JOINT TECHNICAL DOCUMENT

Volume I

Gregory Canyon Landfill
San Diego County, California

September 2010, January 2011

Prepared For:

GREGORY CANYON LIMITED
160 Industrial Street, Suite 200
San Marcos, CA 92708

Prepared By:

BRYAN A. STIRRAT & ASSOCIATES
1360 Valley Vista Drive
Diamond Bar, California 91765
(909) 860-7777

BAS

Joint Technical Document

Gregory Canyon Landfill

San Diego County, California

September 2010, January 2011

Volume I

BAS

Joint Technical Document

Gregory Canyon Landfill

San Diego County, California

September 2010, January 2011

Volume I

TABLE OF CONTENTS

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME I

TABLE OF CONTENTS

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME I

TABLE OF CONTENTS

SECTION | **PAGE**

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME I

TABLE OF CONTENTS

SECTION **PAGE**

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME I

TABLE OF CONTENTS

SECTION **PAGE**

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME I

TABLE OF CONTENTS

SECTION **PAGE**

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME I

TABLE OF CONTENTS

SECTION **PAGE**

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME I

TABLE OF CONTENTS

SECTION **PAGE**

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME I

TABLE OF CONTENTS

SECTION **PAGE**

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME I

TABLE OF CONTENTS

SECTION **PAGE**

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME I

TABLE OF CONTENTS

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME I

TABLE OF CONTENTS

SECTION | **PAGE**

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME I

TABLE OF CONTENTS

SECTION **PAGE**

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME I

TABLE OF CONTENTS

SECTION **PAGE**

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME I

TABLE OF CONTENTS

SECTION **PAGE**

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME I

TABLE OF CONTENTS

SECTION | **PAGE**

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME I

TABLE OF CONTENTS

PAGE*

LIST OF TABLES

*** Page number for location in JTD.**

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME I

TABLE OF CONTENTS

PAGE*

LIST OF FIGURES

*** Page number for first citation in JTD.**

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME I

TABLE OF CONTENTS

*** Page number for first citation in JTD.**

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME II-A

TABLE OF CONTENTS

LIST OF APPENDICES

JOINT TECHNICAL DOCUMENT FOR THE GREGORY CANYON LANDFILL VOLUME II-B

TABLE OF CONTENTS

JOINT TECHNICAL DOCUMENT
FOR THE
GREGORY CANYON LANDFILL
VOLUME III

TABLE OF CONTENTS

LIST OF FULL SIZE DRAWINGS

PART A

REPORT ORGANIZATION AND PROJECT DESCRIPTION

SECTION A.1

INTRODUCTION

A.1 INTRODUCTION

The following is the Joint Technical Document and description of the landfill project for the proposed Gregory Canyon Landfill (GCLF) in San Diego County, California.

California waste management statutes enacted over the last few years have established some of the toughest standards in the nation for the operation of landfills which handle non-hazardous solid waste. Under current regulations, the California Department of Resources Recycling and Recovery (CalRecycle) [previously know as the California Integrated Waste Management Board, CIWMB], the Regional Water Quality Control Boards (RWQCB), local Air Pollution Control Districts, and the local enforcement agencies (EA) all perform inspections of waste management facilities to ensure that they are being operated in compliance with applicable federal, state and local regulations.

Both CalRecycle and the RWQCB require an operator of a waste management facility to obtain an operating permit. The California Code of Regulations Title 27 (27 CCR), Chapter 4 requires an operator of a non-hazardous landfill to obtain an operating permit known as a solid waste facilities permit (SWFP). The SWFP is concurred on by CalRecycle and then issued by an EA (typically the local county health department). The RWQCB, through regulations under 27 CCR, Chapter 4, Article 4, requires that an operator of a waste management facility that discharges wastes to land obtain an operating permit known as Waste Discharge Requirements (WDRs). The main supporting document that is required for a landfill to obtain both the SWFP and WDRs is called a Joint Technical Document (JTD).

In addition to the JTD, prior to issuance of the new SWFP (or whenever there will be a significant change in design and/or disposal operations), the owner must provide CalRecycle with a Preliminary Closure and Post-Closure Maintenance Plan (PCPCMP). The objectives of the PCPCMP are to provide a reasonable estimate of the maximum expected cost to close and maintain the landfill during a 30-year post-closure period. A PCPCMP element has been included as part of this JTD.

A.1.1 PURPOSE

The purpose of this JTD is to present a comprehensive description of the GCLF project including but not limited to: geology, hydrogeology, climatology, proposed design and operational features and procedures, and the proposed closure design and post-closure maintenance activities. This information is utilized by the LEA, CalRecycle, and local RWQCB to determine if the facility can be operated in compliance with applicable regulations and serves as the basis for the SWFP and WDRs.

The closure design and post-closure maintenance procedures will provide the basis for developing required costs estimates to establish funding to eventually close the GCLF and provide a minimum of 30 years of post-closure maintenance secured under an approved financial mechanism.

A.1.2 REPORT ORGANIZATION

The JTD is divided into six major components, Parts A, B, C, D, E and F. Part A provides general information on the JTD's format and content, a historic overview of the site, a summary of the proposed landfill design, landfill development, discussion of the proposed closure and post-closure maintenance plan element and associated financial assurances, and document references. Part B includes site operational information with the exception of the disposal site design features. Part C includes information on the disposal site design. Part D includes information on the site characteristics. Part E describes the proposed closure design and post-closure maintenance activities normally included in the PCPCMP. Finally, Part F provides the cost estimate associated with the proposed closure and post-closure activities described in Part E.

The JTD is separated into three volumes with Parts A through F followed by the figures included in Volume I, the appendices are presented in Volume II, and full-sized drawings are included in Volume III.

A.1 INTRODUCTION

The following is the Joint Technical Document and description of the landfill project for the proposed Gregory Canyon Landfill (GCLF) in San Diego County, California.

California waste management statutes enacted over the last few years have established some of the toughest standards in the nation for the operation of landfills which handle non-hazardous solid waste. Under current regulations, the California Department of Resources Recycling and Recovery (CalRecycle) [previously know as the California Integrated Waste Management Board, CIWMB], the Regional Water Quality Control Boards (RWQCB), local Air Pollution Control Districts, and the local enforcement agencies (EA) all perform inspections of waste management facilities to ensure that they are being operated in compliance with applicable federal, state and local regulations.

Both CalRecycle and the RWQCB require an operator of a waste management facility to obtain an operating permit. The California Code of Regulations Title 27 (27 CCR), Chapter 4 requires an operator of a non-hazardous landfill to obtain an operating permit known as a solid waste facilities permit (SWFP). The SWFP is concurred on by CalRecycle and then issued by an EA (typically the local county health department). The RWQCB, through regulations under 27 CCR, Chapter 4, Article 4, requires that an operator of a waste management facility that discharges wastes to land obtain an operating permit known as Waste Discharge Requirements (WDRs). The main supporting document that is required for a landfill to obtain both the SWFP and WDRs is called a Joint Technical Document (JTD).

In addition to the JTD, prior to issuance of the new SWFP (or whenever there will be a significant change in design and/or disposal operations), the owner must provide CalRecycle with a Preliminary Closure and Post-Closure Maintenance Plan (PCPCMP). The objectives of the PCPCMP are to provide a reasonable estimate of the maximum expected cost to close and maintain the landfill during a 30-year post-closure period. A PCPCMP element has been included as part of this JTD.

A.1.1 PURPOSE

The purpose of this JTD is to present a comprehensive description of the GCLF project including but not limited to: geology, hydrogeology, climatology, proposed design and operational features and procedures, and the proposed closure design and post-closure maintenance activities. This information is utilized by the LEA, CalRecycle, and local RWQCB to determine if the facility can be operated in compliance with applicable regulations and serves as the basis for the SWFP and WDRs.

The closure design and post-closure maintenance procedures will provide the basis for developing required costs estimates to establish funding to eventually close the GCLF and provide a minimum of 30 years of post-closure maintenance secured under an approved financial mechanism.

A.1.2 REPORT ORGANIZATION

The JTD is divided into six major components, Parts A, B, C, D, E and F. Part A provides general information on the JTD's format and content, a historic overview of the site, a summary of the proposed landfill design, landfill development, discussion of the proposed closure and post-closure maintenance plan element and associated financial assurances, and document references. Part B includes site operational information with the exception of the disposal site design features. Part C includes information on the disposal site design. Part D includes information on the site characteristics. Part E describes the proposed closure design and post-closure maintenance activities normally included in the PCPCMP. Finally, Part F provides the cost estimate associated with the proposed closure and post-closure activities described in Part E.

The JTD is separated into three volumes with Parts A through F followed by the figures included in Volume I, the appendices are presented in Volume II, and full-sized drawings are included in Volume III.

Regulatory Requirements Cross-Reference Table

This JTD includes the required cross-reference index to enable the EA, RWQCB, CalRecycle and other readers to easily find the appropriate section and pages in Parts A through F which corresponds to the specific regulatory requirements set forth under 27 CCR, Chapters 3 and 4 and the Code of Federal Regulations, Title 40 (40 CFR), Part 258 (also known as Subtitle D). This information is included in Tables 1 (SWRCB JTD Index) and 2 (JTD Index - CalRecycle Requirements).

Subtitle D Compliance Checklist

The Subtitle D Checklist was developed by the State Water Resources Control Board (SWRCB) to assist the dischargers and RWQCBs in assessing compliance with the Federal requirements (i.e., 40 CFR, Part 258). The checklist is included as Appendix A.

Table 1
Gregory Canyon Landfill
SWRCB JTD Index

SWRCB Requirement	SWRCB Citation	Related CIWMB Citation	JTD Section(s) Fulfilling SWRCB Citation
Mon. systems designed by RG or RCE.	20415(e)(1)		Sec. B.5.1.3.
Logging of borings.	20415(e)(2)-(e)(2)(C)		Sec. B.5.1.3.1; App. C (Attachment 1); App. C-1 (Attachment 1); App. G (Attachment 2); Some existing wells will be incorporated into the proposed monitoring well network.
Shared monitoring system demonstration for contiguous Units.	20415(e)(3)		If contig. Units: All Units at the GCLF will be contiguous, therefore, only one monitoring program will be utilized.
Monitoring sample QA/QC.	20415(e)(4)-(e)(4)(D)		App. G (Attachment 1).
Sampling & analytical methods (perf. std. for).	20415(e)(5)		App. G (Attachment 1).
Monitoring data procurement, analysis, and submittal.	20415(e)(6)-(e)(15)		Sec. E.2.5; App. G, Sec. 2.6.3, 2.6.4; Tables 3-18.
☐20420.Detection Monitoring Program.	20420		Sec. B.5.1.3; Sec B.5.1.3.1; App. G; WDRs will be issued for GCLF during the permitting process.
☐20425. SWRCB - Evaluation Monitoring Program.	20425	re (d)(3): 20919 et seq., 21790(b)(8)(E), 21800(c)	New facility, EMP will be developed, if necessary.
☐20430. Corrective Action Program.	20430		New Facility, CAP will be developed, if necessary. Reasonable Foreseeable Release information included in Section B.5.1.7.
Subchapter 4. Criteria for Landfills and Disposal Sites Article 2. CIWMB - Daily and Intermediate Cover			
☐20705.Standards for Daily and Intermediate (Interim) Cover.	20705		Sec. B.4.4.5 & B.4.4.6, App. F-1.
Subchapter 5. Closure and Post-Closure Maintenance ** Article 1. General Standards For All Waste Management Units **			
☐20950. General Closure and PostClosure Maintenance Standards Applicable to Waste Management Units (Units) for Solid Waste.	20950	re ☐(f): 21780(a)(3), 21790(b)(1), 21800(c), 21820, 21840	Parts E and F.
Article 2. Closure and Post-Closure Maintenance Standards for Disposal Sites and Landfills ☐21090.Closure and Post-Closure Maintenance Requirements for Solid Waste Landfills.			

Table 1
Gregory Canyon Landfill
SWRCB JTD Index

SWRCB Requirement	SWRCB Citation	Related CIWMB Citation	JTD Section(s) Fulfilling SWRCB Citation
Final cover requirements (general).	21090(a)-(a)(2)	21140, 21790(b)(8)(B), ~~21800(c)~~	Sec. E.1.3.
Erosion control layer.	21090(a)(3)-(a)(3)(A)3.	21140, 21150, 21790(b)(8)(D), ~~21800(c)~~	Sec. E.1.3.1.4.
Maintenance (& plan for).	21090(a)(4)-(a)(4)(D)		Sec. E.2; Sec. E.2.8; Sec E.2.10; Sec F.1.3; Table 18.
Discharges of liquids to covers (leachate & condensate).	21090(a)(5)(A)		Not proposed for GCLF.
Discharges of liquids to covers (other liquids).	21090(a)(5)(B)	20800, 21600(b)(8)(D)	Not proposed for GCLF.
Stability analysis.	21090(a)(6)	21145, 21790(b)(8)(B)	Sec. E.1.3.1.3; Sect. E.1.5; App. C.
Grading requirements (performance standards).	21090(b)-(b)(3)	20650, 21142(a), 21150, 21600(b)(4)(D), 21790(b)(8)(B)	Sec. B.5.4, Sec. C.2.8; Sec. C.3.5; Sec. C.4; Sec. E.1.2; Sec. E.1.7; Sec. E.2.12; Figures 9 and 20; and App. M.
General post-closure duties.	21090(c)-(c)(5)	**re (c)(2):** 21150, 21160, 21180, 21790(b)(8)(F) // **re (c)(4):** 21600(b)(8)(F)	Section E.2.
Landfill closure deadline & extension.	21090(d)	21110, 21790(b)(8), 21800(c)	Any closure deadline extension approvals granted by the EA will only be implemented after concurrence with the SDRWQCB.
Final cover survey(s).	21090(e)-(e)(4)	21142(b)	Sec. E.1.4.
Optional clean closure.	21090(f)-(f)(2)	21810	Not applicable to GCLF.
☐21132.Landfill Emergency Response Plan Review.	☐21132		Sec. E.3.
☐21400.Closure Requirements for Surface Impoundments.	☐21400		If LF facility has SI: Not applicable to GCLF.
☐21410.SWRCB - Closure Requirements for Waste Piles.	☐21410		If LF facility has WP: Not applicable to GCLF.
Chapter 4. Documentation and Reporting For Regulatory Tiers, Permits, WDRs, and Plans Subchapter 3. Development of Waste Discharge Requirements (WDRs) and Solid Waste Facility Permits Article 2. CIWMB - Applicant Requirements.			
☐21585.SWRCB - Joint Technical Document (JTD). [format for submittal of ☐21710, ☐21750, ☐21760 information]	21585		Sec. A.1.2; Table 1.
Article 4. SWRCB - Development of Waste Discharge Requirements (WDRs) **			
☐21710.SWRCB - Report Of Waste Discharge (ROWD) and Other Reporting Requirements. [see also ☐21585]	21710	re ☐(c)(~~1~~2): 21145(b), 21200, 21630	This JTD constitutes a Report of Waste Discharge as required under this Section (21710).

Table 1
Gregory Canyon Landfill
SWRCB JTD Index

SWRCB Requirement	SWRCB Citation	Related CIWMB Citation	JTD Section(s) Fulfilling SWRCB Citation
☐21720.SWRCB - Waste Discharge Requirements (WDRs).	21720(d-f)	re ☐(f): 20510, 20515	Sec. A.1-1; Sect. B.2.2.2; WDRs will be issued for GCLF during the permitting process.
☐21730.SWRCB - Public Participation. [proposed listing of potentially interested parties]	21730(a)		SDRWQCB to notify public.
☐21740.SWRCB - Waste Characteristics.	21740	re ☐(a)(1): 21600(b)(2)(A) & (b)(7)(E)	Sec. B.1.5; Table 4.
☐21750.SWRCB - Waste Management Unit (Unit) Characteristics and Attributes to be Described in the ROWD.			
Analysis of potential for impairment.	21750(a)	21600(b)(4)(A)	Sect. B.5.1.1.4; Sec. B.5.1.5
Support for proposed Unit classification.	21750(b)	21600(b)(4)(A)	Part D – Secs. D.1 thru D.6.
Listing & incorporation of supporting documents.	21750(c)	21600(b)(4)(A)	Sec. D.6.
Topographic map.	21750(d)(1)	21600(b)(4)(A)	Sec. D.2.1 and D.2.2; Figure 30A.
Floodplain analysis.	21750(d)(2)-(d)(2)(C)2.	21600(b)(4)(A)	Sec. D.2.3, Figure 30B.
Climate	21750(e)-(e)(6)	21600(b)(4)(A)	Sec. D.3; Figures 28, 28A.
Geology	21750(f)-(f)(7)	21600(b)(4)(A) // re (f)(5): 21145, 21790(b)(8)(B)	Sec. D.4; Figs. 29 and 30; App. C; Plate 1; Fig. 1-1.
Hydrogeology	21750(g)-(g)(7)(D)	21600(b)(4)(A)	Sec. D.5; Fig. 30A; App. C, Plate 2; Tables 2-3 thru 2-19, Fig. 2-3A, 3B; App. C-1
Land/Water Use	21750(h)-(h)(5)	21600(b)(4)(A) re ¶(h)(4): 21600(b)(3)(E)	B.1.2.4, Sec. D.5; D.5-14 thru D.5-17; Figs. 3, 4, 8A, 10C, 11A, 30A; Table 12D; App. C; Fig. 2-2; App. G.
Preliminary closure plan.	21750(i)		Parts E and F including Tables 17 and 18.
☐21760. SWRCB - Design Report and Operations Plan.			
Design Report ☐ Preliminary and asbuilt plans.	21760(a)(1)		Sec. C.1.1; Sec. C.2.1; Drawings 1 thru 28 constitute the Preliminary Plans; As-Built plans will be submitted to the SDRWQCB upon completion of the landfill or any portion there of.
Design Report	21760(a)(3)-(a)(4)		Sec. B.5.1.1.4 thru Sec. B.5.1.7; Sec. E.2.5; Sec. C.4; Fig. 10C; Appendix G
Operation Plan	21760(b)-(b)(3)		Sec. B.4, B.5, Sec. E.2 and E.3.
Subchapter 4. Development of Closure/Post-Closure Maintenance Plans 21769. SWRCB - Closure and Post-Closure Maintenance Plan Requirements.			
Prelim. Cl/P-Cl Plan ☐☐ purpose	21769(b)(1)		Sec. E.1.1.
Prelim. Cl/P-Cl Plan Contents - cost analysis.	21769(b)(2)-(b)(2)(B)5.		Part E (all sections) and Part F including Tables 17 and 18.
Final Cl/P-Cl Plan	21769(c)-(c)(2)(H)3.		Sec. A.2.5.

Table 1
Gregory Canyon Landfill
SWRCB JTD Index

SWRCB Requirement	SWRCB Citation	Related CIWMB Citation	JTD Section(s) Fulfilling SWRCB Citation
Chapter 5. Enforcement Article 4. Enforcement by Regional Water Quality Control Board (RWQCB) **			
☐22190. SWRCB - Mandatory Closure (Cease and Desist Orders).	22190(b)		If early closure is mandated, GCL will comply with SDRWQCB orders.
Chapter 6. Financial Assurances at Solid Waste Facilities and at Waste Management Units for Solid Waste Subchapter 2. Financial Assurance Requirements Article 1. Financial Assurance for Closure			
☐22207. SWRCB - Closure Funding Requirements.	22207(a)		GCL has established closure fund in accordance with CIWMB requirements (See Sec. F.1.4).
Article 2. Financial Assurance for Post-Closure Maintenance			
☐22212. SWRCB - Post-Closure Funding Requirements.	22212(a)		GCL has established closure fund in accordance with CIWMB requirements (See Sec. F.1.4).
Article 4. Financial Assurance Requirements for Corrective Action			
☐22222. SWRCB - Corrective Action Funding Requirements.	22222		Sec. B.5.1.4 thru B.5.1.7, Table 8. A fund to accommodate the Reasonably Foreseeable Release Estimate will be established after the WDRs are issued and prior to actual disposal operation.

Table 2
Gregory Canyon Landfill
JTD Index - CalRecycle Requirements

CalRecycle JTD Requirements	CalRecycle Section No.	SWRCB Section No.	JTD Section(s)
General			
Name of Facility, Site Operator and Owner	21600(b)(1)(A)		Sec. A.2-2 - p. A.2-3
Description of the Operation Cycle	21600(b)(1)(A)		Sec. B.4.4.2 thru B.4.4.5.1
Site Plan Including Boundaries, Acreage, and Buffer Zones	21600(b)(1)(B)		Sec. B.1.2.3; Sec. B.1.4; Figures 2, 6A, 27A; App. B-3
Hours of Operation	21600(b)(1)(C)		Sec. B.4.1
Waste Classification and Management			
Types and Quantities of Waste	21600(b)(2)(A)	21740(a)(1)	Sec. B.1.5.2 thru B.1.5.4
Waste Management Unit Classification and Siting			
Airport Safety	21600(b)(3)(A)		Sec. B.1.2.2; Not applicable to GCLF.
Volumetric Capacity	21600(b)(3)(B)		Sec. B.1.6, B.1-12
Site Life Estimate	21600(b)(3)(C)		Sec. B.1.7
Site Location (vicinity map)	21600(b)(3)(D)		Sec. B.1.3; Figure 6
Surrounding Land Use and Zoning (plot plan)	21600(b)(3)(E)	21750(h)4	Sec. B.1.2.4; Figs. 3, 4
Ancillary Facilities (include on plot plan)	21600(b)(3)(F)		Sec. B.3; Figures 8 and 8A
Design and Construction Standards for All Waste Management Units			
Design Responsibility *{Describe how the site design provides for the surrounding physical setting}*	21600(b)(4)(A)	21750(a-h)	Sec. D.1, D.2, D.3, D.4, D.5 and D.6
Design Responsibility *{New disposal sites shall be designed under a civil engineer}*	21600(b)(4)(B)		Sec. C.1.1
Construction Sequencing Plans	21600(b)(4)(C)		Sec. C.2.9; Figures 20-26
Grading Plan *{Include existing and proposed final contours for disposal area and borrow area}*	21600(b)(4)(D)	21090(b)-(b)(3)	Sec. B.4.4.1.4; Sec. E.1.2; Figures 9 and 20
Gas Management Plan	21600(b)(4)(E)		Sec. B.5.2; Sec. C.2.7; Figures 2, 10D, 11, 16 and 16A
{Demonstrate the ability to comply with T27 20919, 20919.5 and gas control for closure plans}			
Operating Criteria {Demonstrate the ability to comply with the following:}			
Disposal Site Records	21600(b)(5)(A)		Sec. A.3
Site Security	21600(b)(5)(B)		Sec. B.3.2; Sec. B.3.1.3
Sanitary Facilities	21600(b)(5)(C)		Sec. B.4.6.1
Disposal Site Records	21600(b)(5)(A)		Sec. A.3
Site Security	21600(b)(5)(B)		Sec. B.3.2; Sec. B.3.1.3

Table 2
Gregory Canyon Landfill
JTD Index - CalRecycle Requirements

CalRecycle JTD Requirements	CalRecycle Section No.	SWRCB Section No.	JTD Section(s)

Design and Construction Standards for All Waste Management Units (continued)
Operating Criteria {Demonstrate the ability to comply with the following:}

Sanitary Facilities	21600(b)(5)(C)		Sec. B.4.6.1
Communications Systems	21600(b)(5)(D)		Sec. B.4.6.3
Lighting {for facilities which operate during darkness}	21600(b)(5)(E)		Sec. B.4.6.4
Safety Equipment	21600(b)(5)(F)		Sec. B.4.6.5
Personnel Requirements	21600(b)(5)(G)		Sec. B.4.2; Table 6
Personnel Training	21600(b)(5)(H)		Sec. B.4.2.2
Supervisory Structure	21600(b)(5)(I)		Sec. B.4.2.3
Spreading and Compacting	21600(b)(5)(J)		Sec. B.4.4.3

Cover

Cover Materials	21600(b)(6)(A)		Sec. B.4.4.5 thru B.4.4.8; Sec. C.2.2.3; Sec. C.3.2; Figures 15 and 31, App. F-1
Alternative Daily Cover and Beneficial Reuse	21600(b)(6)(B)		Sec. B.4.4.5.1
Cover Frequency	21600(b)(6)(C)		Sec. B.4.4.5
Intermediate Cover	21600(b)(6)(D)		Sec. B.4.4.6

Handling

Public Health Design Parameters	21600(b)(7)(A)		Sec. B.5
Salvaging Activities	21600(b)(7)(B)		Sec. B.4.5
Volume Reduction Activities	21600(b)(7)(C)		Sec. B.4.5.5
Equipment	21600(b)(7)(D)		Sec. B.4.3; Table 7

CalRecycle JTD Requirements	CalRecycle Section No.	SWRCB Section No.	JTD Section(s)

Handling

Special Waste Handling	21600(b)(7)(E)	21740(a)(1)	Sec. B.1.5.2.3.; Sec. B.4.4.2.1; Sec. B.5.6;App. F

Environmental Controls

Nuisance	21600(b)(8)(A)		Sec. B.5.3; App. D-2
Fire Control	21600(b)(8)(B)		Sec. B.5.3.5
Leachate Control (for purposes of public health)	21600(b)(8)(C)		Sec. B.5.1.1; Sec. C.2.5; Fig. 13, 14, 15, 15A
Dust Control	21600(b)(8)(D)	21090(a)(5)(B)	Sec. B.5.3.1
Vector Control	21600(b)(8)(E)	20425(d)(3)	Sec. B.5.3.2
Drainage & Erosion Control	21600(b)(8)(F)	21090(c)(4)	Sec. B.5.4; Sec. C.2.8; Figs. 17, 19, App. I1
Litter Control	21600(b)(8)(G)		Sec. B.5.3.3
Noise Control	21600(b)(8)(H)		Sec. B.5.3.4
Traffic Control (within the facility)	21600(b)(8)(I)		Sec. B.5.5
Hazardous Waste/Loadchecking	21600(b)(8)(J)		Sec. B.4.4.2.1; Sec. B.5.6;App. F

Table 2
Gregory Canyon Landfill
JTD Index - CalRecycle Requirements

CalRecycle - Requirements for JTD/RDSI amendments and/or complete application package [21600(a)]	**CalRecycle Section No.**	**SWRCB Section No.**	**JTD Section(s)**
Approvals			
Compilation of Approvals	21600(b)(9)		Sec. B.2; Table 5, App. D-1
CEQA Information	21570(f)(3)(4)		Sec. B.2.2.5
Conformance Finding Information	21570(f)(5)		Sec. B.2.2.3
Complete Closure/Postclosure Maintenance Plan	21570(f)(6)		Sec. A.2.5; Sec. E.1, E.2, E.3, E.4 and F.1
Financial Assurances Operating Liability Information	21570(f)(7 and 8)		Sec. B.2.2.1; F.1.4
Land Use and/or Conditional Use Permits	21570(f)(9)		Sec. B.2.2.3

CalRecycle - Closure/Postclosure Maintenance Plan Requirements if part of JTD - Preliminary Closure Plans	**CalRecycle Section No.**	**SWRCB Section No.**	**JTD Section(s)**
Closure Cost Estimate	21790(b)(1)	20950(f)	Sec. F.1; Table 17, App. R
Location Maps	21790(b)(2 & 4)		Figures 1 and 6
Post-Closure Land Uses	21790(b)(5)		Sec. B.1.9; Sec. D.1.3
Estimate of Required Closure	21790(b)(6)		Sec. F.1; Table 17, App. R
Estimated Closure Date	21790(b)(7)		Sec. B.1.7
Closure Activities	21790(b)(8)	21090(d)	Sec. E.1.12; Table 13
Site Security and Structure Removal	21790(b)(8)(A)		Sec. E.1.10, E.1.11
Final Cover and Grading	21790(b)(8)(B)	21090(a)-(a)(2), (a)(6), (b)-(b)(3), 21750 (f)(5)	Sec. B.4.4.7; Sec. E.1.2; Sec. E.1.3; Figures 9, 20, and 31
Construction Quality Assurance	21790(b)(8)(C)		Sec C.4; Sec. E.1.6; App. M and N
Drainage and Erosion Control	21790(b)(8)(D)	21090(a)(3)-(a)(3)(B)	Sec. E.1.7; Sec. B.5.4; Sec. C.2.8; Figs. 17, 19, App. I1
Gas Monitoring	21790(b)(8)(E)	20425(d)(3)	Sec. E.1.8; Sec. Sec. B.5.2; Sec. C.2.7; Figures 2, 10D, 11, 16 and 16A
Leachate Monitoring	21790(b)(8)(F)	21090(c)(2)	Sec. B.5.1.1; Sec. C.2.5; Sec. E.1.9.1; Fig. 13, 14, 15, 15A

CalRecycle – Closure/Postclosure Maintenance Plan Requirements if part of JTD – Final Closure Plans	**CalRecycle Section No.**	**SWRCB Section No.**	**JTD Section(s)**
Items Under 21790 (Preliminary Plans)	21800(c)	20425(d)(3), 20950(f), 20909(a)-(a)(3)(A)(3), 21090	Preliminary Closure Plan included in Parts E and F of the JTD.
Sequence of Closure Stages With Dates	21800(c)	21090(a)-(a)(2), (d)	Not applicable to a Preliminary.
Schedule for Disbursement	21800(d)		Not applicable to a Preliminary.

Table 2
Gregory Canyon Landfill
JTD Index - CalRecycle Requirements

CalRecycle – Closure/Postclosure Maintenance Plan Requirements if part of JTD - Preliminary Postclosure Maintenance Plans	CalRecycle Section No.	SWRCB Section No.	JTD Section(s)
Description of Planned Uses per 21190	21825(b)(1)	21769(b)	Sec. B.1.9; Sec. D.1.3
Description of Maintenance per 21180	21825(b)(2)	21769(b)	Sec. E.2; Table 14

CalRecycle - Closure/Postclosure Maintenance Plan Requirements if part of JTD - Final Postclosure Maintenance Plans	CalRecycle Section No.	SWRCB Section No.	JTD Section(s)
Emergency Response Plans per 21130	21830(b)(1)	21769(c)	Sec. E.3
List of Responsible Parties	21830(b)(2)	21769(c)	Sec. E.2.2
Post-Closure Planned Uses per 21190	21830(b)(3)	21769(c)	Sec. B.1.9; Sec. D.1.3
As-builts for Monitoring and Control Systems, etc.	21830(b)(4)	21769(c)	Not applicable.
Description of Maintenance per 21180	21830(b)(5)	21769(c)	Not applicable.
Operations and Maintenance plan for Gas Control System	21830(b)(6)	21769(c)	Not applicable.
Plan to Report Results of Monit./Control per 21180	21830(b)(7)	21769(c)	Not applicable.
Postclosure Mtce. Cost Estimates per 21840	21830(b)(8)	21769(c)	Not applicable.

NOTE: For submitting amendments of Closure and Postclosure Maintenance Plans as part of a JTD, use Section 21780 and include the requirements of Section 21865 (b)(1)-(4).

SECTION A.2

PROJECT DESCRIPTION

A.2 PROJECT DESCRIPTION

A.2.1 HISTORIC OVERVIEW

The GCLF is located in northern San Diego County near the community of Pala (Figure 1). The GCLF property includes approximately 1,770 acres, 13.43 acres to be acquired from San Diego Gas & Electric (SDG&E), of which approximately 308.6 acres will be used for overall landfill activities (e.g., stockpile areas, ancillary facilities, access road, refuse disposal) of which 183 acres will be used for refuse disposal. A major portion of the site's remaining 1,462 acres will be used for permanent open space for long-term preservation of sensitive habitat and species and will not be used for waste disposal operations. The project will dedicate a minimum of 1,313 acres of the site for this proposed open space use. The proposed site will be permitted as a Class III landfill. The landfill will be operated using the canyon and area fill methods of refuse filling. Two dairies (the Lucio and Verboom properties) were operated for a number of years within the property limits of the GCLF, though neither operated within the proposed disposal area footprint.

The project site has been the subject of previous studies to determine the feasibility of developing a landfill: In 1990, the County of San Diego and Bureau of Land Management (BLM) prepared a Draft Environmental Impact Report/Environmental Impact Study (EIR/EIS) that included an evaluation of the Gregory Canyon site. Other landfill sites were also evaluated in the EIR/EIS including the Aspen Road site just west of Rainbow Valley and Interstate 15 near the Riverside County line, and the Blue Canyon site within the San Jose Del Valle region of northeastern San Diego County. The 1990 Draft EIR/EIS was never certified or acted on. However, the analysis led to a decision by the County Board of Supervisors to abandon the Blue Canyon site and add two other potential sites, Merriam Mountain and Gopher Canyon. The Gopher Canyon site was later eliminated from the County's search, leaving Gregory Canyon, Aspen Road and Merriam Mountain as possible landfill sites to serve the North County area.

In early 1994, petitions for an initiative to allow the Gregory Canyon site to be used for a landfill were circulated for registered voter signatures. This resulted in Proposition C being placed on the November 1994 ballot. San Diego County voters approved Proposition C in November 1994 with 68 percent of the vote in favor of allowing construction and operation of a Class III landfill and recycling collection facility on the project site. A copy of the Proposition C initiative is included in Appendix B.

Proposition C provides some project history. Section 2 of Proposition C, Findings and Purpose, cites the County's policy of subregional responsibility and states that San Diego County has unsuccessfully tried to site a new landfill facility in North County since the San Marcos Landfill was approved in 1977. The petition cites the 1986 County Solid Waste Management Plan (CoSWMP), which identified a critical need for an additional North County landfill to service North County residents. It also references the fact that the Gregory Canyon site was selected as one of three preferred landfill sites by the County, based on a 1987 siting study which evaluated more than 150 possible sites within 1,150 square miles of northern San Diego County.

The validity of Proposition C was challenged by two landowners in the area near the Gregory Canyon property. Litigation was filed in the State Superior Court against the County of San Diego and the project applicant, GCL. In May 1995, the Superior Court ruling upheld the validity of the initiative. The Pala Band of Mission Indians, one of the two original plaintiffs, appealed the decision of the Superior Court to the Court of Appeals and in 1997, the Court of Appeals unanimously upheld the validity of the initiative. The Supreme Court of California refused to hear an appeal of the decision of the Court of Appeals.

The approval of Proposition C opened the door for development of the property. Gregory Canyon Limited optioned rights to the property and began the process to approve the landfill project. A final EIR, reflecting the GCLF project, was resubmitted to the EA in January 2001. The Director of the Solid Waste EA certified that the FEIR was completed in compliance with CEQA and the CEQA Guidelines on February 6, 2003. The FEIR is comprised of the following parts: the January 28, 1999, Draft EIR; the December 9, 1999, Revised Draft EIR (RDEIR); the May 25, 2000, Revised Partial Draft EIR (RPDEIR); the comments submitted on the December 9, 1999 RDEIR and May 25, 2000 RPDEIR; responses to those comments; and a list of persons, organizations and agencies that submitted comments. On January 20, 2006, the

Superior Court for San Diego County issued a final order and writ of mandate ordering the decertification of the FEIR (2003 Draft EIR) and requiring additional environmental review to comply with the three matters noted by the Court. A Revised Partial Draft EIR (2006 RPDEIR) was prepared and issued for public comment on July 10, 2006. The 2006 RPDEIR addresses the requirements of the Court's writ and in certain instances goes beyond the requirement of the writ. The 2006 RPDEIR includes revisions to the 2003 Draft EIR that address: Land Use, Traffic, Biological Resources, Historic/Cultural and Ethnohistoric Resources, and Public Services (Water). The Revised Final EIR was certified on May 31, 2007.

In June 2007, a motion was filed to discharge the writ of mandate issued on January 20, 2006, which was granted in part and denied in part on February 11, 2008. The court ordered additional analysis in the area of water supply. An Addendum to the RFEIR was prepared in response to the court order and adopted on August 8, 2008. In August 2008 a second motion to discharge the January 20, 2006 writ of mandate was filed, which was granted on November 20, 2008. The November 20, 2008 order was upheld by the Court of Appeal on March 30, 2010. Based on a Court of Appeal decision overturning a 2006 recycled water supply contract entered into by the operator, an Addendum to the RFEIR was prepared to identify other sources of water supply, and was adopted on January 7, 2010. Based on a new Jurisdictional Determination by the U.S. Army Corps of Engineers, an Addendum to the RFEIR was prepared to update the waters on the landfill site subject to federal and state jurisdiction and was adopted on May 7, 2010.

