APPENDIX L: MALIBU LA PAZ DEVELOPMENT WASTEWATER MANAGEMENT SYSTEM MASTER PLAN (WMSMP), JULY 7, 2008

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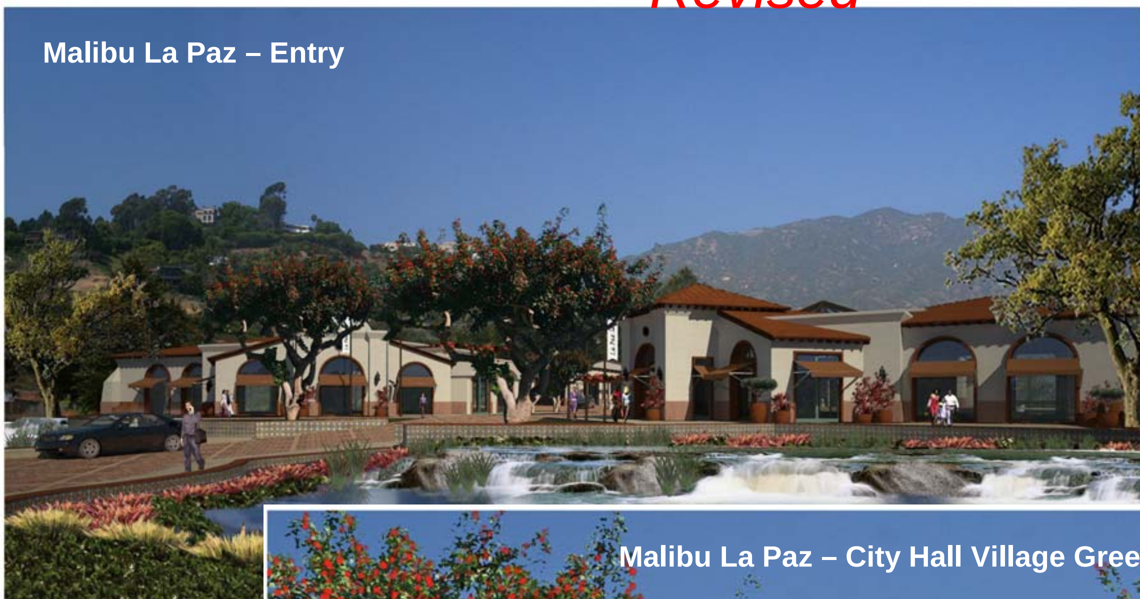
Malibu La Paz Development Wastewater Management System Master Plan

Revised



July 7, 2008

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EXECUTIVE SUMMARY

Lombardo Associates, Inc. (LAI) has been retained by La Paz Ranch, LLC to develop a wastewater collection, treatment and reuse system to serve the proposed La Paz development of which there are two options: Preferred and Alternative Plan, also referred to as 0.20 FAR and 0.15 FAR plans respectively. FAR is defined as Floor to Area Ratio.

The La Paz Development consists of three (3) parcels: A, B and C, as illustrated on Figure ES-1 and ES-2. Seven (7) commercial buildings are to be constructed on Parcel A, four (4) commercial buildings on Parcel B, and one (1) City Hall building on Parcel C. Of the seven (7) buildings to be built on Parcel A, five (5) are strictly retail, while two of the buildings are both retail and office and both have 175 seat restaurants. The four (4) buildings to be built on Parcel B are a combination of office and retail. Table ES-1 presents a summary of the La Paz Development.

TABLE ES-1. LA PAZ DEVELOPMENT LAYOUT

	PREFERRED PLAN (0.20 FAR)			ALTERNATIVE PLAN (0.15 FAR)		
Building	**Retail Space (sf)**	**Office Space (sf)**	**Restaurant # Seats**	**Retail Space (sf)**	**Office Space (sf)**	**Restaurant # Seats**
Parcel A						
1	6,200	-	-	6,200	-	-
2	6,200	-	-	6,200	-	-
3	10,248	-	-	10,248	-	-
4	10,240	-	-	10,240	-	-
5	10,339	7,540	175	10,339	-	175
6	10,290	7,540	175	10,290	-	175
7	400	-	-	400	-	-
Total	***53,917***	***15,080***	***350***	***53,917***	***-***	***350***
Parcel B						
8	7,702	7,598	-	7,702	7,578	-
9	7,883	7,757	-	7,883	7,757	-
10		7,258	-		8,922	-
11		5,236	-		5,398	-
Total	***15,585***	***27,849***	***-***	***15,585***	***29,655***	***-***
Parcel C						
City Hall	-	20,000	-	-	-	-
Total	***-***	***20,000***	***-***	***-***	***-***	***-***
GRAND TOTAL	**69,502**	**62,929**	**350**	**69,502**	**29,655**	**350**

This document is a Master Plan for development, implementation, start-up, performance certification, and operation and maintenance of a complete Wastewater Collection, Treatment & Reuse System for either of the two development options for the Malibu La Paz Project in Malibu, CA.

The Proposed Malibu La Paz Development Wastewater Management System consists of the following:

TABLE ES-2. PROPOSED MALIBU LA PAZ DEVELOPMENT WASTEWATER SYSTEM

Wastewater Component	Technology
Collection	Grease Traps, Septic Tanks & Effluent Collection System
Treatment	Title 22 Compliant System using recirculating synthetic media filters, Nitrex™ denitrification filter and UV – Ozone disinfection with influent equalization storage.
Reuse – in buildings	Reuse for toilet flushing with dual piping (purple pipe system)
Reuse – irrigation	Use for landscape irrigation
Storage Tank	Discharge storage tank for effluent storage during seasonal low ET periods

Based upon an analysis of 15 years of daily Evapotranspiration and Rainfall data collected at Santa Monica by the California Irrigation Management Information System (www.CIMIS.water.ca.gov) and the landscaping area and landscaping palette described herein, the wastewater effluent will be totally used for irrigation purposes, thus enabling a No Net Discharge from the Wastewater System. An effluent storage tank is provided for seasonal periods when wastewater generation is less than reuse requirements.

An average year water balance for the wastewater system that demonstrates a No Net Discharge System is presented on Table ES-3.

TABLE ES-3. WASTEWATER AND IRRIGATION WATER BALANCE - REVISED

Wastewater System Sizing - Annual Avg (gpd)		
	Preferred .20 Option	Alternative.15 Option
Proposed WW System Design Flow[1]	28,000	23,000
Annual Avg daily WWTP Flow[1, 2] (gpd)	19,000	15,000
Reuse %	45%	36%
Reused Wastewater (gpd)	8,540	5,420
Dispersal Req't (gpd)	10,460	9,580
Irrigation Demand Balance [3,4]		
Total Demand (gpd)	14,000	16,700
Wastewater(gpd)	10,460	9,580
Bal by Potable, GW or other Title 22 water	3,540	7,120
Drip & Spray Irrigation System Application Rate		
Area (sf)	266,000	367,000
Application Rate (gpd/sf)	0.039	0.026
Average Application Rate (inches/day)	0.063	0.042
(1) using Malibu Plaza comparables		
(2) Influent Equalization Tank of 23,000 gal for .15 FAR & 28,000 gal for .20 FAR Option		
(3) Based upon 15 years of ET-Rain data at Santa Monica		
(4) Irrigation Efficiency 90%		

The effluent storage and irrigation system is sized based upon the extreme conditions that occurred based upon the Santa Monica data, in which the design landscape evapotranspiration was approximately 75% of the annual average.

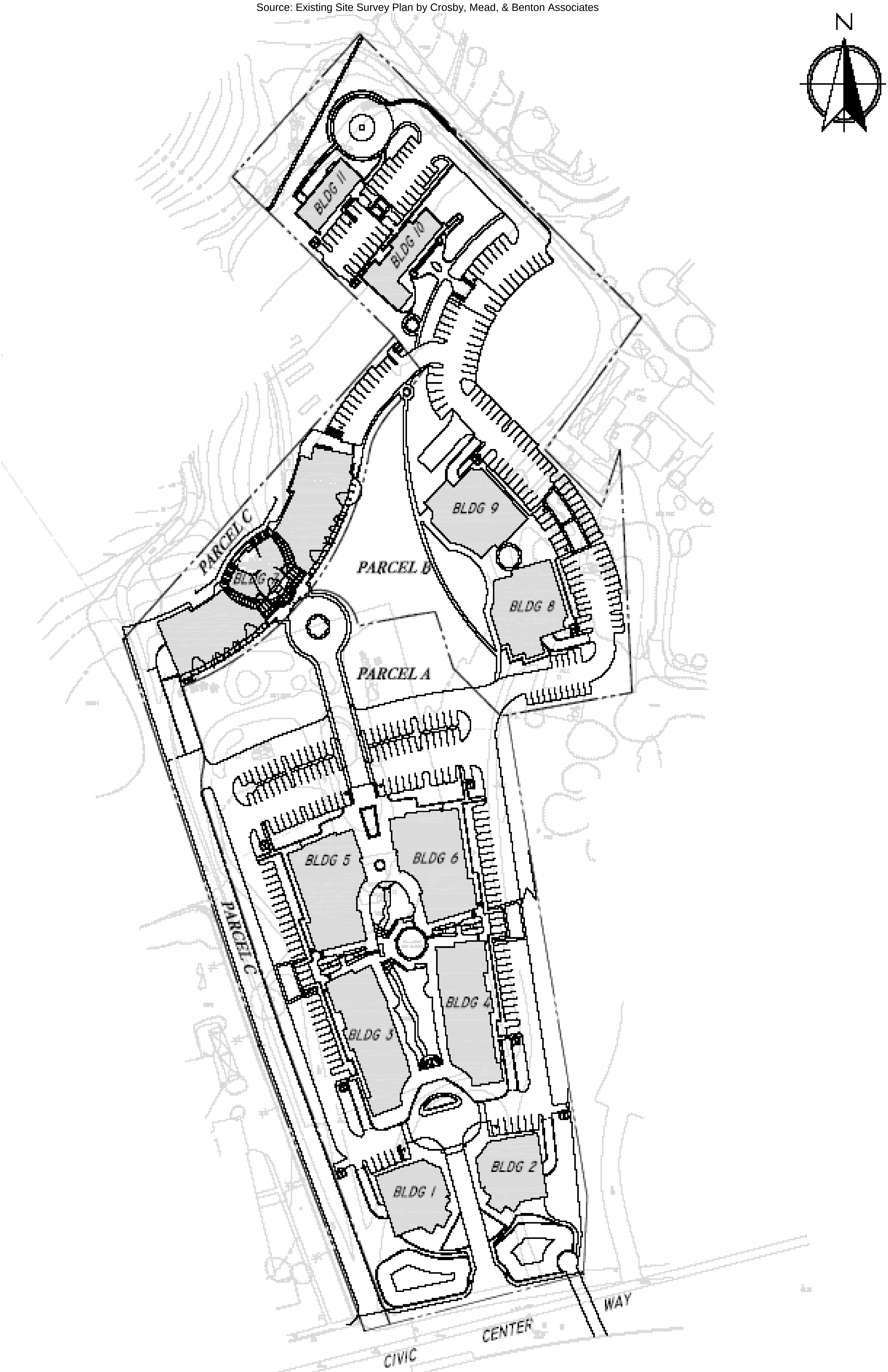
Excess irrigation for soil salt leaching will be offset by an equivalent amount of groundwater extraction to maintain no net discharge to groundwater. A salt management plan will be developed during system design.

Transient analysis of groundwater mounding was performed and determined that negligible mounding would occur offsite should emergency groundwater discharge be necessary, as required by CA Department of Public Health.

This report provides a Master Plan that has been prepared to be compliant with Los Angeles Regional Water Quality Control Board (LARWQCB) requirements, California Department of Public Health (DPH) Title 22 Disinfected Tertiary Treatment Standards requirements, and City of Malibu regulations for a Wastewater Management System.

FIGURE ES-1. SITE PLAN - MALIBU LA PAZ DEVELOPMENT, MALIBU, CA – PREFERRED PLAN

Source: Existing Site Survey Plan by Crosby, Mead, & Benton Associates



1 INTRODUCTION

This report describes the enhanced Wastewater Management System Master Plan for the Malibu La Paz Development Project. The Preferred Plan is the 0.20 FAR project while the Alternative Option is the 0.15 FAR project that are being evaluated simultaneously. The report consists of the following sections:

1. Proposed Development and Building Usage
2. Wastewater Design Flows
3. Wastewater Collection, Treatment and Reuse system – Description and Process Flow Diagrams
4. Design basis of the proposed wastewater management system
5. Permitting Requirements
6. Hydrogeology Issues
7. Preliminary Engineering Sizing and Layouts
8. Performance Monitoring Plan

Appendices:

A. Wastewater Flow Comparables Data
B. ET-Rain Climatic Data
C. Storage Tank Liquid Level Simulation
D. Groundwater Mounding Transient Analysis
E. Soils, Surficial Geology and Percolation Rates

Figure 1-1 illustrates the proposed wastewater management system that achieves a No Net Discharge System as described herein. The No Net Discharge Wastewater System is achieved by:

1. In Building Reuse
2. Landscape Irrigation

Conceptually, it is proposed that at least an amount of groundwater equal to salt leaching requirements be extracted from groundwater and used for site irrigation needs and a salt management plan developed during design. Consequently, there would be no net discharge to groundwater associated with the proposed development. It is noted that average annual irrigation demand exceeds wastewater generation, as described in Section 2.2.7. So supplemental irrigation with groundwater and/or potable water is necessary.

A subsurface drip irrigation system is proposed to satisfy CA Department of Public Health (DPH) requirements for 20 days of wastewater disposal, rather than storage.

FIGURE 1-1A. WASTEWATER COLLECTION, TREATMENT AND REUSE SYSTEM WITH DISPERSAL AREAS SHOWN – REVISED

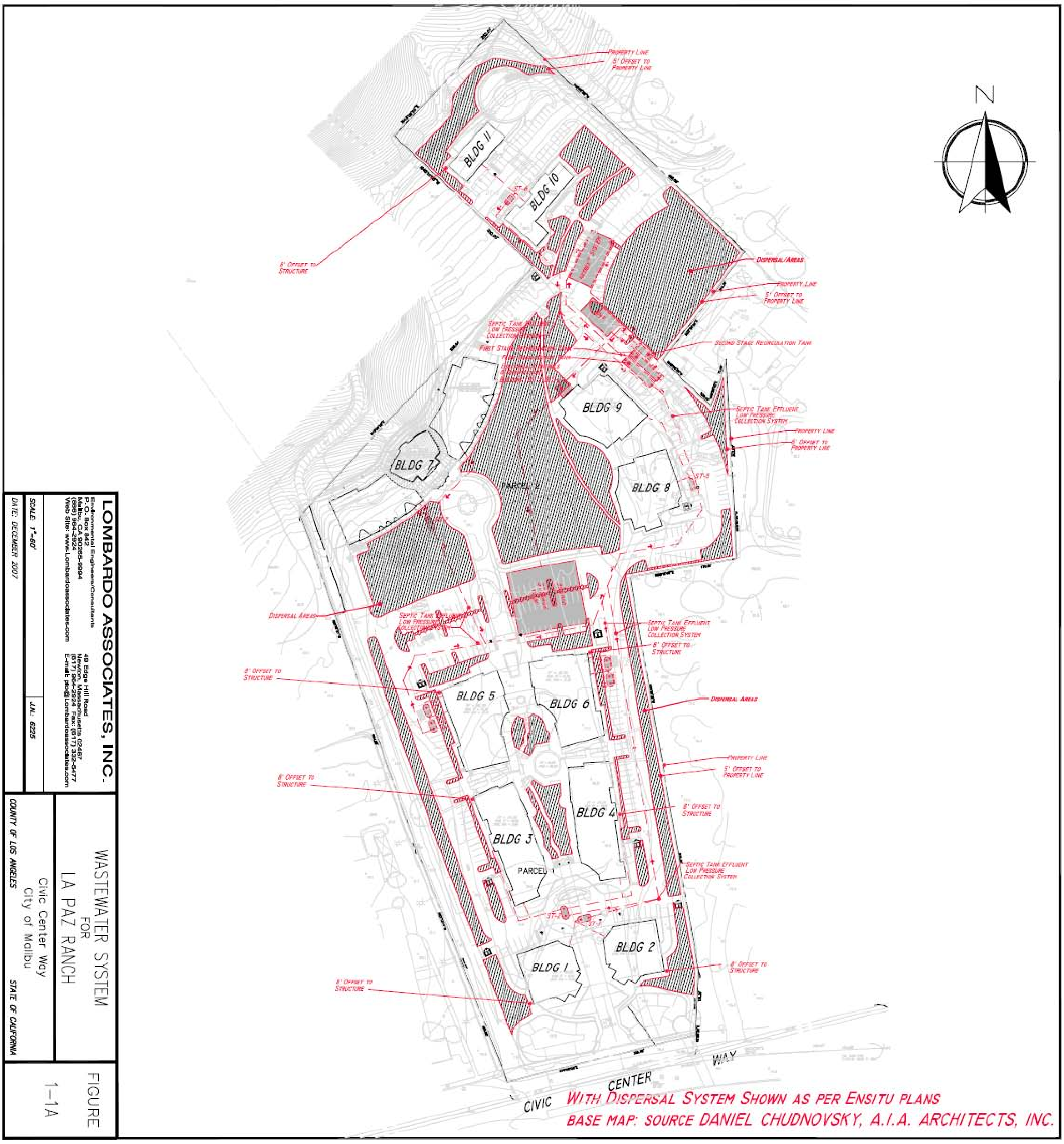
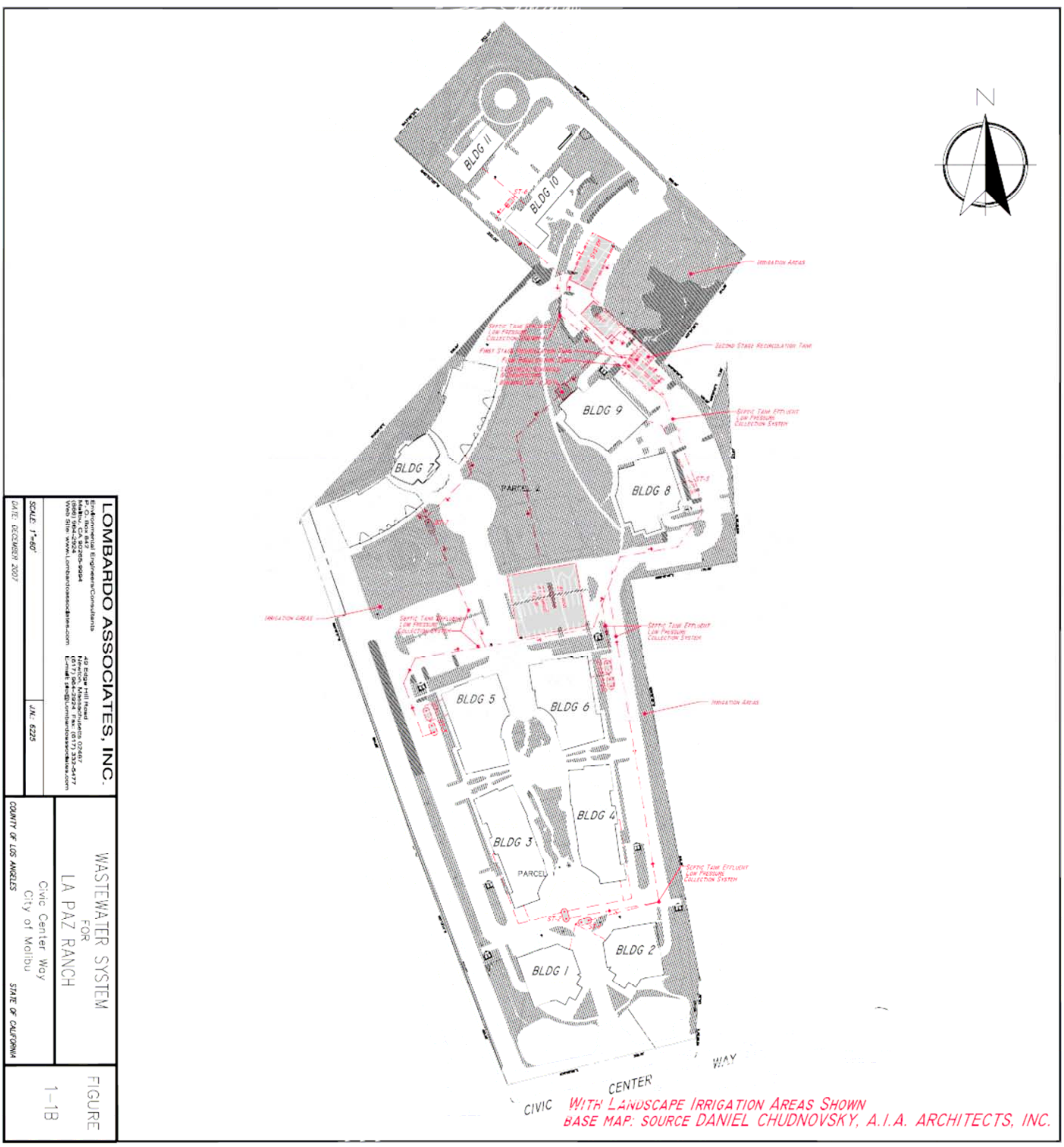


FIGURE 1-1B. WASTEWATER COLLECTION, TREATMENT AND REUSE SYSTEM WITH LANDSCAPE IRRIGATION AREAS SHOWN - REVISED



2 MASTER PLAN

2.1 Proposed Development and Building Usage

The La Paz Development consists of three (3) parcels: A, B and C, as illustrated on Figure 2-1. Seven (7) commercial buildings are to be constructed on Parcel A, four (4) commercial buildings on Parcel B, and one (1) City Hall building on Parcel C. Of the seven (7) buildings to be built on Parcel A, five (5) are strictly retail, while two of the buildings are both retail and office and both have 175 seat restaurants. The four (4) buildings to be built on Parcel B are a combination of office and retail. Table 2.1 presents a summary of the proposed La Paz Development.

TABLE 2.1. LA PAZ DEVELOPMENT LAYOUT

	PREFERRED PLAN (0.20 FAR)			ALTERNATIVE PLAN (0.15 FAR)		
Building	**Retail Space (sf)**	**Office Space (sf)**	**Restaurant # Seats**	**Retail Space (sf)**	**Office Space (sf)**	**Restaurant # Seats**
Parcel A						
1	6,200	-	-	6,200	-	-
2	6,200	-	-	6,200	-	-
3	10,248	-	-	10,248	-	-
4	10,240	-	-	10,240	-	-
5	10,339	7,540	175	10,339	-	175
6	10,290	7,540	175	10,290	-	175
7	400	-	-	400	-	-
Total	***53,917***	***15,080***	***350***	***53,917***	***-***	***350***
Parcel B						
8	7,702	7,598	-	7,702	7,578	-
9	7,883	7,757	-	7,883	7,757	-
10		7,258	-		8,922	-
11		5,236	-		5,398	-
Total	***15,585***	***27,849***	***-***	***15,585***	***29,655***	***-***
Parcel C						
City Hall	-	20,000	-	-	-	-
Total	***-***	***20,000***	***-***	***-***	***-***	***-***
GRAND TOTAL	**69,502**	**62,929**	**350**	**69,502**	**29,655**	**350**

2.2 Wastewater Design Flows

2.2.1 Appendix K Basis Flows

Table 2.2 presents the LA County Plumbing Code Table K-3 Wastewater Design Flows for the Preferred and Alternative Plans for the Malibu La Paz Development.

FIGURE 2-1A. SITE PLAN - MALIBU LA PAZ DEVELOPMENT, MALIBU, CA

Source: Existing Site Survey Plan by Crosby, Mead, & Benton Associates

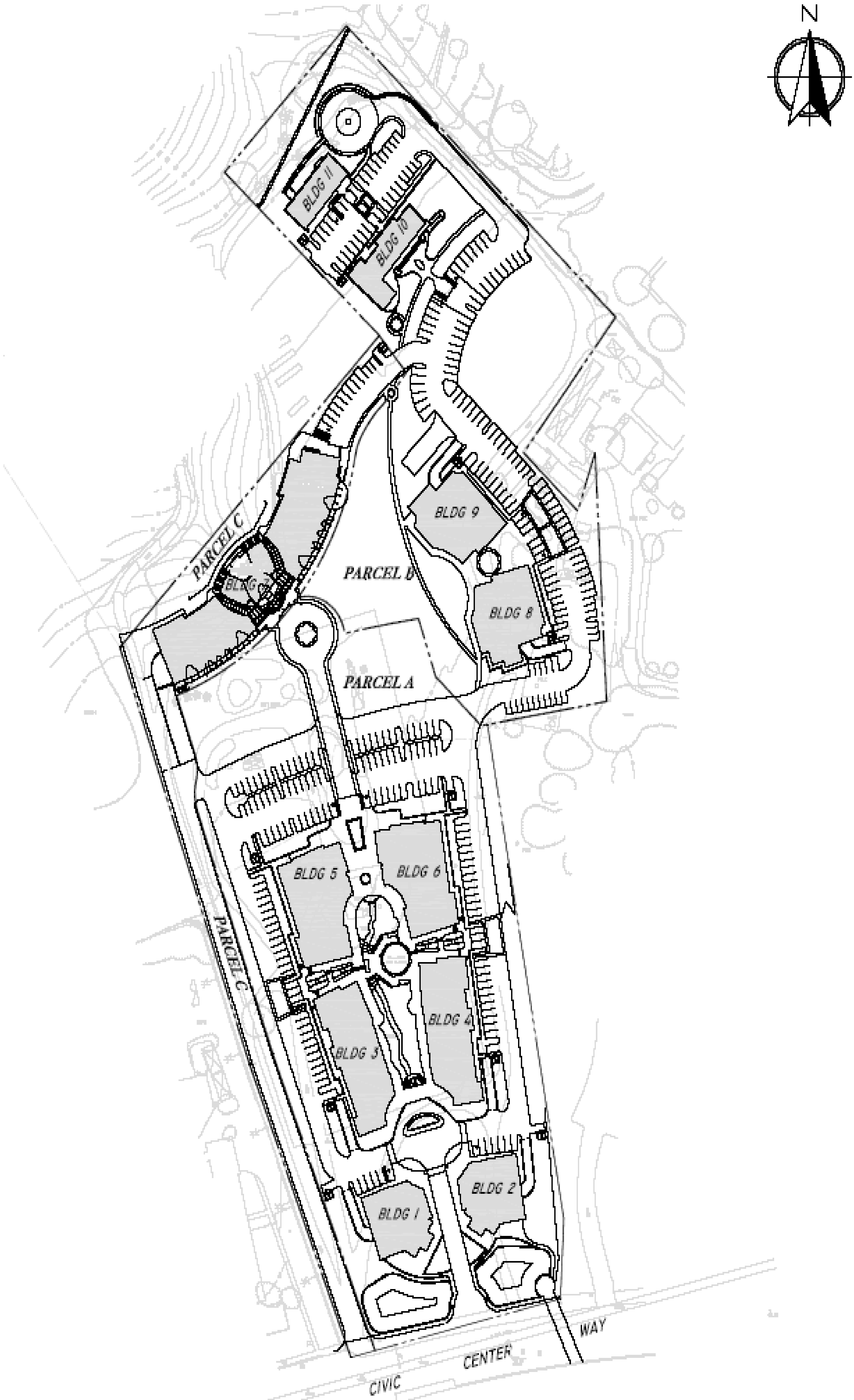


TABLE 2.2. LA COUNTY PLUMBING CODE TABLE K-3 WASTEWATER DESIGN FLOWS FOR PREFERRED AND ALTERNATIVE PLANS

	PREFERRED PLAN (0.20 FAR)								ALTERNATIVE PLAN (0.15 FAR)							
Building	**Retail Space (sf)**	**Flow from Retail (gpd)**	**Office Space (sf)**	**Max # Employees**	**Flow from Office Space (gpd)**	**Restaurant # Seats**	**Restaurant Flow (gpd)**	**Building Flow (gpd)**	**Retail Space (sf)**	**Flow from Retail (gpd)**	**Office Space (sf)**	**Max # Employees**	**Flow from Office Space (gpd)**	**Restaurant # Seats**	**Restaurant Flow (gpd)**	**Building Flow (gpd)**
Plumbing Code K-3 Assumptions	**10 sf / gpd flow**	**0.1 gpd/ sf**	**100 sf / employee**		**20 gpd/ employee 0.2 gpd/SF**		**50 gpd / seat**		**10 sf / gpd flow**	**0.1 gpd/ sf**	**100 sf / employee**		**20 gpd/ employee 0.2 gpd/SF**		**50 gpd / seat**	
Parcel A																
1	6,200	620	-	-	-	-	-	620	6,200	620	-	-	-	-	-	620
2	6,200	620	-	-	-	-	-	620	6,200	620	-	-	-	-	-	620
3	10,248	1,030	-	-	-	-	-	1,030	10,248	1,030	-	-	-	-	-	1,030
4	10,240	1,030	-	-	-	-	-	1,030	10,240	1,030	-	-	-	-	-	1,030
5	10,339	1,040	7,540	76	1,520	175	8,750	11,310	10,339	1,040	-	-	-	175	8,750	9,790
6	10,290	1,030	7,540	76	1,520	175	8,750	11,300	10,290	1,030	-	-	-	175	8,750	9,780
7	400	40	-	-	-	-	-	40	400	40	-	-	-	-	-	40
Total Flow for Parcel A		**5,410**			**3,040**		**17,500**	**25,950**		**5,410**			**0**		**17,500**	**22,910**
Parcel B																
8	7,702	780	7,598	76	1,520	-	-	2,300	7,702	780	7,578	76	1,520	-	-	2,300
9	7,883	790	7,757	78	1,560	-	-	2,350	7,883	790	7,757	78	1,560	-	-	2,350
10			7,258	73	1,460	-	-	1,460			8,922	90	1,800	-	-	1,800
11			5,236	53	1,060	-	-	1,060			5,398	54	1,080	-	-	1,080
Total Flow for Parcel B		**1,570**			**5,600**		**0**	**7,170**		**1,570**			**5,960**		**0**	**7,530**
Parcel C																
City Hall	-	-	20,000	200	4,000	-	-	4,000	-	-	-	-	-	-	-	0
Total Flow for Parcel C		**0**			**4,000**		**0**	**4,000**		**0**			**-**		**0**	**0**
GRAND TOTAL DESIGN FLOW		***6,980***			***12,640***		***17,500***	***37,120***		***6,980***			***5,960***		***17,500***	***30,440***
					% Restaurant =		**47%**						**% Restaurant =**		**57%**	

2.2.2 Comparables – Wastewater Generation Design Flows

As Appendix K of the 2001 California Plumbing Code / Title 28 Los Angeles Plumbing Code and Malibu City Ordinances No. 242 Design Flows is for small scale septic system designs and as Table K-3 states that the designer may modify the design criteria, subject to concurrence of Administrative Authority (LARWQCB and City of Malibu), Lombardo Associates, Inc. proposes actual / comparables wastewater generation data be used in lieu of Table K-3 design flows. Appendix A of this Master Plan presents the Table K-3 design values and actual water use and wastewater generation data for the nearby comparable Malibu Creek Plaza. The Malibu Creek Plaza wastewater system serves restaurant and retail tenants with restaurants generating approximately 80% of the wastewater flow.

The LARWQCB has stated its position that the design meet the plumbing code assumptions for water use even if the WDR/WRR is for lower discharge volumes. This Report requests consideration of design flow reduction based upon the following rationale.

The plumbing code is based upon septic system design for very small flow septic system applications that do not have influent equalization storage. Also the plumbing code does not reflect the wastewater generation reductions that have occurred due to the use of federally required water conserving fixtures. As an example, toilets may not use more than 1.6 gallons per flush, whereas old fixtures used 3 – 7 gallons per flush. Toilet flushing is a predominant water use in buildings. As another example, we have used residential wastewater flows of 200 gallons per day for treatment plant design for communities based upon USEPA standards. Plumbing code flows based upon bedrooms can be 600 gpd. It is common industry practice that peak design flows per unit decrease as the system size increases and that comparables are used. Very importantly, restaurant water conserving equipment and practices are now more common.

In Appendix A, we have provided comparables that demonstrate actual wastewater generation is significantly lower than code flows. The Malibu Creek Plaza wastewater system that has been operating well within permit requirements was based upon approximately 33% reduction in Code flows with a 1 day hydraulic residence time (HRT) influent equalization, and was approved by the City. Most importantly, the Malibu Creek Plaza system has been operating well within permit requirements, achieved within 8 weeks after start-up.

Therefore it is respectfully requested that the design flow be 75% of code flow with the requirement of one day of influent HRT equalization storage. The equalization tank dampens peak flows that the Code uses.

Based upon simulation of daily water use at Malibu Creek Plaza, the following design criteria were developed for that application:

Average Wastewater Generation	=	50% Table K-3 Design Flows
Required Influent Equalization to dampen Peak Daily Flows	=	1 day hydraulic retention time (HRT) of design flow
Design Flow	=	~150% of average wastewater generation
	=	75% Table K-3 Design Flows

These design criteria have been validated based upon operating history of the Malibu Creek Plaza and other wastewater systems engineered or examined by Lombardo Associates, Inc.

It is proposed that similar criteria be used for La Paz.

2.2.3 In Building Water Reuse Demand

In-Building Potable and Non-Potable Water Reuse demand flushing is estimated by building type for each of the development options in Table 2.3.

TABLE 2.3. WATER USE PATTERNS FOR IN-BUILDING WATER USE, EXCLUSIVE OF AIR CONDITIONING

Water Use Component	Office	Retail	Restaurant
Toilet Flushing	85%	85%	20%
Lavatory Sinks	15%	15%	
Cooling Towers			
Cleaning			3%
Dishwashing			67%
Food Prep / Products			10%
Total	**100%**	**100%**	**100%**

References: (1) Pacific Institute "Waste Not, Want Not: The Potential for Urban Water Conservation in California," November 2003; (2) Vickers, Amy, *Handbook of Water Use and Conservation*, Waterplow Press, May 2001.

Based upon these water use patterns, Tables 2.4 and 2.5 present the estimated percent of water demand that can be satisfied by non-potable water. Best Management Practices for water conservation would be used within buildings to reduce wastewater generation / water use.

Comparables for these water reuse estimates are presented in Table 2.4, published by Applied Water Management, a subsidiary of American Water (largest private water utility in the United States).

TABLE 2.4. WATER REUSE SYSTEMS – COMPARABLES OF APPLIED WATER MANAGEMENT WATER REUSE APPLICATIONS

<table>
<tr><th>Building Rype</th><th>Date of 1st System</th><th>Water Reuse</th><th>Water Uses</th></tr>
<tr><td>Research</td><td>1987</td><td>95%</td><td>Toilet Flushing</td></tr>
<tr><td>Office</td><td>1989</td><td>95%</td><td>Toilet Flushing</td></tr>
<tr><td>School</td><td>1990</td><td>75%</td><td>Toilet Flushing</td></tr>
<tr><td>Commercial Centers</td><td>1993</td><td>70%</td><td>Toilet Flushing</td></tr>
<tr><td>Stadiums</td><td>1996</td><td>75%</td><td>Toilet Flushing</td></tr>
<tr><td>Urban Residential High Rise</td><td>2000</td><td>50%</td><td>Toilet Flushing, cooling, irrigation and laundry</td></tr>
<tr><td rowspan="2">30 Systems</td><td rowspan="2">20 years</td><td>80% Reuse Nonresidential</td><td rowspan="2"></td></tr>
<tr><td>50% Reuse Residential</td></tr>
</table>

Treated wastewater that complies with CA Department of Public Health Title 22 Disinfection Tertiary Treated Standards may be used in commercial buildings for non-potable purposes with a dual piping water supply system. Reclaimed water is conveyed in purple pipes with appropriate back flow preventors required to avoid connection to the potable water supply. No reuse is assumed in the restaurants, per CADPH regulations, however common restrooms may be made available during design that would increase reuse potential.

No reuse for toilet flushing associated with restaurants has been assumed due to CA DPH requirements. However, based upon discussions with DPH, toilet flushing for facilities associated with restaurants would be allowed if piping is designed to ensure avoidance of cross-connections. It is noted that this feature would reduce the amount of effluent to be discharged by approximately 20% (or ~2,000 gpd).

TABLE 2.5. PREFERRED PLAN IN-BUILDING WATER REUSE POTENTIAL

Preferred Plan - 0.20 FAR				
La Paz WW App K-3 Flows and In-Building Reuse Potential				
Parcel		Flow (gpd)	% Reuse Potential	Calculated Reuse Potential*
A	Office	3,040	85%	2,584
	Retail	5,410	85%	4,599
	Restaurants	17,500		0
	Subtotal	***25,950***		***7,183***
B	Office	5,600	85%	4,760
	Retail	1,570	85%	1,335
	Subtotal	***7,170***		***6,095***
C	City Hall	4,000	85%	3,400
	Total	***37,120***		***16,677***
Weighted Average % Reuse				***45%***

*Reuse Potential as % of Total Code Flow
Non-Potable: Toilet Flushing

TABLE 2.6. ALTERNATIVE PLAN IN-BUILDING WATER REUSE POTENTIAL

Alternative Plan - 0.15 FAR				
La Paz WW App K-3 Flows and In-Building Reuse Potential				
Parcel		Flow (gpd)	% Reuse Potential	Calculated Reuse Potential*
A	Retail	5,410	85%	4,599
	Restaurants	17,500	0%	0
	Subtotal	***22,910***		***4,599***
B	Office	5,960	85%	5,066
	Retail	1,570	85%	1,335
	Subtotal	***7,530***		***6,401***
C				0
	Total	***30,440***		***10,999***
Weighted Average % Reuse				***36%***

*Reuse Potential as % of Total Code Flow
Non-Potable: Toilet Flushing

2.2.4 Irrigation Treated Wastewater Reuse Requirement

The wastewater out-of-building reuse requirement is listed on Table 2-10, in Section 2.2.7, and is the quantity of treated wastewater that is not needed for in-building reuse. The annual average irrigation reuse requirement is greater than the available treated wastewater of 10,600 gpd for the Preferred Option and 9,600 gpd for the Alternative Option.

LAI determined that with the treated effluent storage tank, the entire wastewater volume that results after in-building reuse will be needed for landscape irrigation. This is further discussed in Section 2.2.5. In fact, as discussed in Section 2.2.6, the site's irrigation water demand will require water in addition to treated effluent, see Table 2-10. This additional water demand will be provided by potable water or extracting groundwater.

2.2.5 Wastewater Effluent Storage Tank Requirements

Wastewater Effluent Storage tank requirements were determined in two manners:

1. Maximum water level in storage tanks simulated by 15 years of daily evapotranspiration (ET) and rainfall data for Santa Monica obtained from the California Irrigation management Information System (www.cimis.water.ca.gov), see Appendix B. This analysis determines the maximum level of water in the storage tank and enables a validation that all wastewater will be used for irrigation.

2. 60 days of storage of irrigation reuse flows

Appendix C presents the daily simulation of storage tank water levels for the two development options, using Santa Monica ET – Rain data and site landscape irrigation needs as described in Section 2.2.6. Table 2.7 presents the results of the simulations, along with 60 days of effluent storage.

TABLE 2.7. WASTEWATER EFFLUENT STORAGE TANK REQUIREMENTS

Wastewater System Sizing - Annual Avg (gpd)		
	Preferred .20 Option	Alternative.15 Option
Design Dispersal Flow (gpd)	10,460	9,600
Simulated Maximum Liquid Volume (gal)[(1)]	732,552	242,085
60 Days Effluent Storage (gal)	627,600	576,000
Proposed Storage Volume (gal)	800,000	400,000

[(1)] Based upon 15 years of ET-Rain data at Santa Monica

As can be seen in Figure C-1, the required storage tank may be reducible to approximately 500,000 gallons by optimizing plantings and irrigation management or discharge of approximately 1,000 gpd, as the storage tank did not empty in July 1996. Figures C-3 and C-4 illustrate the daily ET and Storage Tank volumes for an average year and worst case year. The groundwater mounding analysis of discharge is examined in Section 2.10.

2.2.6 Irrigation Water Demand

Irrigation Water Demand for the Project's two development options were determined based upon landscaping plans, plant types proposed for the various areas, their associated ET_c and assumption on irrigation efficiency. Table 2.8 presents the site data and results of the analysis. Figures 2-2 and 2-3 illustrate the landscaping design for the Preferred and Alternate Plans, respectively, as developed by Wynn Landscape Architects.

ET was determined using the CA Department of Water Resources Guide to Estimating Landscape Plantings in California by the Landscape Coefficient Method and WUCOLS III (www.OWUF.water.ca.gov/docs/wucols00.pdf). The WUCOLS (Water Use Classification of Landscape Species) method is:

$$ET_c = K_c \times ET_o$$

where ET_c = Crop Evaporation
K_c = Crop Coefficient
ET_o = reference ET

ET_o is the amount of water that evaporates from a 4 to 7 inch tall crop season grass growing in an open field. The California Irrigation Management Information System (www.cimis.water.ca.gov) measures ET_o at numerous locations throughout California with Santa Monica being the closest location most similar to Malibu.

Crop coefficients are used for agricultural crops and turfgrasses, but not for landscape planting for the following reasons:

1. Landscape plantings are composed of more than one species
2. Vegetation density can vary
3. Microclimates may exist due toe shading, hot/windy environments, etc.

The Landscape Coefficient Formula is used as follows:

$$ET_L = K_L \times ET_o$$

$$K_L = k_s \times k_d \times k_{mc}$$

Landscape Coefficient = species factor x density factor x microclimate factor

Although the species, density and microclimate factors can be greater than one, we have assumed them to be one to be conservative. Under these assumptions $k_s = k_c$. Also, very importantly, "ET_L calculates the amount of water needed for health, appearance and growth, not the maximum amount that can be lost via evapotranspiration" (WUCOLS Manual, Page 10). "Many plants will lose water at a maximum rate as long as it is available."

Landscape species factors range from 0.1 to 0.9 and are divided into four categories with the density and microclimate reference factors of: (WUCOLS, page 23)

Landscape Coefficient Factors

	Species (k_s)	Density (k_d)	Microclimate (k_{mc})
High	0.7 – 0.9	1.1 – 1.3	1.1 – 1.4
Mod./Ave.	0.1 – 0.6	1.0	1.0
Low	0.1 – 0.3	0.5 – 0.9	0.5 – 0.9
Very Low	<0.1		

Although seasonal factors can affect landscape ET, WUCOLS manual indicates turfgrass ET is year round. Also, as stated in WUCOLS, "Soil water availability plays a major role in controlling the rate of water loss from plants (ET rate). Many plants will lose water at a maximum rate as long as it is available. For example, some desert species have been found to maintain ET rates equivalent to temperate zone species when water is available. When soil moisture levels decrease, however, ET rates in desert species decline rapidly."

Consequently, greater ET than calculated herein can be achieved through irrigation management – thus providing an additional margin of safety for the La Paz project's wastewater effluent use plan.

Irrigation efficiency is defined as:

Irrigation Efficiency = (Beneficially Used Water) / (Total Water Applied) x 100

To avoid runoff and concern with aerosols, and maximize water use efficiency, drip irrigation and limited low level spray irrigation is proposed. We have used a 90% efficiency for the irrigation system, typical for drip irrigation and efficient spray irrigation techniques. The 10% inefficiency is lost to evaporation during application. The WeatherTRAK™ climatologically based controller will be used for managing irrigation. It has demonstrated the ability to irrigate according to ET demand and eliminate runoff and deep percolation.

TABLE 2.8A. PROPOSED LA PAZ LANDSCAPING AREAS, PLANT TYPES AND ESTIMATED ET_c - REVISED

LaPaz Landscaping Areas, Plant Types and Estimated ET_c								
Planting Zone - Water Use	Location	Landscape Description	ET_c		.20 Option Area (sf)	% of Site ET	.15 Option Area (sf)	% of Site ET
High	North & East sides of Bldgs	Lawn Shrubs						
			0.8	Subtotal	124,000	59%	179,000	72%
	Wetland		2		12,000	14%		0%
Moderate	South & West side	Shrubs	0.5		59,000	18%	59,000	15%
Low	Project Perimeter	Drought Tolerant planting	0.2		71,000	9%	129,000	13%
				Total	266,000	100%	367,000	100%
				Weighted Average ET	0.627		0.541	
Annual Net ET (in)	44.5			Avg Irrigation Demand ET Only (gpd)	12,616		15,004	
Irrigation Efficiency	90.0%			Avg Irr Demand (gpd) w/applied eff. Considered	14,000		16,700	

To achieve ET values used in Table 2.8A, the landscaping palette may be modified to achieve a weighted site ET of at least 0.609. The needed site ET can be achieved by alternate plantings, use of constructed wetland of approximately 12,000 square feet, plant selection, irrigation management, or combination of these options. Tables 2.8B and 2.8C present a sensitivity analysis of varying ET_c factor. Table 2.9 presents the currently proposed landscape plantings.

It is noted that the ET_c factor for cool season turfgrass is 0.90 – 0.95 in "Crop Evapotranspiration – Guidelines for Computing Crop Water Requirements – United Nations FAO Irrigation and Drainage Paper 56," 1998. Changing that factor alone, which can be achieved by the proposed irrigation practice to maximize ET_c, allows the needed weighted site factor to exceed 0.609.

TABLE 2.8B. SENSITIVITY ANALYSIS - REVISED

LaPaz Landscaping Areas, Plant Types and Estimated ET_c								
Planting Zone - Water Use	Location	Landscape Description	ET_c		.20 Option Area (sf)	% of Site ET	.15 Option Area (sf)	% of Site ET
High	North & East sides	Lawn						
		Shrubs						
			0.935	Subtotal	124,000	72%	179,000	75%
	Wetland					0%		0%
Moderate	South & West side of bldgs	Shrubs	0.5		59,000	18%	59,000	13%
Low	Project Perimeter	Drought Tolerant planting	0.2		83,000	10%	129,000	12%
				Total	266,000	100%	367,000	100%
				Weighted Average ET	0.609		0.607	
Annual Net ET (in)	44.5			Avg Irrigation Demand ET Only (gpd)	12,248		16,831	
Irrigation Efficiency	90.0%			Avg Irr Demand (gpd) w/applied eff. Considered	13,600		18,700	

TABLE 2.8C. SENSITIVITY ANALYSIS - REVISED

LaPaz Landscaping Areas, Plant Types and Estimated ET_c								
Planting Zone - Water Use	Location	Landscape Description	ET_c		.20 Option Area (sf)	% of Site ET	.15 Option Area (sf)	% of Site ET
High	North & East sides of Bldgs	Lawn						
		Shrubs						
			0.8	Subtotal	124,000	61%	179,000	64%
	Wetland		2		12,000	15%		0%
Moderate	South & West side	Shrubs	0.5		59,000	18%	59,000	13%
Low	Project Perimeter	Drought Tolerant planting	0.2		71,000	9%	129,000	12%
				Total	266,000	103%	367,000	89%
				Weighted Average ET	0.627		0.541	
Annual Net ET (in)	44.5			Avg Irrigation Demand ET Only (gpd)	12,616		15,004	
Irrigation Efficiency	90.0%			Avg Irr Demand (gpd) w/applied eff. Considered	14,000		16,700	

TABLE 2.9. PROPOSED PLANTS AND AREAS

Water Zone Item		.20 scheme Initial planting	.20 scheme at Maturity	.15 scheme Initial Planting	.15 scheme at Maturity
High Zone (EWU)	**ET_c=0.8**				
Marathon Fescue	H	121,970	117,907	176,970	172,907
Azalea sp.	H	444	1,332	444	1,332
Dicksonia antarctica	H	495	1,485	495	1,485
Magnolia soulangeana	H	866	2,600	866	2,600
Liriope "Silvery Sunproof"	H	225	676	225	676
High Zone Total		**124,000**	**124,000**	**179,000**	**179,000**
Moderate Zone (EWU)	**ET_c=0.5**				
Cinnamomum Camphora	M	3,675	58,800		
Erythrina caffra	M	1,395	37,200		
Geijera parviflora	M	672	9,450		
Liriodendron tulipifera	M	54	1,350		
Platanus racemosa	M	6,804	20,412		
Prunus "Thundercloud"	M	72	900		
Raphiolepis "Majestic Beauty"	M	48	436		
Tabebuia ipe	M	1,050	15,120		
Tipuana tipu	M	1,161	25,284		
Jacaranda acutifolia	M	825	13,200		
Abelia "Edward Goucher"	M	500	1,501	1,292	1,292
Agapanthus "Storm Cloud"	M	832	2,496	2,496	2,496
Anigozanthos flavidus	M	300	900	900	900
Buxus "Green Beauty"	M	84	252	252	252
Carissa grandiflora	M	909	2,727	1,026	1,026
Dietes bicolor	M	462	1,387	1,387	1,387
Escallonia "Apple Blossom"	M	296	888	192	192
Festuca ovina "Glauca"	M	130	390	390	390
Hemerocallis sp.	M	1,362	4,088	4,088	4,088
Phormium "Duet"	M	740	2,220	2,220	2,220
Phormium "Guardsman"	M	297	893	893	893
Phormium "Yellow Waves"	M	664	1,992	1,992	1,992
Photinia fraseri	M	1,476	4,428	2,403	2,403
Pittosporum "Wheeler's Dwarf"	M	288	864	864	864
Sollya heterophylla	M	2,156	6,468	1,752	1,752
Polygonum capitatum	M	16,374	-	18,426	18,426
Cerastium tomentosum	M	16,374	-	18,426	18,426
Moderate Zone Total		**59,000**	**213,646**	**59,000**	**59,000**
Low Zone (EWU)	**ET_c=0.2**				
Bougainvillea "Rosenka"	L	392	1,176	1,176	1,176
Cercis occidentalis	L	6,528	19,584	31,872	31,872
Fraxinus dipetalia	L	128	384		
Quercus agrifolia	L	2,000	6,000		
Sambucus mexicana	L	240	720		
Rhamnus californica	L	1,125	3,375	4,425	4,425
Rhus ovata	L	2,350	7,050	8,025	8,025
Rosmarinus "Prostrata"	L	1,076	3,228	3,228	3,228
Salvia leucantha	L	342	1,026	1,026	1,026
Westringia fruticosa	L	532	1,596	1,767	1,767
Xylosma congestum	L	81	243	243	243
Artemesia californica	L	232	696	720	720
Myoporum sp.	L	63,975	25,925		
Ceanothus "Yankee Point"	L	3,811	11,433	22,052	22,052
Cistus purpureus	L	188	564	768	768
Low Zone Total		**83,000**	**83,000**	**129,000**	**129,000**

FIGURE 2-2. PROPOSED LANDSCAPING LAYOUT – PREFERRED PLAN

(Source: Wynn Landscape Architects, Inc.)

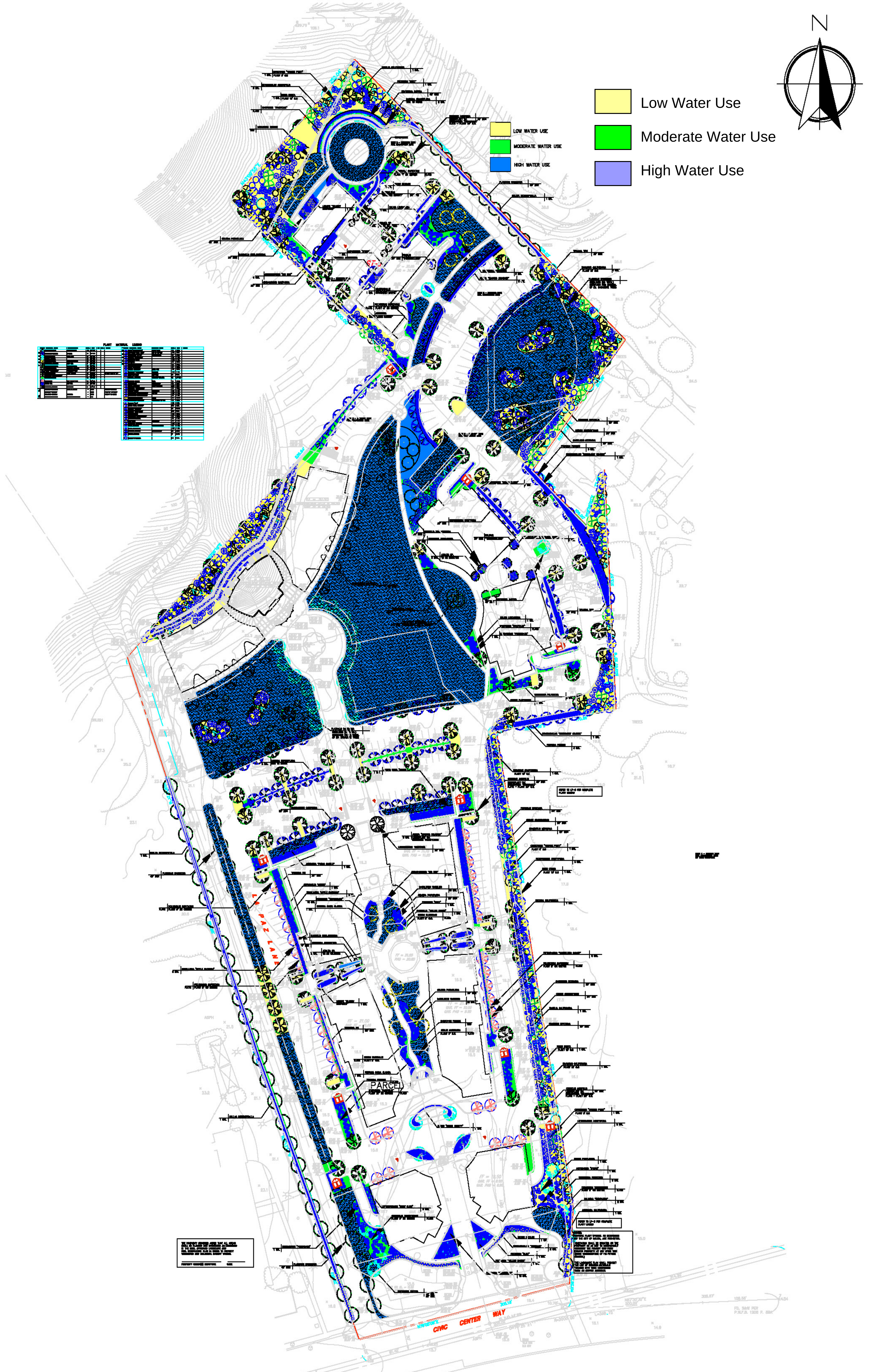


FIGURE 2-3. PROPOSED LANDSCAPING DESIGN – ALTERNATE PLAN

(Source: Wynn Landscape Architects, Inc.)

