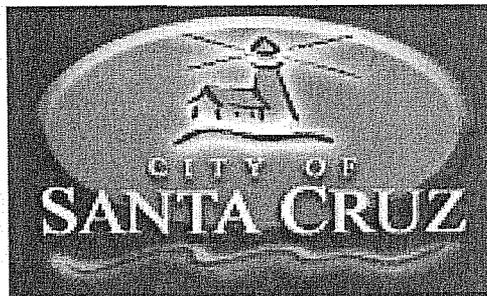


**CLEAN BEACHES INITIATIVE PROJECT:
PROPOSITION 13**

**CITY OF SANTA CRUZ
SANITARY SEWER REHABILITATION
AND
STORM DRAIN DRY WEATHER DIVERSION PROJECTS**



Final Report
March 5, 2008

"Funding for this project has been provided in full or in part through a contract with the State Water Resources Control Board (SWRCB) pursuant to the Costa-Machado Water Act of 2000 (Proposition 13) and any amendments thereto for the implementation of California's Non-point Source Pollution Control Program. The contents of this document do not necessarily reflect the views and policies of the SWRCB, nor does mention of trade names or commercial products constitute endorsement or recommendation for use." (Gov. Code 7550, 40 CFR 31.20)

CLEAN BEACHES INITIATIVE PROJECT: PROPOSITION 13

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CLEAN BEACHES INITIATIVE PROJECT: PROPOSITION 13

CITY OF SANTA CRUZ SANITARY SEWER REHABILITATION AND STORM DRAIN DRY WEATHER DIVERSION PROJECTS

EXECUTIVE SUMMARY

The Clean Beaches Initiative (CBI) Grant Program, Proposition 13, awarded funds to the City of Santa Cruz (City) for the *Clean Beaches Initiative Project* under State Water Resources Control Board (SWRCB) Agreement No 01-077-550-2. The initial agreement, Agreement No 01-077-550-0 was approved on June 1, 2004. The term of the agreement was July 1, 2001 through March 31, 2006. The maximum amount of the Agreement was \$1,475,000. Of this maximum amount, a total of \$915,000 was paid to the City by the grant funds for the project. The City was required to provide matching funds for the portion of the project consisting of capital expenditures for construction in accordance with the formula specified in the Agreement.

In past years, one of the most popular beaches in Santa Cruz, "Santa Cruz Main Beach (Main Beach)" was periodically posted with warnings due to the exceedance of safe body contact standards. Sources of bacterial laden water to Main Beach include the San Lorenzo River (River), which discharges on the southeast end of the beach, and Neary Lagoon, which discharges on the northwest end of the beach during the wet season (lagoon flows are diverted to the City's Wastewater Treatment Plant during the dry season).

Thus, the purpose of this project was to investigate and correct the sources of bacterial contaminants that enter the lower River via the storm drain system in order to improve water quality at Main Beach. The bacterial contaminants are thought to originate from both the sanitary sewer and storm drain systems due to cracked and leaking pipes, and urban runoff. In August 2001, the County of Santa Cruz (County) report entitled *The San Lorenzo River Watershed Management Plan Update (WMP)* indicated that storm drain discharges are one of the sources of the high levels of bacteria found in the lower San Lorenzo River. The report attributed this partially to subsurface leaks of sewage from cracked or damaged sanitary sewer pipelines into the storm drain system. The report also indicated the potential for sewage to leak out into the underlying groundwater and then infiltrate the storm drain system. In the low lying areas around the lower River, which is generally referred to as "Beach Flats," this may occur particularly during the dry season and where the sanitary sewer and storm drain pipelines run in close proximity to one another underground.

Urban runoff and other sources are also thought to contribute to elevated levels of fecal coliform and other bacteria at beaches throughout the county. At Neary Lagoon, urban runoff and resident and migratory birds are considered to be the primary sources of bacterial contamination to the lagoon. As previously mentioned, during the dry season water is diverted from Neary Lagoon to the City's Wastewater Treatment Facility so it may be treated prior to discharge to the Pacific Ocean.

The project goal, therefore, was to improve water quality and reduce beach closures at Main Beach caused by elevated bacteria counts. This was to be accomplished by decreasing the bacterial loadings to the lower San Lorenzo River which discharges on the southeast end of Main Beach. Therefore, the project involved a two pronged approach as follows:

- 1) Identification and repair of aging sewer pipelines in low, tidally influenced areas adjacent to the San Lorenzo River in order to minimize the ex-filtration of sewage into the storm drain system; and
- 2) Dry weather diversion of urban storm water runoff at three flood control pump stations (#1, #1A, and #2) located along the San Lorenzo River. A map of the three pump station/wet well locations is included in Attachment #2.

The project's two main components are summarized below:

1) Sanitary Sewer Rehabilitation Component:

- a) Installation of five shallow groundwater monitoring wells in low-lying areas adjacent to coastal lagoons where groundwater contamination by old leaky sewers was suspected. Please refer to Attachment #3 for a map of the groundwater monitoring wells.
- b) Evaluation of sewer integrity in areas of suspected sewer leakage primarily through CCTV inspection.
- c) Rehabilitation/reconstruction of sewer pipelines, including main lines and some laterals, and manholes found to be defective.

2) Storm Drain Dry Weather Diversion Component:

- a) Cleaning and video inspection of the storm drains lines along the levees and those draining to the lower San Lorenzo River via Pump Stations 1, 1A, and 2.
- b) Cross-connection of the underground storm drain lines at three flood control pump stations/wet wells, Pump Stations, 1, 1A, and 2, along the lower San Lorenzo River to nearby sewer lines to enable the dry weather diversion of storm water runoff to the City's Wastewater Treatment Facility (from June 1 to October 1).
- c) Seal by lining, as necessary, the large storm drain lines adjacent to the San Lorenzo River levee (along Elm Street, Spruce Street, and Center Street) to prevent sands and groundwater from entering existing non-gasketed concrete storm drain lines. This will reduce the amount of water to be pumped and diverted to the City's Wastewater Treatment Facility.

The County of Santa Cruz Environmental Health Services (County Environmental Health) provided support for the project by conducting groundwater, storm drain, river discharge, and ocean water monitoring. The County Environmental Health's monitoring under this project was supplemented by historical water quality data and other ongoing monitoring efforts in the vicinity that were conducted pursuant to AB 411, U.S. EPA BEACH programs, and a

Proposition 13 project to assess non-point sources of beach contamination. The monitoring data collected prior to commencement of the project was used to characterize conditions and identify the problem areas to be addressed. Data collected during and after project completion was intended to be used to document water quality improvements resulting from the project implementation.

