and grease.	
BMP Description:	The unit operates by creating a spiral flow pattern that separates oils, trash, and floatable debris. Pollutants are trapped for later collection.	
Operations & Maintenance:	The City's Sewer Division assumes responsibility for ongoing operations and maintenance. Cleaning is performed monthly with use of a vacuum truck to clear the system of accumulated debris.	
Monitoring/Performance Standards:	Manufacturer's performance standards state a greater than 80% removal of grits and silts down to a particle size of 150 microns with a minimum specific gravity of 2.65 and a greater than 80% removal of light oil with a maximum viscosity of 5.5.	

Calafia Beach Vortex Separator

Watershed:	San Clemente Coastal Streams
Lead Entity:	City of San Clemente
Date Constructed:	2006
Pollutants Addressed:	Trash & Debris Sediment Oil/Grease

BMP Objectives:	The unit is designed to capture settleable solids, floatables, and oil and grease.
BMP Description:	The unit operates by creating a spiral flow pattern that separates oils, trash, and floatable debris. Pollutants are trapped for later collection.
Operations & Maintenance:	The City's Sewer Division assumes responsibility for ongoing operations and maintenance. Cleaning is performed monthly with use of a vacuum truck to clear the system of accumulated debris.
Monitoring/Performance Standards:	Manufacturer's performance standards state a greater than 80% removal of grits and silts down to a particle size of 150 microns with a minimum specific gravity of 2.65 and a greater than 80% removal of light oil with a maximum viscosity of 5.5.

Linda Lane Channel Urban Runoff Diversion

Watershed:	San Clemente Coastal Streams	
Lead Entity:	City of San Clemente	
Date Constructed:	2001	
Pollutants Addressed:	Fecal Indicator Bacteria Total Suspended Solids	
BMP Objectives:	The objective of this diversion is to reduce the amount of fecal indicator bacteria loading from dry weather urban runoff entering the ocean at Linda Lane beach.	
BMP Description:	The City collects 14,000 gallons per day of dry weather urban runoff from San Clemente's coastal streams that would normally discharge to Linda Lane beach and diverts it to the City's municipal sanitary sewer system for treatment and disposal.	
Operations & Maintenance:	The City of San Clemente Sewer Division assumes responsibility for the operations and maintenance of this diversion. Maintenance is performed on an as needed basis.	

Riviera Channel Urban Runoff Diversion

Watershed:	San Clemente Coastal Streams	
Lead Entity:	City of San Clemente	
Date Constructed:	2001	
Pollutants Addressed:	Fecal Indicator Bacteria Total Suspended Solids	
BMP Objectives:	The objective of this diversion is to reduce the amount of fecal indicator bacteria loading from dry weather urban runoff entering the ocean at Riviera beach.	
BMP Description:	The City collects 29,000 gallons per day of dry weather urban runoff from San Clemente's coastal streams that would normally discharge to Riviera beach and diverts it to the City's municipal sanitary sewer system for treatment and disposal.	
Operations & Maintenance:	The City of San Clemente Sewer Division staff removes debris from a 6" PVC line annually before the rainy season.	