

FINAL REPORT
FOR THE
PARKER MESA
LOW-FLOW DIVERSION PROJECT

Clean Beaches Initiative 108
Agreement Number: 02-223-550-0

February 2008

Prepared for

State Water Resources Control Board

Prepared By

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

1) Table of Contents

1) Table of Contents2
 2) Introduction.....3
 3) Data.....6
 3.1) Low Flow Diversion Monitoring Data7
 3.2) Flow Data and Estimated Loading9
 3.3) Beach Mile Days10
 3.4) Summer Beach Report Card Grades11
 3.5) Shoreline Bacteria Monitoring.....12
 4) Conclusions and Recommendations14
 4.1) Bacteria and Flow Monitoring.....15
 4.2) Siting.....15
 4.3) Design and Maintenance16
 5) Contact Information16
 6) References16
 Appendix A Bacterial Monitoring Data17
 Appendix B Chains of Custody and Field Data Sheets.....18
 Appendix C Beach Report Cards.....19
 Appendix D Grant Documents and Project Photos20
 Appendix E Shoreline Monitoring Results.....21

List of Figures

Figure 1) Aerial Photo of Project Site.....3
 Figure 2) Map of Project Location.....4
 Figure 3) Map of Shoreline Monitoring Sites.....7
 Figure 4) Total Coliform Concentrations Diverted to Sewer at Parker Mesa Low Flow Diversion.....8
 Figure 5) Fecal Coliform Concentrations Diverted to Sewer at Parker Mesa Low Flow Diversion.....8
 Figure 6) Fecal Enterococcus Concentrations Diverted to Sewer at Parker Mesa Low Flow Diversion9
 Figure 7) Shoreline Monitoring of Total Coliform Concentrations at Parker Mesa Low Flow Diversion.....13
 Figure 8) Shoreline Monitoring of Fecal Coliform Concentrations at Parker Mesa Low Flow Diversion13
 Figure 9) Shoreline Monitoring of Enterococcus Concentrations at Parker Mesa Low Flow Diversion14

List of Tables

Table 1) Table of Items for Review5
Table 2) Flow Volume and Estimated Bacterial Loads to Sanitary Sewer.....10
Table 3) Beach Mile Days.....11
Table 4) Heal The Bay Summer Dry Beach Report Card Grades.....12

2) Introduction

Problem Statement:

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 (LFD) system was constructed at the Parker Mesa 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. 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. An aerial photo and a map showing the location of the Parker Mesa storm drain are found below.



Figure 1) Aerial Photo of Project Site



Figure 2) Map of Project Location

This low flow diversion project was funded by the Clean Beaches Initiative (Proposition 40). 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 a project location map 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.

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	March 2006	November 2006
1.2	Monitoring Plan	March 2006	April 2007
2.0	WORK TO BE PERFORMED BY GRANTEE		
2.1.3	Final Design Plans and Specifications	April 2004	November 2005
2.1.4	Cost Estimate		
2.2	City Council Approval	December 2004	November 2005
2.3.5	Geotechnical and Geologic Investigations Report	September 2003	November 2005
2.4.1	Notice to Proceed	July 2006	November 2006
2.4.3	Photo Documentation of Project Construction	On-going	April 2007
2.4.4	Board of Supervisors Acceptance of Project	January 2007	October 2007
2.6	REPORTING		
2.6.1	Annual Progress Summary	September of each year	October 2007
2.6.2	Draft Project Report	January 2008	January 2008
2.6.3	Final Project Report	February 2008	February 2008
EXHIBIT B - INVOICING, BUDGET DETAIL AND REPORTING PROVISIONS			
5.0	STANDARD REQUIREMENTS CERTIFICATION FORM	(as needed)	
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	October 2007
6.2	Expenditure/Invoice Projections	Quarterly	October 2007
6.3	Grant Summary Form	Day 90	November 2005
6.4	Natural Resource Projects Inventory Project Survey Form	Before Final Invoice	
EXHIBIT C - SWRCB GENERAL CONDITIONS			
#6	Copy of Final CEQA/NEPA Documentation	March 2004	January 2004
#22	Signed Cover Sheets for All Permits	June 2006	October 2007
EXHIBIT D - GRANT PROGRAM TERMS & CONDITIONS			
#5	Monitoring and Reporting Plan	March 2006	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 Parker Mesa LFD shoreline and the two adjacent monitoring sites are tabulated below.