In November 2007, County Environmental Health prepared a monitoring results report for this project entitled *City of Santa Cruz Clean Beach Initiative Projects, Repair of Leaking Sewer Lines and Diversion of Storm Drain Flow to Sanitary Sewer, Monitoring Results (November 2007)*. The report presents the results of County Environmental Health monitoring from September 2003 through October 2006, in addition to their historical data. In this report, County Environmental Health identifies 10 major conclusions from their analyses of the monitoring results. Their conclusions are summarized and paraphrased below:

Summary of Results

1. In general the data shows a high level of variability from year to year with no clear trends over the three year study period.
2. Bacteria testing included total coliform, E. coli, and enterococcus at all ocean stations and some of the River and storm drain stations... With a few exceptions, enterococcus levels are relatively low and most instances of standard exceedence involve exceedence of standards for fecal coliform or E. coli.
3. During this study, postings at Main Beach declined, but they remained high at Cowell Beach.
4. Water quality at the Main Beach is strongly influenced by water quality in the San Lorenzo River lagoon and the discharge from the San Lorenzo River. Water quality in the River upstream of the lagoon is generally good, and the elevated bacteria levels in the lagoon originate from storm drains, birds, and potentially the presence of homeless encampments. Ribotyping indicates that 9 % of the bacteria in the River lagoon comes from human sources: most likely sewer spills and leaks to the storm system.
5. Bacteria levels in the River lagoon are highly variable and are also influenced by flow, tidal action and whether or not the sand bar is closed. No significant trend in lagoon bacteria levels was observed during the course of this project.
6. Summer water quality at Cowell Beach is primarily influenced by proximity to the Wharf, accumulation of kelp and relatively lower circulation than Main Beach. During posting events high bacteria levels can be very localized and are rapidly diluted when there is more circulation from increased ocean swells. Neary Lagoon was eliminated as a source of high bacteria levels to Cowell Beach during summer months when a dry weather bypass was installed by the City in the 1990's.

7. Water quality at Pump station 1A (Station 0031DW) improved significantly from 2003 to 2006, most likely as a result of the 2004 sewer system upgrades in the area that drains to that pump station.
8. Results from shallow groundwater monitoring do not indicate presence of any significant widespread bacteria contamination in shallow groundwater. However, the presence of elevated nitrate and ammonia does suggest that there is some contribution from sewer leaks and there are likely localized plumes of elevated bacteria in proximity to the leaks. The bacteria are likely filtered out in the subsurface environment at greater distance from the leaks. The low levels of bacteria in the monitoring wells does not rule out the possibility of bacteria and pathogens moving from sewers to storm drains where sewer leaks may occur in close proximity to the storm drains.
9. The construction and operation of the dry weather diversions at the three pump stations is estimated to reduce the bacteria loading in the lagoon by 8 - 45%. These estimates will be refined with further testing during pump down events.
10. Follow up testing will continue with more analyses during operation of the dry weather diversions and with testing for human specific bacterioides in the lagoon, the storm drains and the beaches.'

In summary, although the report states that the project's sewer line improvements and pump station diversions have resulted in measurable improvements in water quality, County Environmental Health also believes that follow up sampling and analyses will help to further characterize the project's effectiveness.

In addition, both County Environmental Health and City staff believe that there are other potential sources, beyond the scope of this project, which may be contributing to water quality contamination at Main and Cowell Beaches. These other potential sources of bacterial contamination are:

- Birds frequenting the adjacent Santa Cruz Municipal Wharf (Wharf);
- Kelp accumulating (and rotting) offshore in the cove adjacent to Cowell Beach;
- Kelp accumulating on the beach;
- Marine mammals, such as seals and sea lions, frequenting the Wharf;
- Homeless encampments under/near the Wharf, and along the San Lorenzo River;
- Discharge from boats anchored off the Wharf;
- One storm drain outlet that drains to Cowell Beach from Monterey Avenue occasionally has high bacteria counts; and
- The reduced circulation of the cove at Cowell Beach tends to contribute to higher bacteria levels during periods of small ocean swell.

Currently, the City does implement certain measures related to some of these potential sources of bacterial contamination. For example, during the summer particularly in August, City Parks and Recreation staff removes the kelp that tends to accumulate on the beach for smell abatement purposes. The kelp is then taken to the City landfill for disposal. In addition, City Parks and Recreation staff cleans Main and Cowell Beaches daily by hand for litter. The City's also uses a "sand sifter" machine at least weekly approximately nine months of the year due to the additional amounts of litter on the beach during the nice weather. During the summer months, the City also uses additional crews to pick up litter. The City's Police Department also does routine daily patrols in the area to discourage homeless encampments under or near the Wharf. The City will continue to assess these other potential sources of beach contamination and will evaluate remedial measures to improve water quality.

In summary, according to County Environmental Health as mentioned above, the Clean Beaches Initiative Project (Proposition 13) has resulted in some improvements in water quality. Both major components of the project, the sanitary sewer evaluation and rehabilitation work and the storm drain diversions at pump stations along the San Lorenzo River contributed to these results.

However, County Environmental Health sampling results indicate high variability and, thus, follow up sampling and analyses will help to further evaluate and characterize the project's effectiveness. For example, the number of days the beach was posted at Main Beach decreased throughout the study period although this decline did not occur at Cowell Beach. However, this may be due to other factors such as Cowell Beach's location along a cove in between the Santa Cruz Municipal Wharf and the cliffs, and the potential sources of bacterial contamination beyond the scope of this project as mentioned in the section above. As previously stated the City currently takes action to address some of these issues, and will continue to evaluate these potential sources of contamination and any remedial measures with the goal of improving water quality.

Another issue which needs more study is that the monitoring results for Pump Stations 1 and 1A show measurable improvements in water quality while the results for Pump Station 2 do not show such an improvement except for the loadings diverted calculated by the pump down sampling events.

Lastly, the City is conducting additional work along the San Lorenzo River under a current Clean Beaches Grant (Proposition 40) for dry weather diversion at two other pump stations (1B and 3). Work under this second project will complement the Clean Beaches Initiative Project (Proposition 13) just completed and should result in additional benefits to water quality in the lower San Lorenzo River and, thus, at Main Beach and Cowell Beach.

CLEAN BEACHES INITIATIVE PROJECT: PROPOSITION 13

I. Introduction

The Clean Beaches Initiative (CBI) Grant Program, Proposition 13, awarded funds to the City of Santa Cruz (City) for the *Clean Beaches Initiative Project* under State Water Resources Control Board (SWRCB) Agreement No 01-077-550-2. The initial agreement, Agreement No 01-077-550-0 was approved on June 1, 2004. The term of the agreement was July 1, 2001 through March 31, 2006. The maximum amount of the Agreement was \$1,475,000. Of this maximum amount, a total of \$915,000 was paid to the City by the grant funds for the project. The City was required to provide matching funds for the portion of the project consisting of capital expenditures for construction in accordance with the formula specified in the Agreement.

