FINAL PROJECT REPORT
FOR THE
SANTA YNEZ
LOW-FLOW DIVERSION PROJECT

Clean Beaches Initiative Project No. 116
Agreement Number: 02-240-550-0
Project No. 674

February 2008

Prepared for

State Water Resources Control Board

Prepared By

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

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2) Introduction

This low flow diversion project was funded by the Clean Beaches Initiative (Proposition 40). This project was undertaken in order to address the dry weather bacterial contamination in Santa Monica Bay. The project will be considered a complete success if all dry weather bacterial contamination in the bay is eliminated. A low flow diversion system was constructed at the Santa Ynez Storm Drain to divert dry weather runoff away from the beach and into the sanitary sewer. Flow from the dry weather runoff may contribute to elevated bacterial levels in Santa Monica Bay, and this project was undertaken in an effort to reduce levels of bacteria in the bay in order to be in compliance with the Santa Monica Bay Beaches Bacteria TMDL. Post construction bacterial monitoring has been conducted and the results are presented in this report. An assessment of the effectiveness of this project in diverting bacteria to the sanitary sewer, the changes in the quality of the receiving waters near the beach and of lessons learned from the genesis, construction and maintenance of the project are also presented. Additional project background including project location and aerial imagery can be found in the Monitoring Plan, Quality Assurance Project Plan, Project Questionnaire and/or Grant Agreement, which are found in Appendix D. A table of items for review which shows a schedule of agreed upon tasks with completion dates is found below in Table 1. Figure 1 shows the project location and associated shoreline monitoring stations.

