



To enrich lives through effective and caring service



Santos H. Kreimann
Director

Kerry Silverstrom
Chief Deputy

September 2, 2010

Ken Coulter, Project Manager
State Water Resources Control Board
Division of Financial Assistance
1001 I Street, 16th Floor
Sacramento, California 95814

Dear Mr. Coulter:

**FINAL PROJECT REPORT FOR THE SEPTIC SYSTEM
IMPROVEMENT PROJECT AT TOPANGA BEACH**

Enclosed is the Final Project Report from the Los Angeles County Department of Beaches and Harbors for the Septic System Improvement Project at Topanga Beach, Contract Number 06-314-550-01.

As requested, we are submitting one master and two hard copies of the Final Project Report. If you have any questions regarding this matter or need additional information, please feel free to contact Francisco J. Martinez at (310) 305-9532.

Very truly yours,

Kerry Silverstrom, Chief Deputy Director

KS:fjm

Enclosures

**TOPANGA BEACH
SEPTIC SYSTEM REPLACEMENT PROGRAM**

FINAL PROJECT REPORT

August 2010

Prepared for:

State Water Resources Control Board

Prepared by:

RMT, Inc.

for the

Los Angeles County Chief Executive Office

Table of Contents

1.0	PROJECT SUMMARY	3
1.1	Introduction	3
1.2	Background.....	4
1.3	Project Objective.....	5
1.4	Project Scope.....	5
1.5	Project Description.....	5
2.0	PROJECT FUNDING	6
3.0	MONITORING	6
4.0	MONITORING RESULTS	8
5.0	CONCLUSIONS.....	13

APPENDICES

Appendix A1 Analytical Data Summary: Bacteria

Appendix A2 Analytical Data Summary: Other Analytes

Appendix A3 Analytical Data Summary: Nearshore Ocean Water Sampling Point HYP-S2

Appendix B Document Submittal Summary

TABLES

Table 1 Historical Beach Postings and Closures due to TMDL Exceedances

Table 2 California Ocean Plan Standards

FIGURES

Figure 1 Topanga Beach showing Lifeguard Station location on beach and Topanga Creek

Figure 2 Groundwater monitoring wells adjacent to Topanga Beach Lifeguard Station

Figure 3 Nearshore ocean water sample location near Topanga Beach Lifeguard Station

Figure 4 Fecal coliform concentrations versus time for Topanga Beach Lifeguard Station groundwater monitoring wells and end-of-pipe sampling port

Figure 5 Bacterial concentrations versus time for nearshore ocean sampling location HYP-S2 near Topanga Beach Lifeguard Station

1.0 PROJECT SUMMARY

1.1 Introduction

The County of Los Angeles Department of Beaches and Harbors (LADBH) owns and operates Topanga Beach Lifeguard Station, located at Topanga Beach, 18720 Pacific Coast Highway, Malibu, California (Figure 1). The Lifeguard Station consists of a two-story building on the beach, located east of Topanga Creek, which flows into the Pacific Ocean.

The facility contains two shower stalls, seven toilets, seven sinks, and two urinals. The shower facilities are used by beach visitors to rinse off sand and seawater. One of the sinks is located on the second story of the building and is used only by the on-duty lifeguard.

The facility has historically used a 3,500-gallon septic tank located approximately 40 feet north of the Lifeguard Station. A lift station pumped wastewater from the facility through a 4-inch-diameter pipe uphill to a 4,650-square-foot leach field located in the parking lot north of the station.

The Septic System Replacement Program at Topanga Beach consisted of replacement of the septic tank and leach field disposal system that control potential water contamination from wastewater discharges from the public restroom facility. The beach restroom septic system was aging and was at risk of failure. The septic system replacement program was designed to protect water quality and to preserve beneficial and recreational water uses at area beaches.

The entire septic system was replaced in April 2009 following approval of design plans. A Quality Assurance Project Plan (QAPP) and a Monitoring Plan (MP) were prepared to guide monitoring efforts to evaluate the effectiveness of the septic system replacement project in reducing bacterial levels in groundwater downgradient of the lifeguard station and nearshore coastal waters. The QAPP and MP were approved by the State Water Resources Control Board (SWRCB) and monitoring proceeded as per the schedule in the QAPP and MP.

This Final Report presents construction documentation and evaluates effectiveness of the new septic system.



Figure 1. Topanga Beach showing Lifeguard Station location on beach and Topanga Creek.

1.2 Background

The number of visitors to Topanga Beach varies seasonally and based on weather conditions. The County of Los Angeles Department of Public Works, Waterworks Division (Malibu Water District) supplies potable water to the facility. Discharge volume varies seasonally and daily.

