

Appendix B – Additional Water Quality Measures

In addition to the Best Management Practices described in this SWMP, the County's Project Clean Water has implemented water quality programs that are not required by the NPDES regulations. Those programs are listed here and described in more detail below:

- A GIS project that maps impermeable areas using remote sensing technology
- Watershed planning and restoration efforts that involve the County
- Treatment control BMPs grant project
- The Questa septic to sewer conversion study
- Benthic Macroinvertebrate (BMI) monitoring
- Chemical monitoring

Detailed Impervious Surface GIS Project

In 2003, the County of Santa Barbara initiated a project to map imperviousness at a parcel-level to target priority areas for future BMP implementation. The project used remote sensing combined with traditional GIS approaches to develop a database tool. The database can be used to prioritize small areas, on a catchment-size scale, for potential BMP projects. Interpretation of the data promises to yield significant benefits in planning for BMP implementation and future modeling of runoff quantity and quality.

The project correlates highly impervious areas with land use and zoning information, topography, and storm drain infrastructure data. The design and population of the database provides a platform for long-term adaptive management as new or improved information becomes available. A detailed assessment of impervious surfaces by feature extraction from high-resolution (60cm) satellite imagery was used to populate the database utilizing multi-spectral remote sensing imagery (4-band including infrared and true-color) obtained from Digital Globe's QuickBird satellite for over 300 km². Results from a subset of the analysis was compared with available GIS data such as roads, buildings, driveways, parking lots, and parcels to ensure the extraction process was within acceptable error limits

The use of multi-spectral satellite imagery for identification of imperviousness can eliminate the need to digitize impervious surfaces for use in modeling and source area identification while still providing very detailed information over large regions. This approach for identifying imperviousness can be a cost effective alternative for planning level imperviousness assessments.

Watershed planning and restoration:

Stakeholder interest has expanded the scope of Project Clean Water (PCW) to include riparian and wetland ecosystem restoration, which is included in the long term goals and objectives of PCW. Riparian areas with healthy vegetation can filter polluted runoff before it reaches the creeks and ocean, and some pollutants can be removed from the water through uptake by plants. In addition to these water quality benefits, healthy riparian areas provide important habitat, recreational opportunities, and have aesthetic value for our communities. PCW implements a number of programs that help meet the goal restoring and maintaining healthy riparian system functions. For more information, visit www.countyofsb.org/project_cleanwater.

- **Guidebook for Reference-Based Assessment of the Functions of Riverine Waters/Wetlands Ecosystems in the South Coast Region of Santa Barbara County, California:** This guidebook, based on assessment of hydrogeomorphic (HGM) functions, was developed in 2000 with grant funding from the US EPA. The guidebook provides domain descriptions and defines HGM functions for the south coast creeks. It is used to

assess creek function at a given reach, and can be used to prioritize restoration sites, monitor restoration projects, or assess and mitigate for the impacts of proposed development. A training workshop was held in December 2001 that comprised County and other agency staff, community members, students and consultants. Additional complimentary studies performed include *Watershed-Level Assessment of the Conditions of Riverine Waters/Wetlands Ecosystems in the South Coast Region of Santa Barbara County, California* (2002), and *Demonstration of reference-Based Assessment of Riverine Waters/Wetlands Functions in the Restoration of Riverine Ecosystems in the South Coast Region of Santa Barbara County, California* (2002).