2.2.7 Wastewater Sizing Summary – No Net Discharge System

A water balance for the wastewater system that demonstrates a No Net Discharge System is presented on Table 2.10 for a year of average ET conditions.

TABLE 2.10. WASTEWATER AND IRRIGATION WATER BALANCE - REVISED

Wastewater System Sizing - Annual Avg (gpd)		
	Preferred .20 Option	Alternative.15 Option
Proposed WW System Design Flow[1]	28,000	23,000
Annual Avg daily WWTP Flow[1, 2] (gpd)	19,000	15,000
Reuse %	45%	36%
Reused Wastewater (gpd)	8,540	5,420
Dispersal Req't (gpd)	10,460	9,580
Irrigation Demand Balance [3,4]		
Total Demand (gpd)	14,000	16,700
Wastewater(gpd)	10,460	9,580
Bal by Potable, GW or other Title 22 water	3,540	7,120
Drip & Spray Irrigation System Application Rate		
Area (sf)	266,000	367,000
Application Rate (gpd/sf)	0.039	0.026
Average Application Rate (inches/day)	0.063	0.042

(1) using Malibu Plaza comparables

(2) Influent Equalization Tank of 23,000 gal for .15 FAR & 28,000 gal for .20 FAR Option

(3) Based upon 15 years of ET-Rain data at Santa Monica

(4) Irrigation Efficiency 90%

2.3 Septic Tank Effluent Wastewater Collection, Treatment and Reuse System

2.3.1 Septic Tank Effluent Wastewater Quality Characterization

The septic tank effluent wastewater generation from the La Paz Project will be commercial strength wastewater, with the following assumed characteristics:

TABLE 2.11. WASTEWATER CHARACTERISTICS – PREFERRED PLAN

Constituent	Units	Restaurants	Office / Retail	Total Table K-3 Flow or Quality Weighted Avg.	Total Design Flow or Quality Weighted Avg.
Flow	gpd	17,500	19,620	37,120	28,000
BOD_5	mg/l	400	150	270	280
TSS	mg/l	150	90	120	120
TN	mg/l	80	100	91	90

TABLE 2.12. SEPTIC TANK EFFLUENT WASTEWATER CHARACTERISTICS – ALTERNATIVE PLAN

Constituent	Units	Restaurants	Office / Retail	Total Table K-3 Flow or Quality Weighted Avg.	Total Design Flow or Quality Weighted Avg.
Flow	gpd	17,500	12,940	30,440	23,000
BOD_5	mg/l	400	150	300	300
TSS	mg/l	150	90	130	130
TN	mg/l	80	100	90	90

2.3.2 Wastewater Quality Requirements

2.3.2.1 Influent Limitations

Waste discharged is limited to discharges from commercial and retail business, and City Hall for the Preferred Option. No water softener regeneration brines or industrial wastewaters shall be discharged.

The maximum daily average influent flow to the treatment system, after equalization, shall not exceed the design capacity of 28,000 gpd for the Preferred Plan or 23,000 gpd for the Alternative Plan. No volatile organic compounds are allowed to be discharged into the system.

2.3.2.2 Effluent Limitations

The maximum daily average effluent discharged to storage for irrigation purposes shall not exceed 10,460 gpd for the Preferred Plan or 9,600 gpd for the Alternative Plan, respectively.

Treated wastewater must meet Title 22 Requirements of the California Department of Public Health (DPH), as the treated wastewater will be used for toilet flushing or irrigation released at depths shallower than 12 inches below ground surface.

The wastewater used for non-potable reuse (toilet flushing and irrigation) purposes will meet the Title 22 Standards for disinfected tertiary treatment and assumed effluent limitations in Table 2.13 below.

TABLE 2.13: EFFLUENT STANDARDS

Monthly Constituent	Unit	Average	Maximum
pH	SU	NA	6.5 - 8.5
BOD_5	mg/L	30	45
Suspended solids	mg/L	30	45
Turbidity	NTU	2	10
Oil and Grease	mg/L	-	15
TDS	mg/L	-	2,000
Sulfate	mg/L	-	500
Chloride	mg/L	-	500
Total Nitrogen	mg/L	-	10
Total Coliform	MPN/100 mL	2.2	23
Fecal Coliform [(a)]	MPN/100 mL	-	200
Enterococcus [(b)]	MPN/100 mL	24	104

(a) The limits for coliform shall apply, prior to discharge of the effluent into the reuse / irrigation system
(b) The Enterococcus limit is based on geometric mean of at least 5 equally spaced samples in any 30-day period.

2.3.3 Siting

1. No part of the irrigation system shall be closer than 50 feet to any water supply well.
2. No part of the irrigation system shall be closer than 100 feet to any stream, channel, or other water course.
3. The solids settling tanks, wastewater collection treatment and reuse / irrigation system shall be protected from damage by storm flows or runoff from a 100-year storm.

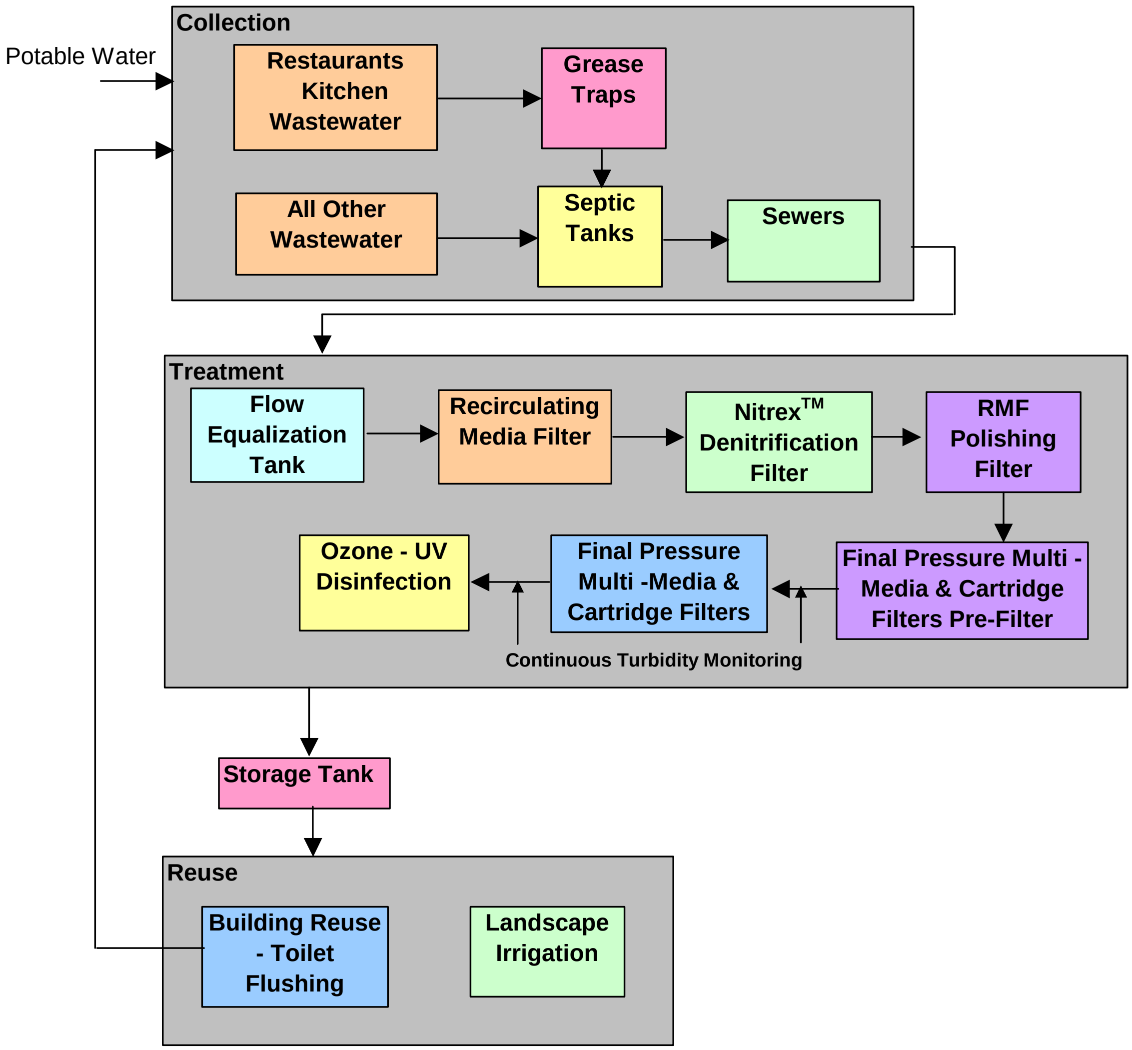
2.4 Conceptual Design of the Proposed Wastewater Management System

The conceptual design of the La Paz Development Wastewater System is described on Table 2.14 and illustrated in the process flow diagram on Figure 2-4. It is a modular system and many of its components can be designed to achieve the City's potential desire to have the wastewater treatment system serving City Hall separate, although it would be costly to separate the filtration/disinfection and reuse systems.

TABLE 2.14. PROPOSED MALIBU LA PAZ DEVELOPMENT WASTEWATER SYSTEM

Wastewater Component	Technology
Collection	Grease Traps, Septic Tanks & Effluent Collection System
Treatment	Title 22 Compliant System using recirculating synthetic media filters, Nitrex™ denitrification filter and Ozone - UV disinfection with influent equalization storage.
Reuse – in buildings	Reuse for toilet flushing with dual piping (purple pipe system)
Reuse – irrigation	Use for landscape irrigation
Storage Tank	Discharge flow storage tank for effluent storage during seasonal low ET periods

FIGURE 2-4. MALIBU LA PAZ DEVELOPMENT WASTEWATER TREATMENT SYSTEM PROCESS FLOW DIAGRAM



2.5 Permitting Requirements

Due to the system's size, the wastewater system is to be permitted by the Los Angeles Regional Water Quality Control Board, along with City of Malibu approval. As a Title 22 water reuse system (purple pipe) is proposed, CA DPH requirements will be required to be adhered to and their approval obtained.

It is understood that the key permitting issues are:

1. Effluent Quality requirements – as described in Table 2.13
2. Irrigation Storage requirements – as described in Section 2.2.5
3. Design and Sampling compliance with CA DPH requirements for Title 22 Reuse Systems – as described in Table 2.15.

2.5.1 Regulatory Requirement for Using Recycled Wastewater as Irrigation and Toilet Flushing Supply

For use as irrigation in a publicly accessible area or as use for urinal and toilet flushing, the recycle wastewater must be defined as "disinfected tertiary recycled water". To meet this requirement, filtration and disinfection in accordance with regulatory requirements is proposed. For planning purposes, it is assumed that any water quality violations will result in partially treated wastewater being diverted to the subsurface drip irrigation system that would serve as an alternate disposal system for the 20 days of emergency discharge as required by DPH.

Filtration Requirements

Due to the proposed use of reclaimed water for irrigation and toilet and urinal flushing, coagulation is not required provided the monitoring and diversion provisions are in place. Pressure multi-media and cartridge micron prefilter are proposed to meet the filter influent turbidity requirements. The pressurized media filter will be identical to the filter feeding the disinfection system and therefore redundancy is provided. For monitoring purposes, the filter influent will be downstream of the prefilter and upstream of the Final filter and disinfection processes.

The loading rate for the pre-filter will be 5 gpm / ft^2 for the first media automatic backwash filter and 10 microns and 5 microns for cartridge (or backwashable) filters. Turbidity will be continuously monitored on both the influent and effluent of the final filter. Alarms will be set to automatically trigger diversion to the alternate dispersal system if any of the following turbidity values are exceeded on the final filter effluent:

- An average of 2 NTU within a 24-hour period;
- 5 NTU more than 5 percent of the time within a 24-hour period;
- 10 NTU at any time.

In addition, due to relief from the coagulation requirement, alarms will also be set to trigger diversion if the following turbidity requirement is not met on the filter influent:

- Filter influent turbidity less than 5 NTU. Alarm set to divert if 5 NTU is exceeded for longer than 15 minutes.

Disinfection Requirements

To meet the disinfection requirements, an ozone - UV treatment system is proposed. This system will be designed to treat the full design flow with excess capacity. Treatment shall conform to the following performance standards, to be confirmed by daily total coliform testing:

- The median concentration over any 7 day period of total coliform bacteria measured in the disinfected effluent does not exceed an MPN of 2.2 per 100 milliliters.
- The number of total coliform bacteria does not exceed an MPN of 23 per 100 milliliters in more than one sample in any 30 day period.
- No sample shall exceed an MPN of 240 total coliform bacteria per 100 milliliters.

Process Requirements – No Alternate Disposal Site

If no alternate disposal site is approved, then long term storage will be required. The requirement will be for 20 days worth of storage including all provisions for odor control, pumps and pump back equipment. The La Paz project proposes a subsurface drip irrigation system be used for disposal.

Use Area Requirements

The use of recycled water for irrigation must meet the following requirements:

1. Irrigation must be greater than 50 feet from a domestic water supply well
2. Impoundment of recycled water must be greater than 100 feet from a domestic water supply well – none is proposed.
3. Any irrigation runoff shall be confined to the recycled water use area, unless the runoff does not pose a public health threat and is authorized by the regulatory agency.
4. Spray, mist, or runoff shall not enter dwellings, designated outdoor eating areas, or food handling facilities.
5. Drinking water fountains shall be protected against contact with recycled water spray, mist, or runoff.
6. In areas accessible to the public, appropriate signs shall be placed reading "Recycled Water – Do Not Drink".
7. No connections of any kind to potable water system
8. No hose bibs for recycled water lines.

General Requirements

- Recycled water shall not be delivered for any internal use to any individually-owned residential units including free-standing structures, multiplexes, or condominiums.

- Recycled water shall not be delivered for internal use except for fire suppression systems, to any facility that produces or processes food products or beverages. Cafeterias or snack bars in a facility whose primary function does not involve the production or processing of foods or beverages are not considered facilities that produce or process foods or beverages.

- Recycled water shall not be delivered to a facility using a dual plumbed system unless the report required pursuant to section 13522.5 of the Water Code, and which meets the requirements set forth in section 60314, has been submitted to, and approved by, the regulatory agency.

Potable Water Supply Back-up

The public water supply shall not be used as a backup or supplemental source of water for a dual-plumbed recycled water system unless the connection between the two systems is protected by an air gap separation which complies with the requirements of sections 7602 (a) and 7603 (a) of title 17, California Code of Regulations, and the approval of the public water system has been obtained.

Inspection Requirements for Dual Plumbing

Cross connection inspections will be conducted by a certified inspector in accordance with regulatory requirements and acceptable to LA County Public Health Cross-Connection and Water Pollution Control Program.

Should there be any incidence of backflow from the dual-plumbed recycled water system into the potable water system, CDPH will be notified within 24 hours of the discovery of the incident.

All backflow prevention devices installed to protect the public water system serving the dual-plumbed recycled water system shall be inspected and maintained in accordance with section 7605 of Title 17, California Code of Regulations.

Report Requirements

An Engineering Report will be prepared to detail the proposed recycled water system for the La Paz project, in accordance with Section 13522.5 of the Water Code. The Engineering Report will include the following:

1. A detailed description of the intended use area identifying the following:

    a. The number, location, and type of facilities within the use area proposing to use dual plumbed systems,
    b. The average number of persons estimated to be served by each facility on a daily basis
    c. The specific boundaries of the proposed use area including a map showing the location of each facility to be served
    d. The person or persons responsible for operation of the dual plumbed system at each facility, and
    e. The specific use to be made of the recycled water at each facility

2. Plans and specifications describing the following:

    a. Proposed piping system to be used,
    b. Pipe locations of both the recycled and potable systems,
    c. Type and location of the outlets and plumbing fixtures that will be accessible to the public, and
    d. The methods and devices to be used to prevent backflow of recycled water into the public water system.

3. The methods to be used to assure that the installation and operation of the dual plumbed system will not result in cross connections between the recycled water piping system and the potable water piping system. This shall include a description of pressure, dye or other test methods to be used to test the system every four years.

TABLE 2.15. EFFLUENT MONITORING PROGRAM - REVISED

Constituent	Units	Types of Samples	Minimum Frequency of Analysis
Total Flow	gal/day	Recorder	Continual
pH	pH Units	Grab	Weekly (1st 12 weeks of startup), then Monthly
Suspended Solids	mg/l	Grab	Weekly (1st 12 weeks of startup), then Monthly
BOD_5 20° C	mg/l	Grab	Weekly (1st 12 weeks of startup), then Monthly
Turbidity	NTU	Continuous	Continual
Total Coliform	MPN/100ml	Grab	Daily
Fecal Coliform	MPN/100ml	Grab	Weekly (1st 12 weeks of startup), then Monthly
Enterococcus	MPN/100ml	Grab	Weekly (1st 12 weeks of startup), then Monthly
Oil & Grease	mg/l	Grab	Monthly
Total Dissolved Solids	mg/l	Grab	Monthly
Chloride	mg/l	Grab	Monthly
Chlorine**	mg/l	Grab	Monthly
Boron	mg/l	Grab	Monthly
Sulfate	mg/l	Grab	Monthly
Nitrate-N	mg/l	Grab	Monthly
Nitrite-N	mg/l	Grab	Monthly
Ammonia-N	mg/l	Grab	Monthly
Organic Nitrogen	mg/l	Grab	Monthly
Phosphorus	mg/l	Grab	Monthly
MBAS	mg/l	Grab	Monthly
Volatile and Semi-Volatile Organics	ug/l	Grab	Monthly
Priority Pollutant Scan	ug/l	Grab	Annual

** If chlorination is used for disinfection

2.6 Preliminary Engineering Sizing and Layouts

Preliminary sizing was completed for the unit processes shown in Figure 2-4. This section summarizes the key design criteria and the preliminary sizing based on these criteria for the Preferred Option and Alternate Option.

2.6.1 Grease Traps, Septic Tanks and Septic Tank Effluent Collection System

Grease traps and septic tanks were sized based on the LA County Plumbing Code Table K-3 design flows associated with the buildings they serve. Table 2.16 summarizes the LA County Plumbing Code Table K-3 design flows and corresponding septic tank and grease trap sizes for the proposed system.

Each septic tank will have duplex pumps to pump septic tank effluent to the wastewater treatment site through a 2-inch pressure pipe. A 3-inch pipe will be used where more than two septic tank effluent pipes converge.

TABLE 2-16. SEPTIC TANK AND GREASE TRAP SIZES FOR PREFERRED & ALTERNATIVE OPTIONS

Septic Tank #	Building #	Total Flow (gpd)	HRT (day)	Septic Tank Size (gal)
ST-1	1	620	1.5	2,000
	2	620	1.5	
ST-2	3	1,030	1.5	4,000
	4	1,030	1.5	
ST-3	5	11,310	1.5	17,000
ST-4	6	11,300	1.5	17,000
ST-5	7	40	1.5	8,000
	8	2,300	1.5	
	9	2,350	1.5	
ST-6	10	1,460	1.5	4,000
	11	1,060	1.5	
ST-7	City Hall	4,000	1.5	6,000
	Total	**37,120**		

Grease Trap #	Building #	Total Flow (gpd)	HRT (day)	Tank Size (gal)
GT-1	5	8,750	1.5	18,000
GT-2	6	8,750	1.5	18,000
	Total	**17,500**		

*Based upon LA County Plumbing Code Table K-3.

2.6.2 Flow Equalization Tank

A flow equalization (EQ) tank is included in the process to ensure as steady a flow through the treatment system as possible. Normal peaks in daily flows will result in rising levels within the tank rather than spikes in flow through the treatment system. During night time and other low demand periods, the equalization tank will empty. The tank is sized based on 1 day HRT and a design flow of 28,000 gpd. A 1 day HRT EQ provides for 5 consecutive days of flow that is 120% design flow, 1 day of 200% of design flow, etc. The sizing calculations are summarized below.

Flow Equalization Tank Sizing:

		Preferred Plan	**Alternative Plan**
HRT	=	1 day	1 day
Minimum Volume (gallons)	=	28,000	23,000
Proposed Volume (gallons)	=	28,000	25,000
HRT Provided (days)	=	1.00	1.09

2.6.3 1st Stage Recirculation Tank

The RMF treatment systems require recirculation tanks in addition to the treatment units. The first stage RMF is sized based on flow and expected wastewater strength. The recirculation tank provides sufficient contact time between the treated RMF effluent and influent wastewater to facilitate partial denitrification and dilute the strength of the incoming wastewater. The effluent flow from this tank is controlled by a recirculating ball valve. This valve maintains the operating level in the tank by allowing increasing flow out as the level in the tank rises. This results in an operating range above the hydraulic capacity of the tank. The key design criteria for this tank is HRT. The design residence time plus operating and surge volume allowances results in a design HRT of 1 day. The sizing of this tank is summarized below.

1st Stage Recirculation Tank Sizing:

		Preferred Plan	Alternative Plan
Flow	=	28,000 gpd	23,000 gpd
HRT	=	1 day	1 day
Minimum Volume (gallons)	=	28,000	23,000
Proposed Volume (gallons)	=	30,000	25,000
HRT Provided (days)	=	1.07	1.09

2.6.4 1st Stage RMF

The 1st stage RMF is designed based on the loading rate, measured in gdp/ft^2 of footprint area. For high strength restaurant flow, the loading rate is 10 gpd/ft^2. A variety of RMFs exist and are under consideration for use. The Advantex™, SeptiTech™ and Waterloo™ Biofilters are candidate RMF, amongst others. Figure 2-5 illustrates the Advantex™ System installed at the Malibu Creek Plaza. Figures 2-6 and 2-7 illustrate installation of the Waterloo Biofilter. Figure 2-8 illustrates the SeptiTech™ system. For office and retail establishments, the loading rate is 20 gpd/ft^2. The design loading rate is the flow-weighted average of these two loading rates, which results in 15 gpd/ft^2.

FIGURE 2-5. ADVANTEX™ SYSTEM – MALIBU CREEK PLAZA, MALIBU, CA

The loading rate was determined based on the following flow split and influent water quality:

Preferred Plan			
Design Flow	**=**	**28,000**	**gpd**
Influent Quality			
BOD	<	300	mg/l
TSS	<	130	mg/l
TN	<	90	mg/l
Office / Retail	=	53%	of Total Flow
	=	**14,840**	**gpd**
Restaurant	=	47%	of Total Flow
	=	**13,160**	**gpd**

Alternate Plan			
Design Flow	**=**	**23,000**	**gpd**
Influent Quality			
BOD	<	300	mg/l
TSS	<	130	mg/l
TN	<	90	mg/l
Office / Retail	=	53%	of Total Flow
	=	**12,190**	**gpd**
Restaurant	=	47%	of Total Flow
	=	**10,810**	**gpd**

The loading rate was calculated and the area of modular RMF units necessary was determined. The following is a summary of this analysis.

1st Stage RMF Design Criteria:

		Preferred Plan	**Alternate Plan**
Flow	=	28,000 gpd	23,000 gpd
Design Loading Rate	=	15.00 gpd/sf	14.00 gpd/sf
Design Surface Area	=	1,867 ft^2	1,533 ft^2
Proposed Surface Area	=	1,900 ft^2	1,600 ft^2
Proposed Loading Rate	=	14.7 gpd/sf	14.4 gpd/sf

2.6.5 Nitrex™ Denitrification Filter

The Nitrex™ denitrification filter is sized based on LAI's extensive experience with this proprietary technology. LAI has determined that up to 8 Nitrex™ 15,000 gallon units may be required to ensure complete denitrification. The Nitrex™ denitrification filter can be utilized as a wetland system and thereby achieve additional treatment and aesthetic improvements.

Figures 2-6 and 2-7 illustrate the design of the Nitrex™ Treatment cluster system installed in Mashpee, MA with a 5,226 gpd design flow at substantial completion and after completion, respectively. Figure 2-9 illustrates installation of the Nitrex™ filters at the Malibu Creek Plaza.

FIGURE 2-6. MASHPEE, MA NITREX™ WASTEWATER SYSTEM AT SUBSTANTIAL COMPLETION

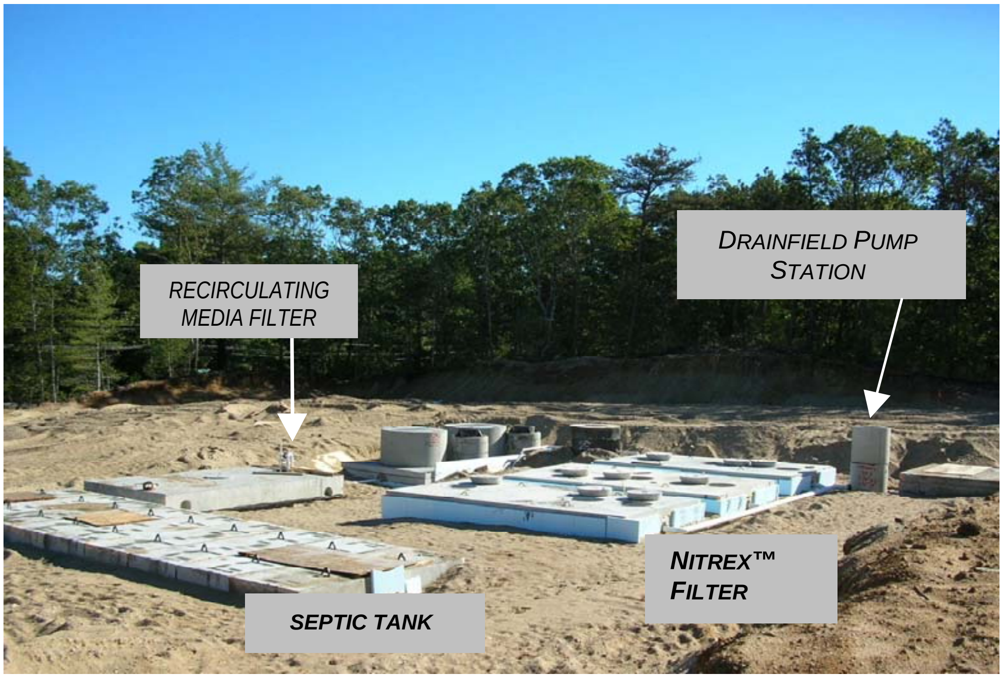


FIGURE 2-7. MASHPEE, MA NITREX™ WASTEWATER SYSTEM AFTER INSTALLATION COMPLETION

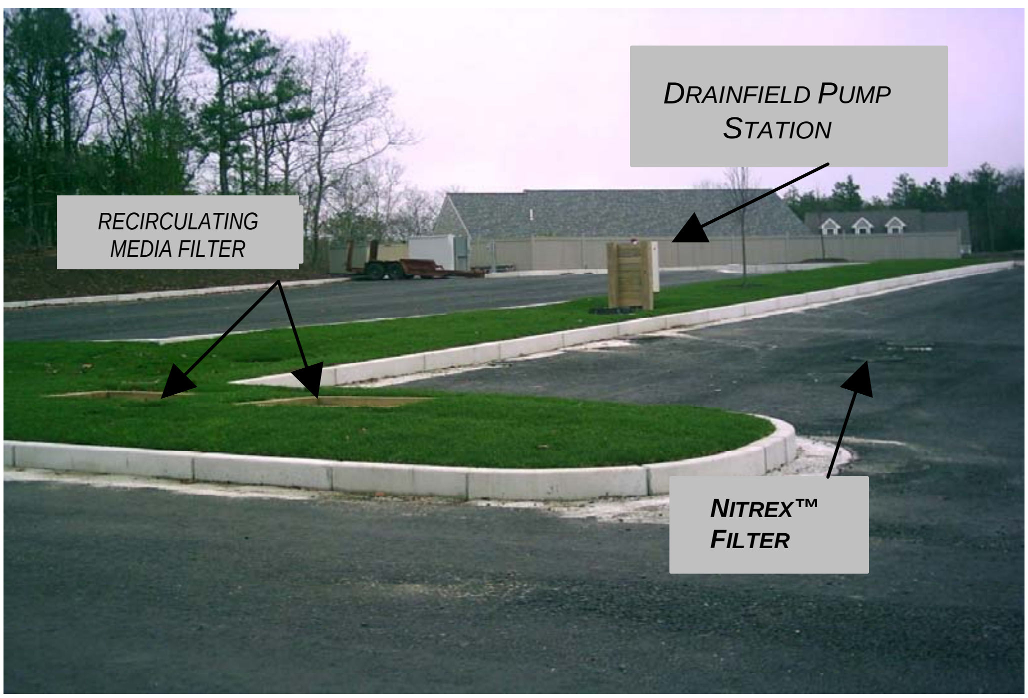


FIGURE 2-8. SEPTITECH™ SYSTEM

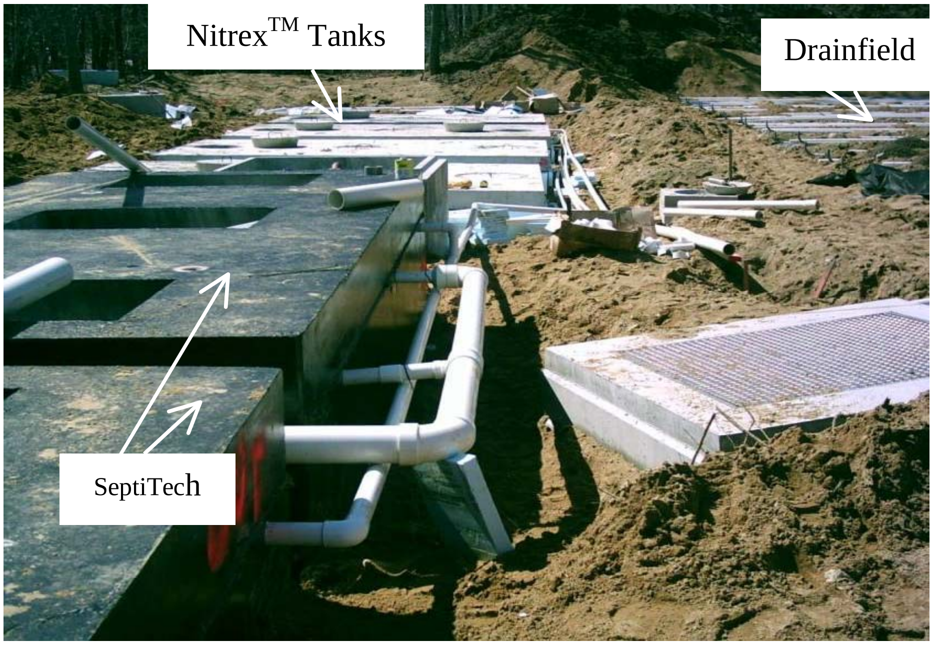


FIGURE 2-9. INSTALLATION OF NITREX™ TANKS – MALIBU CREEK PLAZA

2.6.6 2nd Stage Recirculation Tank

The 2nd Stage RMF is a polishing filter. These filters will be used primarily for BOD and TSS removal and final ammonia removal. There may be some small amount of nitrification in these filters, as the 1st stage will remove nearly all of the ammonia. As such, the recirculation volume requirement is significantly lower. The following summarizes the design criteria and sizing calculations for the 2nd Stage Recirculation Tank.

2nd Stage Recirculation Tank Sizing:

		Preferred Plan	Alternative Plan
Flow	=	28,000 gpd	23,000 gpd
HRT	=	0.5 day	0.5 day
Minimum Volume (gallons)	=	14,000	11,500
Proposed Volume (gallons)	=	15,000	12,000
HRT Provided (days)	=	0.54	0.52

2.6.7 2nd Stage RMF

The 2nd Stage RMF has a design loading rate of 75 gpd/ft^2 and is based upon successful experience at Malibu Creek Plaza. This loading rate was used to calculate the number of 100 ft^2 RMF treatment units needed to polish the Nitrex™ effluent to the quality needed for feed into the disinfection system. The sizing calculations are summarized below.

2nd Stage RMF Design Criteria:

		Preferred Plan	Alternate Plan
Flow	=	28,000 gpd	23,000 gpd
Design Loading Rate	=	75 gpd/sf	75 gpd/sf
Design Surface Area	=	333 ft^2	307 ft^2
Proposed Surface Area	=	400 ft^2	300 ft^2
Proposed Loading Rate	=	70.00 gpd/sf	76.70 gpd/sf

2.6.8 Filtration System

Two identical filtration systems will be used to ensure turbidity levels are within permit / reuse requirements prior to disinfection. The pre-and final filters will consist of:

1. Multi-Media pressure filter – at 5 gpm / SF
2. Dual Micron Filters (Cartridge or Backwashable)
    - 10 microns
    - 5 microns

2.6.9 Disinfection System

The disinfection system consists of an ozone and an UV system. The UV system will provide disinfection in accordance with the “Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse,” Second Edition, dated May 2003. The ozone system will inject up to 40 ppm of ozone into the wastewater with an approximate 5 minute contact time. All units are sized based on design flow rate. The disinfection system will be sized for an average flow rate of 18 gpm (28,000 gpd), with the capability of treating peak flows up to 25 gpm (36,000 gpd).

Figure 2-10 illustrates the 12 gpm ozone-UV system used at the Malibu Creek Plaza.

FIGURE 2-10. OZONE-UV SYSTEM – MALIBU CREEK PLAZA

The 2nd Stage Recirculation Tank will have an integral pump station that feeds the disinfection system at a steady flow rate.

2.6.10 Effluent Dispersal

Treated wastewater effluent will be used for toilet flushing via a dual plumbing system (purple pipe) and landscape irrigation predominately via drip irrigation, with some spray irrigation.

Table 2.10 presents the drip and spray irrigation system average application rate. Drip irrigation of Title 22 Disinfected Tertiary Treated Wastewater will occur at approximately 6 – 8 inch soil depth. Drip dispersal of off-spec wastewater, as discussed in Section 2.10, will occur with a redundant parallel drip dispersion system at 24+ - 30 inches, unless the LARWQCB allows the shallow drip system to be used for both purposes. Automatic valves will be activated to direct treated wastewater to the lower drip irrigation system when continuous turbidity measurements or total coliform laboratory results indicate DPH standards for unrestricted water reuse are not being met.

Figure 2-11 illustrates a drip irrigation system.

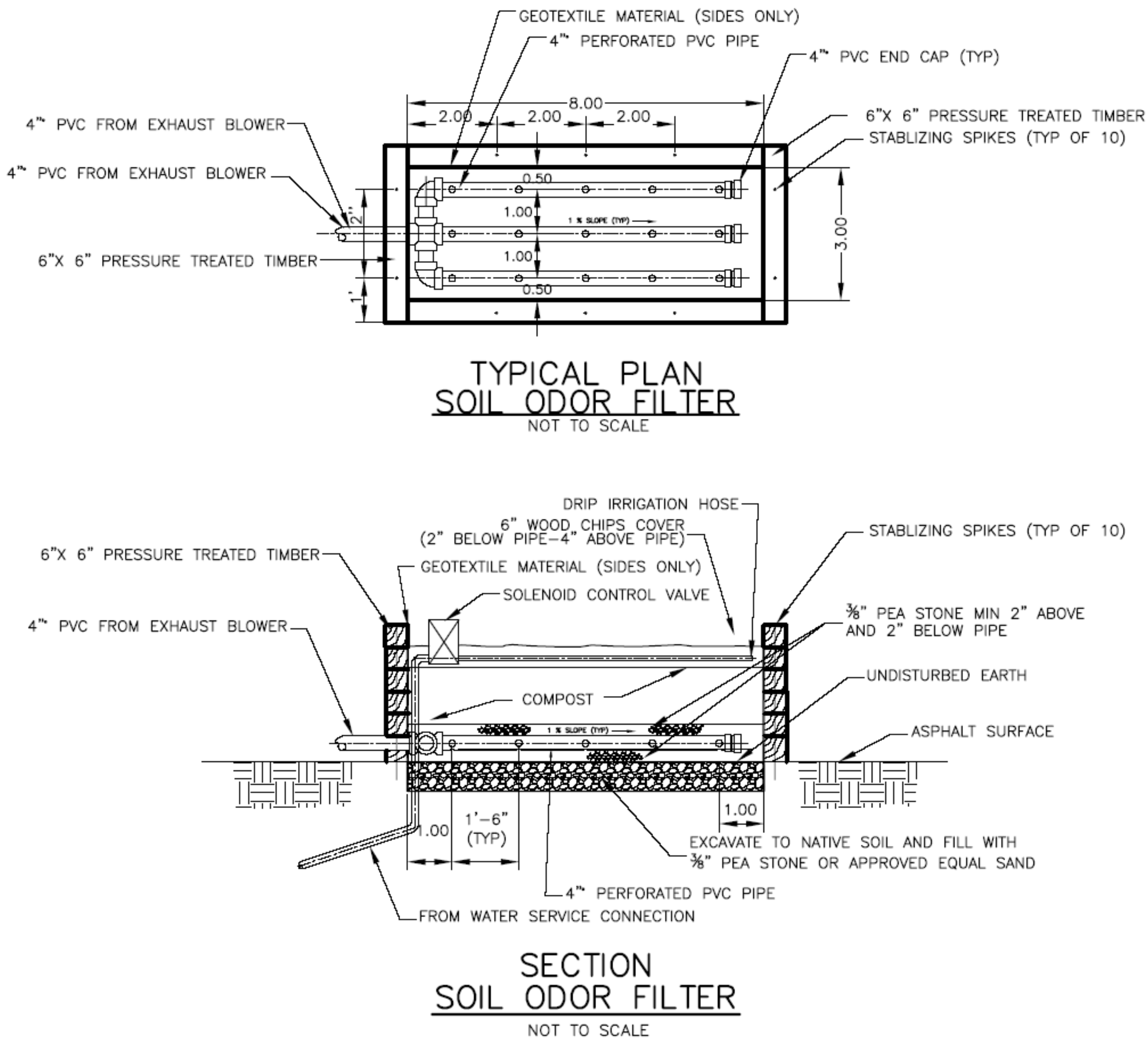
FIGURE 2-11. DRIP IRRIGATION SYSTEM

PLANTATION BY THE LAKES RETIREMENT COMMUNITY.
CALIMESA, CALIFORNIA

2.6.11 Odor Control

Reduction of foul odor generation will be maximized during system design by minimizing splashing in tanks, especially of untreated wastewater. Generally, all areas with foul gases will have positive ventilation and foul gas treatment with soil odor filters will be used or where space constraints exist, carbon filters will be used. For areas where positive ventilation is not practical, passive vents with carbon filters will be used. Figures 2-12 thru 2-16 are typical plan and profiles of these odor treatment units, along with representative photos.

FIGURE 2-12. SOIL ODOR FILTER, TYPICAL PLAN AND SECTION



2.6.12 Electrical Controls and Monitoring

A telephone and internet based continuous monitoring system will be installed to monitor all vital project equipment to enable a proactive and, as needed, emergency response to the wastewater system's functioning. Figure 2-13 illustrates the electronic monitoring panel at the Malibu Creek Plaza. Operators will be notified of emergency conditions and required response time will be specified for all types of emergency conditions.

FIGURE 2-13. CONTROL PANEL – MALIBU CREEK PLAZA

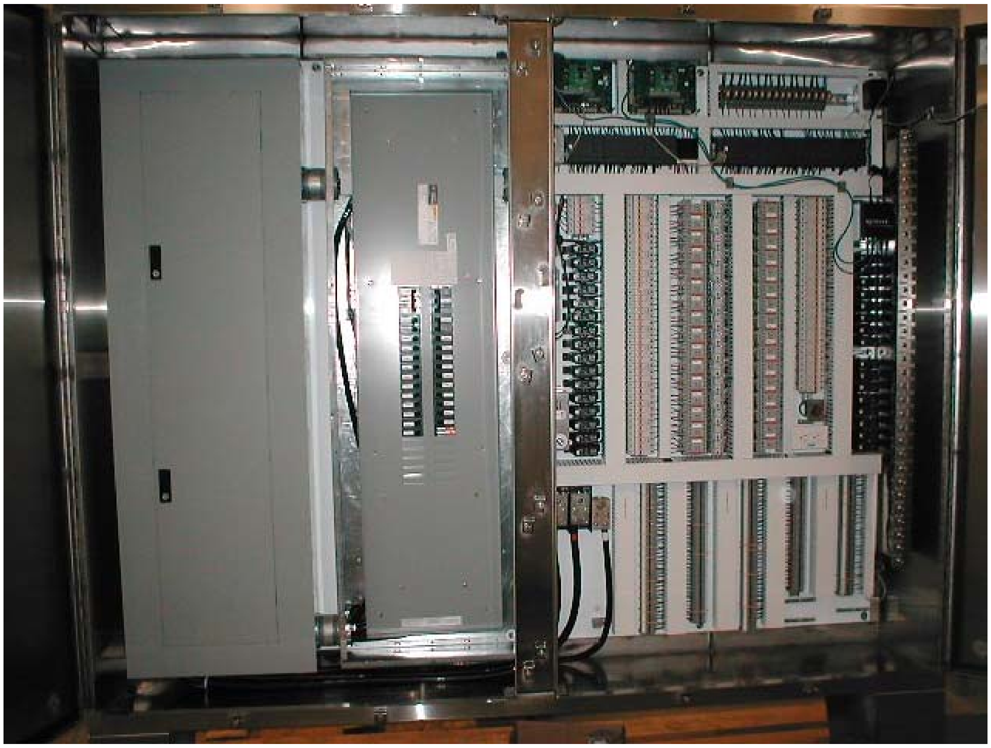


FIGURE 2-14. SOIL ODOR FILTER AT A PUMP STATION

FIGURE 2-15. CARBON ODOR FILTER

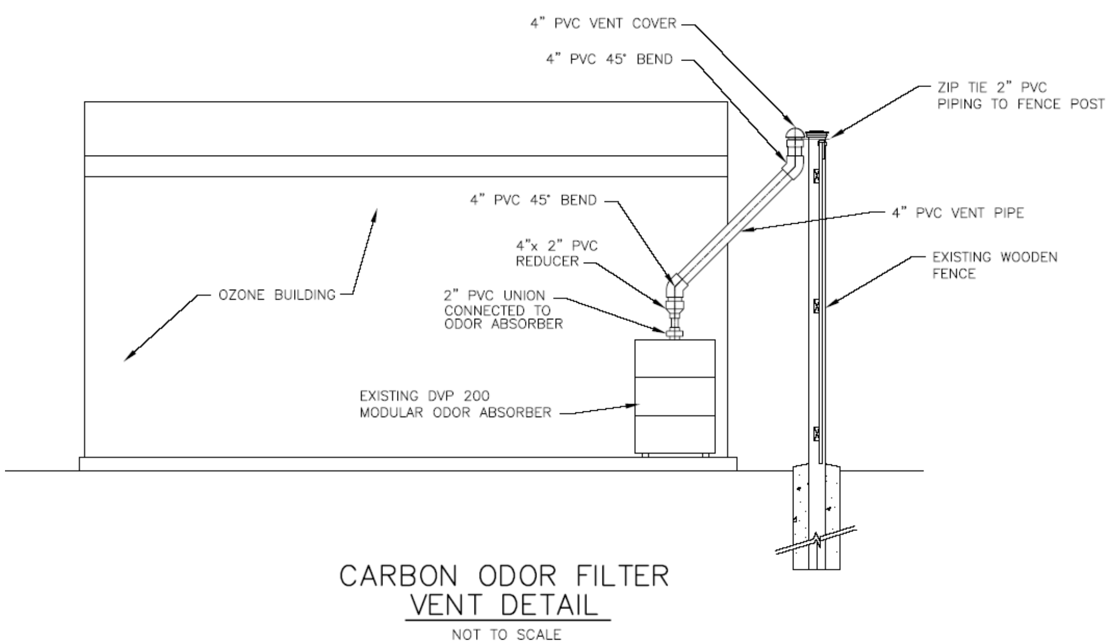
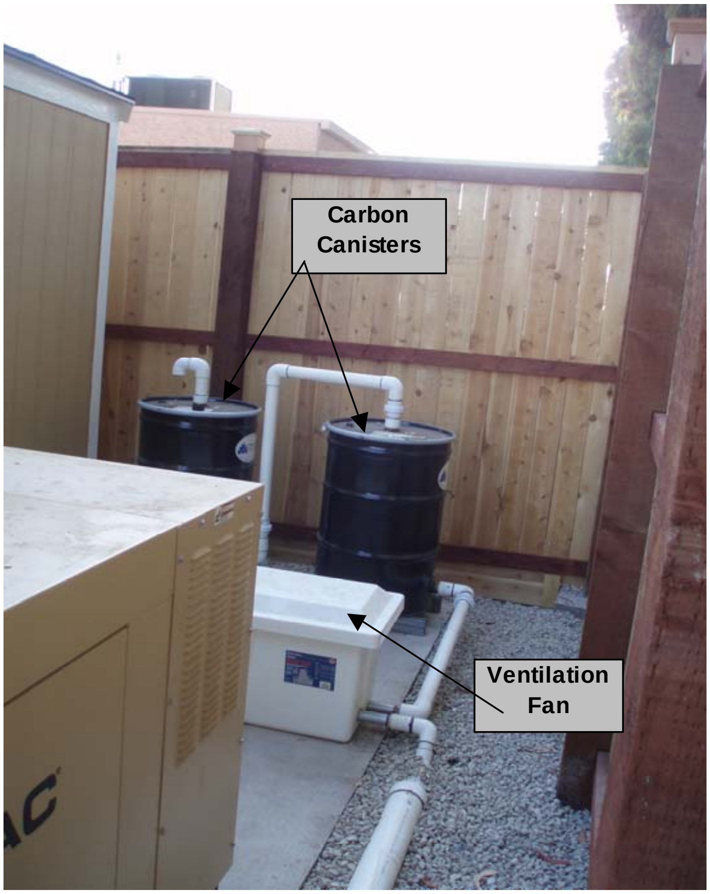


FIGURE 2-16. ODOR FILTER



2.6.13 Reliability

The following reliability features will be included for each unit process, along with an emergency generator that will power the entire wastewater collection, treatment and reuse system.

Septic Tanks:

Duplex pump station and emergency power. Redundant high water alarms will be installed in each tank to notify the operator in the event of any clogging. A service contract will exist with a septic pumping company for emergency pump outs, if necessary.

Flow Equalization Tank:

Duplex pump station and emergency power. Redundant high water alarms will be installed in each tank to notify the operator in the event of any clogging. A service contract will exist with a septic pumping company for emergency pump outs, if necessary

Biofilter:

Redundant unit allowing full design flow to be processed with the largest unit out of service. All internal pump stations are duplex pump stations with emergency power provisions.

Multi-Media Pressure Filters:

Should either multi-media pressure filter fail, a bypass will be in place to send the water to the temporary dispersal area. This area will be capable of accepting the full design flow for up to 20 days.

UV / Ozone Disinfection System:

Each component of the disinfection system will be equipped with a redundant unit such that full design UV and Ozone dose can be delivered with the largest unit out of service.

Reuse Water Booster Pump Station:

The booster pump station supplying the reuse water to the buildings will be designed such that the full peak flow can be maintained with the largest pump out of service.

2.7 Performance Monitoring Plan

Following are components of the Wastewater System's Performance Monitoring Plan:

1. An annual water balance shall be reported to confirm wastewater reuse in accordance with design expectations. It is noted that daily water balances are determined for the Malibu Creek Plaza system using telephone and web connections. It is proposed that an internet based system will be used for the La Paz project.
2. The monthly average and maximum daily waste flow to the wastewater system shall be recorded. Names of any new dischargers into the treatment and disposal system, along with the flow and characteristics of the new waste stream, shall be reported.
3. A sampling station shall be located such that a representative effluent sample can be obtained prior to discharge to the in-building reuse and irrigation systems. Full effluent monitoring shall be conducted monthly and coliform testing daily as required by DPH regulations, in addition to start-up sampling, all described on Table 2.16.
4. A monitoring program to measure, sample, and analyze the groundwater both upgradient and downgradient from the project site shall be established to determine if the effluent used for irrigation has impacted or is impacting water quality.
5. The system shall be inspected at least once every two years by an inspector retained by the discharger but subject to the approval of the Executive Officer of the California Regional Water Quality Control Board.

2.8 Hydrogeology and Groundwater

For reference purposes, Figure 2-17 illustrates the Groundwater Contour Map for the area surrounding the Malibu La Paz site as developed in the recent City of Malibu Civic Center studies. Figure 2-18 illustrates the groundwater contour map of the project site.

FIGURE 2-17: AREA GROUNDWATER CONTOUR MAPS

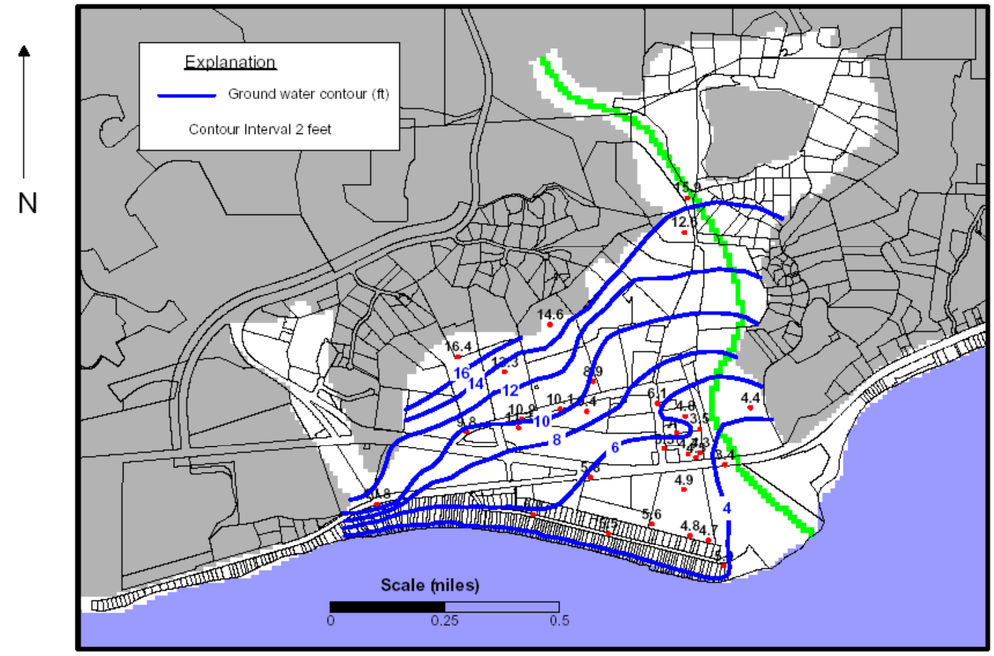


Figure 10 - Map showing water levels measured on March 9,2004 dur ing breached lagoon condition.

McDonald Morrissey ASSOCIATES, Inc.

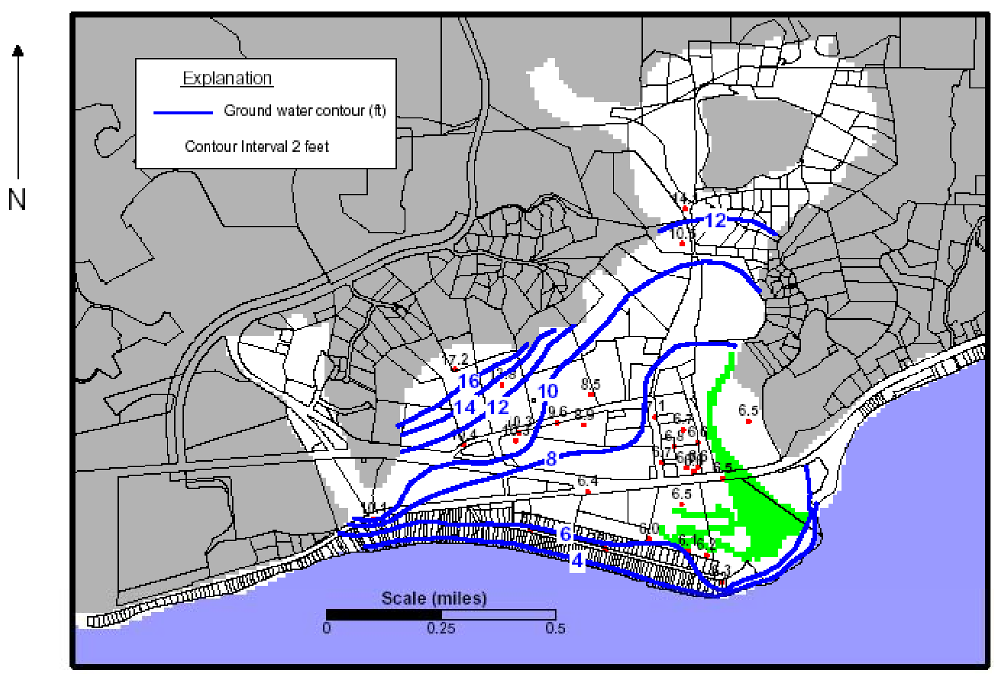
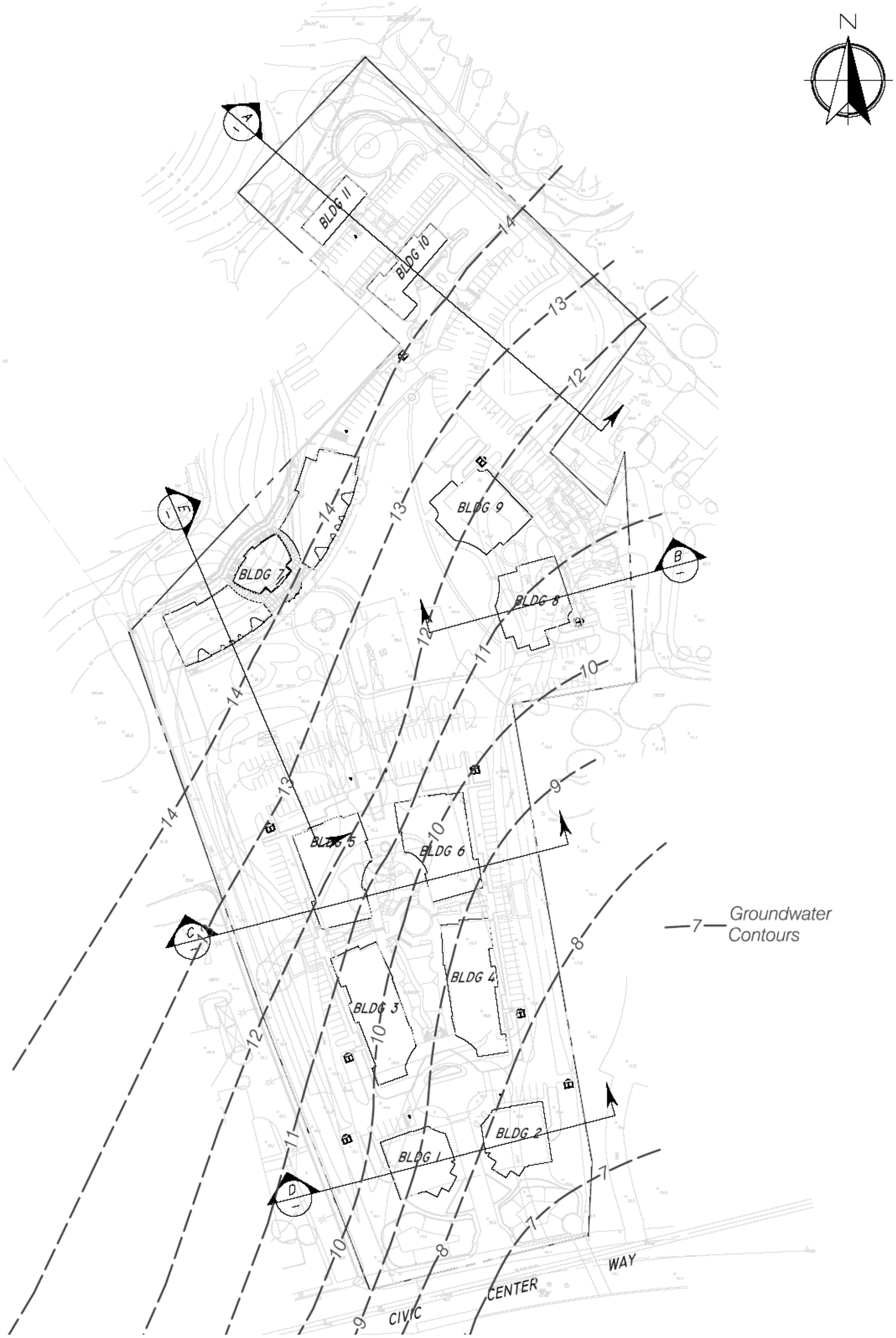


Figure 9 - Map showing water levels measured on September 25, 2003 during flooded lagoon condition.