The proposed design and operational activities related to the GCLF project are summarized in Sections A.2.3 and A.2.4, respectively.

A.2.2 FACILITY OWNER/OPERATOR

The GCLF is located on property currently owned by Gregory Canyon Limited. Gregory Canyon Limited is a California limited liability company in good standing. For additional information regarding ownership of the site, please refer to Section B.1.4. Gregory Canyon Limited will also be shown as the operator of record on all permits and approvals, including the SWFP and WDRs. Actual day-to-day operations at the site will be conducted by a contract operator. A copy of a sample non-exclusive license and operating agreement is included as Appendix B-1. Upon approval of the project, Gregory Canyon Limited will select a qualified contract operator and provide the LEA with a copy of the negotiated contract, including appropriate personnel qualifications.

A.2.3 PROPOSED LANDFILL DESIGN AND DEVELOPMENT

The proposed Class III GCLF project will include the following landfill design features:

- The proposed landfill footprint will be approximately 183 acres. Section B.1.4, Section C.2.1, Section D.1.2, see Figure 2.
- The project area will also include designated soil stockpile/borrow areas (Section B.4.4.1.1; Section C.2.2.4; Section C.3.2 ; Figure 2). The designated stockpiling and borrow areas will be provided in two locations. Borrow/Stockpile Area A will be located west of the proposed landfill footprint at a distance of approximately 960 feet (adjacent to the western property boundary). Borrow/Stockpile Area B will be located immediately southwest and adjacent to the proposed landfill footprint. Other project components include an ancillary facilities area (Section B.3.1), access road (Section B.3.1.1), bridge and internal haul road (Section B.3.1.1), and two drainage desilting basins (Section C.2.8.3.4).
- The GCLF project waste containment unit design will meet and in some cases (i.e., the proposed liner), exceed State Class III WMU standards, as defined under 27 CCR, Chapters 3 and 4, and federal non-hazardous municipal solid waste landfill regulations, as specified in 40 CFR, Parts 257 and 258 (also known as Subtitle D). The waste containment system will consist of a subdrain system (Section B.5.1.2, Section C.2.3, Figures 13, 14, 15 and 15A), composite liner (Section C.2.4, Figure 14); a leachate collection and removal system (LCRS) (Section B.5.1.1.2; Section C.2.5.4, Figures 13, 14, 15, and 15A); a protective cover layer (Section C.2.6, Figure 14); and ultimately, a final cover (Section E.1.3, Figure 31).
- Installation of environmental monitoring and control systems. Section B.5.1.1.2, Section B.5.1.3.1, Section B.5.2.3 , and Section B.5.3 .
- The landfill will be developed in accordance with engineering design plans for the final landfill configuration. The conceptual engineering design proposes four excavation (Phases I, II, III and IV) and three refuse fill phases (Phases I, II and III). Section C.2.9 , and Figures 9, 21, 21B, 22, 23, 24, 25 and 26.

- The final grading contours will reach a maximum elevation of 1,100 feet above mean sea level (amsl). Section B.4.4.1.4 and Figure 9.
- The proposed disposal area will provide approximately 30.8 million tons of refuse capacity. Section B.1.6 .

Figure 2 presents the layout of the proposed landfill and the proposed areas for stockpiling.

It should be noted that over time and as a result of regulatory agency comments, the GCLF project has been changed from the "proposed project" presented in the certified FEIR (Chapter 3.0 – Project Description). The project described in the JTD was downsized from the "proposed project" in the FEIR and as a result has less potential impacts than would occur from the "proposed project" in the FEIR. Appendix B-2 presents comparison information contained in the FEIR and JTD to show these changes.

A.2.4 PROPOSED LANDFILL OPERATIONS

The following proposed operations will be conducted at the GCLF as part of regular disposal activities:

- The peak daily refuse loading will be 5,000 tons per day (tpd). Section B.1.5.4 .
- The average annual tonnage is anticipated to be approximately 1,000,000 tons (assumes 307 operating days and daily inflow rate of 3,200 tpd and is rounded up) or 3,200 tpd over the life of the project. Section B.1.5.4 .
- The hours of operation will be 7:00 a.m. to 6:00 p.m., Monday through Friday, and 8:00 a.m. to 5:00 p.m. on Saturday. The landfill will operate six days a week (less six major holidays) for a total of 307 operating days per year. Section B.4.1.
- The site life will be approximately 30 years. Section B.1.7.
- As part of normal disposal operations, the use of alternative daily cover (ADCs), in conjunction with soil, will be implemented. Initially, the selected ADC will be geosynthetic blankets and processed green material utilized as part of daily refuse cover operations. Section B.4.4.5.1.

A.2.5 PRELIMINARY CLOSURE AND POST-CLOSURE MAINTENANCE PLAN (PCPCMP) STATUS

This JTD integrates a simplified PCPCMP element prepared in accordance with current regulations and included as Parts E and F of this document. A separate Final Closure Plan will be prepared and submitted to the appropriate regulatory agencies (i.e., EA, CalRecycle and RWQCB) two years prior to the anticipated closure date for any portion thereof or the entire landfill. A separate discretionary action and CEQA review and clearance will be required prior to approval of the Final Closure Plan.

SECTION A.3

RECORDKEEPING

A.3 RECORDKEEPING

A.3.1 OPERATING RECORD

A comprehensive operating record will be maintained in accordance with federal and State regulations under 40 CFR 258.29 (Subtitle D) and 27 CCR, Section 20515. Those landfilling activities related to the requirements discussed below will be documented and included in the operating record.

Requirements under 40 CFR 258 and 27 CCR, Section 20515

- Any location restriction demonstration required by 27 CCR, Section 20270;
- Inspection records, training records, and notification procedures required by 27 CCR, Section 20870;
- Gas monitoring results from monitoring and any remediation plans required by 27 CCR, Section 20919;
- Closure and post-closure maintenance plans as required by 27 CCR, Section 21780, notice of intent to close the unit as required by 27 CCR, Section 21135, notice of certification of closure as required by 27 CCR, Section 21880, deed notation as required by 27 CCR, Section 21170, and any gas monitoring, testing, or analytical data as required by 40 CFR 258.61;
- Demonstration, certification, finding, monitoring, testing or analytical data required by 40 CFR 258 Subpart E (Sections 258.50 - 258.58);
- Closure and post-closure care plans and any monitoring, testing, or analytical data required by 40 CFR 258 Sections 258.60 - 258.61; and
- Any cost estimates and financial assurance documentation required by 27 CCR, Sections 22221, 22226, 21820 and 21840.

Approvals, determinations and other requirements authorized by the EA under Chapter 3, Subchapter 4 shall be documented in writing to the operator and placed in the operating record in accordance with 27 CCR, Section 20517.

A.3.2 TONNAGE RECORDS

Each refuse disposal vehicle entering the GCLF will be required to check in at the entrance facility and will be weighed prior to unloading at the landfill working face. Typically, a commercial vehicle's tare weight is known and is usually marked on the vehicle so that the scale operator can determine the net weight of refuse being hauled. If the tare weight is not already known, the scale operator will direct the vehicle to weigh in before and after unloading to determine the weight of refuse delivered. Daily receipts will be kept by the scale operators and maintained in the operating record. This information will be used to assist in projecting the rate of filling, for reporting to the EA and RWQCB, and for determining the various fees assessed on a per ton basis.

A.3.3 SUBSURFACE RECORDS

Data and records concerning subsurface conditions will be found in the boring logs, geologic and hydrogeologic maps, and various studies completed for the proposed GCLF development. Groundwater information will be gathered, as required, under the monitoring program and reported to the RWQCB.

Records showing the excavation of future refuse area subgrade also will be maintained. Subsurface records will be maintained and available on-site for review.

A.3.4 UNUSUAL OCCURRENCES

The operator will maintain a daily log of unusual occurrences which will be available for inspection upon request. Unusual occurrences of special interest would include, but is not limited to, landfill fires, landslides, flooding, unusual and sudden settlement, earthquakes and resulting damage, injury and property damage accidents, explosions, receipt or rejection of unpermitted wastes, and any other unusual occurrences.

A.3.5 LOCATION AND INSPECTION OF OPERATING RECORDS

The operating records will be maintained on-site at the GCLF administration office. These records will be available during normal business hours for inspection by authorized representatives of those regulatory agencies having jurisdiction over the GCLF.

SECTION A.4

REFERENCES

A.4 REFERENCES

The following reference material was utilized in the preparation of this JTD.

1. California Code of Regulations, Title 22, Division 4, Chapter 30.
2. California Code of Regulations, Title 27, Division 2.
3. California, State of, Public Resources Code, Division 30.
4. EPA Regulations, Title 40 Code of Federal Regulations, Parts 257 and 258 (Subtitle D).
5. David Evans and Associates, Inc., January 1999, Draft Environmental Impact Report for the Gregory Canyon Landfill.
6. PCR, December 1999, Revised Draft Environmental Impact Report for the Gregory Canyon Landfill.
7. PCR, May 2000, Revised Partial Draft Environmental Impact Report for the Gregory Canyon Landfill.
8. PCR, December 2002, Final Environmental Impact Report for the Gregory Canyon Landfill.
9. PCR, March 2007, Revised Final Environmental Impact Report for the Gregory Canyon Landfill.

SECTION A.5

CERTIFICATION OF CONTENTS
AFFIDAVITS/DOCUMENTATION

A.5 CERTIFICATION OF CONTENTS AND AFFIDAVITS/DOCUMENTATION

On behalf of Gregory Canyon Ltd., a California limited liability company, I hereby certify that the application for a Solid Waste Facility Permit, including the Joint Technical Document, dated September 2010, Revised January 2011, is accurate and true to the best of my knowledge and belief. The permit application and Joint Technical Document have been prepared in accordance with 27 CCR Sections 21585, 21590, and 21600.

Respectfully submitted,

James D. Simmons
Authorized Representative

CERTIFICATE OF PRESIDENT AND MANAGING MEMBER OF

GREGORY CANYON, LTD. LLC
A California Limited Liability Company

I, IRWIN M. HELLER, hereby certify that:

I am the President and Managing Member of Gregory Canyon, Ltd. LLC, a California limited liability company (the "Company"); and

Pursuant to the Operating Agreement of the Company, James Simmons is authorized to execute the permit application and Joint Technical Document submitted to the San Diego County Department of Environmental Health, any and all certifications related to the accuracy of information contained in the permit application and Joint Technical Document, and all other certifications and documents related thereto, on behalf of the Company.

IN WITNESS WHEREOF, I have executed this certificate as of June 20, 2010.

IRWIN M. HELLER
President and Managing Member

SDGE Southern California Gas Company
Sempra Energy utilities

Jim Seifert
Real Estate Manager

CP1-1D
8335 Century Park Court
San Diego, CA 92123

Tel: (858) 637-3714
Fax: (858) 637-3766
JSeifert@SempraUtilities.com

September 1, 2010

Mr. James Henderson
Solid Waste Local Enforcement Agency
County of San Diego
Department of Environmental Health
9325 Hazard Way
San Diego, CA 92123

Re: Gregory Canyon Landfill

Dear Mr. Henderson:

At the request of Gregory Canyon, Ltd. (Gregory Canyon), this letter is written to acknowledge that San Diego Gas & Electric Company (SDG&E) is the owner of existing transmission facilities, and holds an easement or fee interest over the power line right of way, all located within the Gregory Canyon Landfill site. SDG&E also holds an easement and operates a natural gas pipeline within the Gregory Canyon Landfill site.

SDG&E is aware that the Gregory Canyon Landfill project is a proposed solid waste landfill, and further understands that its construction and operation would occur within areas subject to SDG&E's property interests. We further understand, based on Gregory Canyon's current development plan, that relocation of the transmission facilities can take place some years following initial construction and operation of the proposed landfill.

SDG&E certifies that the statements in this letter, and the discussion in Section B.1.4 of the Gregory Canyon JTD (to the extent it addresses SDG&E's ownership interests and facilities) are true and correct to the best of its knowledge and belief.

Please contact me if you have any questions concerning this matter.

Sincerely,

Jim Seifert
Real Estate Manager

Gregory Canyon Ltd. LLC

August 20, 2010

Solid Waste Local Enforcement Agency
San Diego County Dept. of Environmental Health
9325 Hazard Way
San Diego, CA 92123
Attn: James Henderson

Re: Gregory Canyon Landfill

Dear Mr. Henderson:

This letter is written to describe the current lease arrangements existing on portions of the Gregory Canyon site owned by Gregory Canyon, Ltd.

Two current lease arrangements exist. The first is with Herzog Construction Company for use of a portion of the former Lucio Dairy as a storage yard. This is a verbal lease with no fixed term, and is terminable at will by either party.

The second lease is for the former Lucio residence, for use as a residence by the caretaker of the Gregory Canyon, Ltd. property. This is a verbal lease with no fixed term, and is terminable at will by either party.

On behalf of Gregory Canyon, Ltd. LLC, a California limited liability company, I hereby certify that the information contained herein is accurate and true to the best of my knowledge and belief. I am authorized by Gregory Canyon, Ltd. to provide this certification on behalf of the company.

Sincerely,

James Simmons
Authorized Representative

160 Industrial Street, Suite 200, San Marcos, CA 92078
Telephone: (760) 471-2365 • E-Mail: jim.simmons@cciconnect.com

PART B

DISPOSAL SITE INFORMATION

SECTION B.1

FACILITY OVERVIEW

B.1 FACILITY OVERVIEW

B.1.1 INTRODUCTION

The proposed GCLF will operate as a Class III waste disposal site in accordance with applicable local, State, and federal regulations. This section presents information regarding the ancillary facilities, environmental monitoring procedures/programs, and waste handling and disposal operations for the proposed facility. The information presented in this part satisfies the regulatory requirements under 27 CCR, Sections 21600 and 21760 with the exception of information related to the disposal site design and site characteristics (e.g., geologic, hydrogeologic conditions), which are presented in Parts C and D of this JTD, respectively.

Gregory Canyon Landfill is owned and operated by Gregory Canyon Limited. Gregory Canyon Limited will also be shown as the operator of record on all permits and approvals, including the SWFP and WDRs. Actual day-to-day operations at the site will be conducted by a contract operator.

Tables 1 (SWRCB JTD Index) and 2 (JTD Index - CalRecycle Requirements) included in Part A provides cross-reference information to find the appropriate sections in Part B which best correspond to the specific regulatory requirements for this permitting document under 27 CCR and 40 CFR. In addition, the Subtitle D Checklist is included in Appendix A to assess compliance with 40 CFR, Part 258.

B.1.2 WASTE MANAGEMENT UNIT CLASSIFICATION AND SITING

B.1.2.1 SITE CHARACTERISTICS

In accordance with 27 CCR, Section 20260, Class III landfills shall be located where site characteristics provide adequate separation between wastes and waters of the state. The following classification criteria must be considered for landfills:

- Geologic Setting
- Flooding
- Ground Rupture

- Rapid Geologic Change

These factors were all considered in the design of the GCLF. Based on consideration of the geologic and hydrogeologic setting, a containment system, as presented in Part C, will be utilized at the GCLF. Part D presents additional information on the above listed classification criteria relative to the GCLF design and operation.

B.1.2.2 AIRPORT SAFETY

In accordance with Subtitle D, Subpart B, Airport Safety of 40 CFR, Part 258.10 and 27 CCR, Section 20270, owners/operators of landfills, existing and proposed, are required to demonstrate that a landfill's design and operations will not pose a bird threat to any airport. The GCLF is not located within a five-mile radius of an airport that is used by turbojet aircraft or by piston-type aircraft.

B.1.2.3 FACILITY BOUNDARIES

Figure 2 also shows the property boundary (SWFP boundary), disposal area footprint, approximate acreage of the disposal areas, and the buffer zones (those areas between the property boundary and the disposal area footprint).

B.1.2.4 SURROUNDING LAND USE

Adjacent land uses and zoning designations adjacent to the boundaries of the GCLF are shown on Figures 3 and 4. As shown, land use in the vicinity of the proposed project site is primarily rural, including agricultural, large lot residences, scattered small communities, and occasional large-scale commercial/industrial uses (primarily mining). The GCLF is bounded on the east by the Pala Indian Reservation (including a portion of Gregory Mountain). To the immediate south is Couser Canyon, which hosts agricultural estate-density residential developments, with avocado and citrus estates typically on lots varying from two to eight acres. Between Couser Canyon Road and the southern project site boundary (i.e., within one half mile of the proposed landfill footprint), there are approximately 20 residences, with four structures located within 500 feet of the project boundary. Pala Rey Ranch, a community of agricultural estate-density residences, is located west of the site, with the two closest homes located within 1,000 feet of the GCLF boundary. A sand and gravel extraction operation was formerly located south of SR76 approximately 3,000 feet north of the proposed landfill footprint, but is now inactive. Lower Rice Canyon is located northwest of the site. The San Luis Rey River and SR76 run east-west through the project site with the majority of the project site lying south of SR76. The entire landfill footprint is located south of the river above the 100-year flood plain. A casino and resort hotel was constructed on the Pala Indian Reservation. Figure 5 shows existing structures on adjacent properties within 1,000 feet of the site's property boundary.

The GCLF site is designated as Public/Semi-Public Lands with a Solid Waste Facilities (SWF) designator, as mandated by Proposition C. Although this designation represents lands owned by public agencies, it can also be used to identify privately owned land for appropriate uses. The SWF designator is intended to protect proposed and existing waste facility sites from encroachment by development of incompatible uses.

B.1.3 SITE LOCATION AND ACCESS

The proposed GCLF is located in northern San Diego County approximately three miles east of Interstate 15 (I-15) and two miles southwest of the community of Pala (Figure 6). The site is adjacent to SR 76, the San Luis Rey River and lies along the western slope of Gregory Mountain. The GCLF is located on SR 76, approximately 1300 feet east of the intersection of Couser Canyon Road and SR 76 in Pala, California 92059. The street address is 9708 Pala Road, Pala, California 92059. The GCLF property occupies portions of Sections 4 and 5 of Township 10 South and Sections 32 and 33 of Township 9 South, Range 2 West of USGS 7.5' Pala Quadrangle.

B.1.4 SITE DESCRIPTION

The GCLF is situated on approximately 1,770 acres of which 308.6 acres will be used for landfill related activities including a 183-acre refuse disposal area footprint. The 308.6 acres also includes 13.1 acres for power pole pads and 87 acres designated for soil stockpile and borrow areas. The remaining 24.6 acres will be utilized for the main access roads and bridge, desilting basins, stockpile/borrow area, haul road and the ancillary facilities discussed in Section B.3. Figure 2 presents the landfill footprints for the proposed project area.

The 1,770-acre site consists of 38 parcels (see property description documentation in Appendix B-3). Two additional parcels, totaling 13.43 acres, are within the overall project boundary but are owned and maintained by San Diego Gas and Electric

(SDG&E). Figure 6A shows the parcels which make-up the site. With the exception of the two SDG&E parcels, all parcels are owned by Gregory Canyon Limited. Gregory Canyon Limited has two short-term lease agreements. For further information, refer to letter from Gregory Canyon Limited in Section A.5.

SR-76, a two-lane highway, is located in an easement through the site and occupies approximately 16.5 acres. In addition to the SR-76 easement, there are two other major easements which cross the site. The San Diego Pipelines Nos. 1 and 2 (First San Diego Aqueduct) are in an easement with an average width of 150 feet that crosses in a north-south direction through the middle of the site (Figure 7). The Aqueduct easement, which consists of two 48-inch pipelines placed approximately 10 to 15 feet below ground surface, is located west of the proposed GCLF footprint.

The Escondido and Talega electrical transmission network (Tie Line 23030), which contains a 230 kilovolt (kV) and the Pala-Lilac 69 kV electrical transmission lines, are located on common structures within a 300-foot wide easement, which traverses the site in a north-south direction along the lower slopes of Gregory Mountain (see Figure 7). The transmission lines are owned and maintained by SDG&E and access to the transmission lines is maintained by SDG&E along unimproved dirt roads primarily within the easement. The GCLF project also includes the relocation of a portion of the existing SDG&E transmission lines and easement because two towers are located within the proposed landfill footprint. Therefore, this easement will be realigned as the landfill is developed to the east of their existing location as shown on Figure 2. The preferred easement realignment and the engineering plans presented in this JTD reflect this configuration. A 300-foot easement for the existing and future SDG&E lines will be maintained. The project applicant is coordinating the proposed relocation of the towers and easement with SDG&E. The towers and transmission lines will be relocated as filling operations move up canyon. If the preferred easement configuration is not obtained, prior to any easement configuration change other than the preferred, the JTD will be amended and submitted to the LEA for approval.

SDG&E also holds an easement running west to east though the landfill property on the north side of the San Luis Rey River, for purposes of a natural gas pipeline that was constructed in 2009. The pipeline crosses underneath the proposed landfill access road.

B.1.5 WASTE SOURCE, TYPE, AND VOLUME

B.1.5.1 SERVICE AREA

Though the service area has not been determined, it is anticipated that the GCLF will serve the North County area of San Diego County. Waste flow agreements with surrounding communities will ultimately define the service area.

B.1.5.2 WASTE TYPES

B.1.5.2.1 GENERAL

The wastes received at the GCLF will consist of non-hazardous solid wastes and inert wastes classified in accordance with 27 CCR, Sections 20220(a) and 20230 (Class III wastes). The definition of non-hazardous solid waste as included in 27 CCR includes all putrescible and non- putrescible solid and semi-solid wastes such as household refuse, paper, rubbish, ashes, commercial wastes, industrial wastes, construction and demolition wastes, abandoned vehicles, tires, vehicle parts, discarded home and industrial appliances, manure, animal solids, dewatered sewage sludge, and other solid or semi-solid waste, provided that such wastes do not contain wastes that must be managed as hazardous wastes, or wastes that contain soluble pollutants in concentrations which may exceed applicable water quality objectives or could cause degradation of the waters of the State.

Dewatered sludge will be accepted at the GCLF in accordance with 27 CCR, Section 20220(c). Dewatered sewage or water treatment sludge will be accepted under the following conditions, unless the California Department of Toxic Substances Control (DTSC) determines that the waste must be managed as hazardous waste:

- the landfill is equipped with a LCRS (see Sections B.5.1.1.2 and C.2.5 for details regarding the GCLF LCRS);
- the sludge contains at least 20 percent solids (by weight) if primary sludge, or at least 15 percent solids if secondary sludge, mixtures of primary and secondary sludges, or water treatment sludge; and
- a minimum solids to liquid ratio of 5:1 by weight shall be maintained to ensure that the co-disposal will not exceed the initial moisture holding capacity of the non-hazardous solid waste. The actual ratio required by the RWQCB shall be based on site-specific conditions.

In addition, inert waste, such as asphalt and concrete, that does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives will be accepted at the GCLF. This waste material may be utilized for the construction of a winter deck area and for maintenance of the internal roads and drainage control facilities on the landfill. In addition, green and wood wastes will be accepted and disposed of at the working face, but not processed (i.e., shredded or mulched) on the site.

No salvaging operations other than the public drop-off area are planned at this time. The public drop-off area is further discussed in Sections B.3.1.9, B.4.5.1 and B.4.5.2 of this document.

Designated wastes will not be accepted at the GCLF. Class I and Class II wastes will not be accepted at this site. Wastes that will not be accepted at the GCLF are referenced in Section B.1.5.2.2.

B.1.5.2.2 HAZARDOUS WASTES

The disposal of hazardous wastes, pesticides or any other toxic wastes at the GCLF will be prohibited. Non-hazardous asbestos will not be accepted at the landfill. Hazardous waste exclusion policies will be enforced at the GCLF (see Section B.4.4.2.1).

B.1.5.2.3 OTHER WASTES REQUIRING SPECIAL HANDLING

Wastes which require special handling to be accepted at the GCLF will include tires and bulky wastes. Tires accepted at the site will be stored in a designated, secured area within the landfill footprint. The storage location will move, as needed, depending on the operational phase of the landfill.

The tire storage area will:

- Not exceed 5,000 square feet of contiguous area;
- Not exceed 50,000 cubic feet in volume;
- Be less than 10 feet in height;
- Be more than 20 feet from any property line or perimeter fencing; and
- Separated from vegetation and other potential flammable materials by no less than 40 feet.

Tires will be stored on site in accordance with the State and local fire codes and 14 CCR, Section 17354. Tires will be stored for a maximum of six months to avoid the collection of standing water, rodents and snakes, and to minimize fire hazards. A portable tire shredder will be brought on site when the allowed volumes of storage are met or at a minimum of once every six months to shred the collected tires. The shredded tires will be landfilled.

Bulky wastes may include concrete, demolition debris, tree trunks or large branches, furniture and appliances. Bulky wastes such as concrete, demolition debris, and tree trunks/branches may be used on-site for winter deck construction. Furniture and appliances will be disposed within the landfill. Any freon and/or mercury switches will be removed from appliances by a licensed contractor prior to disposal at the GCLF.

B.1.5.3 WASTE DECOMPOSITION PROCESSES/PRODUCTS

B.1.5.3.1 GENERAL WASTE DECOMPOSITION PROCESS

Solid waste in landfills undergoes natural, chemical and biological decomposition following disposal. The waste decomposition process works in the following manner: organic waste products undergo aerobic decomposition during storage and transport, after placement in the landfill and until aerobic processes deplete the available oxygen. As oxygen becomes depleted, anaerobic decomposition becomes dominant. The duration of the waste decomposition can vary from a few years to over 100 years, depending on the presence and amount of oxygen, moisture content, pH, and temperature within the refuse prism. However, the level of decomposition tends to decrease rapidly following closure and placement of final cover.

The products of biological decomposition of organic wastes are solids, liquids, and gases. Typical primary products of municipal refuse aerobic decomposition are carbon dioxide, water, and nitrates. Typical primary products of anaerobic decomposition are methane, carbon dioxide, water, organic acids, nitrogen, ammonia, iron sulfides, manganese, and hydrogen. Degradation of inorganic waste products occur primarily through chemical oxidation.

B.1.5.3.2 FINAL PRODUCTS

Leachate

Leachate is formed by the infiltration of surface water by the migration of water generated by the decomposition of waste and any free liquids introduced into the waste that migrate through the refuse prism to the bottom of the landfill. The GCLF has been designed and will be operated to minimize leachate formation by reducing potential surface water contact with refuse. The quantity of leachate expected to be generated at the site has been estimated by modeling the water balance in the landfill and the results of this modeling were utilized in the design of the various leachate systems described in this JTD. As with any mathematical modeling, the results of these calculations should be viewed as an approximation of the actual situation. Typical constituents inherent in leachate are shown on Table 3A below.

TABLE 3A
GREGORY CANYON LANDFILL
TYPICAL LEACHATE COMPOSITION

	Value, mg/L		
	New Landfill (<2 years)		Mature Landfill
Constituent	Range[c]	Typical	(>10 years
BOD_5 (5-day biochemical oxygen demand)	2K-30K	10K	100-200
TOC (total organic carbon)	1.5K-20K	6K	80-160
COD (chemical oxygen demand)	3K-60K	18K	100-500
Total suspended solids	200-2K	500	100-400
Organic nitrogen	10-800	200	80-120
Ammonia nitrogen	10-800	200	20-40
Nitrate	5-40	25	5-10
Total Phosphorus	5-100	30	5-10
Ortho phosphorus	4-80	20	4-8
Alkalinity as $CaCO_3$	1K-10K	3K	200-1K
pH	4.5-7.5	6	6.6-7.5
Total hardness as $CaCO_3$	300-10K	3.5K	200-500
Calcium	200-3K	1K	100-400
Magnesium	50-1.5K	250	50-200
Potassium	200-1K	300	0–400
Sodium	200-2.5K	500	100-200
Chloride	200-3K	500	100-400
Sulfate	50-1K	300	20-50
Total Iron	50-1.2K	60	20-200

Source: 1993, Tchobanoglous, Theisen and Vigil, Integrated Solid Waste Management Engineering Principles and Management Issues, McGraw-Hill, Inc.

In addition to inorganic compounds, typically landfill-generated leachate and the condensate produced by landfill gas contains numerous chlorinated aliphatic and aromatic organic compounds. The most commonly detected of these include tetrachloroethene (PCE), trichloroethene (TCE), isomers of dichloroethene (DCE) and dichloroethane (DCA), vinyl chloride, and aromatic compounds such as benzene, toluene, ethylbenzene, and xylenes (collectively, BTEX compounds). The total concentration of VOCs measured in typical landfill leachate samples rarely exceeds 1 milligram per liter (1 mg/L). At these concentrations, the VOCs exist in a dissolved phase within the leachate, and do not form immiscible layers that can be identified and removed.

Engineering and chemical properties of the "other layers " such as daily and intermediate cover materials are discussed in Section D.4.3, Engineering and Chemical Properties of Geologic Materials. Other materials utilized in the construction of the groundwater protection system or liner are considered industry standard material and have been manufactured specifically to remain inert when exposed to typical landfill constituents. A discussion of landfill gas generation and associated mitigation measures for landfill gas are included in the JTD in Sections B.5.1.5.2 and B.5.1.6.2, respectively.

Landfill Gas

Gas composition in a landfill varies, depending on the types of wastes and environmental conditions that develop during decomposition. The typical gas composition for a municipal solid waste landfill is as follows:

TABLE 3B
GREGORY CANYON LANDFILL
ANTICIPATED LANDFILL GAS COMPOSITION

Landfill Gas Components	Percentage of Gas
Methane	40 – 50
Carbon Dioxide	30 – 45
Nitrogen	10 – 25
Oxygen	0 – 5
Hydrogen	0 – 1
Heavier Hydrocarbons	1,000 - 1,500 parts per million (ppm)
Miscellaneous	200 - 3,000 ppm

The projected landfill gas generation estimates will be utilized in the design of the landfill gas collection and control systems for the GCLF. The gas control and monitoring system proposed for the GCLF is discussed in Section C.2.7.

B.1.5.4 WASTE INFLOW RATES

The anticipated initial inflow rate to the GCLF will be approximately 1,950 tpd, which corresponds to an initial annual inflow rate of approximately 600,000 tons. The average inflow rate over the life of the project is estimated to be about 3,200 tpd and the peak daily refuse loading will be 5,000 tpd. It should be noted that geosynthetic blankets and processed green material (PGM) can be used as ADC at the GCLF in accordance with 27 CCR, Section 20690 at the outset of active waste filling operations. For additional information regarding ADCs, refer to Section 4.4.5.1

The anticipated physical composition of individual waste types as a percentage of the initial waste stream for the GCLF was based on information from several landfills within the State of California. The actual percentages of waste types received at the GCLF may vary depending on the make-up of the eventual service area. The estimated waste types are shown on Table 4, which also includes the estimated daily and annual waste volumes for the waste types discussed in Section B.1.5.2.

TABLE 4
GREGORY CANYON LANDFILL
ANTICIPATED LANDFILL WASTE TYPES AND QUANTITIES

Major Waste Categories	Waste Sub-Types		Approximate Tonnage by Type (tons)		Typical Percentage of Total Tonnage
	Putrescible	Non-Putrescible	Annually (6 days/wk)	Daily	
Residential	Household refuse, food, tree and lawn clippings, leaves, brush, scrap lumber, newspaper, paper	Household refuse, small metal containers, patio furniture, furniture, plastic containers, glass	390,000	1,270	65%
Commercial/ Industrial	institutional and process food waste, paper, corrugated cardboard	plastic, rubber, glass, mixtures of concrete, asphalt, steel, brick, block	210,000	680	35%
TOTALS			**600,000**	**1,950**	**100%**

Note: Construction/demolition and/or inert wastes are included under the "Commercial/Industrial" waste type category percentage.

Table 4A shows the average five-year tonnage projections for the site based on the starting daily inflow rate (approximately 1,950 tpd) for the first year of operation and the average daily inflow rate over the life of the project (about 3,200 tpd) for the second through fifth years of operation. Based on information provided in Table 4A, the average five-year projected waste flow estimate is approximately 906,000 tons per year.

TABLE 4A
GREGORY CANYON LANDFILL
FIVE-YEAR PROJECTED WASTE FLOW

Year	Daily Projected Waste Inflow (tons)	Annual Projected Waste Inflow (tons)	Cumulative Waste (tons)
1	1,950	598,650	598,650
2	3,200	982,400*	1,581,050
3	3,200	982,400*	2,563,450
4	3,200	982,400*	3,545,850
5	3,200	982,400*	4,528,250

* Annual projected waste inflow calculation based on 307 operating days and daily projected waste inflow of 3,200 tons.

B.1.6 SITE CAPACITY

The total site capacity, also known as gross airspace, is based on the difference between the proposed bottom grades (Figure 12) and the proposed final disposal area grading contours (Figure 9). The total estimated gross airspace for the proposed GCLF is 59.5 million cubic yards (mcy). The total estimated net airspace (i.e., net airspace = gross airspace less volume consumed by the containment system and final cover system) is approximately 57.0 mcy. The total estimated refuse volume, based on a refuse to daily and intermediate soil cover volume ratio of 4:1, is approximately 45.6 mcy or 30.8 million tons based on an in-place refuse density of 1,350 lbs/cy. In accordance with 27 CCR, Section 21600(b)(3)(B), the certified site capacity calculations are included in Appendix U.

B.1.6.1 FACTORS AFFECTING SITE CAPACITY

Many factors can affect the ultimate site capacity of a given landfill including variations in the use of alternative daily covers, AB 939 recycling programs and/or the annual tonnage delivered to the landfill. In addition, long-term landfill settlement can also have an impact on site capacity and may average 30 percent of the total refuse thickness. The total effect of settlement will depend on various factors or processes such as the types of refuse placed and their corresponding moisture content, the refuse placement density, consolidation of the refuse under loads imposed by overlying fill, and biological and chemical decomposition. It is estimated that much of this total settlement will occur during the operating life of the landfill and will be accounted for in periodic topographic surveys. A settlement analysis was performed for the GCLF and the results are included in the preliminary closure plan (see Part E and Appendix C).

The operator, as part of maintaining ongoing compliance with applicable State regulations, will prepare a permit review report every five years in accordance with 27 CCR, Sections 21640 and 21675, which will include a review of operations, proposed changes in design and operation as documented by amendments to the JTD and finally, an estimate of the remaining capacity and associated site life.

B.1.7 SITE LIFE

Although factors such as waste diversion/reduction, recycling and salvaging may affect inflow rates, it is expected that overall population growth within the service area will increase annual disposal rates at the GCLF over the life of the project. In order to calculate the site life for the GCLF, the following criteria was utilized.

- Net Airspace (less liner and final cover) 57.0 mcy
- Refuse to Cover Ratio 4:1
- In-Place Density 1,350 lbs/cy
- Starting Inflow Rate 1,950 tpd

The net airspace was estimated by calculating the difference between the proposed subgrade elevations and the final fill elevations less the liner and final cover quantities. The estimated quantities for the soil components (e.g., clay liner, operations layer and LCRS gravel) of the liner system and final cover are approximately 1.6 mcy and 0.9 mcy, respectively. The daily and intermediate cover quantity for the project is estimated to be approximately 11.4 mcy based on a refuse to cover ratio of 4:1. This daily and intermediate cover ratio may be adjusted over time due to the proposed use of geosynthetic blanket ADC as allowed under 27 CCR, Section 20690. The inflow rate over the life of the landfill may increase over time until the maximum tpd is achieved. The operator will maintain a constant level thereafter. The site life for the GCLF is calculated to be approximately 30 years based on the assumptions set forth in Section

B.1.6.

B.1.8 TYPES AND NUMBERS OF VEHICLES ANTICIPATED TO ENTER THE FACILITY

Several vehicle volumes associated with the proposed project and the proposed peak daily tonnage were addressed in the EIR which was prepared in support of the project. The projected maximum traffic volume, as addressed in the EIR, is estimated to be 675 trucks from all sources, including refuse delivery vehicles, construction vehicles, employee vehicles or recycled water trucks, or 2,085 passenger car equivalents (PCE) trips per day. The general types of refuse and private vehicles utilizing the GCLF may include, but not be limited to, the following:

- 3-axle trucks and vans
- 4-axle refuse collection packer trucks
- 10-wheel dump trucks
- Belly-dump tractor-trailers
- Fuel transportation vehicles
- Personnel transportation vehicles
- Private vehicles - pick-up trucks and automobiles
- Transfer station 18-wheel, tractor-trailer trucks
- Equipment transport service and maintenance vehicles
- 2,300-gallon water truck/tanker
- 5,000-gallon water/truck/tanker
- 6,500-7,000-gallon water/truck/tanker

It should be noted that types of refuse vehicles may vary depending on the source generator such as a transfer station, which may employ the use of 20-ton transfer trailers.

