FINAL REPORT

LOW FLOW DIVERSIONS FOR THE CALIFORNIA AND FIGUEROA STREET STORM DRAINS AT PROMENADE PARK BEACH

Proposition 13
Grant Agreement No. #06-238-550-1

Clean Beaches Initiative Program

City of Ventura Promenade Park Beach

Prepared by:
City of Ventura Public Works Department

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Executive Summary

Project Description and Purpose:

Before this project was implemented, stormwater from Ventura's downtown core discharged year round through stormdrain outlets that dumped directly onto beaches in heavily used recreational areas. The stormwater was polluted with disease causing bacteria, which threatened the health of bathers, and the many year-round surfers who regularly ride Ventura's famous waves. These beaches were posted with advisories not to enter the water because of bacterial contamination related health risks an average of 11 times per year during the 10-year period of 1998-2008. One year (2005) the beaches were posted twenty-one times!

Data showed that the highest concentrations of bacteria in the stormwater occurred during the dry season of April through November, even though rainfall was practically non-existent during those times. An alarming amount of these dry-weather bacteria was found to be strains that originate from warm-blooded animals that can carry disease to people. Most likely animal fecal sources came from pet owners who did not clean up after their pets, the many downtown transients who did not clean up after themselves, and from seagulls that forage in downtown trash bins. Water sources that carried these contaminants to the beaches included business owners hosing down sidewalks and storefronts, car washing, over-watering of landscaped areas, water leaks, and groundwater discharges from underground utility vaults. As these water sources flow through city streets, gutters and alleys, they picked up the bacterial contaminations that were conveyed into the stormdrain and discharged onto the beach.

To reduce this pollution source, carefully engineered structures were built to divert dry weather stormwater discharges from two storm drain beach outfalls to the City owned wastewater treatment plant. These storm drains collect runoff from Ventura's historic downtown core, a portion of the U.S. 101 Freeway (Caltrans), the Seaside Park Fairgrounds (a State agency), and undeveloped hillsides above Ventura.

Completion of the improvements resulted in immediate and long lasting water quality improvements. Last year (2009) there were no beach closures in the beach area near the stormdrain discharge locations. Also, an intensive 6-month monitoring project demonstrated the success of the diversion structures in improving coastal water quality and making the water safer for surfers and swimmers. This report presents further details on the construction, costs, operation and success of this project.

Involved Public Agency/Private Partners: Surfrider Foundation Ventura County Chapter; Ventura County Environmental Health Department; Ventura County Watershed Protection District; California Coastal Commission; Ventura CoastKeeper

Total Project Cost: $ 1,033,802

Project Funding Source(s): $838,802 from Clean Beaches Initiative. $195,000 from the City of Ventura's General Fund.

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1. Introductions and Overview

This report consists of data results, interpretation of data, information on project status, highlights and results of quality control assessments, internal review and Project achievements. The monitoring efforts were conducted by the City of Ventura pursuant to grant agreement number 06-238-550-1 between the State Water Resources Control Board (State Water Board) and the City of Ventura.

1.1. Problem Statement and Existing Conditions

The coastline from Surfers Point to the Ventura Pier is Ventura's most popular location for body contact with ocean water. The consistent swells lure surfers and other beach activity enthusiasts from throughout Ventura County and Santa Barbara's south coast, from sunrise to sunset throughout the year. Swimmers, kayakers, beach walkers and windsurfers also enjoy the easy coastal access and ample parking. The Ventura County Fairgrounds (AKA Seaside Park), Ventura's Coastal Promenade, hotels and restaurants, and the Ventura Pier border this coastline. It is equally popular with residents and visitors.

The storm drain system collects urban runoff from the downtown business district and the U.S. 101 Freeway and then discharges the runoff onto the beach via five outfalls, depending on tidal conditions and sand accretion. Storm drain-related problems identified to-date, but not prioritized include:

- AB 411 weekly ocean water testing has indicated that in 2001 there were 253 days of beach postings within the ¾ mile subject area. This translates to 337 posting/closed days per beach mile. The subject area is 303(d) listed for bacteria indicators.

- "First flush" rainfall events produce visibly discolored, odorous discharges from the storm drain system.

- The City receives occasional citizen complaints about sewer leaks in this area, with the complaints based on odorous conditions. When investigated, staff identifies the odors to be originating from the storm drain system. No sewage is present.