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The project goal, therefore, was to improve water quality and reduce beach closures at Main Beach caused by elevated bacteria counts. This was to be accomplished by decreasing the bacterial loadings to the lower San Lorenzo River which discharges on the southeast end of Main Beach. A site map is provided in Attachment #1. Therefore, the project involved a two pronged approach as follows:

- 1) Identification and repair of aging sewer pipelines in low, tidally influenced areas adjacent to the San Lorenzo River in order to minimize the ex-filtration of sewage into the storm drain system; and
- 2) Dry weather diversion of urban storm water runoff at three flood control pump stations (#1, #1A, and #2) located along the San Lorenzo River. A map of the three pump station/wet well locations is included in Attachment #2.

The project's two main components are summarized below:

1) Sanitary Sewer Rehabilitation Component:

- d) Installation of five shallow groundwater monitoring wells in low-lying areas adjacent to coastal lagoons where groundwater contamination by old leaky sewers was suspected. Please refer to Attachment #3 for a map of the groundwater monitoring wells.
- e) Evaluation of sewer integrity in areas of suspected sewer leakage primarily through CCTV inspection.
- f) Rehabilitation/reconstruction of sewer pipelines, including main lines and some laterals, and manholes found to be defective.

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- f) Seal by lining, as necessary, the large storm drain lines adjacent to the San Lorenzo River levee (along Elm Street, Spruce Street, and Center Street) to prevent sands and groundwater from entering existing non-gasketed concrete storm drain lines. This will reduce the amount of water to be pumped and diverted to the City's Wastewater Treatment Facility.

The County of Santa Cruz Environmental Health Services (County Environmental Health) also provided support for the project by conducting groundwater, storm drain, river discharge, and ocean water monitoring. The County Environmental Health's monitoring under this project was supplemented by historical water quality data and other ongoing monitoring efforts in the vicinity that were conducted pursuant to AB 411, U.S. EPA BEACH programs, and a Proposition 13 project to assess non-point sources of beach contamination. The monitoring data collected prior to commencement of the project was used to characterize conditions and identify the problem areas to be addressed. Data collected during and after project completion was intended to be used to document water quality improvements resulting from the project implementation. Please refer to Attachment #4 for the *Monitoring and Reporting Plan* which includes a list of the stations sampled and a map of the sampling locations.

In addition, County Environmental Health prepared a report for this project summarizing the monitoring results and detailing their findings. This report is entitled *City of Santa Cruz Clean Beach Initiative Projects, Repair of Leaking Sewer Lines and Diversion of Storm Drain Flow to Sanitary Sewer, Monitoring Results*, dated November 2007 and is included in Attachment #21. This report will be discussed in greater detail in Section III of this document.

II. Project Description and Tasks

The work to be performed under this contract was broken into the following main areas: Project Management, CEQA, Quality Assurance, Installation of Monitoring Wells, Work Scope, and Reporting. The project tasks and associated deliverables are detailed below. As mentioned above, the scope of work had two main components: sanitary sewer repair and dry weather diversion of storm drain lines to the sanitary sewer system.

Sanitary Sewer Repair

This portion of the project involved video inspection of the sewer lines in the Beach Flats area and review of these tapes by the City engineer. This investigation was followed by the rehabilitation/reconstruction of sewer pipelines where leaks, breaks, and other such problems were indicated.

In an effort to help quantify the impact to localized groundwater from the Beach Flats sewage systems, the City installed five groundwater monitoring wells in the Beach Flats area. These groundwater wells were then sampled by the County of Santa Cruz Environmental Health Services as part of the *Monitoring and Reporting Plan*.

Rehabilitation activities included the replacement or repair of sewer main pipes and some private laterals (between the clean-out in sidewalk and the City's main in street), installation of appropriate clean-outs, and any repairs necessary to return the construction site to its original condition. In addition, some manholes were found to be defective repairs and these were also repaired.

Storm Water Diversion (Dry Weather Diversion Project)

The storm drain project involved implementing dry weather diversion of storm water from three City pump stations/wet wells (1, 1A, and 2) along the lower San Lorenzo River, to the City's Wastewater Treatment Facility. Prior to the diversion work, the storm drains lines along the river levees and the feeders lines, down to 12 inches in diameter, draining to the lower San Lorenzo River were evaluated by video inspection to determine which lines needed rehabilitation and/or cleaning. Lines were cleaned as necessary and it was thus determined that the storm drain lines along Elm Street, Spruce Street, and Center Street needed rehabilitation.

As part of the diversion work, cross-connecting piping was installed from the pump stations to the nearest sanitary sewer manhole at least three-feet above the crown of the existing sanitary sewer pipeline. Check and gate valves were installed in the line(s) as a protective measure.

The pump stations and the diversions are described below:

- Pump station 1 is located adjacent to the San Lorenzo River near the Broadway Bridge (on the west side of the River) and is referred to as the “Broadway pump station.” Wet well #1 was pumped to the sanitary sewer manhole on Spruce Street.
- Pump station 1A is located in the Santa Cruz Beach Boardwalk parking lot near the San Lorenzo River railroad trestle and is referred to as the “San Lorenzo Trestle pump station.” Wet well #1A was pumped to the sanitary sewer manhole on Third Street (at Beach Street).
- Pump station 2 is located adjacent to the San Lorenzo River at Bixby Street and San Lorenzo Boulevard (on the east side of the River) and is referred to as the “Bixby pump station.” Wet well #2 was pumped to the sanitary sewer manhole on San Lorenzo Boulevard.

The last major component of the project was the rehabilitation of storm drain pipelines along Elm Street, Spruce Street, and Center Street as mentioned above. These non-gasketed concrete storm drain pipelines were sealed by lining, where necessary, to prevent sands and groundwater from entering the system. This work was thus expected to reduce the amount of water pumped to the Wastewater Treatment Facility during the dry weather diversions. Please refer to Attachment #5 for a location map of this work.

These projects are described in more detail in the Tasks below.

Task 1 - Project Management and Administration

The City of Santa Cruz was responsible for the seven key management and administration items listed below.

- 1.1 Provide all technical and administrative services as needed for contract completion; monitor, supervise, and review all work performed; coordinate budgeting and scheduling to assure that the contract is completed within budget, on schedule, and in accordance with approved procedures, applicable laws, and regulations.
- 1.2 Ensure that the contract requirements are met through completion of quarterly progress reports and through regular communication with the SWRCB Project Representative. The progress reports shall describe activities undertaken and the accomplishments of each task during the quarter, milestones achieved, and any problems encountered in the performance of the work under this contract. The description of activities and accomplishments of each task during the quarter shall be in sufficient detail to provide a basis for payment of invoices and shall be translated into percent of task work completed for the purpose of calculating invoice amounts.