In addition to the daily truck trips limit, in order to mitigate potential traffic impacts on SR 76, project traffic will be limited between 2:00 PM and 3:00 PM to 215 PCE trips or 72 trucks, between 3:00 PM and 4:00 PM to 111 PCE trips or 37 trucks, and between 4:00 PM and 5:00 PM to 111 PCE trips or 37 trucks.

Implementation of the daily traffic restriction is set forth in Mitigation Measure MM 4.5-2 of the EIR. Traffic counts will be made using computerized records. These records will be available for review by LEA during operational hours.

Implemention of the hourly traffic restriction is set forth in Mitigation Measure MM 4.5-3 of the EIR. Vehicle counts are to be taken on the inbound lane of the landfill access road as near as feasible to SR 76. Vehicle trips will be counted manually, or if feasible electronically. Traffic count information will be provided to LEA electronically on a real-time basis if feasible. Otherwise, written traffic count information will be submitted to LEA weekly in writing.

Maintence of any equipment used for vehicle counts will be the responsibility of the operator. Implementation and management of the early warning system will be the responsibility of the operator. Waste contracts will contain the restrictions with which the hauler and its drivers will need to comply in accordance with MM 4.5-2 and 4.5-3. All of the haul trucks have contact with their company either via a 2-way radio or a cell phone. This is standard procedure in order for the truck operators to report accidents, problems with trash collection, road blockage, etc. Therefore, should the 95 or 75 percent thresholds be met, contact would be made with the contracted haulers who would then in turn contact the drivers. The location of the drivers will be determined and trucks will be rerouted as appropriate.

GCLF will implement an early warning system to assure that traffic requirements are met. Haulers will be notified once 95% of the daily traffic limit is met, or if 75% of any hourly traffic limit is met. However, GCLF may not turn away any waste collection vehicle traveling on SR 76 east of Interstate 15 at the time notice was given.

Mitigation measures identified in the EIR will be followed. Mitigation measures related to the early warning system for both daily and hourly traffic restrictions are contained in Mitigation Measures 4.5-2 and 4.5-3 of the EIR. Those mitigation measures can be found in Appendix D-2, Pages 6 and 7 of the Joint Technical Document.

B.1.9 END USE OF SITE

The ultimate post-closure end use for the GCLF will be undeveloped open space. The final cover for the site will be designed to meet regulatory requirements effective at the time of closure. A Final Closure Plan will be prepared and submitted to the appropriate regulatory agencies (e.g., CalRecycle, EA and RWQCB) at least two years prior to the landfill's anticipated closure date, for any portion thereof, or the entire landfill. The CalRecycle, RWQCB, and EA, in accordance with 27 CCR, Section 21190, must review any future proposed changes to the currently proposed end use that would require construction improvements. Any proposed post-closure land use design change must be in accordance with 27 CCR, Section 21190.

SECTION B.2

REGULATORY REQUIREMENTS

B.2 REGULATORY REQUIREMENTS

B.2.1 INTRODUCTION

The operation of a Class III landfill in the State of California requires the approval of local and state agencies having jurisdiction over the handling and disposal of non-hazardous solid waste. The following sections list the responsible agencies that have jurisdiction over the GCLF and the permits that will need to be acquired for the landfill.

B.2.2 PERMITS AND APPROVALS

B.2.2.1 CALIFORNIA DEPARTMENT OF RESOURCES RECYCLING AND RECOVERY (CALRECYLE)

All Class III solid waste facilities are required to have a SWFP issued by the EA and concurred on by the CalRecycle. The SWFP conditions the operation and closure of the project, including monitoring requirements.

The main supporting document to obtain the SWFP is the JTD. This JTD contains all of the technical information on the GCLF's operation, engineering design, site and surrounding area characteristics, closure and post-closure maintenance, and end use. This JTD was prepared in accordance with the content requirements mandated in 27 CCR, Sections 21585, 21590 and 21600. This JTD was submitted along with an application package, to meet requirements of 27 CCR, Section 21570, in support of obtaining a SWFP for the GCLF.

In addition, as allowed under 27 CCR, Sections 21570(f)(6) and 21780(c)(2), a PCPCMP has been included as Parts E and F of this document. These sections provide the information to be used as the basis to prepare the closure and post-closure maintenance cost estimate. This estimate will in turn be used to annually fund the closure account to provide for an environmentally sound closure and 30 years of post-closure maintenance. A financial mechanism, in accordance with 27 CCR, Chapter 6 and 40CFR Subpart G, has been established for the

GCLF closure and post-closure maintenance and is an element of the SWFP application package.

A certificate of insurance to demonstrate financial responsibility for operating liability claims (environmental impairment liability) has been acquired and will be updated annually pursuant to 27 CCR, Section 22215. Verification of insurance for operating liability is included in the SWFP application package.

B.2.2.2 CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

The State Water Resources Control Board (SWRCB) requires Class III solid waste disposal facilities to obtain WDRs. The San Diego RWQCB is the local agency, under the SWRCB, having jurisdiction and authority to issue site-specific WDRs for the GCLF. This JTD was prepared in support of obtaining a new WDR for the GCLF and includes all of the technical information on the GCLF's operation, water protection design, site and surrounding area characteristics, closure and post-closure maintenance, and end use. Tentative WDRs have been prepared as WDR Order No. R9-2009-0004 (included in Appendix S).

The RWQCB is responsible for the issuance of a Section 401 water quality certification, which addresses water quality impacts on waterways. The RWQCB also regulates municipal and industrial stormwater discharge requirements under the National Pollutant Discharge Elimination System (NPDES) program. To obtain authorization for industrial stormwater discharge, the landfill must comply with a General Permit to Discharge Stormwater Associated with Industrial and Construction Activities. The operator will submit a Notice of Intent (NOI) to comply with the NPDES Construction Activities General Permit prior to initiating construction and will submit a NOI for Industrial Activities prior to implementation of disposal operations. A Stormwater Pollution Prevention Plan (SWPPP) and a Monitoring Program and Reporting Requirements (MPRR) have been prepared for the proposed GCLF, in accordance with NPDES General Permit requirements (see Appendix D). At the time of closure construction, the landfill cap will be covered by the Construction Activities General Permit. The closed landfill and post-closure maintenance would be covered by the Industrial Activities General Permit. A financial mechanism in accordance with 27 CCR will be established for the reasonably foreseeable release prior to implementation of disposal operations.

The SWPPP and MPRR will be amended, as necessary, when there is a change in construction, operation, or maintenance procedures which may cause the discharge of significant quantities of pollutants to surface water, groundwater, or local agency's storm drain system.

To permit discharge of extracted groundwater to a waterway, the RWQCB also regulates the General NPDES Permit Authorization for Discharges of Groundwater to Surface Waters. Although no groundwater is anticipated to accumulate in the subdrain system, a permit would be required to discharge any groundwater collected by the subdrain system beneath the landfill to the San Luis Rey River (if it is not used by on site operations). This type of discharge is currently regulated under RWQCB Order No. 96-41 for groundwater extraction and similar waste discharges to surface waters within the San Diego Region, except for San Diego Bay. In the unlikely event that there is a measurable accumulation of groundwater in the subdrain system collection tank, and this water cannot be utilized for operational uses, a permit application package will be submitted to the RWQCB for subdrain water discharges.

B.2.2.3 COUNTY OF SAN DIEGO

Department of Environmental Health Services

The County of San Diego, Department of Environmental Health is the EA having jurisdiction over the GCLF. The EA issues and enforces the terms and conditions of the SWFP and conducts monthly inspections of the landfill. The SWFP lists the conditions of operation and closure which the facility is subject to comply. Additionally, for any hazardous waste that may be generated in disclosable quantities, a permit will be obtained from the Hazardous Materials Division of the County of San Diego, Department of Environmental Health.

San Diego Air Pollution Control District (APCD)

The proposed project falls under the jurisdiction of the San Diego APCD for the monitoring and control of dust and gas emissions outlined in Rule 59 (d) (ii) A (Landfill Emissions Control Systems). The operator will apply for a permit to operate for construction activities and the control of resultant dust. It may also be required for groundwater treatment technologies.

Facilities to collect and destroy landfill gas emitted from the landfill are planned for installation at a future date dependent on waste placement operations. At that time, the necessary permits will be acquired to operate landfill gas collection and destruction facilities, which may be planned for future operations.

Department of Planning and Land Use (DPLU)

Typically, the local land use authority will require the project proponent to obtain a land use entitlement. In the case of the GCLF, the approval would normally be obtained from the San Diego County DPLU. However, in 1994, Proposition C was written to provide for the siting of a new Class III landfill to allow the residents and businesses of northern San Diego County a place to dispose of their solid waste. Proposition C amended the County's General Plan, Zoning Ordinance and other ordinances and policies to allow the construction and operation of a Class III landfill. The Zoning Ordinance was amended to create a new zoning classification designator (Solid Waste Facility) applied only to the Gregory Canyon site. The approval of Proposition C by the voters in November 1994 allowed the project to go forward without the need for any permits from the County of San Diego except for the Habitat Loss Permit (Rule 4d), Approval of Reclamation Plan and Financial Assurances, Water Course Alteration Permit, Bridge Permit, Grading Permit and Building Permit. A copy of Proposition C is included in Appendix B.

Countywide Integrated Waste Management Plan (CIWMP)

The California Integrated Waste Management Act of 1989 (Public Resources Code Section 40000, seq.) requires cities and counties to prepare a plan for their solid waste system known as a CIWMP. The County of San Diego completed their CIWMP in 1996 and received approval from the CIWMB (now known as CalRecycle) in June 1997. The GCLF expansion project was included in the Siting Element within the CIWMP. A revised Siting Element was prepared and approved by the County of San Diego on January 5, 2005 and approved by the CIWMB (now known as CalRecycle) on September 20-21, 2005. The GCLF was included as a proposed new landfill (see Appendix B-4).

B.2.2.4 OTHER PERMITS

In addition to the above reviews, approvals and permits, a list of the permits and approvals for the construction and operation of the GCLF are presented in Table 5 and Appendix D-1.

In addition to permits listed in Table 5, the applicant (Gregory Canyon Limited) may be required to obtain the following permits from San Diego County:

- Groundwater Well Permit
- Landfill Gas Migration Probes Permit
- Well Destruction Permits

B.2.2.5 CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) DOCUMENTATION

The EIR for the project was initially certified on February 6, 2003, SCH#1995061007. Litigation challenging the EIR was filed, and on January 20, 2006, the Superior Court decertified the EIR and ordered additional analysis in the areas of traffic, mitigation for impacts to biology and water supply. The January 20, 2006 order was upheld by the Court of Appeal on June 12, 2009. A Revised Final EIR (RFEIR) was prepared in response to the court order, and was certified on May 31, 2007. In June 2007, a motion was filed to discharge the writ of mandate issued on January 20, 2006, which was granted in part and denied in part on February 11, 2008. The court ordered additional analysis in the area of water supply. An Addendum to the RFEIR was prepared in response to the court order, and adopted on August 8, 2008. In August 2008 a second motion to discharge the January 20, 2006 writ of mandate was filed, which was granted on November 20, 2008. The November 20, 2008 order was

TABLE 5
GREGORY CANYON LANDFILL
SUMMARY OF PERMITS

PERMIT NAME	ISSUING AGENCY	PURPOSE OF PERMIT
Solid Waste Facilities Permit (SWFP)	San Diego County Department of Environmental Health (concurrence by CalRecycle)	Defines operating conditions
Waste Discharge Requirements (WDRs)	Regional Water Quality Control Board	Defines operating conditions and groundwater and surface water protection and monitoring procedures
Variance for Engineered Alternative[a]	Regional Water Quality Control Board	Allow engineered alternative design for bottom design.
National Pollution Discharge Elimination System Permit (NPDES)[b]	State Water Resources Control Board	Establishes requirements for discharges to storm drains and allows discharge of groundwater to surface water.
Section 401 Water Quality Certification	Regional Water Quality Control Board	Addresses water quality impacts on waterways
Permit to Construct/Operate (Air Quality)	San Diego Air Pollution Control District (APCD)	Specifies equipment and standards for collection, processing, and combustion of landfill gas
Section 404 Permit	U.S. Army Corps of Engineers	Addresses disturbances to "waters of the U.S."
Section 7 Consultation[c]	U.S. Fish and Wildlife Service	Addresses Endangered Species Act
Streambed Alteration (Section 1603) Agreement	California Department of Fish and Game	Addresses disturbances to natural streambeds and mitigation measures
Water Appropriation Permit	State Water Resources Board	Addresses water appropriation.
Section 106[e]	State Historic Preservation Office	Consultation regarding cultural resources
Encroachment Permit	California Department of Transportation	Defines modifications to SR 76
Bridge Permit	San Diego County Public Works Department	Addresses crossing of waterways
Water Course Alteration Permit	San Diego County Public Works Department	Addresses alteration to waterways
Habitat Loss Permit (Rule 4d)[c]	San Diego County Department of Planning and Land Use	Addresses loss of habitat
Blasting Permit	San Diego County Sheriff's Department	Defines standards for blasting
Grading Permit	San Diego County Department of Planning and Land Use-Building Div.	Defines standards for grading
Relocation Approval	Public Utilities Commission	Relocation of the easement and towers
Approval of Reclamation Plan and Financial Assurances[d]	San Diego County Department of Planning and Land Use	Reclamation of stockpiles, processing areas, and road (as required by State Surface Mining and Reclamation Act)
Building Permit	San Diego County Department of Planning and Land Use-Building Div.	Defines standards for construction of structures
Major Use Permit[f]	San Diego County Department of Planning and Land Use	Exportation or sale of aggregate material

[a] Alternatives that do not require a variance have been included in Chapter 6 of the FEIR.

[b] For the landfill and ancillary facilities, including the RO system

[c] Either a Section 7 or Habitat Loss Permit may be obtained to authorize an incidental take.

[d] A reclamation plan may not be required because the State Surface Mining and Reclamation Act does not apply to certain activities as provided in Public Resources Code Section 2714(b).

[e] Section 106 consultation under the National Historic Preservation Act (NHPA), if and to the extent required, if applicable.

f The San Diego County Ordinance, under the definition of borrow pit, allows for nine exceptions to the requirement for a MUP for the exportation and sale of aggregate material. Some of the exceptions include site preparation that is completed within a one-year timeframe. Therefore, the initial construction phase may be exempt from the requirement for a MUP. However, the project has been designed to accommodate the storage of all excavated material on-site. If the exportation or sale of aggregate material were to occur, the applicant would obtain the MUP, if necessary, prior to the exportation or sale of material.

Source: Proposition C; David Evans and Associates, Inc.; San Diego County Department of Planning and Land Use, PCR Services Corporation 2002

Source: Final Environmental Impact Report, November 2000.

J:\Gregory Canyon\1997.0139 Permitting\JTD\JTD 2011 January\Table 5-Permits.xls: September 2010; Revised January 2011 upheld by the Court of Appeal on March 30, 2010. Based on a Court of Appeal decision overturning a 2006 recycled water supply contract entered into by the operator, an Addendum to the RFEIR was prepared to identify other sources of water supply, and was adopted on January 7, 2010. Based on a new Jurisdictional Determination by the U.S. Army Corps of Engineers, an Addendum to the RFEIR was prepared to update the waters on the landfill site subject to federal and state jurisdiction, and was adopted on May 7, 2010.

B.2.3 DESIGN REQUIREMENTS

Those design conditions, criteria and requirements applicable to the GCLF and established by the various regulatory agencies having jurisdiction over the landfill are included in the permits described in Section B.2.2.

B.2.4 OPERATIONAL REQUIREMENTS

Those operational restrictions and requirements applicable to the GCLF and established by the various regulatory agencies having jurisdiction over the landfill are included in the permits and documents described in Section B.2.2.

SECTION B.3

DISPOSAL SITE IMPROVEMENTS

B.3 DISPOSAL SITE IMPROVEMENTS

B.3.1 SITE FACILITIES

The proposed GCLF will have the following facilities to support its daily operations: main access road and bridge, internal haul roads, entrance facilities, utilities, on-site water storage tanks, operations support facilities, hazardous waste storage area, recyclable drop-off area, a reverse osmosis system, and landfill gas flare station. The following sections describe GCLF facilities and their locations. A Site Facilities Plan showing the locations of these facilities is presented on Figures 8 and 8A.

Environmental control/protection facilities such as the gas and groundwater monitoring systems and surface water drainage control systems are described in Section B.5 and Part C. It should be noted that some of the site facilities will be installed after disposal operations commence. Once the main access road and bridge have been installed, temporary scales, fee booths, administration and maintenance facilities will be utilized until permanent facilities are constructed. The permanent site facilities and/or improvements, as discussed in this section, will be constructed in stages as the landfill is developed and operational activities ramp up to accommodate increased inflow rates over time. The temporary facilities, such as scales and structures, will be replaced with permanent facilities within three years of the initial receipt of waste.

B.3.1.1 MAIN ACCESS ROAD AND BRIDGE

The GCLF project includes some modifications to SR-76 (Pala Road) at the start of the main access road to improve sight distance and to facilitate truck movements. The improvements, which are approximately 1,700 linear feet, will realign SR 76 to the south of the existing alignment. In addition, the improvements will widen the roadway from 52 to 64 feet to provide for an eastbound deceleration lane and a westbound turn lane into the GCLF.

The proposed access road from SR 76 will be two to three lanes, approximately 32 to 36 feet wide and will include a bridge over the San Luis Rey River. The road will extend through the abandoned Lucio dairy to the ancillary facilities area. The access road from SR 76 to the bridge will be about 910 linear feet and will be 32 feet wide, with two 12-foot travel lanes and a four-foot shoulder on each side. The SDG&E gas pipeline crosses underneath this portion of the main access road, and has been constructed to reasonably eliminate any potential damage to the pipeline from truck traffic. The access road from the bridge into the ancillary facilities will be about 985 linear feet and will be 36 feet wide, with three lanes (two travel lanes and a center lane) with a four-foot shoulder on each side. The access road will be paved with asphalt curbs.

As the access road enters the ancillary facilities area, the road will cross over the existing First San Diego Aqueduct. Two reinforced concrete slabs will be placed at grade, one centered over each pipeline. Each two-foot thick slab will be approximately 28 feet wide and 64 feet in length placed on top of a layer of polystyrene. The three to four foot deep soldier beams at each end of the slab will absorb the weight of the vehicles crossing over the aqueduct. However, if the aqueduct is moved, these crossing facilities will not be required. Technical factors that would be reviewed in determining whether to relocate the aqueduct are discussed in Section D.5.5.

A bridge, approximately 681 feet in length, supported by five large diameter piers, which will form the base of the structure, will be constructed across the San Luis Rey River. The 35.5-foot wide bridge will have two travel lanes. Reflective strips will be used on the inside structure of the bridge to guide vehicles safely across during early morning and early evening hours. No overhead lighting will be installed on the bridge.

Customers will be processed through the entrance facilities (i.e., scales and fee booth) and then directed on a system of internal haul roads to the active unloading area. The internal haul roads leading from the entrance facilities to the unloading area will be paved and/or compacted dirt roads. Signs will be posted along the internal roads to guide customers to the designated, separate unloading areas for commercial and private vehicles.

Procedures for directing customers and traffic flow during extreme rainfall events are discussed in Section B.4.4.4.

B.3.1.2 ENTRANCE FACILITIES

The entrance facilities will consist of two fee booths to handle four scales (three for inbound traffic and one for outbound traffic). Additional lanes will be available for visitors, administration and operations personnel to enter and exit the landfill. As discussed above, the GCLF site facilities and/or improvements will be constructed as needed, therefore, temporary scales and fee booths may be employed during initial operations until permanent structures are completed. Figure 2 shows the layout and traffic flow of the entrance facilities.

B.3.1.3 IDENTIFICATION/ENTRY SIGNS

A facility identification sign will be located at the entrance gate. Signs will provide information on the facility operator, hours of operation, and recognized holidays. Signs will be located on the scalehouse indicating the schedule of charges and the general types of waste materials which will not be accepted at the site. Additionally, posted signs will direct customers to the refuse unloading and recycling collection areas. Other posted signs will display site safety and traffic rules.

B.3.1.4 UTILITIES

The on-site utility sources include electrical power and telephones. A 20,000-gallon water storage tank, located north of paved ancillary facilities area, will provide water for dust control and fire protection purposes. The water tank would be continuously refilled as water is used to maintain 20,000 gallons of stored water. The water tank will be supplied from on-site wells. A 10,000-gallon water tank will be constructed within Borrow-Stockpile Area B to provide water for dust control related to excavation or placement of soil at this location. The water tank would be continuously refilled from proposed percolating groundwater wells located at the western edge of Borrow/Stockpile Area B (see the detailed discussion in Section B.5.3.1). The location of the proposed well and 10,000-gallon storage tank is shown on Figure 2. Temporary water storage tanks may also be rented from time to time as needed.

Drinking water will be provided to landfill personnel through bottled water. A portable chemical toilet will be located at the northern end of the ancillary facilities area. The operator will contract with a sewage disposal service to remove effluent from the chemical toilets for offsite treatment and disposal.

B.3.1.4.1 RECYCLED WATER

A physically separate storage system for recycled water will also be constructed, consisting of a double containment fill pipe and a 20,000-gallon storage tank with secondary containment that will accommodate the entire volume of the tank in order to prevent spillage. The location and schematic of the recycled water facilities are shown on Figure 8A. The recycled water tank will be supplied by trucked recycled water and will be filled, as needed, for construction and operation of the GCLF. This tank may also be supplied with water from on-site wells, but the tank would be treated at all times as if containing recycled water. An alarm feature will be included for the recycled water storage tank for detection of any leaks. The reverse osmosis (RO) treatment system may be used to treat recycled water for blending purposes as needed to meet water quality requirements of the RWQCB. A memorandum entitled, Treated Water Quality Evaluation (March 2007), prepared by GeoLogic Associates (included in Appendix G-1) discusses the possible effluent limitations for the GCLF project and recycled water effluent limitations were included in the tentative WDRs issued by the RWQCB in April 2009 (see Appendix S). It should be noted that WDRs for the landfill, which authorize the use of recycled water, cannot be denied on the basis of exceeding only a salinity water quality standard, as indicated in the California Water Code, Section 13523.5.

The operator will enter into one or more recycled water contracts to provide a back-up source of recycled water to meet all project water needs, during periods of construction, operation, and combined construction and operation, as needed in addition to on-site well water. These contracts, individually or in the aggregate, will be for at least 80,000 gallons per day. The primary uses of recycled water could be for dust control and landscape irrigation.

The EIR provided that water needs for the project total a maximum of 205,000 gallons per day, with that amount divided as follows: approximately 40,000 gallons per day for operations (primarily dust control); approximately 40,000 gallons per day for construction (dust control and other construction uses), and approximately 125,000 gallons per day for installation of the clay liner.

Based on a more recent evaluation of water needs, the operator has determined that it can purchase clay liner material pre-conditioned at the clay mine, eliminating the requirement for the 125,000 gallons per day of water. In addition, the operator will implement the widespread use of chemical dust suppressants for unpaved roads on the landfill site. The operator has developed updated water usage estimates by analyzing five scenarios representing all anticipated construction and operating activities throughout the life of the landfill project. These scenarios estimate water usage for both the maximum use day during the annual operating period, as well as an average daily estimate for the annual operating period. This was done because not all project activities would occur on every operating day. The highest annual average water usage estimate is 66,785 gallon per day, and the maximum daily water usage estimate is 110,135 gpd. To the extent that activities on a given operating day require more water, temporary storage tanks would be utilized. Another temporary storage method would be to hold recycled water trucks at the facilities area, and empty their contents as needed. The use of temporary water storage is feasible because the types of activities that require high levels of water usage, such as excavation for liner construction, building of internal roads, or topical application of chemical dust suppressant, can be planned in advance.

As discussed in the 2009 Addendum to the Certified EIR for the project, adopted on January 7, 2010, water from on-site wells and recycled water obtained by contract and trucked to the landfill site is expected to be sufficient to meet the project's water needs.

In order to minimize potential impacts from the use of recycled water, project water resources will be prioritized so that riparian underflow or percolating groundwater will be used first for areas designated for biological mitigation, landscape irrigation, and dust control on on-site haul roads and Borrow/Stockpile areas A and B before recycled water is used.

B.3.1.5 OPERATIONS SUPPORT FACILITIES

The operations support facilities will be located in the same area as the entrance facilities at the north end of the landfill footprint. The operations support facilities will consist of an office building to be used for administrative functions, a maintenance building, an equipment and storage area, a parking area for employees and visitors, a water tank, portable toilets, and a concrete pad used for temporary storage of source separated recyclable goods, which will be transported off-site periodically. In addition, a diesel storage tank within a concrete containment wall, will be located south of the building for refueling of equipment. A portable emergency showerhead will also be provided outside the maintenance building. As previously discussed, the GCLF site facilities and improvements will be constructed as needed; therefore, temporary (or interim) facilities will be employed during initial operations until permanent structures are completed. Once permanent structures are in-place, the portable toilets will be removed and replaced with permanent restrooms.

B.3.1.6 HOUSEHOLD HAZARDOUS WASTE STORAGE AREA

Household and other hazardous wastes segregated from incoming wastes through the Load Checking Program or found at the working face that cannot be returned to the transporter will be temporarily stored in a secured hazardous materials storage area located in the southeastern portion of the ancillary facilities area (Figure 8). A full-time traffic director/spotter will observe unloading activities during all refuse hours of operation. Hazardous wastes generated by on-site equipment maintenance activities (i.e., changing of lubricating oils) will be stored at the maintenance building area until transported off-site for proper disposal. Additional information regarding the handling of hazardous materials is provided in Section B.4.4.2.1.

B.3.1.7 FLARE STATION

A landfill gas flare station for the destruction of landfill gas will be located on-site east of the ancillary facilities and north of the disposal area or at a location selected during the San Diego APCD permitting process. The flare station will consist of flares and blowers, piping and other associated equipment. The flare facility will be expanded as the landfill is developed to provide ongoing control within the performance criteria established and mandated by the San Diego APCD and State and federal regulations.

B.3.1.8 LIQUID COLLECTION TANKS

The LCRS, consisting of interior bench collectors, bottom laterals and the mainline, was designed to gravity drain to an outfall line located at the toe of the overall refuse footprint (at the northern limit of the landfill). At this location, the

LCRS outfall will discharge into one of two 10,000-gallon leachate storage tanks. Initially, one tank will be installed for storage of leachate. The second tank will be added, as needed, depending on actual flow rates. Although no groundwater is anticipated, the subdrain collection system will discharge to a separate 10,000-gallon storage tank. The storage tanks will be located in the southwestern corner of the ancillary facilities area.

B.3.1.9 RECYCLABLE MATERIALS DROP-OFF AREA

A recyclable materials drop-off area is proposed on the east side of the maintenance building. The drop-off area will have bins for the storage of source separated recyclable materials, such as newsprint, white paper, tin, aluminum, and glass. White goods will also be accepted and stored near the storage bins.

B.3.1.10 REVERSE OSMOSIS SYSTEM

The Agreement between the San Luis Rey Municipal Water District and Gregory Canyon Limited requires the installation of a reverse osmosis (RO) system. The 50-gallon per minute (gpm) RO system will be installed in the southwestern portion of the ancillary facilities area. For details on the RO system, refer to Section B.5.1.8.

B.3.1.11 TEMPORARY CONSTRUCTION STORAGE

Ongoing construction activities at the site, including both initial construction of the landfill/ancillary facilities and future cell development, will require temporary storage of building materials. Historically, a construction storage yard was located on the former Lucio Dairy on the north side of the San Luis Rey River and at the eastern end of the landfill property. This construction storage yard is currently not actively used, and the limited material present generally consists of materials that are suitable for and may be used for initial construction of the landfill/ancillary facilities. The large majority of material (more than 95%) historically present on the construction yard has been removed. Removal of material not suitable for use for initial constuction of the landfill is ongoing and will be completed at the commencement of initial landfill construction.

The entire construction storage yard will eventually become part of the habitat restoration area, and will be eliminated. However, due to the phased nature of habitat restoration mitigation measures in the EIR, that would not be required for initial construction of the landfill/ancillary facilities. Details for he habitat restoration are included in the "Biological Assessment for the Gregory Canyon San Luis Rey River Bridge Replacement" (Appendix I-2) and "Habitat Restoration and Resource Management Plan for Gregory Canyon Landfill Property" (Appendix I-3).

For initial construction, concrete removed as part of the demolition of the abandoned structures and dairy facilities will be crushed and stored within the eastern portion of the current construction storage yard (see Figure 2). This material could be used for a variety of purposes, including foundation fill, stabilization of some internal roads, and stabilization of the working face during wet weather periods. Other material used for initial construction would also be delivered and temporarily stored on the eastern portion of the current construction storage yard.

The western portion of the current construction storage yard would be cleared and revegetated as part of implementation of the habitat restoration plan, prior to or during initial construction.

As liner development proceeds and additional habitat restoration is required, the current construction yard will gradually be taken out of service. Habitat restoration will proceed from west to east along the north side of the San Luis Rey River, and the construction storage area will become progressively smaller and shift toward the east until it is eventually eliminated. As space becomes more limited, material will be removed from the construction storage area to inactive portions of the landfill as needed, and new deliveries of material will be made directly to inactive portions of the landfill footprint.

B.3.2 SITE SECURITY

Entry into the GCLF during business hours will be controlled by site personnel at the entrance facilities, which is the single point of public access to the site. Unauthorized access to the site will be controlled by perimeter fencing and/or topographical constraints, and the landfill property perimeter will be posted with "No Trespassing" signs where unauthorized entry is likely to occur. Lockable gates will be installed on the access road on the north side of the bridge and at the ancillary facilities area. Visitors to the site will be required to check-in at the administrative office. Additional fencing will surround specific on-site facilities. The borrow/stockpile areas will not be fenced.

SECTION B.4

DISPOSAL SITE OPERATIONS

B.4 DISPOSAL SITE OPERATIONS

B.4.1 HOURS OF OPERATION

The GCLF will operate six days a week, Monday through Saturday, except holidays, for a total of 307 days per year. Solid waste operations, which includes the receipt, handling, and disposal of solid waste or the collection of source separated recyclable materials; cover operations; site grading and/or excavation, including controlled blasting and rock processing; and heavy equipment operations, will occur Monday through Friday between 7:00 a.m. and 6:00 p.m. and on Saturday from 8:00 a.m. to 5:00 p.m. Maintenance activities occurring within the maintenance yard or within the enclosed maintenance building, the operation of gas and leachate collection and treatment systems, and remedial activities required by a regulatory agency will not be limited to the hours of operation.

Traffic coming to the site before the hours of operation will be queued on the access road up to the fee booths/scales to prevent stacking of vehicles on SR76. To accommodate the queuing, the gates located at the north side of the bridge will be opened one hour prior to the hours of operation. Therefore, the entrance gates will be opened at 6:00 a.m. Monday through Friday, and 7:00 a.m. on Saturday.

B.4.2 PERSONNEL

Gregory Canyon Limited will be the permitted operator of the GCLF. Gregory Canyon Limited will maintain and/or provide full operations, engineering, administrative support staff. In addition, outside contractors/consultants may also be utilized. Actual day-to-day operations at the site will be conducted by a qualified contract operator. Upon approval of the project, Gregory Canyon Limited will select a qualified contract operator and provide the LEA with a copy of the negotiated contract, including appropriate personnel qualifications. Qualified outside contractors/consultants will be utilized in the areas of landfill operations and engineering. Landfill operations include, but are not limited to, refuse disposal operations, load checking and screening, routine site maintenance, and groundwater monitoring as described in Section B.4.2.1. Outside contractors/consultants will be overseen by qualified Gregory Canyon Limited staff.

B.4.2.1 MINIMUM NUMBERS OF STAFF AND THEIR RESPONSIBILITIES

The number of employees needed to operate and maintain a sanitary landfill is dependent on the hours a facility is open, the daily tonnage received, and the overall areas to be maintained. Initial staffing will require fewer employees. Staff numbers will be increased as the landfill is developed, and the refuse inflow rate increases. The proposed minimum and maximum staff to be provided for the GCLF, as shown in Table 6, is more than adequate to conduct disposal operations and site maintenance operations through peak s. Their position titles and the number of staff in each position are shown below. The minimum staff level will be utilized at the onset of disposal operations and staff will be added as waste inflow increases.

TABLE 6
GREGORY CANYON LANDFILL
SITE OPERATION STAFFING

DIVISION	MINIMUM STAFFING	MAXIMUM STAFFING
- Superintendent	1	1
- Office Manager	1	1
- Site Manager	1	1
- Site Engineer	1	1
- Foreman/Inspector	1	1
- Equipment Operators/Refuse Load Inspectors	3	6
- Traffic Director/Spotter	1	2
- Fee Collectors/Scalehouse	2	3
- Teamster	1	1
- Mechanics	1	2
- Laborers/Litter Collection	1	2
- Recycled Water Supervisor	1	1
Total Site Personnel	15	22

Actual staffing is dependent on the waste inflow rate. The maximum level of staffing is based on handling the average (3,200 TPD) to peak (5,000 TPD) tons per day received. Initially, less staffing will be required to operate the facility in accordance with state minimum standards. The number of employees needed to operate and maintain a sanitary landfill is dependent on the hours a facility is open, the daily tonnage received, and the overall areas to be maintained.

The following presents a general description of the GCLF operations and administration staff responsibilities.

- Landfill Operations Staff

  Landfill operations staff duties and responsibilities include: supervising disposal activities at the GCLF, proper receiving and handling of refuse including compacting and covering all refuse delivered to the site in an environmentally sound manner, hauling and stockpiling cover dirt, preparing fill area grades, controlling dust, constructing interim and permanent surface water drainage control facilities, providing safe access to the unloading areas, maintaining internal haul and maintenance roads, directing traffic, litter control, general nuisance control, providing inclement weather unloading areas and coordination of recycling activities. The above-mentioned activities will be conducted in compliance with applicable solid waste handling regulations. In addition, operations staff will receive ongoing training and will continually evaluate landfilling techniques to more efficiently operate the landfill. Proper records will be maintained and reporting will be conducted as required by regulations and permits. Landfill operations staff, as described in Section B.4.2, may be provided by qualified outside contractors/consultants and overseen by qualified Gregory Canyon Limited staff.

- Administration and Engineering Staff

  Landfill administration and engineering staff duties and responsibilities include: preparation and tracking of landfill operating budget, review of personnel and equipment needs, supervision of and accounting for fee collection, handling public inquiries and complaints, establishing landfill operating and design criteria, evaluating topographic data, monitoring the public drop-off area, coordinating/interfacing with regulatory agencies to ensure site compliance and proper record keeping. Environmental controls, operational emergency situations, and health and safety issues will also be handled by administration and engineering staff. Engineering staff, as described in Section B.4.2, may be provided by qualified outside contractors/consultants and overseen by qualified Gregory Canyon Limited staff.

B.4.2.2 TRAINING

Training for operations personnel will be provided by the contract operator. An Emergency Response Plan (ERP) will be prepared and maintained at the GCLF. Site personnel will be trained based on the procedures included in the ERP. The emphasis in training will be health and safety, hazardous waste identification, handling and storage procedures, environmental control systems management, proper waste handling and disposal procedures, emergency response notification procedures, and environmental mitigation. This training will provide site personnel with a thorough understanding of operator responsibilities, ensure that landfill operations are conducted under safe working conditions, minimize potential public health and safety problems, and maintain a high degree of compliance with all applicable solid waste handling and disposal regulations.

The operator will also provide for training in the use of recycled water by the recycled water supervisor. The recycled water supervisor will provide continuous and regular training for all on-site personnel, which will be included as part of the course materials for routine health and safety training of on-site personnel. The training will include instruction on where recycled water may or may not be used, washing hands whenever there is contact with recycled water, avoiding over-spray from recycled water trucks used on-site for dust control and other purposes, and understanding and adhering to posted warnings on recycled water facilities and equipment (such as "RECYCLED WATER – DO NOT DRINK"). Training and written materials will be provided in both English and Spanish.