McDonald Morrissey ASSOCIATES, Inc.

FIGURE 2-18. GROUNDWATER CONTOURS OF PROJECT SITE



Data Source: Existing Site Survey Plan by Crosby, Mead, & Benton Associates, Encino, California.

2.8.1 Flood Plain

A majority of the project site lies within the FEMA flood zones, see Figure 2-16, AO in which the 100 year flood level could be 2 feet above ground surface. All wastewater treatment facilities will have proper flood protection to include water tight tanks and electrical system protection.

2.8.2 Surface Hydrology

A Preliminary Hydrology Report dated September 2006 was prepared by the project's site Civil Engineer, Jensen Design and Survey, Inc., in which drainage is addressed. In that Report, the amount of impervious area was stated as:

TABLE 2.17. IMPERVIOUS AREA FOR DEVELOPED MALIBU LA PAZ SITE

	Impervious Area* (Acres)	Total Site Area (Acres)
Preferred Project (0.20 FAR)	6.56	15.17
Alternate Project (0.15 FAR)	4.84	15.17

*Thru addition of sidewalks, drive lanes, parking areas and building rooftops.

East and West Stormwater Retention Basins are provided at the southerly end of the project site to satisfy City of Malibu requirements that detention facilities be sized to store a volume of water equal to 1" of rainfall over all impervious surfaces plus ½" of rainfall over all pervious surfaces.

Jensen determined detention requirements of:

Preferred Project – 0.20 FAR	295,050 gallons
Alternative Project – 0.15 FAR	271,700 gallons

Jensen stated that compliance with City of Malibu Water Quality Mitigation Plan (WQMP) will be achieved through use of vegetated swales, catch basin inserts and vortex separators.

2.8.3 Groundwater Rain Recharge

As shown in the analysis, there is no net discharge to groundwater associated with the wastewater treatment and reuse and irrigation. However, there will be reduction in groundwater recharge associated with the addition of impervious surfaces as described in 2.8.2.

Previous modeling studies assumed 1" (Stone report for large Malibu Civic Center area) - 2" (Fugro for La Paz project site area) of rainfall recharged to groundwater. Assuming 2" of rainfall recharge occurs on average and that runoff from impervious areas does not recharge groundwater, the increase in impervious area would reduce groundwater recharge by an average 976 gpd for the Preferred Option and 720 gpd for the Alternate Option. The loss of recharge would increase during years with more than average rainfall and less for years with less than average rainfall.

2.9 Water Supply Impacts

The integrated wastewater-irrigation system achieves the objective of minimizing water use.

Without the water reuse system, the potable water demand will be 32,200 gpd. With water reuse, potable water demand will be 10,600 gpd or 14,869 gpd, determined as follows:

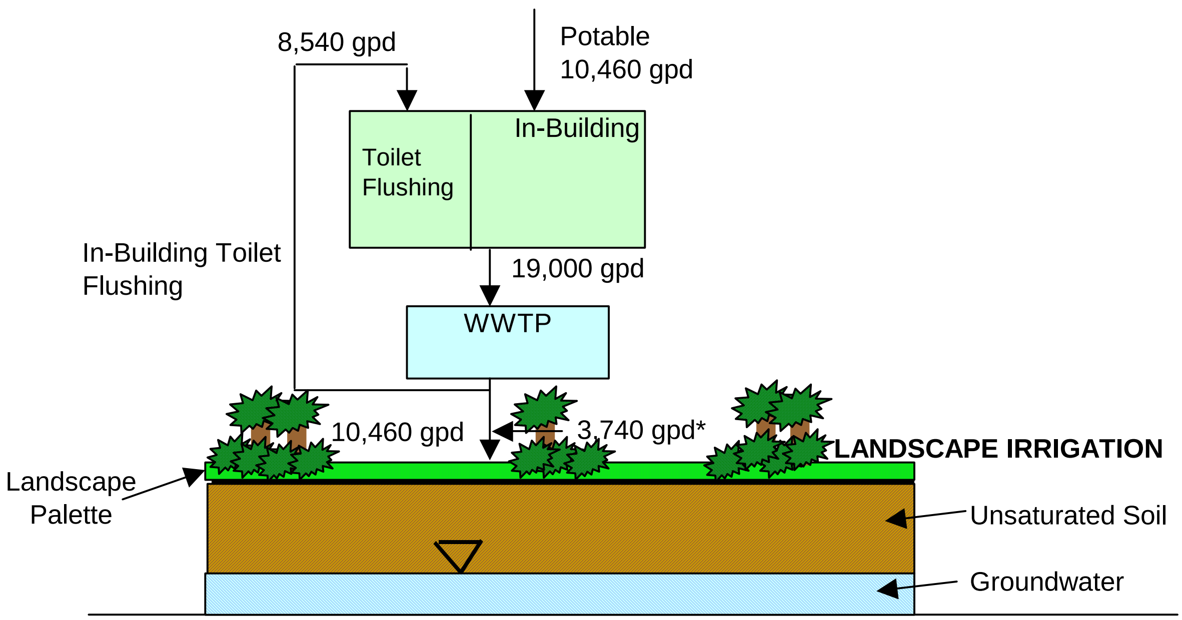
Wastewater Generation Activities	=	19,000 gpd	(see Table 2-10)
Irrigation	=	12,200 gpd	
		31,200 gpd	

with reuse, the water demand would be:

=	10,460 gpd potable	(see Table 2-10)
=	3,740 gpd non potable or potable	
	14,200 gpd	

Graphically, the Malibu La Paz Development Water Balance consists of the following average water uses, presented in Figure 2-19.

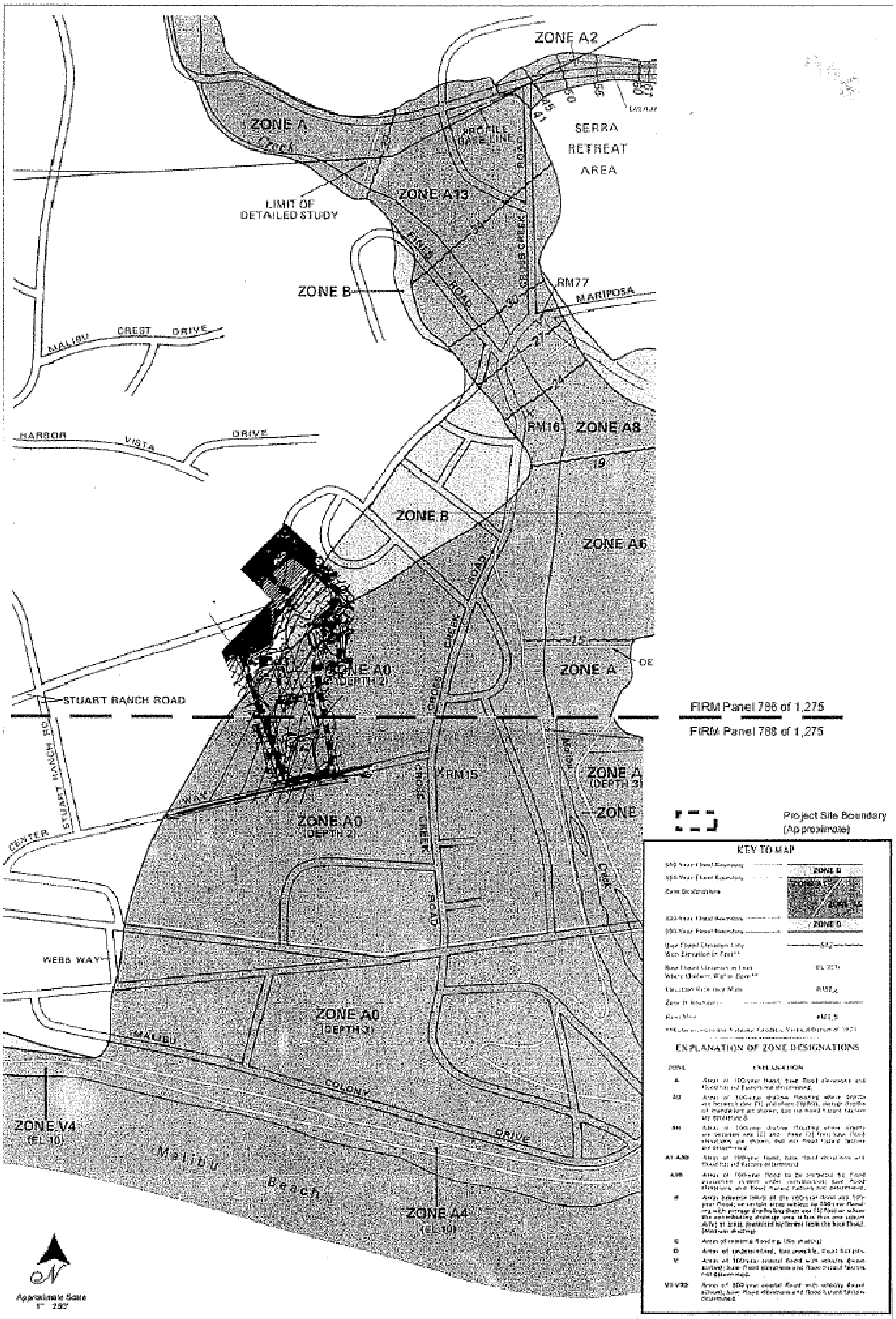
FIGURE 2-19: LA PAZ DEVELOPMENT WATER BALANCE



*Can be potable, other sources of Title 22 water or groundwater.

With the proposed water reuse program, maximum sustainability is achieved. In view of water supply availability constraints and expected increases in water supply rates, the proposed reuse system will optimize environmental considerations.

FIGURE 2-20. FEMA FLOOD PLAIN DESIGNATION MAP FOR MALIBU LA PAZ AREA



Source: Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps 786 and 788, November 15, 1995 and Christopher A. Joseph & Associates, November 2003.

2.10 Impacts of Off-Spec Treated Wastewater Groundwater Discharge

2.11 Impacts of Off-Spec Treated Wastewater Groundwater Discharge

Although no net discharge to groundwater is proposed, should the treatment plant not meet Title 22 Standards for disinfected tertiary treatment, the off-spec treated wastewater will be discharged to the drip irrigation system. CADPH requires the ability to store or discharge for at least 20 days.

The likely causes for any off-spec treated wastewater would be non-compliance with turbidity or total coliform standards – in and of themselves not a public health hazard.

During the time of non-compliance all wastewater, 19,000 gpd for the Preferred Option and 15,000 gpd for the Alternate Option, will need to be discharged to the subsurface drip irrigation system.

To assess the transient nature of this potential short-duration discharge, a transient analysis of the groundwater mound resulting therefrom was modeled by Fugro using the previously calibrated MODFLOW model for the La Paz site. The results of the transient model analysis are presented in Appendix D for the Preferred Option. The 10,000 gpd scenario is based upon the premise that groundwater needs to be extracted to replace the treated wastewater that would have been normally discharged to the storage tank and 10,000 gpd represents the loss of in-building recycled water. 20,000 gpd scenario assumes for no groundwater extraction, so all wastewater is discharged.

The transient modeling analysis does not take into account the time needed for wastewater discharge to travel through the unsaturated zone and reach the groundwater aquifer, which is a conservative assumption.

The results of the transient modeling analyses indicate that minor groundwater mounding will occur with any discharge associated with 20 days or 60 days of “off-spec” treated effluent.

The transient analysis performed by Fugro using the previously calibrated MODFLOW model examined application of:

1. 10,000 gpd for 20 and 60 days
2. 20,000 gpd for 20 and 60 days
3. 1,000 gpd continuous discharge
4. 3,000 gpd continuous discharge

through

- a. A system of 17 drainfields located throughout the La Paz site
- b. Irrigation of Landscaped areas for the 0.20 FAR preferred plan
- c. Irrigation of Landscaped areas for the 0.15 FAR alternate plan

The following notes are associated with the transient analysis:

i. 10,000 gpd represents loading of wastewater as the design discharge flow of 19,000 gpd would be reduced by groundwater extraction, resulting in a net discharge of 10,000 gpd

ii. 20,000 gpd (rounded) represents the situation if there were no groundwater extraction

iii. 1,000 gpd and 3,000 gpd discharges represent hypothetical conditions for an examination of mounding impacts.

The model domain for the landscaped 0.20 and 0.15 FAR was slightly smaller (244,211 sf vs 266,000 sf for 0.20 FAR and 348,391 sf vs. 367,000sf for 0.15 FAR) than the landscaped areas, so the mound predictions are slightly higher than would be expected, caused by the by 5 – 8% reduction in area in the model, i.e. more water being applied in a smaller area. Given the minimal mounding that occurs, these issues are not considered significant.

The 0.15 option water rises are not always less than the 0.2 option water rises because the hydraulic conductivity (which has a significant impact on mounding) is not uniformly distributed throughout the model domain. The hydraulic conductivity values in the northern part of the model domain are more than an order-of-magnitude smaller than those in the southern end. Recharge is distributed uniformly for both the 0.15 option and the 0.2 option areas. So, even though the area in the 0.15 option is larger overall, more discharge is placed in the northern part in the 0.15 layout where the hydraulic conductivity is smaller. During design/operation, more of the discharge would be placed on the areas where the subsurface conductivities are the greatest in the project area to minimize mounding.

A summary of the Fugro report in Appendix D is presented in Table 2.18.

<u>Mounding Beneath Irrigation System</u>

For the analyzed options described above, mounding was always 7.3 feet or more separation between groundwater and the ground surface.

<u>Offsite Groundwater Rise</u>

For the analyzed options described above, groundwater rise at or near the property boundary was less than 0.57 feet at the southern boundary, closest to Legacy Park.

TABLE 2.18. SUMMARY OF TRANSIENT MOUNDING ANALYSIS MAXIMUM GROUNDWATER MOUNDING

(see Appendix D for details, data and transient graphs)

			Drainfields		Drainfields		Drainfields		0.2 FAR Layout		0.2 FAR Layout		0.15 FAR Layout		0.15 FAR Layout	
			10,000 GPD	20,000 GPD	10,000 GPD	20,000 GPD	1,000 GPD	3,000 GPD	10,000 GPD	20,000 GPD	10,000 GPD	20,000 GPD	10,000 GPD	20,000 GPD	10,000 GPD	20,000 GPD
	Ground Surface Elevation (feet, MSL)	Baseline Groundwater Elevation (feet, MSL)	20-day Discharge		60-day Discharge		Continuous Discharge		20-day Discharge		60-day Discharge		20-day Discharge		60-day Discharge	
			Simulated Depth to Groundwater from Ground Surface (feet)		Simulated Depth to Groundwater from Ground Surface (feet)		Simulated Depth to Groundwater from Ground Surface (feet)		Simulated Depth to Groundwater from Ground Surface (feet)		Simulated Depth to Groundwater from Ground Surface (feet)		Simulated Depth to Groundwater from Ground Surface (feet)		Simulated Depth to Groundwater from Ground Surface (feet)	
Under Dispersal Area																
MP-3 (SW Drainfields)	21	9.9	10.18	9.38	9.69	8.54	10.85	10.37	10.92	10.75	10.69	10.30	10.82	10.56	10.55	10.04
MP-4 (SE Drainfields)	20	9.2	10.00	9.26	9.72	8.70	10.61	10.25	10.65	10.52	10.49	10.19	10.67	10.55	10.50	10.22
MP-6 (Central Drainfields)	21	10.9	9.90	9.68	9.52	8.90	9.95	9.58	9.84	9.57	9.36	8.57	9.47	8.83	8.70	7.30
MP-7 (NE Drainfields)	26	12.7	11.92	10.61	11.20	9.25	12.96	12.21	12.56	11.83	11.84	10.40	12.77	12.24	12.20	11.12
			GW Rise (feet)		GW Rise (feet)		GW Rise (feet)		GW Rise (feet)		GW Rise (feet)		GW Rise (feet)		GW Rise (feet)	
Off-Site Areas																
MP-1 (SW property boundary)	16	9.0	0.06	0.13	0.19	0.38	0.07	0.23	0.16	0.31	0.29	0.57	0.16	0.32	0.29	0.57
MP-2 (West off-site)	22	10.3	0.13	0.26	0.35	0.73	0.10	0.33	0.07	0.14	0.20	0.40	0.08	0.16	0.22	0.45
MP-5 (East off-site)	18	9.0	0.23	0.46	0.46	0.92	0.10	0.33	0.07	0.14	0.20	0.40	0.07	0.13	0.20	0.39
MP-8 (NE off-site)	23	11.9	0.07	0.15	0.22	0.45	0.09	0.33	0.11	0.22	0.33	0.66	0.09	0.18	0.27	0.54

2.12 Salt Leaching and Nutrient Management

To avoid damage to plants and soils, soil leaching will be necessary to “flush-out” the accumulated salts resulting from evapotranspiration of the water – be it treated wastewater, groundwater or potable water.

In accordance with CA State Water Resources Control Board Draft Recycled Water Policy, “for all irrigation projects, recycled water shall be applied in an amount that does not exceed the amount needed for vegetation or crops, taking into account evapotranspirative demand, the distribution uniformity of the irrigation system, and leaching needed to prevent the buildup of salts in soils.”

A nutrient management plan will voluntarily be developed during design that will consider the nutrient concentrations present in recycled water when landscape fertilizer application rates are calculated.

It is recognized that the draft Recycled Water Policy may limit the increase in the monthly average flow – weighted TDS concentration of the source water, plus 550 mg/l. However, as it is understood that the groundwater aquifer to which the La Paz project contributes ultimately discharges to the brackish Malibu Lagoon, it is assumed that salt management is not of concern for the La Paz project.

As stated in the LARWQCB Order No. 93-010 “General Waste Discharges to Groundwater in the Santa Clara River and Los Angeles River Basins,” the groundwater water quality objective for the Malibu Creek Hydrologic Subarea of Malibu Hydrologic Unit is:

TDS	2,000 mg/l
Sulfate	500 mg/l
Chloride	500 mg/l
Boron	2.0 mg/l

The proposed treatment system is expected to treat for many unregulated constituents. It is noted that of the 125 non-Standard chemicals analyzed monthly at the Malibu Creek Plaza treatment system (similar to the one proposed for La Paz) only 4 of 875 analysis have been above detection limits.

According to Los Angeles County Waterworks District No. 29 Annual Water Quality Report for 2006, La Paz’s water supply is expected to have TDS of 273 mg/l and chloride concentration of 50 mg/l. Based upon Malibu Creek Plaza data, approximately 300 mg/l of TDS was added as part of wastewater generation. With a reuse of 45%, approximately 450 mg/l of TDS is expected to be added at La Paz, resulting in an effluent TDS of ~818 mg/l.

A soil salt leaching and management plan will be developed as part of the final design solely for reference purposes. Figures 2-21 and 2-22 illustrate groundwater chloride concentration in the Malibu Civic Center area, as measured in the City of Malibu Civic Center Risk Assessment Study of 2004.

FIGURE 2-21. CHLORIDE AVERAGE CONCENTRATIONS (MG/L) FOR ALL MONITORING WELLS – CITY OF MALIBU, CA

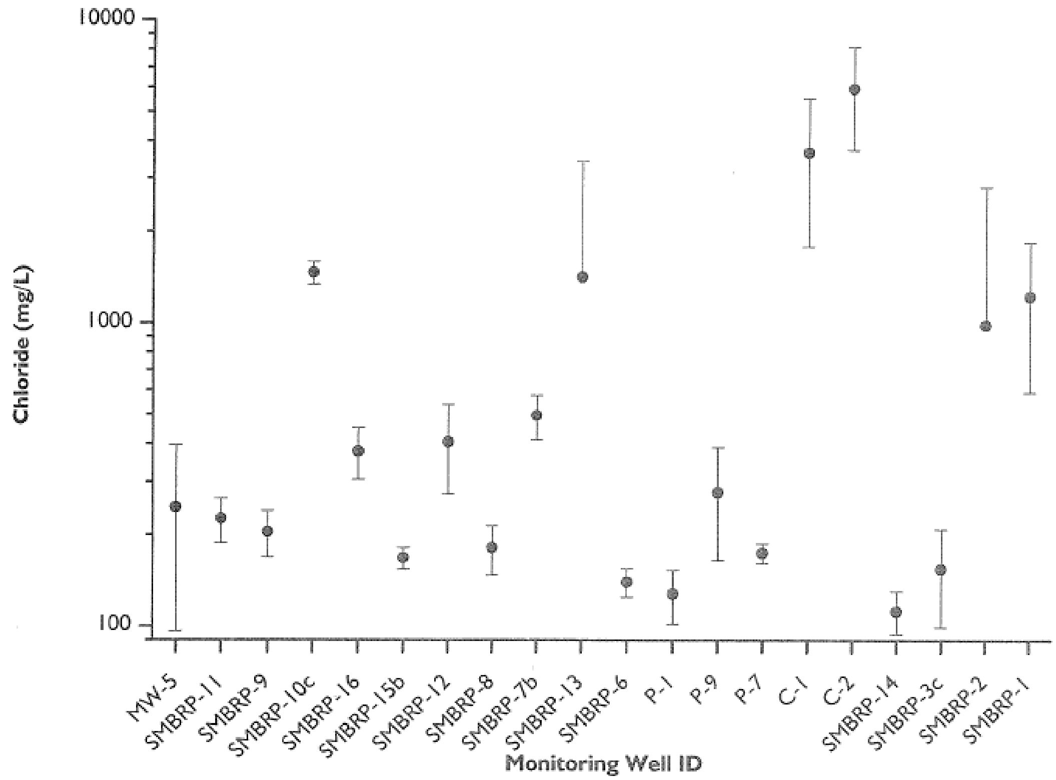
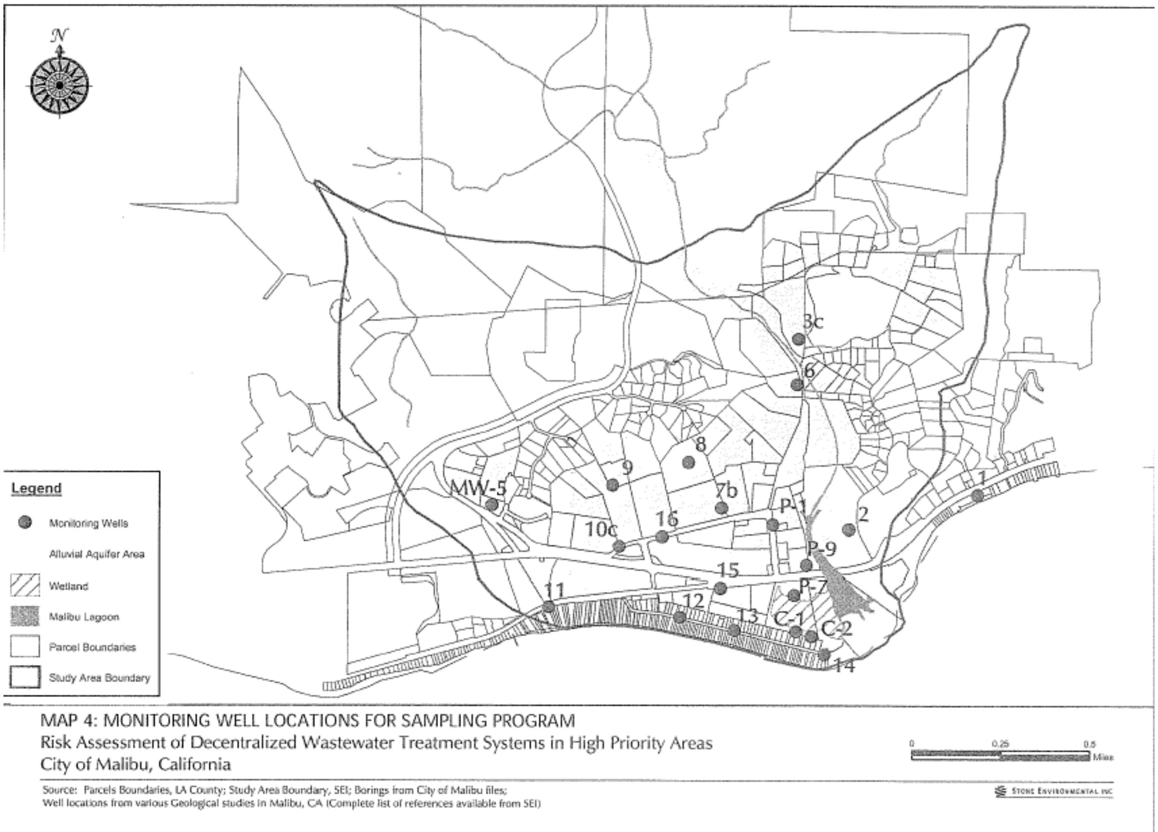


FIGURE 31: CHLORIDE AVERAGE CONCENTRATIONS (mg/L) FOR ALL MONITORING WELLS
City of Malibu, CA

Source: Laboratory reports from Pat-Chem Laboratories, Inc., 2003 and 2004.
Path: o:\proj-01\1269-w-malibu\reports\final\figures\AnalyteAvgStdev.opj
Date: 5-11-04 anm

STONE ENVIRONMENTAL INC

FIGURE 2-22. MONITORING WELL LOCATIONS FOR SAMPLING PROGRAM – MALIBU, CA



2.13 Soils, Surficial Geology & Percolation Rates

Appendix E contains the following information on the La Paz site soils, surficial geology and percolation rates:

1. Location map and surficial geology cross-sections illustrating stratigraphy of site, as prepared by Fugro West.
2. Soils Analysis and Testing Report for Proposed Septic System, prepared by Gold Coast Geoservices, Inc., August 1, 2006.
3. March 17, 2006 letter from Gold Cost Geoservices, Inc. with the determination that the La Paz site soils most typically vary from loam to silt loam.

Although the proposed water reuse project does not rely upon soils for effluent disposal, site soils are capable of accepting the design wastewater flow.

APPENDIX A – WASTEWATER FLOW COMPARABLES DATA

Malibu Creek Plaza Water Use and Wastewater Generation.

Table A-1 presents the LA County Design Flow and LAI Design Flow for the Malibu Creek Plaza Nitrex^{TM} Wastewater System, resulting in Table K-3 and LAI design flows of 25,613 gpd and 16, 000 gpd, respectively.

Four years of historical quarterly water use is presented on Table A-2, showing average and maximum quarterly averages of 11,123 gpd and 12,731 gpd respectively. Actual daily water use was also measured from May - July of 2004, see Table A-3 and Figure A-1, representing the expected peak flow period for the Plaza. The total water use for the Plaza was an average of 11,216 gpd over this period, with a maximum daily recorded water use of 17,280 gpd. Since there is very little outdoor water use at the Plaza, 100% of water use was assumed to contribute to wastewater generation, even though restaurants would have some consumptive use (i.e. coffee, drinking water)

Using this design criteria, an average flow of 12,000 gpd was used as a design basis. 4,000 gpd was added for peaking purposes based upon simulation of the May – July 2004 water use, growth allowance and additional capacity for future changes in use at the Plaza. A 16,000 gallon flow equalization tank was installed to attenuate peak flows.

Daily influent wastewater flow data has been recorded since July 23, 2007. The average daily flow has been 12,480 gpd, with a maximum daily flow of 17,520 gpd, see Table A-4 and Figure A-2.

TABLE A-1. MALIBU CREEK PLAZA DESIGN FLOW

	Malibu Creek Plaza, Malibu, CA											
Tenant	**Retail Space (sf)**	**Flow from Retail (gpd)**	**Office Space (sf)**	**Max # Employees**	**Flow from Office Space (gpd)**	**Restaurant # Seats**	**Restaurant Flow (gpd)**	**Theater / Salon # Seats**	**Theater Flow**	**Salon Flow**	**Appendix K-3 LA County Design Flow (gpd)**	**Actual Design Flow (gpd)**
Plumbing Code K-3 Assumptions	**10 sf / gpd flow**	**0.1 gpd/ sf**	**100 sf / employee**		**20 gpd/ employee or 0.2 gpd/sf**		**50 gpd / seat**		**5 gpd/seat**	**100 gpd/seat**		
Septic Tank 1												
Malibu Theater								259	1,295		1,295	969
Ben & Jerry's						28	1,400				1,400	1,048
Total Flow for ST-1		**0**			**0**		**1,400**		**1,295**	**0**	**2,695**	**2,018**
Septic Tanks 2 and 3												
Casa Escobar						127	6,350				6,350	4,752
Bay City Beauty Supply	850	85									85	64
Fast Frame	1,471	147									147	110
Malibu Eye Center	1,484	148									148	111
Banana Republic	4,595	460									460	344
Total Flow for ST-2 and ST-3		**840**			**0**		**6,350**		**0**	**0**	**7,190**	**5,381**
Septic Tank 4												
Radio Shack	1,718	172									172	51
Guido's						156	7,800				7,800	2,282
European Shoe Repair	968	97									97	28
Pet Headquarters	2,700	270									270	79
Total Flow for ST-4		**539**			**0**		**7,800**		**0**	**0**	**8,339**	**2,440**
Septic Tank 5												
Diesel Bookstore	2,837	284									284	83
Marmalade Café						95	4,750				4,750	1,389
Malibu Beach Club	1,443	144									144	42
Ballet by the Sea	3,178	318									318	93
Super Care Drugs	1,368	137									137	40
Wells Fargo Bank			1,200	12	240						240	70
Total Flow for ST-5		**883**			**240**		**4,750**		**0**	**0**	**5,873**	**1,718**
Septic Tank 6												
Pritchett-Rapf & Associates			2,400	24	480						480	140
Salon at Malibu Creek								7		700	700	205
Gregg Ruth Jewelers	1,227	123									123	36
Colony Cleaners	2,143	214									214	63
Total Flow for ST-6		**337**			**480**		**0**		**0**	**700**	**1,517**	**444**
GRAND TOTAL DESIGN FLOW	***25,982***	***2,598***	***3,600***		***720***		***20,300***		***1,295***	***700***	***25,614***	***12,000***
					% Restaurant =		**79%**					

TABLE A-2. MALIBU CREEK PLAZA METERED WATER USAGE (100 CF)

Period			Meter (100s of cubic feet)				Average Water Use for Period (gpd)
Start	End	Days	NEP 31860595	HER 26751657 Fire Water Meter	ROC 30953382	Total	
11/2/2000	1/2/2001	61	489	0	343	832	10,202
1/2/2001	3/6/2001	63	560	0	328	888	10,543
3/6/2001	5/1/2001	56	483	0	398	881	11,768
5/1/2001	7/2/2001	62	491	0	391	882	10,641
7/2/2001	9/7/2001	67	587	1	475	1063	11,868
9/7/2001	11/7/2001	61	469	0	349	818	10,031
11/7/2001	1/7/2002	61	495	0	310	805	9,871
1/7/2002	3/7/2002	59	463	0	432	895	11,347
3/7/2002	5/1/2002	55	565	0	331	896	12,186
5/1/2002	7/9/2002	69	683	0	439	1122	12,163
7/9/2002	8/28/2002	50	489	0	362	851	12,731
8/28/2002	11/5/2002	69	782	0	319	1101	11,935
11/5/2002	1/3/2003	59	566	1	237	804	10,193
1/3/2003	3/5/2003	61	558	0	235	793	9,724
3/5/2003	5/5/2003	61	652	0	241	893	10,950
5/5/2003	7/3/2003	59	598	0	260	858	10,878
7/3/2003	9/3/2003	62	602	10	405	1017	12,270
9/3/2003	11/4/2003	62	526	0	379	905	10,918
						Average	***11,123***
						Maximum	***12,731***

Table A-3 and Figure A-1 present the daily water use at the Malibu Creek Plaza in Malibu, CA from May 7, 2004 through July 13, 2004.

TABLE A-3. DAILY WATER USE – MALIBU CREEK PLAZA, MAY 7, 2004 – JULY 13, 2004

		Northwest System	South & North System	
		Theatre - Rockwell Meter #30953385	PCH - Neptune Meter #31860598	
Tenants Served		Malibu Theater	Pritchett-Rapf & Associates	
		Ben & Jerry's	Salon at Malibu Creek	
		Casa Escobar	Gregg Ruth Jewelers	
		Bay City Beauty Supply	Colony Cleaners	
		Fast Frame	Radio Shack	
		Malibu Eye Center	Guido's	
		Banana Republic	European Shoe Repair	
			Pet Headquarters	
			Diesel Bookstore	
			Marmalade Café	
			Malibu Beach Club	
			Ballet by the Sea	
			Super Care Drugs	
			Wells Fargo Bank	
Design Flow				
Date	**Day**	**Volume (gpd)**	**Volume (gpd)**	**Total (gpd)**
5/7/2004	Friday	0	0	
5/8/2004	Saturday	7,181	8,438	15,619
5/9/2004	Sunday	5,947	7,114	
5/10/2004	Monday	5,947	7,114	13,061
5/11/2004	Tuesday	5,910	5,760	11,670
5/12/2004	Wednesday	5,311	6,583	11,894
5/13/2004	Thursday	6,732	8,752	15,485
5/14/2004	Friday	8,079	7,929	16,008
5/15/2004	Saturday	8,378	8,902	17,280
5/16/2004	Sunday	6,022	8,042	14,063
5/17/2004	Monday	6,022	8,042	14,063
5/18/2004	Tuesday	6,583	8,154	14,737
5/19/2004	Wednesday	5,386	7,032	12,418
5/20/2004	Thursday	7,032	8,677	15,709
5/21/2004	Friday	5,760	7,106	12,866
5/22/2004	Saturday	7,406	7,181	14,587
5/23/2004	Sunday	5,872	7,668	13,540
5/24/2004	Monday	5,872	7,668	13,540
5/25/2004	Tuesday	4,114	1,646	5,760
5/26/2004	Wednesday	7,406	4,638	12,044
5/27/2004	Thursday	7,256	8,453	15,709
5/28/2004	Friday	6,209	5,685	11,894
5/29/2004	Saturday	8,603	6,508	15,111
5/30/2004	Sunday	8,191	6,246	14,437
5/31/2004	Monday	8,191	6,246	14,437
6/1/2004	Tuesday	6,321	5,199	11,520
6/2/2004	Wednesday	6,321	5,199	11,520
6/3/2004	Thursday	3,553	2,917	6,471
6/4/2004	Friday	3,366	2,319	5,685
6/5/2004	Saturday	4,488	5,984	10,473
6/6/2004	Sunday	4,975	3,030	8,004
6/7/2004	Monday	4,975	3,030	8,004
6/8/2004	Tuesday	3,516	3,366	6,882
6/9/2004	Wednesday	2,506	2,543	5,049
6/10/2004	Thursday	2,917	3,179	6,097
6/11/2004	Friday	2,244	2,394	4,638
6/12/2004	Saturday	2,581	3,329	5,910
6/13/2004	Sunday	4,002	5,797	9,799
6/14/2004	Monday	4,002	5,797	9,799
6/15/2004	Tuesday	3,628	3,703	7,331

TABLE A-3 (CONTINUED)

		Northwest System	South & North System	
Tenants Served		**Theatre - Rockwell Meter #30953385**	**PCH - Neptune Meter #31860598**	
		Malibu Theater	Pritchett-Rapf & Associates	
		Ben & Jerry's	Salon at Malibu Creek	
		Casa Escobar	Gregg Ruth Jewelers	
		Bay City Beauty Supply	Colony Cleaners	
		Fast Frame	Radio Shack	
		Malibu Eye Center	Guido's	
		Banana Republic	European Shoe Repair	
			Pet Headquarters	
			Diesel Bookstore	
			Marmalade Café	
			Malibu Beach Club	
			Ballet by the Sea	
			Super Care Drugs	
			Wells Fargo Bank	
Design Flow				
Date	**Day**	**Volume (gpd)**	**Volume (gpd)**	**Total (gpd)**
6/16/2004	Wednesday	2,768	2,394	5,162
6/17/2004	Thursday	1,534	2,207	3,740
6/18/2004	Friday	2,506	3,478	5,984
6/19/2004	Saturday	2,207	4,301	6,508
6/20/2004	Sunday	4,414	6,770	11,183
6/21/2004	Monday	4,414	6,770	11,183
6/22/2004	Tuesday	1,945	2,581	4,526
6/23/2004	Wednesday	2,207	2,581	4,788
6/24/2004	Thursday	2,805	3,217	6,022
6/25/2004	Friday	2,656	2,917	5,573
6/26/2004	Saturday	2,768	2,805	5,573
6/27/2004	Sunday	5,386	6,620	12,006
6/28/2004	Monday	5,386	6,620	12,006
6/29/2004	Tuesday	0	2,656	
6/30/2004	Wednesday	2,618	2,880	5,498
7/1/2004	Thursday	2,618	3,067	5,685
7/2/2004	Friday	2,768	2,843	5,610
7/3/2004	Saturday	3,366	3,366	6,732
7/4/2004	Sunday	5,835	4,376	10,211
7/5/2004	Monday	5,835	4,376	10,211
7/6/2004	Tuesday	3,067	2,843	5,910
7/7/2004	Wednesday	2,319	2,992	5,311
7/8/2004	Thursday	2,618	2,618	5,236
7/9/2004	Friday	2,506	2,843	5,349
7/10/2004	Saturday	3,217	3,441	6,658
7/11/2004	Sunday	0	0	
7/12/2004	Monday	0	0	
7/13/2004	Tuesday	5,386	6,284	11,670
	AVG	**4,718**	**5,003**	**9,706**
	MAX	**8,603**	**8,902**	**17,280**
	MIN	**1,534**	**1,646**	**3,740**

FIGURE A-1. DAILY WATER USE – MALIBU CREEK PLAZA, MAY 7, 2004 – JULY 13, 2004

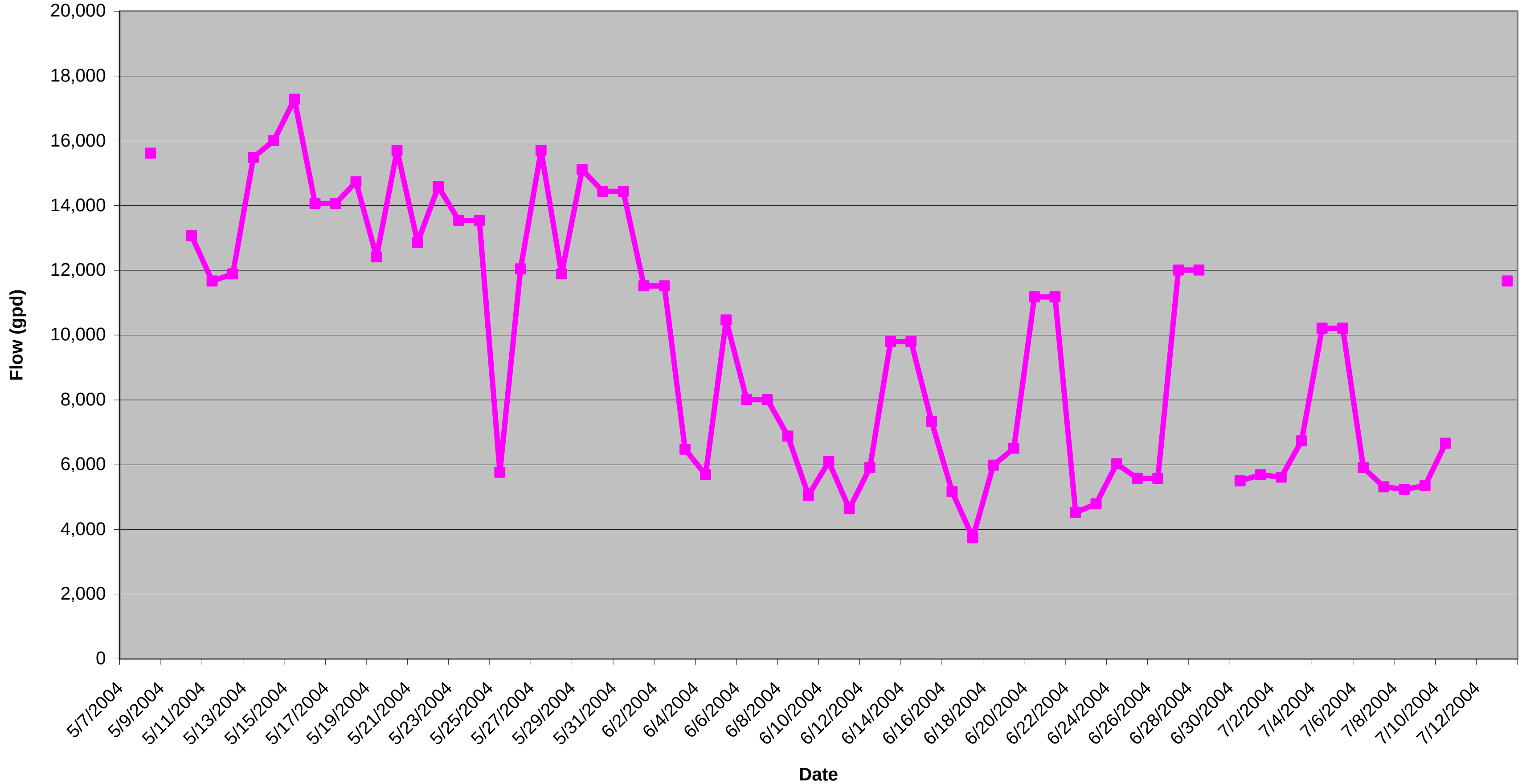


Table A-4 presents the current wastewater flows through the Nitrex™ Wastewater Treatment System at Malibu Creek Plaza, producing effluent compliant with Title 22 requirements.

TABLE A-4. CURRENT WASTEWATER FLOWS AT MALIBU CREEK PLAZA

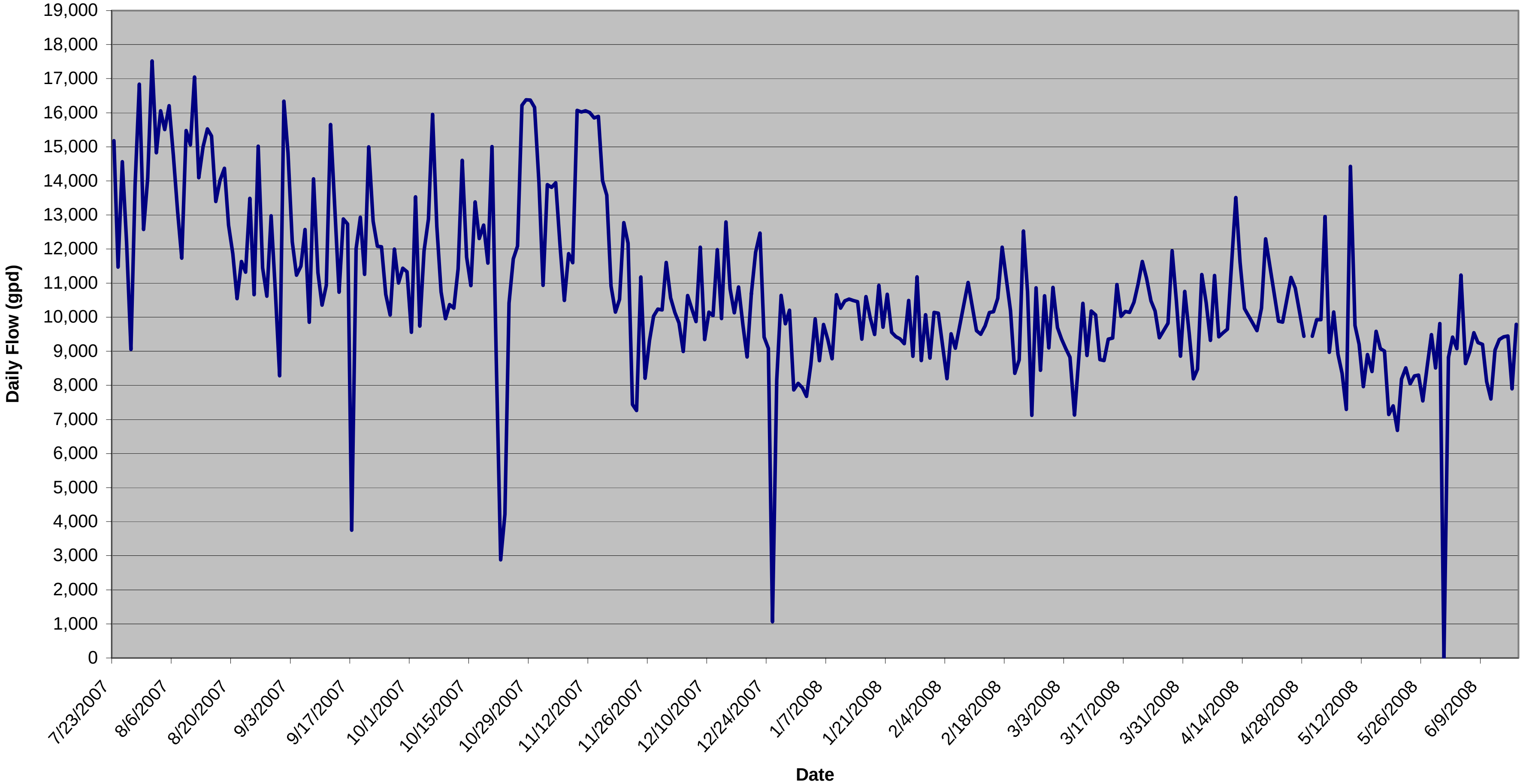
Month	Flow (gpd)	
	Average	Max
Jul-07	13,317	16,843
Aug-07	13,560	17,519
Sep-07	11,958	16,338
Oct-07	11,950	16,380
Nov-07	12,138	16,070
Dec-07	9,884	12,794
Jan-08	9,680	11,188
Feb-08	9,893	12,531
Mar-08	9,905	11,950
Apr-08	10,238	13,512
May-08	8,978	14,429
Jun-08	9,107	11,241
Average	*10,884*	*17,519*

The daily wastewater flow through the system at Malibu Creek Plaza is illustrated in Figure A-2. Table A-5 presents the Malibu Creek Plaza wastewater treatment system effluent quality data and comparison to its permit and Title 22 requirements. The proposed La Paz treatment system is virtually identical (except for size) to the Plaza treatment system.

TABLE A-5. MALIBU CREEK PLAZA WATER QUALITY DATA

Constituent	Units	Malibu Creek Plaza Effluent Standards		Title 22 Unrestricted Reuse Requirements		TREATMENT PLANT AVG. EFFLUENT
		Average	Max	Average	Max	
BOD_5	mg/l	30	45			<6.5
Total Suspended Solids	mg/l	30	45			<6
Turbidity	NTU	10.0	15.0	2.0	10.0	2.0
Oil & Grease	mg/l	-	15			<5
TDS	mg/l	-	2,000			644
Sulfate	mg/l	-	500			74
Chloride	mg/l	-	500			206
Total Nitrogen	mg/l	-	10			5.51
Fecal Coliform(a)	MPN/100 ml	-	200			<1
Enterococcus (b)	MPN/100 ml	24	104			<1
Total Coliform	MPN/100 ml			2.2	23	<2

FIGURE A-2. WASTEWATER FLOW AT MALIBU CREEK PLAZA - JULY 16, 2007 – JUNE 16, 2008



APPENDIX B – ET – RAIN CLIMATIC DATA

Table B-1 presents monthly summaries of the daily Santa Monica ET – Rain Data from CIMIS from January 1993 through December 2007. It is noted that Annual Net ET was fairly constant at the average of 44.50 inches, except for 1995 when it was 31.31 inches.