- **Restoration Projects:** As part of the project to develop the HGM Guidebook (described above), staff also implemented three restoration projects to demonstrate the use of the guidebook in ecosystem restoration. Restoration sites are on Carpinteria, Mission, and Arroyo Burro creeks. In addition, design and permitting were completed for a site on San Jose Creek.
- **San Jose Creek Watershed Plan:** In November 2001, PCW initiated a community effort to develop a watershed plan for the San Jose Creek Watershed. Through a series of stakeholder meetings, issues of concern for the watershed were identified, and goals and objectives intended to improve and protect the natural processes and resources of the San Jose Creek watershed were developed. The draft plan will be released in summer 2004 and should be finalized in the fall. The Plan will serve as a reference document to assist the future planning efforts of the County of Santa Barbara and the City of Goleta within the San Jose Creek watershed.
- **Rincon Creek Watershed Plan:** In 2004, PCW received a grant from the Department of Fish and Game's Fisheries Restoration Grant Program to develop a watershed restoration plan for Rincon Creek, with emphasis on the improvement of steelhead habitat. This plan will be completed in 2006.
- **Watershed Groups:** PCW staff participate actively in a number of local watershed groups, including the Carpinteria Creek Watershed Coalition, the Mission Creek Restoration Partnership, the Arroyo Burro Visioning Team, and the Southern California Wetlands Recovery Project. The City of Santa Barbara has initiated (2004) watershed planning efforts in the Arroyo Burro, Mission, and Sycamore creek watersheds, and the County will participate in these efforts.
- **Watershed Coordinator Grant:** In 2004, PCW staff received a grant to fund a watershed coordinator position for the Southern Santa Barbara County watersheds. The goal of this program is to improve the water quality, water use efficiency, and ecosystem restoration within these watersheds by implementing a number of programs. Tasks include implementing water use efficiency/water quality workshops for agricultural and landscape irrigators and greenhouse operators, continuing efforts with local watershed groups, developing the Rincon Creek Watershed Plan, and researching and preparing recommendations for a watershed protection and management function within County government. This position is split with staff from the Cachuma Resource Conservation District.

Treatment Control BMPs

In 2000, PCW received a \$2.1 million grant from the California Coastal Conservancy to retrofit South Coast urban storm drain systems with treatment control BMPs. The goal was to improve water quality of runoff in the developed areas to the extent possible, and to assess the overall effectiveness of the

technology locally for future applications. A preliminary study identified candidate sites for treatment control BMP installations. Installations implemented through the grant include two systems with the combination of a gross pollutant filter (Continuous Deflective Separation, or CDS) with bioswale in two Goleta neighborhoods, one stand-alone CDS unit in Carpinteria, four stand-alone CDS units in Isla Vista, and an ultraviolet radiation unit in Isla Vista. This grant was completed in June, 2004. For more information, see www.countyofsb.org/project_cleanwater.

Septic System Sanitary Survey (2003)

In June 2001, Santa Barbara County Environmental Health Services hired Questa Engineering Corporation to conduct the Septic System Sanitary Survey of Santa Barbara County. This effort was a survey and compilation of previously existing information on septic systems in the county, not a scientific study to delineate the discharge of pollutants entering ground water that flows into surface water.

The purpose of this survey was to collect and consolidate pertinent data regarding onsite sewage disposal systems, assess the associated impact on public health and water quality, and develop recommendations on ways to address certain types of problems or specific problem areas. This survey was not intended to isolate or evaluate the functioning status or impact from individual septic systems. Collected data were assessed and evaluated to identify and prioritize areas for further study of the onsite systems. For more information, see www.sbcphd.org/ehs/liquid.htm.

Santa Barbara County Creeks Bioassessment Program

The Santa Barbara County Creeks Bioassessment Program (Program) was a long-term effort to assess and monitor the integrity of local stream communities as they respond through time to changing environmental conditions shaped by natural processes and human factors. The Program focused on the use of benthic macroinvertebrates (BMIs) as indicators of stream community integrity. (For more information see www.countyofsb.org/project_cleanwater/documents)

The goals of the Program were to:

1. Determine the strength and nature of natural relationships between local stream biota and physiochemical parameters including stream temperature, water chemistry, stream discharge, microhabitat (e.g., riffles vs. pools), stream width, elevation, gradient, stream order, catchment area, and climatic trends.
2. Determine the strength and nature of relationships between local stream ecosystem integrity and human disturbances including urban development, agricultural development, cattle grazing, physical habitat alterations (e.g. channelization), increased sedimentation, altered hydrology, and water pollution.
3. Determine which biological parameters are the most reliable indicators of local stream ecosystem integrity.
4. Determine how local stream biota responds through time to changing human influences, including changes in land use and stream habitat restoration and water quality improvement efforts.