Shoreline monitoring data for the Parker Mesa Storm Drain during the 2007 AB411 year was obtained from the Los Angeles County Department of Health Services and is shown below.

Figure 3 below illustrates the shoreline monitoring sites that were used in evaluating this project. Beach Mile Days, Summer Beach Report Cards and Shoreline Monitoring Data all reference these locations.

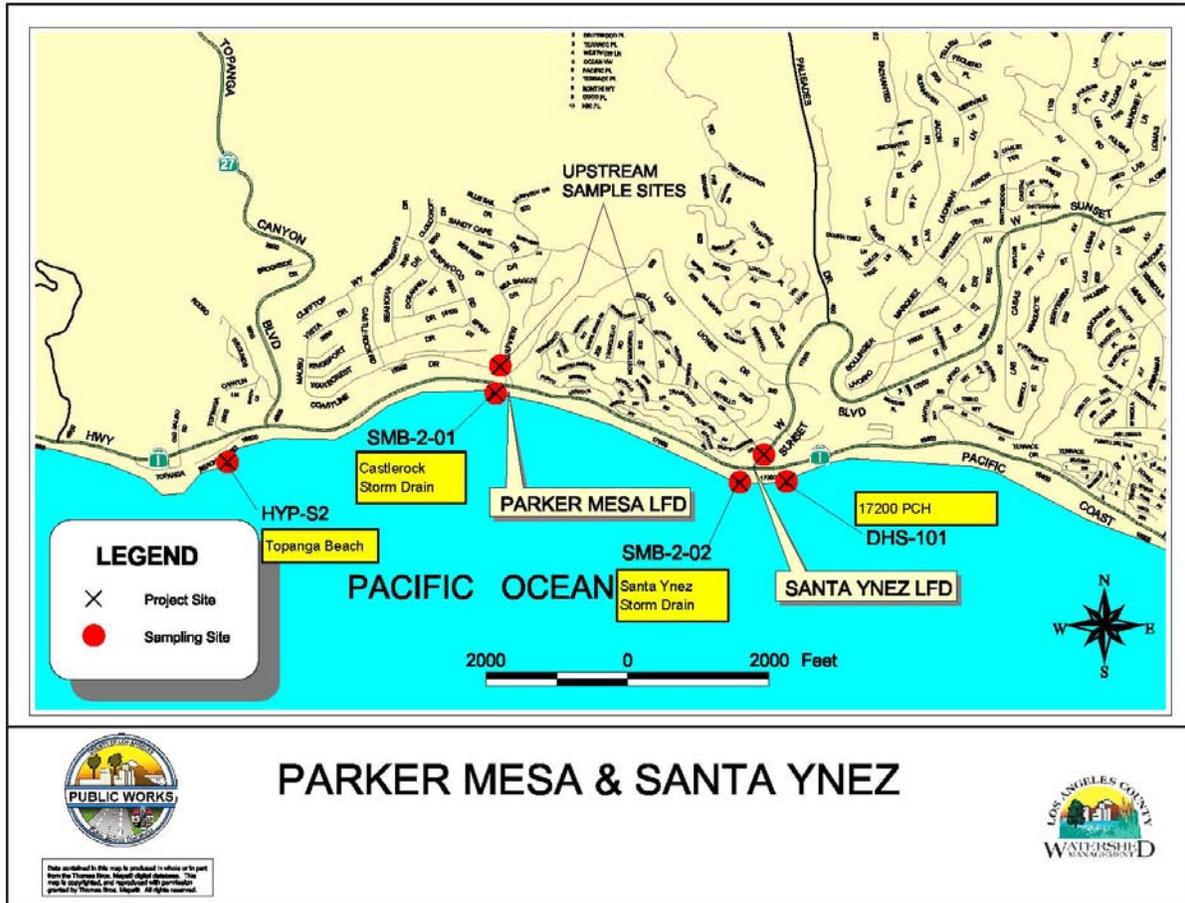


Figure 3) Map of Shoreline Monitoring Sites

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 4 through 6 show the results of bacterial sampling at Parker Mesa upstream of the low-flow diversion.