TABLE B-1. SANTA MONICA ET-RAIN DATA – JAN 1993 THROUGH DEC 2007

DRAFT - FOR REVIEW ONLY - December 8, 2007 Data from CIMIS

Net ET (Evapotranspiration - Rain) (in/month)- Santa Monica, CA

		1993 - 2006 Period			1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
		Max	Min	Avg															
31	Jan	2.73	1.13	2.04	1.13	2.62	1.16	2.42	1.24	1.60	2.12	2.02	2.14	2.44	2.71	2.47	1.80	2.73	2.71
28	Feb	3.11	1.54	2.06	1.56	1.82	2.00	1.56	2.40	1.54	2.56	1.75	1.66	3.11	2.03	2.21	1.83	2.85	2.34
31	Mar	4.28	2.36	3.37	3.42	3.47	3.11	2.36	2.96	3.63	3.19	3.56	3.38	4.13	4.28	3.66	3.11	2.85	4.01
30	Apr	5.26	3.19	4.40	5.26	3.76	5.01	3.59	4.93	4.46	3.95	5.10	4.26	4.25	4.61	4.49	4.72	3.19	4.10
31	May	5.85	3.35	4.82	5.78	4.08	4.32	3.35	5.58	4.71	4.83	5.85	5.00	5.18	4.40	5.66	5.16	3.52	4.55
30	Jun	6.44	3.27	5.04	5.41	5.52	4.59	3.27	5.55	5.07	5.17	6.44	6.11	5.41	3.75	4.51	4.98	4.80	5.11
31	Jul	6.75	2.37	5.46	5.26	4.98	6.05	2.37	5.57	5.54	6.05	6.75	5.94	5.90	5.35	5.77	5.30	5.62	5.97
31	Aug	6.25	3.76	5.53	5.32	5.70	6.04	3.76	5.80	5.88	5.76	6.25	5.49	5.43	6.03	5.29	5.28	5.39	5.58
30	Sep	4.94	2.78	4.10	4.11	4.30	4.29	2.78	4.71	3.87	3.69	4.94	3.17	4.64	3.66	4.77	4.29	4.12	4.78
31	Oct	4.36	2.46	3.19	2.87	3.45	3.36	2.46	4.08	3.88	4.36	2.83	2.74	2.84	2.95	2.63	3.00	3.20	4.00
30	Nov	2.94	1.66	2.37	2.69	2.62	2.32	1.97	2.06	1.66	2.45	2.94	2.03	2.74	2.35	2.31	2.63	2.36	1.86
31	Dec	3.00	1.42	2.13	2.36	2.01	2.00	1.42	2.68	2.37	3.00	2.32	1.98	1.78	1.89	1.97	1.85	2.22	0.56
365	Totals			44.50	45.17	44.33	44.25	31.31	47.56	44.21	47.13	50.75	43.9	47.85	44.01	45.74	43.95	42.85	45.57

Evapotranspiration (in/month)- Santa Monica, CA

		1993 - 2006 Period			1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
		Max	Min	Avg															
31	Jan	2.74	1.33	2.18	1.40	2.71	1.33	2.55	1.41	1.87	2.33	2.12	2.39	2.49	2.74	2.48	1.95	2.73	2.76
28	Feb	3.19	1.65	2.35	1.95	2.60	2.13	1.65	2.47	2.04	2.59	2.02	2.09	3.19	2.55	2.59	2.18	2.85	2.59
31	Mar	4.49	2.56	3.60	3.78	3.60	3.68	2.56	2.98	3.73	3.43	3.81	3.56	4.42	4.49	3.71	3.41	3.21	4.01
30	Apr	5.35	3.67	4.60	5.28	4.01	5.08	4.03	4.94	4.55	4.24	5.35	4.70	4.41	4.76	4.55	4.89	3.67	4.25
31	May	5.89	4.01	5.05	5.79	4.19	4.40	4.01	5.59	5.11	4.83	5.89	5.01	5.62	4.94	5.76	5.32	4.18	4.90
30	Jun	6.54	3.94	5.25	5.52	5.52	4.75	3.97	5.55	5.18	5.37	6.54	6.19	5.82	3.94	4.81	5.34	4.98	5.41
31	Jul	6.86	3.68	5.62	5.26	4.98	6.05	3.68	5.57	5.56	6.08	6.86	6.00	6.03	5.47	6.01	5.56	5.62	5.97
31	Aug	6.33	3.93	5.59	5.32	5.81	6.05	3.93	5.80	5.92	5.81	6.33	5.82	5.43	6.06	5.29	5.28	5.39	5.58
30	Sep	5.00	2.90	4.24	4.26	4.31	4.58	2.90	4.74	3.90	3.75	5.00	4.37	4.64	3.69	4.77	4.29	4.12	4.78
31	Oct	4.50	2.51	3.29	3.11	3.52	3.39	2.51	4.08	3.92	4.50	3.06	3.05	2.84	3.10	2.80	3.00	3.20	4.02
30	Nov	2.99	2.03	2.52	2.99	2.69	2.35	2.13	2.23	2.47	2.57	2.96	2.03	2.79	2.49	2.48	2.63	2.40	2.09
31	Dec	3.02	1.52	2.23	2.44	2.02	2.07	1.52	2.71	2.53	3.02	2.36	2.11	2.07	2.04	2.10	1.85	2.41	2.45
365	Totals			46.51	47.1	45.96	45.86	35.44	48.07	46.78	48.52	52.3	47.32	49.75	46.27	47.35	45.7	44.76	48.81

Table B-1 Continued

Rain (in/month)- Santa Monica, CA																					
		1993 - 2008 Period				1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
		Max	Min	Avg	Median																
31	Jan	14.88	-	4.27	2.13	14.88	0.34	11.16	0.80	7.04	4.84	3.16	1.09	6.60	0.96	0.03	0.01	8.93	0.00	0.47	6.97
28	Feb	11.88	-	4.52	2.32	9.75	4.74	2.22	5.87	0.17	11.88	0.41	5.95	8.10	0.27	2.41	2.20	9.37	0.00	1.05	2.15
31	Mar	8.08	0.02	2.13	1.62	3.27	1.49	8.08	2.16	0.02	0.36	1.43	2.30	1.75	0.53	3.40	0.05	2.25	2.72	0.01	0.04
30	Apr	2.66	0.01	0.91	0.87	0.02	0.61	1.19	1.05	0.01	0.95	1.44	1.47	1.24	0.16	0.79	0.10	1.01	2.66	0.15	0.07
31	May	2.04	-	0.51	0.31	0.01	0.11	0.39	0.83	0.01	2.04	0.00	0.04	0.01	0.44	1.74	0.10	0.27	1.11	0.35	0.63
30	Jun	1.32	-	0.36	0.30	1.32	0.00	0.47	0.70	0.00	0.15	0.71	0.10	0.08	0.41	0.23	0.30	0.36	0.18	0.30	0.43
31	Jul	1.34	-	0.17	0.03	0.00	0.00	0.00	1.34	0.00	0.02	0.03	0.11	0.06	0.13	0.12	0.24	0.26	0.00	0.00	
31	Aug	0.33	-	0.06	0.01	0.00	0.11	0.01	0.17	0.00	0.04	0.05	0.11	0.33	0.00	0.03	0.00	0.00	0.00	0.00	
30	Sep	1.20	-	0.17	0.06	0.15	0.01	0.30	0.12	0.24	0.22	0.06	0.06	1.20	0.00	0.03	0.00	0.00	0.00	0.00	
31	Oct	3.01	-	0.46	0.05	0.41	0.20	0.04	0.05	0.00	0.04	0.14	1.56	0.36	0.00	0.65	3.01	0.00	0.00	0.02	
30	Nov	7.29	-	1.15	0.22	0.73	0.82	0.08	2.33	7.29	3.37	0.54	0.02	0.00	0.06	0.22	0.45	0.00	0.13	0.22	
31	Dec	6.48	-	1.72	1.07	1.19	0.01	2.19	6.48	0.99	0.98	0.08	0.04	1.13	2.76	1.07	6.34	0.00	0.82	1.88	
365	Totals			16.42	12.83	31.73	8.44	26.13	21.9	15.77	24.89	8.05	12.85	20.86	5.72	10.72	12.8	22.45	7.62	4.45	10.29
	Max			31.73		Malibu	9.99	23.13	13.46	20.25	51.19	12.77	12.25	18.4	5.81	9.8	6.49	28.08	4.62	6.43	
	Min			5.72		Malibu-Sl	1.55	(3.00)	(8.44)	4.48	26.30	4.72	(0.60)	(2.46)	0.09	(0.92)	(6.31)	5.63	(3.00)	1.98	

Rain (in/month) Hydrologic Year- Santa Monica, CA																		
	1993 - 2006 Period				Oct-93	Oct-94	Oct-95	Oct-96	Oct-97	Oct-98	Oct-99	Oct-00	Oct-01	Oct-02	Oct-03	Oct-04	Oct-05	Oct-06
	Max	Min	Avg	Median	Mar-94	Mar-95	Mar-96	Mar-97	Mar-98	Mar-99	Mar-00	Mar-01	Mar-02	Mar-03	Mar-04	Mar-05	Mar-06	Mar-07
Oct	3.01	-	0.46	0.10	0.41	0.20	0.04	0.05	0.00	0.04	0.14	1.56	0.36	0.00	0.65	3.01	0.00	0.00
Nov	7.29	-	1.15	0.34	0.73	0.82	0.08	2.33	7.29	3.37	0.54	0.02	0.00	0.06	0.22	0.45	0.00	0.13
Dec	6.48	-	1.72	1.03	1.19	0.01	2.19	6.48	0.99	0.98	0.08	0.04	1.13	2.76	1.07	6.34	0.00	0.82
Jan	11.16	-	3.25	1.03	0.34	11.16	0.80	7.04	4.84	3.16	1.09	6.60	0.96	0.03	0.01	8.93	0.00	0.47
Feb	11.88	-	3.90	2.32	4.74	2.22	5.87	0.17	11.88	0.41	5.95	8.10	0.27	2.41	2.20	9.37	0.00	1.05
Mar	8.08	0.01	1.90	1.62	1.49	8.08	2.16	0.02	0.36	1.43	2.30	1.75	0.53	3.40	0.05	2.25	2.72	0.01
Winter Subtotal																		
	27.34	2.48	11.91	9.66	8.49	22.29	11.10	16.04	25.36	9.35	9.96	16.51	2.89	8.66	3.55	27.34	2.72	2.48
				Median	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Apr	2.66	0.01	0.91	0.98	0.02	0.61	1.19	1.05	0.01	0.95	1.44	1.47	1.24	0.16	0.79	0.10	1.01	2.66
May	2.04	-	0.51	0.19	0.01	0.11	0.39	0.83	0.01	2.04	0.00	0.04	0.01	0.44	1.74	0.10	0.27	1.11
Jun	1.32	-	0.36	0.27	1.32	0.00	0.47	0.70	0.00	0.15	0.71	0.10	0.08	0.41	0.23	0.30	0.36	0.18
Jul	1.34	-	0.17	0.05	0.00	0.00	0.00	1.34	0.00	0.02	0.03	0.11	0.06	0.13	0.12	0.24	0.26	0.00
Aug	0.33	-	0.06	0.02	0.00	0.11	0.01	0.17	0.00	0.04	0.05	0.11	0.33	0.00	0.03	0.00	0.00	0.00
Sep	1.20	-	0.17	0.06	0.15	0.01	0.30	0.12	0.24	0.22	0.06	0.06	1.20	0.00	0.03	0.00	0.00	0.00
Summer Subtotal																		
	4.21	0.26	2.17	2.10	1.50	0.84	2.36	4.21	0.26	3.42	2.29	1.89	2.92	1.14	2.94	0.74	1.90	3.95
Hydro Yearly Total																		
	28.08	4.62	14.08	12.51	9.99	23.13	13.46	20.25	25.62	12.77	12.25	18.40	5.81	9.80	6.49	28.08	4.62	6.43
Winter as % of Total																		
	99%	39%	85%	82%	85%	96%	82%	79%	99%	73%	81%	90%	50%	88%	55%	97%	59%	39%

APPENDIX C – STORAGE TANK LIQUID LEVEL SIMULATION

The liquid level in the Storage Tank for both the Preferred and Alternate Development Scenarios were calculated for the 15 year record of Santa Monica ET-rainfall data as follows:

1. Landscaping Areas and ET_c values developed by the project's Landscape Architect, Donald Wynn Associates, are presented on Table 2-7.
2. Irrigation efficiency is specified on Table 2.7.
3. ET demand was calculated as:
   ET – Rainfall, with ET demand set to zero if ET < Rainfall
4. Irrigation Demand (ID) = ET Demand / Irrigation Efficiency
   a. If ID < Wastewater dispersal volume, the difference was placed into the Storage Tank
   b. If ID > Wastewater Discharge Volume, then the difference (ID – WDV) is withdrawn from the Storage Tank. Volume in storage thank cannot be negative.
5. This analysis was repeated daily for the entire 15 year period of record. The maximum water level was then identified.

Figures C-1 and C-2 illustrate the analysis for the Preferred Option and Alternate Option, respectively.

Based upon this analysis, the following conclusions are drawn:

1. The maximum volume in the storage tank is 733,552 gallons for the Preferred Plan (0.20 FAR) (see Figure C1).
2. The maximum volume in the storage tank is 242,085 gallons for the Alternate Option (0.15 FAR) (see Figure C2).

As can be seen in Figure C-1, the required storage tank may be reducible to approximately 500,000 gallons by optimizing plantings and irrigation management as the storage tank did not empty by July 1996.

Figures C-3 and C-4 illustrate the storage tank volume and net ET for the average year (October 2002 – September 2003) and the worst years (October 1995 – September 1997), respectively.

FIGURE C-1. STORAGE TANK LIQUID LEVEL ANALYSIS – PREFERRED PLAN (0.20 FAR)

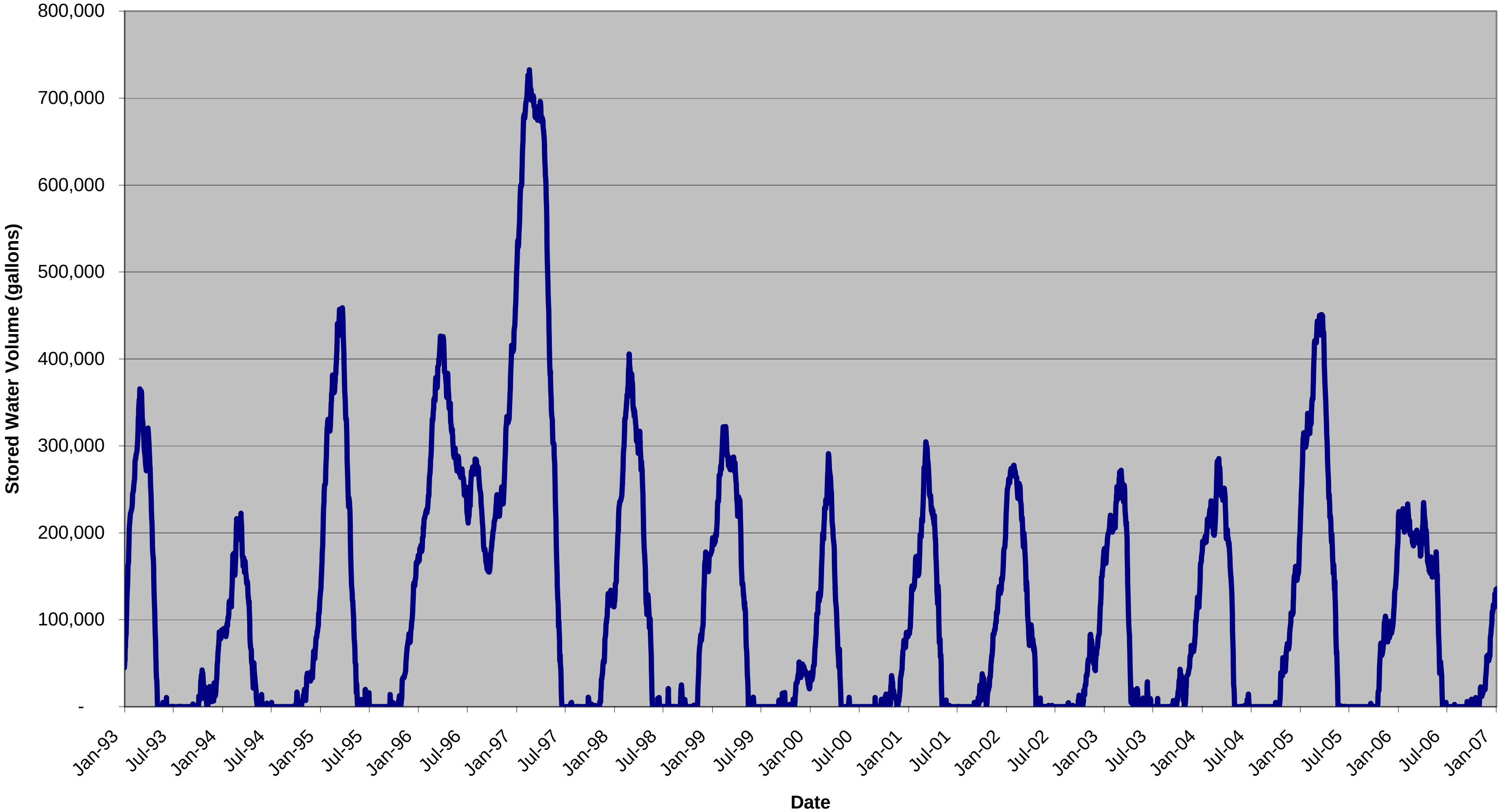


FIGURE C-2. STORAGE TANK LIQUID LEVEL ANALYSIS – ALTERNATE PLAN (0.15 FAR)

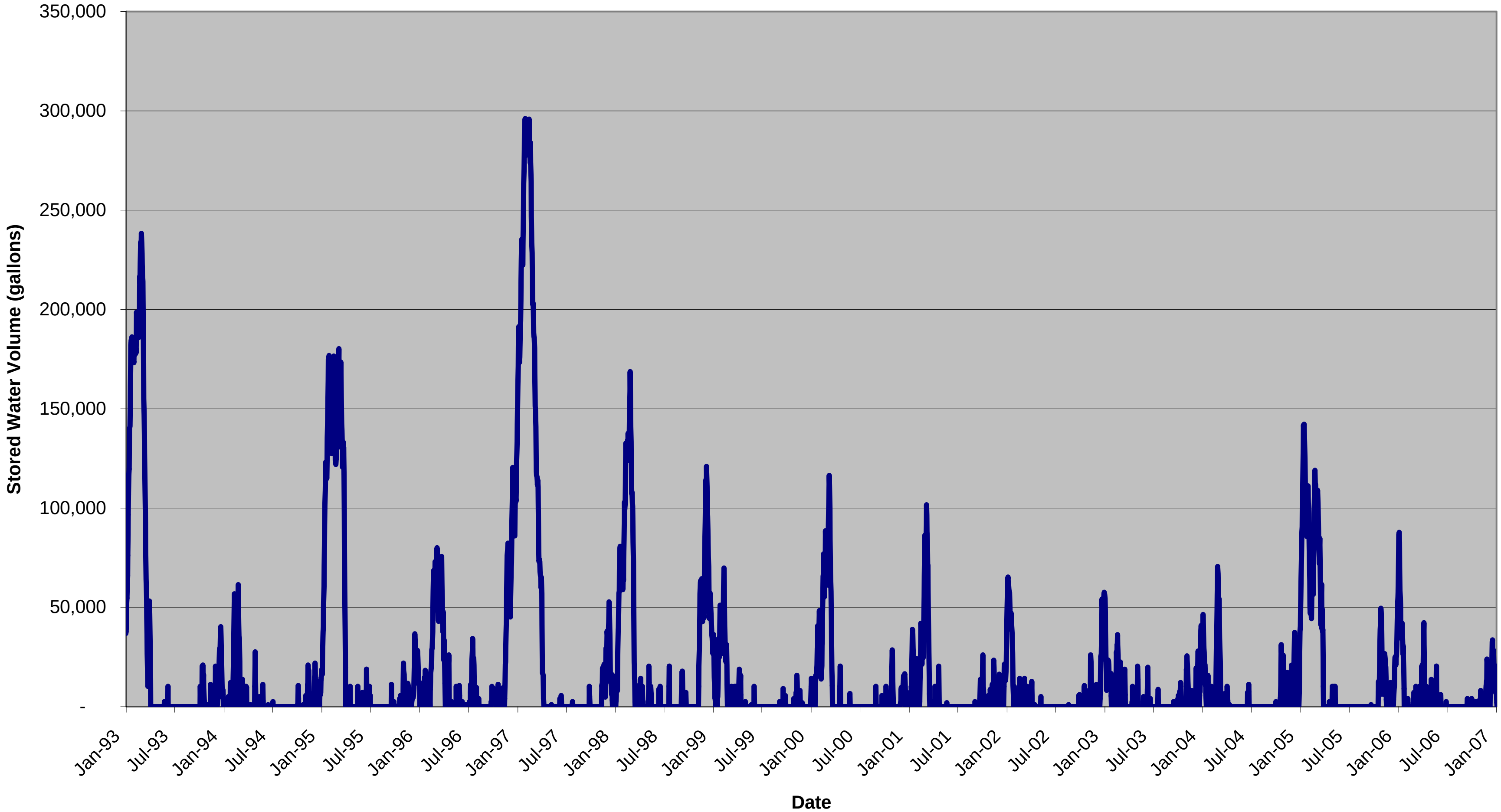


FIGURE C-3. AVERAGE YEAR STORAGE TANK VOLUME AND NET ET

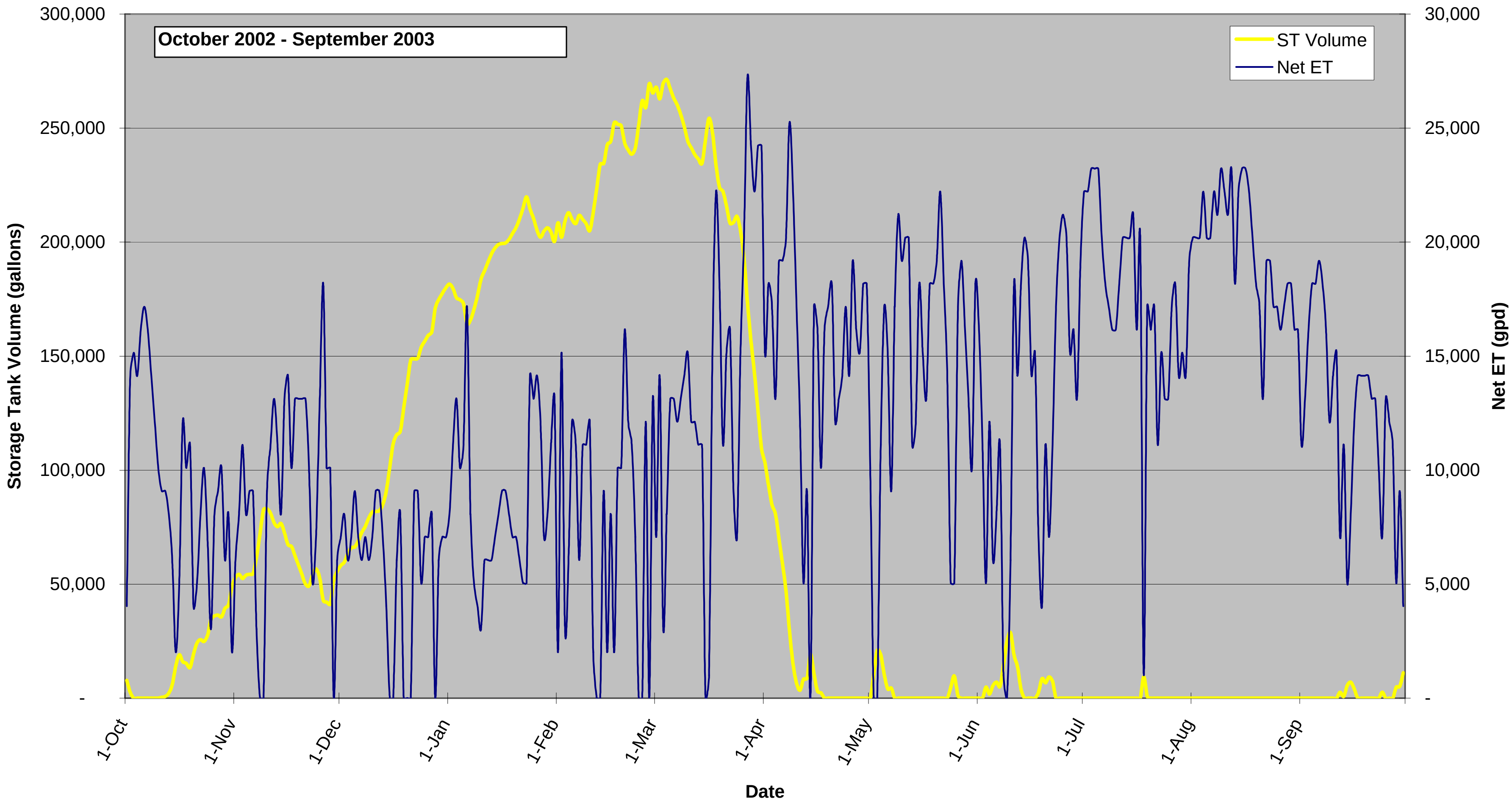
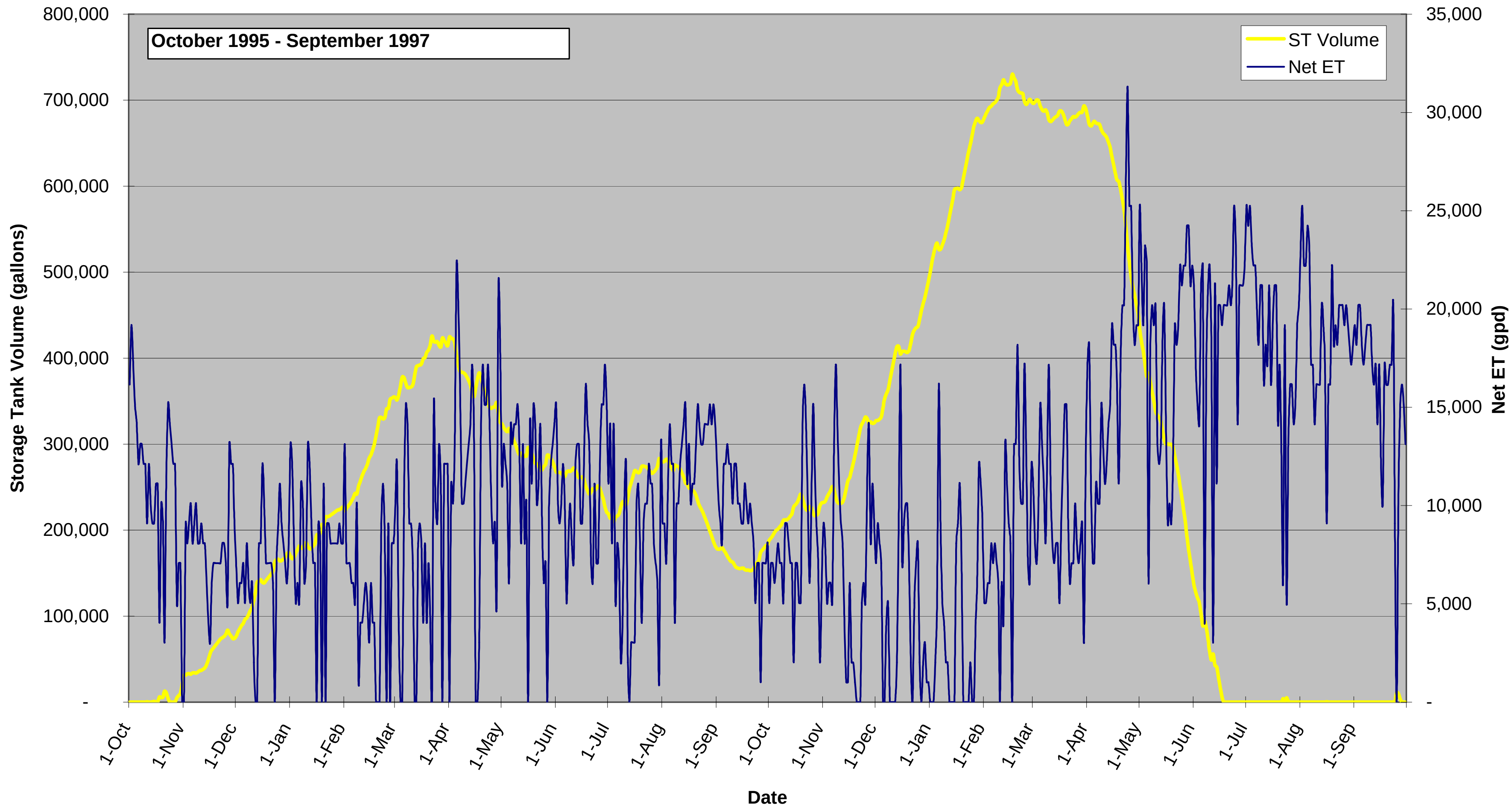


Figure C-4. Worst Years Storage Tank Volume and Net ET



APPENDIX D – GROUNDWATER MOUNDING TRANSIENT ANALYSIS

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April 1, 2008
Project No. 3374.001.10

PROJECT MEMORANDUM

To: Mr. Chris Deleau
Schmitz & Associates

From: Peter Leffler and Nels Ruud

Subject: Transient Groundwater Modeling Results for the Proposed Malibu-La Paz Ranch Development

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INTRODUCTION

This project memorandum documents the results of a transient groundwater modeling study for the proposed Malibu-La Paz Ranch (Ranch) development. For this study, a previously developed steady-state groundwater model for the Ranch was modified to simulate transient groundwater levels due to time-varying discharge in the three different layouts: 1) a system of 17 drainfields, 2) the 0.2 floor area ratio (FAR) landscaping layout under the Preferred Plan, and 3) the 0.15 FAR landscaping layout under the Alternative Plan. The steady-state groundwater model modified for this study and the drainfield layout evaluated in this memorandum were both originally documented in a report prepared by Fugro for Sterling Capitol in May 2005 (Fugro, May 2005). The 0.2 FAR and 0.15 FAR layouts were developed by Lombardo Associates. In this study, total discharge rates of 10,000 and 20,000 gallons per day (GPD) were each separately simulated in the drainfield layout, the 0.2 FAR layout, and the 0.15 FAR layout for both 20- and 60-day discharge durations by the transient groundwater model. In addition, continuous discharge rates of 1,000 and 3,000 GPD were also simulated for the drainfield layout by the model. The results of the transient model simulations for the six discharge scenarios are presented below. The transient model inputs for discharge rates and durations were provided by Lombardo Associates.

TRANSIENT GROUNDWATER MODELING

A system of seventeen 0.12-acre drainfields is presented on Figure 1. This drainfield layout was evaluated during the previous steady-state modeling study performed at the proposed Ranch (Fugro, May 2005). In the current study, six different discharge scenarios were simulated: 1) 10,000 GPD for 20 days; 2) 20,000 GPD for 20 days; 3) 10,000 GPD for 60 days; 4) 20,000 GPD for 60 days; 5) continuous discharge of 1,000 GPD; and 6) continuous discharge of 3,000 GPD. The proportioning of the discharge in the 17 drainfields was optimized in the May 2005 report to minimize the amount of groundwater level rise throughout the Ranch property due to the discharge. For comparison purposes, a baseline condition was also simulated and consisted of zero discharge in the drainfields over each simulation period. Eight hypothetical monitoring points (i.e., designated as MP-1 through MP-8) were defined either beneath the drainfields or off-site of the Ranch property to evaluate the associated groundwater level rises above baseline conditions due to the six different discharge scenarios (Figure 1).

The 0.2 FAR and 0.15 FAR landscaping layouts are presented on Figures 2 and 3, respectively. The modeled areas of the 0.2 FAR layout and the 0.15 FAR layout are 244,211 square feet (ft^2) and 348,391 ft^2, respectively. For these two landscaping layouts, four different discharge scenarios were simulated: 1) 10,000 GPD for 20 days; 2) 20,000 GPD for 20 days; 3) 10,000 GPD for 60 days; and 4) 20,000 GPD for 60 days. The results of the discharge scenarios for the drainfield layout, the 0.2 FAR layout, and the 0.15 FAR layout are all presented below.

Discharge of 10,000 GPD for 20 Days in the Drainfield Layout

This discharge scenario consisted of three stress periods. The first stress period was 10 days in length and consisted of zero discharge in the drainfields. The second stress period was 20 days in length and consisted of a discharge rate of 10,000 GPD distributed amongst the drainfields as defined in Table 1. The third stress period was 370 days in length and again consisted of zero discharge in the drainfields.

For the 10,000 GPD discharge rate over a 20-day discharge duration, hydrographs of the resulting simulated groundwater elevations at the eight hypothetical monitoring points are presented on Figure 4a. The spatial distribution of simulated groundwater level rises above baseline conditions at the end of the discharge period is presented on Figure 4b, and the groundwater level rises at each monitoring point are presented in Table 2. The depth to groundwater from the ground surface at each monitoring point is also presented in Table 2. Off-site groundwater level rises ranged from 0.1 to 0.2 feet and were highest at MP-5 (East off-site). Groundwater level rises beneath the drainfields ranged from 0.2 to 1.4 feet and were highest at MP-7 (NE Drainfields). Nowhere in the model domain did groundwater levels rise within 5 feet of the ground surface for the discharge rate of 10,000 GPD over the 20-day discharge duration.

Discharge of 20,000 GPD for 20 Days in the Drainfield Layout

This discharge scenario consisted of three stress periods. The first stress period was 10 days in length and consisted of zero discharge in the drainfields. The second stress period was 20 days in length and consisted of a discharge rate of 20,000 GPD distributed amongst the drainfields as defined in Table 1. The third stress period was 370 days in length and again consisted of zero discharge in the drainfields.

For the 20,000 GPD discharge rate over a 20-day discharge duration, hydrographs of the resulting simulated groundwater elevations at the 8 hypothetical monitoring points are presented on Figures 5a. The spatial distribution of simulated groundwater level rises above baseline conditions at the end of the discharge period is presented on Figure 5b, and the groundwater level rises at each monitoring point are presented in Table 2. The depth to groundwater from the ground surface at each monitoring point is also presented in Table 2. Off-site groundwater level rises ranged from 0.1 to 0.5 feet and were highest at MP-5 (East off-site). Groundwater level rises beneath the drainfields ranged from 0.3 to 2.7 feet and were highest at MP-7 (NE Drainfields). Nowhere in the model domain did groundwater levels rise within 5 feet of the ground surface for the discharge rate of 20,000 GPD over the 20-day discharge duration.

Discharge of 10,000 GPD for 60 Days in the Drainfield Layout

This discharge scenario consisted of three stress periods. The first stress period was 10 days in length and consisted of zero discharge in the drainfields. The second stress period was 60 days in length and consisted of a discharge rate of 10,000 GPD distributed amongst the drainfields as defined in Table 1. The third stress period was 330 days in length and again consisted of zero discharge in the drainfields.

For the 10,000 GPD discharge rate over a 60-day discharge duration, hydrographs of the resulting simulated groundwater elevations at the 8 hypothetical monitoring points are presented on Figure 6a. The spatial distribution of simulated groundwater level rises above baseline conditions at the end of the discharge period is presented on Figure 6b, and the groundwater level rises at each monitoring point are presented in Table 3. The depth to groundwater from the ground surface at each monitoring point is also presented in Table 3. Off-site groundwater level rises ranged from 0.2 to 0.5 feet and were highest at MP-5 (East off-site). Groundwater level rises beneath the drainfields ranged from 0.6 to 2.1 feet and were highest at MP-7 (NE Drainfields). Nowhere in the model domain did groundwater levels rise within 5 feet of the ground surface for the discharge rate of 10,000 GPD over the 60-day discharge duration.

Discharge of 20,000 GPD for 60 Days in the Drainfield Layout

This discharge scenario consisted of three stress periods. The first stress period was 10 days in length and consisted of zero discharge in the drainfields. The second stress period was 60 days in length and consisted of a discharge rate of 20,000 GPD distributed amongst the drainfields as defined in Table 1. The third stress period was 330 days in length and again consisted of zero discharge in the drainfields.

For the 20,000 GPD discharge rate over a 60-day discharge duration, hydrographs of the resulting simulated groundwater elevations at the eight hypothetical monitoring points are presented on Figure 7a. The spatial distribution of simulated groundwater level rises above baseline conditions at the end of the discharge period is presented on Figure 7b, and the groundwater level rises at each monitoring point are presented in Table 3. The depth to groundwater from the ground surface at each monitoring point is also presented in Table 3. Off-site groundwater level rises ranged from 0.4 to 0.9 feet and were highest at MP-5 (East off-site). Groundwater level rises beneath the drainfields ranged from 1.2 to 4.1 feet and were highest at MP-7 (NE Drainfields). Nowhere in the model domain did groundwater levels rise within 5 feet of the ground surface for the discharge rate of 20,000 GPD over the 60-day discharge duration.

Continuous Discharge of 1,000 GPD in the Drainfield Layout

This discharge scenario consisted of two stress periods. The first stress period was 10 days in length and consisted of zero discharge in the drainfields. The second stress period was 990 days in length and consisted of a discharge rate of 1,000 GPD distributed amongst the drainfields as defined in Table 1.

For the continuous discharge rate of 1,000 GPD, hydrographs of the resulting simulated groundwater elevations at the eight hypothetical monitoring points are presented on Figure 8a. The spatial distribution of simulated groundwater level rises above baseline conditions at the end of the discharge period is presented on Figure 8b, and the groundwater level rises at each monitoring point are presented in Table 4. The depth to groundwater from the ground surface at each monitoring point is also presented in Table 4. Off-site groundwater level rises were 0.1 feet at each monitoring point. Groundwater level rises beneath the drainfields ranged from 0.2 to 0.3 feet and were highest at MP-7 (NE Drainfields). Nowhere in the model domain did groundwater levels rise within 5 feet of the ground surface for the continuous discharge rate of 1,000 GPD.

Continuous Discharge of 3,000 GPD in the Drainfield Layout

This discharge scenario consisted of two stress periods. The first stress period was 10 days in length and consisted of zero discharge in the drainfields. The second stress period was 990 days in length and consisted of a discharge rate of 3,000 GPD distributed amongst the drainfields as defined in Table 1.

For the continuous discharge rate of 3,000 GPD, hydrographs of the resulting simulated groundwater elevations at the eight hypothetical monitoring points are presented on Figure 9a. The spatial distribution of simulated groundwater level rises above baseline conditions at the end of the discharge period is presented on Figure 9b, and the groundwater level rises at each monitoring point are presented in Table 4. The depth to groundwater from the ground surface at each monitoring point is also presented in Table 4. Off-site groundwater level rises ranged from 0.2 to 0.3 feet at the monitoring points. Groundwater level rises beneath the drainfields ranged from 0.5 to 1.1 feet and were highest at MP-7 (NE Drainfields). Nowhere in the model domain did groundwater levels rise within 5 feet of the ground surface for the continuous discharge rate of 3,000 GPD.

Discharge of 10,000 GPD for 20 Days in the 0.2 FAR Layout

This discharge scenario consisted of three stress periods. The first stress period was 10 days in length and consisted of zero discharge from the landscaped areas. The second stress period was 20 days in length and consisted of a discharge rate of 10,000 GPD distributed uniformly throughout the landscaped area. The third stress period was 330 days in length and again consisted of zero discharge from the landscaped areas.

For the 10,000 GPD discharge rate over a 20-day discharge duration, hydrographs of the resulting simulated groundwater elevations at the 8 hypothetical monitoring points are presented on Figure 10a. The spatial distribution of simulated groundwater level rises above baseline conditions at the end of the discharge period is presented on Figure 10b, and the groundwater level rises at each monitoring point are presented in Table 5. The depth to groundwater from the ground surface at each monitoring point is also presented in Table 5. Off-site groundwater level rises ranged from 0.1 to 0.2 feet and were highest at MP-1 (Southwest property boundary). Groundwater level rises beneath the landscaping ranged from 0.1 to 0.7 feet and were highest at MP-7 (NE Area). Nowhere in the model domain did groundwater levels rise within 5 feet of the ground surface for the discharge rate of 10,000 GPD over the 20-day discharge duration.

Discharge of 20,000 GPD for 20 Days in the 0.2 FAR Layout

This discharge scenario consisted of three stress periods. The first stress period was 10 days in length and consisted of zero discharge from the landscaped areas. The second stress period was 20 days in length and consisted of a discharge rate of 20,000 GPD distributed uniformly throughout the landscaped area. The third stress period was 330 days in length and again consisted of zero discharge from the landscaped areas.

For the 20,000 GPD discharge rate over a 20-day discharge duration, hydrographs of the resulting simulated groundwater elevations at the 8 hypothetical monitoring points are presented on Figure 11a. The spatial distribution of simulated groundwater level rises above baseline conditions at the end of the discharge period is presented on Figure 11b, and the groundwater level rises at each monitoring point are presented in Table 5. The depth to groundwater from the ground surface at each monitoring point is also presented in Table 5. Off-site groundwater level rises ranged from 0.1 to 0.3 feet and were highest at MP-1 (Southwest property boundary). Groundwater level rises beneath the landscaping ranged from 0.3 to 1.5 feet and were highest at MP-7 (NE Area). Nowhere in the model domain did groundwater levels rise within 5 feet of the ground surface for the discharge rate of 20,000 GPD over the 20-day discharge duration.

Discharge of 10,000 GPD for 60 Days in the 0.2 FAR Layout

This discharge scenario consisted of three stress periods. The first stress period was 10 days in length and consisted of zero discharge from the landscaped areas. The second stress period was 60 days in length and consisted of a discharge rate of 10,000 GPD distributed uniformly throughout the landscaped area. The third stress period was 330 days in length and again consisted of zero discharge from the landscaped areas.

For the 10,000 GPD discharge rate over a 60-day discharge duration, hydrographs of the resulting simulated groundwater elevations at the 8 hypothetical monitoring points are presented on Figure 12a. The spatial distribution of simulated groundwater level rises above baseline conditions at the end of the discharge period is presented on Figure 12b, and the groundwater level rises at each monitoring point are presented in Table 6. The depth to groundwater from the ground surface at each monitoring point is also presented in Table 6. Off-site groundwater level rises ranged from 0.2 to 0.3 feet and were highest at MP-1 (Southwest property boundary) and MP-8 (NE off-site). Groundwater level rises beneath the landscaping ranged from 0.3 to 1.5 feet and were highest at MP-7 (NE Area). Nowhere in the model domain did groundwater levels rise within 5 feet of the ground surface for the discharge rate of 10,000 GPD over the 60-day discharge duration.

Discharge of 20,000 GPD for 60 Days in the 0.2 FAR Layout

This discharge scenario consisted of three stress periods. The first stress period was 10 days in length and consisted of zero discharge from the landscaped areas. The second stress period was 60 days in length and consisted of a discharge rate of 20,000 GPD distributed uniformly throughout the landscaped area. The third stress period was 330 days in length and again consisted of zero discharge from the landscaped areas.

For the 20,000 GPD discharge rate over a 60-day discharge duration, hydrographs of the resulting simulated groundwater elevations at the 8 hypothetical monitoring points are presented on Figure 13a. The spatial distribution of simulated groundwater level rises above baseline conditions at the end of the discharge period is presented on Figure 13b, and the groundwater level rises at each monitoring point are presented in Table 6. The depth to groundwater from the ground surface at each monitoring point is also presented in Table 6. Off-site groundwater level rises ranged from 0.4 to 0.7 feet and were highest at MP-8 (NE off-site). Groundwater level rises beneath the landscaping ranged from 0.6 to 2.9 feet and were highest at MP-7 (NE Area). Nowhere in the model domain did groundwater levels rise within 5 feet of the ground surface for the discharge rate of 20,000 GPD over the 60-day discharge duration.

Discharge of 10,000 GPD for 20 Days in the 0.15 FAR Layout

This discharge scenario consisted of three stress periods. The first stress period was 10 days in length and consisted of zero discharge from the landscaped areas. The second stress period was 20 days in length and consisted of a discharge rate of 10,000 GPD distributed uniformly throughout the landscaped area. The third stress period was 330 days in length and again consisted of zero discharge from the landscaped areas.

For the 10,000 GPD discharge rate over a 20-day discharge duration, hydrographs of the resulting simulated groundwater elevations at the 8 hypothetical monitoring points are presented on Figure 14a. The spatial distribution of simulated groundwater level rises above baseline conditions at the end of the discharge period is presented on Figure 14b, and the groundwater level rises at each monitoring point are presented in Table 7. The depth to groundwater from the ground surface at each monitoring point is also presented in Table 7. Off-site groundwater level rises ranged from 0.1 to 0.2 feet and were highest at MP-1 (Southwest property boundary). Groundwater level rises beneath the landscaping ranged from 0.1 to 0.6 feet and were highest at MP-6 (Central Area). Nowhere in the model domain did groundwater levels rise within 5 feet of the ground surface for the discharge rate of 10,000 GPD over the 20-day discharge duration.

Discharge of 20,000 GPD for 20 Days in the 0.15 FAR Layout

This discharge scenario consisted of three stress periods. The first stress period was 10 days in length and consisted of zero discharge from the landscaped areas. The second stress period was 20 days in length and consisted of a discharge rate of 20,000 GPD distributed uniformly throughout the landscaped area. The third stress period was 330 days in length and again consisted of zero discharge from the landscaped areas.

For the 20,000 GPD discharge rate over a 20-day discharge duration, hydrographs of the resulting simulated groundwater elevations at the 8 hypothetical monitoring points are presented on Figure 15a. The spatial distribution of simulated groundwater level rises above baseline conditions at the end of the discharge period is presented on Figure 15b, and the groundwater level rises at each monitoring point are presented in Table 7. The depth to groundwater from the ground surface at each monitoring point is also presented in Table 7. Off-site groundwater level rises ranged from 0.1 to 0.3 feet and were highest at MP-1 (Southwest property boundary). Groundwater level rises beneath the landscaping ranged from 0.2 to 1.3 feet and were highest at MP-6 (Central Area). Nowhere in the model domain did groundwater levels rise within 5 feet of the ground surface for the discharge rate of 20,000 GPD over the 20-day discharge duration.

Discharge of 10,000 GPD for 60 Days in the 0.15 FAR Layout

This discharge scenario consisted of three stress periods. The first stress period was 10 days in length and consisted of zero discharge from the landscaped areas. The second stress period was 60 days in length and consisted of a discharge rate of 10,000 GPD distributed uniformly throughout the landscaped area. The third stress period was 330 days in length and again consisted of zero discharge from the landscaped areas.

For the 10,000 GPD discharge rate over a 60-day discharge duration, hydrographs of the resulting simulated groundwater elevations at the 8 hypothetical monitoring points are presented on Figure 16a. The spatial distribution of simulated groundwater level rises above baseline conditions at the end of the discharge period is presented on Figure 16b, and the groundwater level rises at each monitoring point are presented in Table 8. The depth to groundwater from the ground surface at each monitoring point is also presented in Table 8. Off-site groundwater level rises ranged from 0.2 to 0.3 feet and were highest at MP-1 (Southwest property boundary) and MP-8 (NE off-site). Groundwater level rises beneath the landscaping ranged from 0.3 to 1.4 feet and were highest at MP-6 (Central Area). Nowhere in the model domain did groundwater levels rise within 5 feet of the ground surface for the discharge rate of 10,000 GPD over the 60-day discharge duration.

Discharge of 20,000 GPD for 60 Days in the 0.15 FAR Layout

This discharge scenario consisted of three stress periods. The first stress period was 10 days in length and consisted of zero discharge from the landscaped areas. The second stress period was 60 days in length and consisted of a discharge rate of 20,000 GPD distributed uniformly throughout the landscaped area. The third stress period was 330 days in length and again consisted of zero discharge from the landscaped areas.

For the 20,000 GPD discharge rate over a 60-day discharge duration, hydrographs of the resulting simulated groundwater elevations at the 8 hypothetical monitoring points are presented on Figure 17a. The spatial distribution of simulated groundwater level rises above baseline conditions at the end of the discharge period is presented on Figure 17b, and the groundwater level rises at each monitoring point are presented in Table 8. The depth to groundwater from the ground surface at each monitoring point is also presented in Table 8. Off-site groundwater level rises ranged from 0.4 to 0.6 feet and were highest at MP-1 (Southwest property boundary). Groundwater level rises beneath the landscaping ranged from 0.6 to 2.8 feet and were highest at MP-6 (Central Area). Nowhere in the model domain did groundwater levels rise within 5 feet of the ground surface for the discharge rate of 20,000 GPD over the 60-day discharge duration.

REFERENCE

Fugro West, Inc. (May, 2005), *Supplemental Report/Response to Comments for a Steady-State Groundwater Flow Model for the Proposed Malibu-La Paz Ranch Development*, prepared for Sterling Capitol.

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES

TABLES

Table 1. Discharge Rates in Each Drainfield for Various Model Stimulations

Drainfield Identification Number	Drainfield Area (acres)	Drainfield Discharge 10,000 GPD (ft^3/day)	Drainfield Discharge 10,000 GPD (gallons/day)	Drainfield Discharge 20,000 GPD (ft^3/day)	Drainfield Discharge 20,000 GPD (gallons/day)
1	0.12	50.9	380	101.7	761
2	0.12	29.2	218	58.4	437
3	0.12	72.6	543	145.3	1,087
4	0.12	72.6	543	145.3	1,087
5	0.12	85.3	638	170.6	1,276
6	0.12	54.6	409	109.3	817
7	0.12	54.6	409	109.3	817
8	0.12	0.0	0	0.0	0
9	0.12	21.9	164	43.9	328
10	0.12	174.1	1,302	348.1	2,604
11	0.12	174.1	1,302	348.1	2,604
12	0.12	174.1	1,302	348.1	2,604
13	0.12	128.7	963	257.5	1,926
14	0.12	0.0	0	0.0	0
15	0.12	87.2	652	174.4	1,304
16	0.12	87.2	652	174.4	1,304
17	0.12	69.5	520	138.9	1,039
Total	2.04	1336.6	10,000	2673.1	20,000

Table 2. Ground Surface Elevations and Water Levels at Hypothetical Monitoring Points for 20-Day Discharge Rates of 10,000 GPD and 20,000 GPD in 17 Drainfields

Hypothetical Monitoring Points (MP)	Ground Surface Elevation (feet, MSL)	Baseline Groundwater Elevation (feet, MSL)	Drainfields 10,000 GPD 20-day Discharge Simulated Groundwater Elevation (feet, MSL)	Drainfields 10,000 GPD 20-day Discharge Simulated Groundwater Rise (feet)	Drainfields 10,000 GPD 20-day Discharge Simulated Depth-to-Groundwater from Ground Surface (feet)	Drainfields 20,000 GPD 20-day Discharge Simulated Groundwater Elevation (feet, MSL)	Drainfields 20,000 GPD 20-day Discharge Simulated Groundwater Rise (feet)	Drainfields 20,000 GPD 20-day Discharge Simulated Depth-to-Groundwater from Ground Surface (feet)
MP-1 (Southwest property boundary)	16	9.0	9.1	0.1	6.9	9.2	0.1	6.8
MP-2 (West off-site)	22	10.3	10.4	0.1	11.6	10.6	0.3	11.4
MP-3 (SW Drainfields)	21	9.9	10.8	0.9	10.2	11.6	1.7	9.4
MP-4 (SE Drainfields)	20	9.2	10.0	0.8	10.0	10.7	1.5	9.3
MP-5 (East off-site)	18	9.0	9.2	0.2	8.8	9.5	0.5	8.5
MP-6 (Central Drainfields)	21	10.9	11.1	0.2	9.9	11.3	0.4	9.7
MP-7 (NE Drainfields)	26	12.7	14.1	1.4	11.9	15.4	2.7	10.6
MP-8 (NE off-site)	23	11.9	12.0	0.1	11.0	12.1	0.2	10.9

Table 3. Ground Surface Elevations and Water Levels at Hypothetical Monitoring Points for 60-Day Discharge Rates of 10,000 GPD and 20,000 GPD in 17 Drainfields

Hypothetical Monitoring Points (MP)	Ground Surface Elevation (feet, MSL)	Baseline Groundwater Elevation (feet, MSL)	Drainfields 10,000 GPD 60-day Discharge Simulated Groundwater Elevation (feet, MSL)	Drainfields 10,000 GPD 60-day Discharge Simulated Groundwater Rise (feet)	Drainfields 10,000 GPD 60-day Discharge Simulated Depth-to-Groundwater from Ground Surface (feet)	Drainfields 20,000 GPD 60-day Discharge Simulated Groundwater Elevation (feet, MSL)	Drainfields 20,000 GPD 60-day Discharge Simulated Groundwater Rise (feet)	Drainfields 20,000 GPD 60-day Discharge Simulated Depth-to-Groundwater from Ground Surface (feet)
MP-1 (Southwest property boundary)	16	9.0	9.2	0.2	6.8	9.4	0.4	6.6
MP-2 (West off-site)	22	10.3	10.6	0.4	11.4	11.0	0.7	11.0
MP-3 (SW Drainfields)	21	9.9	11.3	1.4	9.7	12.5	2.6	8.5
MP-4 (SE Drainfields)	20	9.2	10.3	1.1	9.7	11.3	2.1	8.7
MP-5 (East off-site)	18	9.0	9.5	0.5	8.5	9.9	0.9	8.1
MP-6 (Central Drainfields)	21	10.9	11.5	0.6	9.5	12.1	1.2	8.9
MP-7 (NE Drainfields)	26	12.7	14.8	2.1	11.2	16.8	4.1	9.2
MP-8 (NE off-site)	23	11.9	12.2	0.2	10.8	12.4	0.4	10.6

Table 4. Ground Surface Elevations and Water Levels at Hypothetical Monitoring Points for Continuous Discharge Rates of 1,000 GPD and 3,000 GPD in 17 Drainfields

Hypothetical Monitoring Points (MP)	Ground Surface Elevation (feet, MSL)	Baseline Groundwater Elevation (feet, MSL)	Drainfields 1,000 GPD Continuous Discharge Simulated Groundwater Elevation (feet, MSL)	Drainfields 1,000 GPD Continuous Discharge Simulated Groundwater Rise (feet)	Drainfields 1,000 GPD Continuous Discharge Simulated Depth-to-Groundwater from Ground Surface (feet)	Drainfields 3,000 GPD Continuous Discharge Simulated Groundwater Elevation (feet, MSL)	Drainfields 3,000 GPD Continuous Discharge Simulated Groundwater Rise (feet)	Drainfields 3,000 GPD Continuous Discharge Simulated Depth-to-Groundwater from Ground Surface (feet)
MP-1 (Southwest property boundary)	16	9.0	9.1	0.1	6.9	9.3	0.2	6.7
MP-2 (West off-site)	22	10.3	10.4	0.1	11.6	10.6	0.3	11.4
MP-3 (SW Drainfields)	21	9.9	10.2	0.2	10.8	10.6	0.7	10.4
MP-4 (SE Drainfields)	20	9.2	9.4	0.2	10.6	9.7	0.5	10.3
MP-5 (East off-site)	18	9.0	9.1	0.1	8.9	9.3	0.3	8.7
MP-6 (Central Drainfields)	21	10.9	11.0	0.2	10.0	11.4	0.5	9.6
MP-7 (NE Drainfields)	26	12.7	13.0	0.3	13.0	13.8	1.1	12.2
MP-8 (NE off-site)	23	11.9	12.0	0.1	11.0	12.3	0.3	10.7

Table 5. Ground Surface Elevations and Water Levels at Hypothetical Monitoring Points for 20-Day Discharge Rates of 10,000 GPD and 20,000 GPD in the 0.2 FAR Layout

Hypothetical Monitoring Points (MP)	Ground Surface Elevation (feet, MSL)	Baseline Groundwater Elevation (feet, MSL)	0.2 FAR Layout 10,000 GPD 20-day Discharge Simulated Groundwater Elevation (feet, MSL)	0.2 FAR Layout 10,000 GPD 20-day Discharge Simulated Groundwater Rise (feet)	0.2 FAR Layout 10,000 GPD 20-day Discharge Simulated Depth-to-Groundwater from Ground Surface (feet)	0.2 FAR Layout 20,000 GPD 20-day Discharge Simulated Groundwater Elevation (feet, MSL)	0.2 FAR Layout 20,000 GPD 20-day Discharge Simulated Groundwater Rise (feet)	0.2 FAR Layout 20,000 GPD 20-day Discharge Simulated Depth-to-Groundwater from Ground Surface (feet)
MP-1 (Southwest property boundary)	16	9.0	9.2	0.2	6.8	9.3	0.3	6.7
MP-2 (West off-site)	22	10.3	10.4	0.1	11.6	10.4	0.1	11.6
MP-3 (SW Area)	21	9.9	10.1	0.2	10.9	10.2	0.3	10.8
MP-4 (SE Area)	20	9.2	9.3	0.1	10.7	9.5	0.3	10.5
MP-5 (East off-site)	18	9.0	9.1	0.1	8.9	9.1	0.1	8.9
MP-6 (Central Area)	21	10.9	11.2	0.3	9.8	11.4	0.5	9.6
MP-7 (NE Area)	26	12.7	13.4	0.7	12.6	14.2	1.5	11.8
MP-8 (NE off-site)	23	11.9	12.0	0.1	11.0	12.2	0.2	10.8

Table 6. Ground Surface Elevations and Water Levels at Hypothetical Monitoring Points for 60-Day Discharge Rates of 10,000 GPD and 20,000 GPD in the 0.2 FAR Layout

Hypothetical Monitoring Points (MP)	Ground Surface Elevation (feet, MSL)	Baseline Groundwater Elevation (feet, MSL)	0.2 FAR Layout 10,000 GPD 60-day Discharge Simulated Groundwater Elevation (feet, MSL)	0.2 FAR Layout 10,000 GPD 60-day Discharge Simulated Groundwater Rise (feet)	0.2 FAR Layout 10,000 GPD 60-day Discharge Simulated Depth-to-Groundwater from Ground Surface (feet)	0.2 FAR Layout 20,000 GPD 60-day Discharge Simulated Groundwater Elevation (feet, MSL)	0.2 FAR Layout 20,000 GPD 60-day Discharge Simulated Groundwater Rise (feet)	0.2 FAR Layout 20,000 GPD 60-day Discharge Simulated Depth-to-Groundwater from Ground Surface (feet)
MP-1 (Southwest property boundary)	16	9.0	9.3	0.3	6.7	9.6	0.6	6.4
MP-2 (West off-site)	22	10.3	10.5	0.2	11.5	10.7	0.4	11.3
MP-3 (SW Area)	21	9.9	10.3	0.4	10.7	10.7	0.8	10.3
MP-4 (SE Area)	20	9.2	9.5	0.3	10.5	9.8	0.6	10.2
MP-5 (East off-site)	18	9.0	9.2	0.2	8.8	9.4	0.4	8.6
MP-6 (Central Area)	21	10.9	11.6	0.8	9.4	12.4	1.5	8.6
MP-7 (NE Area)	26	12.7	14.2	1.5	11.8	15.6	2.9	10.4
MP-8 (NE off-site)	23	11.9	12.3	0.3	10.7	12.6	0.7	10.4