- 1.3 Ensure that all documents, written reports, or brochures have a "State Disclosure" which are prepared in whole or in part pursuant to this contract include the following disclosure statement:
"Funding for this project has been provided in full or in part through a contract with the State Water Resources Control Board (SWRCB) pursuant to the Costa-Machado Water Act of 2000 (Proposition 13) and any amendments thereto for the implementation of California's Nonpoint Source Pollution Control Program. The contents of this document do not necessarily reflect the views and policies of the SWRCB, nor does mention of trade names or commercial products constitute endorsement or recommendation for use."
(Gov. Code 7550, 40 CFR 31.20)
- 1.4 Ensure that the SWRCB Project Representative is notified at least ten working days prior to any public or media event publicizing the accomplishments and/or results of this contract and provide the opportunity for attendance and participation by SWRCB representatives.
- 1.5 Complete a one-page contract summary form (form to be provided by the SWRCB) within three month(s) of the contract execution.
- 1.6 Award contract(s) to appropriate subcontractor(s) to perform tasks as outlined in the Agreement (Agreement No. 01-077-550-2). Document steps taken in soliciting and awarding the subcontract and submit them to the SWRCB Project Representative for review. Document all subcontractor activities in quarterly reports.
- 1.7 At the completion of this project and prior to final payment, the Project Representative shall fill out and provide a project survey form to the SWRCB Project Representative.

As a part of completing this work, the City submitted the following information to the State: 1) quarterly progress reports, 2) contract summary form, and 3) subcontractor documentation. Submittal of the project survey form is pending.

Task 2 – California Environmental Quality Act (CEQA) Documentation

- 2.1. Prior to commencing work under this contract, for any work subject to CEQA, the City was required to submit documents to the SWRCB Project Representative that satisfied the CEQA process.

The City submitted a Negative Declaration for the *Clean Beaches Initiative-Dry Weather Diversion Project* to the SWRCB Project Representative. The State Clearinghouse Data Base *Document Details Report* indicates that it was received on 2/18/2003, began review on 2/18/2003, and ended review on 3/19/2003. The State Clearinghouse ten digit project number is: SCH# 2003022080.

- 2.2 The City was required to secure all required permits for the project work.

Prior to commencing work subject to permitting, the City submitted the appropriate documents satisfying the permit process to the SWRCB Project Representative,

2.2.1 The City was required to obtain permits for the installation of up to five groundwater monitoring wells.

Permits for the work were obtained by the City's consultant, Weber, Hayes & Associates.

Task 3 – Quality Assurance Project Plan

3.1 The City was required to prepare and maintain a Quality Assurance Project Plan (QAPP).

The City submitted a QAPP entitled *Assessment of Non-point Sources of Beach Contamination & Monitoring of Santa Cruz Main Beach Water Quality Improvements and Related Efforts*, Revision No.4. The QAPP for the beach and lower San Lorenzo River mouth (lagoon) was prepared by the County of Santa Cruz, Environmental Health Services (County Environmental Health Services), in accordance with the EPA Guidelines Booklet: *Quality Assurance Management Plan For Projects Funded by US Environmental Protection Agency Development Grants For Beach Water Quality And Public Notification Programs* dated June 20, 2002.

The QAPP was prepared to facilitate the sampling and analysis of groundwater, storm drain, river discharge, and ocean water monitoring in order to determine the amount of contamination from specific sources thought to be contributing to beach closings in the Santa Cruz county area. The QAPP *Monitoring and Reporting Plan* was also conducted by County Environmental Health Services.

Although some of the *Monitoring and Reporting Plan* sampling was conducted specifically for this project, much of it was already being conducted by the County for several other concurrent monitoring programs such as: AB 411 beach sampling, routine County sampling of the San Lorenzo River, and sampling as part of the Proposition 13 project to assess beach water quality (2003-2004). In addition, County Environmental Health Services also provided historical water quality data which supplemented the project efforts including characterization of pre-project levels of indicator bacteria. As previously mentioned, please refer to Attachment #4 for a copy the Monitoring and Reporting Plan, which includes a list of the stations sampled and a map of the sampling locations.

According to the *Monitoring and Reporting Plan*, sample water was analyzed for total coliform, enterococcus, and E. coli bacteria in the lower San Lorenzo River and the ocean waters at Main Beach. These samples were tested using the IDEXX Chromogenic Testing Method. River and storm drain samples were analyzed for turbidity, pH, dissolved oxygen, temperature, and conductivity.

Samples collected from the groundwater wells installed by the City for this project were tested for conductivity, and the water level in the well was determined. Ribotyping was

also used for source characterization at several stations under the County's Beach Water Quality Investigation project. Nutrient analyses were limited to nitrates and other analytes, such as ammonia, were tested as needed.

Task 4 – Installation of Monitoring Wells

- 4.1 The City was required to prepare documents including the design and sub-contracting plans and specifications and final cost estimate for the installation of monitoring wells in accordance with the City Standards.

Task Deliverable: 100% design and specification submittal

The City prepared and submitted all documents as required.

- 4.2 The City was required to select a well driller by a competitive bidding process. The firm was required to drill, construct, and complete the wells as specified.

Task Deliverable: Approved plans and specifications for distribution during the bidding process, contract addenda (if necessary) and award of contract.

The City request bids for the well installation work. Three informal bids were received and Weber, Hayes & Associates was the lowest bidder. On July 30, 2003, the City issued a PO to Weber, Hayes & Associates for the installation of five monitoring wells. The PO was for \$7,565; however, this amount did not include the fees for the well permits. Installation of the monitoring wells was done in August 2003. A map showing the locations of the monitoring wells is included in Attachment #3.

The following details the location of each of the monitoring wells (MW):

- MW1 is located on Beach Street in front of the Ideal Fish Restaurant (near the entrance to the Santa Cruz Municipal Wharf)
- MW2 is located on Cliff Street
- MW3 is located on Raymond Street
- MW4 is located on Uden Street (currently part of a City owned lot called "200 Raymond Street")
- MW5 is located on Park Place

Unfortunately, in winter 2005/2006, MW1 was accidentally paved over when Beach Street was repaved and a bicycle lane was installed. County Environmental Health staff was unable to locate the well cover and, thus, sampling from this well was discontinued as of the January 2006 monitoring event. The City is currently in the process of trying to locate this well to see if it may be re-opened and the monitoring resumed.

In addition, during a demolition project at the old Beach Flats Community Center, Well MW4 was buried under dirt and debris and County staff thought that the well lid had been broken off by a bulldozer or scraper. Thus, sampling from this well was discontinued as of the February 2005 monitoring event. In 2007, the lot was prepared for

construction of a new building and, thus, City and County staff were recently able to relocate Well MW4. It was determined that the well condition was sufficient to resume monitoring and therefore County staff resumed monitoring at MW4 in October 2007.

- 4.3 The City was required to sample the groundwater monitoring wells in accordance with the Monitoring and Reporting Plan.

Task Deliverable: Data from the sampling of the monitoring wells.

County Environmental Health Service sampled the monitoring wells in accordance with the Monitoring and Reporting Plan with the exception of the two wells, MW1 and MW4, which became non-functional in January 2006 and February 2005 respectively as described above.