The primary purpose of this project is to reduce the discharge of bacteria into coastal waters at Ventura County's most popular location for water contact activity. In compliance with AB 411, the County Environmental Health Department conducts weekly ocean water quality testing at five locations within the subject area. The subject area is currently 303(d) listed for bacteria indicators. The goal of the project is to eliminate dry weather storm drain discharges into this popular recreational area. This accomplishment would remove the subject area from its current 303(d) listing for bacteria indicators.

1.2. Geographical Setting

The Figueroa Street storm drain system collects runoff from 62 acres of the downtown business area, from the ocean to the northern side of U.S. 101. Development in this area is a mix of commercial and residential uses. This area is fully developed, and the storm drain system is completely undergrounded. No natural habitat exists in this area.

Collecting runoff from 13 acres of the city's downtown commercial and residential area, the California Street storm drain system also receives runoff from approximately 10 acres of the U.S. 101 Freeway. It is fully developed, with no natural habitat.

Figure 1: Map of the City of Ventura

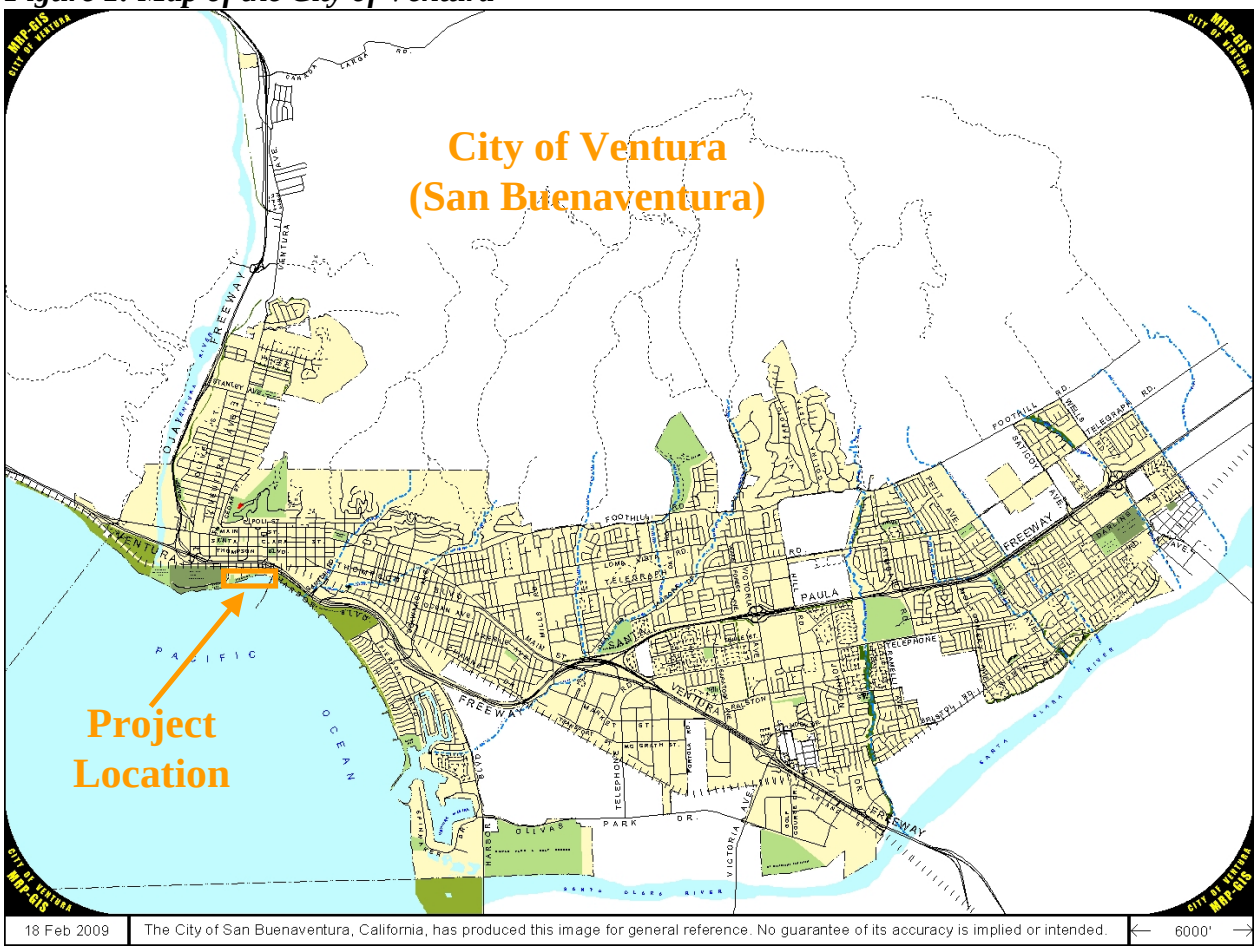
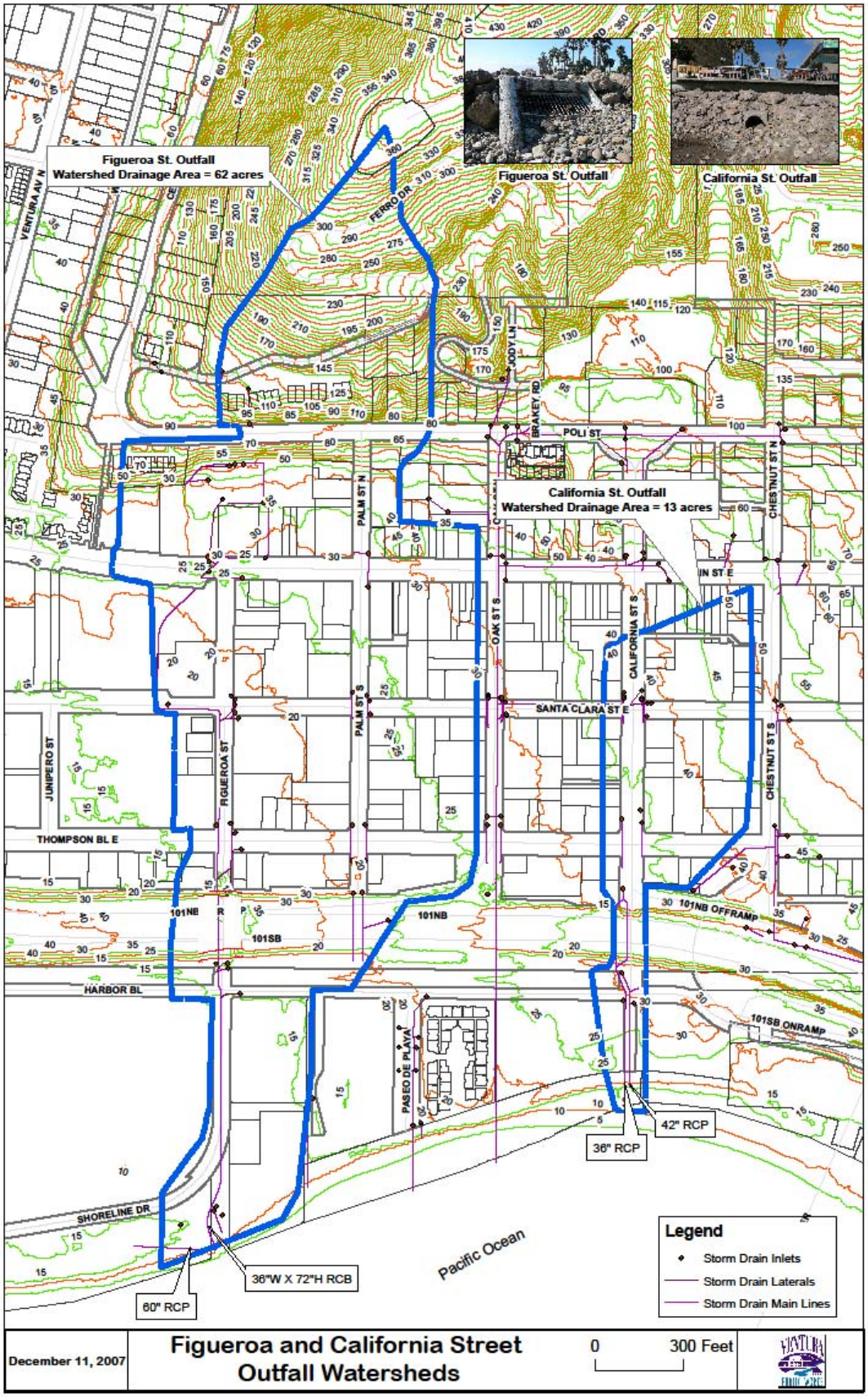