B.4.2.3 SUPERVISION

The operator will provide adequate supervision of a sufficient number of qualified personnel to conduct proper operation of the site in compliance with all applicable State and federal requirements. In addition, the operator will also provide a recycled water supervisor, who has completed a State-approved training course on the use of recycled water. The recycled water supervisor will be responsible for proper installation, operation and use of on-site recycled water facilities and recycled water trucks, including routine inspection of construction and operation of recycled water facilities, maintaining the integrity of all secondary containment structures, disinfection of recycled water trucks prior to reuse with other than recycled water, and maintaining a continuous supply of potable or bottled water for drinking or hand washing. The recycled water supervisor will provide continuous and regular training for all on-site personnel, which will be included as part of the course materials for routine health and safety training of on-site personnel. The training will include instruction on where recycled water may or may not be used, washing hands whenever there is contact with recycled water, avoiding over-spray from recycled water trucks used on-site for dust control and other purposes, and understanding and adhering to posted warnings on recycled water facilities and equipment (such as "RECYCLED WATER – DO NOT DRINK"). Training and written materials will be provided in both English and Spanish.

In accordance with 27 CCR, Section 20615, the EA, local health agency, and fire authority will be notified in writing of the names, addresses, and telephone number of the operator or responsible party(ies). A copy of the written notification will be placed in the operating record.

B.4.2.4 EMERGENCY CONTACT LIST

The names of the site personnel for the GCLF to contact in the event of an emergency are on the contact list included in Appendix E.

B.4.3 EQUIPMENT

B.4.3.1 ON-SITE EQUIPMENT

A variety of equipment will be used for the operation of the GCLF. On-site equipment will serve disposal and site maintenance needs to allow for operations of the GCLF in an environmentally sound manner and to comply with all applicable regulatory requirements. On-site equipment will be maintained in accordance with State minimum standards. Less equipment will be necessary during initial refuse disposal operations. The numbers and types of equipment utilized to meet operational requirements will be added as the landfill is developed and increased to accommodate a higher inflow rate. However, in the event of multiple equipment failure, a local rental company will be contacted to provide necessary back-up equipment. A detailed list of equipment is shown on Table 7.

TABLE 7
GREGORY CANYON LANDFILL
LIST OF OPERATING EQUIPMENT

Minimum Quantity	Maximum Quantity	Description	Uses
2	4	Dozer	Push, compact, grade and cover refuse. Walk-in slopes, miscellaneous earthwork.
1	2	Compactor	Refuse and cover compaction.
2	2	Scraper (or equivalent)	Haul earth for cut and cover operations. One back-up is on site.
1	1	Water Truck	Control cover soil moisture content and dust control, landscape irrigation, and fire fighting.
3	6	Light Duty Vehicles	Transporting of landfill personnel around the site.
1	1	Motor Grader	Grade unloading deck, maintain internal roads and drainage control of decks. One back-up is on site.
1	1	Surge Bin	Loading bin for equipment and/or material.
1	1	Mechanics Truck	Maintenance of equipment.
1	1	Portable Rock Crusher	Crushing of rock material.
1	1	Fuel Truck	Fueling landfill heavy equipment.
1	1	Mobile Tire Shredder	Shredding of tires.

The available equipment listed in Table 7 does include stand-by. In the event of multiple equipment failure, Hawthorne Machinery Company may be used for rental equipment. This company has seven branches in San Diego county to meet rental needs. Other vendors may also be utilized.

B.4.3.2 EQUIPMENT MAINTENANCE PROCEDURES

All operating equipment will be maintained in accordance with a preventative maintenance program to keep heavy equipment breakdowns to a minimum. Most repair and maintenance activities will be conducted on-site. Used oil, lubricants, and filters will be removed from the site and disposed of properly on a regular basis.

All environmental testing, monitoring and stationary equipment will be maintained and/or repaired by appropriate staff or outside vendors. Equipment maintenance activities will be conducted so as not to interfere with disposal operations and to maintain compliance with applicable State and federal regulations.

B.4.3.3 OPERATING SITE MAINTENANCE PROCEDURES

In addition to the equipment maintenance procedures discussed above, 27 CCR, Section 20750, requires an operator to implement a preventative maintenance program to monitor and promptly repair all defective or deteriorating support facilities, environmental controls, and containment systems for the landfill. All environmental monitoring and control facilities, ancillary features (i.e., access roads, signs, gates, fencing, landscaping), containment areas and all other on-site structures will be inspected and maintained as necessary.

B.4.4 MATERIALS HANDLING ACTIVITIES

This section addresses general materials handling activities required at the site including construction and daily operations activities.

B.4.4.1 CONSTRUCTION SEQUENCING

B.4.4.1.1 EXCAVATION/STOCKPILING OPERATIONS

Once the initial excavation for the site facilities area and the first stage of the Phase I refuse area has been completed, subsequent excavation/stockpiling operations will be conducted concurrent with refuse disposal throughout the development of the landfill. Soils excavated will be placed in Borrow/Stockpile Area B located immediately southwest and adjacent to the landfill footprint (see Figure 2). Excavation and stockpiling operations will be conducted so as not to interfere with disposal and other ancillary operations. Proper drainage control will be maintained and the stockpile area will be graded to promote lateral run-off of precipitation into drainage control facilities. For additional information regarding excavation/stockpiling activities, see Section C.2.

Rock crushing, which will be conducted concurrently with landfill construction, will occur onsite to facilitate the movement of excavated rock. A portable rock processing facility, which will include a crusher and screens, will initially be located on the southwestern portion of the landfill footprint, when it is needed. This equipment will be moved as the landfill excavation progresses up canyon. Excavated rock will be stored on-site for future use or ground for use as daily or intermediate cover.

B.4.4.1.2 BASE PREPARATION/LINER PLACEMENT

Base preparation and liner placement is described in Sections C.2.2 and C.2.4.

B.4.4.1.3 FILL SEQUENCING

Fill sequencing operations required for the development of the landfill disposal areas are described in Section C.2.9.

B.4.4.1.4 FINAL GRADING

The proposed final grading contours for the GCLF are shown on Figure 9. Final landfill slopes were designed with an overall gradient of 3.5:1 with 20-foot benches every 40 vertical feet and the maximum landfill elevation, including the final cover system, will be 1,100 feet amsl. A slope stability analysis for the site was performed to verify the design and is included in Appendix C. The final deck area will have a minimum grade of three percent. This minimum deck area gradient is sufficient to maintain adequate drainage control and accommodate settlement.

Slight changes to the proposed final contours may be necessary in the future to achieve optimum drainage control and to prevent ponding and/or excessive erosion of completed fill areas or to reduce impacts associated with anticipated settlement throughout the post-closure maintenance period. The PCPCMP included in Part E of this report contains additional information regarding the final grading plan.

B.4.4.2 <u>REFUSE UNLOADING OPERATIONS</u>

Upon acceptance of waste for disposal at the entrance facility, vehicles will be immediately directed to the working face of the landfill. Signs will be posted along the internal haul roads to guide customers to the designated unloading areas. Commercial refuse vehicles (i.e., collection trucks and/or transfer trailers) will be directed to the working face, which will generally be maintained at the toe of the working face. Private vehicles (i.e., automobiles and/or pick-up trucks), if any access the site, will be directed to a separate tipping area away from the commercial vehicle unloading area. Separate commercial and private vehicle tipping areas reduce safety concerns for customers, allow for better inspection of the refuse loads to detect prohibited materials, and expedite unloading for the commercial refuse vehicles.

As the refuse is being unloaded, landfill staff will continuously observe the refuse to monitor for prohibited materials. A comprehensive load checking program will be conducted at the landfill to detect hazardous waste delivered to the site and to prevent the material from being discharged to the landfill. Unacceptable waste identified by designated landfill staff will be separated or rejected. Detailed information regarding the Load Checking Program is discussed in Section B.4.4.2.1.

The GCLF will be operated utilizing the canyon and area fill methods of refuse disposal. Refuse is typically placed in lifts up to approximately 20 feet high and anywhere from 100 to 200 feet in length. Generally, successive lifts are constructed to create a series of adjoining cells. The process of constructing lifts is repeated until desired grades, both interim and final, have been achieved. Refuse placed during the working day will be compacted by using a dozer or compactor to complete the cell and then covered with soil, processed green material (PGM) or ADC, as allowed under 27CCR, Section 20690(b)(1).

The size of the daily working face depends on the actual inflow rate conditions and the unloading of waste during the operational day. The unloading area will generally be maintained so that wastes can be immediately spread and compacted.

B.4.4.2.1 HAZARDOUS WASTE EXCLUSION PROGRAM

A hazardous waste exclusion program (HWEP) for the GCLF is included as Appendix F. The HWEP also includes a load checking program which complies with the state and federal regulations under 27 CCR, Sections 20220 and 20870. These regulations state that "Owners or operators of all Municipal Solid Waste Landfill (MSWLF) units must implement a program at the facility for detecting and preventing the disposal of regulated hazardous wastes as defined in Part 261 of this chapter (40 CFR Chapter 1) and polychlorinated biphenyl (PCB) wastes as defined in Part 761 of this chapter (40 CFR Chapter 1)".

The proposed HWEP for the GCLF was developed to discover and discourage attempts to dispose hazardous or other unacceptable wastes, including PCBs, at the landfill. The proposed HWEP contains the following major components:

- Descriptions of acceptable and prohibited wastes.
- A gamma-scintillation counter will be installed at the scale facility to detect radioactive materials.
- Random inspections of incoming loads.
- Records of any inspections.
- Training of facility personnel to recognize regulated hazardous waste and PCB wastes.
- Notification of the Director of the California DTSC, the EA, the County of San Diego Department of Environmental Health Hazardous Materials Division (a delegated agent for the DTSC), and the San Diego RWQCB, if regulated hazardous wastes or PCB wastes are discovered at the facility, in accordance with 27 CCR, Section 20870(a)(4).

Unsuitable wastes identified through the HWEP will be handled as follows:

(1) If the wastes pose an immediate risk to health, safety and/or the environment, site personnel will notify the emergency response unit of the Hazardous Incident Response Team (HIRT), a Joint Powers Authority (JPA) entity administered by the City of San Diego and the County of San Diego Department of Environmental Health. The generator of the hazardous waste will be responsible for the cleanup and if the generator cannot be identified, then the landfill operator will be responsible for cleanup of the wastes. The wastes will be transported by a licensed hazardous waste hauler for disposal at a permitted hazardous waste treatment and disposal facility.

(2) If wastes are in adequate containers and can be safely handled, waste will be stored on-site in a designated area to await proper disposal by a licensed hazardous waste hauler/recycler or, if the hauler who brought the waste can be identified, the hauler will be asked to remove the waste.

The designated hazardous waste storage area will be located in the southeast corner of the ancillary facilities area, as discussed in Section B.3.1.6 and shown on Figure 8, for the temporary disposition of wastes collected as part of the HWEP. This area will be specifically designed for the handling and storage of hazardous wastes, including secondary containment and approved storage containers which are safe and convenient for storing identified wastes.

On-site hazardous waste storage will be limited to 90 days or as required by applicable state laws and regulations prior to being transported to a permitted treatment, storage and disposal facility (TSDF). Collected on-site hazardous waste will be placed in overpack drums at the time the waste is collected. The "Accumulation Start Date" on the California hazardous waste label of each overpack drum containing hazardous waste will be monitored weekly. Prior to shipment off site, site personnel trained in hazardous waste management will overpack and manifest the materials with a licensed hazardous waste hauler/disposer.

Unauthorized hazardous waste discharges will be reported to the following agencies:

California Regional Water Quality Control Board
San Diego Region
(858) 467-2952

Department of Toxic Substances Control
Cal-EPA Cypress Regional Office
(714) 484-5300

County of San Diego
Department of Environmental Health
(858) 694-2888

County of San Diego
Department of Environmental Health
Hazardous Materials Division
(619) 338-2222
(800) 253-9933

Load Checking Program

As previously discussed, refuse unloading activities will be continuously observed through the use of a full time spotter located at the tipping area. In addition, all landfill personnel will be trained to spot hazardous wastes which may be inadvertently contained within incoming refuse loads. As part of the overall HWEP, the operator will also, on a weekly basis, randomly select a commercial load for a detailed load check. The driver of the load to be inspected will be asked to unload the vehicle on a portion of the flat deck area away from the commercial vehicle and private vehicle unloading areas. Designated landfill personnel will then inspect, search, and sort through the load looking for prohibited wastes. If no prohibited wastes are observed, a dozer will push the load to the working face. If prohibited wastes are observed, the area will be cordoned off and the operator will follow the procedures outlined in the HWEP.

The load checking program was developed to conform with the requirements of 27 CCR, Section 20870 and the WDRs for landfills. The load checking program was designed to identify and remove hazardous and prohibited wastes from the municipal waste stream coming to the landfill. The load checking program is part of the HWEP, which includes procedures, policies, and the necessary reporting forms (see Appendix F). Specific components of the program include:

- Customer notification by signs, notices and verbal inquiries.
- Surveillance through visual inspection of waste loads and questioning of customers by scalehouse personnel.
- Waste inspection conducted on randomly-selected loads at the working face.
- A gamma-scintillation counter will be installed at the scale facility to detect radioactive materials.

These procedures are intended to prevent haulers from unlawfully disposing of hazardous wastes at the landfill. These procedures are also designed to identify hazardous wastes at the time of disposal, so the disposer can be directed to remove the hazardous waste from the disposal location. If the hauler associated with the hazardous waste is identified, the hauler is responsible for the cleanup of any spill.

Training for the load checking program will be tailored to each employee according to his or her responsibilities in the program. Inspection personnel will be instructed to report any prohibited material found hidden in loads of trash and to take license numbers, vehicle descriptions, and names of the responsible party. All hazardous materials will be removed immediately if observed during unloading and returned to the customer or appropriately stored.

Landfill staff assigned the duties required in the waste load checking program, including visual inspection of the working face, will be formally trained to recognize suspicious or potential containers of hazardous waste and to perform the reporting requirements of this program.

As discussed above, gamma-scintillation counters will be installed at the scale facility. Radiation portal monitors will be installed in each scale house to scan incoming waste for radioactivity. Each scale will have a dedicated radiation monitor capable of detecting gamma radiation. An audible alarm will sound if radiation is detected. The alarm point will be set at least twice the average local background levels as recommended in *Detection and Prevention of Radioactive Contamination in Solid Waste Facilities* (Conference on Radiation Control Program Directors, Inc.). Vehicles hauling materials which contain detectable levels of radioactive waste will be segregated and denied entry to the landfill.

To insure that radiation detectors are properly calibrated, each existing, new, or repaired monitor will be tested monthly with a check-source supplied by the radiation monitor manufacturer.

B.4.4.3 SPREADING AND COMPACTION

Once customers have disposed of their refuse at the designated unloading areas, a compactor or dozer will spread the waste over the working face in approximately two-foot thick layers. A compactor or dozer will then make repeated passes over the working face to thoroughly compact the refuse. The working face is typically sloped to a gradient of approximately 5:1 (horizontal to vertical) or less to maximize refuse compaction. Refuse is spread and compacted in this manner to minimize voids in the daily refuse cells, to inhibit vector propagation, to reduce windblown litter, and to maximize site capacity.

Large, bulky wastes may be separated to prevent bridging of the surrounding refuse, or may be placed in the lower portion of the advancing lift to be thoroughly crushed by the landfill compactor.

B.4.4.4 INCLEMENT WEATHER OPERATIONS

Rain and/or high winds are the predominant inclement weather conditions which may cause the operator to adjust on-site waste handling and disposal procedures. Landfill operations are typically not hampered by mild wet weather conditions; however, when heavy rains cause the unloading areas (commercial and private vehicles) to become muddy and unusable, operations will be moved to a designated wet weather area, generally near an improved internal road, to provide continuous operation during inclement weather. Traffic and vehicle access to the unloading areas will be provided by paved roads and/or tightly compacted dirt or base rock roads. The unloading area may also be improved by tightly compacting the dirt and/or placement of rock base material.

Stockpiles of soil material will be maintained near the designated alternative unloading area to ensure that an adequate supply of soil material will be available to cover all wastes. An approved ADC material may also be utilized minimizing the need to stockpile near the wet weather unloading area.

The landfill access road bridge has been designed to prevent overtopping of the road deck in a 100 year, 24-hour storm event. As a result, it is not expected that access to the landfill by waste collectors or other vehicle traffic would be impaired except in a very extreme storm event. If monitoring of weather conditions suggests such an extreme event is possible, the operator will monitor rainfall totals and current and projected river flows. In the event there is a reasonable potential that waters could overtop the bridge deck, landfill operations will be temporarily halted. Waste collectors will be notified and collection vehicles will be redirected using the same early warning system procedures as provided in Section B.5.5.

When high wind conditions occur, the unloading areas (commercial and private vehicles) will typically be reduced in size and, whenever possible, placed in a portion of the facility that affords protection from the wind. Additional equipment may be utilized to expedite the spreading and compacting of the refuse as soon as it unloaded. Cover operations may also be implemented earlier in the day to reduce the area of exposed waste on the working face. In addition, portable litter fencing may also be utilized downwind around the working face. Litter control procedures are discussed in Section B.5.3.3.

B.4.4.5 DAILY COVER PLACEMENT

The purpose of daily cover soil or an equivalent ADC approved by the EA, is to provide a suitable barrier to the emergence of flies, prevent windblown trash and debris, minimize the escape of odors, prevent excess infiltration of surface water, and hinder the progress of potential combustion within the landfill. Daily cover in the form of soil material compacted to a minimum thickness of six inches or an ADC, such as a geosynthetic blanket or PGM, will be placed over all exposed refuse at the end of each working day. Cover material will be transported by scrapers to the working face where it will be spread and compacted by either the scrapers or a dozer.

B.4.4.5.1 ALTERNATIVE DAILY COVERS

Introduction

CalRecycle promulgated regulations in 27 CCR, Section 20690, for the use of ADC at Class III Landfills. These regulations contained in 27 CCR, Division 2, Subdivision 1, Chapter 3, Article 2 provides the requirements to control the use of ADCs at solid waste landfills and the reporting of that use. Site-specific demonstration projects have shown that specific ADC materials can be used as a suitable daily cover (e.g., in lieu of soil) if used in accordance with the ADC standards established in 27 CCR, Section 20690. Site-specific demonstration projects are generally no longer required for the following ADC materials, if used as specified in 27 CCR, Section 20690(a) and (b):

- Geosynthetic Fabric or Panel Products (Blankets)
- Foam Products
- Processed Green Material
- Sludge and Sludge-Derived Materials
- Ash and Cement Kiln Dust Materials
- Treated Auto Shredder Waste
- Contaminated Sediment, Dredge Spoils, Foundry Bonds, Energy Resource Exploration and Production Wastes
- Compost Materials
- Construction and Demolition Wastes
- Shredded Tires

Geosynthetic blankets and PGM can be used as ADC at the GCLF in accordance with 27 CCR, Section 20690 as part of waste filling operations. If other ADCs are proposed for future use, the standard operating procedures for the additional ADCs will be added to the JTD and submitted to the LEA and other regulatory agencies as a JTD amendment or permit revision, as applicable.

If utilized, ADC at the GCLF would reduce on-site cover demands and maximize refuse capacity. The use of ADC has been shown to reduce refuse-to-daily/intermediate cover ratios from 4:1 to 7.5:1, which could reduce the on-site soil cover need by as much as one-third. Geosynthetic blankets and PGM can be used as specified in 27 CCR, Section 20690(b)(1). Handling and general procedures for the geosynthetic blanket product are included in Appendix F-1. General use procedures for PGM as ADC are as follows:

Incoming PGM will be weighed at the scales. PGM should be free of all contaminant debris (glass, paper, plastic, etc.), as well as salt and deleterious materials such as clods, coarse objects, and rocks. The particle size of the PGM used at the landfill should be a grain size specification by volume of 95 percent less than 6 inches.

For dry weather applications, PGM will be spread at a thickness of approximately 18 inches with a trash dozer to ensure complete coverage; it is then compacted using heavy equipment (trash compactor) to an average thickness of twelve inches. For wet weather applications, the PGM will be spread and compacted to an average thickness of twelve inches using a trash dozer. Processed green material placed as cover shall not be exposed for greater than 21 days.

Operations personnel will visually inspect the PGM loads as they are unloaded onsite, making sure that the specifications are met and to determine if the loads are contaminated (i.e., mixed with paper, plastics and other trash). If the loads appear to have unacceptable contamination, the PGM loads will not be allowed as exempt material but rather as waste and buried. The hauler will be notified that contaminated loads are not acceptable.

The estimated range in tons of PGM use was calculated based on the following assumptions:

- Area of working face is approximately 20,000 square feet
- Range of thickness for PGM is 6 to 12 inches
- Density of PGM is approximately 0.35 tons/cy

Based on the above assumptions, the estimated range of PGM use is approximately 130 to 260 tons/day. This assumes the entire working face is covered with PGM. If portions of the working face are covered with other materials, the quantities of PGM used will decrease proportionally.

B.4.4.6 INTERMEDIATE COVER PLACEMENT

Intermediate cover is defined in 27 CCR, Section 20164 as cover material on areas where additional cells are not to be constructed for 180 days or more to control vectors, fires, odors, blowing litter, scavenging, and drainage. In accordance with 27 CCR, Section 20700(a), a minimum 12-inch thick layer of suitable cover material or equivalent (as approved by the EA) will be placed over the top, side slopes and working face of the advancing lift, refuse cell or portions of the disposal area where no additional refuse is to be deposited within 180 days.

B.4.4.6.1 ALTERNATIVE INTERMEDIATE COVER

Title 27, Section 20700(b) allows an operator to place alternative materials of alternative thickness (other than at least 12 inches of earthen material) for intermediate cover as approved by the EA with the concurrence of the CalRecycle, provided that the owner or operator demonstrates that the alternative material and thickness control vectors, fires, odors, blowing litter, and scavenging without presenting a threat to human health and the environment. The proposed use of an alternative intermediate cover (AIC) would require a site-specific demonstration project and approval of the RWQCB. Demonstration projects will be approved by the EA with concurrence by the CalRecycle pursuant to 27 CCR, Section 20700(d).

No AICs are currently proposed for the GCLF. In the event that such an AIC is proposed, Gregory Canyon Limited will comply with the requirements of 27 CCR 20700 and will obtain approval from the appropriate regulatory agencies.

B.4.4.7 FINAL COVER

The purposes of a final cover are to minimize surface water intrusion, accommodate settlement and subsidence, isolate wastes from the surface, and reduce the potential for odors and gas emissions. The cover also provides a base for vegetation, which will reduce drainage velocities and minimize erosion and abrasion of the cover. The State minimum standard prescriptive design for a landfill requires a single low-permeability soil layer cover or a cover which meets the permeability of the proposed liner system.

Several factors were taken into consideration in evaluating the cover design for the GCLF to ensure adequate performance of the final cover. These factors included regulatory requirements, the geometry of the landfill, local climatic conditions, potential landfill settlement, erosion protection, vegetative growth, the waste liner system design and end use of the land at closure. Section E.1.3 of Part E includes detailed information regarding the final cover design at the GCLF. For additional information on material availability, refer to Section C.2.2.3.

B.4.4.7.1 ALTERNATIVE FINAL COVER DESIGN CONSIDERATIONS

The federal regulations under 40 CFR, Section 258.60 and State regulations under 27 CCR, Section 20080(b) allows an operator to propose an alternative final cover to the standard prescriptive cover design. To date, some alternative final cover designs have been approved by several of the Regional Water Quality Control Boards and the CalRecycle. In the future, an alternative final cover design may be developed and proposed for approval at the GCLF. Should an alternative cover design be considered, the appropriate modeling will be performed and presented to the reviewing agencies to ensure consistency with the performance of a prescriptive cover system. Upon approval of the alternative final cover design, the PCPCMP would be updated to incorporate the changes in design.

B.4.4.8 COVER AVAILABILITY

Excavated topsoil, alluvium/colluviums, weathered bedrock and rippable hard rock will be stockpiled for use during the operation and closure of the landfill. Assuming a 4:1 cover ratio, approximately 11.4 million cubic yards (mcy) would be needed for daily operations during the life of the landfill. An additional 2.7 mcy of material will be necessary to provide for canyon shaping, the operations layer and final cover for the site. The total anticipated soil requirement, including cover, would be 14.1 mcy. The proposed landfill development will include the excavation of approximately 7.9 mcy within the landfill footprint, of which approximately 4.9 mcy consists of topsoils, alluvium/colluvium, weathered bedrock and rippable hard rock that would be suitable for cover material with limited processing required, primarily crushing of the rippable hard rock. The approximate volumes of material to be excavated from Borrow/Stockpile Areas A and B are 1.3 mcy and 3.2 mcy, respectively. The entire excavated quantity would be available for cover needs since all of the material is colluvium or weathered bedrock. Therefore, approximately 9.4 mcy of material will be available on-site for cover, leaving a shortfall of readily useable material of 4.7 mcy. This shortfall can be addressed through the use of ADC, fill sequencing to minimize cover needs, some additional crushing of hard rock and reuse of materials from demolition of the former dairy facilities.. A more detailed discussion of the impact of the use of ADC is provided in Section C.2.2.3.

B.4.5 RECYCLING AND RESOURCE RECOVERY

B.4.5.1 INTRODUCTION

Recycling and resource recovery operations are important to conserving landfill space throughout the State of California. Legislation under AB 939 was enacted in 1990 to establish mandatory recycling goals. The specific actions, activities and programs to be implemented within a given county were required to be incorporated into an integrated waste management plan. The GCLF will be part of the County of San Diego's solid waste system.

Therefore, recycling and resource recovery operations will be encouraged by Gregory Canyon Limited through the operation of a public drop-off area for source separated recyclables to be located on the east side of the maintenance building. Public salvaging will not be allowed at the GCLF and no salvaging operations other than the public drop-off area are planned at this time.

White goods, such as refrigerators, stoves, washing machines, microwaves, etc., and unaltered tires will be physically removed by hand or with the use of heavy equipment, as needed from the waste stream at the working face. These materials will be stored at the site facilities area.

B.4.5.2 STORAGE OF SALVAGEABLE GOODS

The source separated recyclable materials will be stored in the drop-off area, which will be located on the east side of the maintenance building. The drop-off area will have bins for source-separated recyclable materials, such as newsprint, white paper, tin, aluminum, and glass. White goods will also be accepted and stored near the recycled bins area.

B.4.5.3 REMOVAL OF SALVAGED GOODS

The storage of source separated recyclables will be limited to a duration which will not result in health or fire problems. Salvaged goods will be removed once a suitable volume is received to fill a collection vehicle, but in any event not less than every six months. These materials will be kept away from disposal operations and will be limited to a volume and storage time as approved by the EA in accordance with 27 CCR, Section 20710(c).

B.4.5.4 NON-SALVAGEABLE ITEMS

The only salvaging operations allowed at the GCLF will be those described in Section B.4.5.1. The types of materials which are considered to be non-salvageable items include drugs, cosmetics, foods, beverages, medical wastes, and other waste materials capable of impairing public health are specified in 27 CCR, Section 20720. Depending on the material, it would be disposed of at the landfill or handled in accordance with Sections B.3.1.6 and B.4.4.2.1.

B.4.5.5 VOLUME REDUCTION AND ENERGY RECOVERY

Volume reduction activities will not be conducted at the GCLF with the exception of the collection of source separated materials as part of the recycling and resource recovery operations described in Section B.4.5.1 and waste tire processing or shredding described in Section B.1.5.2.3. The more non-traditional volume reduction activities such as incineration, bailing, shredding or composting will not be conducted at the landfill.

B.4.6 HEALTH AND SAFETY

B.4.6.1 SANITARY FACILITIES

Portable chemical toilets will be located at the northern end of the ancillary facilities area. Once permanent structures are in-place, the portable toilets will be removed and replaced with permanent restrooms. Portable chemical toilets will be made available near the working face. The operator will contract with a sewage disposal service to remove effluent from the chemical toilets for off-site treatment and disposal. Handwashing facilities will also be available in accordance with 27 CCR, Section 20550.

B.4.6.2 POTABLE WATER SUPPLY

Potable water will be supplied by bottled drinking water and will be available to all employees.

B.4.6.3 COMMUNICATIONS

Telephones will be available within the offices in the ancillary facilities area and at each of the fee booths for computer links with the truck scales. Two-way hand-held radios and cell phones will be used for communication purposes at the ancillary facilities to the staff located at the working face or other locations around the landfill property boundary.

B.4.6.4 LIGHTING

Disposal operations will generally not be conducted during hours of darkness unless it is necessary to complete daily cover activities at the end of the working day. However, all disposal equipment will be outfitted with sufficient lighting and/or portable lighting fixtures or stands (approximately two (2)) will be available to provide safe working conditions during end of the day refuse cover operations during winter months.

Security lighting will be provided around the buildings in the ancillary facilities area. Lighting will be low impact, focused, and shielded to minimize spill light into the night sky or adjacent properties and to avoid significant impacts to biological resources. All lighting at the GCLF will comply with the County Light Pollution Ordinance.

B.4.6.5 SAFETY EQUIPMENT

Safety equipment will be provided to landfill personnel as necessary and will include: hard hats, reflective vests, ear and eye protection and filtration masks. In addition, fire extinguishers will be located in on-site buildings, operating equipment and maintenance and support vehicles.

SECTION B.5

DISPOSAL SITE CONTROLS

B.5 DISPOSAL SITE CONTROLS

B.5.1 LIQUIDS MANAGEMENT PLAN

The liquids management plan covers the collection monitoring, storage, handling, and ultimate disposal of liquids originating in the subsurface regions of the landfill. In addition, the liquids management plan also includes the monitoring and handling of surface water run-off. A detailed description of the surface water control system is included in Section C.2.8.

The three possible types of subsurface liquids associated with municipal waste landfills are leachate, groundwater, and gas condensate from the landfill gas collection system. The components of the GCLF's liquids management system include the LCRS, the subdrain collection system, groundwater treatment system (e.g., the reverse osmosis [RO] system), surface water control and monitoring network, and the landfill gas condensate collection, storage and disposal system. A Contingency Plan has been prepared providing procedures to be followed in the event of a failure in waste handling facilities or containment systems and is included as Appendix F-2.

B.5.1.1 LEACHATE CONTROL AND MONITORING SYSTEMS

B.5.1.1.1 INTRODUCTION

Leachate is generated when water passing through the landfill comes in contact with the buried refuse. Potential sources of water for leachate formation include infiltration of rainfall, surface water from surrounding areas draining onto the landfill, and/or moisture contained within the waste materials. The composition of leachate is highly dependent upon the types of waste received. The operational procedures and engineering design features for the GCLF are intended to prevent or minimize leachate generation, detect leachate generation and movement, contain and collect generated leachate, and store leachate until it is disposed of off-site.

B.5.1.1.2 LEACHATE COLLECTION AND REMOVAL SYSTEM

The landfill design includes a double composite liner system. The liner will be overlain by a LCRS designed and constructed to meet or exceed minimum state and federal regulations. The quantity of leachate expected to be generated within the lined portion of the landfill was estimated by modeling the water balance in the landfill site. In accordance with 27 CCR, Section 20340, the LCRS is designed to collect and remove a minimum of twice the anticipated maximum daily volume of leachate generated from within the refuse prism, as well as maintain less than a 30-cm (12-inch) depth of leachate over the composite liner system. In fact, based on the leachate generation analysis the peak daily head on the liner will be 0.25 inches.

In the bottom area, the LCRS will consist of a continuous gravel blanket and an integrated drainage pipe collection network made up of lateral collectors and a mainline pipe. For slope areas (i.e., those areas within 5:1 gradients or steeper) given the steep gradients, leachate would readily flow down the slope to the interior benches on top of the uppermost HDPE containment layer. The leachate would then be captured in the pipe and gravel collection system constructed on the benches. This bench collection system will be connected to the bottom area LCRS pipe network. The LCRS laterals and bench collection piping will discharge into a mainline placed down the center of the refuse area. This LCRS design will effectively collect leachate and be protective of the environment and meets the requirements of 27 CCR, Section 20340(e).

The LCRS was designed and will be operated to function without clogging through the scheduled closure of the unit and during the post closure maintenance period in accordance with 27 CCR, Section 20340(d). Clean-outs were incorporated into the LCRS design and are available to flush debris from the LCRS pipes. The collection header under the waste footprint may be accessed through the outfall or cleanouts that will be included in the final design. The clean-outs will be utilized to annually test the LCRS flow capability. Specified volumes of clean water will be pumped into each cleanout prior to waste placement. Flow rate and volume will be recorded. This same method will be repeated each year to determine system performance. A comparison of the most recent test results against results from previous years will be conducted. In the bottom area, the LCRS design, as also described in Section C.2.5.4, will consist of a continuous gravel blanket and an integrated drainage pipe network.

The LCRS pipes will be placed in V-shaped gravel trenches which will intercept the leachate flow. In the unlikely event that localized clogging occurs, the surrounding gravel pack allows the leachate to flow around the restricted area. To minimize the potential for clogging, 85% of the gravel will be larger than the diameter of the perforations in the pipe. In addition, the bottom area LCRS gravel pack will be overlain by geotextile fabric to prevent fines in the operations layer soil material from clogging of gravel.

The side slope LCRS will consist of collectors (also known as a "burrito" type collectors) placed at each interior bench. These collectors are perforated pipe surrounded by gravel and then wrapped with geotextile filter fabric. The benches are sloped to drain any leachate which makes its way through the operations or protective layer back to the toe of the bench/upper slope interface. A strip of tri-planar geonet will also be placed over the remaining flat area of the bench to direct liquid flow for added redundancy. Geonet is designed and manufactured with landfill-specific conditions in mind including flow rate factors of safety. Geonet will accommodate heavy loading up to a pressure of 25,000 psf. This equals 240 feet of trash placed at an average density of 1,500 lbs/cy. Geonet is also designed to resist biofouling.

The inward gradient of the interior cut slope benches is more than adequate to direct flows into the "burrito" collector.

Any leachate that comes into contact with the slopes will flow along the operations layer/refuse-interface to the benches, then either through protective layer and into the bench collectors or continue all the way down to the bottom areas and into the LCRS. A detail of this particular configuration is presented on Figure 14, Detail 5/17. The LCRS bench collector and riser junction are presented on Figure 15, Detail 4/18.

The entire LCRS system is designed to drain by gravity flow to a solid outfall pipe located at the northwest corner of the refuse prism. The outfall pipe is connected to two 10,000-gallon leachate collection storage tanks located in the southwest corner of the ancillary facilities area. The leachate storage tanks will be routinely monitored by the operator in accordance with the site specific WDRs. If liquid is detected during routine monitoring, a grab sample will be taken and analyzed in accordance with the WDRs. Leachate collected in the storage tanks will be transported off-site for treatment and disposal. Frequency of off-site transportation will be monitored and adjusted as needed to reflect leachate generation and utilization of storage capacity. There are facilities located in San Diego and Los Angeles counties that can dispose of any leachate that is collected. Section C.2.5 contains additional information regarding the LCRS design.

B.5.1.1.3 LEACHATE VOLUMES

In order to develop the proper design criteria and performance parameters for the LCRS, leachate generation rates were calculated using the Hydrologic Evaluation of Landfill Performance Version 3 (HELP3) computer program, which uses representative rainfall and evapotranspiration data to calculate the amount of leachate that might be generated in a Municipal Solid Waste Landfill (MSWLF). The leachate generation analysis (1998) and amended leachate generation analysis (2001) used rainfall data adjusted to 50-year and 60-year annual rainfall records in the computer modeling software (HELP3). For the 2001 (60-year) analysis, the computer program synthesized the rainfall data from a designated San Diego weather station, corrected for the site latitude, and created the precipitation record with minimum and maximum yearly totals of 8.36 and 34.8 inches, respectively (GLA, 2001). This program takes into account the total area landfilled, representative precipitation patterns, representative evapotranspiration, and the hydraulic conductivity of various construction materials to calculate leachate generation and accumulation. Based on the results of the HELP3 analysis, it is anticipated that leachate generation will be of a low volume during the active operations and even less after closure. The predicted volume of leachate generated during the maximum rainfall year of 34.8 inches formed the basis for the design of the leachate collection system. The results of this analysis are presented in Section C.2.5.3. The leachate generation analysis is included as part of Appendix C.