Topanga Beach is among the most polluted beaches along Santa Monica Bay. In Heal the Bay's annual beach reports, it has consistently received grades of "F" during wet conditions. Dry season grades generally ranged from "C" to "F" between 2006 and mid-June 2009. Grades generally were "A" for the second half of 2009. In 2010, grades generally were "F;" the most recent grade of "B" was recorded for the week ending July 15, 2010. The SWRCB database reports that the number of days that the beach was posted because of bacteria level exceedances from 2006 to 2009 ranged from 19 to 159 days. There have been no postings or beach closures in 2010 through July 15. A summary of historical postings and closures due to total maximum daily load (TMDL) exceedances is presented in Table 1.

Table 1. Historical Beach Postings and Closures due to TMDL Exceedances

Year	No. of Postings	Days Posted	No. of Beach Closures
2006	20	159	1
2007	8	19	0
2008	6	30	0
2009 ¹	9	32	0
2010 ²	0	0	0

Source: SWRCB Database.

¹ There were no postings or closures after May 2009.

² Through July 15, 2010.

The possible sources of water-contaminating bacteria at Topanga Beach are sewage spills, septic systems, and storm water runoff from urban, suburban, and rural areas. The health risk of exposure to waterborne microbial pathogens can occur during swimming or other recreational beach activities via ingestion, inhalation, or direct contact with polluted water. Fever, flu-like symptoms, ear infection, respiratory illness, gastroenteritis, cryptosporidiosis, hepatitis, and other illnesses have been associated with waterborne pathogens.

The Lifeguard Station at Topanga Beach received a General Waste Discharge Requirements Permit from the California Regional Water Quality Control Board, Los Angeles Region (RWQCB) on September 19, 2002. Groundwater monitoring was not required for issuance of the permit. However, subsequent issues with septic system failures led to a plan in 2007 to initiate groundwater monitoring at Topanga Beach. A plan to install three monitoring wells was submitted to the RWQCB, and installation was completed in April and May 2007. Groundwater well locations are illustrated on Figure 2.

Quarterly groundwater monitoring was initiated in Second Quarter 2007 to monitor the effectiveness of the septic system, and has been ongoing since that time. In consideration of the age and signs of potential failure of the septic system, a mitigation plan for septic system upgrade was submitted to the RWQCB in March 2008. The septic system was replaced and became operational on April 7, 2009.

1.3 Project Objective

The objective of the septic system replacement project was to reduce the levels of bacteria and related contaminants in treated wastewater, in groundwater downgradient of the beach septic system, and in nearshore coastal waters.

1.4 Project Scope

The septic tank and leach field disposal system for the Topanga Beach Lifeguard Station were replaced to control potential water contamination from wastewater bacterial discharges, protect water quality, and preserve beneficial and recreational water uses at Topanga Beach.

1.5 Project Description

The project involved the following tasks:

- Excavation and disposal of the existing 3,500-gallon, prefabricated septic tank located 40 feet north of the Lifeguard Station, and replacement with a new 8,000-gallon Xerxes fiberglass primary tank.
- Removal and disposal of all existing sewer pipes and fittings and replacement with new 4-inch-diameter, Sch. 40 polyvinyl chloride pipe.
- Installation of a new 2,000-gallon Jensen Precast concrete tank approximately 15 feet northeast of the Lifeguard Station, to be used as a sand trap.
- Removal and disposal of the existing pump panel and replacement with a new pump panel for the primary tank.
- Removal and disposal of the existing D-box and decommissioning of the existing 4,650-square-foot leach field. The leach field was left in place.
- Installation of a new 3,000-gallon Xerxes fiberglass recirculation tank northeast of the leach field.
- Installation of four 6-foot-diameter, 12-foot-deep seepage pits 60 feet east of the leach field.
- Installation of a Bio-Kinetic Wastewater Management System nutrient decomposition unit and a Salcor ultraviolet disinfection unit between the recirculation tank and the seepage pits.
- Installation of an AdvanTex AX100 filter pod north east of the seepage pits.
- Disposal of all removed and excavated materials off site at an approved facility.

During construction, County of Los Angeles staff inspected construction activities and generated photo documentation.

2.0 PROJECT FUNDING

Funding for the project was provided by the SWRCB Clean Beaches Initiative Program, which was funded by Proposition 40, the California Clean Water, Clean Air, Safe Neighborhood Parks, and Coastal Protection Act of 2002 and County of Los Angeles Capital Projects Fund. A grant agreement for the septic system replacement was made between the State of California and LADBH. The term of the agreement began on April 21, 2005 and all work including finalization of this Final Report shall be completed by September 30, 2010. The County of Los Angeles provided the additional funds required to complete this project.