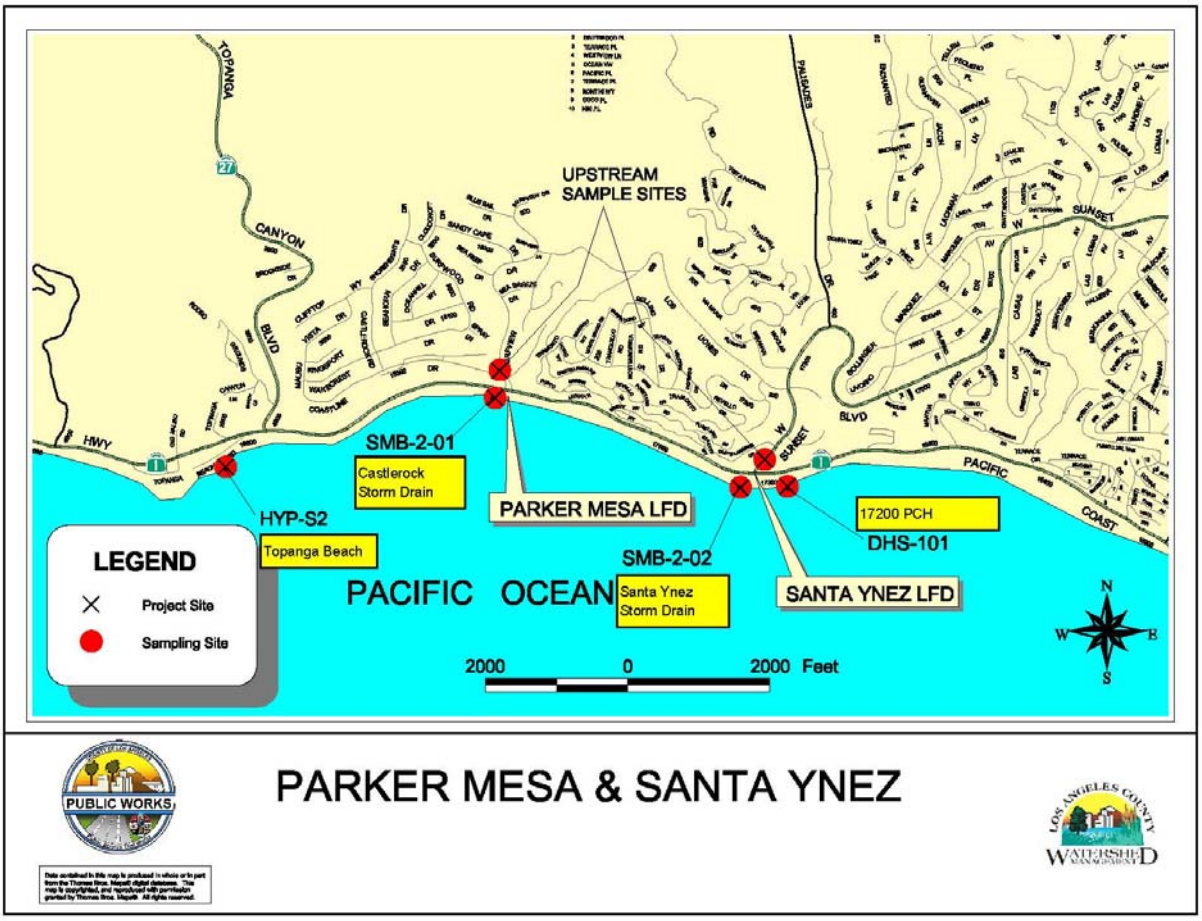

Figure 1) Project Location and Shoreline Sampling Sites

Item	DESCRIPTION	DUE DATE	COMPLETED DATE
EXHIBIT A - SCOPE OF WORK			
1.0	QUALITY ASSURANCE PROJECT PLAN and MONITORING PLAN		
1.1	Quality Assurance Project Plan	July 2005	July 2006
1.2	Monitoring Plan	July 2005	April 2007
2.0	WORK TO BE PERFORMED BY GRANTEE		
2.1.3	Final Plans and Specifications	June 2005	November 2005
2.1.4	Cost Estimate	June 2005	November 2005
2.2	Board of Supervisors Approval of Plans and Specifications	July 2005	November 2005
2.3.5	Geotechnical and Geologic Investigations Report	May 2005	November 2005
2.4.1	Notice to Proceed	July 2005	November 2005
2.4.3	Photo Documentation of Project Construction	Continuous	May 2006
2.4.4	Board of Supervisors Acceptance of Project	July 2006	November 2006
2.6	REPORTING		
2.6.1	Annual Progress Summary	September 2005; September 2006	October 2007
2.6.2	Draft Project Report	November 2007	December 2007
2.6.3	Final Project Report	January 2008	February 2008
EXHIBIT B - INVOICING, BUDGET DETAIL AND REPORTING PROVISIONS			
5.0	STANDARD REQUIREMENTS CERTIFICATION FORM	(as needed)	November 2005
6.0	REPORTS		
6.1	Progress Reports by the twentieth (20th) of the month following the end of the calendar quarter(March, June, September, and December)	Quarterly	January 2008
6.2	Expenditure/Invoice Projections	Quarterly	January 2008
6.3	Grant Summary Form	Day 90	November 2005
6.4	Natural Resource Projects Inventory Project Survey Form	Before Final Invoice	January 2008
EXHIBIT C - SWRCB GENERAL CONDITIONS			
#6	Copy of Final CEQA/NEPA Documentation	June 2005	January 2004
#22	Signed Cover Sheets for All Permits	June 2005	November 2005
EXHIBIT D - GRANT PROGRAM TERMS & CONDITIONS			
#5	Monitoring and Reporting Plan	July 2005	April 2007

Table 1) Table of Items for Review

3) Data

Samples were collected and analyzed in compliance with the approved Monitoring Report. Data is presented below in graphical form. Tabulated monitoring data, Chains of Custody and the Field Data Sheet can be found in Appendices A and B.

Flow data was collected during monitoring. An estimate of the total volume of water diverted to the sanitary sewer and an approximate bacterial load is presented below.

Beach Mile Days data was downloaded from the Beachwatch Website (http://beachwatch.waterboards.ca.gov) and analyzed to determine trends in shoreline water quality.