Figure 2: Map of Drainage Areas Diverted and Treated by Project



2. Project Summary

2.1. Project's Objective

This project designed and constructed stormwater diversions from two storm drains within the project area to the City-owned wastewater treatment plant. These storm drains collect runoff from the downtown business and residential district, a portion of the U.S. 101 Freeway (Caltrans), the Seaside Park Fairgrounds (a State agency), and undeveloped hillsides above Ventura and discharge the runoff onto the beach below the City's Promenade. The drains are:

- Figueroa Street Storm Drain (4' x 6' concrete box)
- California Street Storm Drain (42" corrugated metal pipe)

This project:

- Identified tie-in locations for diversions from the storm drain system to the sanitary sewer.
- Provided conceptual, preliminary and final drawings for the diversion structures.
- Constructed low flow storm drain diversions to the wastewater treatment plant.

Completion of the improvements resulted in immediate and long lasting water quality improvements. Project success has been measured by sampling water quality above the diversion structures and comparing it to AB 411 monitoring results obtained in the mixing zone below these storm drains. Flow volumes were measured.

2.2. Project History

The Ventura County Environmental Health Department (EHD) began AB 411 compliance sampling in 1998. Initially, 30 to 40 sites were monitored on a weekly basis. By 2004, approximately 55 sites were monitored weekly, on a year-round basis. Due to budget constraints, EHD gradually began reducing the number of sites monitored during the wet season. As of November 2008, EHD is no longer conducting wet season monitoring.

The project was needed because the Promenade Park Beach (AKA Surfers Point) is the most heavily used beach in Ventura County, and monitoring results indicated that bacterial levels posed a significant health risk to beach goers.

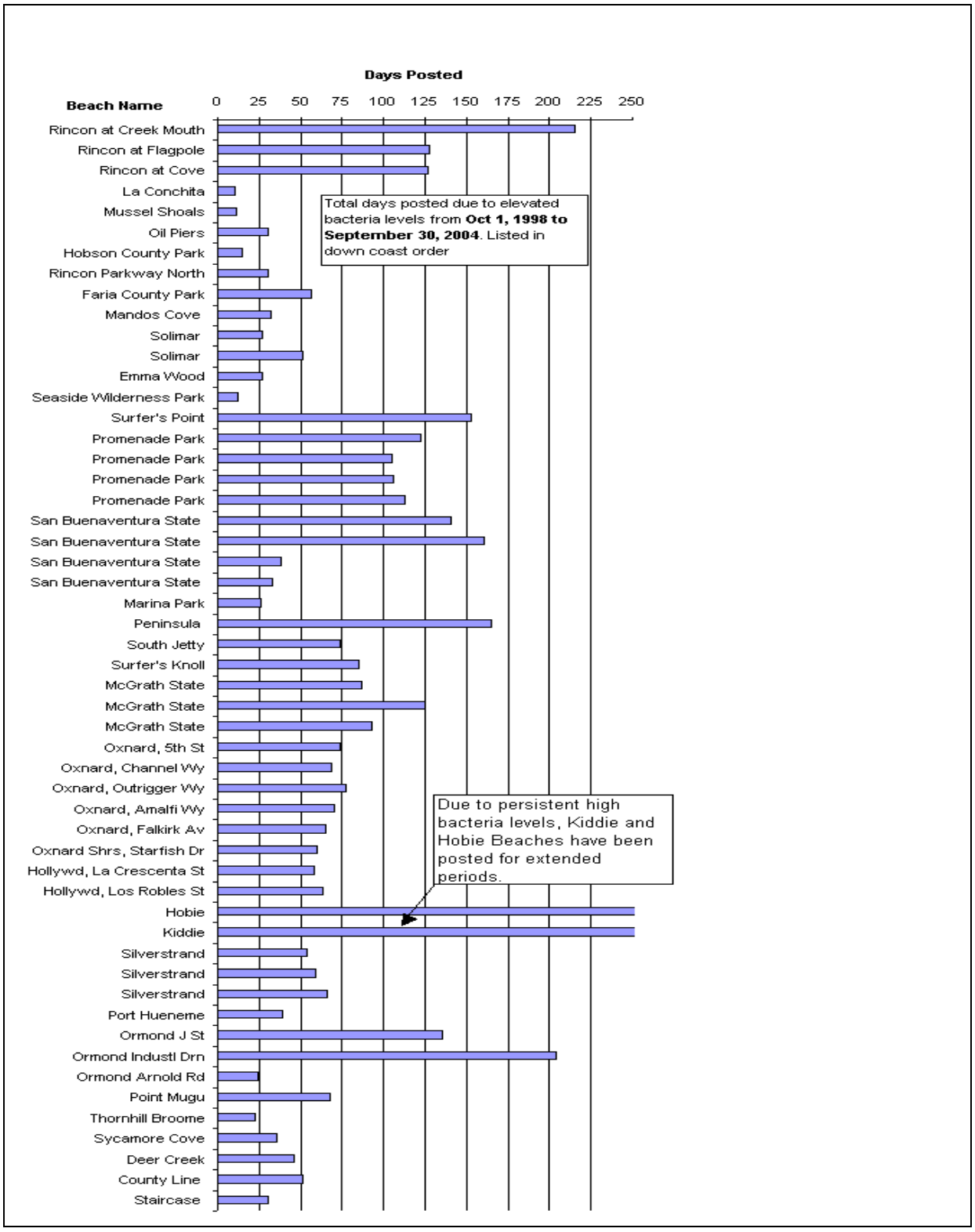
The City of Ventura Public Works Department collaborated with the Ventura County Chapter of the Surfrider Foundation, the Ventura CoastKeeper, the Ventura County Watershed Protection District, and the local (Ventura) office of the California Coastal Commission to bring this project to its fruition.