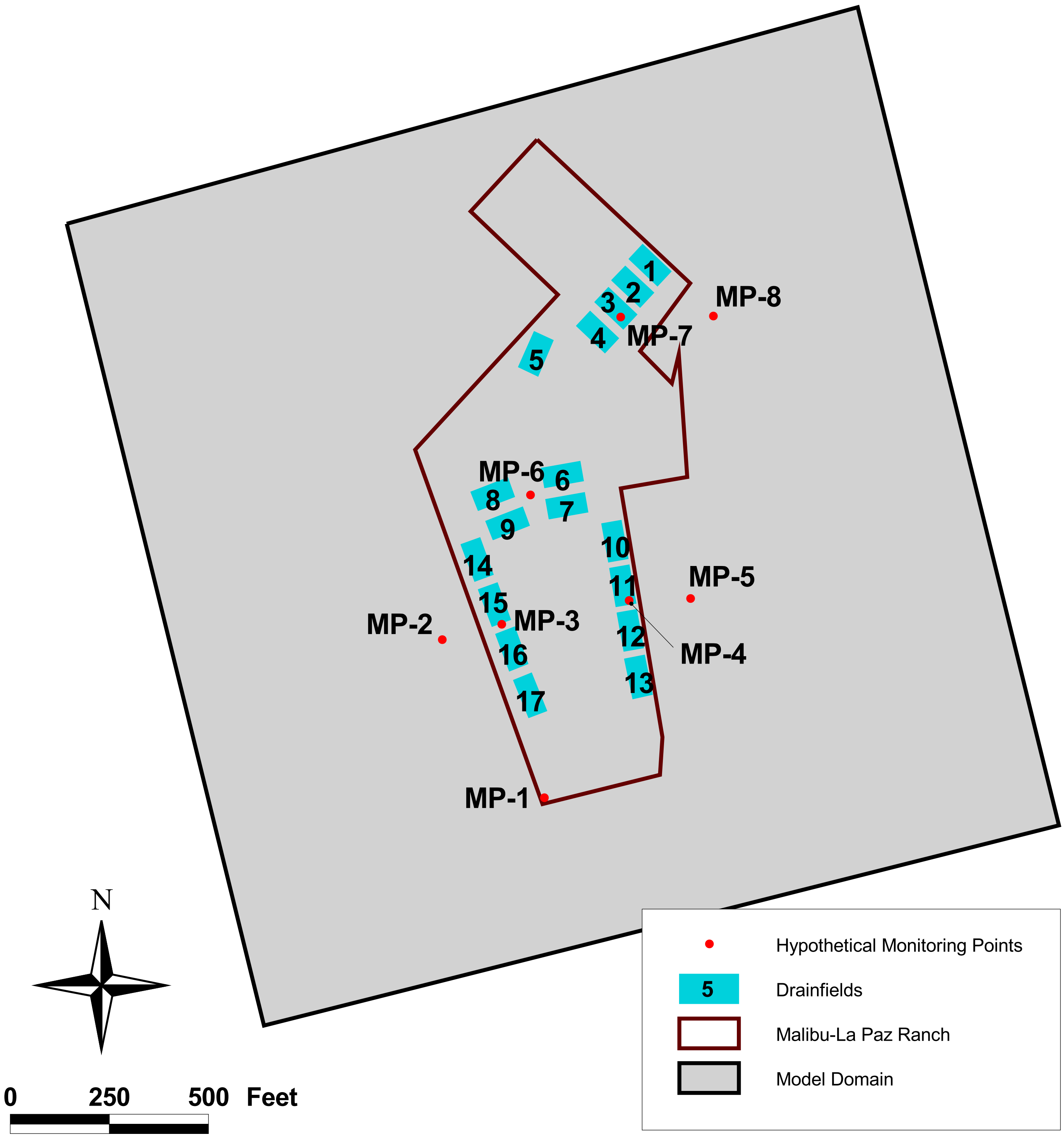
Table 7. Ground Surface Elevations and Water Levels at Hypothetical Monitoring Points for 20-Day Discharge Rates of 10,000 GPD and 20,000 GPD in the 0.15 FAR Layout

Hypothetical Monitoring Points (MP)	Ground Surface Elevation (feet, MSL)	Baseline Groundwater Elevation (feet, MSL)	0.15 FAR Layout 10,000 GPD 20-day Discharge Simulated Groundwater Elevation (feet, MSL)	0.15 FAR Layout 10,000 GPD 20-day Discharge Simulated Groundwater Rise (feet)	0.15 FAR Layout 10,000 GPD 20-day Discharge Simulated Depth-to-Groundwater from Ground Surface (feet)	0.15 FAR Layout 20,000 GPD 20-day Discharge Simulated Groundwater Elevation (feet, MSL)	0.15 FAR Layout 20,000 GPD 20-day Discharge Simulated Groundwater Rise (feet)	0.15 FAR Layout 20,000 GPD 20-day Discharge Simulated Depth-to-Groundwater from Ground Surface (feet)
MP-1 (Southwest property boundary)	16	9.0	9.2	0.2	6.8	9.4	0.3	6.6
MP-2 (West off-site)	22	10.3	10.4	0.1	11.6	10.5	0.2	11.5
MP-3 (SW Area)	21	9.9	10.2	0.3	10.8	10.4	0.5	10.6
MP-4 (SE Area)	20	9.2	9.3	0.1	10.7	9.4	0.2	10.6
MP-5 (East off-site)	18	9.0	9.1	0.1	8.9	9.1	0.1	8.9
MP-6 (Central Area)	21	10.9	11.5	0.6	9.5	12.2	1.3	8.8
MP-7 (NE Area)	26	12.7	13.2	0.5	12.8	13.8	1.1	12.2
MP-8 (NE off-site)	23	11.9	12.0	0.1	11.0	12.1	0.2	10.9

Table 8. Ground Surface Elevations and Water Levels at Hypothetical Monitoring Points for 60-Day Di: 10,000 GPD and 20,000 GPD in the 0.15 FAR Layout

Hypothetical Monitoring Points (MP)	Ground Surface Elevation (feet, MSL)	Baseline Groundwater Elevation (feet, MSL)	0.15 FAR Layout 10,000 GPD 60-day Discharge Simulated Groundwater Elevation (feet, MSL)	0.15 FAR Layout 10,000 GPD 60-day Discharge Simulated Groundwater Rise (feet)	0.15 FAR Layout 10,000 GPD 60-day Discharge Simulated Depth-to-Groundwater from Ground Surface (feet)	0.15 FAR Layout 20,000 GPD 60-day Discharge Simulated Groundwater Elevation (feet, MSL)	0.15 FAR Layout 20,000 GPD 60-day Discharge Simulated Groundwater Rise (feet)	0.15 FAR Layout 20,000 GPD 60-day Discharge Simulated Depth-to-Groundwater from Ground Surface (feet)
MP-1 (Southwest property boundary)	16	9.0	9.3	0.3	6.7	9.6	0.6	6.4
MP-2 (West off-site)	22	10.3	10.5	0.2	11.5	10.7	0.5	11.3
MP-3 (SW Area)	21	9.9	10.4	0.5	10.6	11.0	1.0	10.0
MP-4 (SE Area)	20	9.2	9.5	0.3	10.5	9.8	0.6	10.2
MP-5 (East off-site)	18	9.0	9.2	0.2	8.8	9.4	0.4	8.6
MP-6 (Central Area)	21	10.9	12.3	1.4	8.7	13.7	2.8	7.3
MP-7 (NE Area)	26	12.7	13.8	1.1	12.2	14.9	2.2	11.1
MP-8 (NE off-site)	23	11.9	12.2	0.3	10.8	12.5	0.5	10.5

FIGURES

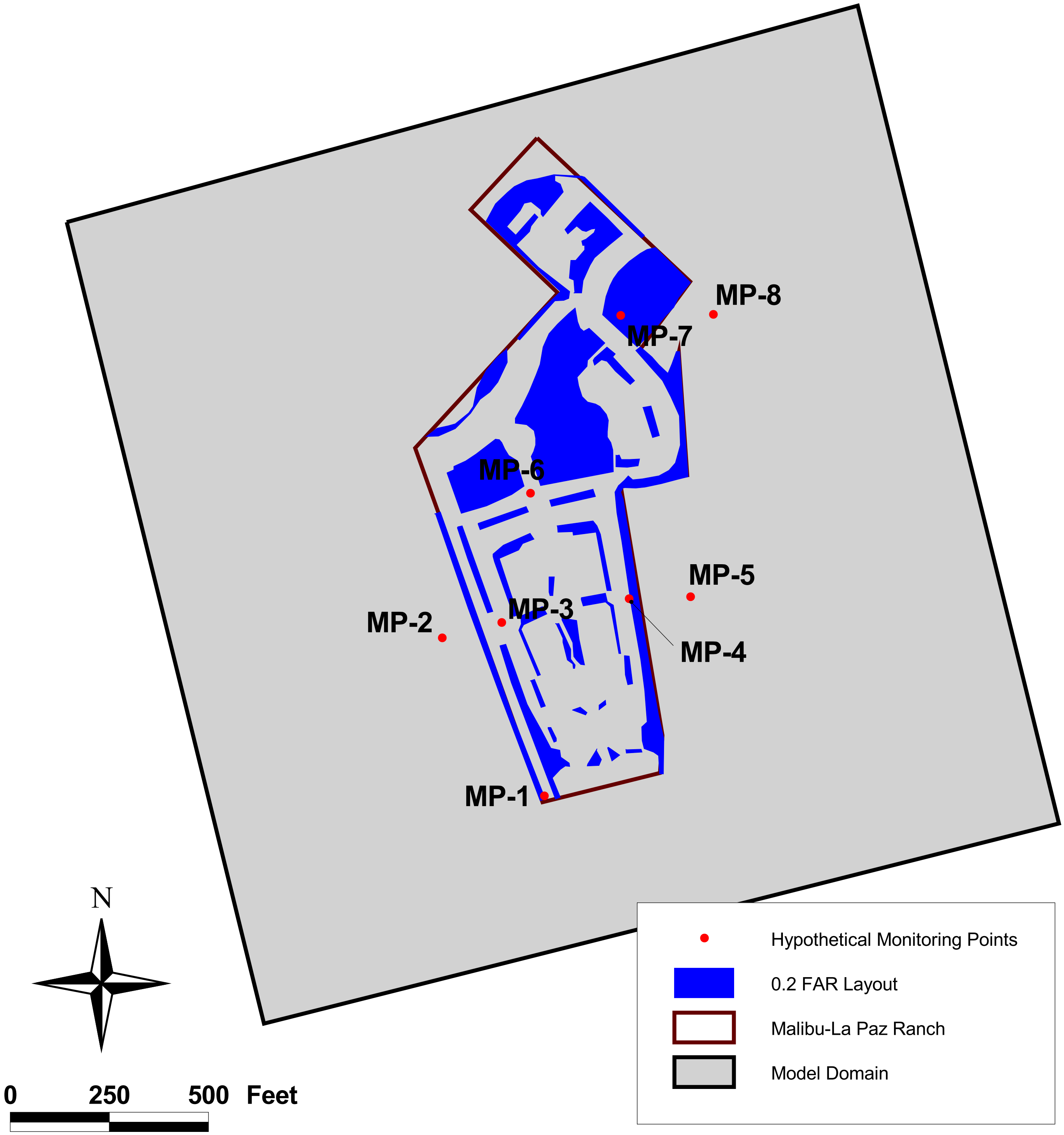


LOCATIONS AND IDENTIFICATION NUMBERS OF 17 DRAINFIELDS AND 8 HYPOTHETICAL MONITORING POINTS (MP-1 to MP-8)

Malibu-La Paz Ranch Development

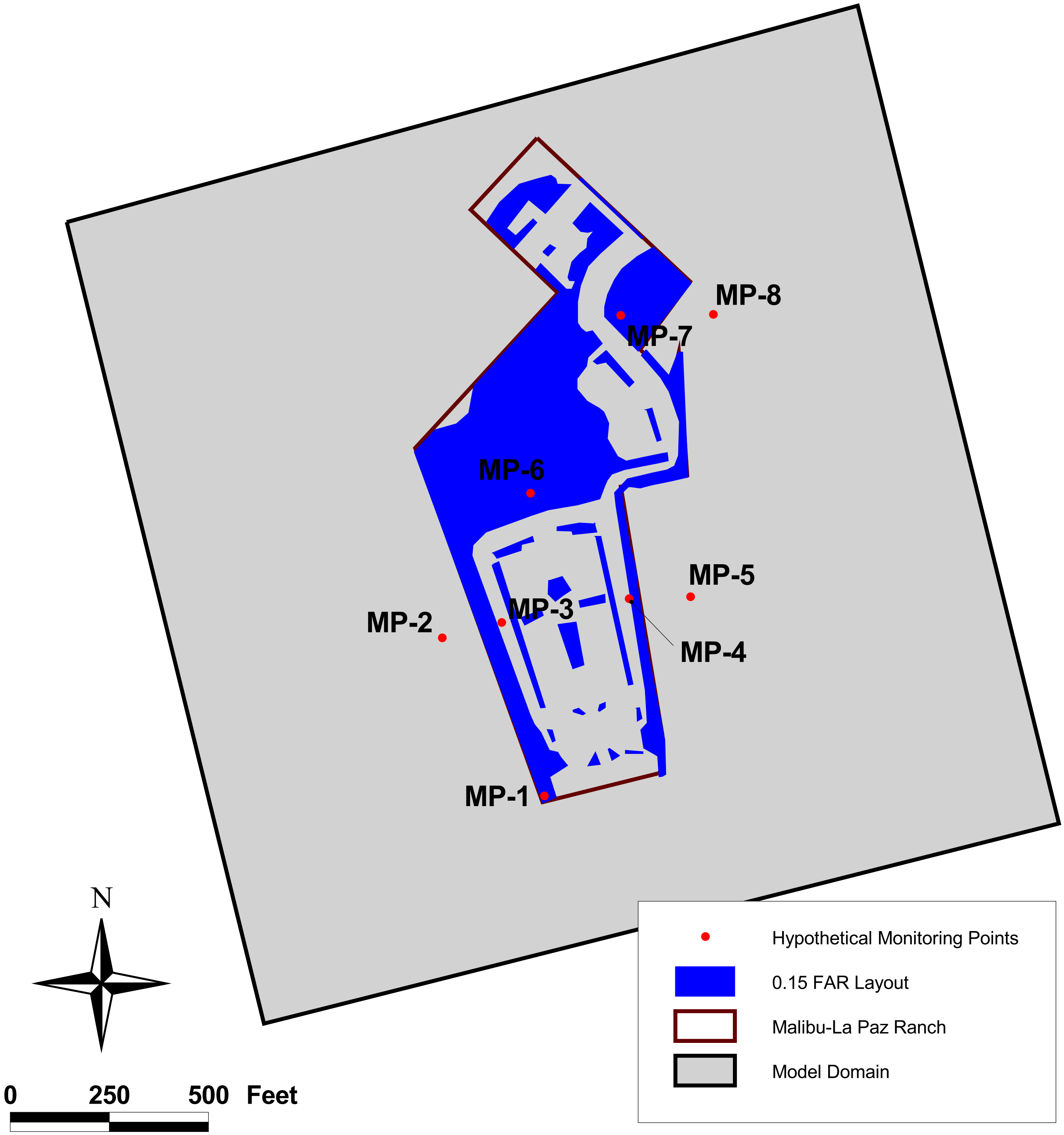
Malibu, California

FIGURE 1



MODELED AREAS OF THE 0.2 FAR LANDSCAPING LAYOUT (PREFERRED PLAN)
Malibu-La Paz Ranch Development
Malibu, California

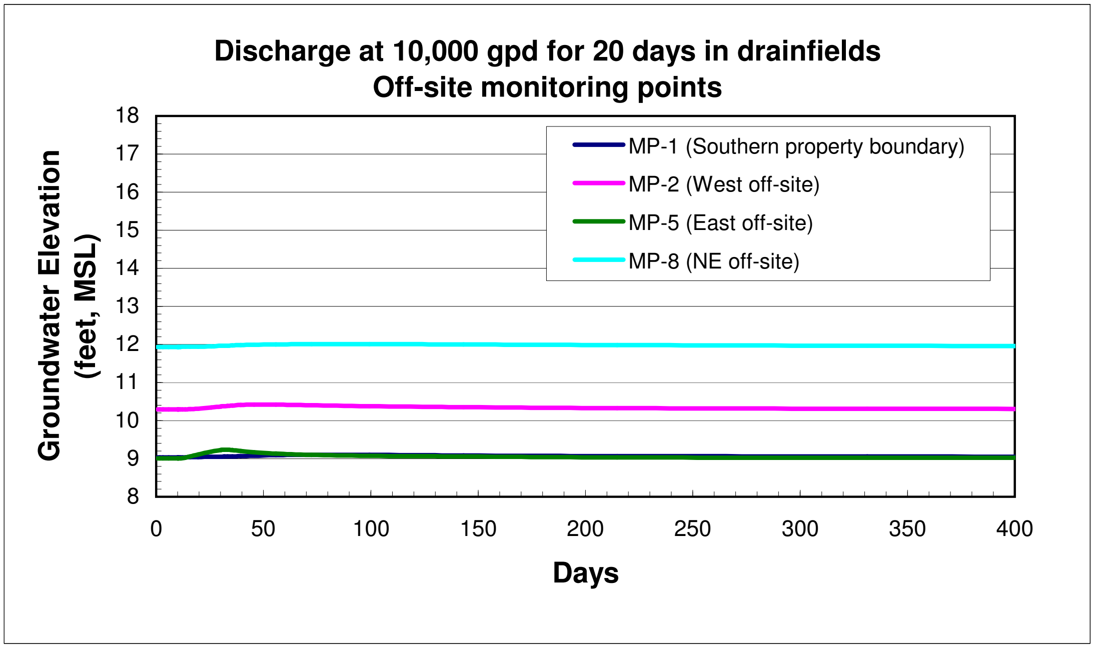
FIGURE 2

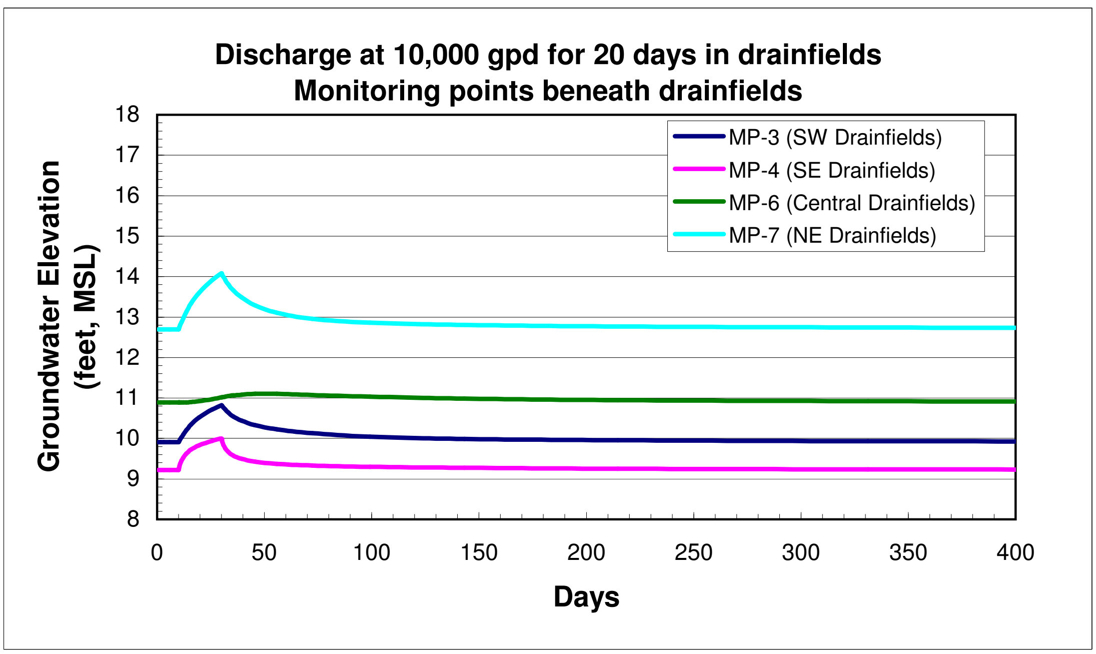


MODELED AREAS OF THE 0.15 FAR LANDSCAPING LAYOUT (ALTERNATIVE PLAN)

Malibu-La Paz Ranch Development
Malibu, California

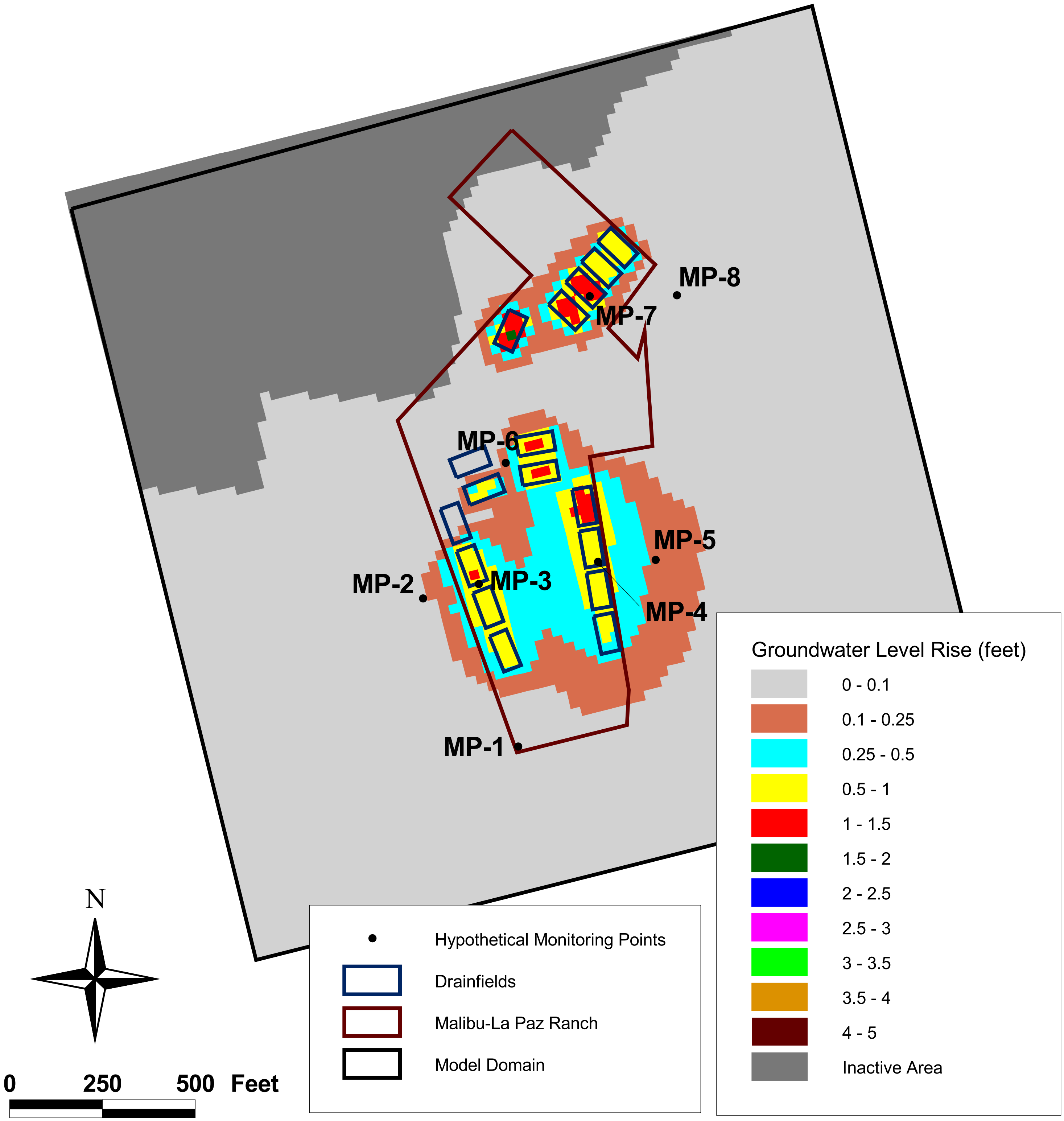
FIGURE 3





SIMULATED GROUNDWATER ELEVATIONS AT HYPOTHETICAL MONITORING POINTS MP-1 TO MP-8 FOR A DISCHARGE RATE OF 10,000 GPD OVER A 20-DAY DURATION IN 17 DRAINFIELDS

Malibu-La Paz Ranch Development
Malibu, California



SIMULATED GROUNDWATER LEVEL RISES FOR A DISCHARGE RATE OF 10,000 GPD OVER A 20-DAY DURATION IN 17 DRAINFIELDS

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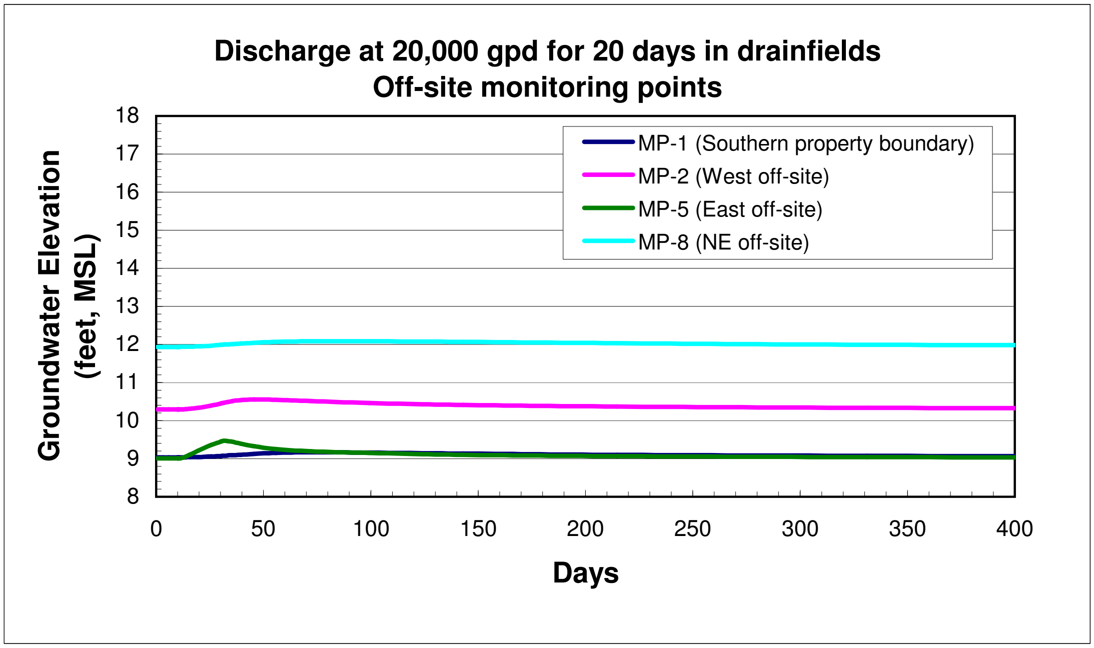
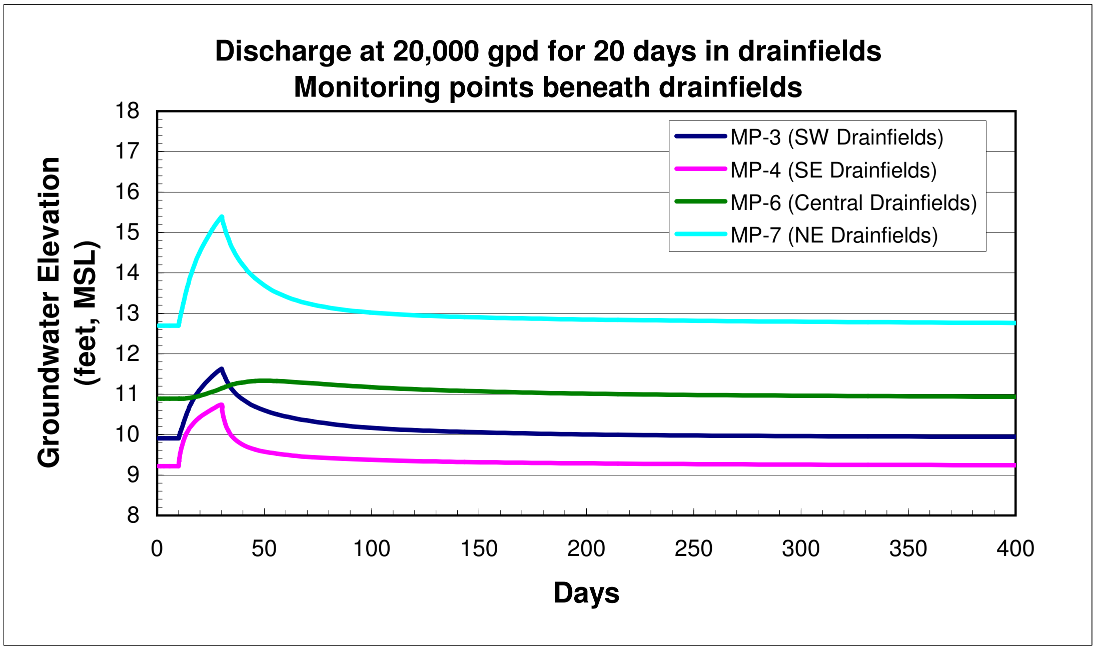
Malibu, California

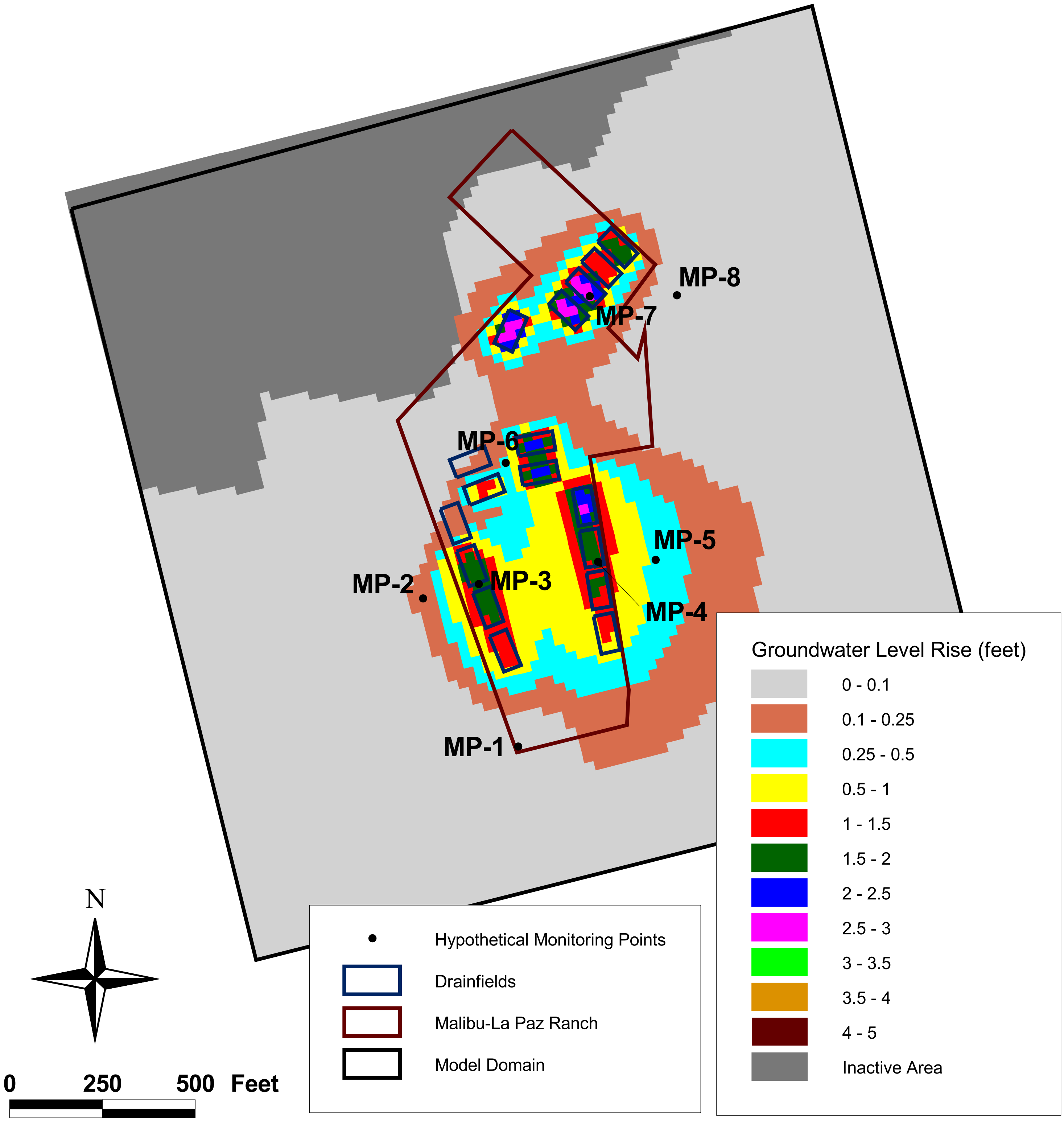




SIMULATED GROUNDWATER ELEVATIONS AT HYPOTHETICAL MONITORING POINTS MP-1 TO MP-8 FOR A DISCHARGE RATE OF 20,000 GPD OVER A 20-DAY DURATION IN 17 DRAINFIELDS

Malibu-La Paz Ranch Development

Malibu, California



SIMULATED GROUNDWATER LEVEL RISES FOR A DISCHARGE RATE OF 20,000 GPD OVER A 20-DAY DURATION IN 17 DRAINFIELDS

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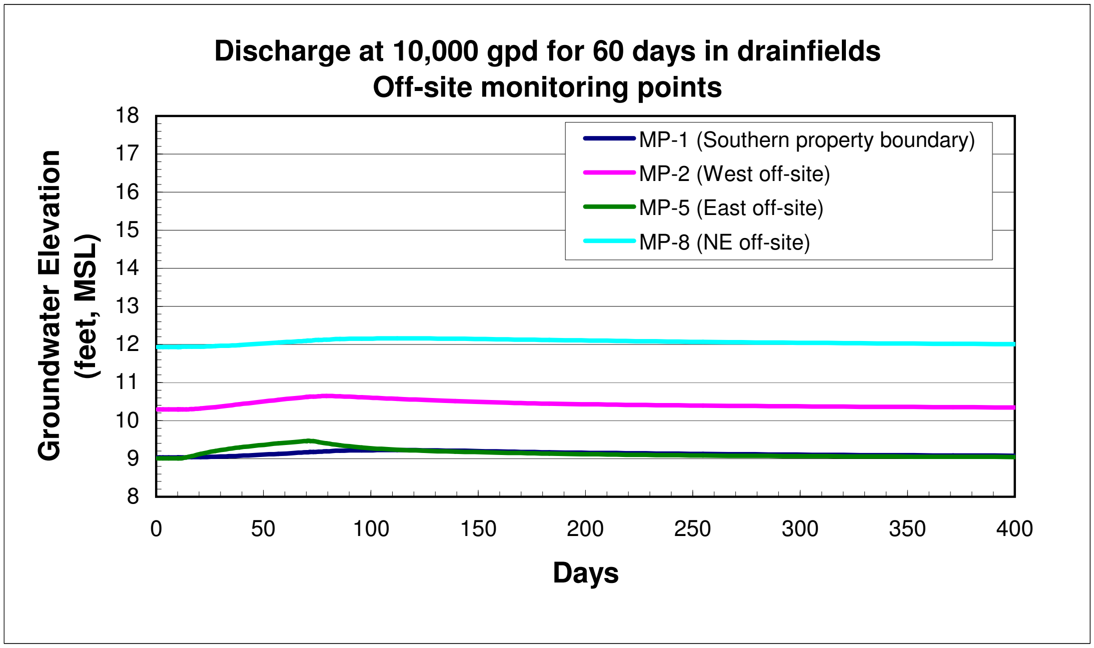
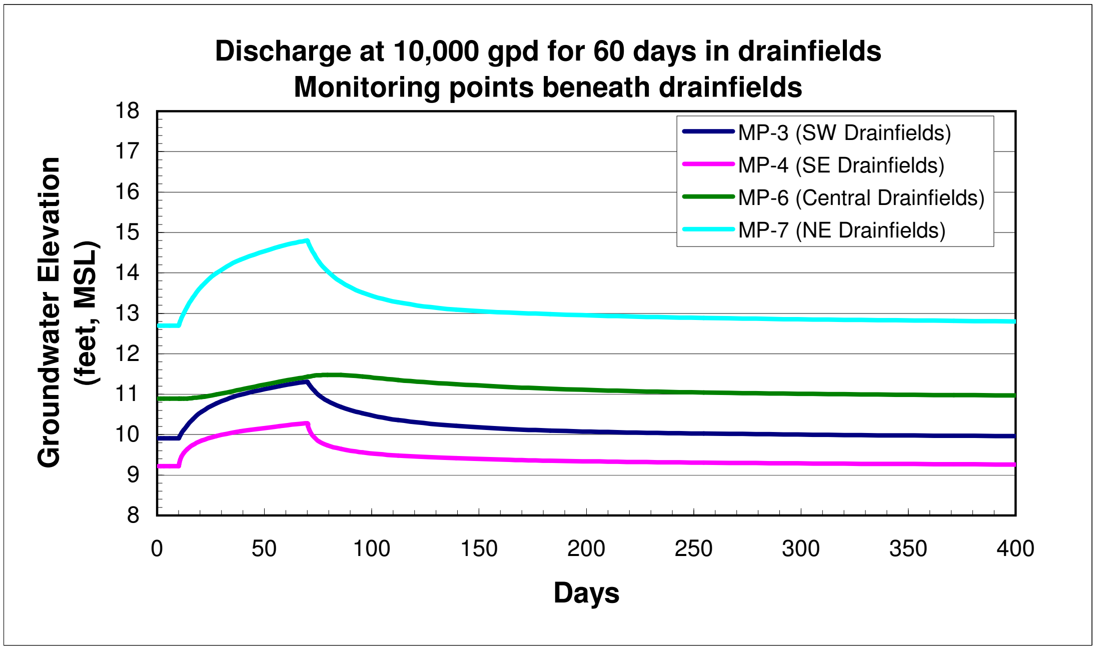
Malibu, California





SIMULATED GROUNDWATER ELEVATIONS AT HYPOTHETICAL MONITORING POINTS MP-1 TO MP-8 FOR A DISCHARGE RATE OF 10,000 GPD OVER A 60-DAY DURATION IN 17 DRAINFIELDS

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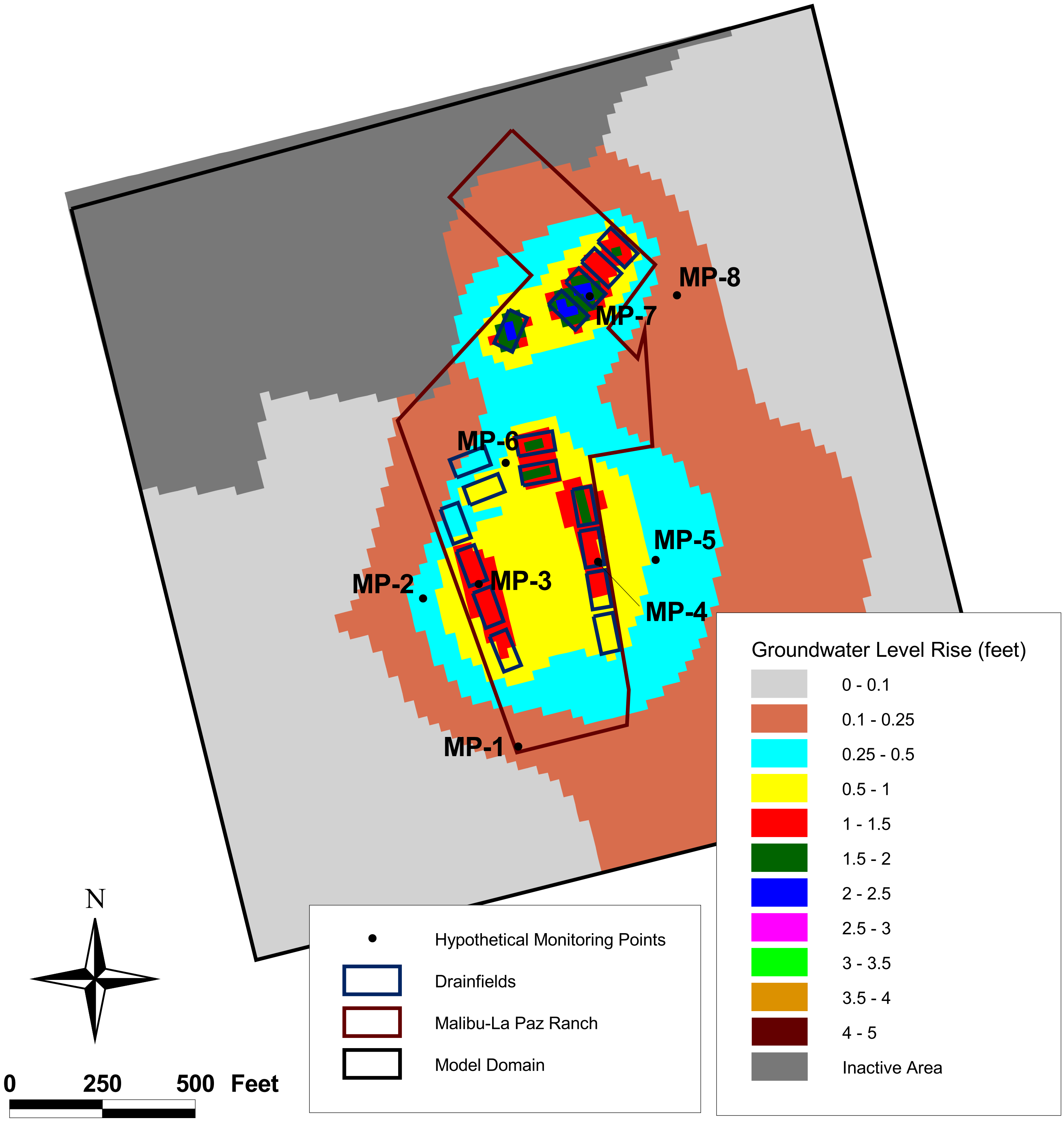

SIMULATED GROUNDWATER LEVEL RISES FOR A DISCHARGE RATE OF 10,000 GPD OVER A 60-DAY DURATION IN 17 DRAINFIELDS

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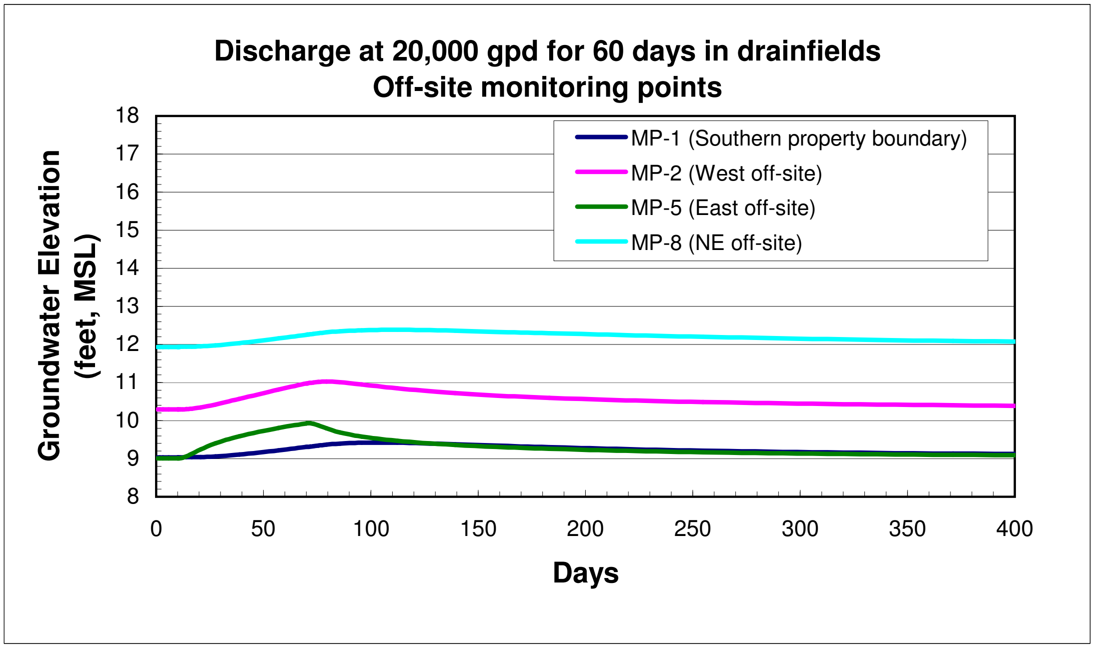
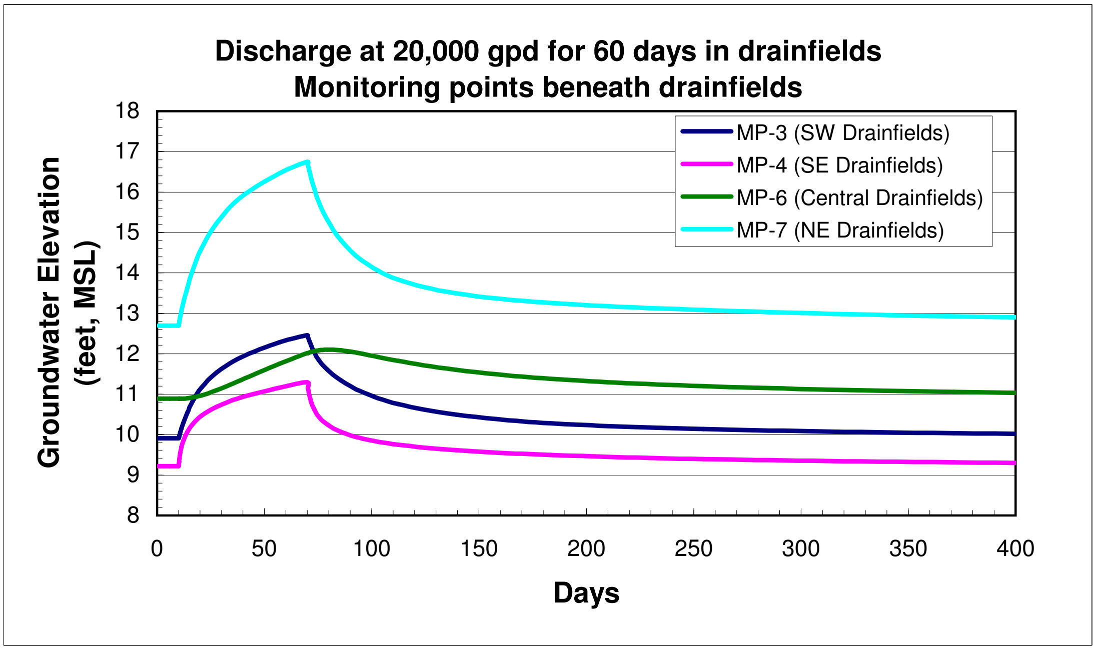
Malibu, California

FIGURE 6b





SIMULATED GROUNDWATER ELEVATIONS AT HYPOTHETICAL MONITORING POINTS MP-1 TO MP-8 FOR A DISCHARGE RATE OF 20,000 GPD OVER A 60-DAY DURATION IN 17 DRAINFIELDS

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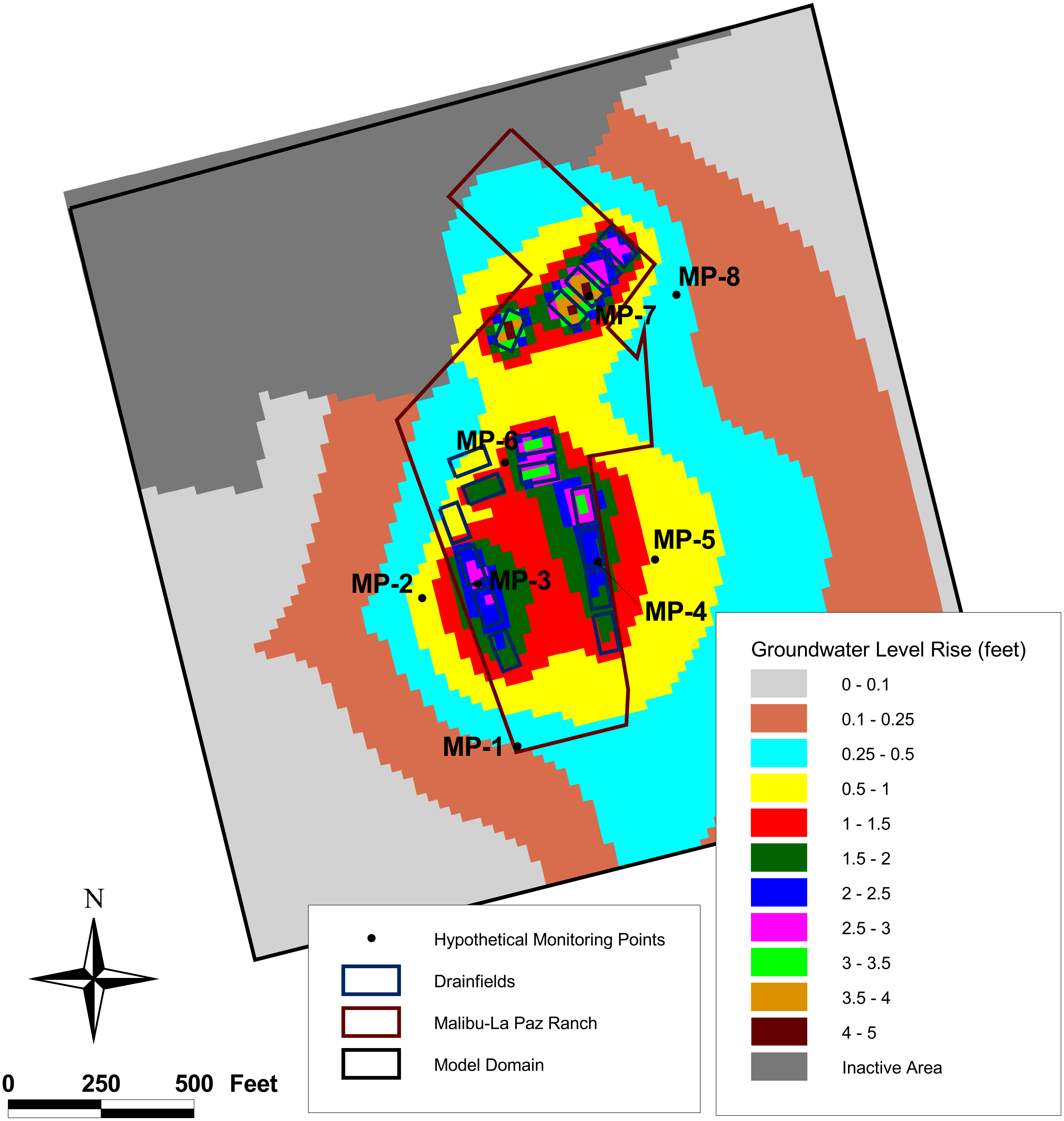
Malibu, California

FIGURE 7a



SIMULATED GROUNDWATER LEVEL RISES FOR A DISCHARGE RATE OF 20,000 GPD OVER A 60-DAY DURATION IN 17 DRAINFIELDS

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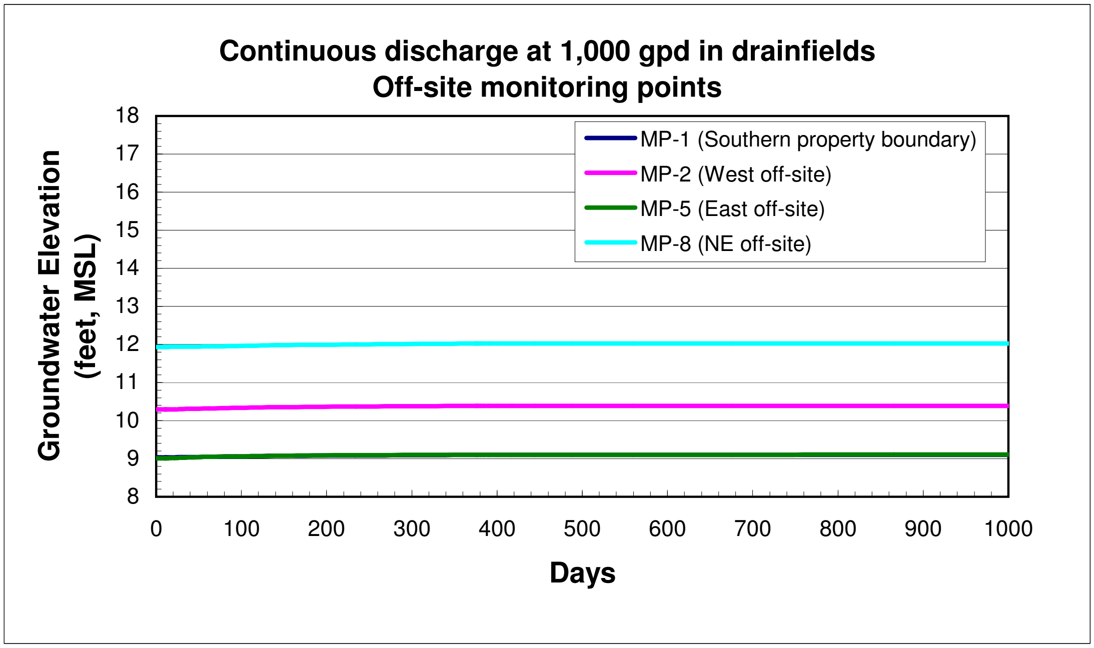
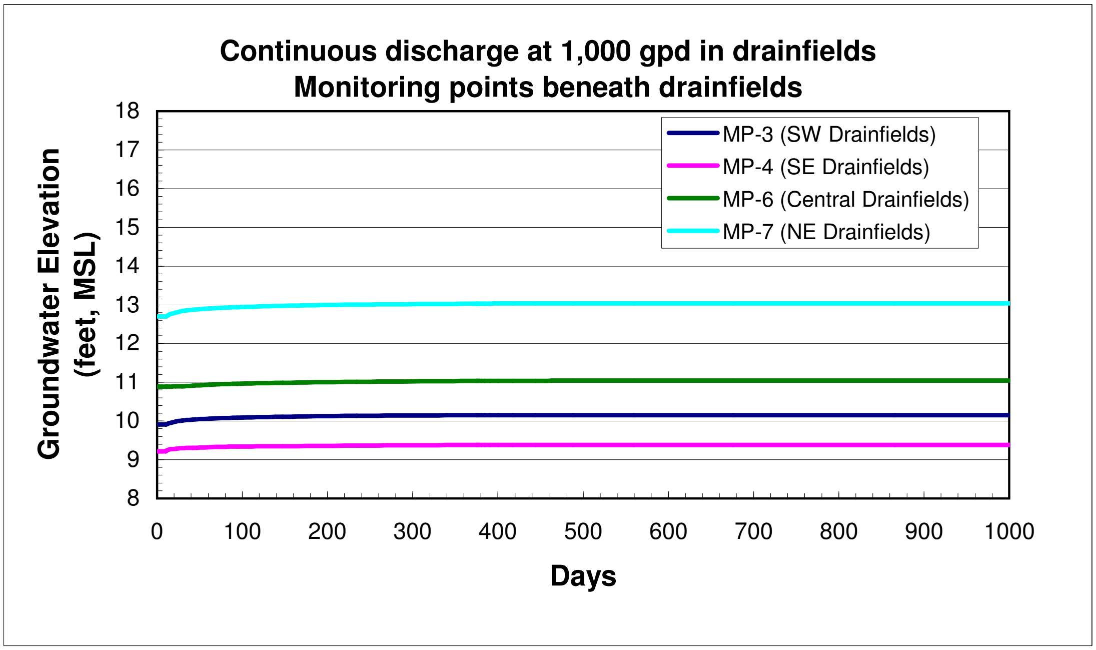
Malibu, California