Summer Beach Report Cards were downloaded from Heal the Bay (www.healthebay.org) and the grades for Santa Ynez and the two adjacent monitoring sites are tabulated below.

Shoreline monitoring data for the Santa Ynez storm drain during the 2007 AB411 year was obtained from the Los Angeles County Department of Health Services and is shown below.

3.1) Low Flow Diversion Monitoring Data

Water samples were collected from the storm drain upstream of the diversion structure. Samples were collected in a pre-rinsed bucket and then transferred to sterile bottles containing sodium thiosulfate. Sodium thiosulfate dechlorinates the sample so that unwanted bacteria die-off does not occur. Sample bottles were then transported on ice and under chain of custody to the laboratory within the required 6 hour holding time.

Figures 2 through 4 show the results of bacterial sampling at Santa Ynez upstream of the low-flow diversion.

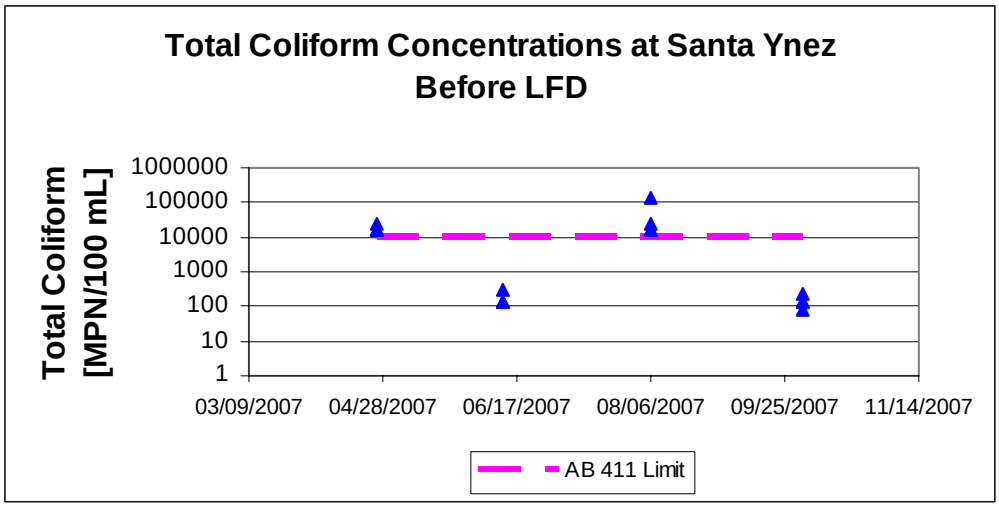

Figure 2) Total Coliform Concentrations Diverted to Sewer at Santa Ynez

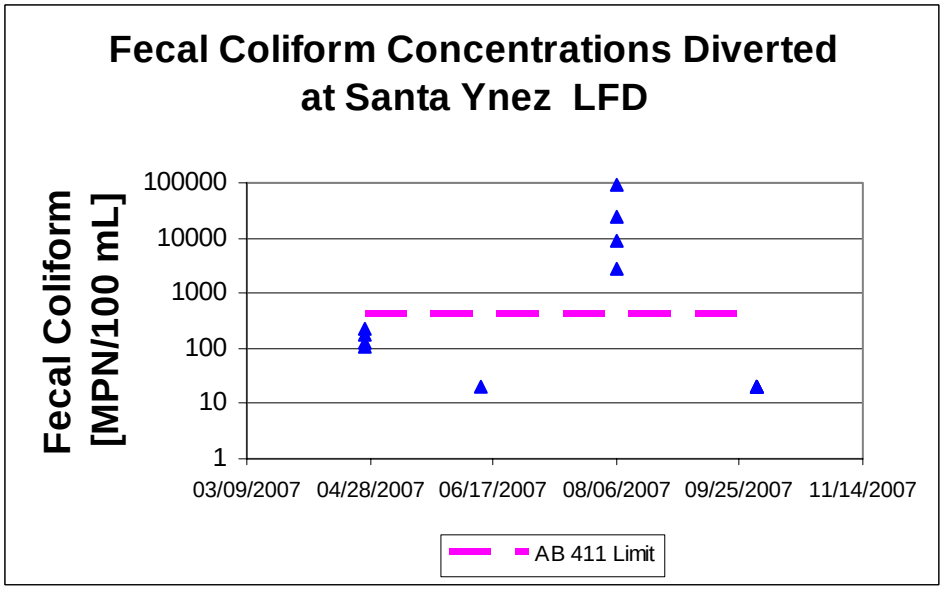

Figure 3) Fecal Coliform Concentrations Diverted to Sewer at Santa Ynez

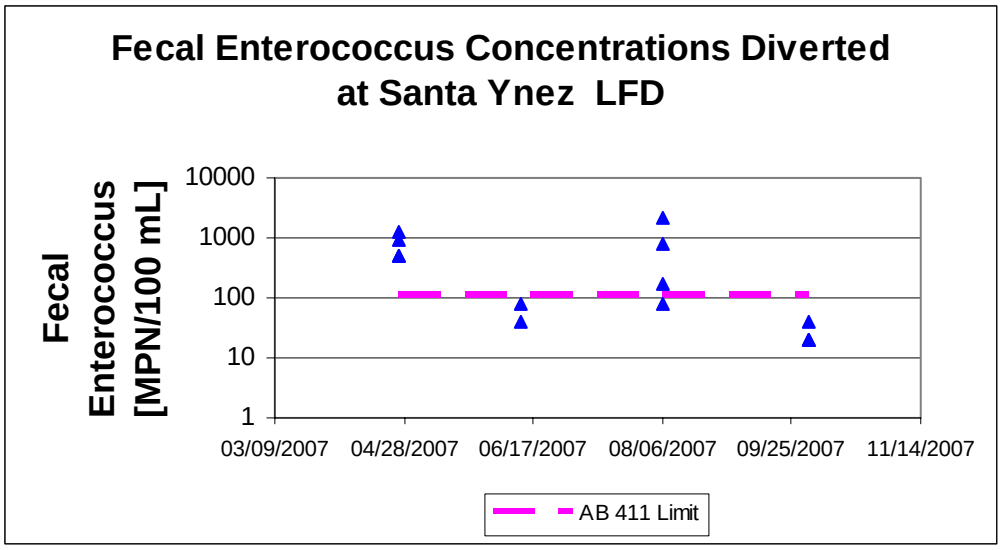

Figure 4) Fecal Enterococcus Concentrations Diverted to Sewer at Santa Ynez

Figures 2 through 4 show the results of bacterial monitoring conducted during the summer of 2007. Exceedences of AB411 standards are seen for all three bacteria. Bacteria levels tend to be highest around August when temperatures and beach use are expected to peak. Exceedences can also be seen earlier in the year suggesting that bacteria may exceed AB411 standards at various times throughout the year this storm drain. However, the majority of samples collected had bacteria concentrations less than the AB 411 limits, suggesting that any contribution that this storm drain system made to shoreline exceedences was periodic, not continuous. Geometric averages of bacteria diverted to the sewer can be found below in Table 2.

Monitoring results taken at the same time are generally within an order of magnitude of each other, but do exhibit some variation. It may be helpful for future monitoring efforts to collect multiple samples in order to minimize exceedences and/or the risk of missing an exceedence due to natural variation in the concentrations. In this manner the health of the beach going public and other portions of the environment can be protected most economically.

Tabulated data can be found in Appendix A.