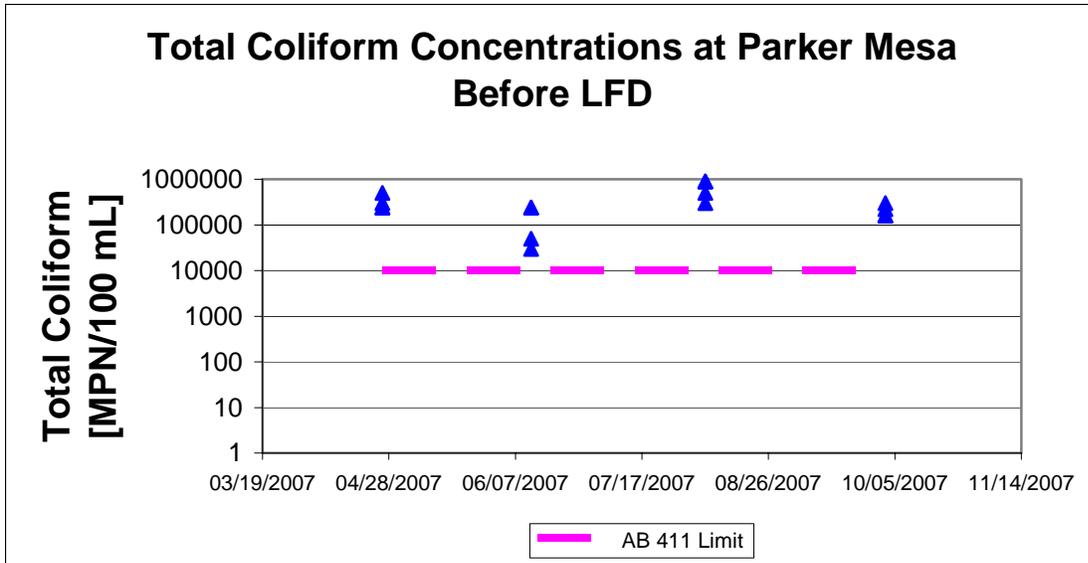


Figure 4) Total Coliform Concentrations Diverted to Sewer at Parker Mesa

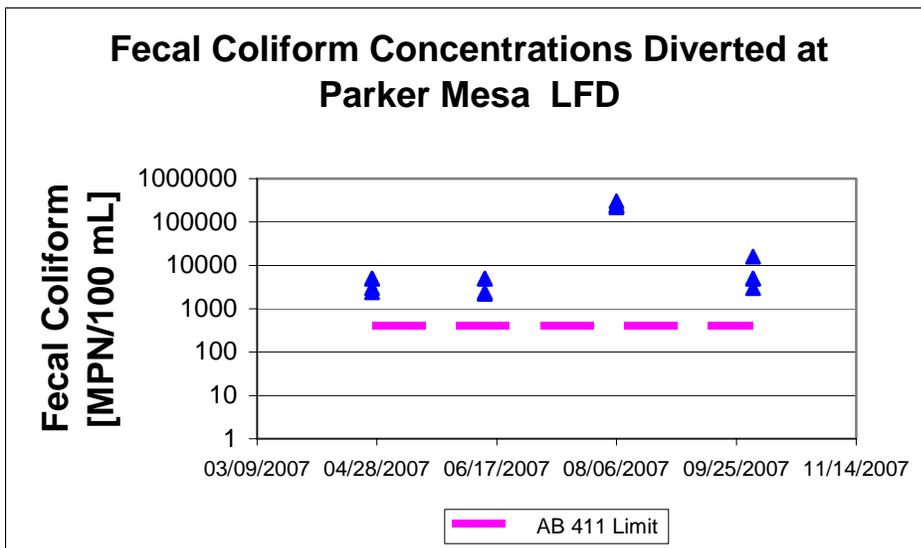


Figure 5) Fecal Coliform Concentrations Diverted to Sewer at Parker Mesa

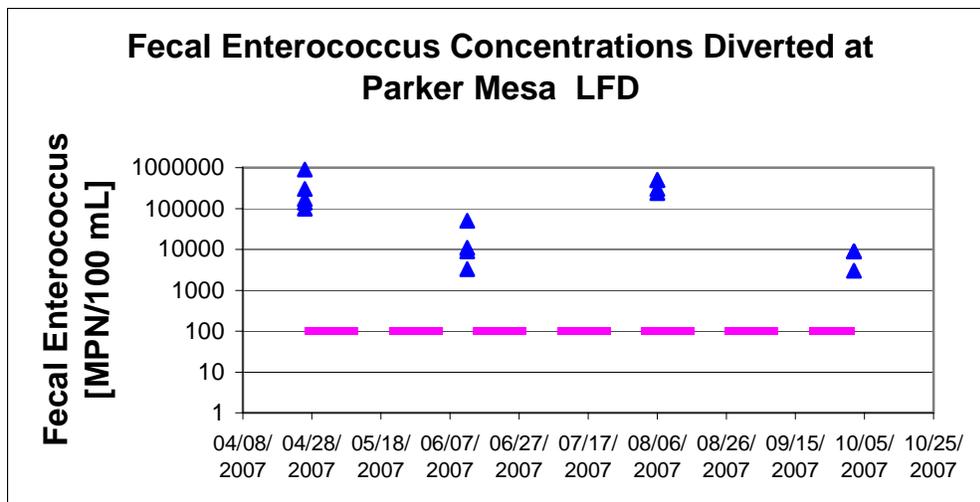


Figure 6) Fecal Enterococcus Concentrations Diverted to Sewer at Parker Mesa

Figures 4 through 6 show the results of bacterial monitoring conducted at the LFD, during the summer of 2007. Exceedences of AB411 standards are seen for all three bacterial indicators. Bacteria levels tend to be highest during summer when temperatures and beach use are expected to peak. Exceedences can also be seen throughout the year suggesting that bacteria may exceed AB411 standards at various times throughout the dry weather at this storm drain. However, the majority of samples collected had bacteria concentrations more than the AB411 limits, which suggests that the storm drain system would have made continuous contributions to shoreline exceedences. 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 and efficiently.

Tabulated data can be found in Appendix A.

3.2) Flow Data and Estimated Loading

Approximately 14 million gallons of flow was diverted to the sanitary sewer at the Parker Mesa low-flow diversion during the 2007 AB411 year. The flow to the low flow diversion system is designed to be diverted to the sanitary sewer system for treatment. Visual inspections indicated that some water bypassed the LFD toward the ocean, when dry season flows exceed the LFD system capacity. 75 gallons per minute can be

discharged to the sewer. If flow into the LFD exceeds this amount, bypass can occur. This water goes all the way to the outlet. The remainder of the flow was diverted flow and transported through the sanitary sewer system for treatment at a City of Los Angeles Water Treatment Plant, during dry weather.