B.5.1.1.4 ANALYSIS OF POTENTIAL IMPAIRMENT TO GROUNDWATER

The alluvial valley that forms the Pala groundwater basin has an average width of 2,600 feet and a maximum depth of about 240 feet (average thickness of 150 feet). The groundwater gradient in the basin is approximately 0.004 feet/feet (horizontal displacement of 250 feet to one vertical foot), which is similar to the topographic gradient of the ground surface. Depths to water were estimated to range from less than five feet to approximately 10 feet below ground surface. The average hydraulic conductivity of the alluvial sediments was estimated to be about 80 to 100 feet/day, with higher conductivity materials in the main river channel and lower conductivity materials (8 feet/day) skirting the edges of the valley (Geraghty & Miller, 1988).

The proposed landfill will occupy a canyon on the south side of the Pala groundwater basin. The western part of the basin is managed by the San Luis Rey Municipal Water District, which in 1995 requested an assessment of potential impacts of a leachate release from the proposed landfill on the basin. At the request of the SLRMWD, computer model simulations of groundwater flow in the Pala Basin in the vicinity of the proposed landfill were performed and a simulation of the expected groundwater flowpath from the landfill was presented (GLA, 1995). Estimated worst-case leakage from the landfill was modeled, as was its affect on identified production wells (ones from which water is extracted) within the basin. The analysis assumed that the leachate containment systems incorporated in the project design meet the requirements for environmental protection mandated by U.S. and California EPAs. The computer model is summarized below, and is provided in Appendix C.

This analysis was expressly intended to provide a "worst case" analysis, and was not intended to serve as a basis for an analysis of a reasonably foreseeable release. The scenario hypothesized in this analysis goes well beyond what is reasonably foreseeable. The reasons for this are:

- The analysis was conducted in 1995, prior to the time the operator modified its design to the highly protective double composite liner system, which exceeds applicable state and federal regulation. Any contaminants that might penetrate the five containment layers would be captured by either the leak detection/collection layer or the subdrain, prior to reaching the fractured bedrock formation.

- The analysis did not consider that, at the request of RWQCB, the operator would provide continuous pumping of monitoring wells in the fractured bedrock at the northern end of the landfill footprint. This would provide for substantial (approximately 90%+) capture before any contaminants reached the alluvial aquifer, and would be already operational at the time of any hypothetical release of contaminants through the liner system.

- The analysis did not consider that the pre-installed treatment system would have the capability of effectively treating typical landfill constituents through use of granular activated carbon, in addition to the reverse osmosis (RO) component.

- Based on Huntley (2009) (Appendix C-2), there is a potential that the continuous pumping would not capture all of the contamination present in the bedrock formation, and that some contamination could in theory reach the alluvial aquifer due to the known hydrogeologic connection. However, Huntley noted that the volume of flow in the bedrock formation is so much less than the volume of flow in the alluvial aquifer that there would be substantial and immediate dilution over a distance of 50 feet in the alluvial aquifer. As a result, any contaminants in the fractured bedrock that might reach the alluvial aquifer would be "rapidly diluted to below the detection limit." Dr. Huntley concluded that "I am unaware of any alluvial aquifer which has been contaminated by releases to an adjacent fractured rock aquifer."

The analysis simply tracks the movement of particles through the alluvial aquifer. It does not consider whether this would result in the detection of contamination in sufficient levels to require corrective action. Based on the findings of Dr. Huntley, it is not reasonably foreseeable that any wells in the alluvial aquifer, even wells on the GCL property in the alluvial aquifer, would have detectable contamination that would require remediation. That is even more the case with wells in the alluvial aquifer located downstream some miles from the GCL property.

Using Pala Basin hydrogeologic characterization summary input data, a two-dimensional groundwater flow model was developed using the finite difference computer program Flowpath (Franz and Guiguer, 1992). Constituent transport modeling with the Flowpath computer program is accomplished with the use of particle tracking techniques, which simulate constituents as "particles" that follow the groundwater flowlines.

Two conditions were simulated. The first was to simulate groundwater flow under existing conditions with a worst case leakage through the liner of about 10 gallons per day per acre (1,850 gallons per day for the 185-acre area) and head conditions in the Pala basin at levels approximately equal to those shown on the Geoscience (1993) hydrogeologic base map. The release is assumed to be a point source and is modeled as an injection well. The second simulation involved a lower groundwater elevation approximately 10 feet (20 feet below ground surface) in the southwest corner of the basin, as could happen if increased pumping took place during extended drought periods.

The first model showed that steady-state groundwater flow in the Pala basin can be reasonably assumed to follow the topography, with flow lines following the general trend of the river (Figure 10a). Owing to slightly increased recharge in the vicinity of the river, groundwater velocities are higher immediately adjacent to the trace of the river. Figure 10a also shows the predicted pathways of particles potentially released from the landfill. As shown, the particle pathways could extend past wells #41 and #42 (San Luis Rey Water District designations) when allowed to flow under steady state conditions. (Both of these wells are within the footprint of the property owned by Gregory Canyon Limited, at least 2/3 of a mile from the down-gradient boundary). On a transient simulation, the particles would need approximately 5.5 years to travel the distance of 2,000 feet between the toe of the landfill and wells #41 and #42, at an average flow velocity of approximately one foot per day.

From this point, the particle pathways then extend along the southern perimeter of the canyon until the particles intercept the point of constriction within the canyon, at the base of the bluff where the Verboom homestead is located on the west side of the property (within the footprint of the property owned by Gregory Canyon Limited, and at least 1/3 of a mile from the down-gradient boundary). At this point the pathway merges with the underflow of the San Luis Rey River, which would conceivably then carry the particles farther downstream.

Figure 10b illustrates the second groundwater flow simulation for the case where groundwater head levels have been reduced by 10 feet in the southwest part of the basin to a level approximately 20 feet below ground surface. As a result of the reduced groundwater head levels in the downgradient part of the model, a steeper groundwater gradient is induced. The net effect is slightly higher groundwater flow velocities in the central portion of the basin. Though there is a resulting change in the groundwater flow velocity, the change in the trajectories of particles is very small as demonstrated by the almost identical particle tracks calculated for the second simulation (Figure 10b). Under these conditions, the particles would need approximately 4.9 years to travel the 2,000 feet between the toe of the landfill and wells #41 and #42, at an average flow velocity of approximately 1.1 feet per day.

Using the particle-tracking model data, which simulates advective flow along groundwater flow lines, constituents in the groundwater such as volatile organic compounds (as identified by EPA Method 8260), or increased concentrations of sodium, chloride, and total dissolved solids could be detected in Wells #34, #41, and #42 assuming a worst case leakage scenario of 10 gallons per day per acre. Based on typical concentrations and estimated quantities of leachate generation, GLA (1995) estimated that as much as 1.0 pound/day of sodium, 7.5 pounds/day TDS, and 1.2 pounds/day of chloride could be added to the basin by a worst case leakage scenario. Additional discussion of potential release scenarios from the waste management unit that might impact groundwater or surface water is provided in B.5.1.5.

Another source of groundwater impacts is from landfill gas produced by the in-place refuse (see Section B.5.1.5.2). Although there are many factors that effect the rate and quantities of landfill gas produced (e.g., moisture content, refuse density, age and composition), all landfills produce landfill gas in the course of biological decomposition of the waste. The greatest amount of landfill gas is generated during the methanogenesis phase, when the gas concentration reaches 50 percent by volume. This phase may occur in three months in wet refuse to perhaps never in dryer materials. Over time, the landfill would be expected to produce methane concentrations at 40 to 70 percent by volume until the refuse organics are depleted sufficiently to create a decline in the production levels. Typically, methane production from refuse may occur in refuse that is older than 30 years, but the rate of production is low (McBean, 1995). In addition, dry conditions reduce the activity of most organisms and can lead to increased air access to the interior of the landfill and reduce the methane generation.

With the continued production and accumulation of landfill gas, gas pressures will increase causing the gas to migrate beyond the confines of the refuse into the atmosphere and into the surrounding area. Upon exiting the refuse prism, landfill gases may also impact groundwater in two ways. First, where groundwater is relatively shallow, landfill gases may mix directly with groundwater. The second and more common mode occurs when the warm landfill gases migrate to the cooler vadose zone and the water vapor associated with the landfill gas condenses to the liquid phase carrying with it some VOC components. Once condensed, these landfill constituents may migrate vertically downward through the unsaturated zone to groundwater, following a similar migrational pathway to that described above.

However, landfill gas control, and thus reduced impacts for groundwater, is an important element of landfill management. Included in the control of landfill gas is the placement of cover materials to limit the infiltration of water through the landfill surface, and the placement of landfill gas extraction wells to recover the landfill gas. Additional discussion of landfill gas controls and monitoring is provided in Sections B.5.2 and C.2.7. Landfills with waste containment systems (i.e., liner systems) further limit landfill migration away from the refuse prism and subsequently into the vadose zone and/or attendant groundwater.

The GCLF will be monitored on a quarterly basis in accordance with site-specific WDRs issued by the RWQCB. If impairment to groundwater is observed through the approved Detection Monitoring Program (DMP), evaluation monitoring will be triggered and if necessary, corrective action. This JTD presents a discussion and cost estimate of the reasonable foreseeable release in Section B.5.1.5. Additionally, Gregory Canyon Ltd. will secure financial assurance to fund corrective action in the event of a release.

B.5.1.2 SUBDRAIN SYSTEM

A subdrain system will be constructed as part of the waste containment unit. Although groundwater seepage is not anticipated, this system is designed to collect and control groundwater which intersects the bottom subgrade surface. The subdrain system will discharge to a storage tank in the ancillary facilities area. If groundwater is observed, a sample of the liquid will be collected and the subdrain system will be monitored for the presence of contamination in accordance with the WDR parameters. A detailed discussion of the subdrain system is provided in Section C.2.3.

As a contingency, in the event that localized groundwater seeps are encountered in the canyon and/or the proposed cut slopes, this water will also be managed. Seeps encountered above the active development areas will be directed into the perimeter surface water control system (i.e., perimeter channels). In this event, the design also includes provisions for a subdrain system beneath the composite liner over the slope areas.

The seeps will be measured for flow volume to determine the exact design of the subdrain collector. Once liner construction reaches the observed seep elevation, a localized subdrain collection feature will be installed. The subdrain feature utilized will be a chimney drain. Based on seep flows, the chimney drain will be constructed consisting of either a geonet or trench-type collector. A geonet strip collector will be constructed and used for lower flow seeps and placed from the seep to the next lower bench into a section of slotted pipe surrounded with gravel and wrapped in geotextile. The slotted pipe will transition to solid pipe gravity flowing to the floor area subdrain system. Higher flow seeps may warrant a trench collector type chimney drain. A trench will be cut into the side slope from the next lower bench up to the seep. The trench will be filled with gravel and wrapped with geotextile. A perforated pipe can also be added for additional flow capacity. The trench size will be dictated by flow rates. The trench collector will connect at the bench and eventually to the floor subdrain system similar to the geonet collector.

As discussed in Section B.2.2.2, to permit discharge of extracted groundwater to a waterway, the RWQCB also regulates the General NPDES Permit Authorization for Discharge of Groundwater to Surface Waters. Although no groundwater is anticipated to accumulate in the subdrain system, a permit would be required to discharge the groundwater collected by the subdrain system beneath the landfill to the San Luis Rey River. The discharge is currently regulated under RWQCB Order No. 2001-96 for groundwater extraction and similar waste discharges to surface waters within the San Diego Region, except for San Diego Bay. In the unlikely event that there is a measurable accumulation of groundwater in the subdrain system collection tank it will be used onsite by spraying on covered areas to reduce immediate dust hazards or discharged to the San Luis Rey River and a permit application package would be prepared and submitted to the RWQCB for subdrain water discharges.

B.5.1.3 GROUNDWATER MONITORING SYSTEM

The groundwater monitoring program at the GCLF will be implemented in accordance with State water protection requirements under 27 CCR, Chapter 3, Subchapter 3, Article 1 (Article 1) through site-specific WDRs issued by the San Diego RWQCB. The water quality monitoring system will be designed and certified by a registered geologist or registered civil engineer in accordance with 27 CCR, Section 20415(e)(1).

Specifically, the water quality protection standards include: establishment of monitoring systems for the groundwater, surface water, and unsaturated zone, including background and compliance monitoring points for each medium; establishment of constituents of concern; establishment of monitoring parameters; and establishment of a monitoring protocol and a compliance period. In accordance with 27 CCR, Section 20410 an operator must continue monitoring until the discharger (GCLF) demonstrates continuous compliance with the sites established Water Standard for three consecutive years. The compliance period for the GCLF is the active life of the site, anticipated to be 30 years based on the projected inflow rate plus the minimum 30-year post-closure maintenance period, or a minimum total of 60 years. However, the compliance period will be conducted for a period of time such that compliance with 27 CCR, Section 20410 is achieved.

The objectives of the water quality monitoring system for the GCLF are to:

- Characterize background groundwater quality.
- Detect changes in water quality that may result from changes in recharge, possible landfill leakage or other landfill-related factors before such changes affect off-site water quality.
- Monitor groundwater elevations and gradients around the GCLF.
- Fulfill RWQCB WDRs for groundwater monitoring.

The proposed Monitoring and Reporting Plan (M&RP), which includes a Sampling and Analysis Plan, to meet these objectives is included in Appendix G. The groundwater monitoring workplan was updated to reflect the recommendations of Dr. Huntley (see Appendix C-2) and is included in Appendix G-2.

The water quality monitoring system for the GCLF will provide for the monitoring of surface water and groundwater. The groundwater monitoring points discussed in the following sections were established for WDRs in compliance with 27 CCR, Article 1, and reflect the following: the results of hydrogeologic investigations; current site conditions; and implementation of a DMP.

Six phases of geologic and hydrogeologic characterization have been completed at the site and were used to design the monitoring well network discussed below. An Initial Study was completed by Geotechnical Consultants, Inc. for the County of San Diego and the U.S. Department of Interior in 1989. The second and third phases were completed by Geraghty & Miller in 1988 and 1990, respectively. The fourth phase comprised the work of Woodward-Clyde completed in 1991 and reported in 1995. The fifth phase was the hydrogeologic study completed by GLA in 1997 and the sixth phase, also completed by GLA (1998), addressed geotechnical issues. GLA has also completed supplemental reports to address specific concerns relating to the hydrogeology of the site. Specifically, these studies include a report entitled “Phase 5 Supplemental Investigation Results of Pumping Tests” by GLA (2001) conducted to better characterize the hydraulic properties of the bedrock aquifer beneath the site, and a report summarizing a two dimensional groundwater flow model (GLA, 1995) to assess impacts of a release from the landfill to the Pala Basin. Each of these reports has been incorporated into one “master” Geologic, Hydrogeologic, and Geotechnical Investigations Report (GLA, 2003) and included as Appendix C.

Finally, following RWQCB review of the May 2004 JTD, the RWQCB requested that the groundwater monitoring network be installed and tested to demonstrate that the proposed monitoring network will be able to provide the earliest detection of a release of waste constituents from the proposed solid waste management unit at Gregory Canyon. In response to this request, GLA drilled, logged, constructed, and tested seven bedrock groundwater monitoring wells across the mouth of Gregory Canyon (at the downgradient limit of the proposed landfill); modified two wells (GLA-2 and GLA-10) to grout up the lower open hole sections of these wells; and drilled, logged and constructed two replacement alluvial wells for the groundwater monitoring network. Results of this drilling and aquifer testing program are summarized in a supplemental report to the Geologic, Hydrogeologic and Geotechnical Investigations Report (GLA, 2003) and are included in Appendix C-1.

B.5.1.3.1 GROUNDWATER MONITORING WELL LOCATIONS

Based on hydrogeologic investigations, the alluvial and shallow bedrock systems are interconnected and groundwater freely communicates between them, although the quantity of water transmitted to the alluvial aquifer from the fractures in the bedrock is minor relative to the volume of water transmitted through the alluvium. Though the alluvial system represents the zone with the highest overall hydraulic conductivity, these materials will be removed within the landfill footprint (i.e., the landfill will be underlain by bedrock and engineered fill), and a release from the landfill would be detectable in the fractured bedrock flow system first. As a result, a dual detection monitoring system, which includes dedicated wells in both the alluvial and the bedrock fracture flow systems was installed. The DMP will include downgradient wells to collect representative samples of groundwater at the downgradient limit of the landfill, or "point of compliance", and upgradient wells to collect samples of groundwater that are representative of "background" conditions. In addition, cross-hole testing has been performed following well construction to verify that there is hydraulic connectivity between wells and that the monitoring wells, as currently constructed, would be capable of detecting a contaminant because all fractures are recharged from the same source. Further discussion of the cross-hole pumping tests performed along the point of compliance is provided in Appendix C-1.

The groundwater monitoring system at the GCLF was initially designed to include a total of 20 wells, 16 of which monitor the weathered and unweathered bedrock fractured flow system. Additional groundwater monitoring wells have been proposed to reflect Dr. Huntley's recommendations (Appendix C-2), and the revised workplan is included in Appendix G-2. As shown in the following table, the proposed groundwater monitoring network will include 14 fractured bedrock wells, six weathered bedrock wells, and three alluvial wells. In addition, the groundwater monitoring network includes two alluvial "sentry" wells, downgradient of the point of compliance, and designated to intercept groundwater flows as predicted by computer modeling that simulates a release from the landfill to the Pala Basin (Section B.5.1.1.4, and Appendix C). Groundwater level measuring stations have been established in three fractured bedrock wells, and five weathered bedrock wells. The proposed groundwater monitoring network is presented on Figure 10C.

Groundwater Detection Monitoring Network

Monitored Zone	Well Name	Designation	Well Position
Fractured (Unweathered) Bedrock	GLA-4, GLA-5, GLA-11, and GLA-18*	Monitoring Well	Upgradient (Background)/ Cross-gradient
	GLA-1D*, GLA-2, GLA-12, GLA-13, GLA-A GLA-BD*, GLA-CD*, GLA-D, GLA-E and GLA-F		Downgradient (Compliance)
	GMW-4, GLA-1 and GLA-8	Water Level Measuring Station	Not Applicable
Weathered Bedrock	GMW-1, GLA-B, GLA-C, GLA-G, GLA-14 and GLA-19*	Monitoring Well	Downgradient (Compliance)
	GLA-3, GLA-7, GLA-10, GMW-2 and GMP-2	Water Level Measuring Station	Not Applicable
Alluvium	Lucio #2R	Monitoring Well	Background
	GMW-3 and GLA-2A*		Downgradient (Compliance)
	GLA-16, SLRMWD #34R		Downgradient/Sentry

* Proposed well; not currently constructed.

Wells such as GLA-7 and GLA-8 that are located within the future landfill footprint, will continue to be used as water level measuring stations until they are formally abandoned prior to landfill development in that area. It should be noted that in the event that facility construction requires the destruction of any of the groundwater monitoring wells (e.g., an existing well located in the ancillary facilities area), a replacement well would be constructed in the vicinity of the originally designated well. Of these wells, the only well that cannot be constructed prior to landfill operations will be GLA-18. Because of the steep slopes, access to this well location is not anticipated until the landfill operations extend a significant distance up the canyon and the utility pad is constructed. Until that time, a drill rig will not be able to gain access to the area for well construction.

The boring logs for those wells included as part of the site's DMP are included in Appendices C, C-1 (for the more recently constructed wells [in June/July 2004]), and G.

Water quality monitoring will also include sampling and analysis of surface water and other monitoring points (e.g., leachate and subdrain liquids). Discussion of these portions of the monitoring program is provided in Sections B.5.1.3.2 and B.5.1.3.3.

Beginning in December 2000, samples were collected quarterly for one year and analyzed for the full suite of "constituents of concern" (COCs) as defined by the Code of Federal Regulations (40 CFR Part 258, Appendix II). The COCs include a broad range of general chemistry constituents, 17 metals, as well as volatile organic compounds (VOCs), semi-volatile organic compounds, pesticides, herbicides and polychlorinated biphenyls (PCBs). A summary of the water quality data obtained during the four quarters of COC monitoring is provided in Appendix C.

Following construction of the groundwater monitoring network (with the exception of proposed background well GLA-18 and five additional wells recommended by Dr. Huntley [Appendix C-2]) and based on RWQCB guidelines to obtain up to 16 baseline data points to characterize naturally-occurring water quality of the site before waste is received by the facility, the groundwater monitoring network and surface water monitoring points were sampled and tested quarterly for the entire COC list of analytes to develop a statistical database of background (pre-development) water quality chemistries. In anticipation of the landfill construction schedule, a more accelerated sampling and analysis program (e.g., bimonthly) was implemented to obtain the necessary 16 baseline data points. The monitoring program included collection of samples from existing bedrock monitoring wells GLA-2, GLA-4, GLA-5, GLA-11, GLA–12, GLA-13, GLA-14, GMW-1, GLA-A through GLA-G, and alluvial wells GMW-3, Lucio #2R, SLRMWD #34R, and GLA-16. Prior to each sampling event, water levels will also be measured in each of these wells and water level measuring stations GLA-1, GLA-3, GLA-7, GLA-8, and GLA-10.

Samples were also collected and tested for the 40 CFR Part 258, Appendix I list of a minimum of 47 VOCs along with the metal surrogates (chloride, nitrate as nitrogen, sulfate, pH and total dissolved solids [TDS]), calcium, magnesium and sodium, referred to herein as the routine monitoring parameters (MPars).

In accordance with State and Federal regulations, the laboratory was required to achieve the lowest possible detection limits for each constituent in the program. Now that the database has been established, the groundwater chemistry data is sufficient to be analyzed for statistical significance using the procedures set forth in 27 CCR, Section 20415 when waste placement begins. Finally, once the landfill becomes operational and in accordance with site-specific WDRs prepared by the RWQCB, the results and interpretation of the data obtained during sampling will be reported to include the rate and groundwater flow direction determined from measurement of depths to groundwater in the monitoring wells and water level measuring stations; a description of the sampling and analytical methods and laboratory quality control procedures; and a summary of landfill recordkeeping and on-site inspections. It is anticipated that the data will be reported to the RWQCB on a quarterly basis, or as specified in the site-specific WDRs. This data will also be coordinated with and provided to the San Luis Rey Municipal Water District as required in the agreement with Gregory Canyon Ltd.

The more extensive analytical program for COCs (as identified in 40 CFR 258, Appendix II) will be conducted every five years for each media (e.g., groundwater, surface water, leachate, leak detection/drainage layer liquid, and subdrain water), and COCs identified in a sample and verified by retest will be added to the list of routine analytes. In addition, whenever a new background well is added to the DMP, the new well will be sampled quarterly for the full 40 CFR 258, Appendix II suite of COCs, as necessary, in order to establish the 16 data point background database for groundwater chemistry in the new well. Any Appendix II constituents identified through sampling of leachate in the LCRS or in subdrain water will be added to the Appendix I list and analyzed quarterly.

B.5.1.3.2 SURFACE WATER MONITORING

Surface water monitoring is conducted to provide the RWQCB with data on the operational site containment system effectiveness. Surface water monitoring at the GCLF will be performed to monitor seasonal surface water run-off at three proposed monitoring points (see Figure 10c), including samples within the landfill area (at the bottom of the canyon, if water is present), and within the San Luis Rey River, up and downstream of the point where Gregory Canyon intersects the river. As a result of the limited water that is likely to collect in the upper reaches of the canyon, there is not likely to be sufficient data on which to evaluate surface water within Gregory Canyon using upstream to downstream comparisons. However, following a significant rain event, sampling and testing of a downstream (compliance) location (GCSW-2) for the MPars will be conducted in accordance with the site WDRs. The canyon compliance location GCSW-2 will be located toward the mouth of the canyon, approximately 30 feet east of well GLA-10 and monitored for the MPars as an indicator of landfill impacts to surface water. To monitor the surface water quality in the San Luis Rey River, the background San Luis Rey River surface water monitoring point (SLRSW-1) will be located in the San Luis Rey River at the Gregory Canyon site upstream property boundary, downstream from the former Hanson sand and gravel pits. It will provide water quality data for surface water entering the property from the Hanson sand and gravel quarry. The compliance surface water monitoring point (SLRSW-2) will be located downstream of the landfill at a sampling point east of the access road bridge. Surface water monitoring will be performed on a quarterly basis in accordance with the site WDRs issued by the RWQCB.

B.5.1.3.3 OTHER MONITORING POINTS

In addition to groundwater and surface water monitoring at the GCLF, after landfill construction begins, sampling will also include collection of liquid from the subdrain system (although under the prescriptive standard design no groundwater is expected in the subdrain system), the leak detection/drainage layer between the upper composite liner and lower HDPE liner and the LCRS.

At a minimum, if liquid is present, the subdrain system and leak detection/drainage layer monitoring program will include analysis for the constituents included in the groundwater and surface water monitoring program (the quarterly MPars). If groundwater is collected in the subdrain, following review of the laboratory analytical data, it will either be used on site or discharged to the river under an approved NPDES permit for point source discharge.

For the LCRS, sampling will be conducted upon the first collection of leachate and thereafter annually in October, and analyzed for all of the COCs as listed in 40 CFR Part 258, Appendix II. If a new constituent is identified in any sample, the LCRS will be resampled. It is proposed that with the exception of the metals, which are generally poorer indicators of a release since many are also naturally occurring, new constituents confirmed in the retest sample will be added to the list of routine quarterly water quality MPars, or addressed as indicated in the site WDRs.

B.5.1.4 NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES) STORMWATER MONITORING PROGRAM

A SWPPP and MPRR have been prepared for the landfill in accordance with NPDES General Permit requirements. Copies of the SWPPP and the MPRR are included in Appendix D. To obtain authorization for industrial stormwater discharge, the landfill must comply with a General Permit to Discharge Stormwater Associated with Industrial and Construction Activities. The operator has submitted a Notice of Intent (NOI) for issuance of a NPDES permit under the Construction Activities General Permit and will submit a NOI for Industrial Activities concurrent with the application to obtain WDRs. Stormwater monitoring is required on two occasions each year during the wet season, starting with the first rain event that produces a significant runoff volume. The designated discharge points will be monitored in accordance with the SWPPP and MPRR, and MPRR reports will be submitted to the RWQCB on an annual basis. The GCLF will operate under a SWPPP that is maintained to reflect current general permit requirements. As the SWPPP is updated, a current version of the SWPPP will be provided to the LEA.

B.5.1.5 POTENTIAL RELEASE FROM THE WASTE MANAGEMENT UNIT

Water quality impacts associated with solid waste management units are typically related to the following: surface water degradation associated with contact of the waste prism with surface water or liquid discharge from the landfill to surface waters; vadose zone degradation associated with either gas or moisture migration from the waste management unit; and groundwater degradation associated with landfill liquid or gas migration to the water table. In accordance with 27 CCR, Article 1, the following sections describe the anticipated avenues by which landfill constituents may be released to groundwater beneath and/or adjacent to the waste management unit. Though not anticipated at the GCLF owing to the design and operational controls to be implemented, their pathways form the basis of the "reasonably foreseeable release" discussed in Section B.5.1.6.

B.5.1.5.1 SURFACE WATER

Landfills can impact waters of the state by direct communication between surface waters and refuse. The design of effective drainage and erosion controls at the GCLF will minimize the potential for direct surface water contact with refuse. The most likely contact is precipitation from a storm falling onto any exposed refuse at the active face when the site is open. The active face is maintained to as small an area as possible and any precipitation migrating into the refuse prism would eventually be captured in the LCRS.

Another possible scenario involves surface water impacts associated with seepage of landfill fluids, and the commingling of these fluids with normal surface water run-off. However, this is not a common occurrence due to the use of BMPs, cover repair, etc. associated with routine landfill operations.

B.5.1.5.2 LANDFILL GAS

Subsurface movement of landfill gas outside the limit of refuse is a second means by which landfill constituents can impact state waters. Landfill gas often contains a variety of VOCs that may move off-site with the gas. Landfill gases are typically water-saturated. Upon exiting the refuse prism, landfill gases may impact groundwater in two ways. First, where groundwater is relatively shallow, landfill gases may mix directly with groundwater. The second and more common mode occurs when the warm landfill gases migrate to the cooler vadose zone and the water vapor associated with the landfill gas condenses to the liquid phase carrying with it some VOC components. Once condensed, these landfill constituents may migrate vertically downward through the unsaturated zone to groundwater.

B.5.1.5.3 VADOSE ZONE

The vadose zone can be defined as a subsurface zone containing water at hydraulic pressures that are less than atmospheric pressure and air or gases at atmospheric pressure. Water in the vadose zone (including landfill gas condensate) can migrate vertically, through fractures or pores in the weathered rock, and eventually reach groundwater.

B.5.1.5.4 GROUNDWATER

Once landfill constituents have reached groundwater, the natural groundwater flow gradients and the dispersive properties of the specific contaminants will govern how groundwater contaminants migrate from the site. At the GCLF, groundwater flows in a northerly direction under a gradient of approximately 0.045 ft/ft (alluvial aquifer) to 0.2 ft/ft (bedrock aquifer).

B.5.1.6 ANTICIPATED METHODS OF MITIGATION

The following discussion identifies the "worst case release" scenario that could reasonably be expected at the site, and the mitigation measures that are anticipated to respond to these conditions. While not anticipated at the GCLF, this scenario is submitted in response to 27 CCR, Article 1.

B.5.1.6.1 SURFACE WATER

Since surface waters will not come in contact with wastes, and run-on and run-off will be controlled, the worst case surface water release scenario involves transport of minor volumes of landfill constituents in run-off to the San Luis Rey River. Considering that wastes will be covered by daily and interim cover soils, and since run-off will be controlled in a drainage system designed for the 100-year storm event and will be monitored as part of both the WDRs and NPDES permits, the volume of impacted water that might be released from the site is expected to be minimal. In the event that runoff from the WMU impacts San Luis Rey River water, a program would be implemented to investigate how such impacts occur and to identify engineering measures (e.g., leachate seep controls such as additional cover soils or drains) to eliminate the source of impacts.

During inclement weather, the active disposal area will be reduced to limit the amount of refuse exposed to the rainfall. In addition, periodic inspection and repair of cover soils will significantly minimize the possibility that landfill fluids will seep through the cover soils and migrate into surface water control systems.

GCLF will have extensive temporary and permanent storm water control systems in place throughout active site operations and during a minimum of 30 years of post-closure. These design features are presented in Sections B.5.4 and C.2.8.3 of the JTD. The site operator will be complying with both the Industrial and Construction General Storm water Permits. Therefore, an extensive SWPPP and M&RP was developed specifically for the GCLF (Appendix D). This program is required to be reviewed annually and adjusted to provide optimum protection of storm water flows. In an extreme situation, such as a "wash-out" of solid wastes from the Unit caused by a large storm event or multiple events, all efforts by the discharger would be geared toward preventing run-off to local surface water bodies (e.g., San Luis Rey River). Measures would be taken to retain the affected storm water within the desilting basins (i.e., temporary freeboard can be achieved through placement of sandbags along the perimeter of the desilting basins). The affected surface water would be retained until it could be tested and would then be released, pumped into a holding tank or treated, as appropriate.

A discharge of waste to the river from a potential "wash out" would temporarily impact the beneficial uses of the surface water. In response to such a condition, all waste would be collected from the river immediately by the operator's litter crew, working from the furthest end of the release to the landfill.

B.5.1.6.2 LANDFILL GAS

A network of landfill gas migration monitoring probes will be installed around the perimeter of the refuse footprint as the landfill expands (Figure 2). These probes will be routinely monitored to ensure that no gas is leaving the site in excess of regulatory limits. Any landfill gas migration from the refuse prism will be mitigated by the installation of landfill gas collection wells to control potential gas migration. Section B.5.2.3.1 provides information on the landfill gas migration monitoring system.

B.5.1.6.3 VADOSE ZONE

As described above, landfill gas migration into the vadose zone can be mitigated by a network of landfill gas collection wells. Given the fractured nature of the underlying geologic structure, liquids entering from the landfill are not anticipated to accumulate significantly in the vadose zone and as a result, lysimeters are not considered practical at this site. Monitoring of the primary and secondary LCRSs and the subdrain will be conducted in lieu of other vadose zone systems.

B.5.1.6.4 GROUNDWATER

The "reasonably foreseeable" release to groundwater from the facility would involve leakage of landfill fluids or landfill gas from point defects in the landfill liner system into the underlying bedrock. Landfill gas impacts might also occur by migration from the landfill, which upon cooling will condense and form a liquid that can infiltrate into the underlying bedrock through a point defect.

A release of leachate or landfill gas condensate would likely contain a variety of inorganic and organic compounds. Typically, landfill-generated leachate and condensate contain numerous chlorinated aliphatic and aromatic organic compounds. The most commonly detected of these include tetrachloroethene (PCE), trichloroethene (TCE), isomers of dichloroethene (DCE) and dichloroethane (DCA), vinyl chloride, and aromatic compounds such as benzene, toluene, ethylbenzene, and xylenes (collectively, BTEX compounds). The total concentration of VOCs measured in typical landfill leachate samples rarely exceeds 1 milligram per liter (1 mg/L). At these concentrations, the VOCs exist in a dissolved phase within the leachate, and do not form immiscible layers that can be identified within an aquifer and removed. Generally, removal of such low concentrations of these chlorinated organic compounds can be effectively accomplished using reductive dechlorination, while the aromatic hydrocarbons are more effectively degraded by oxygenation techniques. These techniques break down VOCs by replacing the chlorine ions with hydrogen ions, reducing them to stable compounds (such as ethene or ethane) that have little or no effect on human health or the environment.

The reasonably foreseeable release and the extent of corrective action were based on the following factors:

- The installation of a highly protective double composite liner system, which exceeds applicable state and federal regulation. Any contaminants that might penetrate the five containment layers would be captured by either the leak detection/collection layer or the subdrain, prior to reaching the fractured bedrock formation.

- The operator would provide continuous pumping of monitoring wells in the fractured bedrock at the northern end of the landfill footprint. This would provide for substantial capture before any contaminants reached the alluvial aquifer, and would be already operational at the time of any hypothetical release of contaminants through the liner system.

- The pre-installed treatment system would have the capability of effectively treating typical landfill constituents through use of granular activated carbon, in addition to the reverse osmosis (RO) component.

- Based on Huntley (2009) (Appendix C-2), there is a potential that the continuous pumping would not capture all of the contamination present in the bedrock formation, and that some contamination could in theory reach the alluvial aquifer due to the known hydrogeologic connection. However, Huntley noted that the volume of flow in the bedrock formation is so much less than the volume of flow in the alluvial aquifer that there would be substantial and immediate dilution over a distance of 50 feet in the alluvial aquifer. As a result, any contaminants in the fractured bedrock that might reach the alluvial aquifer would be "rapidly diluted to below the detection limit." Dr. Huntley concluded that "I am unaware of any alluvial aquifer which has been contaminated by releases to an adjacent fractured rock aquifer."

Based on the findings of Dr. Huntley, it is not reasonably foreseeable that any wells in the alluvial aquifer, even wells on the GCL property in the alluvial aquifer, would have detectible contamination that would require remediation. That is even so in the case wells in the alluvial aquifer located downstream some miles from the GCL property. For this reason, the corrective action for a reasonably foreseeable release is limited to actions within the fractured bedrock formation.

Since the site will already be equipped with a groundwater treatment system (i.e., RO system), potential groundwater mitigation assumes a groundwater extraction and treatment method. The reasonably foreseeable release corrective action will include the installation of eight groundwater extraction wells drilled to approximately 100 feet and placed on 250-foot centers across the downgradient limit of the landfill. The wells will be equipped with dedicated pumps and discharge tubing to extract the water from the wells to an influent tank. Based on the anticipated concentrations, it is currently anticipated that the organic compounds in the groundwater can be most effectively treated by granular activated carbon (GAC). As a result, initially it will be processed through the GAC to remove organic compounds and then the water will pass through the RO system to remove additional inorganic compounds.. The treated water would likely be stored in a tank for use on site or discharged to the San Luis Rey River under an approved NPDES permit.

It is also anticipated that there will be additional groundwater monitoring costs to evaluate the effectiveness of the treatment system and to comply with an NPDES permit for potential discharge of the treated groundwater to the San Luis Rey River. Under the current reasonably foreseeable release scenario, it is assumed that monthly influent and effluent sampling will be performed and the samples will be submitted for TDS and volatile organic compounds analysis for the duration of the corrective action, estimated to be operational over a period of up to 10 years. Under the NPDES permit, the effluent will be analyzed for a suite of inorganic and organic compounds as well as acute and chronic toxicity on a quarterly/semiannually basis in accordance with the permit conditions. (A longer constituent list is required semiannually compared with the quarterly monitoring program). Results of the monitoring program will be reported to the RWQCB on a quarterly basis.