3.2) Flow Data and Estimated Loading

Approximately 82 million gallons of flow was diverted to the sanitary sewer at the Santa Ynez low-flow diversion during the 2007 AB 411 year. Visual inspections of flow bypass were made during 3 of the 4 sampling events. In all cases 100 percent of the flow was being diverted the sanitary sewer system for treatment at the Hyperion Treatment Plant. Table 2 shows the geometric average concentrations of the diverted bacteria and an estimated diverted load. For bacteria, geometric averages were calculated by

multiplying all sixteen individual sample values and then taking the sixteenth root of the product. This was done for each reported category of bacteria (Total Coliform, Fecal Coliform and Enterococcus). Flow volume was calculated by determining the flow the occurred between June 12, 2007 and October 2, 2007 based upon the cumulative flow gage, then prorating this value over the 2007 AB411 year. Estimated Bacteria Loads were calculated by multiplying the flow volume by the geometric averages. Bacteria can exhibit rapid changes in population size, so these estimated loads should not be relied upon when determining bacterial concentrations in receiving waters.

Geometric Bacteria Concentrations (MPN/100 mL)		Flow (Gallons)	Estimated Bacteria Loads (MPN)
Total Coliform	1,840		5.7E+12
Fecal Coliform	288		8.9E+11
Enterococcus	160	8.2E+07	5.0E+11

Table 2) Flow Volume and Estimated Bacterial Loads to Sanitary Sewer

3.3) Beach Mile Days

Beach Mile Day data was downloaded from the BeachWatch website (http://beachwater.waterboards.ca.gov). A Beach Mile Day is a measure of shoreline water quality that takes both the geographical and temporal extent of water quality issues. Tabulated results for the shoreline monitoring stations located near outfall of Santa Ynez and the nearest stations on either side are presented below in Table 3.

Year	BMD (all year)	BMD (AB 411 year April - October)	BMD (all year)	BMD (AB 411 year April - October)
0	Topanga State Beach		17200 Pacific Coast Hwy	
2002	9.87	8.06	28.64	4.19
2003	6.86	2.46	0.4	0.4
2004	9.43	5.84	0.3	0.3
2005	14.3	9.79	0	0
2006	0.99	0.66	0.1	0.1
2007	0	0	0	0
0	Bel Air Bay Club			
2003	0	0		
2004	0	0		
2005	3.41	3.3		
2006	3.03	1.31		
2007	0.44	0.44		

Table 3) Beach Mile Days

An analysis of the Beach Mile Days for these stations indicates that water quality in the bay generally improved over the past 5 years (3 years in the cases of the Bel Air Bay Club site. However, with only 5 years of data it is difficult to establish a definite trend, and other variations such as rainfall totals make it difficult to definitively assert that any single Low Flow Diversion project significantly affected water quality in Santa Monica Bay.

3.4) Summer Beach Report Card Grades

Another widely used and publicly available measure of shoreline water quality is Heal the Bay's Report Card. This Low-Flow Diversion is designed to operate only during dry weather between April 15 and October 15, so only the Summer Dry scores are presented below in Table 4 for the Santa Ynez Storm Drain and the stations immediately adjacent. Appendix C contains the weekly Beach Report Cards for these drains.

	Castlerock storm Drain at Castlerock Beach	Santa Ynez storm drain at Castlerock beach	Will Rogers State Beach at 17200 PCH
2007	C	A+	A
2006	F	F	A
2005	ns	ns	A
2004	A+	A	A+
2003	B	D	A

Table 4) Heal The Bay Summer Dry Beach Report Card Grades

An analysis of the grades indicates that water quality at the Santa Ynez Storm Drain outlet improved since the installation of the LFD. Water quality at the adjacent Castlerock drain outlet remains poor, while the water quality near 17200 PCH has remained consistently high. The water quality at the Castlerock drain and Santa Ynez drain appears to influence each other, but this is most likely indicative of an outside factor common to both. Water quality at 17200 PCH doesn't appear to be connected to water quality at the Santa Ynez Drain.

3.5) Shoreline Bacteria Monitoring

In accordance with Assembly Bill 411 (AB411) and the Santa Monica Bay Beaches Bacterial TMDL, bacteria monitoring is conducted along the shore of Santa Monica Bay. These monitoring results are used to determine if beaches should be posted or closed to protect the health of the public depending on the concentrations of fecal indicator bacteria. This project diverts low flows away from the bay, but if it didn't, the water would enter the bay at the Santa Ynez Storm Drain, SMB-2-2. Results for this year's AB411 season are presented graphically below in Figures 4 to 6. Tabulated Data can be found in Appendix E.