Task 5 – Final Project Engineering-Sanitary Sewer Repair

- 5.1 Map portion of sewer system to be videoed.

Task Deliverable: Map of sewer pipelines to be videoed.

This map was submitted to the RWQCB in 2002.

- 5.2 Subcontract to have the specified pipelines videoed.

Task Deliverable: Contract with subcontractor to video pipelines.

Video inspections were conducted by the subcontractor between April 4 and April 30, 2002. A total of 13,230 lineal feet of sewer pipeline was videoed. The City paid the subcontractor, Video Inspection Specialists, \$5,688.90 on June 21, 2002 for this work. Copies of the PO the City issued for the work, the contractor's invoice, and the check issued to the contractor by the City was submitted to the SWRCB on February 10, 2003.

- 5.3 Review the videotapes to determine the location of infiltration and damaged pipe to be repaired.

Task Deliverable: Video logs and tapes.

Videotapes of the selected sewer lines were reviewed by the project engineer who determined the locations of infiltration and damaged pipes that needing repairs. A copy of the video logs was submitted to the SWRCB in 2003 and the videotapes were made available for review by the state representative during a field visit.

- 5.4 Prepare construction documents for bidding repairs.

5.4.1 Field survey and prepare base map for construction documents.

- 5.4.2 Design repairs and prepare sub-contract documents including final construction plans and specifications and final cost estimate for the project in accordance with the City of Santa Cruz Standards.
- 5.4.3 Bid and award the repair project. Provide bid documents, respond to questions as required to clarify details for the plans and specifications, prepare addenda to the plans and specifications, and award project. Award will be to the lowest qualified bidding sub-contractor.

Task Deliverable: 100% design and specification submittal and construction cost estimates, 50 sets of approved plans and specifications for distribution during the bidding process, contract addenda (if necessary) and award of construction contract.

Final plans and specification were submitted to the SWRCB as required. The "as-built" drawings are included in Attachment #6.

Task 6 –Project Implementation-Sanitary Sewer Repair

- 6.1 Selection of a Construction Contractor (CC): A CC was required to be selected based on a competitive bidding process using approved contract documents prepared as part of Task 5.4.2.

Task Deliverable: Contract with CC.

A copy of the City's contract with the CC, KJ Woods Construction Inc., was submitted to the SWRCB on February 10, 2003. A copy of the PO issued by the City to the Contractor on September 12, 2003 for a total of \$864,000 was also submitted.

- 6.2 The Contractor's staff was required to perform the function of Construction Management (CM): the CM will provide inspection and oversight of construction activities to verify compliance with approved plans and specification. The CM was also required to be responsible for taking pre and post photos of the work that was done and for reviewing post construction video for watertight sanitary sewer pipelines.

Task Deliverable: Report reviewing post-construction videos.

Logs and video of post construction were shown to SWRCB staff at the time of the site visit. The City Department of Public Works retains the logs and videos.

- 6.3 Construction activities were required to include but were not limited to the replacement or repair and testing of sewer main pipes and laterals, installation of appropriate clean-outs, and any repairs necessary to return the construction site to its original condition.

Task Deliverable: Completed project indicated by pre and post photos, and as-built drawings.

As mentioned above, the sewer pipeline videos were reviewed by SWRCB staff during the site visit and the City retains the videos. Also, the "as-built" drawings are included in Attachment #6.

In addition to rehabilitation of the main lines (about 6,000 linear feet), approximately 70 private sewer laterals in the Beach Flats area were repaired between the clean-out in the sidewalk and the City's main in the street.

Task 7 – Final Project Engineering - Storm Water Diversions

- 7.1 Hire an electrical engineer to design control panel for proposed diversion pumps.

Task Deliverable: Subcontract documentation with electrical engineer.

The City submitted documents related to the control panel design for the diversion pumps to the SWRCB.

- 7.2 Hire contractor to clean the lines as necessary to facilitate televising of the storm lines which deliver storm water to pump stations 1, 1A, and 2.

Prior to televising the storm drain lines leading to these pump stations, both a contractor and City Wastewater Mains crews were used to clean and/or pump pipelines that were impassable or filled with water or debris that could obstruct the camera's view.

- 7.3 Hire contractor to televise the storm water lines.

A PO was issued to the contractor, Video Inspection Specialists, on May 18, 2004 for the video inspection of City storm drain lines between 12-54 inches in diameter that drain to pump stations (1, 1A, and 2), which are the locations for the dry weather diversions. The Contractor was required to inspect the lines using a color, closed circuit television camera (CCTV), with a 360-degree articulating, remotely controlled lens and to document the inspection on ½ inch VHS format video/audio cassette recorder.

In order to provide the fullest view of pipe, the Contractor was required to conduct the TV inspections during low flow conditions. The contractor was directed to stop the camera at all points within the storm drain where a defects, lateral, or sewer appurtenances were noticed and then pan to ensure adequate video coverage.

A total of 13,595 lineal feet was televised including 9,074 lineal feet of storm drain pipeline televised between 6/16-7/2/2004 and 4,521 lineal feet of work televised on 8/26/2004.

In addition, in March 2005 a PO for \$14,682 was issued to the contractor, Greenline, for the cleaning and videoing of approximately 3,300 feet of 14 to 48 inch storm drain pipelines and manholes (along San Lorenzo Boulevard per Pump Station 2). The contractor was required to provide all tapes and inspection logs to the City.

- 7.4 Field survey and prepare base map for construction documents for dry weather diversion of Wet Wells 1(A), 1, and 2.

Field surveys were conducted and base maps were prepared for the construction documents.

- 7.5 Design civil and piping layout portion of the project including installation of small submersible pumps in wet well station sediment chamber to pump summer flows to sanitary sewer manhole. Wet well #1 will be pumped to the sanitary sewer manhole on Spruce Street. Wet well #1A will be pumped to the sanitary sewer manhole on Third Street (at Beach Street). Wet well #2 will be pumped to the sanitary sewer manhole on San Lorenzo Boulevard.

This was accomplished as planned.

- 7.6 Incorporate electrical design and monitoring device into the project. Monitoring device required to shut down system if contaminants are detected to prevent damage to the Wastewater Treatment Plant.

This was accomplished as planned.

- 7.7 Prepare contract documents (plans, specifications and final cost estimate) for the project in accordance with the City of Santa Cruz standards.

Task Deliverable: 100% Plans and specifications and construction estimates, and copies of any contract addenda.

Contract documents were prepared in accordance with the City of Santa Cruz standards. Copies of these documents and other pertinent information were submitted to the SWRCB in the quarterly reports.

Task 8 –Project Implementation- Storm Water Diversions

- 8.1 Selection of a Construction Contractor (CC): A CC was required to be selected based on a competitive bidding process using approved contract documents prepared as part of Task 7.7.

Task Deliverable: Contract with CC.