B.5.1.6.5 AFFECTS OF GROUND AND SURFACE WATER ON THE UNIT

Impacts can occur to the landfill unit from groundwater intrusion and surface water inundation. An evaluation of the fluctuation of local groundwater levels as they might affect the integrity of the liner system for the waste management unit and surface water condition related to off-site drainage run-on and storm water discharges upon the waste management unit is presented below.

B.5.1.6.6 AFFECTS OF GROUNDWATER

Generally, no impacts are expected from groundwater on the waste management unit since the landfill is situated above the highest anticipated groundwater elevation. However, in the unanticipated event that groundwater was to rise significantly, the landfill design also includes a subdrain system in the floor areas of the landfill to convey any groundwater away from the landfill by gravity. A discussion of the subdrain system is included in Section B.5.1.2 – Subdrain System.

B.5.1.6.7 AFFECTS OF SURFACE WATER

Surface water run-on and storm water discharges affects on the landfill unit could include:

- Erosion of daily, intermediate, and final cover.
- Exposure of wastes thus increasing vectors and nuisances and potential offsite surface water impacts.
- Infiltration of water which increases the potential for the production of leachate and potential for groundwater impairment.

Elimination or reduction of the amount of surface water that enters the landfill unit is important in the design and operation of the unit because surface water is the major contributor to the total volume of leachate. Storm water run-on from the surrounding areas will not be allowed to enter the unit and storm water discharges will not be allowed to accumulate on the surface of the landfill. Section B.5.4 – Drainage and Erosion Control discusses control methods which aid in the minimization of run-on/run-off and surface water intrusion and Section C.2.8 – Drainage Control System discusses the drainage control measures which aid in removal of surface water run-off and prevention of surface water run-on.

B.5.1.7 ESTIMATED COST FOR REASONABLY FORESEEABLE RELEASE MITIGATION

In accordance with 27 CCR, §20380(b), the GCLF will establish and maintain assurance of financial responsibility for initiating, and completing corrective action for all reasonably foreseeable releases from the GCLF. As shown in Table 8, costs have been estimated to implement a Correction Action Program associated with a release to the underlying bedrock as described in Section B.5.1.6.4 above. The cost estimate is intended to provide a basis for the compliance with 27 CCR, Article 1 financial assurance requirements.

TABLE 8
GREGORY CANYON LANDFILL
ESTIMATED MITIGATION COSTS

ITEM	UNIT COST	UNITS	TOTAL COST
Construction Costs			
Corrective Action Well Construction (1)	$10,700	8	$85,600
Extraction Pumps	$4,000	8	$32,000
Electrical Conduit	$15	4200	$63,000
Conveyance Piping	$40	4200	$168,000
Water Treatment System	$800,000	1	$800,000
R/O System (3) (5) (5A)	$540,000	1	$540,000
Surface Water Impact Mitigation (6)	$500,000	LS	$500,000
Regulatory Liaison/Project Management (7)	$125,000	LS	$125,000
Engineering/CQA	$60,000	LS	$60,000
Construction Management (2)	$30,000	LS	$30,000
		Sub-Total	**$2,403,600**
	Contingency	10%	$240,360
		Construction Sub-Total	**$2,643,960**
Operational Costs	**COST/YEAR**	**YEARS**	**TOTAL COST**
Extraction Well Maintenance (8)	$10,700	3	$32,100
Laboratory Analyses (4)	$21,400	30	$642,000
Groundwater Monitoring and Reporting	$40,000	30	$1,200,000
Regulatory Liaison/Project Management	$20,000	30	$600,000
Granular Activated Carbon Treatment System Annual Maintenance	$50,000	30	$1,500,000
Surface Water Mitigation (9)	$1,000,000	LS	$1,000,000
		Operation Cost Sub-Total	**$4,974,100**
		Total Cost	**$7,618,060**

Updated January 2011

Assumptions:

1. Corrective action wells will be permitted by the San Diego County Dept. of Environmental Health ($150/well), and are assumed to be five-inch diameter wells to 100 feet, with stainless steel screens (~$100/ft.). Each well will be developed following construction (~4 hours @ $130/hour).
2. Construction management will include logging of borings, observation of well construction, well development, and documentation.
3. A R.O. system for water treatment will be installed at the onset of the project development. Therefore, the cost for the R.O. system is not necessary as part of the cost estimate for reasonably foreseeable release mitigation. Costs include only those associated with addition of GAC to treat volatile organic compounds in groundwater.
4. Laboratory analyses include monthly influent and effluent analyses (~$250/month), and quarterly (~$1500) and semiannual (~$2050) analyses for NPDES monitoring. Analyses also include staff time for sample collection (~1 hour/month @ $50/hour).

5. The R.O. system will be installed during initial construction per an agreement with the San Luis Rey Water District and be available for impacted groundwater treatment along with the water treatment system described in Section B.5. Therefore, the capital cost of $540,000 for the R.O. system is not included in the reasonably foreseeable release cost estimate.
5A. The R.O. system may be used for surface water clean-up. The surface water impact mitigation cost includes evaluation and determination of corrective action, and implementation of surface water clean-up as well as determination if operational cost for the R.O. system should be utilized for surface water clean-up.
6. Surface water impact mitigation is for unanticipated releases from the waste management unit to the natural drainage ways including the San Luis Rey River during the active operation and post-closure maintenance period. Any release occurring during active operations will be mitigated with operational revenues generated from tipping fees.
7. Includes preparation of an ROWD, EMP/AMP, EFS/ACM, SOR and CAP documents in response to identification of release and coordination with RWQCB during CAP construction.
8. Operational cost estimate assumes replacement of one extraction well every 10 years.
9. The operation and maintenance of the R.O. system is included in the line item for "Surface Water Mitigation" cost.

B.5.1.8 GROUNDWATER TREATMENT SYSTEMS

Reverse Osmosis

The Agreement between the San Luis Rey Municipal Water District and the applicant requires the installation of a RO system. The RO system will be installed in the southwestern portion of the ancillary facilities area. The RO equipment and interconnecting piping will be constructed above ground inside a concrete containment area, which will be secured with a slatted chain link fence.

The purpose of the RO system is to provide a groundwater treatment facility that is in place in the event that groundwater impacts are identified. As currently configured, the primary constituent that the RO system would remove is total dissolved solids (TDS) and has the capability to treat 50 gpm. The system can be modified to handle organic compounds or other contaminants, as necessary.

Based on a typical release, VOCs are generally the constituents that are associated with landfills which need removal and treatment. Due to the high cost of operations for an R/O system, a granular activated carbon system was included as the impacted groundwater treatment system for purposes of 27CCR reasonably foreseeable release. The GAC is discussed in the following section and O&M costs associated with this treatment option are included in Table 8.

The RO treatment involves the separation of TDS from water by applying pressure to a feed stream passing over a semi-permeable membrane, thereby inducing flow of water molecules through the membrane, leaving the dissolved solids on the influent side. The RO system creates two effluent streams, the reduced TDS water that passed through the membrane (clean water) and the elevated TDS solution (brine) that remains on the feed side of the membrane.

If necessary, the effluent (clean water) will be stored in a tank and then discharged into the San Luis Rey River or used on site and would meet a standard of 500 parts per million (ppm) of TDS or a standard as set by the RWQCB for discharge to the San Luis Rey River. The brine, which is the end waste product that contains the larger TDS particles in a concentrated liquid, will be collected in a tank and hauled off site for disposal. It is anticipated that the brine would be taken to the Hale Avenue Resource Recovery Facility in Escondido or a similar facility.

If the RO system were to be needed, groundwater would be supplied to the RO system influent tank from the groundwater monitoring wells, any dedicated groundwater extraction wells installed as part of a Corrective Action Program, or from the subdrain collection system that is part of the overall waste containment and environmental monitoring system.

Granular Activated Carbon

GAC adsorption technology is a proven technology for removal of VOCs from groundwater, which is a more typical contaminant release treatment scenario for a non-hazardous landfill. GAC is also often used as a water purification technology for removal of VOCs from drinking water. The major components of the GAC treatment system for the GCLF groundwater project would include:

- Influent equalization tank;
- Two influent transfer pumps;
- Pre-filtration system;
- Two 2,000-pound GAC vessels; and
- Effluent surge tank.

The influent tank would be used to maintain a steady flow through the GAC vessels and to accommodate GAC backwash water for re-processing. The influent transfer pump would be controlled by high- and low-level switches in the influent tank and, when operating, would maintain a constant flow rate to the treatment system. A pre-filtration system will be required to minimize transfer of suspended matter from the influent to the GAC vessels. It is expected that the GAC adsorption system would operate under pressure (about 10-15 pounds per square inch [psi]), and will be transferred directly to an effluent surge tank or an effluent transfer pump. The treated effluent will then be pumped to the RO system.

For the Gregory Canyon site, it is anticipated that two GAC adsorption vessels would operate in parallel. Periodic backwashing may be required to remove trapped suspended matter and biofouling matter that accumulates on the GAC bed. During backwash, one GAC vessel would remain in operation while the second vessel undergoes backwashing. Water from the backwash process would then be circulated to the influent tank for re-treatment. Since the filtration system would be installed ahead of the GAC vessels, a monthly backwash of each unit would be recommended.

Table 8 provides the system design cost for the GAC adsorption treatment system. It should be noted that the GAC would only be utilized in the event of a release and implementation of a CAP under the reasonably foreseeable release scenario.

B.5.1.9 REPORTING

GCLF will conduct compliance monitoring and submit associated reports in accordance with WDRs for the proposed landfill to the RWQCB. GCLF shall submit, at a minimum, the following required monitoring reports:

- Water Quality Monitoring Report (Quarterly, or as indicated in the site WDRs)
- Annual Summary Report
- Constituents of Concern (COC) Monitoring Report - Every Five Years

B.5.2 GAS CONTROL AND MONITORING

B.5.2.1 INTRODUCTION

Landfills which receive organic wastes in significant quantity will produce "landfill gas". This gas generally consists of equal amounts of methane and carbon dioxide along with traces of other constituents. The production of landfill gas within the refuse cell is of interest due both to the flammability of methane in concentrations between 5 and 15 percent by volume in air and for air pollution reasons. For additional information regarding the landfill gas control system, refer to Section C.2.7.

B.5.2.2 REGULATORY REQUIREMENTS

Local, state and federal regulations require the control of landfill gas to prevent it from migrating away from the landfill boundaries and accumulating in off-site structures. In addition, local air pollution control districts, and state and federal air quality regulations require the control of emissions into the atmosphere. The local air protection agency is the SDAPCD which administers Rule 59 (d) (ii) A (Landfill Emissions Control Systems) and Rule 59.1 (landfill gas control requirements with respect to surface emissions).

The landfill will be subject to two Federal New Source Performance Standards (NSPS):

- Subpart WWW (Standards of Performance for Municipal Solid Waste Landfills); and
- Subpart OOO (Standards for Performance of Nonmethalic Mineral Processing Plants).

Each of these NSPS establishes national standards for controlling emissions from parts of the facility, and each standard is fully applicable in San Diego to the GCLF.

Subpart WWW regulates Municipal Solid Waste (MSW) Landfills and establishes standards and control efficiencies for emissions of nonmethane organic compounds. Subpart OOO regulates rock processing operations at the landfill, and requires that stringent limitations be met for emissions from crushing, screening, transfer points and other operations and process.

Although stationary source emissions of NO_X and VOC at the GCLF do not exceed the applicability threshold limit of 50 megagrams per year for "serious" ozone non-attainment areas, under Part 70 (Title V Program), all landfills subject to Subpart WWW with a design capacity greater than or equal to 2.75 million tons may be subject to Part 70 permitting requirements.

Part 72----(Acid Rain Program) will not apply to the GCLF because the stationary source emissions do not meet the requirements of an affected source, as found in Subpart A---Acid Rain Program General Provisions; and Subpart G---Acid Rain Phase II implementation, as related to Title V operating permit programs. Part 72.6(8)---Applicability exempts non-utility units from the Acid Rain Program.

Title 17, California Code of Regulations, Section 95460 et seq.---requires monitoring, collection and/or destruction of methane gas produced in landfills to help reduce the emission of greenhouse gases.

The new AB 32, Greenhouse Gas (GHG) requirements for landfills under California Code of Regulations, Title 17, Subchapter 10 – Climate Change, Article 4, Subarticle 6, Sections 95460 to 95476 also apply to the GCLF.

B.5.2.3 GAS CONTROL/RECOVERY SYSTEM

The landfill gas control system will consist of a series of gas collection wells interconnected by above-ground laterals (pipes) and a main header pipe connected to the flare station. The system will be brought on-line with a blower designed to create a vacuum pulling landfill gas to the flare for destruction. The flare station will be located along the northern portion of the landfill, adjacent to the operations support facilities. The gas control/recovery system will be expanded as the landfill is developed to provide ongoing control within the performance criteria established and mandated by the SDAPCD and state and federal regulations. Figure 11 presents a conceptual layout for the landfill gas control system based on the anticipated final configuration of the landfill.

B.5.2.3.1 PERIMETER GAS MIGRATION MONITORING SYSTEM OVERVIEW

The gas migration monitoring system at GCLF will ultimately consist of 14 probes spaced at less than 1,000-foot centers around the entire refuse prism and two temporary probes will be placed in future fill areas (see Figure 10D) to detect potential gas migration prior to reaching the property boundary. The probes will be installed along the property boundary to the south and in consideration of the site topography along the northeast and west of the refuse footprint. The probes will be installed around the perimeter as the landfill is developed beginning on the northern end of the site and moving towards the south. The conceptual location of the probes provide effective points to detect any gas migration since the probes are located a sufficient distance beyond the landfill footprint to allow detection of migrating gas. Once the site is operational and real data is gathered, adjustments will be made to the probe locations, as necessary.

If gas is detected in the monitoring probes in excess of regulatory requirements (i.e., 27CCR and 40CFR, 258.23), the gas control system will be adjusted or expanded, as required. Results from the perimeter gas monitoring probes will be compiled into a report and submitted by GCLF to the SDAPCD, EA and CalRecycle on a regular basis as determined by the EA and/or SDAPCD.

B.5.2.3.2 PERIMETER MONITORING NETWORK REGULATORY COMPLIANCE (27 CCR, SECTION 20925 (a) through (d))

In compliance with 27 CCR, Section 20925, a complete review of the proposed gas migration monitoring probes was made to compare the system with the requirements of the new regulations. Following is a discussion of the review.

Location

27 CCR, Section 20925(a) requires that probes be located outside the refuse footprint and at or near the disposal site permitted facility boundary. All proposed probes will be located outside the refuse footprint boundary. However, a majority of the probes will not be located at or near the disposal site permitted facility boundary which in most cases is separated from the refuse footprint by a substantial buffer area (Figure 2). Because the GCFL is located in a canyon area, the terrain surrounding the footprint is very steep and heavily vegetated and would require significant construction of access roads and drilling pads in order to place the probes at or near the facility boundary. This would create significant environmental issues in its own right. Because of this, the probes will be placed closer to the permitted refuse limit. As allowed in 27 CCR, Section 20925(a)(2), the operator may establish an alternate boundary closer to the waste disposal footprint. Should compliance levels be exceeded at the alternate boundary, the operator will install additional monitoring probes closer to the permitted facility boundary as feasible.

Spacing

27 CCR, Section 20925(b) indicates that the lateral spacing of the probes shall not exceed 1,000 feet unless the operator can demonstrate that there is no potential for adverse impacts to the public health and safety and the environment from wider spacing. The probes will be installed around the

perimeter as the landfill is developed beginning on the northern end of the site and moving towards the south. Prior to Phase I operations probes P-1 through P-3 and P-10 through P-14 will be installed at 1,000 foot or less. Two temporary probes (TP1 and TP2) will be installed adjacent to the southern end of Phase I to meet the spacing requirements. Prior to Phase II operations the remainder of the permanent probes will be installed. All of the probes around the perimeter of the GCFL will meet the spacing requirements.

Depth

27 CCR, Section 20925(c) lists the requirements for the depths of perimeter gas probes. The number and depths of monitoring probes within the boreholes shall be installed in accordance with the following:

- a shallow probe shall be installed 5 to 10 feet below the surface;
- an intermediate probe shall be installed at or near half the depth of the waste;
- a deep probe shall be set at or near the depth of the waste;
- the specified depths of monitoring probes within the wellbore shall be adjusted, based on geologic data obtained during drilling, and probes shall be placed adjacent to soils which are most conducive to gas flow;
- all probes shall be installed above the permanent low seasonal water table, above and below perched groundwater, and above bedrock; and
- when the depth of the waste does not exceed 30 feet, the operator may reduce the number of probes to two, with one probe located in the shallow zone as indicated above, and the other located adjacent to permeable soils at or near the depth of the waste.

Exclusions or modifications to the above requirements may be requested pursuant to the regulations. Proposed probe depths will be evaluated via the probe construction logs, the maximum depth of waste and the elevation of regional groundwater below the probes. Proposed probes P-1 through P-14 will be drilled to either groundwater or the maximum depth of waste, whichever is encountered first, where the deepest completion will be constructed.

Monitoring Well Construction

In accordance with 27 CCR, Section 20925(d), all monitoring wells at the GCFL will be drilled by a licensed drilling contractor or by a drilling crew under the supervision of the design engineer or engineering geologist and the wells logged by a geologist or geotechnical engineer. The well logs will include the names of the person(s) logging the hole and as – built description. A seal of a minimum of 5-feet of bentonite will be provided at the surface and between the monitored zones. A map of the location of all proposed probes is included in the JTD as Figure 10D.

B.5.2.3.3 GAS CONDENSATE COLLECTION SYSTEM

A landfill gas condensate collection system will be constructed to gravity drain condensate to sumps located at header low-points around the landfill. The collected condensate will be removed from the sumps manually or will be pumped automatically to a central holding tank to be located at the flare station area shown on Figure 11. Liquid condensate collected from the landfill gas system will be incinerated in the flares, treated on-site, and if necessary, removed off-site for disposal.

B.5.2.3.4 STRUCTURE MONITORING

On-site structures at the GCLF will be monitored for detection of potential landfill gas migrating into building structures in accordance with 27 CCR, Section 20931 and 40 CFR, 258.23.

B.5.2.4 LANDFILL GAS MONITORING

The monitoring of dust control and gas emissions will be conducted in accordance with SDAPCD Rule 59 (d) (ii) A (Landfill Emissions Control Systems). Results from data will be compiled into a report and submitted by GCLF to the SDAPCD.

B.5.3 NUISANCE CONTROL

The following sections describe those measures established by GCLF to eliminate and/or minimize nuisances associated with the operation of a typical landfill. Mitigation measures included in the MMRP from the certified FEIR are included in Appendix D-2 of the JTD.

B.5.3.1 DUST CONTROL

The dust control program for the GCLF consists of both construction/operations and maintenance procedures; including paving of the main access road; proper maintenance and the use of a soil sealant on most internal haul roads; proper maintenance and watering of internal haul roads that would be routinely relocated (e.g., the last 500 feet to the active face); water spraying of soil excavated and placed for cover; water spraying of areas where soil excavation is occurring for purposes of cell development; ancillary dust control activities; applying water and/or planting temporary vegetation on intermediate soil cover areas; and planting and maintaining a vegetative cover on completed fill and excavation slopes.

The project will use on-site well water for dust control, including riparian water from the underflow of the San Luis Rey River on portions of the site having riparian rights, percolating groundwater from the fractured bedrock formation underlying the landfill, with a projected safe yield of 38,880 gallons per day (this resource is expected to diminish over time as cell development proceeds to 21,576 gpd), and percolating groundwater from the fractured bedrock formations underlying other watersheds within the project property with a projected safe yield of 20,349 gallons per day. The location of the wells where riparian underflow would be pumped are shown on Figure 1 of Appendix G-1 (Memorandum - Evaluation of Additional Percolating Groundwater Resources on the Gregory Canyon Property, November 2009). The location of the proposed percolating ground water wells within the landfill area are shown on Figure 11A, and the location of proposed percolating groundwater wells within other watersheds property is shown in Figure 1 of Appendix G-1 (Memorandum - Evaluation of Additional Percolating Groundwater Resources on the Gregory Canyon Property, November 2009). The quantity of riparian underflow is substantial, and depending on where construction or operation is occurring on the project site could provide for virtually all of the dust control and irrigation requirements for the project. The amount of riparian underflow anticipated to be used at any time during the life of the landfill project ranges from 8,414 gpd to 66,742 gpd as an annual average, substantially less than the 205,000 gallons per day or 193 acre-feet per year analyzed in the EIR and determined to have an impact of less than significant. The greater use of riparian underflow is expected during the earlier years of project development and operations which occur in the lower portions of the canyon within riparian areas (up to 66,742 gpd), with less usage of riparian underflow in later years. Water requirements are expected to be greatest during Excavation Phase 1 as depicted in Figure 21B. This is because the greatest amount of soil excavation for purposes of cell development would occur during this time. As construction proceeds southward up the canyon, the amount of soil overburden and the amount of soil excavation required for cell development diminish. To illustrate this, the annualized average water usage is 66,785 gpd during Excavation Phase 1, and 40,617 gpd during Excavation Phases 2 and 3. Recycled water may also be used for dust control and other water usage requirements. The operator will enter into one or more contracts with public agencies or private suppliers of recycled water for at least 80,000 gallons per day, individually or in the aggregate. The operator has entered into one contract to date, for the supply of up to 80,000 gpd of recycled water.

The Revised Final EIR indicates that to the extent available, percolating groundwater be used first for areas designated for biological mitigation, landscape irrigation, and dust control on on-site haul roads and Borrow/Stockpile areas A and B before recycled water is used. The January 2010 EIR Addendum provided that riparian underflow water would have the same priority of use over recycled water.

The following measures will be implemented to assure that riparian underflow is only used on riparian portions of the project property:

- The extent of the riparian areas on the landfill footprint shall be marked using monuments or other markings placed by the operator, following a survey performed by a licensed surveyor.
- Water storage tanks and water trucks shall be installed with a bracket to hold removable signs. A sign shall be placed on each storage tank or water truck noting whether its contents include riparian underflow, percolating groundwater or recycled water.
- Riparian underflow will not be commingled with percolating groundwater in any water storage tank.

- Riparian underflow shall not be commingled with percolating groundwater or recycled water in any water truck where discharged outside of the riparian areas. When riparian underflow and recycled water are commingled in a water truck, the signage shall indicate that both types of water are present. Use of that product shall then be limited to riparian portions of the landfill property.

The following measure will be implemented to assure that pumping from percolating groundwater wells from other (outside of Gregory Canyon) watersheds does not inadvertently pump underlying riparian underflow:

- An alluvial observation well shall be installed in the vicinity of the Area 1 and Area 3 pumping wells. Alluvial groundwater capture shall be evaluated as part of the initial and biennial pump tests for the Area 1 and Area 3 bedrock pumping wells (depicted on Figure 1 of Appendix G-1 - Memorandum - Evaluation of Additional Percolating Groundwater Resources on the Gregory Canyon Property, November 2009). If drawdown is measured in the adjacent alluvial observation well during the pumping test, the pumping rate shall be adjusted so that no measurable drawdown is indicated in the alluvial observation well.
- In addition, water level measurements will be taken at both alluvial observation wells concurrent with all groundwater detection monitoring program sampling events, which typically would occur on a quarterly basis.

The following measures will be implemented to assure that pumping of percolating groundwater does not result in a significant impact to groundwater resources:

- Each pumping well shall be installed with a totalizer meter, as well as a level control to cycle the pump on and off at a rate that matches the well's production capability. The settings for the level control shall be determined through pump testing and a sustainable yield calculation using RockWorks Drawdown Calculator software (or an equivalent method approved by the LEA).
- In order to provide ongoing verification, each pumping well shall undergo a new pumping test on a biennial basis (every other year), and the sustainable yield re-calculated using RockWorks Drawdown Calculator software (or an equivalent method approved by the LEA). If needed, the level controls shall be re-set based on the results of the calculation of long term sustainable yield.
- In order to provide ongoing verification, an updated safe yield analysis will be undertaken on a biennial basis within each watershed, with the results

compared with actual pumping rates obtained from the totalizer meters. Based on this comparison, coupled with the biennial sustainable yield analysis, a recommendation regarding additional modifications to pumping rates will be submitted to LEA for review and concurrence.

- Alluvial groundwater capture shall be evaluated on a biennial basis to ensure that groundwater extracted from bedrock wells do not draw groundwater from the alluvial aquifer. Alluvial well MW-3 and proposed alluvial well GMW-2A shall be used as observation wells during the initial and biennial pumping tests performed for bedrock wells GLA-3, GLA-12, GLA-13, GLA-B, GLA-C, GLA-G, and GMW-1. If drawdown is measured in the adjacent alluvial observation wells during the pumping test, the pumping rate shall be adjusted so that no measurable drawdown is indicated in these alluvial observation wells.

Routine groundwater monitoring of percolating groundwater wells within Gregory Canyon would detect the presence of contaminants in water to be used for dust control. Contaminated percolating groundwater would not be utilized for dust control unless treated to acceptable levels at the pre-installed treatment facility.

During construction the site will be wetted down in the late morning and after work is completed for the day. Areas with active excavation of soil will be wetted regularly. Wetting of areas with active excavation of rock is not proposed, but may become a condition of the air quality permit issued by SDAPCD. Non-active construction areas with exposed soil that have not been reseeded will be wetted down at least once per day to minimize windblown dust. The main access road will be paved until the last 500 feet of the road and will be swept regularly with a wet sweeper, as needed to meet SDAPCD requirements. In addition, wheel wash trackout controls with appropriate runoff BMPs may also be installed as needed to meet SDAPCD requirements. Most unpaved haul roads will be constructed with a non-toxic soil sealant, which is thoroughly mixed into the uppermost six inches of the road, and then maintained periodically with a topical application of soil sealant. Topical application would occur as needed, at an estimated frequency of between quarterly and biennially. Unpaved haul roads that will be routinely relocated (such as the last 500 feet to the active working face) will be watered every two hours unless the road surface appears visibly damp. Traffic speeds of no more than 10 miles per hour will be maintained on all on-site, unpaved road surfaces. Soil cover areas will be watered when conditions exist which may result in the formation of fugitive dust.

To minimize fugitive dust from loads (such as construction and demolition debris), covering or tarping these loads will be required. Uncovered dusty loads may be refused. Customers found to be bringing in uncovered loads will be informed of the covered load policy and will be rejected upon second observation. Dusty loads will be watered as soon as possible to reduce fugitive dust generation during tipping.

Dust control measures will be implemented in areas that are not in active operations to minimize wind generated dust. Water will be applied and/or temporary vegetation planted on intermediate soil cover areas. Groundcover will be re-established on areas disturbed by construction through seeding and watering those areas that will not be disturbed for extended periods. A native vegetative cover will be planted and maintained on completed fill and excavation slopes.

A Dust Control Plan will be prepared and submitted to the LEA and SDAPCD.

B.5.3.2 VECTOR AND BIRD CONTROL

Refuse compaction and the application of daily cover are the most effective preventions against the propagation of vectors (i.e., insects, rodents) and birds on-site. Professional pest control services, including conventional slap-traps and anticoagulant rodenticide, will be used to control insects and rodents in the ancillary facilities area. Site personnel will inspect landfill areas bi-weekly for any signs of rodent activity and will implement the necessary activities to minimize vector nuisances. A Vector Control and Management Plan (Plan) will be submitted to the Vector Surveillance and Control Division of the Department of Environmental Health for review and approval 30 days prior to commencement of refuse disposal operations. The approved Plan and bird control policy will be implemented for the landfill. Under the vector control plan, items used at the site which may attract vectors will be stored in closed containers and/or within enclosed structures. Building openings, ground holes and deficiencies in the perimeter fence will be repaired to deter the intrusion of ground vectors.

Removal of the existing dairy will eliminate attraction and habitat for cowbirds and other nuisance bird species. However, the landfill will attract birds. Therefore, when birds are observed on-site, operations staff will use dispersal techniques to disturb the bird behavioral patterns. These techniques may include, but are not limited to, the playback of distress vocalizations, falcon kites, owl decoys, or dispersal by humans and/or dogs.

To minimize mosquitoes, proper grading and drainage will eliminate puddles and wet areas. The desilting basins are designed using Best Management Practices (BMPs) so that the basins drain themselves within 72 hours through the use of drain pipes and evaporation. The basins will be cleaned out regularly. Since tire storage attracts vectors, tires will be shredded a minimum of every six months to deter both mosquitoes and rodents.

B.5.3.3 LITTER CONTROL

The primary cause of litter around a landfill is wind. The main control for windblown litter begins at the unloading area through the rapid spreading and compacting of refuse, and daily cover placement over all exposed refuse at the end of each working day. The commercial unloading activities will be conducted at the toe of the working face, when practical, to afford some wind protection. Litter migrating off-site will be minimized by perimeter fencing. The operator has also proposed the installation of a 12-foot high litter fence along the bridge deck to control litter from waste collection vehicles from reaching the San Luis Rey River (a memorandum providing litter fence detail is included in Appendix T). Finally, all commercial loads will be required to be covered with a tarp. Portable, temporary fencing may be used to control windblown papers at the working face. Disposal operations will be suspended during periods of high winds (when sustained winds of 40 miles per hour or greater, or gusts of 55 miles per hour or greater are expected to persist for one hour or longer).

Section 5 of Proposition C includes a mitigation measure concerning litter and illegal dumping. The measure, in addition to the litter control measures discussed above, requires that a clean up team, consisting of one truck with a two-person crew, inspect for and clean up all litter and illegal dumping on or adjacent to the landfill access road and SR76 between I-15 and the site. The inspection and clean up will occur five days each week. In addition to the requirements of Proposition C, litter inspection will be done every day that the landfill is open to accept refuse, and litter will be cleaned up on the sixth day as determined necessary by the inspectors. Litter will be collected as necessary outside the landfill perimeter, along the southern boundary of the project site adjacent to the landfill footprint, on-site around the operations area, around the ancillary facilities (i.e., entrance area, maintenance area), along SR76 between I-15 and the project site, along the access road, and any other areas where litter has blown off-site in objectionable quantities. Project-related litter will not be allowed to accumulate along roads, fences, or in vegetation.

B.5.3.4 NOISE CONTROL

Site operations will be conducted in compliance with Cal-OSHA regulations and the County Noise Ordinance. Noise levels of on-site equipment will be controlled by installation and proper maintenance of mufflers on all motorized vehicles. In the event that excavation operations necessitate additional measures beyond use of traditional heavy equipment, controlled blasting may be employed. Written notice will be provided to residents within a one-mile radius of the blast site at least 24 hours in advance of any on-site blasting. Site personnel will be provided with hearing protection (e.g., ear plugs or muffs) to reduce exposure from continued on-site noise levels. Rock crushing and tire shredding will occur at least 1,500 feet from the nearest residences unless other forms of noise attenuation, such as berms or acoustical curtains, are used to reduce combined landfill noise levels to below the County Noise Ordinance limit.

B.5.3.5 FIRE CONTROL

The GCLF is located in a somewhat remote area, therefore, fire prevention and control measures are of great importance and will be diligently pursued by the operator. Burning of refuse will not be allowed at the landfill facility, which minimizes the chance of above ground fires. Fire protection services are expected to be provided by the San Diego County Fire Authority. The landfill property is within the boundaries and jurisdiction of the Authority. As an alternative fire protection may be provided by the North County Fire Protection District through contract or annexation into the District. The entity providing fire protection services would also enforce the requirements of the 2009 Consolidated Fire Code, as applicable.

The primary fire prevention measure will be a firebreak between the refuse and the undisturbed natural areas surrounding the landfill. In compliance with the requirement to maintain a minimum clearance of 150 feet from the periphery of any exposed flammable solid waste (California Public Resources Code Section 4373), refuse placed within 150 feet of the landfill perimeter will be placed using the following procedures:

- Clearance of brush and vegetative debris from around the active disposal area.
- As operations move into the 150-foot zone, the operator will place soil cover regularly throughout the day.
- At no time during operational hours will refuse be exposed for more than four hours.

The potential of subsurface fires is reduced through the application of daily and intermediate soil cover placement, which will limit the amount of oxygen available for combustion. The primary measures for fire control include load checking for smoldering or burning wastes and separation of these wastes if spotted by a dozer and the covering of the fire with soil. While water could be sprayed over burning wastes, this is generally not done to avoid the introduction of liquids into the waste prism.

Additional fire prevention measures will occur on site. The landfill gas control system will be operated so as not to introduce excessive amounts of oxygen into the refuse prism. The extraction wells will be monitored for temperature and oxygen content to determine if a subsurface fire is present. All equipment with internal combustion engines will be equipped with approved spark arrestors and any flammable debris will be removed from the under carriages and engine compartments of heavy equipment on a regular basis. Fire extinguishers will be available at the entrance facilities, in the administration and operations trailers, and in landfill equipment and vehicles. Hazardous materials, collected as part of the HWEP, will be stored in fire proof containers located in the ancillary facilities area.

Site personnel will also be observant of wildfires that may occur along the perimeter of the site and will help in suppression efforts. Additional wildfire suppression forces are available from the San Diego County Fire Authority, California Department of Forestry (CDF) station, the North County Fire Protection District, and the Pala Reservation fire station, among others. Fire prevention measures, which will be adhered at the GCLF, meet current local fire code standards. The GCLF site is located within a state responsibility area. The San Diego County Fire Authority operates a fire station in the general vicinity of the landfill property, and it is expected that the Authority will be constructing a fire station at a location close to the landfill property. In addition, the North County Fire Protection District operates a station five miles from the landfill site and is a party to a reciprocal aid agreement with other fire protection agencies, including the San Diego County Fire Authority.

Tire storage can result in fires. To reduce the risk of fires from tire storage, tires will be stored within the landfill footprint in compliance with the State and local fire codes, as well as 14 CCR, Section 17354. Tires will be shredded a minimum of every six months. Section B.1.5.2.3 provides additional detail on tire acceptance, storage, processing, and disposal.

The risk of fire from blasting operations will be reduced through the use of a screening material placed above the blasting area that will prevent the escape of rock fragments, dust or other solid debris. The screening is designed so that only gases can escape through the screen.

B.5.3.6 ODOR CONTROL

The primary means of controlling odor from refuse at the site is the landfill gas control system and the placement of daily, ADC (i.e., geosynthetic blankets) or intermediate soil cover over all exposed refuse at the end of each operating day. The active working face will be confined to as small an area as practicable to help control odors. In addition, a landfill gas control system will be installed to further control odors.

B.5.4 DRAINAGE AND EROSION CONTROL

The primary function of the surface water drainage and erosion control system is to minimize erosion, to divert and convey stormwater flows in a controlled manner, and to inhibit the potential infiltration of surface water run-on or precipitation into the refuse disposal areas and to minimize hydromodification of the San Luis Rey River. The goal of hydromodification prevention is to mimic both the frequency of volume of storm water flows to the river to those occurring under the pre-existing natural condition. The surface water drainage control system for the GCLF is designed to accommodate a 100-year, 24-hour storm event run-off volumes and the volume of water caused by a simultaneous rupture of the existing Pipeline 1 and 2 and the future Pipeline 6. Section C.2.8 contains information on the interim and final drainage control features.

The drainage control system for the GCLF will consist of a variety of treatment BMP's, which may include perimeter drainage systems for the open channels (for adjacent area run-on) and buried pipe (for run-off from the landfill footprint), drainage berms, downdrains, energy dissipaters, desilting basins, drainage swales, structural media filtration, bio-treatment swales and percolation areas. A detailed listing of potential BMP's is provided in the Stormwater Management Plan in Appendix I-1 and the Stormwater Pollution Prevention Plan (SWPPP) in Appendix D. The 2003 Rational Method for hydrology analysis was used to predict the 100-year runoff peak for the GCLF drainage areas. The western perimeter channel is sized to accommodate a rupture of existing Pipelines 1 and 2 and future Pipeline 6 at the same time as a 100-year, 24-hour storm event. In addition, the refuse fill slopes east of the perimeter interceptor channel may be armored to prevent the runoff from a rupture destroying the cover material and exposing trash. (The size of the perimeter drains could be reduced if the existing and future pipelines are located further to the west.)

Interim drainage control features will consist of compacted earth berms constructed around the deck perimeter and the working face, which will divert water around the refuse fill and into either the downdrains and buried storm drain pipes or the perimeter storm drain system. Silt fences and sand bags may also be used to dissipate energy and remove silt upstream of the basin.