FIGURE 7b





SIMULATED GROUNDWATER ELEVATIONS AT HYPOTHETICAL MONITORING POINTS MP-1 TO MP-8 FOR A CONTINUOUS DISCHARGE RATE OF 1,000 GPD IN 17 DRAINFIELDS

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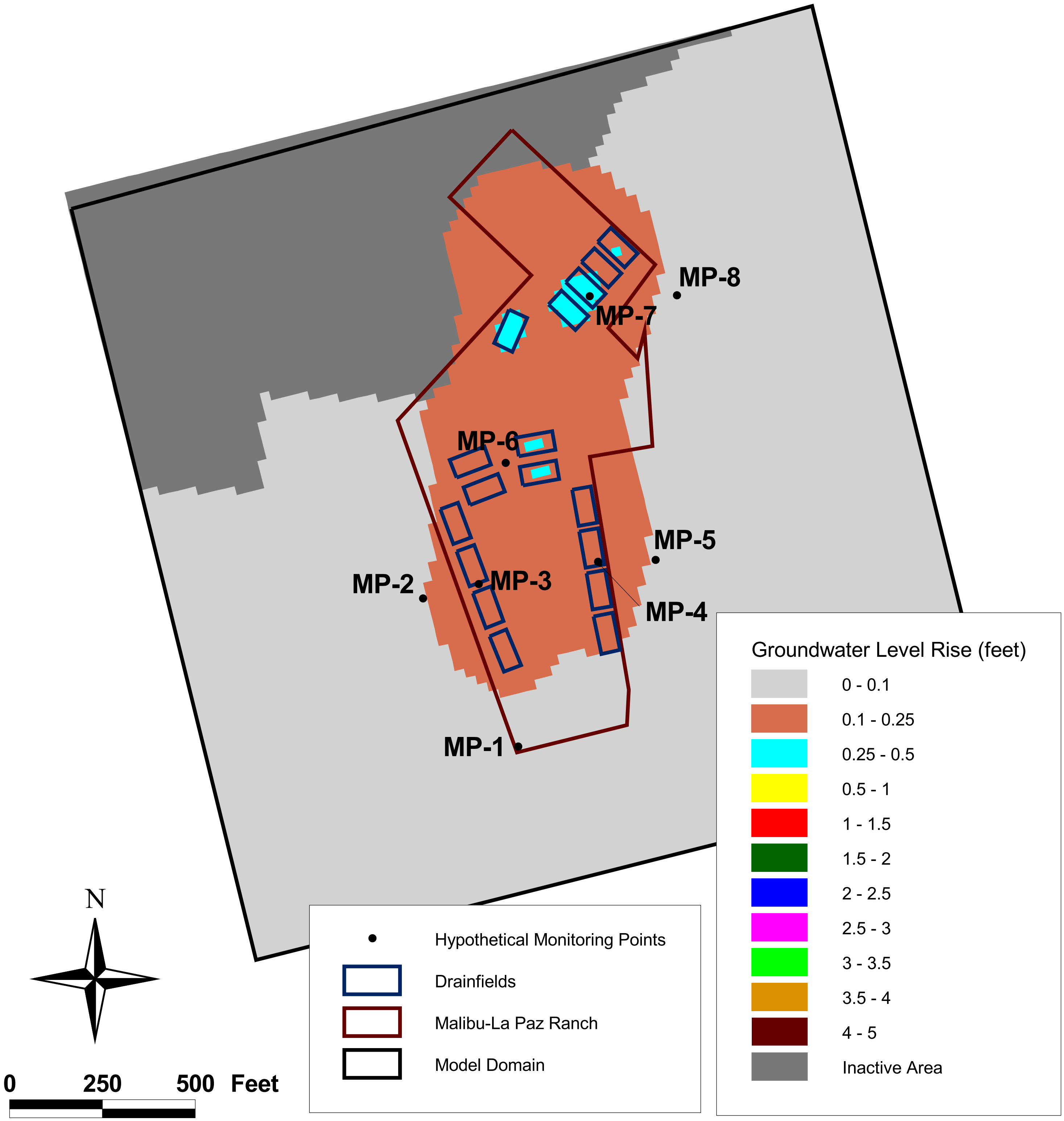

SIMULATED GROUNDWATER LEVEL RISES FOR A CONTINUOUS DISCHARGE RATE OF 1,000 GPD IN 17 DRAINFIELDS

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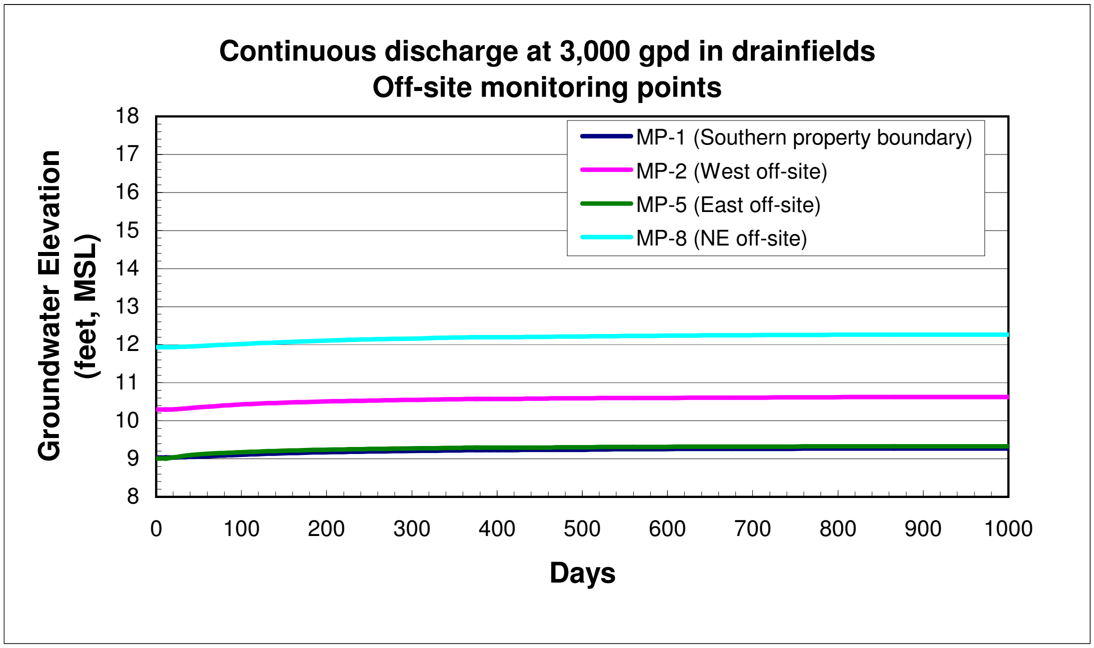

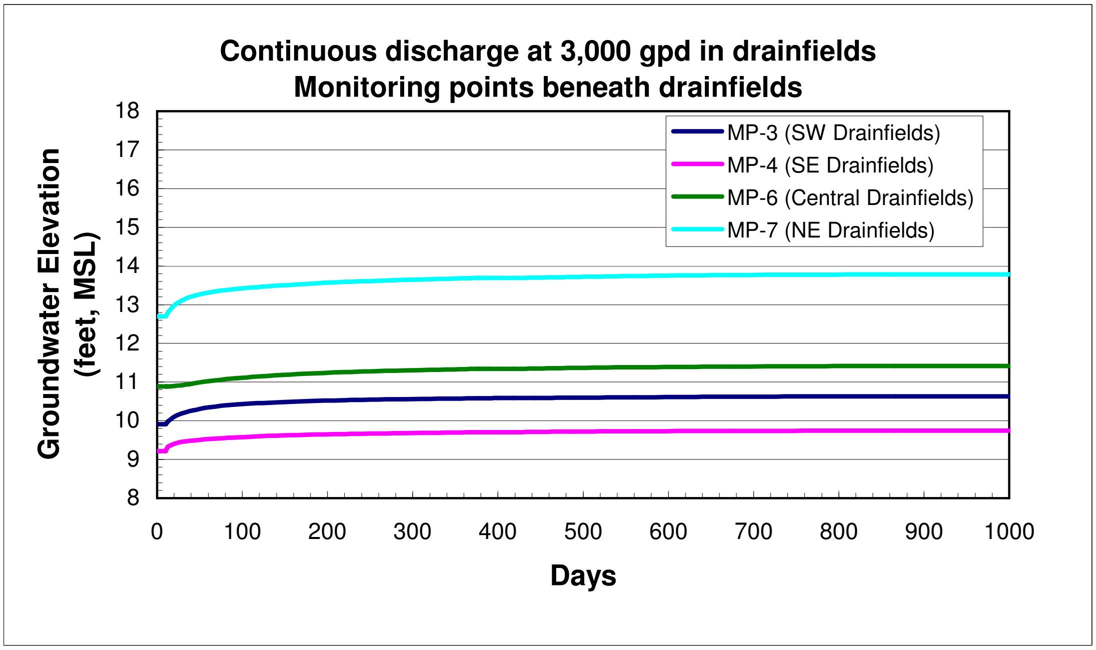

SIMULATED GROUNDWATER ELEVATIONS AT HYPOTHETICAL MONITORING POINTS MP-1 TO MP-8 FOR A CONTINUOUS DISCHARGE RATE OF 3,000 GPD IN 17 DRAINFIELDS

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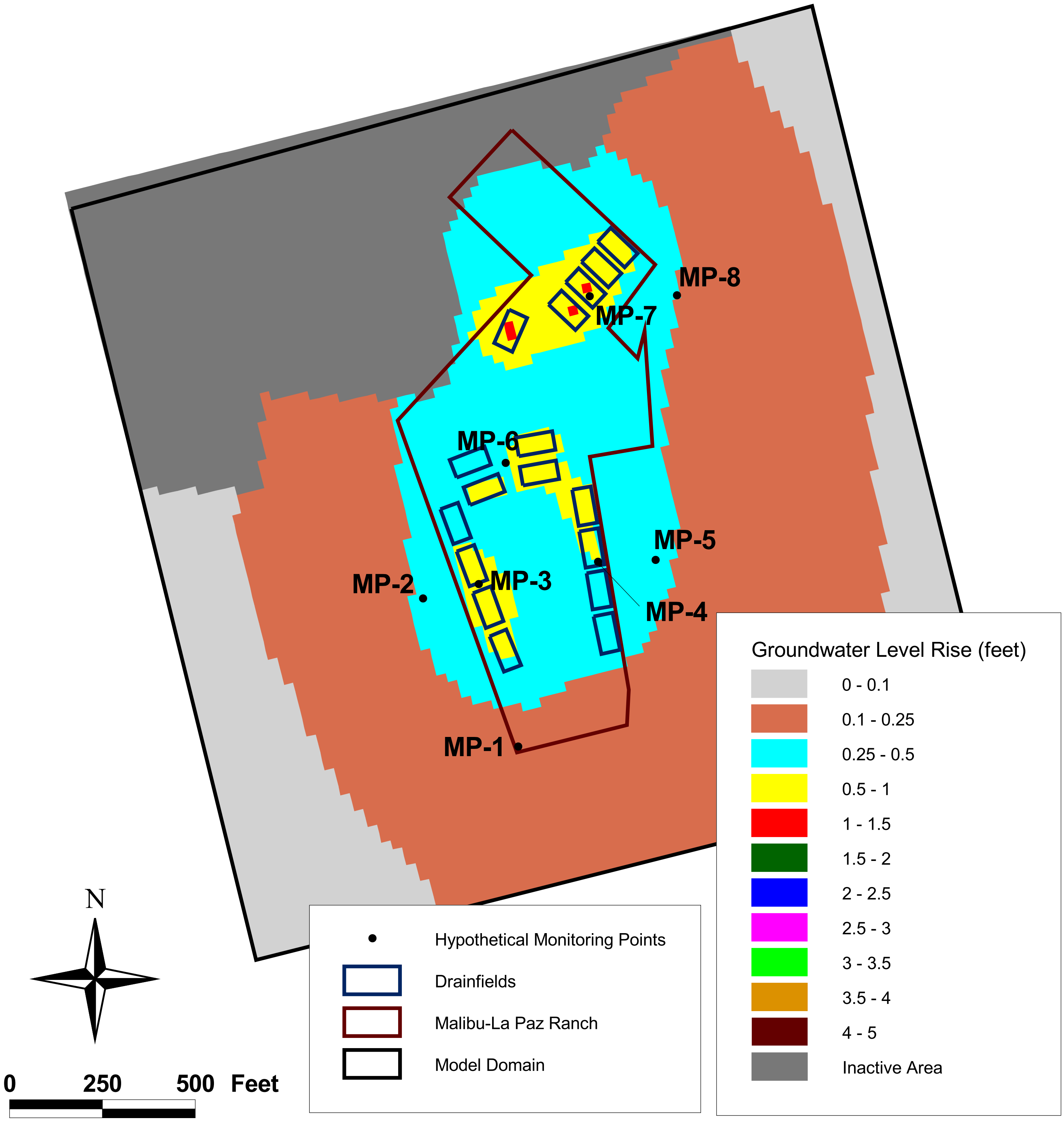
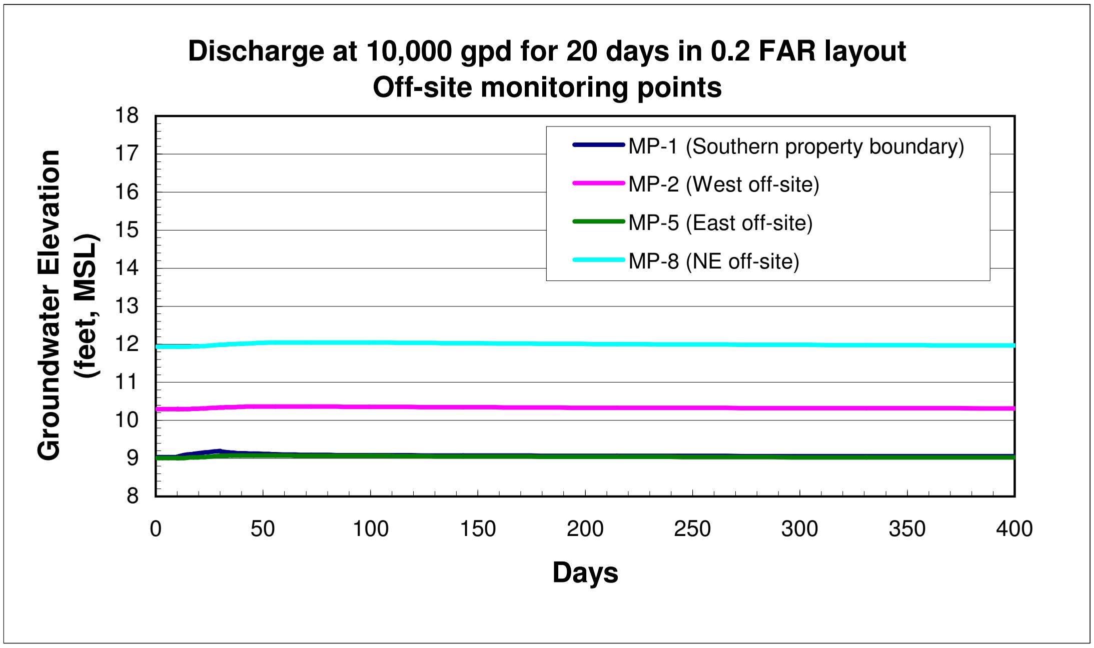
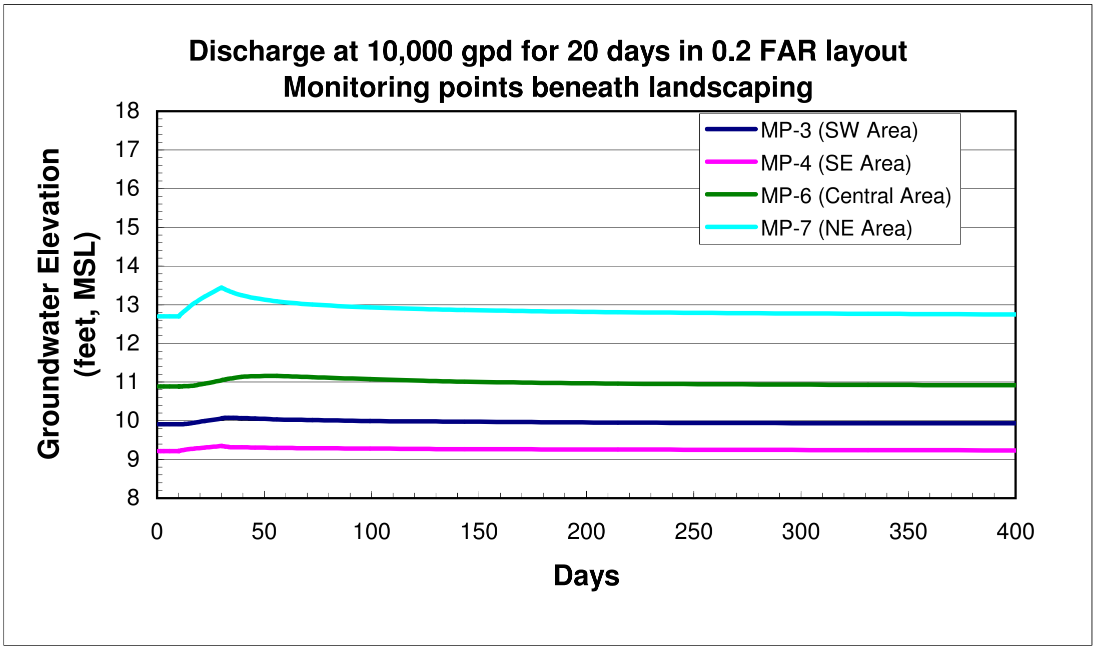


SIMULATED GROUNDWATER LEVEL RISES FOR A CONTINUOUS DISCHARGE RATE OF 3,000 GPD IN 17 DRAINFIELDS

Malibu-La Paz Ranch Development
Malibu, California





SIMULATED GROUNDWATER ELEVATIONS AT HYPOTHETICAL MONITORING POINTS MP-1 TO MP-8 FOR A DISCHARGE RATE OF 10,000 GPD OVER A 20-DAY DURATION IN THE 0.2 FAR LAYOUT

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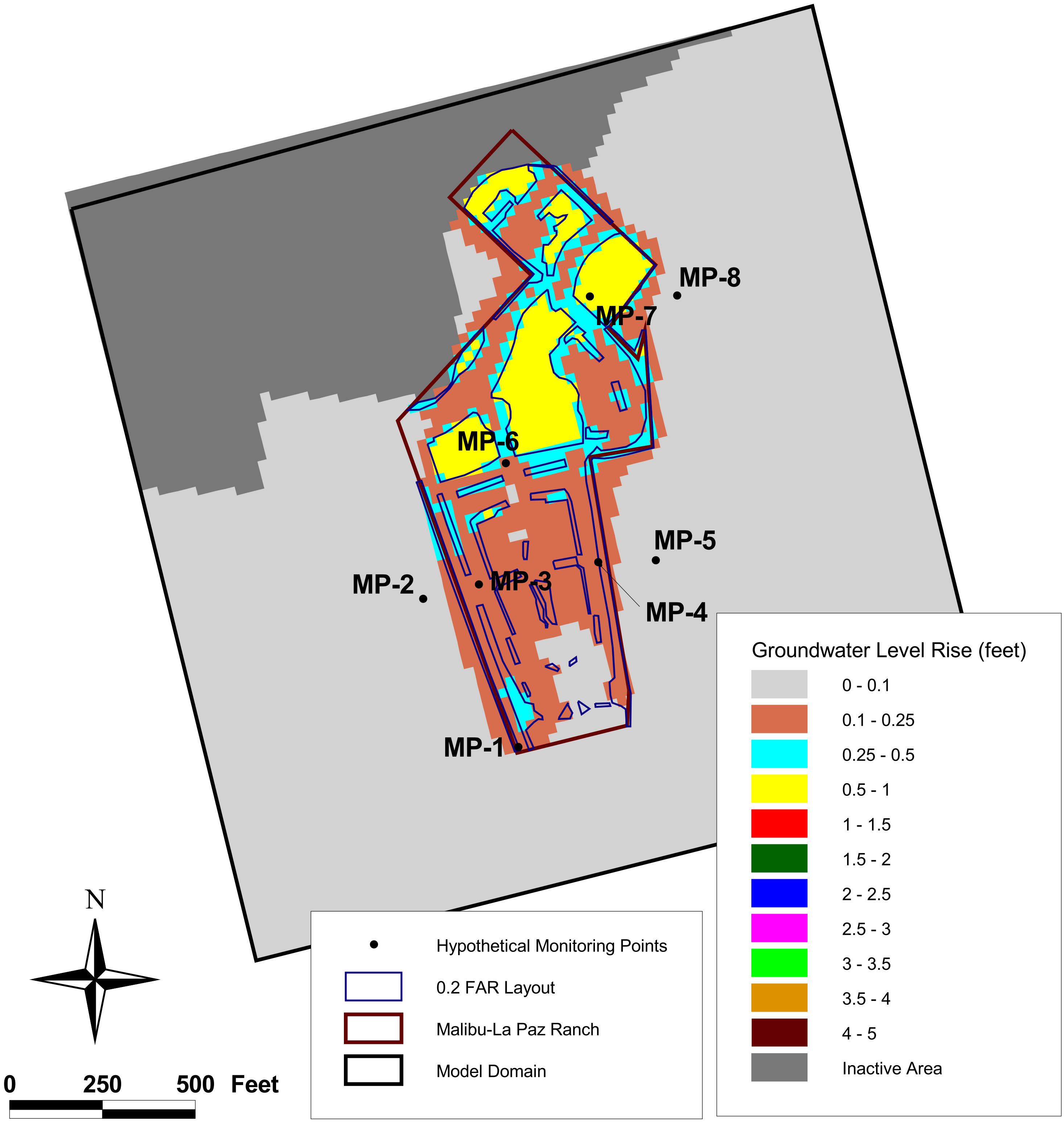
Malibu, California



SIMULATED GROUNDWATER LEVEL RISES FOR A DISCHARGE RATE OF 10,000 GPD OVER A 20-DAY DURATION IN THE 0.2 FAR LAYOUT

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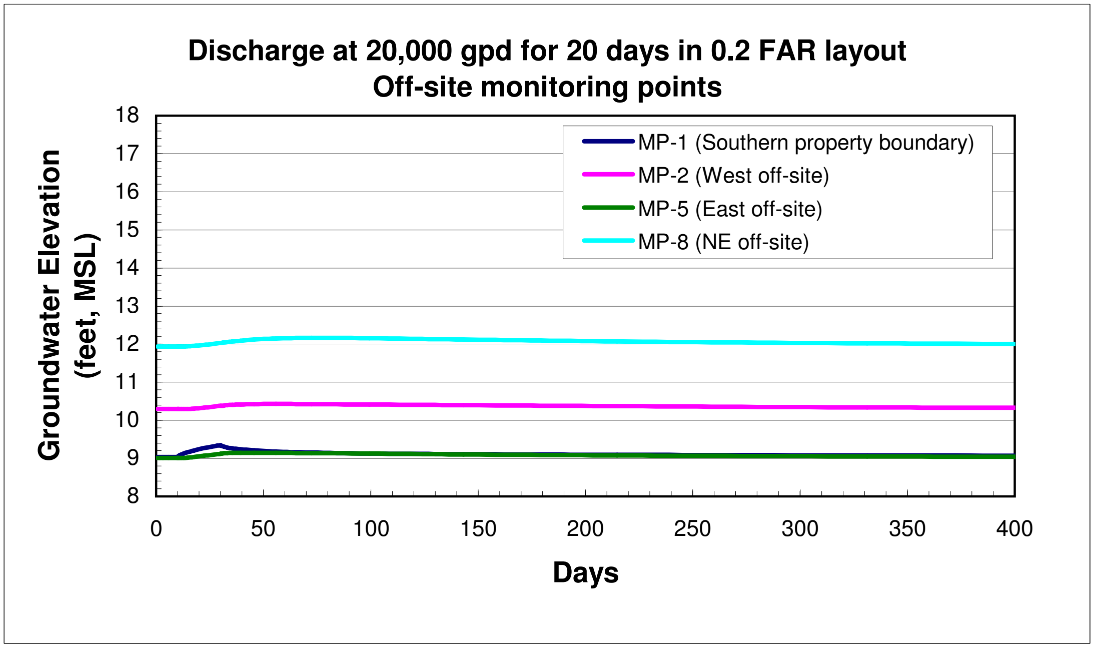
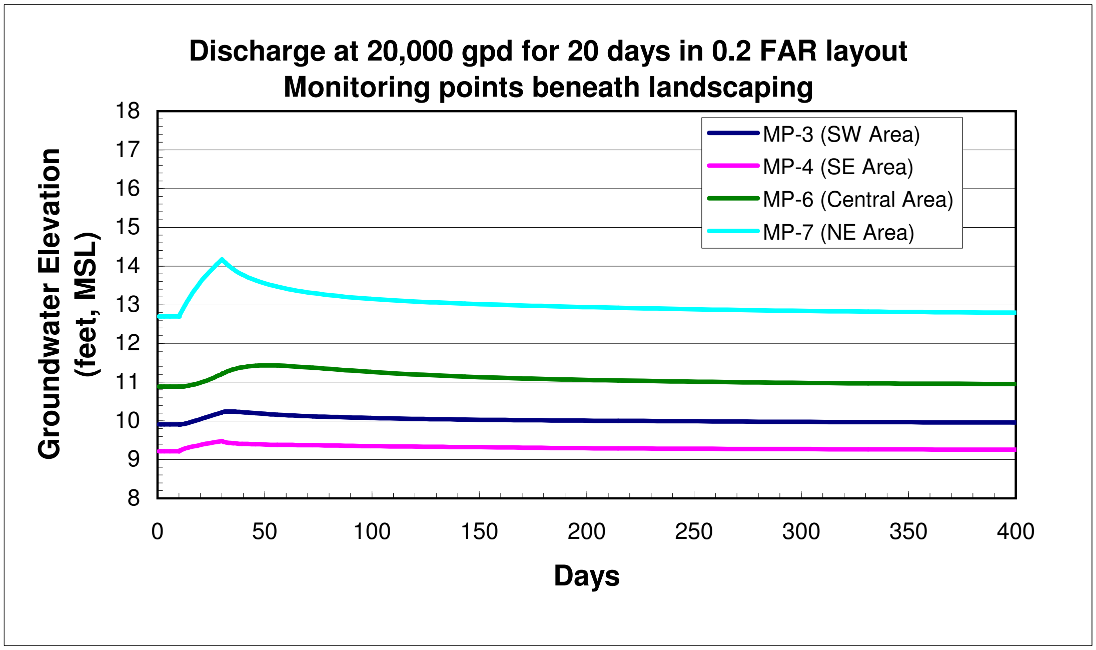
Malibu, California

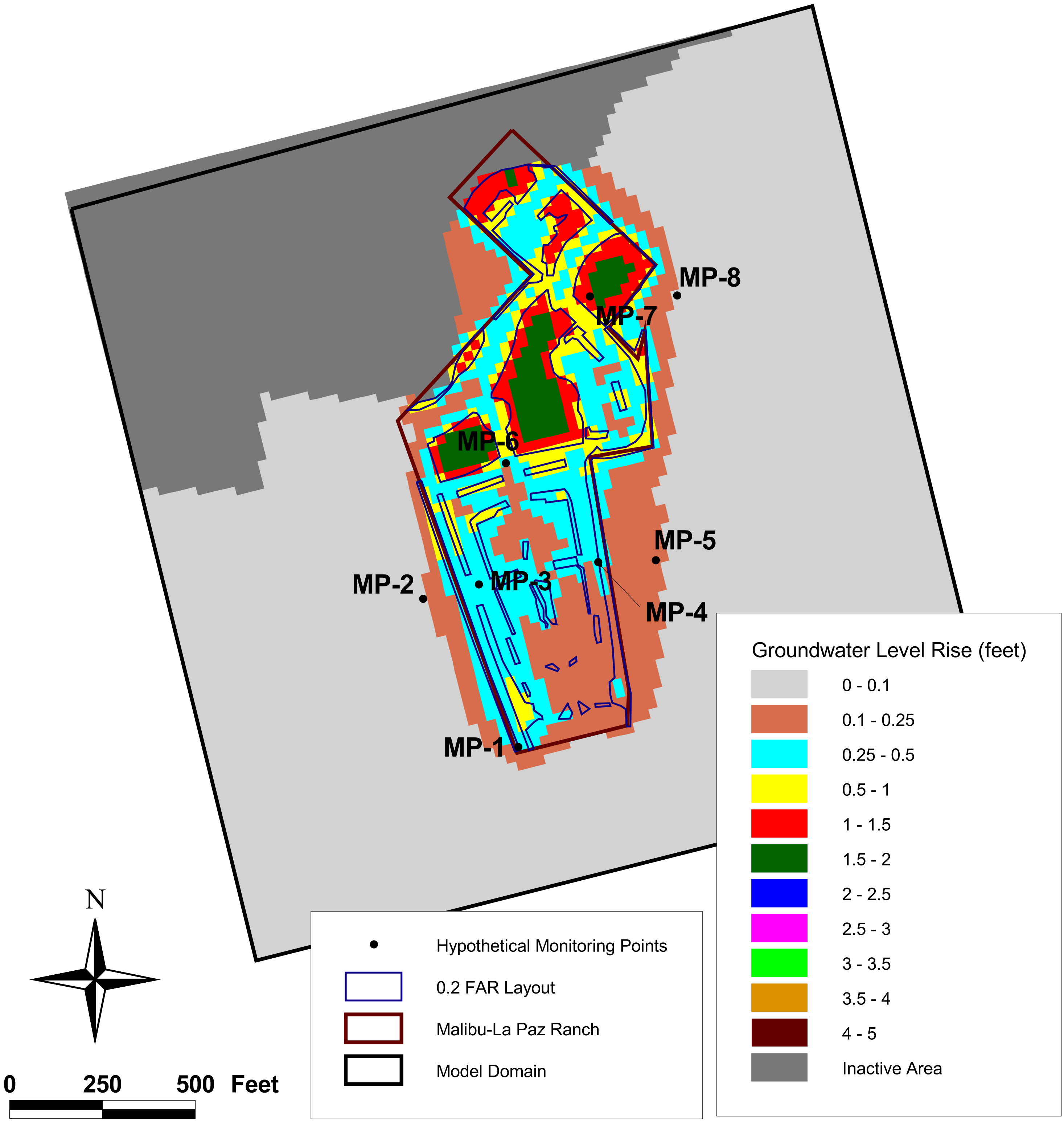
FIGURE 10b





SIMULATED GROUNDWATER ELEVATIONS AT HYPOTHETICAL MONITORING POINTS MP-1 TO MP-8 FOR A DISCHARGE RATE OF 20,000 GPD OVER A 20-DAY DURATION IN THE 0.2 FAR LAYOUT

Malibu-La Paz Ranch Development
Malibu, California

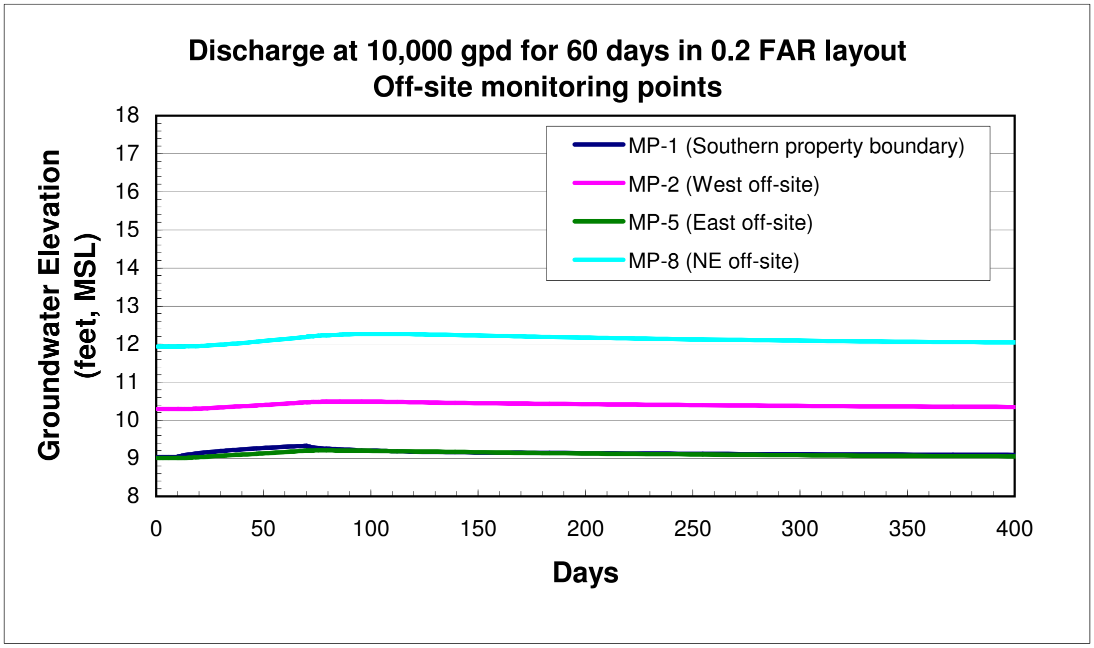


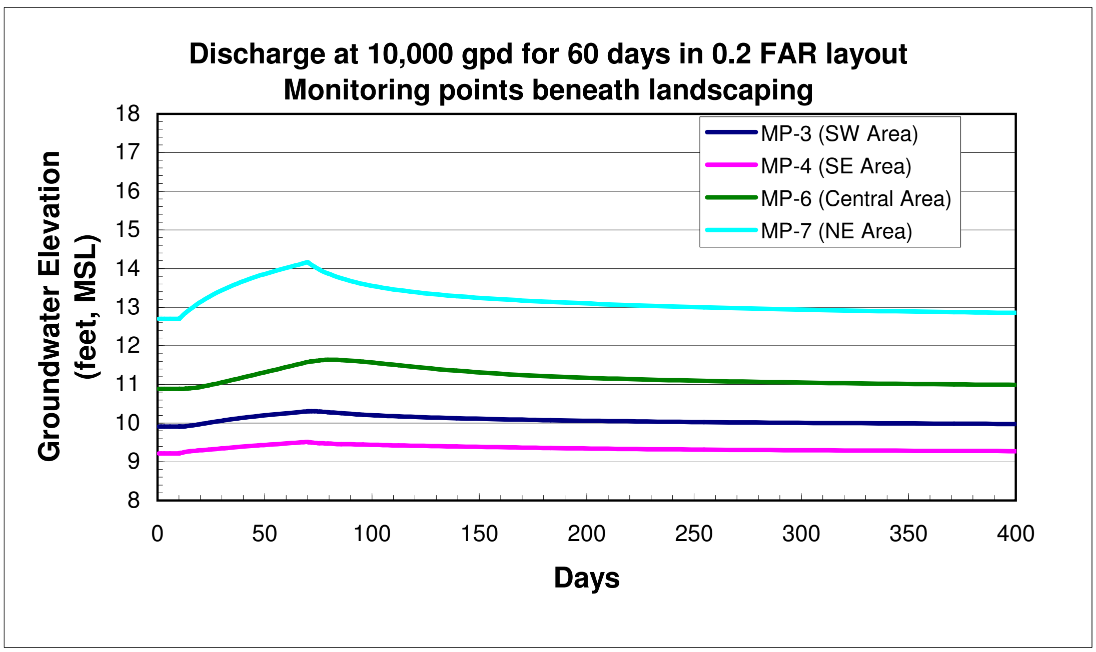
SIMULATED GROUNDWATER LEVEL RISES FOR A DISCHARGE RATE OF 20,000 GPD OVER A 20-DAY DURATION IN THE 0.2 FAR LAYOUT

Malibu-La Paz Ranch Development

Malibu, California

FIGURE 11b

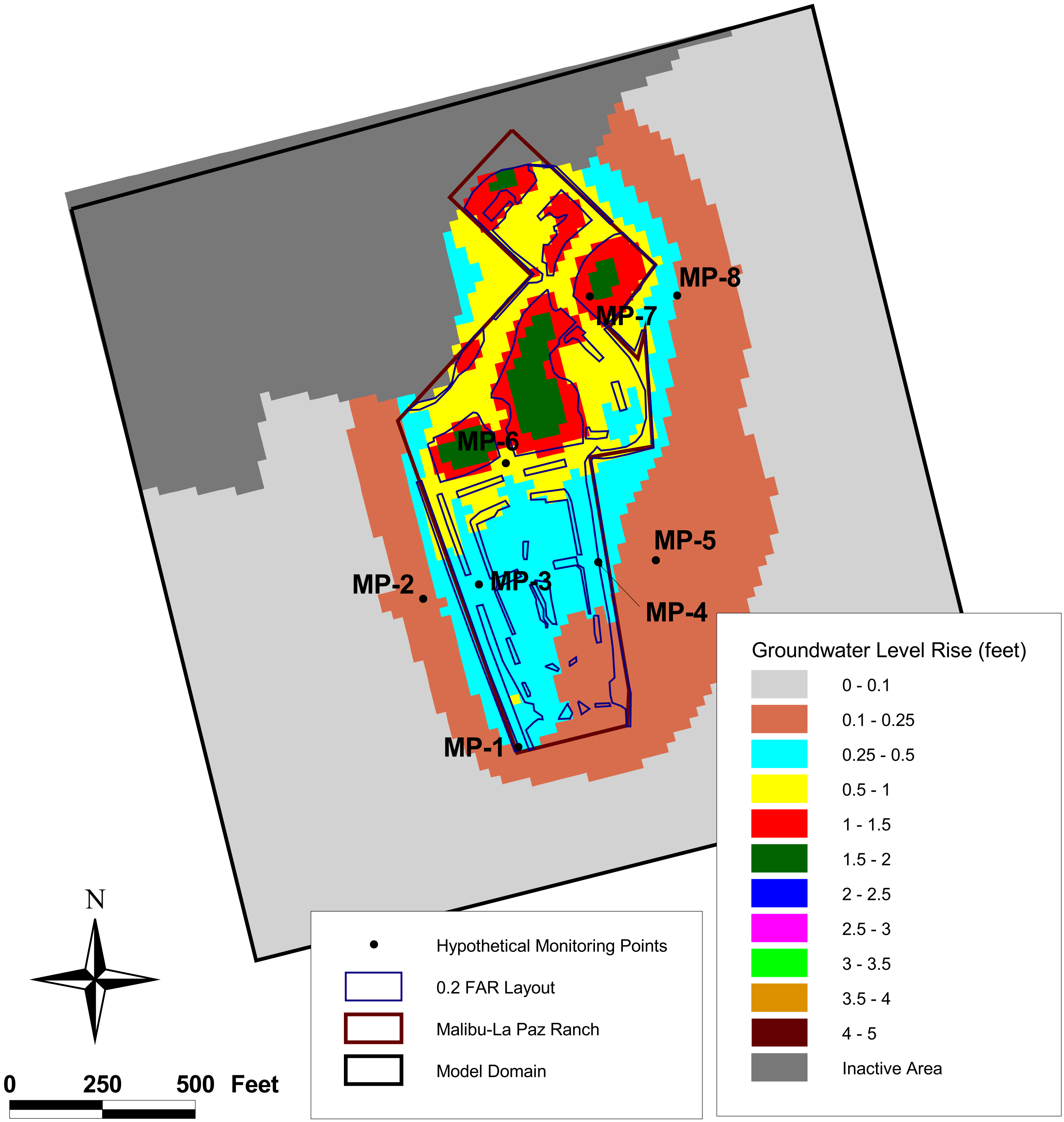




SIMULATED GROUNDWATER ELEVATIONS AT HYPOTHETICAL MONITORING POINTS MP-1 TO MP-8 FOR A DISCHARGE RATE OF 10,000 GPD OVER A 60-DAY DURATION IN THE 0.2 FAR LAYOUT

Malibu-La Paz Ranch Development

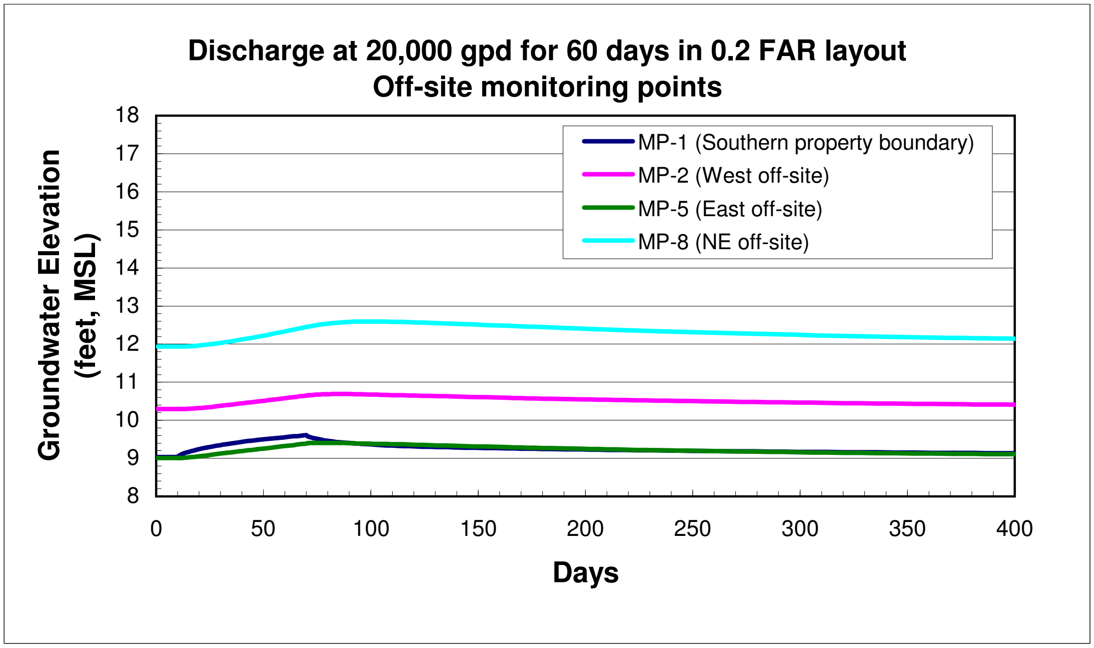
Malibu, California

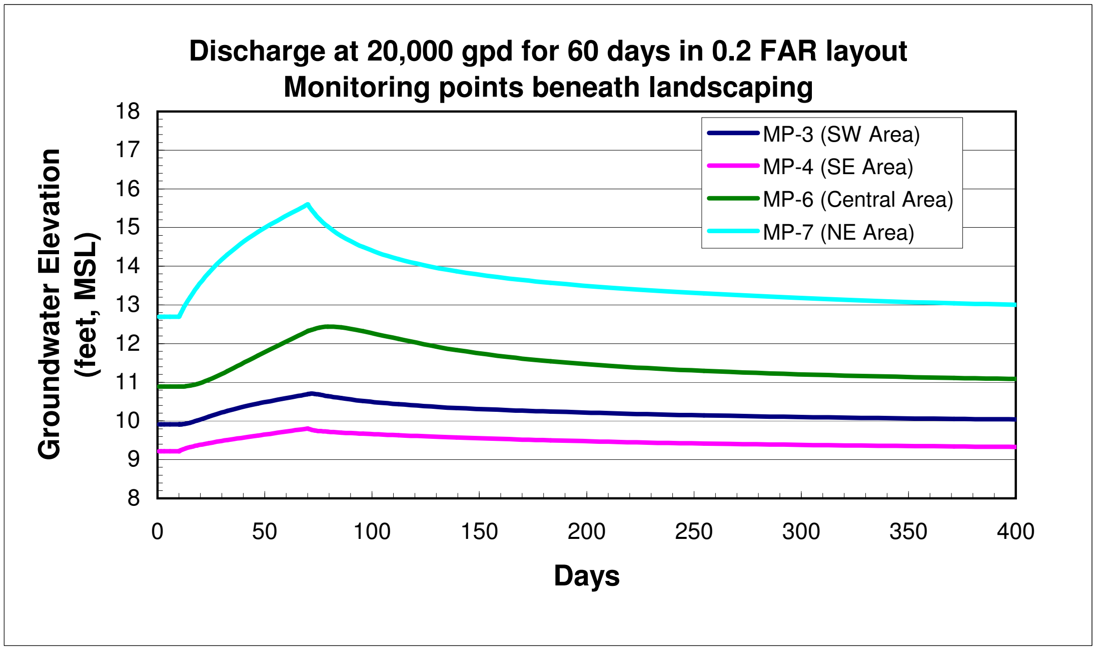


SIMULATED GROUNDWATER LEVEL RISES FOR A DISCHARGE RATE OF 10,000 GPD OVER A 60-DAY DURATION IN THE 0.2 FAR LAYOUT

Malibu-La Paz Ranch Development

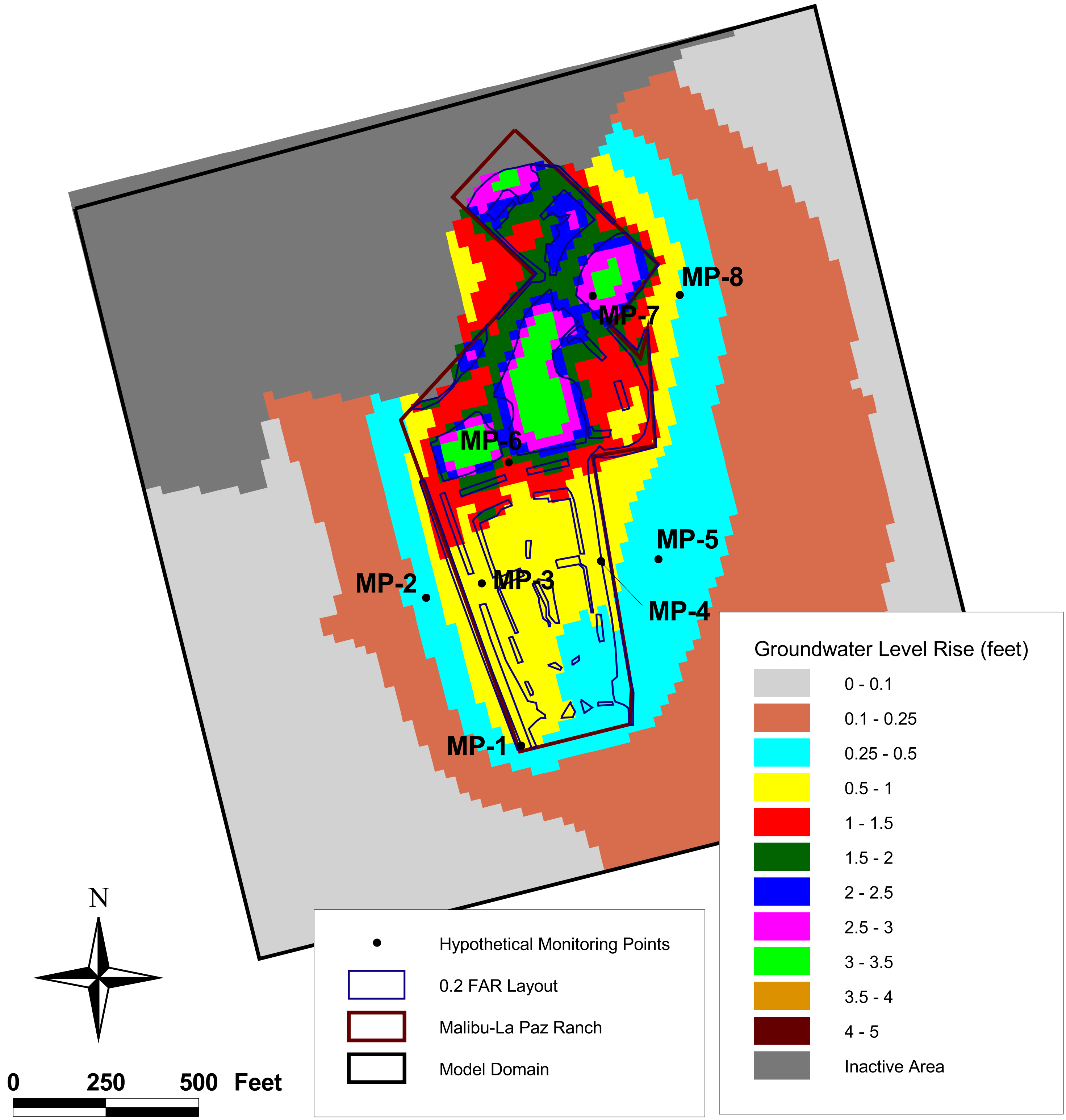
Malibu, California





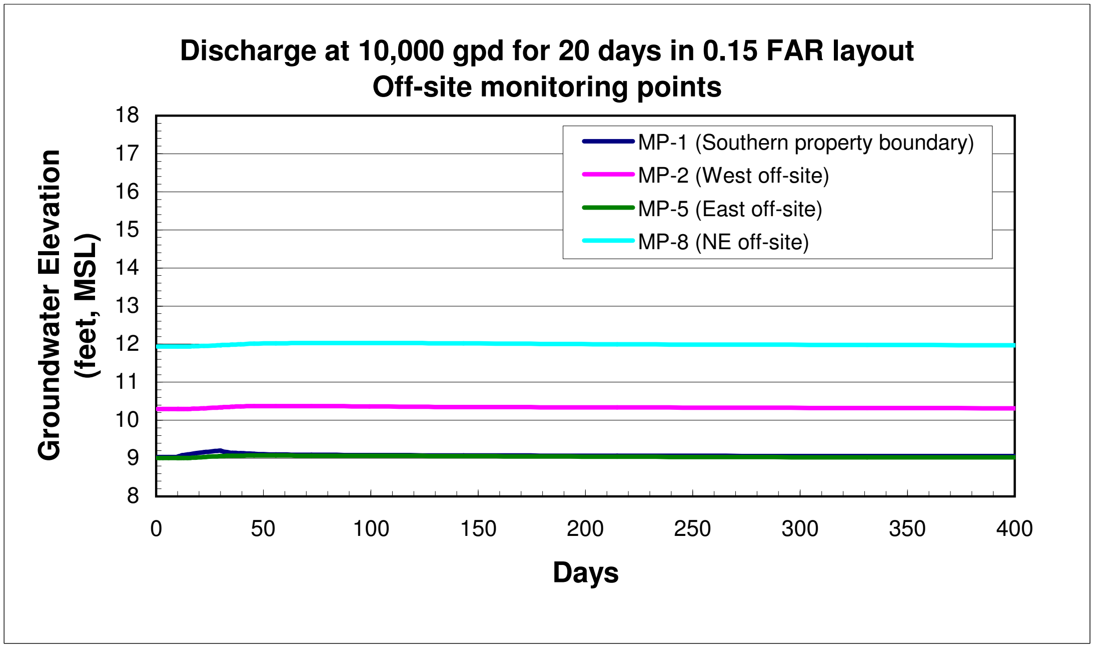
SIMULATED GROUNDWATER ELEVATIONS AT HYPOTHETICAL MONITORING POINTS MP-1 TO MP-8 FOR A DISCHARGE RATE OF 20,000 GPD OVER A 60-DAY DURATION IN THE 0.2 FAR LAYOUT

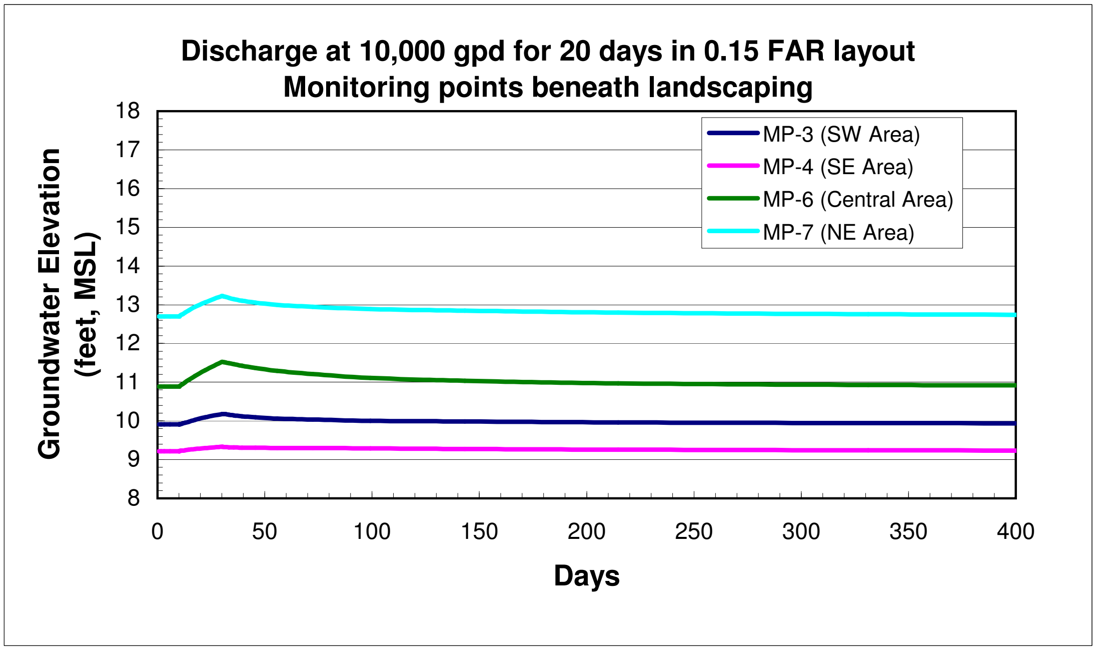
Malibu-La Paz Ranch Development
Malibu, California