Several construction contractors were used to complete the work at the three pump stations/wet wells. A copy of each contract was submitted to the SWRCB in the quarterly reports from the corresponding periods.

- 8.2 The contractor's staff was required to perform the function of Construction Management (CM): the CM will provide inspection and oversight of construction activities to verify

compliance with approved plans and specification. The CM was also required to be responsible for taking photos of the work that was completed.

8.3 Construction activities include, but are not limited to the following:

- 8.3.1 Line storm drain pipe with Cured in Place Pipe (CIPP).
- 8.3.2 Install one submersible pump in each of the three existing storm drain wet sumps. Pumps and piping (as needed) shall be easily removable for maintenance at the end of each dry season.
- 8.3.3 Set control panel including automatic pump controls based on level of water in sump.
- 8.3.4 Install piping from pump to closest sanitary sewer manhole. Install a check valve and gate valve in line as protective measure. Pipe shall enter manhole at least 3 feet above crown of existing sanitary sewer pipeline.
- 8.3.5 Complete finishing touches for the project completion including the installation of proper access to valves, adjustments to the pump stations and repair any street paving damaged and/or removed as part of the construction.

Task Deliverable: Photo documentation.

Detailed photos of each pump station are submitted with this report and are included in the Attachments. Attachments # 7-11 include photos of Pump Station/Wet Well #1. The photos show the pump station layout, the diversion pump railing, the outlet where storm water is diverted to the sanitary sewer, the submersible diversion pump (which is underwater in the photo), and the control panel box. There is also a photo showing the pump station outlet, marked by the concrete apron, to the San Lorenzo River. Attachments #12-15 include photos of Pump Station/Wet Well #1A. These photos show some of the pump station layout, a close-up of the control panel box, and the storm drain outlet pipes to the San Lorenzo River. There also is a photo showing the pump station outlet discharging to the San Lorenzo River. Attachments #16-19 include photos of Pump Station/Wet Well #2. These photos show the pump station layout, the submersible diversion pump railing, and close-up of the control panel box.

Summary of the work: As previously mentioned, Wet well #1 was pumped to the sanitary sewer manhole on Spruce Street. Wet well #1A was pumped to the sanitary sewer manhole on Third Street (at Beach Street). Wet well #2 was pumped to the sanitary sewer manhole on San Lorenzo Boulevard.

A submersible pump was installed in each of the three pump station wet wells (sumps). Pumps and piping, that are easily removable for maintenance and withdrawal at the end of each dry season, were installed. A control panel, including automatic pump controls based on level of water in the wet well, was also installed at each pump station.

Cross-connecting piping was installed from each pump station to the nearest sanitary sewer manhole at least three-feet above the crown of the existing sanitary sewer pipeline. Check and gate valves were also installed in the lines as a protective measure. A brief description of the work done at each pump station/wet well is provided below. Also included below is a summary of the storm drain rehabilitation work done as part of this project on the main lines running along Elm Street, Spruce Street, and Center Street in order to minimize groundwater infiltration and the diversion of excessive amounts of groundwater to the wastewater treatment plant.

Pump Station 1

Pump Station 1 Diversion Force Main Project

This work involved potholing existing utilities prior to trenching, traffic control, water control, sanitary sewer bypass, shoring, and 400 L.F. 4-inch force main. A PO for this work was issued to Johnson & Company on June 2, 2005 for \$36,800. The work was completed by July 28, 2005.

Pump Station 1 Diversion Pump and Controls Installation Project

This work involved installation of a small diversion pumping system in the existing storm water pump station wet well. This included an access hatch, guide rail with quick-disconnect system, and all electrical and plumbing. The Contractor installed and connected a City supplied pump and control panel. A PO for this work was issued to Johnson & Company for \$21,680. The work was completed by June 30, 2006.

Pump Station 1A

Pump Station 1A Diversion Force Main Project

The contract work involved six components as follows: 1) potholing the existing utilities prior to trenching; 2) traffic control; 3) water control; 4) sanitary sewer bypass; 5) shoring; 6) 118 LF 4-inch force main. A PO for this work was issued to Johnson & Company on May 6, 2005 for \$21,824. The work was completed by May 12, 2005.

Pump Station 1A Diversion Pump and Controls Installation Project

This work involved installation of a small diversion pumping system in the existing storm water pump station wet well. This included an access hatch, guide rail with quick-disconnect system, and all electrical and plumbing. The City supplied pump and control panel was also installed and connected by the Contractor. A PO for this work was issued to Anderson Pacific Engineering Construction, Inc. for \$25,084.00. The work was completed by March 30, 2006.

Pump Station 2

Pump Station 1A Diversion Force Main

The diversion piping for Pump Station 2 was installed several years ago as part of an unrelated project. The diversion pipe extends from this pump station to a sanitary sewer manhole in the center of San Lorenzo Blvd. When the diversion pump was installed for this grant project (see below), a connection was made within the perimeter of Station 2 to the pre-existing diversion pipe.

Pump Station 2 Diversion Pump and Controls Installation Project

This work involved installation of a City supplied pump on a rail system, along with discharge piping to the point of connection in the existing storm water pump station wet well. The pump capacity is just under 70 gpm and the controller was outfitted with a timer. A PO for this work was issued to George H. Wilson Inc. for \$2,682.00. Dry weather diversion at Pump Station 2 was completed by August 1, 2005.

Storm Drain Rehabilitation Project: Elm Street, Center Street, and Spruce Street

This work involved rehabilitation of the storm drain pipelines along Elm Street, Spruce Street, and Center Street as indicated by video inspection. As previously mentioned, a site street map is included in Attachment #5. These concrete storm drain pipes were lined with Cured in Place Pipe (CIPP). The work will prevent groundwater from entering the storm drain system along these pipelines, which is expected to reduce the amount of water pumped to the Wastewater Treatment Facility during the dry weather diversions. The City awarded a contract for this work to Pacific Liners, Inc. A PO was issued to the Contractor for \$187,539 on January 19, 2006. The Notice of Completion date was April 13, 2006.

Task 9 –Reporting

- 9.1 Submit to the SWRCB a monitoring and reporting plan consistent with Water Code 79148.8(d). The plan shall address the following information:
 - 9.1.1 Identifies the non-point source or sources of pollution to be prevented or reduced by the project.
 - 9.1.2 Describe the baseline water quality or quality of the environment to be addressed.
 - 9.1.3 Describes the manner in which the project will be effective in preventing or reducing pollution and in demonstrating the desired environmental results

A Quality Assurance Project Plan (QAPP) and a Monitoring and Reporting Plan were submitted as required. The QAPP, Revision No. 4, was dated December 26, 2003. The Monitoring and Reporting Plan was dated July 2004. Both were prepared by the County of Santa Cruz, Environmental Health Services.