The access road/bridge would be located within the designated boundaries of the 100-year and 500-year floodplains. However, the lowest elevation of the access road/bridge would be 312.0 while the 100-year floodplain at the upstream side is 310.7 feet. Therefore, the access road/bridge is designed to be above the highest record elevation of the 100-year floodplain so that no significant flooding impacts would occur during operations. However, as discussed in Section B.4.4.4, should there be the threat that the bridge may not be accessible due to flood or other safety factors due to extreme weather, the bridge will be closed to incoming traffic and waste will be directed to other local landfills accordingly.

B.5.5 TRAFFIC CONTROL

Traffic control will be maintained at the GCLF to ensure that traffic flow into, on and out of the site minimizes interference and safety problems for customers and for traffic on adjacent and adjoining public roads. It is anticipated that adequate traffic control, in accordance with the above criteria and applicable regulations, will be achieved at the GCLF. The following procedures will be utilized at the landfill for traffic control:

- Customers utilizing the site will gain access via SR76. The entrance facilities will be located approximately 2,700 feet from SR76; therefore, providing a sufficient distance to prevent queuing or stacking problems onto SR76.
- Incoming traffic will be monitored on the inbound lane of the landfill access road at a location as near as feasible to SR 76. Vehicle trips will be counted manually or electronically, and if feasible, real-time traffic counts will be made available to the LEA. The daily truck trips limit, in order to mitigate potential traffic impacts on SR 76, project traffic will be limited between 2:00 PM and 3:00 PM to 215 PCE trips or 72 trucks, between 3:00 PM and 4:00 PM to 111 PCE trips or 37 trucks, and between 4:00 PM and 5:00 PM to 111 PCE trips 37 trucks.
- GCLF will implement an early warning system to assure that traffic requirements are met. Haulers will be notified once 95% of the daily traffic limit is met, or if 75% of any hourly traffic limit is met. However, GCLF may not turn away any waste collection vehicle traveling on SR 76 at the time notice was given.
- The on-site internal haul roads will be asphalt or tightly-compacted dirt roads that will be used by all landfill traffic. The speed limit on the landfill will be 10 mph. Safety cones will be utilized to separate and direct two-way traffic flow into and out of the active disposal areas (separate designated areas for commercial and private vehicles) of the landfill.
- The GCLF project also includes modifications to SR76 to improve sight distance and to facilitate truck movements (see Section B.3.1.1).
- Traffic coming to the site before the hours of operation will be queued on the access road up to the fee booths/scales to prevent stacking of vehicles on SR76. To accommodate the queuing, the gates located at the north side of the bridge will be opened one hour prior to the hours of operation. Therefore, the entrance gates will be opened at 6:00 a.m. Monday through Friday, and 7:00 a.m. on Saturday.
- Traffic counts will be made using computerized records. These records will be available for review by LEA during operational hours.

Traffic control measures will be maintained throughout the operation of the landfill. Traffic impacts and mitigation measures associated with the project have been addressed in the EIR document prepared in support of the GCLF development. Appendix D-2, Table 10-1 (pages 5 through 8) refer specifically to traffic control mitigation measures.

B.5.6 HAZARDOUS WASTE EXCLUSION PROGRAM

A HWEP for the GCLF has been prepared to comply with the state regulations under 27 CCR, Sections 20220(b)(2) and 20870(a)(1). The HWEP for the GCLF has been developed to discover and discourage attempts to dispose of hazardous or other unacceptable wastes, including PCBs, at the landfill. The HWEP includes the installation of a gamma-scintillation counter at the scale facility to detect radioactive materials, which is discussed in detail in Section B.4.4.2.1. The HWEP is discussed in detail in Section B.4.4.2.1 and a copy of the HWEP is included as Appendix F.

PART C

DISPOSAL SITE DESIGN

SECTION C.1

ENGINEERING DESIGN

C.1 ENGINEERING DESIGN

C.1.1 REGULATORY CRITERIA

The GCLF has been designed and will be permitted and operated in compliance with Class III landfill standards set forth in 27 CCR and 40 CFR. Section C.2 presents a description of the waste containment design of the refuse disposal area.

All municipal solid waste landfills are subject to Federal regulations which became effective on October 9, 1993 under the Resource Conservation and Recovery Act, also known as Subtitle D. The Subtitle D regulations were promulgated under 40 CFR, Parts 257 and 258. One of the most important aspects of Subtitle D (40 CFR 258.40) requires operators of municipal solid waste landfills to construct a composite or approved engineered alternative liner system in new waste management units, lateral expansions, or areas within a previously permitted waste management unit which had not had refuse placed within them as of October 9, 1993.

Subtitle D defines a composite liner as a system consisting of two low-permeability components. The upper component must consist of a minimum of 30-mil flexible membrane liner (FML) and the lower component must consist of at least a two-foot layer of compacted soil with a hydraulic conductivity of no greater than 1×10^{-7} cm/sec. FML components consisting of HDPE shall be at least 60-mil thick. Additionally, a leachate collection system must be installed above the composite liner system with the design capability to maintain less than a 30-cm (12 inches) depth of leachate over the liner. The GCLF composite liner system and LCRS meets and exceeds 40 CFR 258.40 requirements for the refuse disposal area.

27 CCR, Section 20240 requires that all new landfills be sited, designed, constructed and operated to ensure that wastes will be a minimum of five feet above the highest anticipated elevation of underlying groundwater. The waste containment unit can either be situated above the highest anticipated groundwater level or the operator may propose an engineered alternative. The GCLF project was designed to create the required five feet of separation

between underlying groundwater and the landfill. The bottom subgrade will be a minimum of five feet above the highest anticipated groundwater level.

In addition to engineering the GCLF to accommodate a five-foot separation (i.e., placing the bottom grades above the peizometric surface), the design includes a subdrain system as added protection against groundwater impairment. The subdrain system will collect and convey water away from the bottom of the liner and also prevents the development of pore pressure within the containment system in the unlikely event that groundwater seeps into the excavation or rises above its historical high level.

In addition, the liner system exceeds the prescriptive standard minimum and, therefore, by definition is consistent with the prescriptive standard of performance, and affords the equivalent protection against water quality impairment. As requested by the RWQCB, a liner demonstration analysis in support of the design was prepared and is included as Appendix H.

The design features for the lined waste management unit are described in Section C.2 and are shown on the design plans referenced in that section. In accordance with 27 CCR, Section 20310, the waste management unit was designed and the construction will be certified by a registered civil engineer and/or a certified engineering geologist.

The JTD sections that present the bottom and side slope containment system design (Section C.2) are formatted to present each liner system component from the subgrade to the operations layer (e.g., protective soil cover) as they would be sequentially constructed. Typical sections for the sideslope liner design which vary from the bottom liner design are also discussed. The total waste containment system includes the following elements:

- Excavation Plan (Subgrade Configuration)
- Subdrain System
- Liner System (including secondary drainage layer)
- Leachate Collection and Removal System
- Protective Layer (Operations Layer)

In addition, Section C.2 also presents information on the landfill gas collection/recovery and drainage control (both interim and final) systems and landfill construction sequencing. The GCLF engineering design also includes waste containment features to be implemented upon closure of a portion and/or the entire landfill. Part E of this JTD presents the closure design features for the GCLF.

The engineering plans are conceptual and reflect the design. Minor revisions to the engineering design may be necessary throughout the development of the landfill based on actual field conditions encountered prior to and/or during construction. The construction level design plans will be prepared to reflect actual conditions and be submitted to the RWQCB prior to construction of each phase or stage of waste containment system construction.

In addition, detailed as-built plans and quality assurance reports will be prepared and submitted to the RWQCB, upon completion of containment system construction for each area of development as required by 27 CCR, Section 21760.

The information presented herein satisfies the applicable regulatory reporting requirements under 27 CCR, Sections 21600 and 21760 related to the site's design. Tables 1 and 2, discussed in Part A, provide the necessary cross-reference information to find the appropriate subsections in Part C which correspond to the specific regulatory requirements under 27 CCR and 40 CFR, Part 258. As discussed in Section A.1.2, the Subtitle D Compliance Checklist is also included in Appendix A to allow dischargers and RWQCBs to assess compliance with Federal requirements (i.e., 40 CFR, Part 258).

SECTION C.2

PROPOSED DISPOSAL SITE DESIGN FEATURES

C.2 PROPOSED DISPOSAL SITE DESIGN FEATURES

C.2.1 INTRODUCTION

A description of the GCLF's disposal site design features is included in the following sections. The long-term development of the GCLF includes construction of a 183-acre refuse footprint. The three relocated SDG&E transmission lines are located along the eastern edge of the refuse footprint. The groundwater protection system for the GCLF refuse footprint will include a subdrain system, a composite liner system, an LCRS, and a protective layer. The GCLF will also be constructed with an interim and final surface water control system, as well as environmental control/monitoring systems. The GCLF will also be capped with a final cover system designed in accordance with applicable regulatory requirements. The proposed final closure design features and post-closure maintenance activities were developed in accordance with 27 CCR and are included in Parts E and F of this JTD.

All of the engineering plans reflecting the landfill are conceptual in nature and subject to change. The composite liner system design, which is a component of the overall waste containment system, exceeds the prescriptive standard design criteria specified in 40 CFR, 258.40. As required by 27 CCR, Section 21760, detailed as-built plans and quality assurance reports of the containment system will be prepared and submitted to the RWQCB, upon completion of containment system construction for each area of development.

C.2.2 EXCAVATION PLANS

C.2.2.1 GENERAL DESCRIPTION

In order to maximize site capacity, development of the GCLF refuse disposal area will include the mass excavation of a substantial volume of native materials. The excavation plan shown on Figure 12 presents final subgrade contours and limits of excavation. The overall interior slope gradient will be 2:1 and the flatter bottom areas will have a minimum gradient of 5 percent. As discussed in the following sections, once the excavation is complete, a subdrain system, composite liner system and LCRS will be installed. As noted earlier, the landfill will be constructed in phases and the construction sequencing is discussed in Section C.2.9.

C.2.2.2 STABILITY OF EXCAVATION SLOPES

Based on slope stability analysis recommendations provided in the geotechnical investigations (Appendix C), the subgrade contours will not exceed gradients of 1.5:1 between the interior benches and the overall interior slope gradient with benches will not exceed 2:1. The interior cut slopes will have benches 20 feet wide spaced no greater than 40 vertical feet apart. These benches will be graded with a 6.7 percent inward gradient toward the inside of the bench/toe of the upper slope interface. The interior benches will have a 3 percent gradient horizontally toward the mouth of the canyon.

Additionally, studies conducted by Woodward-Clyde Consultants (1995) concluded that 2:1 slopes adjacent to the aqueduct are appropriate with a factor of safety of at least 1.5 under static conditions and, therefore, the impacts on the aqueduct by the landfill are not significant. In response to concern about the stability of the first San Diego Aqueduct during an earthquake event, GLA also performed a pseudo-static analysis of the proposed east-facing cut slopes (adjacent to the aqueduct). Static analysis of modeled wedges indicates a factor of safety of 5.9. This means that the forces resisting movement are approximately six times greater than the forces causing movement. When subjected to ground acceleration associated with the Maximum Credible Earthquake (0.4g), the factor of safety also exceeds the prescriptive 1.5 dynamic factor of safety for all landfill foundation and final fill slopes required by 27 CCR.

C.2.2.3 MATERIAL AVAILABILITY

Assuming a 4:1 refuse-to-cover ratio, approximately 11.4 million cubic yards (mcy) would be needed for operations during the life of the landfill. An additional 2.7 mcy of material will be necessary to provide for canyon shaping, the operations layer and final cover over the site. The total anticipated soil requirement for both operations and closure would be 14.1 mcy.

The proposed landfill development will include the excavation of approximately

7.9 mcy within the landfill footprint, of which approximately 4.9 mcy consists of topsoil, alluvium/colluvium, weathered bedrock and rippable hard rock that would be suitable for cover material with limited processing required, primarily crushing of the rippable hard rock.

Overall development of the GCLF also includes removal of soil from two borrow/stockpile areas. Borrow/Stockpile Area A is approximately 22.4 acres and will be excavated to depths ranging between 10 and 65 feet below existing ground surface, to extract approximately 1.3 mcy of soil. Development of Borrow/Stockpile Area B (approximately 64.5 acres) calls for an excavation that will reach depths ranging from 70 to 150 feet below ground surface and extract approximately 3.2 mcy.

The entire excavated quantity from the Borrow/Stockpile Areas will be available for cover needs since all of the material is colluvium or weathered bedrock. Therefore, approximately 9.4 mcy of material would be available for on-site cover, leaving a shortfall of readily useable material of 4.7 mcy. This shortfall can be addressed through, among other things, the use of ADC. The use of ADC has been shown to reduce refuse-to daily cover ratios from 4:1 to at least 7.5:1. Table 9A shows the daily/intermediate cover volume demands at both 4:1 and 7.5:1. As can be seen, at a 7.5:1 refuse-to-cover ratio, operational cover demands would be 6.7 mcy. Including the 2.7 mcy required for the operations layer and final cover, the total cover material demand would be 9.4 mcy, which corresponds to the volume of readily usable on-site material.

TABLE 9A
GREGORY CANYON LANDFILL
SOIL REQUIREMENT SCENARIOS

4:1 Daily/Intermediate Soil Cover Volume Requirement		
Net Volume (cy)	**Refuse Volume (cy)**	**Soil Volume (cy)**
57,000,000	45,600,000	11,400,000
7.5:1 Daily/Intermediate Soil Cover Volume Requirement with ADC		
Net Volume (cy)	**Refuse Volume (cy)**	**Soil Volume (cy)**
57,000,000	50,300,000	6,700,000

Based on gross air space of 59.5 mcy and net air space of 57.0 mcy

Geosynthetic blankets and PGM (approved ADCs under 27 CCR, Section 20690) and on-site materials would be available for use by the operator. The combination of on-site alluvim/colluvium, weathered bedrock, rippable hard rock, fill sequencing to reduce cover needs, ADC, some additional crushing of on-site hard rock, and reuse of materials from demolition of the former dairy operations would assure adequate material availability.

C.2.2.4 STOCKPILE/BORROW AREAS

As discussed above, approximately 87 acres of borrow/stockpile area will be provided in two locations (Figure 2). Borrow/Stockpile Area A, which is about 22.4 acres in size, will be located west of the landfill footprint (adjacent to the western property boundary). Borrow/Stockpile Area B, which is about 64.5 acres in size, will be located immediately southwest and adjacent to the landfill footprint. The maximum height of the Borrow/Stockpile Area B ranges from about 940 to 1,020 feet amsl. For borrow purposes, excavation in the designated areas will be a maximum of 150 feet and positive drainage will be maintained.

GLA reviewed the stability of the cut slopes in the borrow/stockpile areas, and calculated static factors of safety for two critical cross-sections (Appendix C; Figures 3-3A and 3-3B). Results of the analyses indicated a calculated minimum static factor of safety of 1.9. Since this value is larger than the threshold factor of safety of 1.5 required by 27 CCR, the stockpile slopes were considered to have adequate stability.

The borrow/stockpile areas will be used to store and provide cover material for refuse disposal operations at the landfill. During the initial excavation of the Phase I area of the refuse footprint, a portion of the excavated material will be used for engineered fill necessary to construct the ancillary facilities area and the toe buttress at the very northern end of the overall refuse area. The remainder of the excavated material will be stockpiled in the landfill footprint or Borrow/Stockpile Area A. Borrow/Stockpile Area A will be used for stockpiling or excavated material during the initial construction after which the area will be graded to promote proper drainage, and then revegetated with native plant species. Borrow/Stockpile Area A will then not be used again until the last few years of landfill operations, at which time material will be removed from Area A and utilized for cover. In subsequent excavation phases, material will be stockpiled within the footprint or in Borrow/Stockpile Area B.

The borrow/stockpile haul road, connecting Borrow/Stockpile Area A with the landfill footprint, will be 20 feet wide and will run along the base of the adjacent hillside with turn-out locations for heavy equipment at three points along the route. Most of the alignment of the haul road follows an existing dirt road on the site. Borrow/Stockpile Area B is located immediately southwest and adjacent to the refuse footprint, therefore, access will be gained directly from the refuse area footprint. The maximum slope of the borrow/stockpile haul roads will be 15 percent. Equipment moving between the borrow/stockpile areas and the landfill will cross over the First San Diego Aqueduct. Two reinforced concrete slabs will be placed at grade, one centered over each pipeline. Each two foot thick slab will be approximately 28 feet wide by 64 feet in length placed on top of a layer of polystyrene. The three to four foot deep soldier beams at each end of the slab will absorb the weight of the equipment as it crosses the aqueduct. However, if the aqueduct is moved , these crossing facilities will not be required.

Proper drainage control will be maintained in the borrow/stockpile areas. Surface water control features will include grading of the flatter deck areas to promote lateral runoff of precipitation into drainage control facilities such as downdrains and bench drains on the slopes. Surface waters will be conveyed from the borrow/stockpile areas and discharged into the existing natural drainage courses. Erosion control measures such as vegetation, desilting basins, sand bags, straw matting and/or rip-rap will be utilized to reduce downstream siltation potential.

Borrow/Stockpile Area B will drain to the southwest into a natural drainage course. The drainage course for Borrow/Stockpile Area A runs northwesterly. The drainage control facilities will direct the surface water runoff into the existing streambeds. At the western end of the Borrow/Stockpile Area B, a desilting basin will be constructed to minimize the flow of silt from the borrow/stockpile area. The desilting basins will be designed to accommodate the soil loss from the borrow/stockpile areas. The pre-developed drainage condition of the area will be maintained as closely as possible once operations are discontinued in each of the borrow/stockpile areas. Discharge rates will be equal to or less than natural flow conditions.

In addition, the borrow/stockpile areas will also be revegetated with native plant species to return these areas to a more natural state. Construction and operation of the borrow/stockpiles including the drainage facilities will be conducted in accordance to the BMPs developed as part of the SWPPP included as Appendix D. The SWPPP is required to comply with State and Federal regulations under the NPDES program. The NPDES permit encompasses all federal guidelines regarding the discharge of stormwater.

C.2.3 SUBDRAIN SYSTEM

As currently designed, the necessary groundwater separation will be achieved by constructing the bottom subgrade at a minimum of five feet above the highest anticipated groundwater level. In addition, the composite liner system, LCRS and operations layer provide even more separation between the highest groundwater level and refuse.

Even though the GCLF bottom grades are a minimum of five feet above the piezometer surface and therefore, groundwater is not anticipated, a subdrain system is proposed to be constructed beneath the GCLF waste containment system in floor areas. The subdrain system will collect and control any groundwater, if it intersects the subgrade excavation along the bottom. Water from the subdrain would flow to a holding tank in the landfill facilities area. The location of this tank is shown on Figure 8.

The subdrain system for the GCLF will be placed beneath the composite liner and will consist of a one-foot thick gravel blanket and gravel filled trenches with slotted collector pipes in the floor areas. The floor subdrain system is designed to be a redundant system in which the permeable gravel pack and the pipe can both convey over a million gallons of water per day. A geotextile layer separates the gravel layer from the low-permeability soil layer on the landfill floor. This geotextile layer prevents the floor subdrain from clogging. Figure 13 shows the proposed layout of subdrain pipe design. Cross sections of the subdrain system on the bottom area are shown on Figures 14, 15, and 15A.

As a contingency, in the event that localized groundwater seeps are encountered in the canyon and/or the proposed cut slopes, the water will be managed. Seeps encountered above the active development areas will be directed into the perimeter surface water control system (i.e., perimeter channels). In this event, the design also includes provisions for a subdrain system beneath the composite liner over the slope areas.

The seeps will be measured for flow volume to determine the exact design of the subdrain collector. Once liner construction reaches the observed seep elevation, a localized subdrain system will be installed. The subdrain feature utilized will be a chimney drain. Based on seep flows, the chimney drain will be constructed consisting of either a geonet or trench-type collector. A geonet strip collector will be constructed and used for lower flow seeps. The collector will be placed from the seep to the next lower bench into a section of slotted pipe surrounded with gravel and wrapped in geotextile. The slotted pipe will transition to solid pipe gravity flowing to the floor area subdrain system. Higher flow seeps may warrant a trench collector type chimney drain. A trench will be cut into the side slope from the next lower bench up to the seep. The trench will be filled with gravel and wrapped with geotextile. A perforated pipe can also be added for additional flow capacity. The trench size will be dictated by flow rates. The trench collector will connect at the bench and eventually to the floor subdrain system similar to the geonet collector.

The subdrain system discharge will be monitored for contamination in accordance with the WDR parameters. Any contaminated water will be treated at the landfill as discussed in B.5.1.8 or transported to an appropriate off-site disposal facility.

C.2.4 LINER SYSTEM DESIGN

As discussed above, the composite liner system to be installed at the GCLF exceeds the prescriptive design standards required by 40 CFR 258.40. As discussed earlier, a liner demonstration in support of the design was prepared and is included in Appendix H. The liner system design for the GCLF consists of the following components:

- **Bottom Liner System Design.** The bottom area liner section will include (from top to bottom): a minimum 24-inch thick protective soil cover layer, a 12-ounce non-woven geotextile, a 12-inch thick LCRS gravel layer, a 16-ounce non-woven geotextile, an 80-mil HDPE geomembrane (textured on both sides), a non-woven geosynthetic clay liner (GCL), a 60-mil HDPE geomembrane (textured on both sides), a 16-ounce non-woven geotextile, a 9-inch minimum thickness gravel or equivalent drainage layer (including collection pipe), a 16-ounce non-woven geotextile, a 60-mil HDPE geomembrane (textured on both sides), and a 24-inch thick layer of low-hydraulic-conductivity material ($<1x10^{-7}$ cm/sec) placed over the subdrain system (see Section C.2.3) with a 12-ounce non-woven geotextile between the low-permeability layer and a 12-inch thick layer of subdrain gravel. Figure 14 presents a typical cross-section of the bottom liner system design.

- **Slope Liner System Design.** The slope liner system design (e.g., sections with gradients greater than 5:1), will include (from top to bottom): a protective soil cover layer (minimum of 24-inches thick), a 16-ounce non-woven geotextile, an 80-mil HDPE geomembrane (single-sided textured, textured side down), a non-woven GCL, a 60-mil HDPE geomembrane (textured on both sides) and a 24-inch thick layer of low-hydraulic-conductivity material ($<1x10^{-7}$ cm/sec) placed over the subdrain system placed over a localized subdrain system, as needed (see Section C.2.3). Figure 14 presents a typical cross-section of the slope liner system design.

- **Geosynthetic Materials.** At present, three types of geosynthetic materials are to be used in the construction of the liner system. These include:

  - **Geomembrane.** 40 CFR 258.40 specifies a minimum geomembrane thickness of 30 mils, unless HDPE geomembrane is utilized. If HDPE geomembrane is used, the minimum required thickness is 60 mil. The design proposed for the GCLF will utilize a 60-mil and 80 mil HDPE geomembrane liner.
  - **Geotextiles.** Although geotextiles are not required by regulation, geotextiles will be used in the GCLF liner system to minimize fine-grained material particle migration from the liner and protective soil layers into the various underlying subdrains and LCRS drainage layers and to provide cushioning protection to the HDPE geomembranes.
  - **Geosynthetic Clay Liner.** A non-woven geotextile-supported geocomposite clay liner (GCL) is installed between two HDPE geomembrane layers in the liner. The GCL provides low-permeability and chemical resistance capabilities.

- **Soil Liner Component.** Liner construction will be monitored under extensive Construction Quality Assurance (CQA)[1] guidelines. The material for the low-permeability liner will likely be imported to the site, most likely from the Lake Elsinore area. Approximately 530,000 cubic yards of low-permeability material will be needed for the slope liner and 125,000 cubic yards for the floor liner.

---

[1] CQA assures that construction material will be tested, installed and monitored as specified in the design plans and specifications, and that accepted civil engineering practices will be used.

With respect to long-term performance of the liner, the proposed composite liner system will have excellent durability and is expected to have an effective life that exceeds the time period in which leachate and gas would be produced in the landfill. The design and operational procedures for the landfill will prevent the HDPE geomembrane from being exposed to unacceptable mechanical or chemical stresses. Under these conditions, the life of the geomembrane should be at least hundreds of years (Bonaparte, Daniel and Koerner (2002), "Assessment and Recommendations for Improving the Performance of Waste Containment Systems").

Hsuan and Koerner (1998) looked at the depletion of the antioxidants in HDPE geomembranes, the first stage in a three-stage process of geomembrane degradation. Antioxidants are added to the HDPE geomembrane formulation to prevent oxidation during extrusion and to provide long-term service life to the product. Based on accelerated laboratory simulation testing over a period of 24 months and modeling to extrapolate the antioxidant lifetime to a typical landfill site at 20 degrees C, the predicted time was 200 to 215 years for this first stage of geomembrane degradation alone. During the testing period, additional testing of the incubated materials indicated that the physical and mechanical properties remained unchanged.

Construction of the liner system will be conducted in accordance with a CQA plan prepared in compliance with 27 CCR, Sections 20323 and 20324, and certified by a registered engineer or a certified engineering geologist. The CQA plan includes selected testing, inspection and documentation of the final construction product in order to provide the Owner/Agencies with an evaluation of whether the end product is of the specified quality of materials and workmanship. A CQA plan for the liner construction is provided in Appendix N.

C.2.5 LEACHATE COLLECTION AND REMOVAL SYSTEM

C.2.5.1 GENERAL DESCRIPTION

The containment system design for the GCLF includes a LCRS above the liner to collect and convey leachate that may be generated within the refuse prism. The LCRS has been designed on the basis of maximum anticipated leachate generation for the disposal area. The general LCRS design will consist of a granular (gravel) drainage blanket (one foot thick) constructed immediately above the liner in the bottom liner areas. A network of leachate collection pipes placed within the granular (gravel) drainage blanket will convey accumulated fluid by gravity flow to the mouth of the canyon to be discharged into two double-walled collection tanks. Figure 13 shows the proposed layout of the leachate collection pipes.

The LCRS design over slope liner areas consists of gravel pipe collectors wrapped with a geotextile filter fabric placed on the interior benches along the slopes. The LCRS details are provided in Figures 14, 15 and 15A.

C.2.5.2 DESIGN CRITERIA AND OBJECTIVES

The design criteria for the LCRS are based on current State (27 CCR, Section 20340) and federal (EPA Subtitle D) regulations for municipal waste landfills. These criteria result in a conservative design that includes:

- Maintaining leachate levels at one foot (30 cm) or less at all points over the composite liner system;
- Design of a system capable of collecting and removing twice the anticipated maximum daily volume of leachate from the cells;
- A minimum gradient of one percent in the mainline; and
- Long-term, maintenance-free performance compatibility in the leachate environment and under the expected maximum landfill loading conditions.

In addition to the above-mentioned criteria, the LCRS is designed in accordance with the following objectives:

- To rapidly transport collected leachate from the collection point to the discharge;
- To maintain a reasonable and effective collection pipe spacing over the landfill base; and
- To maintain a pipe orientation that generally crosses the predominant leachate drainage direction on the cell floor to generate the maximum possible system redundancy and collection efficiency.

These objectives were used to reduce the amount of time that leachate remains on the liner, thereby, reducing the potential for migration of leachate through the liner system.

C.2.5.3 LEACHATE GENERATION

C.2.5.3.1 ANTICIPATED LEACHATE VOLUME

Modeling of potential leachate generation was performed for the GCLF using the United States Environmental Protection Agency's Hydrologic Evaluation of Landfill Performance Version 3 (HELP3) computer program, which uses representative rainfall and evapotranspiration data to estimate leachate quantities that may be generated within the refuse prism. The program takes into account the representative precipitation patterns, representative site evapotranspiration, and the hydraulic conductivity of various construction materials to estimate the leachate generation and accumulation. Unsaturated flow is approximated in HELP3 using a material-dependent coefficient in its flow calculation. The leachate generation analysis performed for the GCLF is included in Appendix C.

The leachate generation analysis utilized the default climate database provided by HELP3. The database contains 5-years of precipitation, solar radiation, evaporation, and wind data for select cities in the United States. Climate data for San Diego was selected and adjusted for the latitude of the proposed GCLF. The adjusted precipitation records were then used by HELP3 to synthetically generate precipitation events over the modeling periods of the active life and post-closure. The synthetic events produced minimum yearly total of 8.4 inches and a maximum yearly total of 34.8 inches. Earlier modeling (GLA, 1998) was based on minimum and maximum yearly totals of 4.4 inches and 24.8 inches, respectively.

Modeling indicates that the leachate generation will peak at approximately 9,246 gallons per day. A maximum 500-foot leachate collection pipe spacing for the floor areas and a maximum 100-foot drain spacing in the slope liner areas was recommended. These parameters will be adjusted to limit liquid build-up on the liner to the levels allowed by current regulations. The peak head of leachate over the liner at peak leachate generation based on the LCRS design was calculated to be 0.25 inches until the final cover is placed, after which leachate generation was estimated to decrease significantly (to almost zero).

C.2.5.4 LCRS DESIGN

Due to the relatively flat grade along the base liner system, a minimum one foot thick gravel layer will be installed over the majority of the bottom liner areas. In addition, the bottom base gravel blanket will host perforated LCRS lateral collectors and mainline pipes that will lead to the leachate outfall. The outfall pipe will discharge to two 10,000-gallon leachate collection storage tanks located in the southwest corner of the ancillary facilities. The LCRS pipes will be placed in V-shaped gravel trenches constructed within the top of the liner system. To minimize the potential for clogging, bio-fouling and piping, 85 percent of the gravel will be larger than the diameter of the perforations in the pipe. The bottom area LCRS gravel pack will be overlain by geotextile fabric to prevent clogging of gravel from the operations layer soil material.

Details of the pipe designs will be prepared prior to construction of the individual landfill phases. Based on preliminary analysis, it is anticipated that an HDPE pipe with a six-inch inside diameter and a sidewall to diameter ratio (SDR) of 11 will be adequate to carry the anticipated liquid volume and resist crushing under the anticipated refuse loads.

Regulations require that the LCRS layer extend up the side slopes of the excavation. However, a 12-inch thick gravel layer will not be constructed on slope because it could not be kept stable. Rather, the LCRS design for those areas with a slope gradient of 5:1 or steeper will consist of a permeable drainage gravel pack surrounded or wrapped with a geotextile fabric placed over the liner at the toe of the interior cut slope benches. Any leachate contacting the slopes will flow along the operations layer/refuse-interface to the bench collectors. Slotted HDPE pipe will be placed in the gravel pack to allow for liquid collection and distribution to the LCRS mainlines (see Figure 15).

Annual testing methods and procedures for the performance of the LCRS are discussed in Section B.5.1.1.2.

C.2.5.4.1 ACCESS RISERS AND LEACHATE EXTRACTION

Solid HDPE pipes will be used as risers to connect the perforated pipe sections from the main line to the benches and eventually to a LCRS outfall located at the point of discharge. The risers will ultimately daylight to the top of the refuse prism can also be used as access ports to afford cleaning of the LCRS pipes (see Figure 15). Leachate will flow from the outfall to two above ground tanks with a storage capacity of 20,000 gallons. The storage tanks will be monitored for the presence of liquid by the operator.

C.2.5.5 LEACHATE TREATMENT/DISPOSAL

Leachate collected in storage tanks will be transported off-site for treatment and disposal. There are facilities located in San Diego and Los Angeles Counties that could dispose of the project-generated leachate. Alternate uses of the collected leachate will require prior approval by the RWQCB and possibly the SDAPCD.

C.2.6 OPERATIONS LAYER

An operations layer (or protective soil layer) will be placed over the LCRS in the bottom liner area and all slope liner areas (see Figure 14). The operations layer is placed over the liner system to provide protection from waste materials, which may damage or puncture the upper liner component. The operations layer will consist of a maximum two-foot thick sand or soil layer. A geotextile fabric layer will be placed over the LCRS gravel on the bottom area prior to placement of the operations layer.

C.2.7 LANDFILL GAS EXTRACTION/RECOVERY

C.2.7.1 GENERAL DESCRIPTION

The landfill gas control system will consist of a series of vertical gas extraction wells joined through a system of above ground lateral pipes, which will be connected to a main header pipe leading to the flare station. The entire system can be divided into three main subsystems; the landfill gas extraction well field; the landfill gas conveyance lines and then the landfill gas treatment facility (generally a landfill gas flare). In addition to the landfill gas extraction/recovery system, a perimeter landfill gas migration monitoring network will also be installed.

Once the gas control system is installed and operational, the landfill gas flare station will be the primary method for disposing of the collected gas. The flare station will be located near the site facilities area (Figure 8). Liquid condensate collected from the landfill gas system will be incinerated in the flares, treated on-site, and if necessary, removed off-site for disposal.

C.2.7.1.1 VERTICAL GAS EXTRACTION WELLS

A number of vertical gas extraction wells will be installed to maintain compliance with applicable regulations for gas migration and surface emission control. A typical vertical gas extraction well will have a variable diameter, generally perforated PVC casing set in a gravel backfill. The well casing will vary in diameter depending on the depth of the well, and each well will transition from perforated pipe to a minimum of a ten-foot section of solid pipe near the surface sealed with a grout material. The vertical wells installed at the GCLF will be placed to the maximum depth possible without penetrating the bottom of the landfill. A wellhead assembly consisting of sample ports and a flow control valve will be installed to allow for monitoring and tuning of the wells. The wellhead assembly may also include a pitot tube port to monitor flow. Figure 16 shows a typical vertical gas collection well. Figure 16A presents details for both single and dual gas extraction well connections.

C.2.7.2 LANDFILL GAS SYSTEM FACILITIES AND OPERATION

The proposed conceptual layout of the landfill gas control system is shown on Figure 11. This system was developed based on the anticipated gas generation and reflects the associated number of wells required at the GCLF. However, the actual number of extraction wells will be dictated by landfill gas generation conditions observed as the landfill is developed (e.g., results of subsurface and surface monitoring performance). Due to the varying depths of refuse, the unknown nature of the waste composition and associated gas generation potential, the final spacing of the extraction wells may be modified, as needed, to accommodate actual site conditions and meet San Diego APCD standards.

During active operations, gas extraction wells will be installed incrementally to provide ongoing environmental control. The extracted gas will be transported to the flare station through gas headers. The number of flares required will depend on the amount of landfill gas the site generates and whether or not future operations include a use for the gas other than flaring. Typically, flare stations are expanded in phases to process the additional landfill gas flow and it is anticipated that up to four 1,500 scfm flares may be necessary to handle gas destruction at the GCLF, once peak landfill gas production is reached.

Condensate which forms in the gas system piping will gravity drain to sumps placed at low-points in the system around the landfill. The collected condensate will be removed from the sumps manually or will be pumped automatically to a dual-wall crosslinked polyethylene tank with a minimum capacity of 3,000 gallons located near the flare station (see Figure 11). Liquid condensate collected from the landfill gas system will be incinerated in the flares, treated on-site, and if necessary, removed off-site for disposal.

It is anticipated that the entire gas control system will be installed prior to closure and that minimal additions/modifications to the system will be necessary at closure. During closure construction, the system will be taken off-line in phases (as the final cover system is placed), modified appropriately and then reconnected.

C.2.7.3 GAS MIGRATION MONITORING

Landfill gas migration monitoring probes will be installed in native soils around the perimeter of the GCLF to monitor for possible subsurface migration. It is anticipated that a total of 14 probes will be installed at multiple depths at less than 1,000-foot centers around the entire refuse prism and two temporary probes will be placed in future fill areas (see Figure 10D). These probes will be sampled at a minimum on a quarterly basis to determine if landfill gas is migrating away from the landfill. When compliance levels are exceeded in any probe notification will be immediately provided to the LEA and a corrective action plan will be provided to the LEA as soon as possible (see 27 CCR, Section 20937(a)(3)). Adjustments to the gas system will be initiated and/or additional extraction wells will be installed.

Generally, the landfill gas migration probes are installed at or near the disposal site property boundary to comply with 27 CCR, Section 20925(a)(2). However, due to the large area of property encompassed by the GCLF, the severe changes in topography, the fractured nature of the material underlying the site and the cost of probe installation and monitoring, the majority of the probes will be installed in natural ground around the refuse footprint.