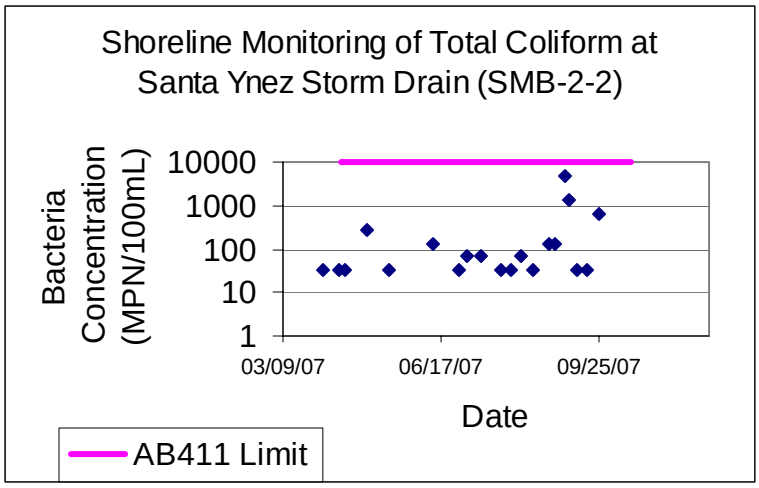

Figure 5) Shoreline Monitoring of Total Coliform at Santa Ynez

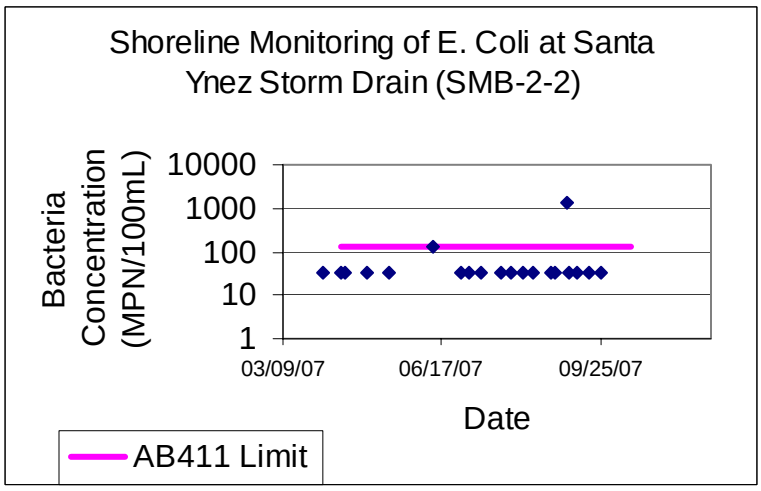

Figure 6) Shoreline Monitoring of E. Coli at Santa Ynez

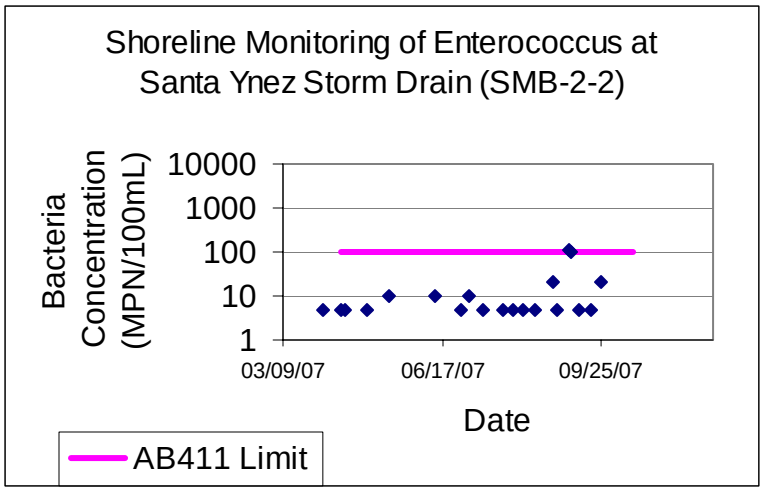

Figure 7) Shoreline Monitoring of Fecal Enterococcus at Santa Ynez

Figures 5 to 7 illustrate that bacteria samples taken at the outfall of the Santa Ynez storm drain were generally below AB411 single sample limits. A couple of exceedences are observed for E. Coli and for Enterococcus. Flow from above the Low Flow Diversion was diverted to the sanitary sewer during this time period, suggesting that runoff from above the diversion did not contribute to shoreline water quality, and that bacterial exceedences can occur even when a Low Flow Diversion system is in place. There are natural and anthropogenic sources of bacteria which do not use the storm drain system to reach Santa Monica Bay, and flows below the diversion continue to contribute to shoreline water quality.

4) Conclusions and Recommendations

Although this report is primarily focused on fecal indicator bacterial monitoring, some important conclusions and recommendations regarding other aspects of this Low-Flow Diversion project should be acknowledged. For the convenience of the reader these are presented in two sections, Bacteria and Flow Monitoring, and Design and Maintenance.

4.1) Bacteria and Flow Monitoring

This project successfully diverted 82 million gallons of water to the sanitary sewer for treatment during the 2007 AB411 year. The geometric seasonal average concentration of Enterococcus in this water was over the AB 411 single sample limit for contact recreation. The average concentration of Total and Fecal Coliform were both under the AB 411 single sample limit, but did exhibit individual exceedences, especially later in the season.

Water quality in Santa Monica Bay seems to have generally improved during the summer dry weather in the last five years. Water quality at Santa Ynez appears to have

improved since the installation of the LFD, but was not consistently poor before the installation.

This Low-Flow Diversion Project successfully diverts water that sometimes contains bacteria in excess of public health standards into the sanitary sewer for treatment. However, it is difficult to determine if this has a significant effect on the water quality in Santa Monica Bay since the shoreline water quality near this project is variable. In the season since the LFD was installed, summer dry weather water quality near the Santa Ynez Storm Drain has been good.