2.3. Baseline Water Quality

Water quality conditions at the two storm drain discharges were noticeably poor prior to this project. Surfers could smell the Figueroa Street storm drain discharges 100 yards offshore. The California Street storm drain discharged into a stagnant pond that became malodorous and filled with algae.

The following chart illustrates summary results for various Ventura County Beaches from 1998-2004

Figure 3 (Graph): Days beaches were posted for bacteria contamination in Ventura County. 1998-2004



2.4. Potential Source Categories

Urban runoff is the primary source of pollution identified. This runoff originates from the downtown business and residential land use areas, as well as the U.S. 101 Freeway. Initial flows are caused by stormwater, pumped groundwater, irrigation over watering, residential car washing, water line flushing, and other allowable non-stormwater discharges, subject to conditions. Typical pollutants include pet waste, fertilizers, nutrients, pesticides, vehicle fluid drippings, by-products of motor vehicle tire and brake wear, sediments, road wear, etc.

2.5. Funding Program

Initial investigations were conducted with funding, in the amount of approximately $97,000, received through the Supplemental Environmental Funding (SEP) program of the Los Angeles Regional Water Quality Control Board. The SEP program is funded by fines imposed by the RWQCB for water quality violations. Clean Beaches Initiative funding paid for design and construction of the low flow storm drain diversions. The City of Ventura's General Fund paid $195,000 to the wastewater treatment plant for connection fees. The City's General Fund pays for ongoing operations and maintenance, costs, as well as metered treatment charges paid to the sewage treatment plant. Project administration, reporting, monitoring and other incidental costs have been absorbed by the City's General Fund.

Table 1: Project Budget

	Planning*	Design	Construction	Monitoring	O& M Annual
Project Cost	$97,000	$168,000	$866,000	$10,000	$20,000
CBI – Grant		$168,000	$671,000		
Other (specify)	$97,000				
Local Match			$195,000	$10,000	$20,000

**Include environmental document, permitting and right of way.*

Ongoing maintenance, operation and treatment costs are paid for by the City's General Fund.

3. Project Activities, Tasks and Schedule of Completion

The following Table (Table 2) summarizes documents and forms submitted for review to the California State Water Resources Control Board during this project.