Project funding has been provided through Agreement No. 06-314-550-01 with the SWRCB dated September 20, 2007, and amended January 28, 2010. The contents of this document do not necessarily reflect the views and policies of the SWRCB, nor does mention of trade names of commercial products constitute endorsement or recommendation for use.

3.0 MONITORING

To monitor the effectiveness of the new septic system to meet the project objective, LA County DPW has monitored water quality in the three groundwater monitoring wells located near the septic system on a quarterly basis. Monitoring wells B-1 and B-2 are designated as upgradient monitoring locations, and monitoring well B-3 is designated as a downgradient monitoring location. Following septic system replacement in April 2009, end-of-pipe samples also have been collected from a sample port on the treatment system discharge pipe prior to discharge to the disposal field. End-of-pipe samples have been collected during the same week as the groundwater samples are collected.



Figure 2. Groundwater monitoring wells adjacent to Topanga Beach Lifeguard Station.

Samples collected from the monitoring wells and end-of-pipe sample port are analyzed for bacteria (i.e., total coliform, fecal coliform, and Enterococcus) and selected chemical constituents (i.e., nitrate, nitrite, chloride, ammonia, pH, total organic nitrogen [TON], total nitrogen, and total dissolved solids [TDS]).

The Los Angeles County Department of Public Health conducts nearshore ocean water sampling for bacterial analysis on a daily basis on weekdays only. The sampling location is shown on Figure 3.



Figure 3. Nearshore ocean water sample location near Topanga Beach Lifeguard Station.

Although a groundwater monitoring program was not required at Topanga Beach by the RWQCB, a program has been in place for Topanga Beach since Second Quarter 2007 to monitor the effectiveness of the septic system. The program has resulted in a documented history of chemical and bacterial constituent concentrations for groundwater near the beach septic system prior to and following septic system replacement. The addition of sampling at the end-of-pipe sample port has allowed for evaluation of the effectiveness of treatment by the new septic system prior to discharge of treated wastewater into the disposal field.

Monitoring procedures used at Topanga Beach have been consistent with those used in the Groundwater Monitoring Workplan for Surfrider Beach, which was approved by the RWQCB in 2003, as well as the MP and QAPP for Topanga Beach, which were approved by the SWRCB in May 2009.

4.0 MONITORING RESULTS

Quarterly monitoring results for monitoring well and end-of-pipe samples are tabulated in Appendix A and were previously reported in quarterly monitoring reports for First Quarter 2008 through First Quarter 2010 and/or summarized in annual progress reports for 2007 through 2009. Bacteria results are tabulated in Appendix A1 and other results are tabulated in Appendix A2. The discussion that follows focuses on results for fecal coliform analysis because beach postings and closures are based on the presence of fecal coliform. Results for other analytes (i.e., nitrate, nitrite, chloride, ammonia, pH, TON, total nitrogen, and TDS) are discussed briefly. A graph of fecal coliform results versus time is presented as Figure 4. Results were compared to the standards listed in Table 2.

Table 2. California Ocean Plan Standards

Analyte	30-Day Geometric Mean Density per 100 mL ¹	Single Sample Maximum Density per 100 mL ¹
Total Coliform	1,000	10,000
Fecal Coliform	200	400
Enterococcus	35	104
Analyte	6-Month Median (mg/L)	Daily Maximum (mg/L)
Nitrate	–	10
Ammonia	0.6	2.4
Total Nitrogen	–	10
TDS	–	2,000

¹ REC-1 Water-contact Standards of California Ocean Plan issued by SWRCB.

mg/L = milligrams per liter

mL = milliliter

TDS = total dissolved solids

Upgradient versus Downgradient Results

Bacteria

- Fecal coliform bacteria were not detected in the two upgradient groundwater monitoring wells (B-1 and B-2), with one exception (detection of 40 MPN/100 mL in September 2007 in B-2). Similarly, fecal coliform bacteria were not detected in the downgradient well (B-3), with one exception (detection of 2 MPN/100 mL in March 2008). The two detected fecal coliform concentrations are less than the Ocean Plan standard of 400 MPN/100 mL.
- Total coliform bacteria generally were not detected in the two upgradient wells. There were two detections in B-1 (23 and 40 MPN/100 mL in March 2008 and February 2010, respectively) and three detections in B-2 (170, 40, and 4 MPN/100 mL in June 2007, September 2007, and March 2008, respectively). Concentrations detected in downgradient well B-3 ranged from 8 MPN/100 mL in March 2008 to 5,000 MPN/100 mL

in February 2010. All detected concentrations in upgradient and downgradient wells are less than the Ocean Plan standard of 10,000 MPN/100 mL.