- 9.2 Prepare a draft final project report that summarizes project accomplishments and submit to the Project Representative for review and comment. The report shall provide the following requirements:
- 9.2.1 A brief introduction section including a statement of purpose, the scope of the project, and a brief description of the approach and techniques used during the project.

III. Project Results and Findings

The diversion pumping from the pump stations/wet wells 1, 1A, and 2 began in July 2006 and was conducted on a weekly basis as controlled pump downs until September 19, 2006. Controlled pump downs, with field monitoring prior to discharge, was chosen by the City in lieu of round-the-clock diversion in order to protect the City's Wastewater Treatment Plant from any harmful pollutants that might be discharged into the storm drain system in these areas. At each pump station, staff conducted a visual check for oil sheens, etc, plus in-field monitoring for pH and the presence of volatile organic compounds. Staff also conducted a 30 minute MicroTox test called "Delta Tox" using frozen luminescent bacteria.

Once the on-site inspection and monitoring indicated that the water did not contain harmful or hazardous levels of these pollutants, the City Wastewater Mains Supervisor was notified and his crews went to each of the pump stations and manually started the discharge to the treatment plant. The total pump time, the pumping rate, and the total amount of gallons diverted was recorded at each pump station. A summary of the pump down and diversion data for 2006 is included in Attachment #20.

As previously mentioned, County Environmental Health Services provided support for the project by conducting groundwater, storm drain, river discharge, and ocean water monitoring. Although some of the above monitoring was conducted specifically for this project, much of the sampling was already being conducted by the County for several other concurrent monitoring programs such as: AB 411 beach sampling, routine County sampling of the San Lorenzo River, and sampling as part of the Proposition 13 project to assess beach water quality (2003-2004). In addition, the County also provided historical water quality data which supplemented the project efforts including characterization of pre-project levels of indicator bacteria.

To assess and summarize the project's monitoring results, County Environmental Health prepared a report entitled *City of Santa Cruz Clean Beach Initiative Projects, Repair of Leaking Sewer Lines and Diversion of Storm Drain Flow to Sanitary Sewer, Monitoring Results* (County Environmental Health Monitoring Results 2007 report) dated November 2007. Please refer to this report, which is included in Attachment #21, for a complete analysis by County Environmental Health. County Environmental Health notes that the project's sewer line improvements and pump station diversions have resulted in measurable improvements in water quality. However, they state that there is still a fair amount of variability, and follow up sampling and analyses will help to further characterize the project's effectiveness. Highlights from this report are included below.

Highlights from the County Environmental Health report, *City of Santa Cruz Clean Beach Initiative Projects, Repair of Leaking Sewer Lines and Diversion of Storm Drain Flow to Sanitary Sewer, Monitoring Results (November 2007)*

The County Environmental Health monitoring results report includes a figure (Figure 12) detailing the sewer and storm drain lines in the vicinity of the San Lorenzo as excerpted below:

Figure 12: Sewer and Storm Lines near the Lower San Lorenzo River
(Sewers are solid lines and storm drains are dotted lines)



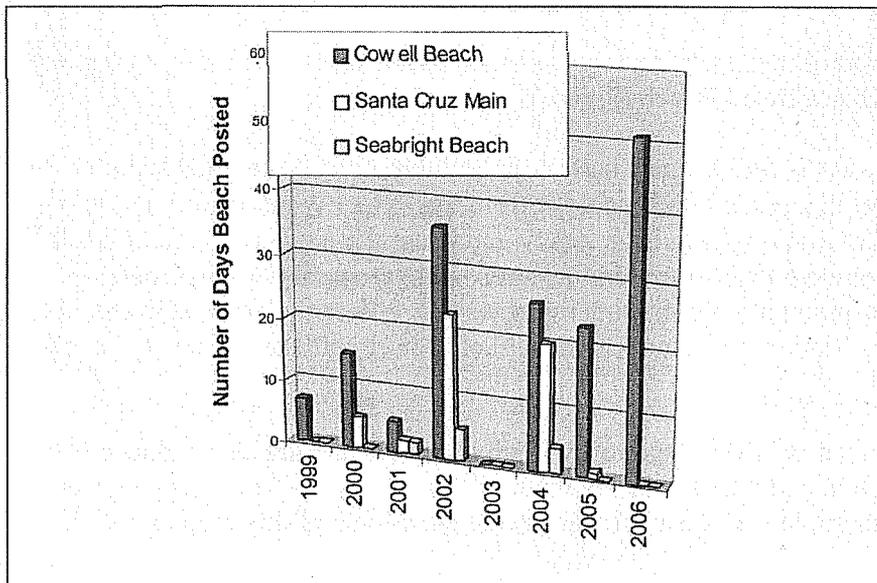
Sample results from the diversion pump downs at Pump Stations 1 and 2 in 2006 show that the work done under the *Clean Beach Initiative Project* grant has resulted in significant bacterial loadings being diverted from the San Lorenzo River. The table below is an excerpt from the County Environmental Health Monitoring Results 2007 report, and it indicates the volume of storm water pumped to sanitary sewer by City staff in 2006 along with the estimated amount of bacteria loadings diverted from the San Lorenzo River.

Table 7: Volume of Storm Water Pumped to Sanitary Sewer and Estimated Bacteria Load Diverted

Pump station	Volume Pumped (gallons)	2006 Log mean E.coli (cfu/100ml)	Summer 2006 Log mean E.coli	Low Estimate 2006 E. coli Load (gallons x logmean)	High Estimate Summer 2006 E. coli Load (gallons x logmean)
1	243,950	116	857	28,298,200	209,065,150
1A	43,050	13	5	559,650	215,250
2	167,650	5412	25000	907,321,800	4,191,250,000
				936,179,650	4,400,530,400
% contribution to lagoon				8.2%	45.2%
Total Lagoon volume	40,728,625	282	239	11,485,472,250	9,734,141,375

In addition, the County Environmental Health Monitoring Results 2007 report shows the number of days of beach postings at Main Beach, Cowell Beach, and Seabright Beach (also in the City of Santa Cruz southeast of the San Lorenzo River towards the Santa Cruz Yacht Harbor) between 1999 and 2006. As indicated in the graph (Figure 6), the report states that “over the period of this study postings at Main Beach have declined, but they have remained high at Cowell Beach.”

Figure 6: Days of Beach Postings – 1999-2006



Regarding Cowell Beach, the report also states that “summer water quality at Cowell Beach is primarily influenced by proximity to the wharf, accumulation of kelp and relatively lower circulation than Main Beach. During posting events high bacteria levels can be very localized and are rapidly diluted when there is more circulation from increased ocean swells. Neary Lagoon was eliminated as a source of high bacteria levels to Cowell Beach during summer

months when a dry weather bypass (to the Wastewater Treatment Facility) was installed in the 1990's."