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 that 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	243,549	1.4E+07	1.3E+14
Fecal Coliform	11,606		6.2E+12
Enterococcus	61,830		3.3E+13

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 into account both the geographical and temporal extent of water quality issues. Tabulated results for the shoreline monitoring stations located near outfall of Parker Mesa storm drain and the nearest stations north and south 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)
	Topanga Beach		17200 Pacific Coast Hwy	
2002	0	0	0	0
2003	9.87	8.06	28.64	4.19
2004	6.86	2.46	0.4	0.4
2005	9.43	5.84	0.3	0.3
2006	14.3	9.79	0	0
2007	0.99	0.66	0.1	0.1
	Big Rock Beach			
2002	0.97	0.4		
2003	0.88	0.88		
2004	0	0		
2005	0.60	0.35		
2006	2.45	1.75		
2007	0.22	0.22		

Table 3) Beach Mile Days (BMD)

Table 3 shows the BMD data for the entire year and for the AB411 year (April to October) for the last six years. An analysis of the Beach Mile Days for these stations indicates that water quality in the bay generally improved over the past six years, especially over the last year, since the LFD has been activated. At the 17200 Pacific Coast Hwy site, closest to the Parker Mesa Drain, the water quality showed improvement through time. At both of the flanking sampling sites of Big Rock Beach, north of this LFD, and Topanga Beach, south of this LFD, a jump in decreased water quality was evidenced. However, with such a short period of data available, 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 1 and October 31, so only the Summer Dry scores are presented below in Table 4 for the Parker Mesa Storm Drain and the stations immediately to the north and south. Appendix C contains the weekly Beach Report Cards for these drains.