- The spike in total Coliform bacteria in downgradient well B-3 was not accompanied by a spike in fecal Coliform, suggesting that the spike in total coliforms did not originate in the restroom septic system, but from some other undefined, upgradient source.
- Enterococcus was detected in June 2007 in upgradient monitoring well B-1 at a concentration of 140 MPN/100 mL, which exceeds the Ocean Plan standard of 104 MPN/100 mL. Because B-1 is an upgradient monitoring well, the Enterococcus value for June 2007 originates from an unknown upgradient source, and is not associated with the restroom septic system. All other results for well B-1 and the other two groundwater monitoring wells were non-detect for all other sampling events.

Other Analytes

- Concentrations of nitrate in all three wells are similar and range from non-detect to 0.5 milligrams per liter (mg/L), with the exception of an elevated detection of 2.55 mg/L in B-2 in March 2008. All nitrite concentrations are non-detect in all three wells. All TON concentrations for all three wells are similar.
- Ammonia concentrations exceed the Ocean Plan standard of 2.4 mg/L in three upgradient samples. Ammonia concentrations are an order of magnitude lower in downgradient well B-3 and do not exceed the Ocean Plan standard.
- One upgradient total nitrogen concentration exceeds the Ocean Plan standard of 10 mg/L. Total nitrogen concentrations typically are an order of magnitude lower in downgradient well B-3 and do not exceed the Ocean Plan standard.
- TDS concentrations in all but one upgradient well B-1 samples and in about half of upgradient well B-2 samples exceed the Ocean Plan standard of 2,000 mg/L. TDS concentrations are lower in downgradient well B-3 and do not exceed the Ocean Plan standard.
- Few chloride and pH data points are available. Chloride concentrations and pH values for all three wells are similar.

Results Before System Replacement versus After System Replacement

Bacteria

- Fecal coliform results for the two upgradient groundwater monitoring wells prior to septic system replacement generally were non-detect, with one exception for B-2, as noted above. Following septic system replacement in April 2009, all fecal coliform results for upgradient wells have been non-detect. Similarly, fecal coliform results for the downgradient well prior to system replacement were non-detect, with one exception, as noted above, and have all been non-detect since system replacement.
- Total coliform bacteria were detected in upgradient wells four times prior to system replacement and only once afterward. Total coliform bacteria have been detected three times prior (ranging from 8 to 80 MPN/100 mL) and three times following (ranging from 230 to 5,000 MPN/100 mL) system replacement in downgradient well B-3.
- All Enterococcus results both before and after system replacement were non-detect, with one exception, as noted above.

Other Analytes

- Concentrations of nitrate, nitrite, TON, total nitrogen, and TDS in all three wells did not change appreciably following system replacement.
- Concentrations of ammonia in all three wells decreased following system replacement.
- Few chloride data points are available. Chloride concentrations for all three wells are similar both before and after system replacement. No pH data are available prior to system replacement.