The study area included 35 miles of creeks on the South Coast from Rincon Creek west to Gaviota Creek. A total of 44 study reaches in 18 coastal streams were surveyed over the course of the Program from 2000 through 2003.

The analyses of the data collected were used to develop an Index of Biotic Integrity (IBI) to be used in assessing the biologic integrity of study area streams. Because the IBI can be used to translate complex biologic data into a composite measure of biological integrity, it can be a powerful tool for communicating the health of riparian systems to a wide audience, and an important basis for environmental management decisions.

It is envisioned that this type of BMI sampling could replace chemical sampling as a way to monitor the long-term health of local creeks. In 2004, flow in the creeks was inadequate to allow sampling during May, but the study continued with sampling in May 2005.

Water Quality Sampling

In 1998, the South Coast Watershed Characterization Study was conducted by Project Clean Water staff to characterize the water quality of four South Coast streams. This study marked the first major local effort at evaluating baseline water quality conditions and water quality impacts from storm water runoff and wet weather conditions. Both dry and wet weather sampling occurred within the watersheds of Arroyo Burro, Mission, Carpinteria, and Rincon creeks. The most significant water quality parameter that was consistently high was the indicator bacteria (total coliform, fecal coliform, and enterococcus groups).

In order to gain a better understanding of the types and extent of pollutants contributed by storm water and low flow runoff, Project Clean Water staff implemented a program of dry and wet weather sampling for the 1999-2000 season. The sampling program significantly broadened the previous year's study by adding many more creek sites and water quality parameter measurements, such as volatile organic compounds (VOCs) and various pesticides. In addition, the 1999-2000 storm water sampling program focused heavily on collecting samples during the "first flush" of each storm event (i.e., during increasing flow due to initial runoff). The purpose of this sampling effort was to conduct a broad screening of water quality in local creeks in order to ascertain which contaminants are present at significant levels, and which watersheds exhibit consistently higher levels of contaminants.

This sampling regime was continued during the 2000-01 and 2001-02 seasons. Due to funding issues in the 2002-2003 rain year, the program was scaled back and attention turned to selected watersheds. On the South Coast, time-series, longitudinal sampling was conducted on San Jose Creek. That this creek provided flow to a 303(d)-listed waterbody (the Goleta Slough), had established sampling locations, and was the subject of an in-progress watershed plan were all critical in the selection of this watershed. Special studies were also performed at the South Turnpike BMP site and at the discharge point of the Glen Annie Golf Course. In the North County, sampling sites were selected to ascertain the inputs to the Santa Ynez River from the communities of Santa Ynez, Vandenberg Village and Mission Hills. Also in the North County, sampling was continued at sites on Orcutt Solomon creek.

The storm-water quality data obtained in 1999-2000, 2000-01, 2001-02 and 2002-03 was developed, in part, to be the basis for both efforts to improve water quality and more limited sampling in subsequent years. Since very little was previously known about the characteristics of the County's urban runoff prior to the first year's sampling effort, results from these first four full seasons of water quality testing have established general characteristics of storm water quality and provided a screening-level evaluation of pollution problems in local creeks.

Typical results showed very high levels of indicator bacteria were present in most creeks (up to 25 times the State's Ocean Water Advisory level). Metals were also detected in most creeks at levels approaching or, in many cases, exceeding basin plan standards. Nitrogen and phosphorus were found in all creeks with highest levels found in agriculturally dominated watersheds. A limited number of VOCs were detected in some creeks. Pesticide results indicate that glyphosate, malathion, and diazinon were present in a majority of the creeks. For details on the sampling results, refer to the annual Water Quality Analysis Reports, found on the Project Clean Water website at www.countyofsb.org/project_cleanwater.