Year	Topanga State Beach at Creek Mouth	Castlerock Storm Drain at Castlerock Beach	Santa Ynez storm drain at Castlerock beach
2007	A	C	A+
2006	D	F	F
2005	F	Ns	Ns
2004	A	A+	Ns
2003	D	B	Ns

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

An analysis of the grades indicates that water quality at the Castlerock Storm Drain at Castlerock Beach outlet, which is nearest the Parker Mesa Storm Drain, has improved since the installation of the LFD in April 2007. Water quality at the adjacent Topanga State Beach at creek mouth drain and Santa Ynez storm drain at Castlerock Beach has improved. The water quality at these adjacent drains appears to influence each other, but this is most likely indicative of an outside factor common to them. When no samples were taken by Heal The Bay, 'Ns' is shown in the table, above.

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 did not, the water would enter the bay at the Parker Mesa Storm Drain, SMB-2-1. Results for this year's AB411 season are presented graphically below in Figures 7 to 9. Tabulated Data can be found in Appendix E.

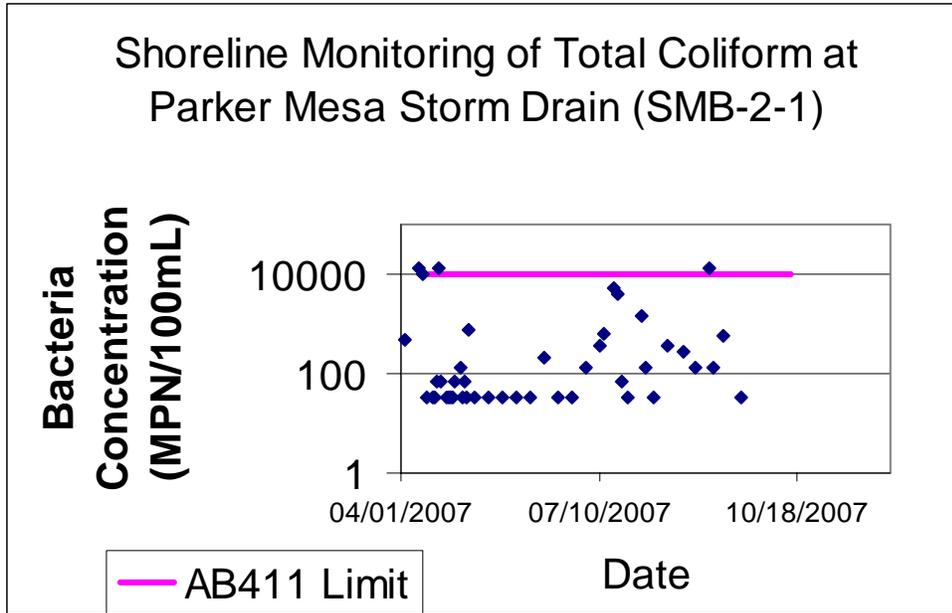


Figure 7) Shoreline Monitoring of Total Coliform at Parker Mesa

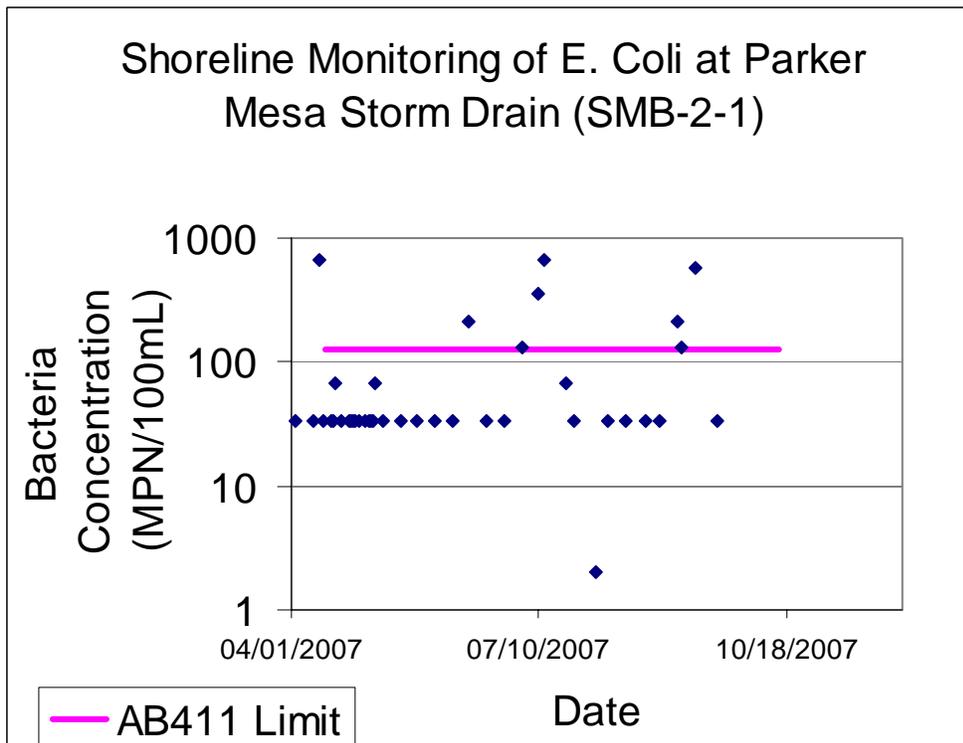


Figure 8) Shoreline Monitoring of E. Coli at Parker Mesa

4.1) Bacteria and Flow Monitoring

This project successfully diverted 14 million gallons of water to the sanitary sewer for treatment. The geometric seasonal average concentrations of Total Coliform, Fecal Coliform, and Enterococcus in this water were all over the AB411 single sample limit for contact recreation. These bacteria concentrations in the diverted water also exceeded AB411 standards for contact recreation by and large, especially during the driest part of the season.

Water quality in Santa Monica Bay seems to have oscillated, but has generally improved during the summer dry weather over the last five years. Water quality at Parker Mesa 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 Parker Mesa 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) Siting