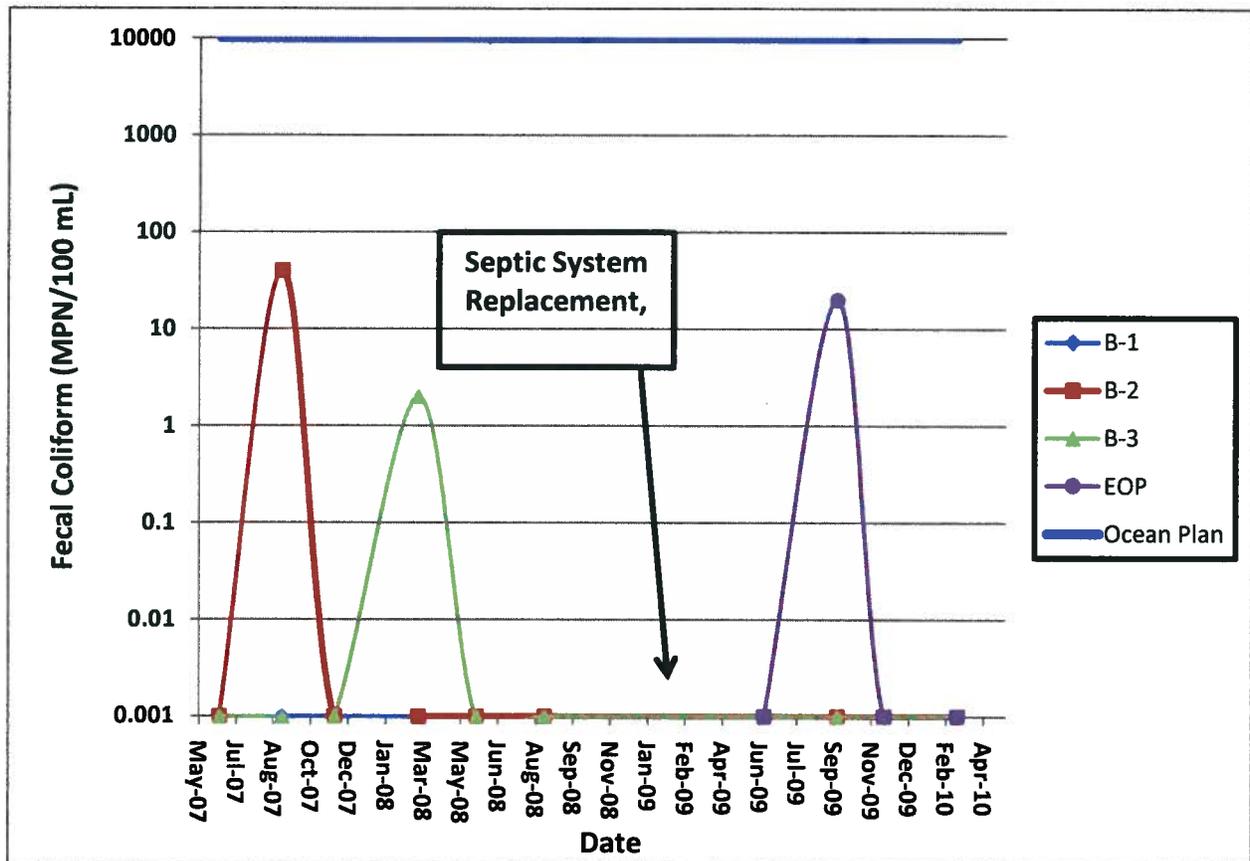


Figure 4. Fecal coliform concentrations versus time for Topanga Beach Lifeguard Station groundwater monitoring wells and end-of-pipe sampling port. 0.001 along vertical axis represents non-detect.

End-of-Pipe Sampling Data

End-of-pipe (EOP) samples have been collected since June 2009, the first monitoring event conducted following septic system replacement. The end-of-pipe sample results indicate the degree of treatment of the raw wastewater prior to any attenuation that likely occurs in the seepage pits and subsurface soil.

Bacteria

- Of the four quarterly samples collected, only one had a fecal coliform concentration other than non-detect: 20 MPN/100 mL in the sample collected in September 2009, which is an order of magnitude less than the Ocean Plan standard of 400 MPN/100 mL and is of a similar magnitude as the two fecal coliform detections in the monitoring wells. The most recent reported sample collected in February 2010 was non-detect.

- Total coliform has been detected twice at concentrations that are well below the Ocean Plan standard of 10,000 MPN/100 mL. The values generally are similar to those in upgradient wells and less than those in the downgradient well.
- Enterococcus has been detected in three of four EOP samples, in contrast to data for the monitoring wells, which generally were all non-detect. The concentration detected in September 2009 (300 MPN/100 mL) exceeds the Ocean Plan standard of 104 MPN/100 mL.

Other Analytes

- Of the four quarterly samples collected, all had nitrate concentrations that exceed the Ocean Plan standard of 10 mg/L. Nitrate concentrations in the EOP samples were one to two orders of magnitude higher than those of groundwater wells. Nitrite was detected in one sample only (February 2010).
- Concentrations of ammonia, TON, and total nitrogen generally are one to two orders of magnitude higher than those in the groundwater wells. All ammonia and total nitrogen concentrations exceed the respective Ocean Plan standards of 2.4 mg/L and 10 mg/L.
- TDS concentrations generally are similar to those in downgradient well B-3 and are less than the Ocean Plan standard of 2,000 mg/L.
- Chloride concentrations generally are similar to those in the monitoring wells.
- pH values are about 0.5 unit lower than those in the monitoring wells.

Nearshore Ocean Sampling Data

Nearshore ocean water sampling results for bacterial analysis from January 1, 2008, through July 18, 2010, are tabulated in Appendix A3. A graph of bacterial concentrations versus time in samples collected from nearshore ocean sampling location HYP-S2 is presented as Figure 5.