SIMULATED GROUNDWATER LEVEL RISES FOR A DISCHARGE RATE OF 20,000 GPD OVER A 60-DAY DURATION IN THE 0.2 FAR LAYOUT

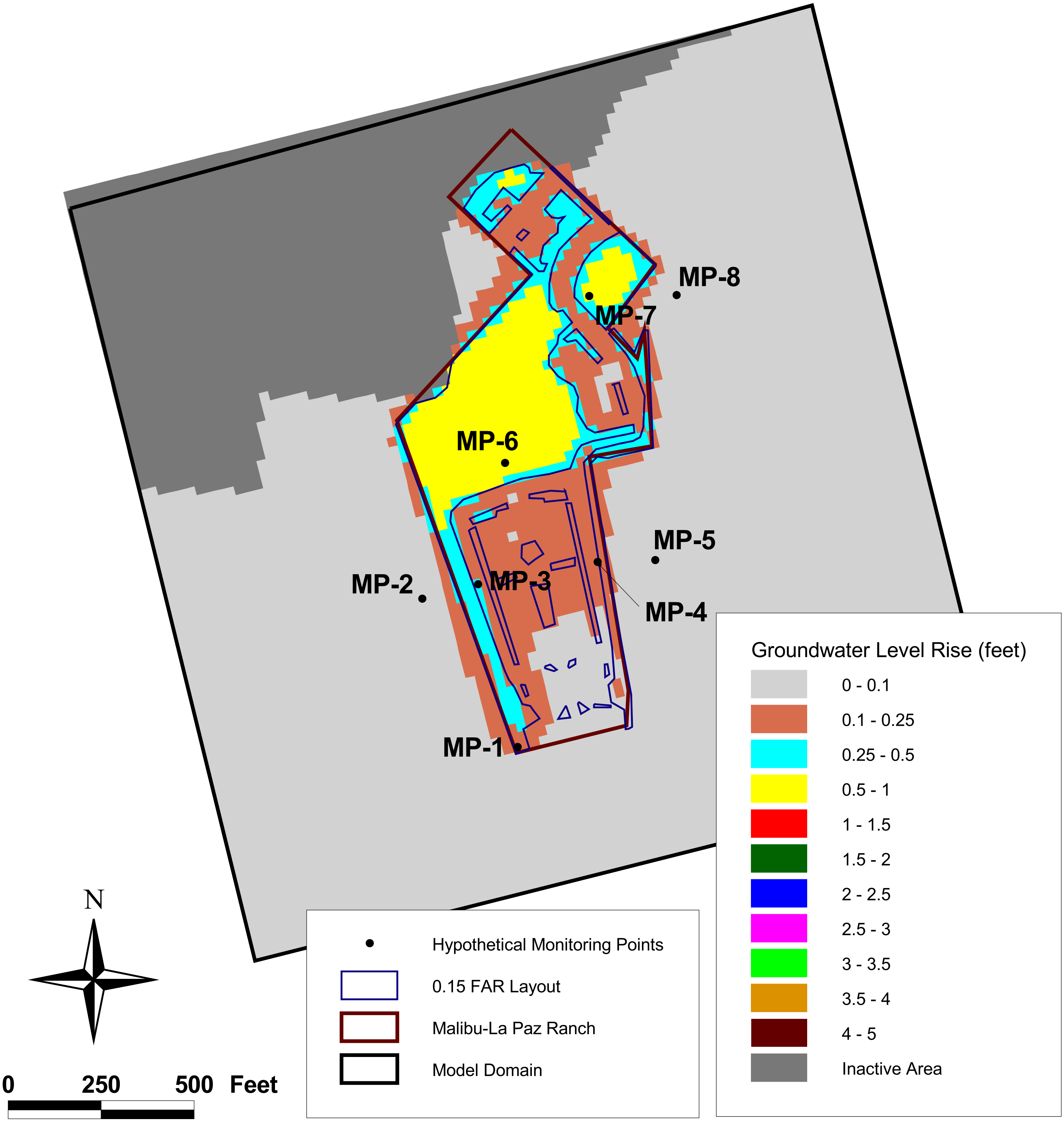
Malibu-La Paz Ranch Development
Malibu, California





SIMULATED GROUNDWATER ELEVATIONS AT HYPOTHETICAL MONITORING POINTS MP-1 TO MP-8 FOR A DISCHARGE RATE OF 10,000 GPD OVER A 20-DAY DURATION IN THE 0.15 FAR LAYOUT

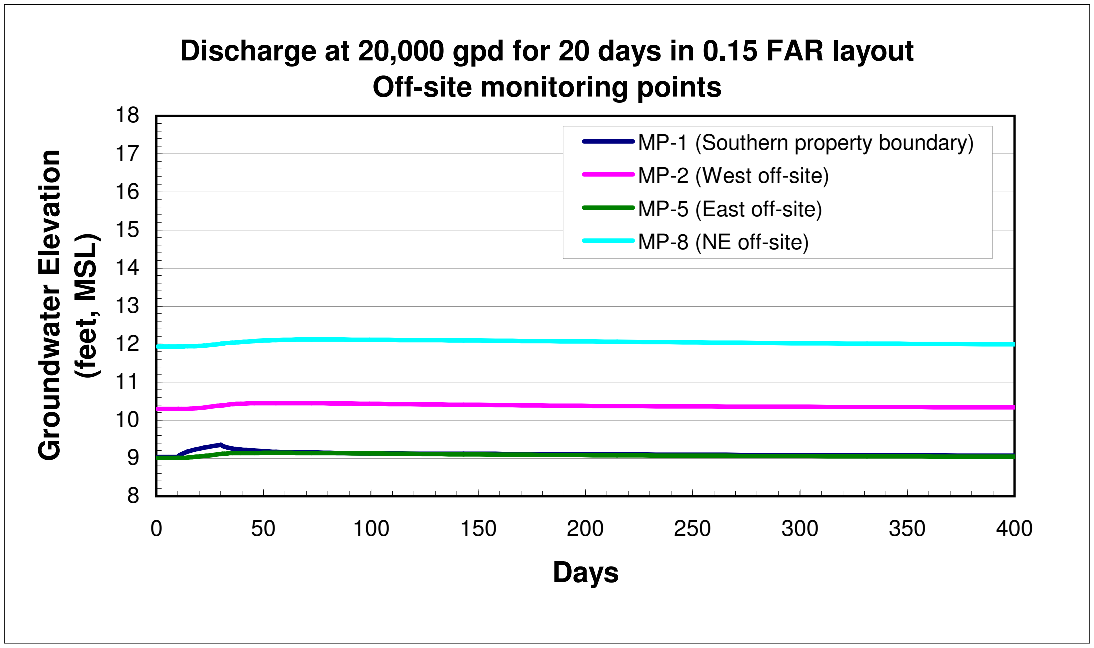
Malibu-La Paz Ranch Development
Malibu, California

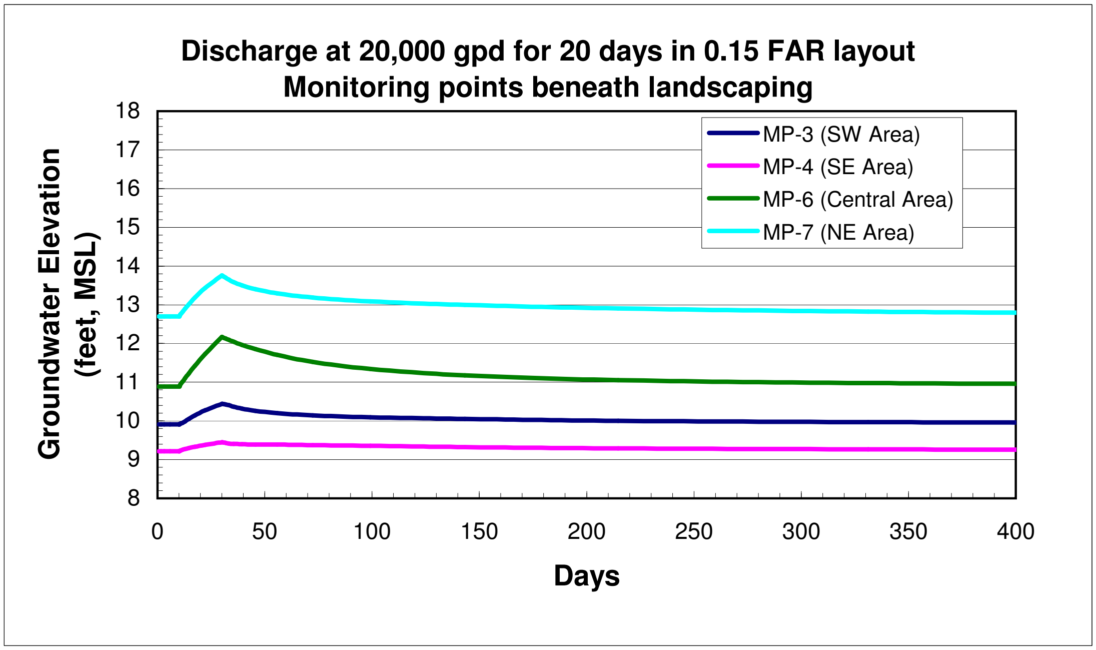


SIMULATED GROUNDWATER LEVEL RISES FOR A DISCHARGE RATE OF 10,000 GPD OVER A 20-DAY DURATION IN THE 0.15 FAR LAYOUT

Malibu-La Paz Ranch Development

Malibu, California





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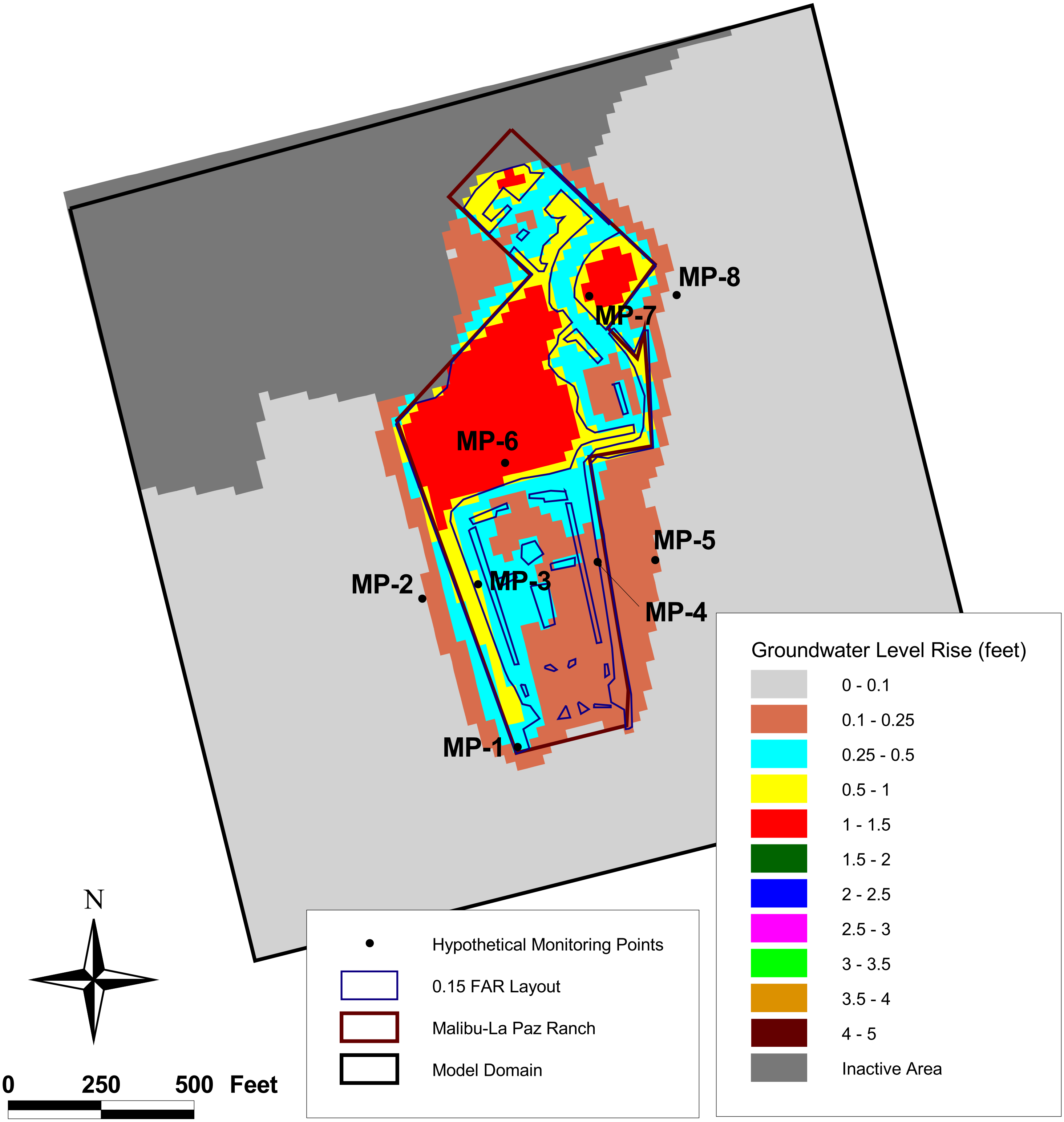
Malibu-La Paz Ranch Development

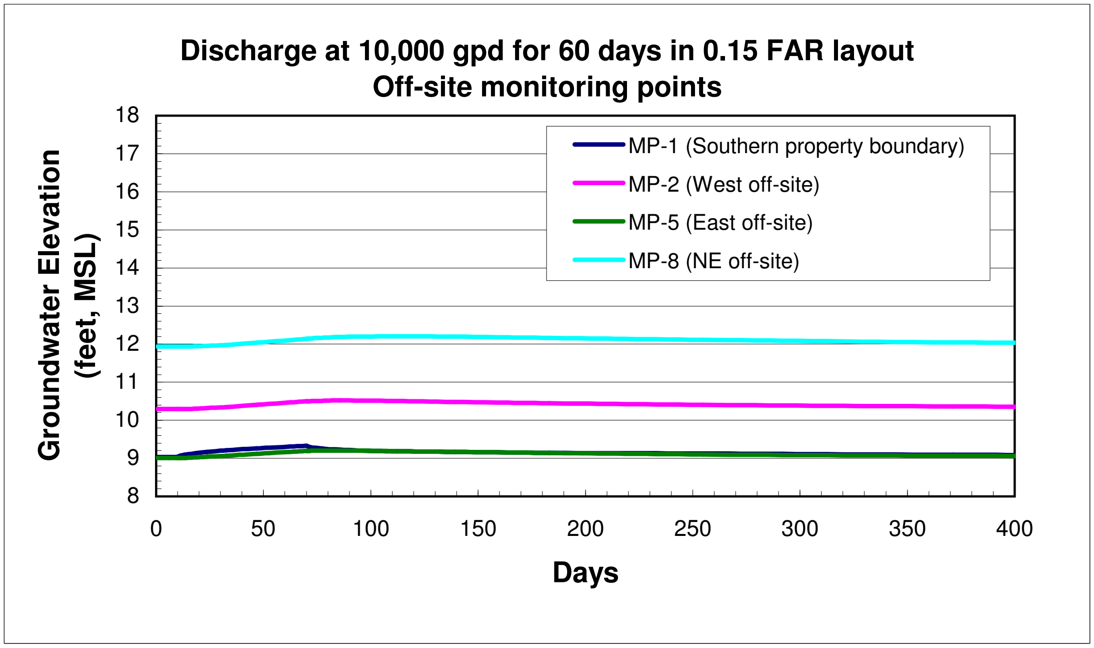
Malibu, California

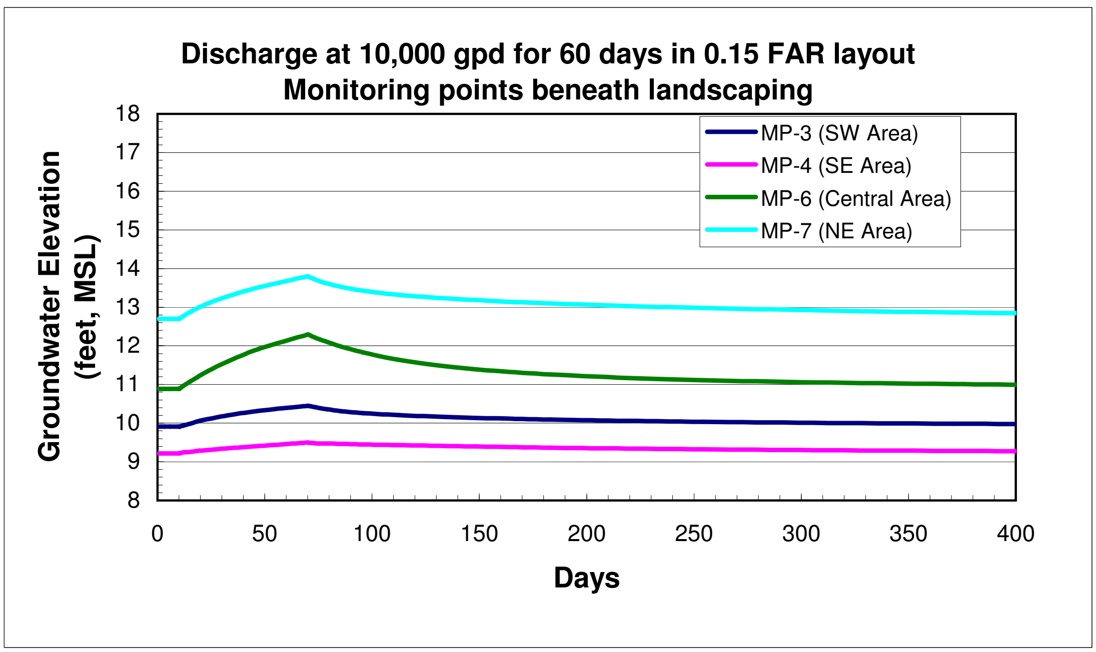


SIMULATED GROUNDWATER LEVEL RISES FOR A DISCHARGE RATE OF 20,000 GPD OVER A 20-DAY DURATION IN THE 0.15 FAR LAYOUT

Malibu-La Paz Ranch Development

Malibu, California





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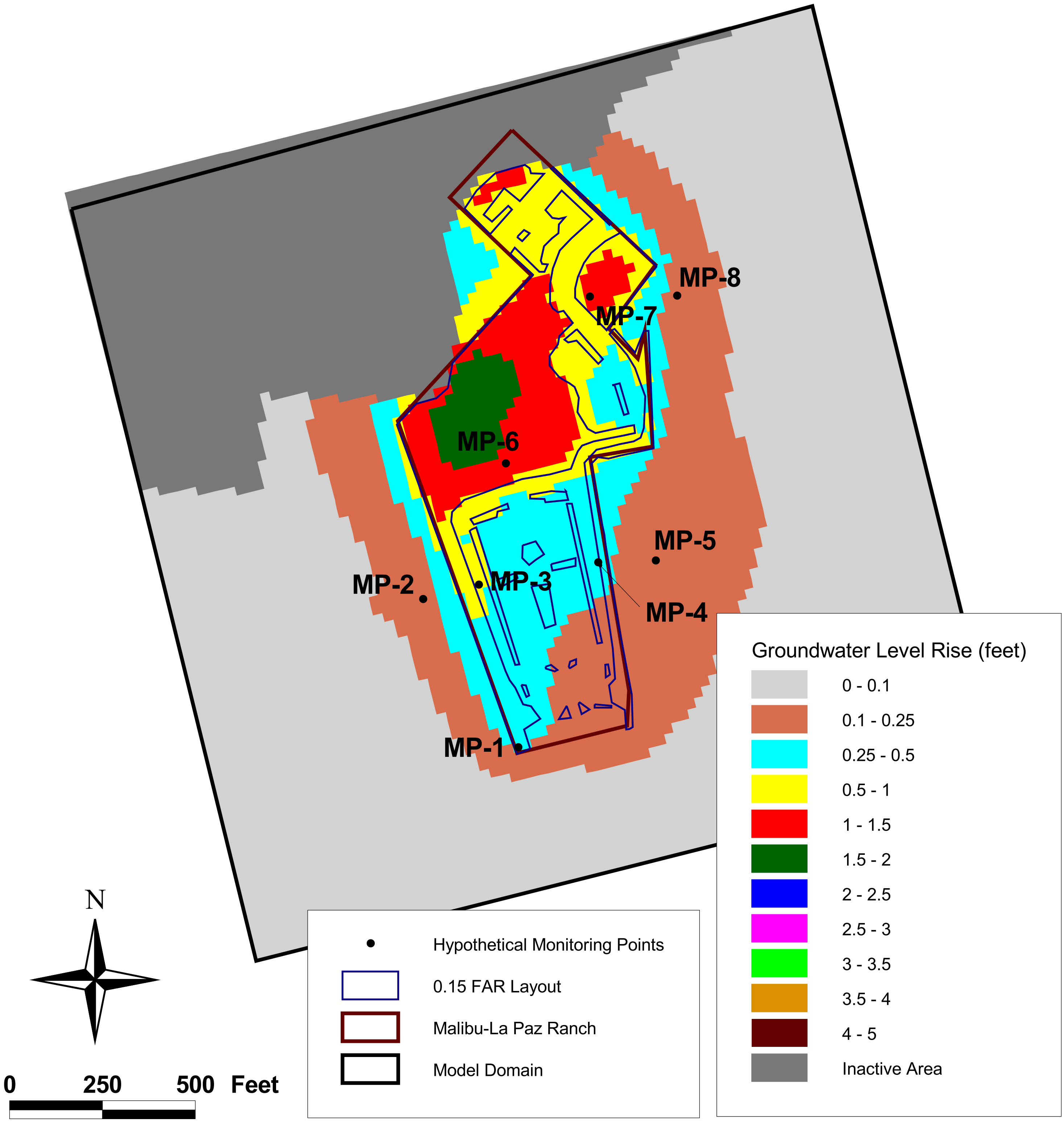
Malibu-La Paz Ranch Development

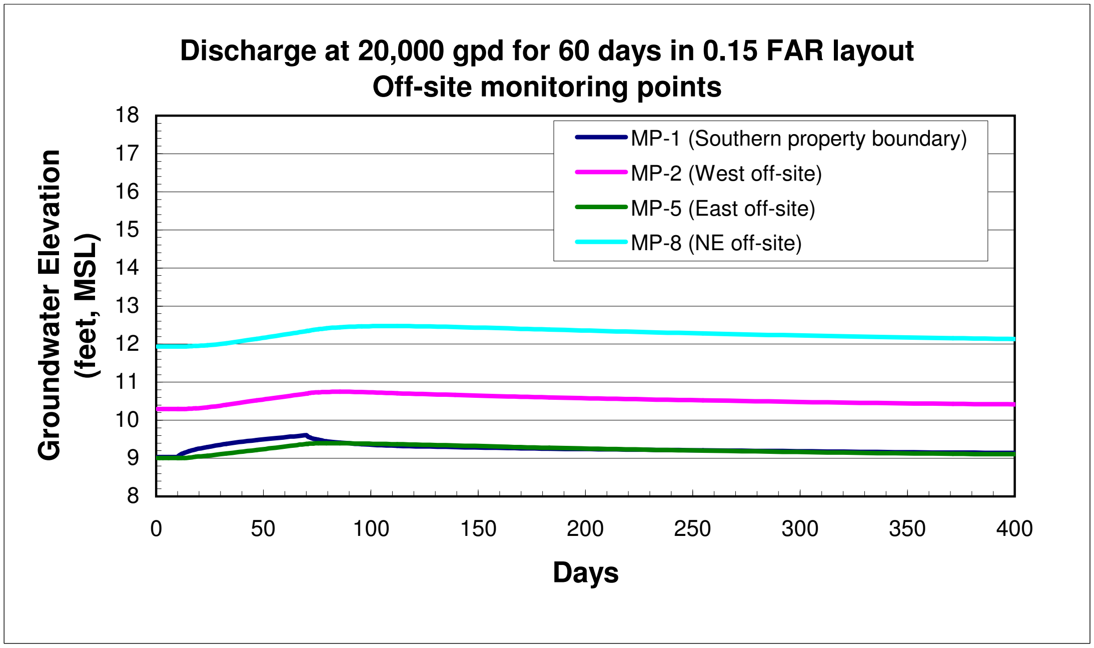
Malibu, California

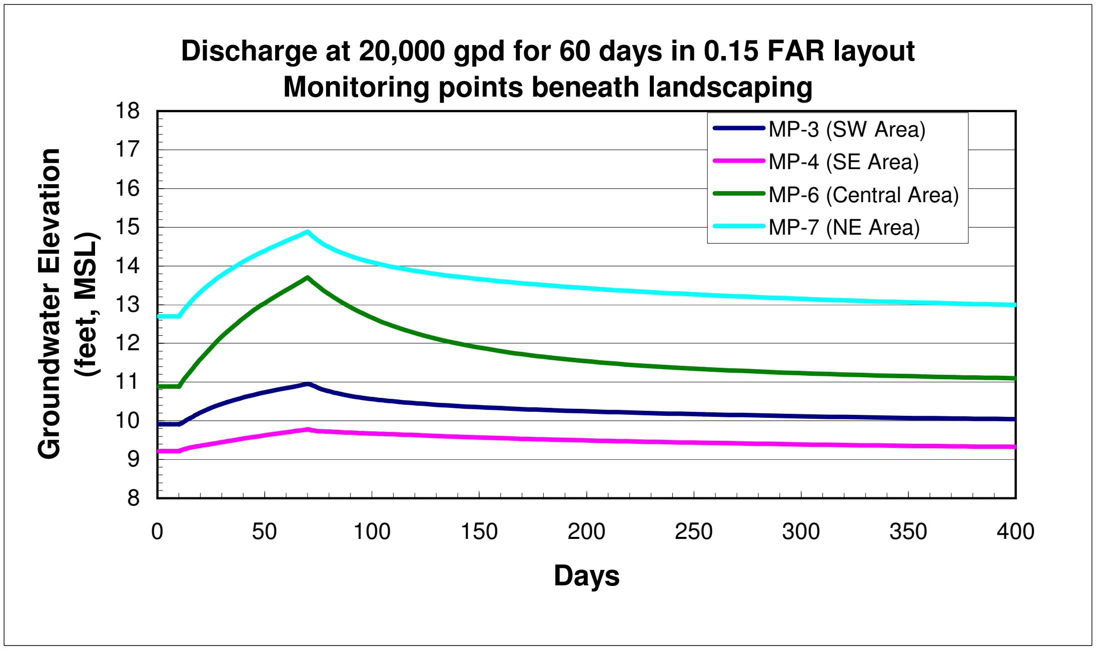


SIMULATED GROUNDWATER LEVEL RISES FOR A DISCHARGE RATE OF 10,000 GPD OVER A 60-DAY DURATION IN THE 0.15 FAR LAYOUT

Malibu-La Paz Ranch Development
Malibu, California

FIGURE 16b





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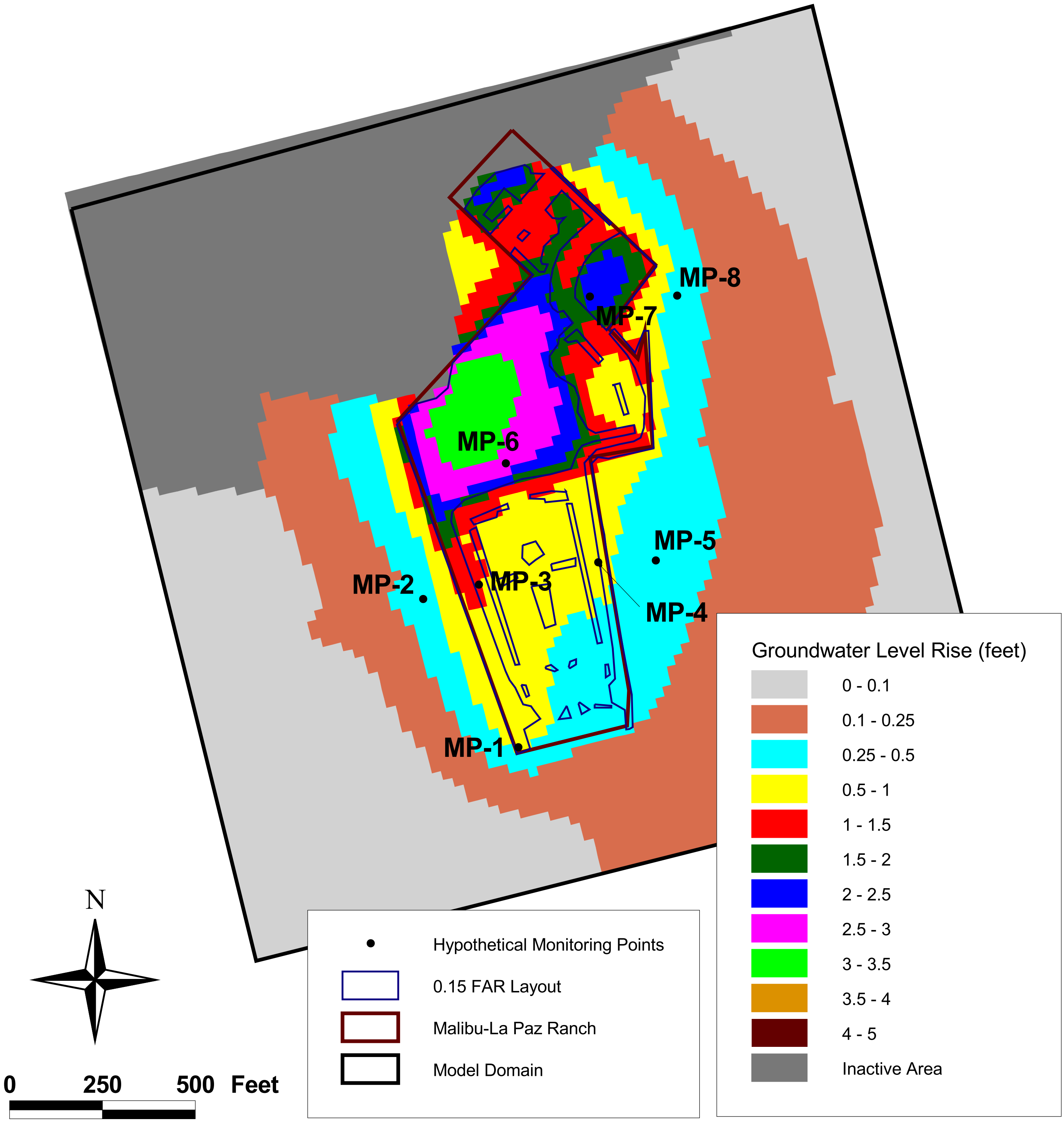


SIMULATED GROUNDWATER LEVEL RISES FOR A DISCHARGE RATE OF 20,000 GPD OVER A 60-DAY DURATION IN THE 0.15 FAR LAYOUT

Malibu-La Paz Ranch Development
Malibu, California

FIGURE E-1. LA PAZ, MALIBU CROSS SECTION LOCATION MAP

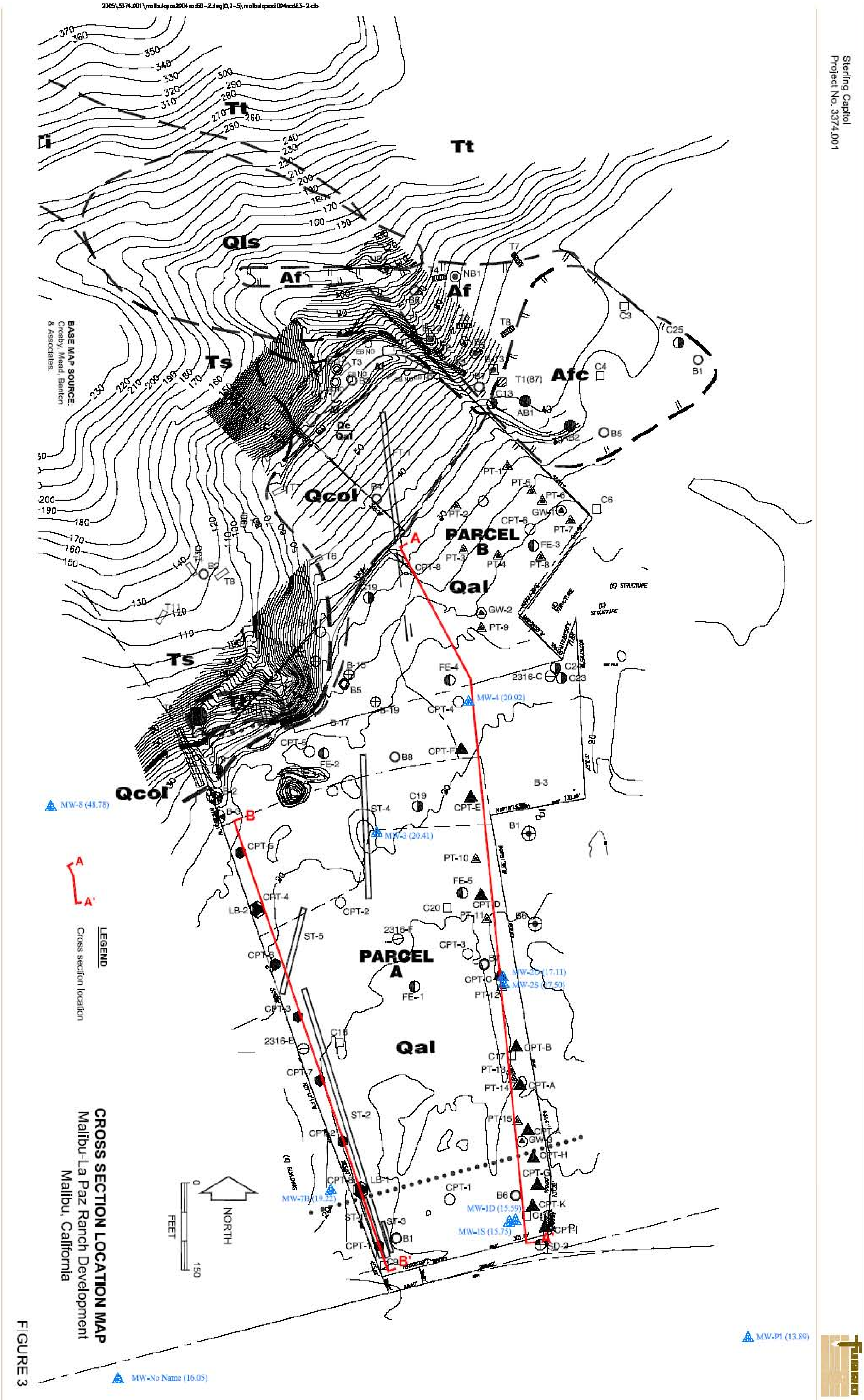


FIGURE E-2. GEOLOGIC CROSS SECTION – LA PAZ, MALIBU, CA

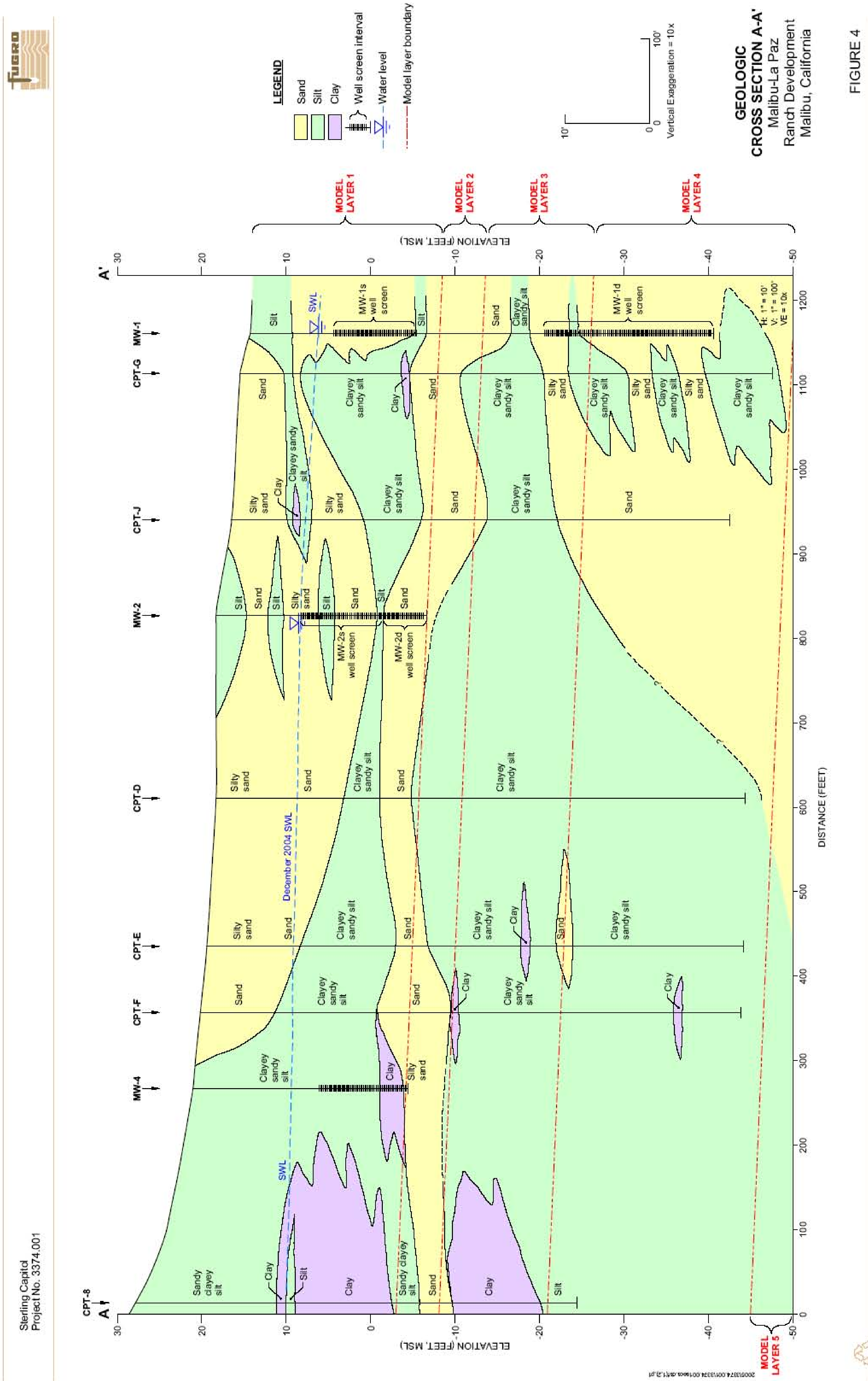
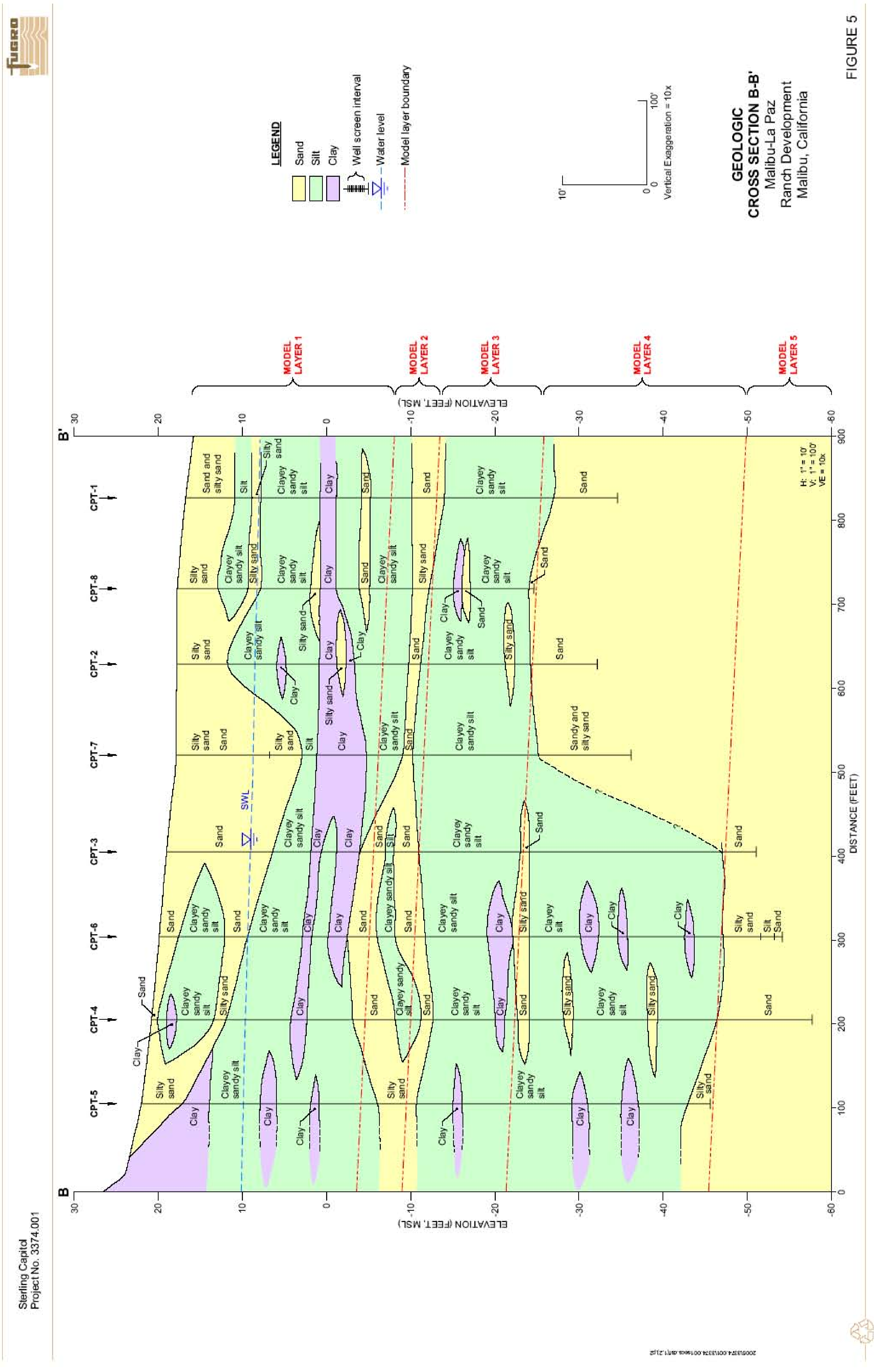


FIGURE E-3. GEOLOGIC CROSS SECTION 2 – LA PAZ, MALIBU, CA



GOLD COAST GEOSERVICES, INC.
Engineering Geologic and Geotechnical Consultants

SOILS ANALYSIS AND TESTING REPORT FOR PROPOSED SEPTIC SYSTEM

Malibu-La Paz Ranch, LLC

3700 La Paz Lane

City of Malibu, California

<u>for:</u>

STERLING CAPITOL

c/o Schmitz and Associates

29350 Pacific Coast Highway

Malibu, CA 90265

August 1, 2006

File No. GC99-071243

5217 Verdugo Way, Suite B • Camarillo, CA 93012 • (805) 484-5070 • Fax (805) 484-4295

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INTRODUCTION

This report presents the results of soils analysis conducted in the areas of the planned on-site wastewater disposal fields for the proposed Malibu-La Paz Ranch commercial/retail development at 3700 La Paz Lane in Malibu. The purpose of the soils analysis was to evaluate the on-site soil conditions with respect to the proposed on-site wastewater disposal system, as proposed on the plan prepared by Ensitu Engineering, Inc.

SCOPE OF WORK

The scope of work for this soil study consisted of the completion of the following tasks:

1. Consultation with the Environmental Health Specialist for the City of Malibu, to determine a scope of soil testing and soils analysis suitable for evaluating the septic system design as proposed by Ensitu Engineering, Inc.

2. Infiltration testing to determine soil loading rates in the areas of the proposed wastewater disposal fields as shown on the plan by Ensitu Engineering, Inc.

3. Percolation testing to determine percolation rates in the areas of the proposed Infiltrator® chambers.

4. Evaluation of percolation testing data determined for this site during our previous study of the site in 2004.

5. Laboratory soil testing to determine grain size distribution for soil classification using the USDA soil taxonomy.

6. Evaluation of soil loading rates based upon soil classification, soil texture, and soil structure criteria.

7. Evaluation of the wastewater disposal plan by Ensitu Engineering with respect to the proposed site grading and project development as called for on the Grading Plan prepared by Jensen Design & Survey, LLC.

8. Preparation of this report to provide a discussion of our procedures, findings, conclusions regarding the suitability of the on-site soils to support the septic system as proposed, and recommendations for use by the design and construction professionals.

PROPOSED DEVELOPMENT

The proposed development will consist of one- and two-story commercial/retail buildings, with subterranean parking garage levels, as shown on the Plot Plans with this report (in pocket). The building pads will be created by cut and fill grading to establish pad grades as necessary to maintain a building elevation above the established flood hazard level for the Malibu Creek flood plain.

PROPOSED SEPTIC SYSTEM DESIGN

The septic system plan as proposed by Ensitu Engineering, Inc. calls for on-site wastewater treatment with secondary disinfection and nitrogen reduction using the FAST® wastewater treatment process system. Treated wastewater is to then be dosed to several wastewater disposal fields dispersed across the site. The wastewater disposal fields will utilize shallow Wasteflow® Driplines by Geoflow.

The locations of the wastewater disposal fields are shown on the Plot Plans with this report for both the "Preferred" and the "Alternate" projects. The "Preferred" project is to include construction of

Infiltrator® chambers for both storage and disposal of wastewater, as needed. Also shown on the Plot Plans are the locations of the percolation tests and soil infiltration tests.

The Conceptual Grading Plan by Jensen Design and Survey, Inc. calls for minor grading in the areas of the proposed wastewater disposal fields which are to utilize primarily or wholly proposed landscaping areas. The Plot Plans with this report show Earthwork Summaries prepared by Jensen Design and Survey with proposed grade changes in the proposed wastewater disposal field areas.

SITE GEOLOGY

A report providing information on site geology was prepared by this office, dated November 22, 1999. The property is situated on the flood plain of Malibu Creek, about 1/4 of a mile west of its mouth, at the south base of the Santa Monica Mountains. The flat land property is underlain by lenses and layers of late Pleistocene to recent (0-100,000 years old) alluvial, fluvial (floodplain), colluvial, and estuarine sediments. The alluvial and fluvial sediments within Malibu Creek reportedly attain a thickness of about 100 feet or more. The alluvial and fluvial sediments are in turn underlain at depth by marine and non-marine sedimentary rocks assigned to the Sespe Formation. The sedimentary rocks crop out at the base of the Santa Monica Mountains along the northwesterly side of the property.

The alluvium and flood plain deposits encountered in the percolation test pits and in the infiltration test pits (dug 12 inches in depth) are composed of massive admixtures of silt, sand, and clay, with minor amount of pebbles and gravel. The predominant soil types are massive silty clayey sand and massive sandy silty clay.

DRAINAGE

Site drainage is by topographically controlled sheetflow runoff to the south-southeast. No indications of ponding or concentrated flows occur on or adjacent to the property, although minor concentrated flow may enter the property at its north side where drainage from the upslope residential properties at Harbor Vista Drive appears to be directed and released at the north side of the site at the base of the ascending Santa Monica Mountains. The southerly two-thirds of the property is located within either a Flood Hazard A or B zone, as determined for the Malibu Creek area by the Federal Emergency Management Agency (FEMA).

The Conceptual Grading Plan by Jensen Design and Survey, Inc. calls for site preparations as necessary to establish positive site drainage control in the areas of the proposed wastewater disposal fields. Site drainage improvements shall be sufficient to assure that water does not pond at or adjacent to the proposed wastewater disposal fields.

GROUND WATER

Ground water occurring as "free water" has been encountered at depths varying from 8-29 feet across the property. The top of the ground water surface slopes northward across the property, ranging from about eight feet deep at the southerly side of the property, about 15 feet deep in the central portion of the property, and about 24 feet deep along the northerly side of the site.

A steady-state groundwater flow model was constructed and calibrated for this site and a 100-acre area surrounding the site by Fugro West, Inc. The groundwater modeling by Fugro West, Inc., as discussed in their report dated January, 2005, indicated that the proposed wastewater disposal system using subsurface drip would not result in a significant rise in the groundwater level at or adjacent to the property.

SOIL TEST PROCEDURES AND RESULTS

Soils testing procedures and results are as follows:

a. SOIL PERCOLATION TESTING (2004)

In March, 2004, a total of 15 percolation test pits (PT-1 to PT-15) were excavated for percolation testing at the approximate locations shown on the Plot Plans. Descriptive logs of the percolation test hole excavations are attached with this report (see Trench Logs, Plates 3.1 to 3.2).

On March 30 and 31, 2004, percolation testing was performed in the test trenches in accordance with County of Los Angeles Department of Health Services testing procedures (as allowed by the City of Malibu). The percolation tests indicated a "worst case" percolation rate of **7** minutes per inch. Percolation test results are summarized on the "Leach Field Performance Data Work Sheets", provided as Tables 1, 2, and 3 with this report.

b. SOIL PERCOLATION TESTING (2006)

In May, 2006, a total of 12 additional percolation test pits (T-1 to T-12) were excavated for percolation testing at the approximate locations shown on the Plot Plans. Descriptive logs of the percolation test hole excavations are attached with this report (see Trench Logs, Plates 3.3 to 3.5).

On May 17 and 18, 2006, percolation testing was performed in the test trenches in accordance with County of Los Angeles Department of Health Services testing procedures (as allowed by the City of Malibu). The percolation tests indicated a "worst case" percolation rate of **85** minutes per inch. Percolation test results are summarized on the "Leach Field Performance Data Work Sheets", provided as Tables 4 and 5 with this report.

c. SOIL INFILTRATION TESTING

Soil infiltration testing was performed at several locations within all proposed wastewater disposal field areas. Test procedures and results are provided in the report attached herewith in Appendix II.

d. SOIL CLASSIFICATION and ANALYSIS

Following the current City of Malibu interpretation of the Local Coastal Program, Local Implementation Plan (LCP), soil analysis was performed in our laboratory to determine soil texture and soil structure for representative soil samples obtained at selected infiltration test locations across the site. Soil texture and soil structure characteristics were analyzed and utilized to determine the Long Term Acceptance Rate (LTAR) values specified in literature published by the United States Department of Agriculture (USDA) and the United States Environmental Protection Agency (USEPA).

Sieve analysis and hydrometer tests (per ASTM D442) were conducted in our laboratory to determine grain size distribution (see Plates H-1 and H-2). The results were utilized to determine soil texture as mandated in the Model Decentralized Wastewater Practitioner Curriculum which utilizes a soil texture triangle after soil type fractions (silt, sand, and clay) (Figure 1). The LTAR range for each soil texture classification was adjusted according to a standardized value that also considers soil structure (type, size, and grade) in conformance with criteria first developed by Tyler, 2001. The soil analysis follows criteria published in the USEPA Onsite Wastewater Treatment Systems Manual and as directed by the Model Decentralized Wastewater Practitioner Curriculum (Lindbo et. al., 2005).

The laboratory soil test results and soils analysis by texture and structure are summarized on Plate TS-1. The soil analysis indicates that the soils at this site fall mostly into soil texture Group III category. An area containing Group IV soils was encountered within the central part of the property, at the southwest side of Parcel B, northwest side of Parcel A.

CONCLUSIONS AND RECOMMENDATIONS

The results of the soils analysis indicate that the soil conditions are suitable for on-site wastewater disposal utilizing subsurface drip fields in the areas proposed on the plans by Ensitu Engineering, Inc. The data provided in this report shall be reviewed and considered by the design and construction professionals for the project as proposed. Any proposed to the septic system design as proposed at this time shall be reviewed and approved by this office.

REMARKS

Please call the undersigned at (805) 484-5070 if you have any questions regarding this report.

Respectfully submitted,

GOLD COAST GEOSERVICES, INC.

PROFESSIONAL GEOLOGIST
SCOTT J. HOGREFE
No. EG1516
CERTIFIED
ENGINEERING
GEOLOGIST
Exp. 10-31-06
STATE OF CALIFORNIA

Scott J. Hogrefe, CEG 1516

APPENDIX I

REFERENCES

Ensitu Engineering, Inc., Septic System Plans, La Paz Ranch, dated April 19, 2006.

Fugro West, Inc., 2005, A Steady State Groundwater Flow Model for the Proposed Malibu-La Paz Ranch Development.

Gold Coast GeoServices, Inc., 1999, Engineering Geologic and Geotechnical Report, Proposed Malibu-La Paz Ranch, LLC, Civic Center Way, Malibu.

Jensen Design & Survey, Inc., 2005, Conceptual Grading Plan for La Paz Ranch, Civic Center Way, Malibu.

Miles, R., D. L. Lindbo, M. H. Stolt, D. L. Mokma, and S. Greene, 2005, Field Description: Structure - Power Point Presentation, in *Model Decentralized Wastewater Practitioner Curriculum*, National Decentralized Water Resources Capacity Development Project, North Carolina State University, Raleigh, NC, D. L. Lindbo and N. E. Deal eds.

Miles, R., D. L. Lindbo, M. H. Stolt, D. L. Mokma, and S. Greene, 2005, Soil Module Text, in *Model Decentralized Wastewater Practitioner Curriculum,* National Decentralized Water Resources Capacity Development Project. North Carolina State University, Raleigh, NC.

United States Environmental Protection Agency, Office of Water, Office of Research and Development, 2002, *Onsite Wastewater Treatment Systems Manual*: Washington Governmental Printing Office, EPA/625/R-00/008.