The County Environmental Health Monitoring Results 2007 report identified 10 major conclusions from their analyses. These conclusions are excerpted below:

"Summary of Results

11. This report presents the results of monitoring conducted from September 2003 through October, 2006, as well as historical data. Results for each station monitored are summarized for each year for the AB 411 testing period (April-October) in Table 1 and Appendix A, and are presented in figures and tables, below. In general the data shows a high level of variability from year to year with no clear trends over the three year study period. However, a number of observations can be made.
12. Bacteria testing included total coliform, E. coli, and enterococcus at all ocean stations and some of the River and storm drain stations. River testing has historically used fecal coliform and this continued during this study. Past comparative testing in Santa Cruz County has shown that there is little difference between fecal coliform and E. coli results and the two are generally used interchangeably in the data analysis. The same standard is applied to both fecal coliform and E. coli: a logmean of 200 MPN(cfu)/100ml and an instantaneous maximum of 400 MPN(cfu)/100ml. With a few exceptions, enterococcus levels are relatively low and most instances of standard exceedence involve exceedence of standards for fecal coliform or E. coli.
13. Over the period of this study postings at Main Beach have declined, but they have remained high at Cowell Beach (Figure 6).
14. Water quality at the Main Beach is strongly influenced by water quality in the San Lorenzo River lagoon and the discharge from the River. Water quality in the River upstream of the lagoon is generally good, and the elevated bacteria levels in the lagoon originate from storm drains, birds, and potentially the presence of homeless encampments. Ribotyping indicates that 9 % of the bacteria in the River lagoon comes from human sources: most likely sewer spills and leaks to the storm system.
15. Bacteria levels in the River lagoon are highly variable and are also influenced by flow, tidal action and whether or not the sand bar is closed. No significant trend in lagoon bacteria levels was observed during the course of this project.
16. Summer water quality at Cowell Beach is primarily influenced by proximity to the wharf, accumulation of kelp and relatively lower circulation than Main Beach. During posting events high bacteria levels can be very localized and are rapidly diluted when there is more circulation from increased ocean swells. Neary Lagoon

was eliminated as a source of high bacteria levels to Cowell Beach during summer months when a dry weather bypass was installed in the 1990's.

17. Water quality at Pump station 1A (Station 0031DW) improved significantly from 2003 to 2006, most likely as a result of the 2004 upgrades to the sewer system in the area that drains to that pump station.
18. Results from shallow groundwater monitoring do not indicate presence of any significant widespread bacteria contamination in shallow groundwater. However, the presence of elevated nitrate and ammonia does suggest that there is some contribution from sewer leaks and there are likely localized plumes of elevated bacteria in proximity to the leaks. The bacteria are likely filtered out in the subsurface environment at greater distance from the leaks. The low levels of bacteria in the monitoring wells does not rule out the possibility of bacteria and pathogens moving from sewers to storm drains where sewer leaks may occur in close proximity to the storm drains.
19. The construction and operation of the dry weather diversions at the three pump stations is estimated to reduce the bacteria loading in the lagoon by 8 - 45%. These estimates will be refined with further testing during pump down events.
20. Follow up testing will continue with more analyses during operation of the dry weather diversions and with testing for human specific bacterioides in the lagoon, the storm drains and the beaches."

As previously mentioned, please refer to Attachment #21 for the complete County Environmental Health report *City of Santa Cruz Clean Beach Initiative Projects, Repair of Leaking Sewer Lines and Diversion of Storm Drain Flow to Sanitary Sewer, Monitoring Results, November 2007*.

In summary, although the County Environmental Health report states that the project's sewer line improvements and pump station diversions have resulted in measurable improvements in water quality, they also believe that follow up sampling and analyses will help to further characterize the project's effectiveness.

In addition, both the County Environmental Health and City staff believe that there are other potential sources, beyond the scope of this project, which may be contributing to water quality contamination at Main and Cowell Beaches. These other potential sources of bacterial contamination are:

- Birds frequenting the adjacent Santa Cruz Municipal Wharf (Wharf);
- Kelp accumulating (and rotting) offshore in the cove adjacent to Cowell Beach;
- Kelp accumulating on the beach;
- Marine mammals, such as seals and sea lions, frequenting the Wharf;
- Homeless encampments under/near the Wharf, and along the San Lorenzo River;

- Discharge from boats anchored off the Wharf;
- One storm drain outlet that drains to Cowell Beach from Monterey Avenue occasionally has high bacteria counts; and
- The reduced circulation of the cove at Cowell Beach tends to contribute to higher bacteria levels during periods of small ocean swell.

Currently, the City does implement certain measures related to some of these potential sources of bacterial contamination. For example, during the summer particularly in August, City Parks and Recreation staff removes the kelp that tends to accumulate on the beach for smell abatement purposes. The kelp is then taken to the City landfill for disposal. In addition, City Parks and Recreation staff cleans Main and Cowell Beaches daily by hand for litter. The City's also uses a "sand sifter" machine at least weekly approximately nine months of the year due to the additional amounts of litter on the beach during the nice weather. During the summer months, the City also uses additional crews to pick up litter. The City's Police Department also does routine daily patrols in the area to discourage homeless encampments under or near the Wharf. The City will continue to assess these other potential sources of beach contamination and will evaluate remedial measures to improve water quality.

IV. Conclusion

In summary, according to County Environmental Health as mentioned above, the Clean Beaches Initiative Project (Proposition 13) has resulted in some improvements in water quality. Both major components of the project, the sanitary sewer evaluation and rehabilitation work and the storm drain diversions at pump stations along the San Lorenzo River contributed to these results. However, County Environmental Health sampling results indicate high variability and, thus, follow up sampling and analyses will help to further evaluate and characterize the project's effectiveness. For example, the number of days the beach was posted at Main Beach decreased throughout the study period although this decline did not occur at Cowell Beach. However, this may be due to other factors such as Cowell Beach's location along a cove in between the Santa Cruz Municipal Wharf and the cliffs, and the potential sources of bacterial contamination beyond the scope of this project as mentioned in the section above. As previously stated the City currently takes action to address some of these issues, and will continue to evaluate these potential sources of contamination and any remedial measures with the goal of improving water quality.

Another issue which needs more study is that the monitoring results for Pump Stations 1 and 1A show measurable improvements in water quality while the results for Pump Station 2 do not show such an improvement except for the loadings diverted calculated by the pump down sampling events.

Lastly, the City is conducting additional work along the San Lorenzo River under a current Clean Beaches Grant (Proposition 40) for dry weather diversion at two other pump stations (1B and 3). Work under this second project will complement the Clean Beaches Initiative Project

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(Proposition 13) just completed and should result in additional benefits to water quality in the lower San Lorenzo River and, thus, at Main Beach and Cowell Beach. The "Summary of Work Completed to Date" table for this project is included in Attachment #22. A copy of the final grant disbursement table, which was previously submitted to the SWRCB in September 2006, is included in Attachment #23.

Remaining
contents of
Final Report
are in Master
File for
reference