Concentrations of *E. coli* (equivalent to fecal coliform), total coliform, and Enterococcus in nearshore ocean water, as depicted on Figure 5 and in Appendix A3, vary widely. The following observations are of note:

- Concentrations of *E. coli* (fecal coliform) and total coliform range from <67 to >13,000 MPN/100 mL. Many concentrations detected at sampling location HPY-S2 are hundreds to thousands of times higher than the concentrations detected in the Topanga Beach Lifeguard Station groundwater monitoring wells and the EOP sample port.
- Concentrations of Enterococcus range from <10 to >2,000 MPN/100 mL. As for the coliform analyses, many concentrations detected at sampling location HPY-S2 are hundreds to thousands of times higher than the concentrations detected in the Topanga Beach Lifeguard Station groundwater monitoring wells and the EOP sample port.

Average concentrations were calculated for each bacterial analyte both before septic system replacement (January 1, 2008, through March 31, 2009) and after septic system replacement (April 15, 2009, through July 18, 2010). Concentrations noted as "greater than" value "x" were changed to value "x" for the purpose of calculation. Concentrations noted as "less than" were not used in the calculation. The results are listed in Table 3.

Table 3. Average concentrations at sampling location HYP-S2 before and after septic system replacement

Analyte	Average Before System Replacement (MPN/100 mL)	Average After System Replacement (MPN/100 mL)
Total Coliform	1,710	2,462
E. Coli	489	1,020
Enterococcus	166	255

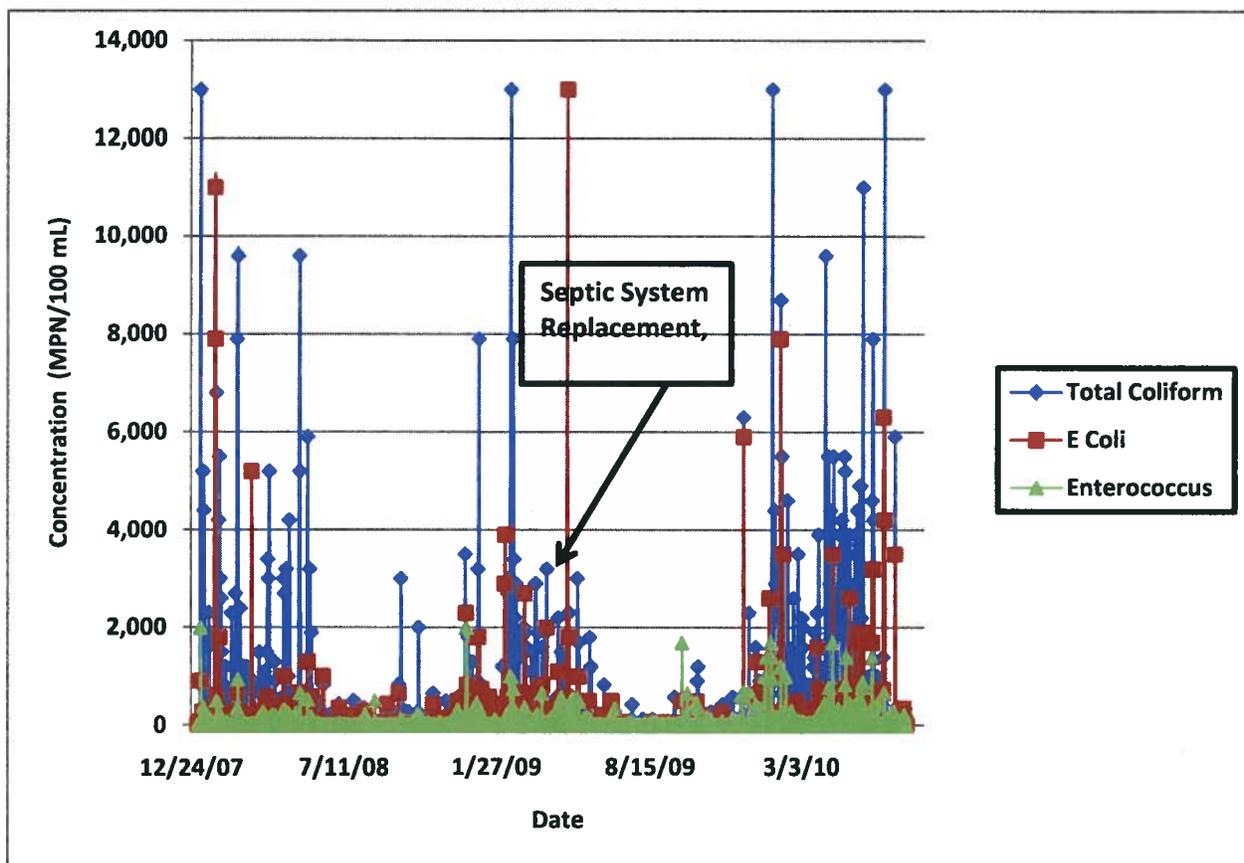


Figure 5. Bacterial concentrations versus time for nearshore ocean sampling location HYP-S2 near Topanga Beach Lifeguard Station.