Table 2: Documentation and Review Timelines

Item	DESCRIPTION		DUE DATE	SUBMITTAL DATE
EXHIBIT A – SCOPE OF WORK				
1.0	QUALITY ASSURANCE PROJECT PLAN and MONITORING PLAN		- -	
1.1	Quality Assurance Project Plan		Sept. 2004	Sept. 2004
1.2	Monitoring Plan		June 2008	June 2008
2.0	WORK TO BE PERFORMED BY GRANTEE		- -	
2.3	Copy of Engineering Feasibility Evaluation		Sept. 2004	Sept. 2004
2.4	Final Design		--	
2.4.1	Copies of Final Plans and Specifications		May 2005	May 2005
2.5	Construction		--	
2.5.1	Copy of Bid Materials and Letter of Award		June 2006	June 2006
2.5.2	Copy of Notice to Proceed Letter		August 2006	August 2006
2.5.4	Copy of "As-built" Drawings and Photo Documentation		January 2007	January 2007
3.0	Reporting			
3.1	Annual Progress Summary		September 2005, September 2006, September 2007, & September 2008	September 2005, September 2006, September 2007, & September 2008
3.2	Draft Project Report		November 2009	February 2010
3.3	Final Project Report		November 2009	March 2010
EXHIBIT B – INVOICING, BUDGET DETAIL AND REPORTING PROVISIONS				
5.0	REPORTS		--	
5.1	Progress Reports by the twentieth (20^{th}) of the month following the end of the calendar quarter (March, June, September, and December)		Quarterly	Quarterly
5.2	Grant Summary Form		Day 90	Day 90
5.3	Natural Resource Projects Inventory Project Survey Form		Before final invoice	March 2010
EXHIBIT C – SWRCB GENERAL CONDITIONS				
# 6	Copy of final CEQA/NEPA documentation		As Needed	May 1, 2006
#22	Signed Cover Sheets For All Permits		Not Needed	Not Needed
EXHIBIT D – GRANT PROGRAM TERMS & CONDITIONS				
#5	Monitoring and Reporting Plan		June 2008	June 2008

Project Completion Date

Project construction was completed in September 2007. Operations commenced immediately thereafter.

4. Project Implementation and Improvements

This project designed and constructed two low-flow storm drain diversions, from the California Street and Figueroa Street storm drains to the sanitary sewer system. Construction began in July 2006 and was completed in September 2007. Each storm drain diversion has been designed for a maximum capacity of 40 gallons per minute.

The diversions function year-round. Rain switches turn the diversions off during rain events, then a computerized delay restarts them several hours after the rain event, unless the sewage treatment plant capacity is being challenged by storm-related intrusion and infiltration.

Cost estimate overruns forced redesign, and associated delays, to bring the project in within its budget. Archaeological concerns also delayed construction.

California Street Diversion Construction

California Street – construction completed.
Note new manholes and lighter concrete

Figueroa Street storm drain interception site during construction

Figueroa Street storm drain interception site during construction

Regulatory Permits

No federal, state or local permits were required for this project. The project consisted of modifications to interior segments of fully improved, underground storm drains.

5. Monitoring Program and Sample Collection

To test the effectiveness of the diversion structures, an intensive 6-month monitoring program was implemented after the project was constructed and fully operational. The monitoring was conducted July-December, 2008 following the protocol established in the "Monitoring Project Plan" prepared by Richard Bradley, City of Ventura Environmental Services Supervisor, dated June 13th, 2008.

The sampling strategy was to collect water samples in the stormdrain diversion structures at the same time that the County collected water samples in the surf zone from July to December, 2008. The data from the two different locations were then compared to measure the bacteria pollutant load the diversion structures were capturing (and sending to the wastewater treatment plant) and the receiving water quality resulting from this diversion.

The sampling demonstrated that the diversion structures are successfully diverting stormwater flows that are significantly contaminated by Total Coliform bacteria, thereby rendering the receiving waters safe for swimming and surfing. In fact, during the one year period (2009) following this monitoring project, these same two beach areas did not receive one single posting for closure due to bacterial contamination. During the ten years prior to the construction of this project, the beaches were posted closed an average of 11 times per year.

6. Data Quality Assessment: Data Verification and Evaluation

The data collected during the monitoring period is summarized in the table below. Note that the County Environmental Health Department was unable to provide monitoring data for some of the testing periods because either data was inconclusive, or the inability to test due to lack of funding. However, the City managed to collect data for the stormdrain diversion samples every month during the sampling period.

State Department of Health Standards has established a standard that public water contact areas should not exceed a Total Coliform Bacteria Count of 10,000 organisms per 100 milliliters. As noted in the table below, 83% of the stormwater samples taken from the diversion structures exceeded these state standards and were considered contaminated. However, because the contaminated stormwater flows were diverted to the wastewater treatment plan, the ocean water quality remained far below the threshold.