However, steps should still be taken to prevent the degradation of current conditions including conducting source identification studies similar to the North Santa Monica Bay Source Identification Study conducted by the Los Angeles County Department Of Public Works and partnership with the Los Angeles County Department of Public Health, Heal the Bay and the Southern California Coastal Waters Research Program in the event that an exceedence is detected. Rapid identification of bacteria sources will allow for quick assessment of the threat and for the proper remedial measures to be taken.

4.2) Design and Maintenance

It has been observed that the electrical control panels are different on most every LFD installed by the County of Los Angeles. This makes it difficult to operate and maintain these systems since each LFD requires the development of specific training. This is a time intensive process which saps both the morale and financial resources of the Flood Control District. It is recommended that Design Division coordinate with Flood Maintenance and Operational Services Divisions at the field supervisor level to develop a single control panel system for use in all LFDs. This will streamline the design, construction and maintenance processes, saving time and taxpayer dollars.

5) Contact Information

For questions regarding Project 116, the Santa Ynez Low-Flow Diversion Project, please contact Mr. Mark Lombos, Associate Civil Engineer, Los Angeles County Department of Public Works, at 626 458 5197 or mlombos@dpw.lacounty.gov.

Questions specifically regarding the content of this monitoring report may be directed to Mr. John Merrifield, Associate Civil Engineer, Los Angeles County Department of Public Works at 626 458 4361 or jmerrifi@dpw.lacounty.gov.

6) References

BeachWatch Beach Mile Days Reports, http://beachwatch.waterboards.ca.gov, accessed 10/14/2007

Heal the Bay Summer Report Cards, http://healthebay.org/brc/summer/default.asp, accessed 10/12/2007

Appendix A Bacterial Monitoring Data

Appendix B Chains of Custody and Field Data Sheets

Appendix C Beach Report Cards

Appendix D Grant Documents

Appendix E Shoreline Monitoring Results