APPENDIX II

INFILTRATION TEST REPORT

consultants
sustainable water systems & solutions

INFILTRATION TEST REPORT
FOR A
SUBSURFACE DRIP
LEACH FIELD DISPERSAL SYSTEM

LA PAZ RANCH
CIVIC CENTER WAY,
MALIBU, CA 90265

Prepared For:
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Prepared By:
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August 4, 2006

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PROJECT SITE AND BACKGROUND

The subject property is located in the City of Malibu, and is currently undeveloped land. Commercial development is being proposed which will require an alternative onsite wastewater treatment and dispersal system. The developer, in conjunction with the wastewater system designer, has proposed areas to be used for dispersal. EPD Consultants was enlisted to perform infiltration testing with the goal of determining the suitability of these areas for the proposed dispersal. This report describes our findings.

INFILTRATION TESTING INTRODUCTION

Infiltration Testing is a technique that uses specific apparatus to first test the absorption or infiltration capability of soil under conditions of unsaturated flow, and to then evaluate soil hydraulic conductivity. Once these have been established under 'real time' conditions, the suitability of various rates and methods of application for treated wastewater, septic tank effluent, recycled water, gray water, or irrigation water can be determined. In onsite wastewater treatment and dispersal systems, the Infiltration Test is a valuable tool in the development of a successful, integrated design. The **Infiltration Test** has been developed to supplement or replace the various methods of percolation testing commonly used to design septic systems and to overcome shortcomings in these standard percolation tests.

Research and field experience in onsite wastewater treatment systems over the last two decades has confirmed that a major source of leach field failure is hydraulic overloading. While traditional leach field design is based in large part on an assumption of conditions of unsaturated flow, in actual practice traditional leach fields are set up to operate largely as unlined underground storage tanks, with the loading rate based on the percolation rate at which these 'tanks' leak into the surrounding soil. Flooding of leach fields with bulk amounts of effluent, under a widespread set of conditions and difficult soil types, can result in the local swelling of the soils and in the simple hydraulic plugging of the void spaces. This can result in the surfacing or 'daylighting' of poorly reacted effluent, or in short-circuiting to the ground water or breaching to the topography nearby.

In order to prevent the hydraulic overloading of leach fields, a system of intermittent dosing has evolved. Utilizing a dosing siphon or a pump on a programmable timer, treated wastewater effluent can be applied to the receiving soils in measured intermittent doses over the entire 24-hour period in a day, rather than in bulk during times of peak use in the residence. In this way, unsaturated flow conditions prevail in the receiving soil. If the distribution field is sized for peak flows, frequent resting periods may occur during normal use, further enhancing aerobic and unsaturated conditions. It is, therefore, the ability of a given soil type, at a given depth in the soil profile, to receive water in timed intermittent doses that the **Infiltration Test** measures.

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INFILTRATION TEST METHODS

To more accurately assess the ability of surface soils to successfully absorb effluent under actual conditions of intermittent dosing and unsaturated flow in a subsurface wastewater infiltration system (SWIS) over an extended period of time at the above referenced site, Infiltration Testing was conducted. The testing apparatus used was Orenco Systems' Infiltration Kit, which is considered the industry standard. Each kit consists of a water reservoir with a float valve, a pump operated by a programmable timer, and a section of 1" PVC lateral with five 1/8" orifice holes drilled in the top at one-foot intervals. The lowest testable infiltration rate using the standard Orenco controller is 1.0 gpd/sf, which is accomplished with a pump run time between three- to four-seconds per hour depending upon pump squirt height (refer to Attachment 2). In order to be able test at rates lower than 1.0 gpd/sf, a modified pump controller was utilized that allows the off cycle to be extended to up to twelve hours.

At each testing location, a trench 5-ft long, 6-in wide and 12-in deep, with a base area of 2.5-sf, was dug in representative areas of the proposed wastewater distribution field. Care was taken to eliminate smearing in the floor and sidewalls. The lateral section was then placed in the bottom of the shallow trench and attached via a union fitting to the pump and reservoir. A 5-ft long section of 6-in diameter half-pipe was then placed over the lateral to serve as an orifice shield, directing the squirt back into the trench.

The control panel directed the pump to dose small amounts of water once every hour interval (or longer as described above) to the trench. Using the orifice equation, the residual head at the orifices (squirt height) was used to calculate the flow rate. The loading rate was then controlled by the number of seconds the pump ran per interval. A successful loading rate was determined an unsaturated condition (no standing water) occurring in the trench by the time of the next dose of water.

A rechargeable 12VDC dry cell battery powers the control panel. After completion of testing or after interchanging the batteries during the testing, the pumps were manually activated to confirm the battery charge via measuring squirt height. Protocols for the testing are included with this Report as Attachment 2.

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INFILTRATION TEST RESULTS

Location (ITP #)	Passing Rate (gpd/ft^2)	Time to Unsaturated Trench (min)		Location (ITP #)	Passing Rate (gpd/ft^2)	Time to Unsaturated Trench (min)
1	4	30		42.5	5	5
2.5	4	58		43.5	1.5	58
4.5	1.5	55		44	2	25
4.6	1.5	59		44.5	5	10
6	1.5	59		46	4	49
7	1.5	56		49	4	56
9	3	59		50	4	53
13	3	35		90	3	59
16	3	59		91	3	18
19	4	51		92	3	33
20	4	45		93	3	30
21	4	4		94	4	8
25	5	25		95	3	38
26	5	53		A1	2	48
27	4	40		A2	3	59
29	5	17		E	3	59
31	5	16		F	4	31
35.5	5	11		G	5	18
37	5	20		H	3	43
38	5	14		I	3	59
39.5	5	20		J	4	47
40.5	5	28		K	3	53
41	5	28		L	0.5	235
42	2	40		M	3	28
				N	2	41

EPD consultants
sustainable water systems & solutions

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San Pedro, CA 90731
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Fax (310) 241.6566

DISCUSSION

The Infiltration Tests at the representative locations of the proposed Intermittently-Dosed Subsurface Drip Leach Field Dispersal System at the subject property were commenced on May 16 and terminated on August 4, 2006. Forty-nine total tests were performed. Tests passed at rates ranging from 5 gpd/sf in the northeastern quadrant of the property, 1.5 gpd/sf along the central western edge, and 0.5 gpd/sf in one test at the northwestern quadrant of the property (ITP-L).

Please note that the results of the Infiltration Tests are presented solely as the rate at which the surficial soils at this site were observed to be able to absorb potable water via intermittent dosing. The conversion between potable water infiltration rate to treated effluent application rate is typically achieved by reducing the lowest passing potable water infiltration rate by a safety factor of 10, however it shall be the responsibility of the design engineer to determine the actual conversion safety factor. This scope of this report does not include the recommendation of design treated effluent application rates. Likewise, the scope of this report does not address the affect of increasing the moisture content of the soils and the stability of the slopes at this site, nor does it address the location of groundwater. These issues should be evaluated by a licensed geologist.

This report completes our scope of services in accordance with our agreement. Please contact the undersigned if there are any questions concerning this report or the recommendations included herein.

Respectfully submitted,
EPD Consultants, Inc.

Kevin Poffenbarger, PE
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
KEVIN L. POFFENBARGER
C 69089
EXP. 6-30-08
CIVIL
STATE OF CALIFORNIA

consultants
sustainable water systems & solutions

ATTACHMENT 1

Infiltration Test Plan

SEE PLOT PLANS IN APPENDIX IV AT THE END OF THIS REPORT

ATTACHMENT 2

Infiltration Test Protocols

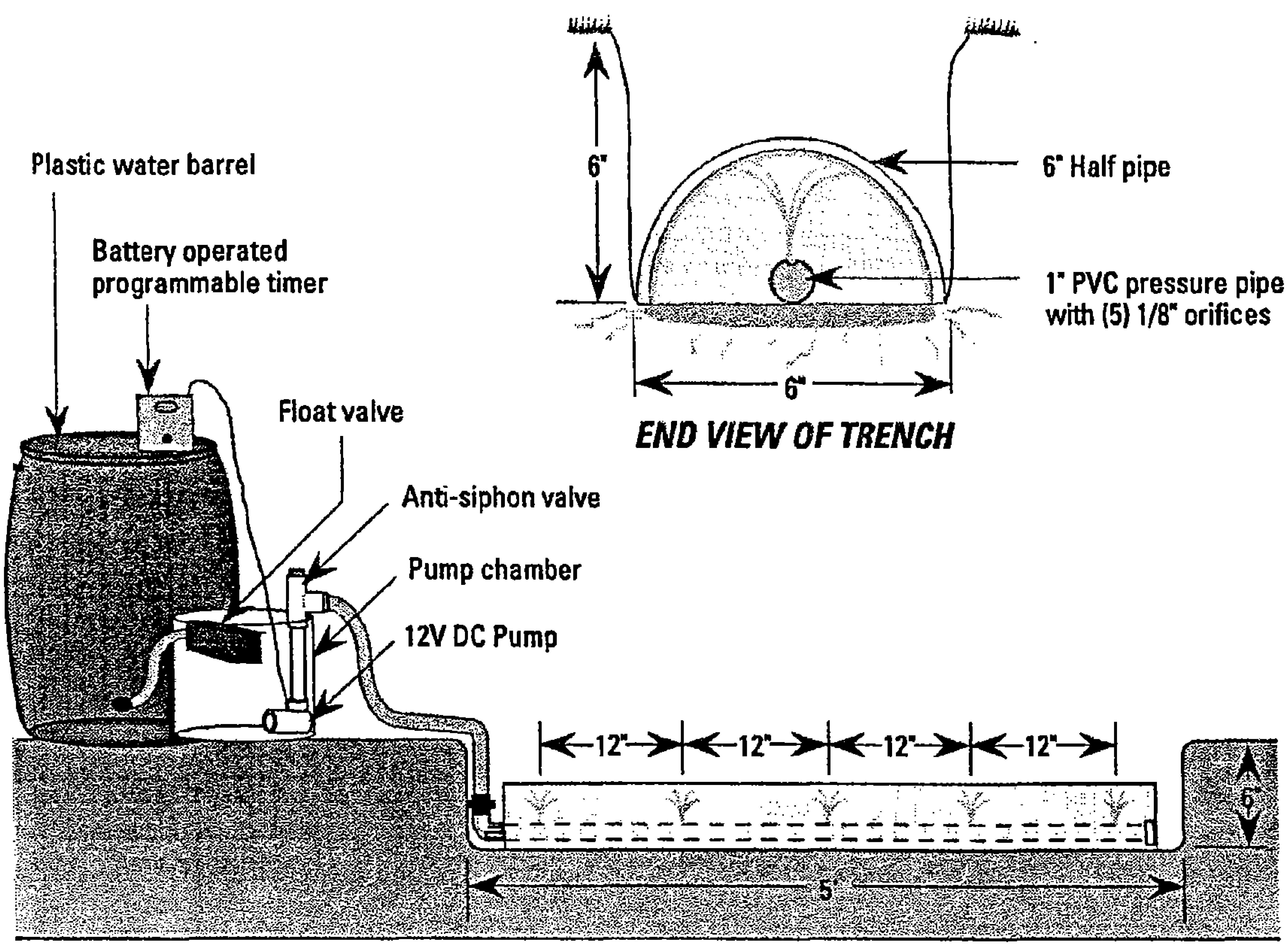
OSI Infiltration Kit

Orenco Systems* Incorporated

814 AIRWAY AVENUE
SUTHERLIN, OREGON
97479-9012

TELEPHONE:
(541) 459-4449

FACSIMILE:
(541) 459-2884



SIDE VIEW

Installation Instructions

Step 1 - *Make sure the battery is fully charged* - a half-charged battery will not give the correct results. The best way to ensure a full charge is to leave the battery charger on the battery all night prior to the test.

Step 2 - Dig a trench 6 inches wide, 6 inches deep and 5 feet long (the base area is 2.5 ft^2).

Step 3 - Place the 1" PVC pressure pipe in the bottom of the trench with the orifices pointing upward.

Step 4 - Set up the test equipment as shown above. Remove the 6" half pipe from the trench; the next step involves the exposed pressure pipe.

Step 5 - Turn the pump on by flipping the switch on the control panel to the "MAN" (manual) position. Measure the squirt height in inches. Once the height has been recorded, turn the pump to the "AUTO" (automatic timer operation) position.

Step 6 - Place the half section of 6" PVC over the pressure pipe. The test kit is now set up; the next page describes how to calculate the timer settings.

OSI Infiltration Kit

Testing Instructions

The timer should be set to dose the trench exactly as the drainfield is going to be dosed. The chart below shows how long per hour the pump must run to achieve a given loading rate based on the actual flow from your test kit.

At the top of the chart, find the squirt height closest to that which you recorded. At the left of the chart, select the loading rate specified by the designer or which you think is appropriate for the soil and effluent strength in the system. Read down from the squirt height and across from the loading rate to their intersection, where the pump run time is indicated, in seconds per hour.

If you wish to dose less often than hourly, multiply the run time on the chart by the number of hours per cycle. *For example, if the chart indicates 10 seconds of run time per hour and you want to dose every two hours, multiply by 2 and you get 20 seconds of run time every two hours.*

Set the timer following the instructions in the control panel enclosure.

If, after a day or more of dosing at a given rate, no continuous ponding occurs in the trench, that loading rate can be considered acceptable.

Squirt Height (inches)	36	42	48	54	60	66	72	78
Flow Rate (gpm)	1.68	1.81	1.93	2.05	2.16	2.27	2.37	2.47
Hydraulic Loading Rate (gal./sq.ft./day)	*Pump Run Time, in Seconds per Hour*							
1.0	4	3	3	3	3	3	3	3
1.5	6	5	5	5	4	4	4	4
2.0	7	7	6	6	6	6	5	5
2.5	9	9	8	8	7	7	7	6
3.0	11	10	10	9	9	8	8	8
3.5	13	12	11	11	10	10	9	9
4.0	15	14	13	12	12	11	11	10
4.5	17	16	15	14	13	12	12	11
5.0	19	17	16	15	14	14	13	13
5.5	20	19	18	17	16	15	15	14
6.0	22	21	19	18	17	17	16	15

Example Pump Run Time Computation:

- You've measured 66" squirt height.
- The hydraulic loading rate, specified by the designer, is 5 gal./sq.ft./day.
- According to the chart above, the pump needs to run 14 seconds per hour.
- You plan to dose the drainfield eight times a day.
- Dividing 24 hours by 8 gives you 3-hour intervals.
- So the timer needs to be set to turn on the pump (3 x 14 =) 42 seconds every three hours.
- Timer settings are in tenths of a minute, so divide 42 seconds by 60 seconds per minute and you find you must set the timer to run the pump 0.7 minutes every three hours.

APPENDIX III

LEACH FIELD PERFORMANCE DATA WORK SHEETS

AND LABORATORY TEST RESULTS

GOLD COAST GEOSERVICES, INC.

LEACH FIELD PERFORMANCE TEST DATA WORK SHEET

FILE NO.: GC99-071243
CLIENT NAME: Sterling Capital
SITE LOCATION: 3700 La Paz Lane, Malibu
TEST HOLE DIMENSIONS: 12" x 12" x 12" Deep

TABLE 1

TRENCH NO.	PT-1	PT-2	PT-3	PT-4	PT-5
DATE OF PRESOAK	03/30/04	03/30/04	03/30/04	03/30/04	03/30/04
DATE OF TEST	03/31/04	03/31/04	03/31/04	03/31/04	03/31/04
EXCAVATION DEPTH OF TRENCHES	2'	2'	2'	2'	2'
TESTED DEPTH OF TRENCH	3'	3'	3'	3'	3'
HEIGHT OF WATER IN TEST HOLE AFTER PRESOAK (In Inches)	0	0	0	0	0
TIME WATER REACHES 5TH INCH	9:39	9:43	11:05	9:48	8:54
TIME WATER REACHES 6TH INCH	9:42	9:45	11:06	9:50	9:01
TIME REQUIRED FOR WATER TO DRAIN FROM 5TH TO 6TH INCH	2	2	1	2	7

GOLD COAST GEOSERVICES, INC.

LEACH FIELD PERFORMANCE TEST DATA WORK SHEET

FILE NO.: GC99-071243
CLIENT NAME: Sterling Capital
SITE LOCATION: 3700 La Paz Lane, Malibu
TEST HOLE DIMENSIONS: 12" x 12" x 12" Deep

TABLE 2

TRENCH NO.	PT-6	PT-7	PT-8	PT-9	PT-10
DATE OF PRESOAK	03/30/04	03/30/04	03/30/04	03/30/04	03/30/04
DATE OF TEST	03/31/04	03/31/04	03/31/04	03/31/04	03/31/04
EXCAVATION DEPTH OF TRENCHES	3'	2'	2'	2'	2'
TESTED DEPTH OF TRENCH	4'	2'	2'	2'	2'
HEIGHT OF WATER IN TEST HOLE AFTER PRESOAK (In Inches)	0	0	0	0	0
TIME WATER REACHES 5TH INCH	9:04	9:10	10:04	11:09	10:28
TIME WATER REACHES 6TH INCH	9:07	9:16	10:11	11:11	10:30
TIME REQUIRED FOR WATER TO DRAIN FROM 5TH TO 6TH INCH	2	6	7	2	2

GOLD COAST GEOSERVICES, INC.

LEACH FIELD PERFORMANCE TEST DATA WORK SHEET

FILE NO.: GC99-071243
CLIENT NAME: Sterling Capital
SITE LOCATION: 3700 La Paz Lane, Malibu
TEST HOLE DIMENSIONS: 12" x 12" x 12" Deep

TABLE 3

TRENCH NO.	PT-11	PT-12	PT-13	PT-14	PT-15
DATE OF PRESOAK	03/30/04	03/30/04	03/30/04	03/30/04	03/30/04
DATE OF TEST	03/31/04	03/31/04	03/31/04	03/31/04	03/31/04
EXCAVATION DEPTH OF TRENCHES	2'	2'	2'	4'	2'
TESTED DEPTH OF TRENCH	3'	3'	3'	5'	3'
HEIGHT OF WATER IN TEST HOLE AFTER PRESOAK (In Inches)	0	0	0	0	0
TIME WATER REACHES 5TH INCH	10:35	10:41	11:40	11:45	11:50
TIME WATER REACHES 6TH INCH	10:37	10:44	11:43	11:47	11:52
TIME REQUIRED FOR WATER TO DRAIN FROM 5TH TO 6TH INCH	2	3	3	2	2

GOLD COAST GEOSERVICES, INC.

LEACH FIELD PERFORMANCE TEST DATA WORK SHEET

FILE NO.: GC99-071243
CLIENT NAME: Sterling Capital
SITE LOCATION: 3700 La Paz Lane, Malibu
TEST HOLE DIMENSIONS: 12" x 12" x 12" Deep

TABLE 4

TRENCH NO.	T-1	T-2	T-3	T-4	T-5	T-6
DATE OF PRESOAK	5/17/06	5/17/06	5/17/06	5/17/06	5/17/06	5/17/06
DATE OF TEST	5/18/06	5/18/06	5/18/06	5/18/06	5/18/06	5/18/06
DEPTH OF TRENCH	5'	5'	5'	6'	7'	6'
DEPTH OF TEST HOLE	6'	6'	6'	7'	8'	7'
HEIGHT OF WATER IN TEST HOLE AFTER PRESOAK (In Inches)	0	0	0	0	0	0
TIME WATER REACHES 5TH INCH	11:53	12:00	4:22	10:25	4:30	4:40
TIME WATER REACHES 6TH INCH	11:56	12:07	5:38	10:59	5:55	6:03
TIME REQUIRED FOR WATER TO DRAIN FROM 5TH TO 6TH INCH	3 MIN	7 MIN	78 MIN *	24 MIN	85 MIN *	83 MIN *

* Indicates test locations where tests were subsequently performed

24-HOUR CHECK: ALL TEST HOLES DRY

GOLD COAST GEOSERVICES, INC.

LEACH FIELD PERFORMANCE TEST DATA WORK SHEET

FILE NO.: GC99-071243
CLIENT NAME: Sterling Capital
SITE LOCATION: 3700 La Paz Lane, Malibu
TEST HOLE DIMENSIONS: 12" x 12" x 12" Deep

TABLE 5

TRENCH NO.	T-7	T-8	T-9	T-10	T-11	T-12
DATE OF PRESOAK	5/17/06	5/17/06	5/17/06	5/17/06	5/17/06	5/17/06
DATE OF TEST	5/18/06	5/18/06	5/18/06	5/18/06	5/18/06	5/18/06
DEPTH OF TRENCH	6.5'	7'	5'	2.5'	8'	7'
DEPTH OF TEST HOLE	7.5'	8'	6'	3.5'	9'	8'
HEIGHT OF WATER IN TEST HOLE AFTER PRESOAK (In Inches)	0	0	0	0	0	0
TIME WATER REACHES 5TH INCH	12:01	10:34	10:06	10:58	11:17	11:19
TIME WATER REACHES 6TH INCH	12:08	11:01	10:28	11:40	11:40	11:41
TIME REQUIRED FOR WATER TO DRAIN FROM 5TH TO 6TH INCH	7 MIN	27 MIN	22 MIN	42 MIN	23 MIN	22 MIN

24-HOUR CHECK: ALL TEST HOLES DRY

Soil Testing - Geology
Goldcoast GeoServices, Inc.
5217 Verdugo Way, Suite B - Camarillo, CA 93010 - (805) 484-5070 - FAX (805) 484-4295

HYDROMETER Per ASTM D422

	HYDRO READINGS				Sample Tested by Hydrometer					Pre-Sieved Samples Only				
SAMPLE #	BASE	40 SEC.	BASE	1 HR.	CLAY %	SILT %	SAND %	GRAVEL%	Sieved - #10?	% Passing #10	Adj % Clay	Adj. % Silt	Adj % Sand and Gravel	TOTAL % (Check)
ITP-1	1	22	1	15	28.0	14.0	58.0	0.0	Y	93.0	26.0	13.0	60.9	100.0
ITP-4.6	1	34	1	20	38.0	28.0	34.0	0.0	Y	97.0	36.9	27.2	36.0	100.0
ITP-46	1	34	1	21	40.0	26.0	34.0	0.0	Y	99.4	39.8	25.8	34.4	100.0
ITP-A1	1	36	1	26	50.0	20.0	30.0	0.0	Y	99.8	49.9	20.0	30.1	100.0
ITP-7	1	23	1	16	30.0	14.0	56.0	0.0	Y	98.6	29.6	13.8	56.6	100.0
ITP-F	1	29	1	18	34.0	22.0	44.0	0.0	Y	98.9	33.6	21.8	44.6	100.0
ITP-21	1	34	1	21	40.0	26.0	34.0	0.0	Y	96.1	38.4	25.0	36.6	100.0
ITP-37	1	26	1	16	30.0	20.0	50.0	0.0	Y	87.6	26.3	17.5	56.2	100.0
ITP-42.5	1	27	1	16	30.0	22.0	48.0	0.0	Y	82.8	24.8	18.2	56.9	100.0
ITP-29	1	18	1	11	20.0	14.0	66.0	0.0	Y	95.3	19.1	13.3	67.6	100.0
ITP-G	1	22	1	13	24.0	18.0	58.0	0.0	Y	95.4	22.9	17.2	59.9	100.0
ITP-31	1	27	1	15	28.0	24.0	48.0	0.0	Y	99.4	27.8	23.9	48.3	100.0
ITP-44	1	28	1	18	34.0	20.0	46.0	0.0	Y	98.9	33.6	19.8	46.6	100.0

PROJECT LOCATION: LA PAZ	**DATE:** 7.19.06
FILE NO.: GC99-071243	**PLATE:** H-1

Hydrometer Analysis Test Results

ASTM D422

Soil Testing - Geology
Goldcoast GeoServices, Inc.
5217 Verdugo Way, Suite B - Camarillo, CA 93010 - (805) 484-5070 - FAX (805) 484-4295

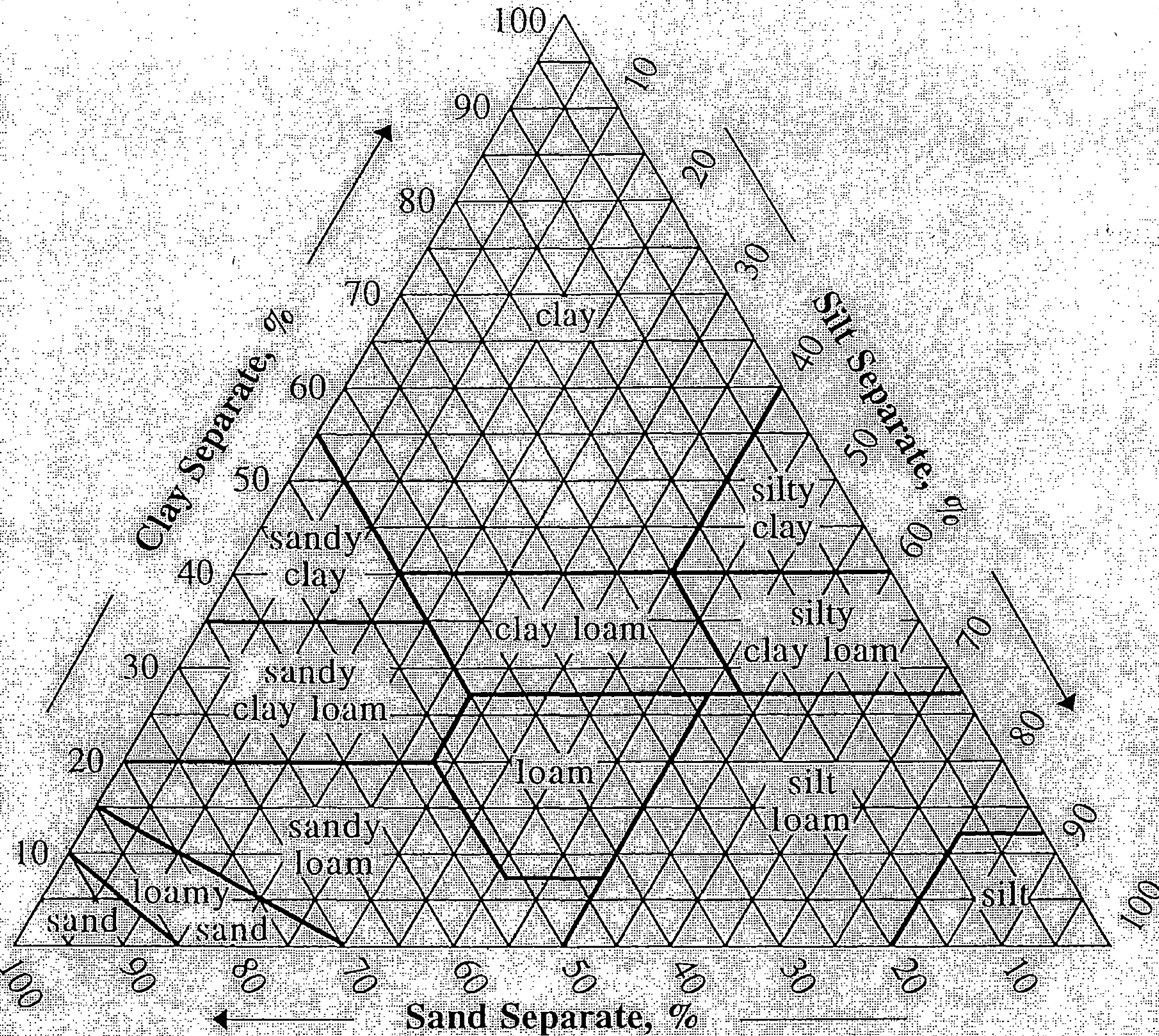
HYDROMETER Per ASTM ONLY

	HYDRO READINGS				Sample Tested by Hydrometer					Pre-Sieved Samples Only				
SAMPLE #	BASE	40 SEC.	BASE	1 HR.	CLAY %	SILT %	SAND %	GRAVEL%	Sieved - #10?	% Passing #10	Adj % Clay	Adj. % Silt	Adj % Sand and Gravel	TOTAL % (Check)
ITP-J	1	28	1	16	30.0	24.0	46.0	0.0	Y	91.1	27.3	21.9	50.8	*100.0*
ITP-16	1	25	1	15	28.0	20.0	52.0	0.0	Y	97.3	27.2	19.5	53.3	*100.0*
ITP-20	1	24	1	12	22.0	24.0	54.0	0.0	Y	99.3	21.8	23.8	54.3	*100.0*
ITP-39.5	1	28	1	18	34.0	20.0	46.0	0.0	Y	97.4	33.1	19.5	47.4	*100.0*
ITP-M	1	25	1	14	26.0	22.0	52.0	0.0	Y	94.1	24.5	20.7	54.8	*100.0*

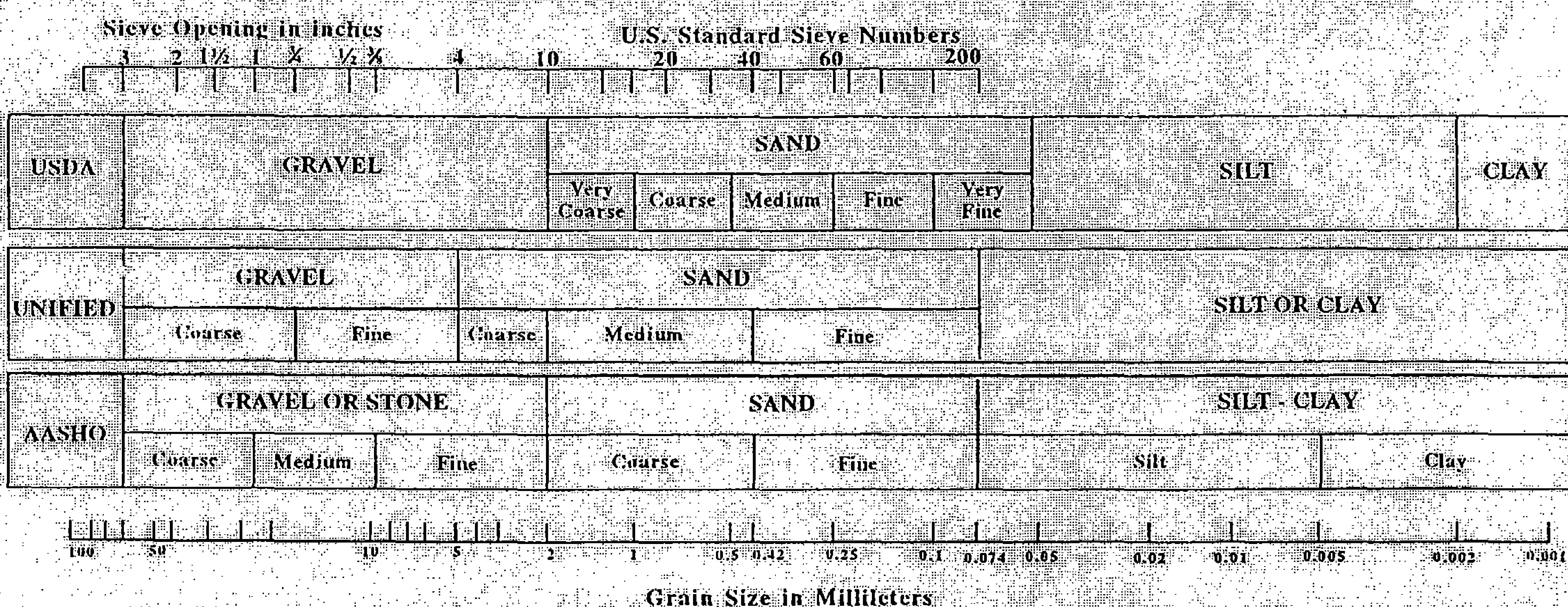
PROJECT LOCATION: LA PAZ	**DATE:** Jul-06
FILE NO.: GC99-071243	**PLATE:** H-1

Hydrometer Analysis Test Results

ASTM D422



COMPARISON OF PARTICLE SIZE SCALES



GOLD COAST GEOSERVICES, INC.	**USDA Soils Texture Triangle** 3700 La Paz Lane, Malibu	DATE:	**08/06**
		FILE NO.:	**GC99-071243**
		FIGURE 1	

SOIL MORPHOLOGIC ANALYSIS SUMMARY

3700 La Paz Lane, Malibu

Sample Location	Sample Tested by Hydrometer			USDA Texture	OSWW TEXTURAL GROUP	L.T.A.R. Range (gpd/ft²)	SOIL STRUCTURE			LONG TERM ACCEPTANCE RATE (gpd/ft²)
	CLAY %	SILT %	SAND %				TYPE	SIZE	GRADE	
ITP-1	26.0	13.0	60.9	SANDY CLAY LOAM	GROUP III	0.6 - 0.3	GR	M	2	0.4
ITP-4.6	36.9	27.2	36.0	CLAY LOAM	GROUP III	0.6 - 0.3	GR	M	2	0.4
ITP-46	39.8	25.8	34.4	CLAY LOAM	GROUP III	0.6 - 0.3	GR	M	2	0.4
ITP-A1	49.9	20.0	30.1	CLAY	GROUP IV	0.4 - 0.1	GR	M	2	0.2
ITP-7	29.6	19.8	56.6	SANDY CLAY LOAM	GROUP III	0.6 - 0.3	GR	M	2	0.4
ITP-F	33.6	21.8	44.6	SANDY CLAY	GROUP IV	0.4 - 0.1	GR	M	2	0.2
ITP-21	38.4	25.0	36.6	CLAY LOAM	GROUP III	0.6 - 0.3	GR	M	2	0.4
ITP-37	26.3	17.5	56.2	SANDY CLAY LOAM	GROUP III	0.6 - 0.3	GR	M	2	0.4
ITP-42.5	24.8	18.2	56.9	SANDY CLAY LOAM	GROUP III	0.6 - 0.3	GR	M	2	0.4
ITP-29	19.1	13.3	67.6	FINE SANDY LOAM	GROUP II	0.8 - 0.6	GR	F	2	0.7
ITP-G	22.9	17.2	59.9	SANDY CLAY LOAM	GROUP III	0.6 - 0.3	GR	M	2	0.4
ITP-31	27.8	23.9	48.3	CLAY LOAM	GROUP III	0.6 - 0.3	GR	M	2	0.4
ITP-44	33.6	19.8	46.6	SANDY CLAY LOAM	GROUP III	0.6 - 0.3	GR	M	2	0.4
ITP-J	27.3	21.9	50.8	SANDY CLAY LOAM	GROUP III	0.6 - 0.3	GR	M	2	0.4

OSWW - Onsite Wastewater
LTAR - Long-Term Acceptance Rate
GR - Granular
ITP - Infiltration Test Pit
VF - Very Fine
F - Fine
M - Medium
C - Course

GOLD COAST GEOSERVICES, INC.
5217 Verdugo Way, Suite B, Camarillo, CA 93012
805-484-5070 Telephone * 805-484-4295 Facsimile

DATE: 07/06
FILE NO.: GC99-071243
PLATE TS-1

APPENDIX IV

PLOT PLANS AND TRENCH LOGS

PROJECT : 3700 La Paz Lane, Malibu

TRENCH LOG : T-1 to T-7

FILE NO : GC99-71243

DATE : 3/25/04

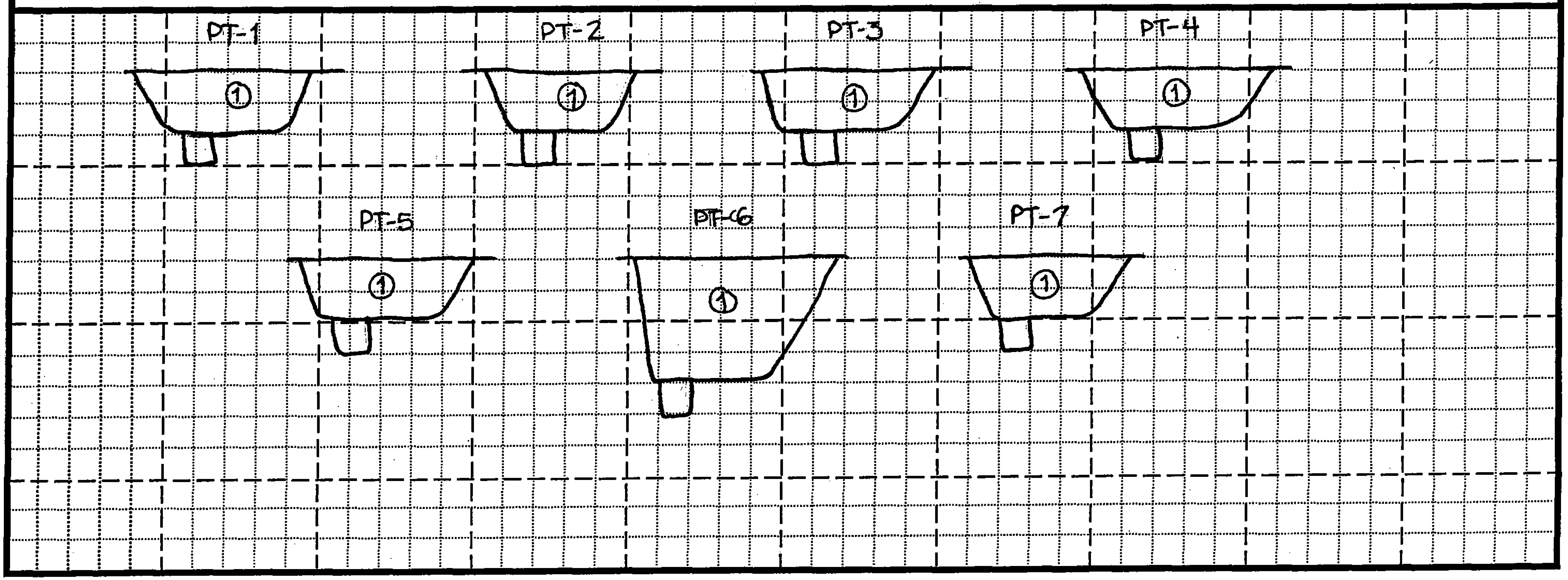
LOCATION : SEE PLOT PLAN, PLATE 1

LOGGED BY : JCR

ALLUVIUM – (Qal)

1. Dark brown to grayish black clayey sand, firm to dense, slightly moist to moist.

SCALE 1" : 5'



GOLD COAST GEOSERVICES, INC. * 5217 VERDUGO WAY, SUITE B* CAMARILLO, CA 93012 * (805) 484-5070 * FAX (805) 484-4295

PROJECT : 3700 La Paz Lane, Malibu

TRENCH LOG : T-8 to T-15

FILE NO : GC99-71243

DATE : 3/25/04

LOCATION : SEE PLOT PLAN, PLATE 1

LOGGED BY : JCR

ALLUVIUM – (Qal)

1. Dark brown to grayish black clayey sand, firm to dense, slightly moist to moist.
2. Grayish yellow silty fine-grained sand, firm to dense, slightly moist.

SCALE 1" : 5'

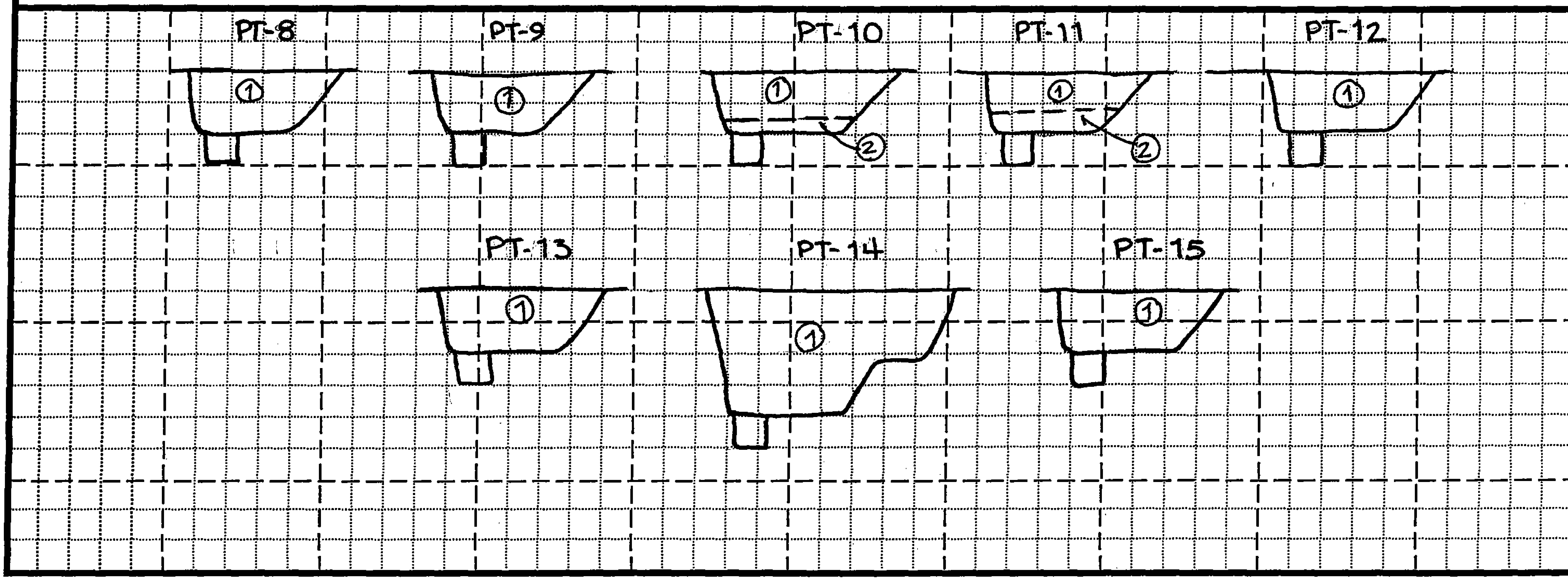


PLATE 3.2

GOLD COAST GEOSERVICES, INC. * 5217 VERDUGO WAY, SUITE B* CAMARILLO, CA 93012 * (805) 484-5070 * FAX (805) 484-4295

PROJECT : 3700 LA PAZ LANE, CITY OF MALIBU

TRENCH LOG : T-1 TO T-4

FILE NO : GC99-071243

DATE : 05/17/06

LOCATION : SEE PLOT PLAN, PLATE 1

LOGGED BY : JCR

1. **NATIVE SOIL – (Ns)** – Medium brown to grayish brown silty very fine- to fine-grained sand, firm, dry to slightly moist.

2. **NATIVE SOIL – (Ns)** – Dark brown to grayish brown clayey to silty very fine to coarse-grained sand, firm to dense, slightly moist, with yellowish brown sandstone and siltstone fragments locally.

3. **ALLUVIUM – (Qal)** – Grayish yellow silty very fine- to fine-grained sand, slightly moist to dry.

SCALE: 1" = 5'

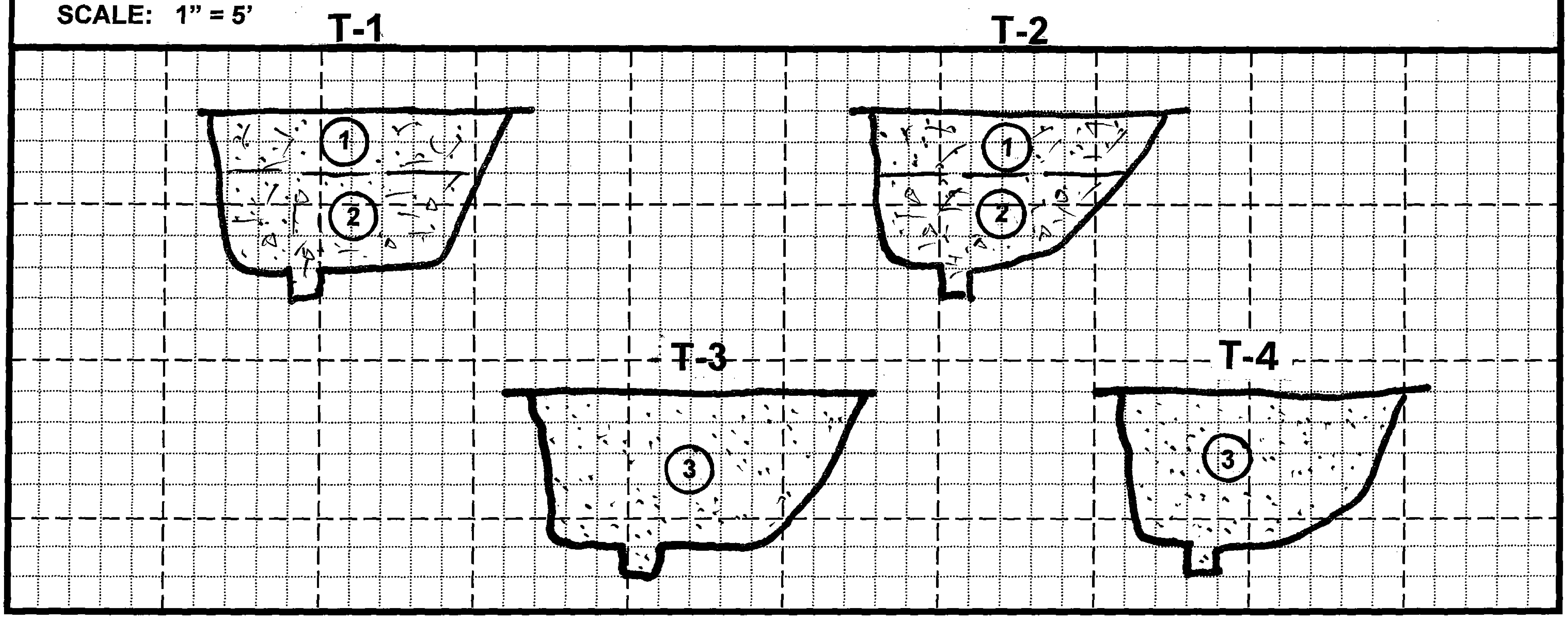


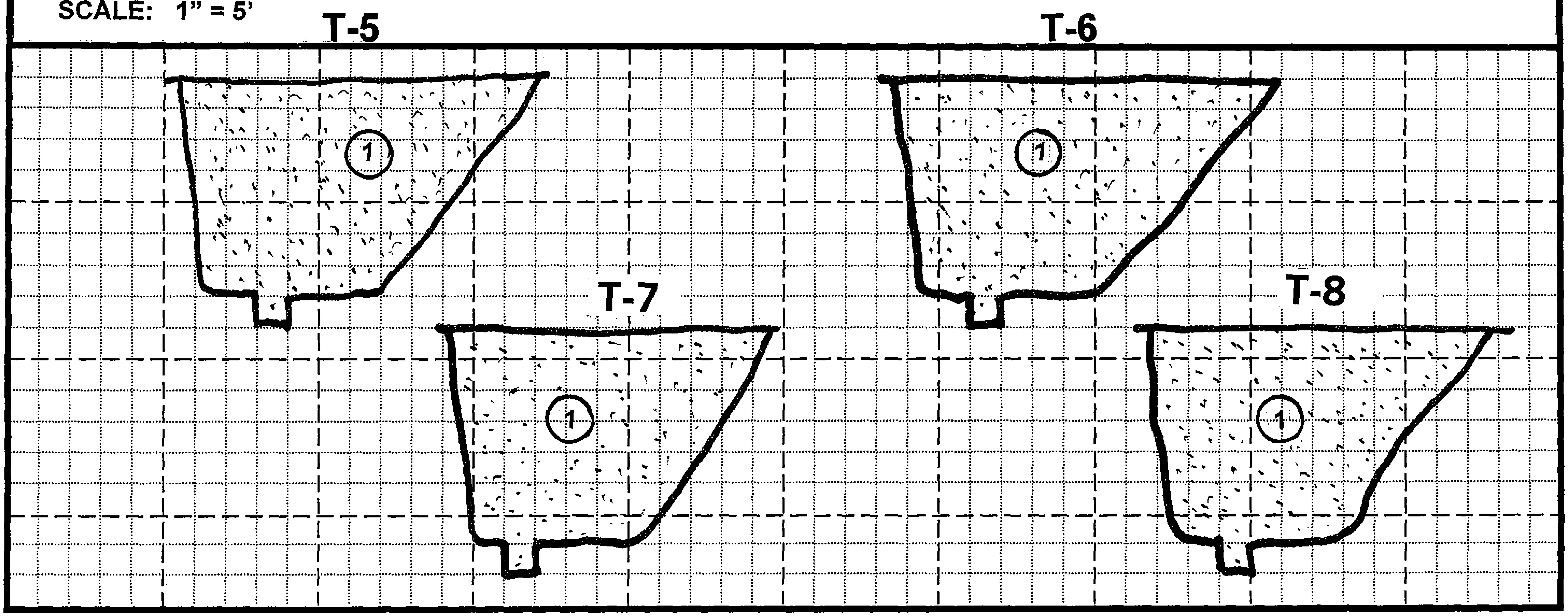
PLATE 3.3

GOLD COAST GEOSERVICES, INC. * 5217 VERDUGO WAY, SUITE B* CAMARILLO, CA 93012 * (805) 484-5070 * FAX (805) 484-4295

PROJECT :	3700 LA PAZ LANE, CITY OF MALIBU	TRENCH LOG :	T-5 TO T-8
FILE NO :	GC99-071243	DATE :	05/17/06
LOCATION :	SEE PLOT PLAN, PLATE 1	LOGGED BY :	JCR

1. **ALLUVIUM – (Qal)** – Grayish yellow clayey silty very fine- to fine-grained sand, slightly moist to dry, dense.

SCALE: 1" = 5'



GOLD COAST GEOSERVICES, INC. * 5217 VERDUGO WAY, SUITE B* CAMARILLO, CA 93012 * (805) 484-5070 * FAX (805) 484-4295

PROJECT : 3700 LA PAZ LANE, CITY OF MALIBU

TRENCH LOG : T-9 TO T-12

FILE NO : GC99-071243

DATE : 05/17/06

LOCATION : SEE PLOT PLAN, PLATE 1

LOGGED BY : JCR

1. **ALLUVIUM – (Qal)** – Grayish yellow clayey silty very fine- to fine-grained sand, slightly moist to dry, dense.

SCALE: 1" = 5'

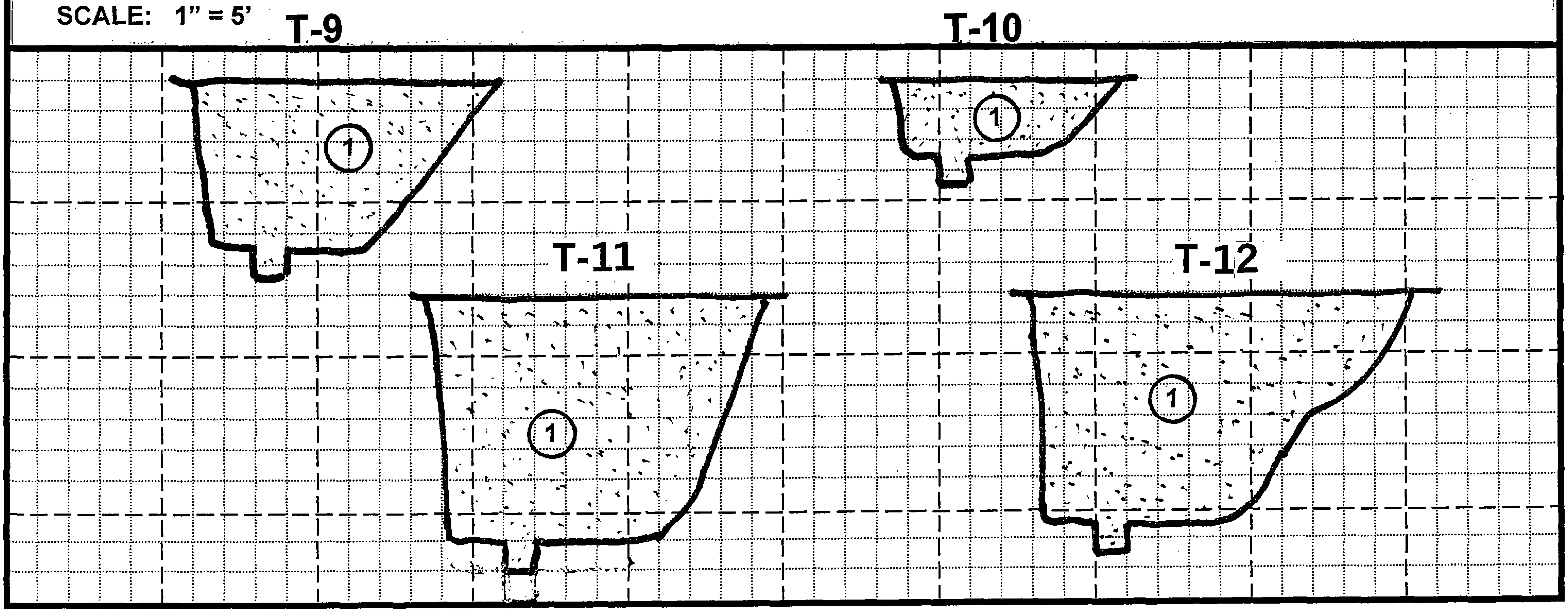


PLATE 3.5

GOLD COAST GEOSERVICES, INC. * 5217 VERDUGO WAY, SUITE B* CAMARILLO, CA 93012 * (805) 484-5070 * FAX (805) 484-4295

GOLD COAST GEOSERVICES, INC.
Engineering Geologic and Geotechnical Consultants

March 17, 2006
File No. GC99-71243

STERLING CAPITOL
c/o Schmitz and Associates
29350 Pacific Coast Highway
Malibu, CA 90265

SUBJECT: USDA Soil Classification for proposed subsurface drip disposal field design, Malibu-La Paz Ranch, LLC, **Parcels A, B, and C,** 3700 La Paz Lane, Malibu.

Gentlemen:

As requested by Ensitu Engineering, Inc., we have determined the USDA soil classification for the soil underlying the areas of the proposed subsurface drip disposal fields within the landscaping areas for the Malibu-La Paz Ranch in Malibu. It is our determination from analysis of subsurface soils data obtained from several borings within the property by this office and by others that the soil underlying the proposed drip fields most typically vary from loam to silt loam (see attached chart).

Please call this office at (805) 484-5070 if you have any questions regarding this information.

Respectfully submitted,
GOLD COAST GEOSERVICES, INC.

Scott J. Hogrefe, CEG 1516

PROFESSIONAL GEOLOGIST
SCOTT J. HOGREFE
No. EG1516
CERTIFIED
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