Table 3: Sampling Data From Diversion Structures

California Street Storm Drain	AB 411 Ocean Water Quality			Storm Drain Testing			Monthly Gallons Diverted
	Total Coliform MPN/100mL	E. Coli MPN/100mL	Enterococcus MPN/100mL	Total Coliform MPN/100mL	E. Coli MPN/100mL	Enterococcus MPN/100mL	
7/29/08	990	31	<10	12,997	63	<10	118,563
8/19/08	862	10	31	14,136	708	86	123,563
9/15/08	216	<10	<10	120,330	100	100	106,525
10/13/08	No Data	No Data	No Data	12,997	31	226	95,893
11/10/08	No Data	No Data	No Data	12,033	120	426	50,810
12/08/08	No Data	No Data	No Data	5,794	98	275	19,665

Figueroa Street Storm Drain	AB 411 Ocean Water Quality			Storm Drain Testing			Monthly Gallons Diverted
	Total Coliform MPN/100mL	E. Coli MPN/100mL	Enterococcus MPN/100mL	Total Coliform MPN/100mL	E. Coli MPN/100mL	Enterococcus MPN/100mL	
7/29/08	265	52	<10	278,900	1,000	1,000	90,618
8/19/08	1076	62	<10	36,540	<100	100	99,892
9/15/08	483	20	<10	9,208	10	41	50,591
10/13/08	52	<10	<10	24,192	520	175	48,657
11/10/08	305	<10	<10	1,299,700	42,600	1,000	32,784
12/08/08	No Data	No Data	No Data	11,199	110	20	223,222

Additional research was conducted of beach closures in the vicinity of the California and Figueroa Outfalls. During the ten-year period prior to construction of the diversion structures, these beaches were posted for closures an average of 11 times per year, with the highest closure incidents (21 closures) occurring in 2005. Last year (2009) neither of these beaches was posted for closures.

7. Outreach

Outreach has been an integral part of this project from its beginning. A surfside celebration was held to announce the awarding of the grant and kick-off of the project. A temporary interpretive sign was posted at the diversion structures during construction. Additionally, a cable TV segment was also filmed to showcase the project and continues to air on the local TV station. After the project was completed, an interpretive information sign was installed on the Figueroa Diversion where it is still posted.

Construction site signage credited the SWRCB CBI program

Completed Figueroa diversion with interpretative signage

8. Conclusions

Completion of the improvements resulted in immediate and long lasting water quality improvements. Last year (2009) after the project was completed and operational, there were no beach closures in the beach area near the stormdrain discharge locations. Also, an intensive 6-month monitoring project demonstrated the success of the diversion structures in improving coastal water quality and making the water safer for surfers and bathers. The project was completed under budget and continues to operate successfully. Those who surf or play in

Ventura's prime beach area can now enjoy the environment with a greater peace of mind that they will be safer from polluted waters.

9. Recommendations

Replication of this project is highly recommended for any heavily used beach area that receives direct untreated stormwater discharges from core urban areas. Some of the lessons learned in Ventura's project include the following:

- Wastewater Treatment Costs: A cost to connect the diversion structures into the wastewater plant was an unexpected cost. Also, the ongoing costs charged by the wastewater plan to treat the dry weather flow were higher than expected and ended up being a continuing general fund liability. Our recommendation is to diligently estimate the one-time connection cost and the ongoing treatment costs before deciding on moving ahead with this project.

- Monitoring: We had based our monitoring plan around the County of Ventura AB 411 testing to save on costs. Although the City was able to successfully acquire data for every single sampling event, data from four of the County's sampling periods were not acquired because of sampling errors or lack of funding. Our recommendation is to factor in the extra expense of sampling entirely from the grant funds rather than trying to save money by leveraging other data as we did.

- Wet Well Access: To save costs, our project was designed with a 4' diameter access, which made it difficult for some personnel to enter. We'd recommend designing future wet wells to have a 6' diameter access.

- Wet Well Sloping: Although the wet wells function well, there seems to be excessive silt build-up in the bottom that requires frequent cleaning. This problem could possibly be resolved by increasing the slope in the bottom of the wet well so the sediment can more easily pass through during high storm events.

- Sonic Sensors: The original design called for sonic sensors to monitor water levels in the wet well to determine when to activate the pumps. However, during initial testing, the sonic sensors sent false readings. We resolved this problem by replacing the sonic sensors with standard float valves, which have functioned very well.

10. Terms

Funding for this Project has been provided in full or part through an agreement with the State Water Resources Control Board (State Water Board). The contents of this document do not necessarily reflect the views and policies of the State Water Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use. (Gov. Code 7550, 40 CFR 31.20)