The nearshore ocean sample results are likely not reflective of groundwater downgradient of the restroom septic system. Bacteria concentrations in groundwater samples downgradient of the restroom septic system are consistently hundreds to thousands of times lower than the ocean sample values. Ocean currents can easily carry bacterial contaminants from other locations. Also, the nearshore sampling point HYP-S2 is directly downstream from the mouth of Topanga Creek, and therefore is likely affected from whatever is carried in the surface runoff.

5.0 CONCLUSIONS

Comparison of pre- and post-system replacement data indicate that the new septic system has been effective at reducing the levels of bacteria in treated wastewater. Bacteria concentrations in groundwater downgradient of the beach septic systems also have generally decreased. The REC-1 water-contact standard for fecal coliform was met at the discharge point, as represented by the EOP sample port results. With one exception (Enterococcus in September 2009), the other REC-1 water-contact standards for total coliform and Enterococcus also were met at the discharge point. This indicates that even before dispersion and attenuation occurs in the seepage pits and subsurface soil, with one exception, the treated wastewater results have been below SWRCB REC-1 water-contact standards for bacteria. This is consistent with the observation that fecal coliform bacteria results in all groundwater samples have been below detection limits since septic system replacement.

There have been no postings or beach closures since May 2009, indicating that the new septic system has prevented significant bacterial contamination from reaching nearshore ocean waters. The bacterial concentrations in the groundwater samples and EOP samples are far below those in the nearshore ocean water samples, indicating that the ocean water samples are receiving bacterial contamination from another source unrelated to the beach restrooms, and that the new septic system replacement has been effective.

Appendix A1
Analytical Data Summary: Bacteria

Well No.	Sampling Date	Total Coliform (MPN/100 mL)	Fecal Coliform (MPN/100 mL)	Enterococcus (MPN/100 mL)
B-1 (upgradient)	6/15/07	ND	ND	140
	9/7/07	ND	ND	ND
	11/16/07	ND	ND	ND
	3/7/08	23	ND	ND
	5/23/08	ND	ND	ND
	8/22/08	ND	ND	ND
	12/5/08	-	-	-
	6/12/09	ND	ND	ND
	9/18/09	ND	ND	ND
	11/20/09	ND	ND	ND
	2/26/10	40	ND	ND
B-2 (upgradient)	6/15/07	170	ND	ND
	9/7/07	40	40	ND
	11/16/07	ND	ND	ND
	3/7/08	4	ND	ND
	5/23/08	ND	ND	ND
	8/22/08	ND	ND	ND
	12/5/08	-	-	-
	6/12/09	ND	ND	ND
	9/18/09	ND	ND	ND
	11/20/09	ND	ND	ND
	2/26/10	ND	ND	ND
B-3 (downgradient)	6/15/07	40	ND	ND
	9/7/07	80	ND	ND
	11/16/07	ND	ND	ND
	3/7/08	8	2	ND
	5/23/08	ND	ND	ND
	8/22/08	ND	ND	ND
	12/5/08	-	-	-
	6/12/09	ND	ND	ND
	9/18/09	230	ND	ND
	11/20/09	230	ND	ND
	2/26/10	5,000	ND	ND
EOP (end-of-pipe)	6/15/07	-	-	-
	9/7/07	-	-	-
	11/16/07	-	-	-
	3/7/08	-	-	-
	5/23/08	-	-	-
	8/22/08	-	-	-
	12/5/08	-	-	-
	6/12/09	ND	ND	ND
	9/18/09	20	20	300
	11/20/09	230	ND	80
	2/26/10	ND	ND	20
Ocean Plan Standard		10,000	400	104

Note: Concentrations that exceed the Ocean Plan Standard are highlighted gray.
ND = not detected

Appendix A2
Analytical Data Summary: Other Analytes
All concentrations in milligrams per liter