This project is located in a low-density residential area, adjacent to PCH and the beach. It is located in a vault within a moderately sized right-of-way in the unincorporated County of Los Angeles. PCH is a heavily traveled street; however the sampling is not performed on the active right-of-way. Working in traffic poses risks and hardships to maintenance staff and the traveling public that were avoidable in this project. Interagency red-tape, which may delay access, was largely avoidable.

The locale of the watershed results in bacterial and sediment loads that are typical of residential runoff. That ties into the conclusions about the bacterial monitoring and design and maintenance of this LFD. Although the water quality needs for this project are hard to determine, locating this project more away from heavy traffic yielded some important lessons.

4.3) Design and Maintenance

Construction of the LFD was completed in April 2007 and was operational April 10, 2007. Modifications have not been made since that time. The Parker Mesa LFD is unique in its superior maintenance record. It operates from April 1 until October 31, yearly, only during dry weather.

Presently, inspection is performed weekly. Routine cleaning is done on an as needed basis to maintain the LFD. Flow meters are also recalibrated when needed. Storm drain and well water sampling is conducted quarterly during the dry season. If the system does not operate properly and at peak performance it will not comply with NPDES standards, due to failed of telemetry, pumps, or electric control mechanisms; any faulty equipment must be replaced or repaired. Overall, under normal conditions, the low flow diversion system operates properly.

It has been observed that the electrical control panels are different on most LFDs 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 Flood Control District's resources. 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 the Parker Mesa Drain, the Parker Mesa Low-Flow Diversion Project, please contact Mr. Mark Lombos, Associate Civil Engineer of Los Angeles County Department of Public Works, at 626 458 5197 or MLombos@dpw.lacounty.gov.

Questions specifically regarding the content of this project report may be directed to Mr. John Merrifield, Associate Civil Engineer of 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 10/22/2007.

Appendix A Bacterial Monitoring Data

Appendix B Chains of Custody and Field Data Sheets

Appendix C Beach Report Cards

Appendix D Grant Documents and Project Photos

Appendix E Shoreline Monitoring Results