Well No.	Sampling Date	Nitrate - N	Nitrite - N	Cl	NH ₃	pH	TON	Total N	TDS
B-1 (ug)	6/15/07	ND	ND	-	1.98	-	2.84	4.82	1,856
	9/7/07	0.1	ND	-	2.96	-	0.74	3.80	2,058
	11/16/07	0.21	ND	-	ND	-	0.21	0.42	3,124
	3/7/08	ND	ND	-	ND	-	0.568	0.57	3,500
	5/23/08	0.24	ND	-	ND	-	0.236	476	3,332
	8/22/08	0.14	ND	-	0.17	-	0.21	0.52	2,948
	12/5/08	0.2	-	462	ND	-	0.67	0.87	3,072
	6/12/09	0.17	-	345	ND	7.08	0.29	0.46	2,900
	9/18/09	0.26	-	407	ND	7.08	-	0.26	-
	11/20/09	0.27	-	-	ND	-	0.15	0.47	3,030
	2/26/10	ND	ND	376	ND	7.12	0.21	0.24	3,190
B-2 (ug)	6/15/07	0.48	ND	-	ND	-	0.14	0.62	3,322
	9/7/07	ND	ND	-	ND	-	0.29	0.29	3,594
	11/16/07	0.24	ND	-	1.90	-	1.98	4.12	1,720
	3/7/08	2.55	ND	-	2.72	-	0.68	5.95	2,536
	5/23/08	0.26	ND	-	3.67	-	1.13	5.06	2,064
	8/22/08	0.16	ND	-	2.16	-	2.46	4.78	1,584
	12/5/08	0.26	-	165	ND	-	0.24	0.50	1,592
	6/12/09	0.20	-	168	1.29	7.08	0.46	1.95	1,632
	9/18/09	0.28	-	257	1.13	7.01	-	1.41	-
	11/20/09	ND	-	-	1.53	-	0.81	2.55	1,520
	2/26/10	ND	ND	839	0.99	7.03	1.59	2.58	3,010
B-3 (dg)	6/15/07	0.04	ND	-	ND	-	0.18	0.22	1,660
	9/7/07	ND	ND	-	ND	-	ND	ND	1,544
	11/16/07	0.24	ND	-	ND	-	0.15	0.39	1,370
	3/7/08	ND	ND	-	0.13	-	0.71	0.84	1,552
	5/23/08	0.27	ND	-	0.126	-	ND	0.396	1,518
	8/22/08	0.1	ND	-	0.12	-	0.2	0.42	1,262
	12/5/08	0.27	-	151	ND	-	0.13	0.4	1,444
	6/12/09	0.18	-	150	ND	7.01	0.15	0.33	1,524
	9/18/09	0.50	-	193	0.16	6.76	-	0.66	-
	11/20/09	ND	-	-	ND	-	0.07	0.35	1,540
	2/26/10	ND	ND	173	0.10	7.10	0.14	0.24	1,650
EP (end-of-pipe)	6/15/07	-	-	-	-	-	-	-	-
	9/7/07	-	-	-	-	-	-	-	-
	11/16/07	-	-	-	-	-	-	-	-
	3/7/08	-	-	-	-	-	-	-	-
	5/23/08	-	-	-	-	-	-	-	-
	8/22/08	-	-	-	-	-	-	-	-
	12/5/08	-	-	-	-	-	-	-	-
	6/12/09	35.90	-	352	8.97	6.41	2.41	47.30	1,166
	9/18/09	62	-	380	9.72	6.67	-	74.10	-
	11/20/09	30.50	-	-	17.70	-	20.30	68.60	1,330
	2/26/10	42	0.31	491	22.60	6.52	15.50	38	1,480
Ocean Plan Standard		10	-	-	2.4	-	-	10	2,000

Note: Concentrations that exceed the Ocean Plan Standard are highlighted gray.

Cl = chloride

dg = downgradient

N = nitrogen

ND = not detected

NH₃ = ammonia

TDS = total dissolved solids

TON = total organic nitrogen

ug = upgradient

Appendix B

Document Submittal Summary

Work Item	Item No. and Description	Percent Complete	Date Submitted
EXHIBIT A	1.0 Quality Assurance Project Plan And Monitoring Plan		
	1.1 Quality Assurance Project Plan	100%	5/11/09
	1.2 Monitoring Plan	100%	5/11/09
	2.0 WORK TO BE PERFORMED BY GRANTEE		
	2.2 Monitoring and Documentation		
	2.2.2 Design Plans	100%	9/22/08
	2.2.4 Notice to Proceed	100%	12/10/08
	2.3.2 Photo Documentation (Pre, During, and Post)	100%	5/5/09
	3.0 REPORTING		
	3.1 Annual Progress Summary	33%	1/08
		66%	1/09
		100%	1/10
	3.2 Draft Project Report	100%	7/31/10
	3.3 Final Project Report	TBD	8/31/10
EXHIBIT B	5.0 REPORTS		
	5.1 Progress Report by the 20 th of the month following the end of the calendar quarter (March, June, September, and December)	100%	7/10
	5.2 Grant Summary Form	100%	4/24/08
	5.3 Natural Resources Projects Inventory Project Survey Form	100%	9/30/10
EXHIBIT C	22.0 Signed Cover Sheets for all Permits	100%	11/20/08
EXHIBIT D	5 Monitoring and Reporting Plan	100%	5/11/09