C.2.8 DRAINAGE CONTROL

C.2.8.1 GENERAL DESCRIPTION

The surface water drainage control systems (both interim and final) for the GCLF are designed to accommodate 100-year, 24-hour storm event run-off volumes. Surface water drainage control at the site will be handled by two separate systems, one collecting and conveying water from undisturbed areas and the other collecting and conveying water from disturbed areas. The system for undisturbed areas will collect and convey run-on from the surrounding areas as well as runoff from the undisturbed areas within the refuse footprint. This system will consist of above ground perimeter drainage channels (i.e., the eastern and western perimeter channels) and energy dissipaters. The disturbed area system includes deck and slope area grading, earthen berms and downdrains all set to discharge to buried perimeter drainage pipes, which empty to the desilting basins.

In addition, the western perimeter channel was also sized to accommodate the volume of water caused by a simultaneous rupture of the existing Pipeline Nos. 1 and 2 and the future Pipeline No. 6 at the same time as a 100-year, 24-hour storm event. Interim drainage control features and procedures will be instituted during active disposal operations and will include fill area grading, downdrains, earthen berms and desilting basins. Some of the interim drainage control system facilities (e.g., desilting basins) will be utilized as part of the final drainage control system for the site.

The final drainage control system includes a variety of treatment BMP's, which may include exterior slope downdrains, engineered deck area gradients and drainage berms, deck inlets, bench drains and inlets, perimeter drainage pipes, trapezoidal perimeter channels, two desilting basins, drainage swales, structural media filtration, bio-treatment swales and percolation areas. A detailed listing of potential BMP's is provided in the Stormwater Management Plan in Appendix I-1 and the Stormwater Pollution Prevention Plan (SWPPP) in Appendix D. The following discussion outlines the methodology that was used to design and analyze the drainage control system for the GCLF. The final drainage control system configuration is shown on Figure 17, and on Attachment B, Figure 1 of the SWPPP (see Appendix D).

C.2.8.2 HYDROLOGY

A hydrology study was conducted to evaluate future surface water drainage conditions at the site in accordance with 27 CCR, Section 20365. The objective of the hydrology study was to provide sizing and location information for the site's storm drain facilities based on the final fill configuration.

The Rational Method was used for the calculation of the peak discharge of a 24-hour, 100-year storm event. As discussed above, the western perimeter channel is sized to accommodate a rupture of existing Pipelines 1 and 2 and future Pipeline No. 6 at the same time. In addition, the refuse fill slopes east of the western perimeter interceptor channel may be armored to prevent the runoff from a rupture from destroying the cover material and exposing trash. It should be noted that the SDCWA aqueduct may be relocated to the west away from the refuse footprint; thereby minimizing potential impacts from a rupture. If the aqueduct is relocated, design of the perimeter drains will be re-evaluated and updated as necessary. Estimated run-off values were calculated based on the most current San Diego County Hydrology Manual (2003 version) in conjunction with computer software developed by Advanced Engineering Software (AES). The hydrology study map for on-site flows is shown on Figure 18. Hydrology/hydraulics analysis is contained in Appendix I and the drainage system sizing calculations, including the desilting basins, are contained in Appendix J.

The Stormwater Management Report and Evaluation of Hydrogeomorphology and Potential Beneficial Uses at Gregory Canyon were prepared to provide additional analysis of estimated storm water flows and provide for additional controls to minimize hydromodification of the San Luis Rey River. The additional controls may include a series of drainage swales, bio-swales or percolation areas to limit the frequency and volume of storm water flows into the river to the pre-development condition. These reports are contained in Appendix I-1.

C.2.8.3 DRAINAGE CONTROL SYSTEM

C.2.8.3.1 ON-SITE DRAINAGE FEATURES

On-site drainage features were designed and will be constructed to control stormwater that falls on the landfill and run-on from the surrounding watershed. Stormwater on the landfill deck will sheet flow until it is intercepted by berms located along the edges of the deck. The deck berms will direct flows to downdrains. Exterior benches will collect stormwater from the up gradient slope and divert flows to the bench downdrain inlets. The downdrains will be perpendicular to slope contours and located atop, and anchored into, the final landfill surface. Downdrains will be extended up completed side slopes of the landfill as the filling progresses and also accommodate inlets at each bench. The gradient of these downdrains will follow the surface of the refuse slope and will maintain a minimum three percent grade across the benches. The downdrains will outlet into buried perimeter drainage pipes located adjacent to the open channel storm drains discussed below. The buried pipes will discharge into the desilting basins. The buried storm drain pipes will be outfitted with manhole access pipes placed approximately every 300 linear feet and at major grade breaks and sharp angles to provide access and maintenance. The manholes will be covered with lids which can be locked. Inspection of the buried storm drain pipes will be conducted in September, prior to the onset of the stormwater season, and monthly during the stormwater season. Any blockage observed will be jetted away with high pressure water or other standard cleaning methods. The desilting basins will reduce the amount of silt ultimately discharged from the landfill site. Figure 19 shows the drainage control system details.

C.2.8.3.2 PERIMETER STORM DRAIN (PSD) SYSTEM

The PSD system will consist of a reinforced concrete trapezoidal drainage channels placed around (outside) the refuse footprint. A portion of the eastern channel will be constructed during the initial construction phase (Phase I) to accommodate flows from the upper eastern slopes of the canyon. Earthen berms will also be used to divert run-on from adjacent slopes and the up-canyon areas of the undisturbed footprint into the perimeter storm drains. Construction of a portion of the western perimeter channel along the lower portion of the canyon will be installed concurrent with the initial construction phase (Phase I) to divert run-on from the east facing slopes, west of the footprint.. The PSD channels will be completed moving up canyon as the landfill is developed. The PSD is intended to control run-on (from adjacent areas to the landfill) that might otherwise flow onto the landfill. The stormwaters conveyed by the PSD system will discharge into percolation areas at approximately the same discharge point as the eastern and western desilting basins, located near the ancillary facilities. Energy dissipaters will be utilized to match pre-development flow velocities. A PSD detail is shown on Figure 19.

The western perimeter trapezoidal channel crosses the existing First San Diego Aqueduct easement as it flows to its discharge point. At this location, the perimeter channel will have a cut-off wall on the upstream and downstream side of the crossing to prevent water from undermining the aqueduct. The crossing will be reinforced with extra concrete and steel.

C.2.8.3.3 OTHER STORM DRAIN FACILITIES

Intermediate deck drains and downdrains will be required, extended and upgraded as waste filling progresses, or as required, to satisfy the ultimate design presented in the final drainage plan.

Drainage from the facilities area will be directed into a bio-swale located to the west of the facilities area with structural media filtration at the end of the bio-swale prior to discharge, as shown in Attachment B, Figure 1 of the SWPPP in Appendix D and in Figures 3 and 4 of the Evaluation of Hydrogeomorphology and Potential Beneficial Uses at Gregory Canyon in Appendix I-1. Drainage from the main landfill access road and landfill access road bridge will be to bio-swales located on the east and west sides of the road and bridge, with structural media filtration. The location of these facilities is shown in Attachment B, Figure 1 of the SWPPP in Appendix D and in Figures 3 and 4 of the Evaluation of Hydrogeomorphology and Potential Beneficial Uses at Gregory Canyon in Appendix I-1.

C.2.8.3.4 STORMWATER DESILTING BASIN

The primary function of a desilting basin is to collect and store sediment before it can be transported offsite. However, desilting basins are passive systems that rely on settling soil particles out of the water in a finite time period, and are not 100 percent efficient in entrapping sediment. Therefore, desilting basins are typically only designed to function as a secondary system to help minimize transport of sediment offsite. The primary erosion control measures are BMPs which are designed to control sediment transport at the source. The use of BMPs and their use throughout disposal operations are discussed in Section C.2.8.3.5, below.

When designing desilting basins, the capacity is based on the potential volume of silt generated from the contributing watershed area which is determined based on the Universal Soil Loss Equation (USLE). One of the coefficients in the USLE is an empirical value that is a summation of individual storm products of the kinetic energy of rainfall, in hundreds of foot-tons per acre, and the maximum rainfall intensity, in inches per hour of all significant storms on an average annual basis. As discussed above, the GCLF is designed to include two separate drainage control systems, one to handle storm water flows from surrounding areas and undisturbed areas within the refuse footprint, and the second to handle run-off from the disturbed areas within the refuse footprint. Therefore, only flows from the disturbed areas within the refuse footprint would be directed to the desilting basins, dramatically reducing silt potential.

The 10-year, 6-hour rainfall data along with a 0.02mm particle size was used to calculate the efficiency of the desilting basins pursuant to the California Storm Water Best Management Practice Handbook (2009). As presented in Appendix I, the post-development flows for the GCLF are less than the pre-development flows for the 100-year, 24-hour storm. No attenuation of the peak flows are required, thus, the basins are sized to reduce the downstream sediment loading. The 0.02mm entrapment particle size was based on site conditions. These factors were considered acceptable by the RWQCB as the project design basis. Utilizing this particle size, the calculated efficiency of the basins would be approximately 75 acres of disturbed landfill area at any given time over the life of the project. The results of the basin efficiency calculations are included in Appendix J. The following design criteria/parameters were utilized:

- maximum disturbed acreage for three particle sizes of 0.01, 0.02, and 0.05 mm;
- the Rational Method Hydrology Computer Model run for the 10-year, 6-hour storm event;
- Table 8.1 of the Erosion and Sediment Control Handbook showing settling velocities for various grain sizes; and
- ACOE information.

The 0.02mm grain size and resulting calculations are considered to be conservative because the excavated side slope areas will consist primarily of hard rock and will contribute very little if any sediment to the basins.

The desilting basins will be located just east and west of the ancillary facilities (see Figure 17). The grading plans for the eastern and western desilting basins are shown on Figure 20. The desilting basins are intended to control the amount of silt ultimately discharged from the landfill as well as the rate of discharge. The basins are designed to settle out material in the coarse silt range and will not retain water. Table 9B presents some of the characteristics of the desilting basins.

The eastern desilting basin and western desilting basin will outlet to percolation areas shown in Attachment B, Figure 1 of the SWPPP in Appendix D and in Figures 3 and 4 of the Evaluation of Hydrogeomorphology and Potential Beneficial Uses at Gregory Canyon in Appendix I-1. However, if the aqueduct easement is relocated further west and pipelines are moved west, then the western desilting basin will discharge to a pipe located at the access road crossing to reduce the number of structures crossing the aqueduct easement. The desilting basins will be constructed during initial refuse liner construction with Phase I. Also as part of Phase I, a temporary desilting basin will be constructed as shown on Figure 21.

TABLE 9B
GREGORY CANYON LANDFILL
CHARACTERISTICS OF DESILTING BASINS

Characteristic	Eastern Desilting Basin	Western Desilting Basin
Acres	1.8 acres	3.7 acres
Length	375 feet	675 feet
Width	350 feet	250 feet
Depth	20 feet	20 feet
Capacity	15 acre-feet; 32,500 tons of silt	18.4 acre-feet; 40,000 tons of silt

Source: Bryan A. Stirrat & Associates, 1999
Refer to Appendix J for desilting basin calculations.

Before each rainy season, after each major storm and monthly during the rainy season, all drainage facilities will be inspected and any required maintenance performed to ensure that the drainage channels and desilting basins function properly. Any silt collected in the basins will be used as daily cover.

C.2.8.3.5 EROSION CONTROL PLAN

Site operations will utilize a number of erosion control improvements to minimize transport of sediment offsite. By analyzing existing topographical and design maps, the areas most prone to erosion were identified. Best Management Practices (BMPs) will be implemented to control and minimize transport of sediment off-site. In addition, BMPs utilizing the Best Available Technologies that are an economically achievable will also be considered. The BMPs will focus on erosion control measures discussed below in conjunction with the interim and final drainage control features discussed in Section C.2.8.3. Applying these practices will protect the soil surface and prevent soil particles from being detached by rainfall or wind. As a secondary means of controlling sediment transport, desilting basins are also proposed.

The natural geologic conditions at the site will act as a type of BMP. For example, the exposed slope faces in the excavation areas will be largely hard rock material that in some instances may require blasting. This type of material is not erosive and storm water runoff from these areas will carry little if any sediment.

For those areas disturbed and consisting of alluvial material, sediment transport from the landfill cover will be greatly reduced by the use of the BMPs discussed below.

To maintain the integrity and effectiveness of the BMPs, inspection and maintenance protocols will be implemented. Inspection of the BMPs will be conducted and documented on a regular basis and maintenance repairs will be performed based on these routine inspections and on an as-needed basis.

Down drains are proposed as part of the BMPs to intercept surface water from the deck area and slope areas and to facilitate rapid removal of runoff from the landfill. The down drains will reduce the runoff concentrations on unprotected areas of the waste prism, thereby minimizing erosion. The down drains are proposed at an average of 600-foot intervals to intercept runoff flows from the deck and benches before their flow velocities become erosive.

To further reduce silt loading, only storm water flows from disturbed erodable areas within the refuse footprint will be allowed to discharge into the basins. To accomplish this objective, the surface water control system includes the addition of a separate buried pipe system installed along the perimeter of the refuse footprint, which would redirect runoff from only disturbed areas (a maximum of 75 acres) from within the refuse footprint and into the desilting basins. Flows from undisturbed areas within the landfill footprint would be directed to the perimeter drainage channels, and not the desilting basins.

All run-on from surrounding areas and the undisturbed areas of the site would be captured by the perimeter drainage channels and discharge downstream of the landfill into percolation areas shown in Attachment B, Figure 1 of the SWPPP in Appendix D and in Figures 3 and 4 of the Evaluation of Hydrogeomorphology and Potential Beneficial Uses at Gregory Canyon in Appendix I-1. These storm water flows would be discharged utilizing energy dissipaters. Figure 17, Attachment B, Figure 1 of the SWPPP in Appendix D, and Figures 3 and 4 of the Evaluation of Hydrogeomorphology and Potential Beneficial Uses at Gregory Canyon in Appendix I-1 present a layout of the drainage control systems and Figure 18 is an updated Hydrology Map showing the sub areas consistent with the utilization of two perimeter drainage control system features.

In addition to the drainage control system, the site will be operated with a combination of BMPs including erosion control mats, mulching, and hydroseed to promote the establishment of a vegetative barrier to minimize exposure of soil from the elements.

In addition, coir logs, straw wattle, and straw/hay bale check dams will be installed to reduce flow velocities within the watershed. The erosion control mats and mulching will provide a temporary barrier to intercept energy from rainfall and prevent soil particles from being detached until the hydroseeded vegetative barrier is established. These erosion control mats will be installed on the slopes and the decks of the landfill.

One of these BMPs will include the establishment of native vegetation on intermediate or final fill areas of the landfill. Once an area of the landfill is completed and native vegetation reaches a state of 70 percent coverage (based on pre-development conditions) then storm water flows from that area will be diverted into the perimeter drainage channels, which will not discharge downstream into the desilting basins.

An additional benefit to the buried perimeter drainage pipes utilized for the disturbed areas is that they can be reactivated during the post-closure maintenance period. Any routine cover repairs, which result in significant disturbance to the ground surface, may cause silt loading. Therefore, until native vegetation is re-established, any storm water will be discharged to the basins.

Figure 21 presents the Phase I Fill Plan showing the anticipated location and types of BMPs that may be utilized to control storm water flows at the beginning of landfill operations. Figure 21A presents BMP details and sections.

C.2.9 LANDFILL CONSTRUCTION PHASING

C.2.9.1 <u>INTRODUCTION</u>

Incremental landfill phase configurations are based on the fill sequencing anticipated over the life of the landfill. The following sections describe the rationale for the phase configurations as well as the anticipated excavation, grading, liner and LCRS, waste fill, drainage control, and infrastructure development. The development sequence is based on the excavation plan, ultimate fill plan, and established design criteria.

The project includes some modifications to improve sight distance and to facilitate truck movements on Pala Road (SR 76) near the access road entrance. These activities will be completed in conjunction with the construction of the main access road and bridge. A discussion of main access and SR 76 improvements is included in Section B.3.1.1 and traffic control is discussed in Section B.5.5.

The on-site and off-site stormwater drainage control facilities and the GCLF infrastructure for the ultimate configuration are intended to be constructed progressively as waste filling is completed. Interim drainage and erosion control structures will be constructed and periodically relocated as waste filling progresses until final grades are reached. This will provide continuous stormwater collection and conveyance in a controlled manner and minimize erosion, ponding, and the potential for excess leachate generation and surface water contamination.

Phases I and II constitute the majority of excavation during the GCLF's development and as a result, stockpile areas have been designated to accommodate these soils until used for cover operations and/or other uses. Material excavated within the refuse footprint will be stockpiled in the areas designated as Borrow/Stockpile Area A and/or Borrow/Stockpile Area B. The stockpile locations will be west of the footprint area (Borrow/Stockpile Area A) and immediately southwest and adjacent to the footprint area (Borrow/Stockpile Area B) (see Figure 2). Up to approximately 9.4 mcy of soil can be stockpiled in these areas. The total volume of materials estimated in each phase was calculated using the contour method. This method involved estimating the enclosed area of each contour within the topographic and/or grading plan boundary, computing the volume contained between adjacent contours, and summing the individual volumes into a total volume. Definitions and assumptions are provided below. For additional information on material availability, refer to Section C.2.2.3.

It should be noted that the following fill sequencing discussion is based on the design which includes four excavation and three fill phases. Depending on actual refuse inflow rates over the course of active fill operations, each excavation/fill phase will be broken down into a number of actual construction stages.

C.2.9.1.1 DEFINITIONS

- <u>Excavation Total</u>: The total volume of excavation between the excavation plan surface and the existing ground surface (topographic map dated 1991).
- <u>Gross Airspace</u>: The total airspace volume contained between the excavation plan surface and the final fill plan surface.
- <u>Containment System</u>: The total volume of the containment system on the

bottom and side slope areas. The volume of the liner system and LCRS is estimated by multiplying the assumed thickness by the total surface area.

- Final Cover: The total volume consumed by the final cover system on the deck and side slope areas. The volume is estimated by multiplying the proposed cover thickness by the surface area. The final cover system thickness may change with the approval of an alternative cover.
- Net Airspace: The volume available for daily operation. The net airspace is estimated as the gross airspace less the volumes of the containment system and final cover system.
- Daily and Intermediate Cover: The volume of soil required for daily and intermediate cover of the refuse.
- Waste Volume: The volume of net airspace less the volume of daily and intermediate cover.
- Phase Life: The operational life, in years, of the phase is estimated by dividing the available waste volume by the annual disposed volume.

C.2.9.1.2 EXCAVATION

As previously discussed, development of the GCLF will begin with the excavation of a portion of Phase I to allow construction of the initial refuse development. Controlled blasting may also be necessary to excavate some of the rock material. The excavated slopes will have an overall gradient of 2:1 or less, with 15 to 20-foot wide benches located every 40 vertical feet. The upper slopes of excavations above the active cell will remain exposed until fill operations reach these areas and then the slopes will be lined.

The phased excavation of the GCLF will utilize two stockpile locations (see Figure 2) and/or unused areas within the footprint up to the proposed final grading contours. The stockpile areas will incorporate drainage and erosion control features to direct stormwater away from the active site.

C.2.9.1.3 INITIAL REFUSE PLACEMENT PROCEDURES

Special precautions will be taken during initial placement of refuse over the operations layer in newly completed liner areas. In these initial lifts, selected refuse will be screened visually to divert or remove bulky wastes, which could penetrate the 24 inches of protective soil and damage the liner system. These screening procedures will be implemented until one lift or a minimum of ten feet of refuse has been placed across newly lined areas.

C.2.9.1.4 REFUSE SLOPE STABILITY

An analysis of the slope stability of the landfill development is contained in Appendix C. Stability analyses of the planned final refuse fill configuration indicates that the static factor of safety decreases as the height of the refuse prism increases, but in all tested scenarios the calculated factor of safety exceeded 1.5. Since the static factor of safety increases as the length of the base of the refuse prism increases, landfilling in thin, full-length lifts across the entire base of the landfill will yield more stable conditions than landfilling in thick, short lifts. Therefore, the fill sequencing within Phases I, II, and III will be conducted in horizontal phases whereby refuse will be placed in relatively thin layers (e.g., 20 feet) across the entire landfill footprint from the bottom floor to the final elevations within a given phase.

27 CCR, Section 21750 (f) (5) (B) states that the refuse prism must have a factor of safety of at least 1.5 under dynamic conditions, and that if this is not the case, a more rigorous analysis must be performed to estimate the magnitude of movement under seismic loading conditions. Since the results of pseudo-static (dynamic) analyses failed to yield a factor of safety greater than 1.5, displacement analyses were completed to evaluate the amount of displacement that could occur within the landfill and containment system under seismic loads associated with a M 7.1 earthquake (the design earthquake) on the nearby Elsinore fault. Dynamic stability analysis was performed for the MCE site acceleration of 0.40g using the methods of Bray and Rathje (1998). This method calculates the seismically induced permanent displacement for the fill slope due to the postulated MCE and is regarded to be more representative of actual conditions within a landfill than the TNMN computer software, which analyzes for a simple sliding block (Pyke, 1992). The procedure of Bray and Rathje (1998) involves estimating the maximum horizontal equivalent acceleration (MHEA) for the potential sliding wedge based on the slope geometry, material properties, and characteristics of the MCE. For the prescriptive standard design, the following parameters were used:

- Slope Height - 300 feet
- Average Shear Wave Velocity of Refuse Fill – 1,200 feet/second (Bray and Rathje, 1998)

- MCE Site Acceleration – 0.40g
- Mean Period of Shaking – 0.50 seconds (Bray and Rathje, 1998)
- Significant Duration of MCE – 16 seconds (Bray and Rathje, 1998)

Based on the analysis method of Bray and Rathje (1998), the displacements calculated to occur to the total refuse prism and liner is about 0.1 inches for the prescriptive configuration. This is within SWRCB policy maximum of 6 inches.

C.2.9.2 PHASE I

C.2.9.2.1 RATIONALE

The pre-construction phase will include removal of the existing dairy buildings and residences on the site, removal of the manure to minimize or eliminate odors and/or potential impacts to water quality, and initiation of habitat restoration. The initial landfill construction phase will include construction of the access road and bridge, improvements to SR76 at the access road, the ancillary facilities, installation of the leachate and subdrain water storage tanks and the reverse osmosis system, excavation of the initial area of Phase I, installation of the Phase I waste containment system within the excavated area (subdrain system, LCRS and composite liner), preparation of the Borrow/Stockpile Area A, clearance and grading of turnouts along the internal haul road between Borrow/Stockpile Area A and the landfill footprint, and installation of water quality monitoring wells. The pre-construction and initial landfill construction period will be approximately nine to twelve months.

C.2.9.2.2 EXCAVATION

The initial development of the landfill will involve excavation of a portion of the Phase I area. It is anticipated that the initial excavation will be completed in an area of approximately 50 acres with approximately 34 acres lined to accommodate the first million tons of refuse received at the GCLF. The total Phase I excavation is approximately 3.7 mcy as shown on Figure 21B. Approximately 0.3 mcy of the 3.7 mcy will be required for the construction of the ancillary facilities area and to shape the canyon for receipt of the containment system. Excess soil and/or rock generated from the initial development will be processed and then stockpiled within the landfill footprint, or in Borrow/Stockpile Area A.

C.2.9.2.3 LINER SYSTEM DEVELOPMENT

Liner construction in the Phase I area will be completed in stages. As excavation and waste filling progresses in Phase I, the next stage of liner construction will commence. The liner system will be installed ahead of fill operations. In general, all subsequent phases will be similarly constructed in appropriately sized stages in consideration of actual refuse inflow rates and associated capital expenditure.

The LCRS will be installed immediately upon completion of each stage of liner construction and the main line will be extended with each stage to a sump located at the northwest corner of the development area. The leachate will flow from the LCRS outfall to above-ground storage tanks designed to provide continued service in the event of system fluctuations.

C.2.9.2.4 WASTE FILL DEVELOPMENT

Upon completion of the first excavation in Phase I, the required base liner system will be constructed and fill operations will be initiated. Subsequent staged filling within Phase I will create a deck area at an approximate elevation of 600 feet amsl (Figure 21). Each stage will consist of a series of lifts. The lifts (typically 15 to 20 feet high) will be developed within the Phase I footprint while maintaining the minimum deck and side slope gradients. During the filling of Phase I, work will begin on the excavation of the next area or stage. Phase I will provide approximately 8.1 mcy of gross airspace and require approximately 1.6 mcy of soil for daily and intermediate cover unless ADC is utilized. When completed, the north facing slope of Phase I will be at final grade. Landfill gas collection/recovery facilities will be installed at a pre-determined in-place refuse volume or as perimeter and surface monitoring dictates. At that time, extracted gases will be conveyed via header pipes to the flare station for destruction. These activities will be conducted and/or systems extended for all future phases of development.

C.2.9.2.5 DRAINAGE CONTROL DEVELOPMENT

Interim drainage control facilities will be constructed as required to control storm flows and prevent the inundation of the active face. Drainage control facilities will be placed along the interior benches above the lined slopes and direct flow into one of the perimeter channels and ultimately to the basins located at the north end the landfill. Two desiltation basins and a portion of the perimeter storm drain channels will be constructed during the Phase I development. The surface water falling directly within the Phase I footprint will be directed, via grading and downdrains, to the buried perimeter drainage pipes. All drainage control facilities will be sized to carry the water from a 24-hour, 100-year storm event and a simultaneous rupture of the existing Pipeline Nos. 1 and 2 and the future Pipeline No. 6. Hydroseeding of final fill contours will be conducted to establish native vegetation. Once an area reaches 70 percent coverage (based on pre-development conditions) then storm water flows will be diverted to the perimeter channels. Section C.2.8.3.5 presents additional detail on stormwater management.

C.2.9.2.6 LANDFILL ACCESS ROAD/MAIN HAUL ROAD/BRIDGE

The GCLF project includes construction of an access road and bridge as well as widening of SR 76 near the access road entrance. The main access road from SR 76 will be a two or three lane paved road, approximately 32 to 36 feet wide. The road will extend through the abandoned Lucio dairy to the ancillary facilities area. The access road from SR 76 to the bridge will be wide and 910 linear feet with two 12-foot travel lanes and a four-foot shoulder on each side. The access road from the bridge into the ancillary facilities will be about 985 linear feet and will be 36 feet wide, with three lanes (two travel lanes and a center lane) with a four-foot shoulder on each side. The access road will be paved with asphalt curbs.

As the access road enters the ancillary facilities area, the access road will cross over the existing First San Diego Aqueduct. Two reinforced concrete slabs will be placed at grade, one centered over each pipeline. Each slab will be approximately 28 feet wide and 64 feet in length placed on top of a layer of polystyrene. The three to four foot deep soldier beams at each end of the slab will absorb the weight of the vehicles crossing over the aqueduct. However, if the aqueduct is moved , these crossing facilities will not be required.

A bridge, approximately 681 feet in length supported by five large diameter piers, which will form the base of the structure, will be constructed across the San Luis Rey River. The 35.5-foot wide bridge will have two travel lanes. For additional information regarding bridge design changes, refer to Section B.3.1.1 and Appendix B-2.

The main haul road leading from the entrance facilities to the active face will be routed to the northeastern corner of the Phase I cut slope. Upon completion of the Phase I fill, the haul road will curve sharply to the southwest and traverse from east to west at an approximate grade seven percent along the northern facing finished slope of Phase I (Figure 21). An interim bench splits off the haul road where it turns along the western edge of the fill area. The haul road will eventually terminate at the top of the Phase I fill. An interim bench will provide access to the Phase I temporary drainage basin and Phase II bottom area.

C.2.9.3 PHASE II

C.2.9.3.1 RATIONALE

Phase II development requires that an area be excavated and lined prior to the completion of refuse placement in the Phase I fill area.

C.2.9.3.2 EXCAVATION

Phase II will be excavated to a depth of approximately 525 feet amsl or 25 feet below ground level during filling of Phase I (Figure 22). Excess soil and/or rock generated will be utilized for Phase I daily cover or stockpiled in Borrow/Stockpile Area B. The total Phase II excavation is approximately 3.7 mcy. Approximately, 0.76 mcy of the 3.7 mcy is required as fill material to shape the canyon for receipt of the containment system.

C.2.9.3.3 LINER SYSTEM DEVELOPMENT

As discussed earlier, liner placement will be implemented in stages throughout the development of Phase II to provide continuous refuse capacity and allow for the construction of the next stage. The LCRS will be installed over the liner along the bottom of this area and directly tie into the Phase I LCRS.

C.2.9.3.4 WASTE FILL DEVELOPMENT

Figure 23 shows the limits of the waste filling operation proposed for Phase II. Waste fill development will occur in stages within the entire Phase II footprint, in a fashion similar to that used in Phase I. Upon completion of landfilling in the final stage of Phase I, landfill operations will move to the first stage of Phase II. When completed, Phase II will extend the fill up-canyon and the top deck of the refuse fill will reach elevations of 675 feet amsl. The Phase II gross fill capacity is approximately 6.3 mcy.

C.2.9.3.5 DRAINAGE CONTROL DEVELOPMENT

Drainage control facilities will be constructed as required to control storm flows at all times. Most drainage from the Phase II deck area will be diverted into the west and east buried drain pipes by proper grading of a deck ridgeline. The PSD will be constructed up-canyon to upper limits of the cut to divert stormwater run-on from the surrounding undisturbed areas. Once an area reaches 70 percent of pre-developed vegetative condition then storm water flows will be diverted to the perimeter channels.

C.2.9.3.6 LANDFILL INTERNAL ACCESS ROADS

The access road from Phase I will curve sharply to the southwest to provide access to the top deck area of Phase II.

C.2.9.4 <u>PHASE III AND IV</u>

C.2.9.4.1 RATIONALE

Phases III and IV are the final excavation and refuse fill development phases for the GCLF. Phase III and IV excavations and liner construction are necessary to accommodate final refuse fill placement and must be completed prior to completion of the Phase II fill area.

C.2.9.4.2 EXCAVATION

Once the Phase II excavation is complete two small final phases of excavation (Phases III and IV) are proposed prior to and in conjunction with Phase III fill operations. Phase III excavation is the final area in the uppermost (southern) limits of the canyon and involves excavation of approximately 489,000 cubic yards of soil and rock (Figure 24). Phase IV includes a small area along the west side of the refuse footprint (about half way up the canyon) and will involve approximately 23,000 cubic yards of excavation (Figure 25). Approximately, 111,000 cy of the Phase III/IV excavation will be required to shape the canyon for receipt of the containment system.

C.2.9.4.3 LINER SYSTEM DEVELOPMENT

Liner system development in the Phase III and IV areas will include only slope liner construction and will complete the overall liner system for GCLF. As part of the Phase III and IV liner system construction, the LCRS mainline and LCRS risers will be extended up the slope to daylight.

C.2.9.4.4 WASTE FILL DEVELOPMENT

Phase III fill operations will complete the landfill to the final grading configuration, shown on Figure 26. The final deck will reach elevations of approximately 1,100 feet amsl and Phase III will provide approximately 43.1 mcy of gross airspace. Several fill stages will be employed within the Phase III footprint and incremental closure of the landfill may be implemented as disposal continues at higher elevations.

C.2.9.4.5 DRAINAGE CONTROL DEVELOPMENT

The final drainage system configuration will be completed as part of the Phase III fill and final cover construction. All surface water facilities will be constructed to handle a 24-hour, 100-year storm event. Drainage from the deck area will be directed by deck berms into downdrains and eventually into the buried drain pipes along the perimeter of the site. The PSD will be constructed up-canyon to upper limits of the cut to divert stormwater run-on from the surrounding undisturbed areas. Once an area reaches 70 percent of pre-developed vegetative condition then storm water flows will be diverted to the perimeter channels. The final configuration of the drainage control system is shown on Figure 17.

C.2.9.4.6 LANDFILL INTERNAL ACCESS ROADS

The main haul road will extend from Phase II and traverse from east to west along the northern facing finished slope of Phase III (see Figure 26). The haul road will curve sharply back from west to east and traverse the eastern facing finished slopes before reaching the top deck. The haul road alignment is designed to provide access and facilitate drainage for the final landfill configuration.

SECTION C.3

DESIGN CALCULATIONS

C.3 DESIGN CALCULATIONS

C.3.1 SITE CAPACITY

The GCLF design plans presented in Section C.2 reflect a net airspace of approximately 57.0 mcy. Information used to determine the site's overall capacity is discussed in Section B.1.6.

C.3.2 SOIL AVAILABILITY

Based on the geophysical study of potential borrow areas, soil materials for daily and intermediate cover of active waste disposal operations will be obtained from three on-site sources: the landfill footprint itself, and two borrow areas - Borrow/Stockpile Area A will be located west of the landfill footprint (adjacent to the western boundary) and Borrow/Stockpile Area B will be located immediately southwest and adjacent to the landfill footprint. The landfill development will include the excavation of topsoils, alluvium/colluvium, weathered bedrock and rippable hard rock from just within the footprint of the landfill. Excavated alluvium/colluvium, weathered bedrock material and rippable hard rock will be stockpiled for use during the operation and closure of the landfill. Unweathered hard rock materials will also need to be excavated from within the footprint, but these materials would need to be crushed and processed and are not readily adaptable for cover applications. A comparison of needed and available resources suggests a deficit of soil materials. This potential deficit will be offset by use of ADC during refuse operations, fill sequencing to minimize cover needs, some additional crushing of hard rock, and reuse of materials from demolition of the former dairy operations. For additional information on material availability, refer to Section C.2.2.3.

C.3.3 SETTLEMENT ANALYSIS

Permanent survey monuments will be installed in accordance with 27 CCR, Section 20950(d) to provide both horizontal and vertical control points by which to monitor settlement of the final site face during the post-closure period. In addition, an aerial photographic survey will be performed and provided to the RWQCB, LEA, and CalRecycle upon completion of all closure activities in accordance with 27 CCR, Section 21090(e)(1). In accordance with 27 CCR, Section 21090(e)(2) requirements, the operator will prepare an iso-settlement map of the entire permitted site every five years throughout the post-closure maintenance period.

Settlement analyses have also been performed for the GCLF as part of the closure requirements in 27 CCR, Section 21142. Results of these analyses are discussed in Section E.1.4 and included in Appendix C.

C.3.4 LEACHATE GENERATION

Leachate is formed when surface water infiltrates or any free liquids inherent to waste migrate through the refuse prism. The GCLF will be operated to inhibit leachate formation by minimizing surface water infiltration. In addition, the containment system design for the landfill area includes a LCRS above the composite liner to collect and remove leachate that may be generated.

In order to size and locate the LCRS components, modeling of potential leachate generation at GCLF was completed using the HELP3 computer program. HELP3 uses synthesized rainfall and evapotranspiration data to estimate leachate quantities, which might be generated at the landfill. Based on the results of the HELP3 model, it is anticipated that generally small volumes of leachate will be generated in the landfill during active operations and after closure. The results of the modeling are discussed in Sections B.5.1.1 and C.2.5 and the complete leachate generation analysis is included in Appendix C.

C.3.5 DRAINAGE SYSTEM CAPACITY REQUIREMENTS

The location of the GCLF precludes inundation of the landfill by a 100-year flood. In addition, the various drainage control features have been designed to control surface water run-off from a 24-hour, 100-year rainstorm event. The western perimeter channel is sized to accommodate a rupture of existing Pipelines 1 and 2 and future Pipeline 6 at the same time as a 100-year, 24-hour storm event. Supporting calculations for the GCLF's drainage control system design configuration are contained in Appendix J.

C.3.6 GAS GENERATION AND AIR EMISSIONS CALCULATIONS

In accordance with the San Diego APCD regulations, a landfill gas control/recovery system will be installed at the GCLF. Information regarding estimated gas generation and air emissions was considered in the design of the gas control/recovery system. The landfill gas generation information utilized in the EIR is presented in Appendix K.

C.3.7 SOIL EROSION ANALYSIS

A soil erosion analysis was performed for the GCLF. The soil loss analysis map is shown in Figure 27 and additional information regarding the soil loss analysis results is included in Section E.1.7.2 and Appendix L.

C.3.8 SEISMICITY

The seismicity of the GCLF, including the location of the site with respect to active and potentially active faults and their potential impacts to the waste containment units from seismic events, is discussed in Sections D.4.4 and D.4.5. Analyses of refuse and excavation slope stabilities under earthquake loads at the GCLF are presented in Appendix C.

SECTION C.4

CONSTRUCTION QUALITY ASSURANCE

C.4 CONSTRUCTION QUALITY ASSURANCE

C.4.1 INTRODUCTION AND PURPOSE

The construction quality assurance (CQA) program includes all relevant aspects of construction quality control (CQC). It provides a description of the materials and procedures to be used for construction of the composite liner and final cover systems and provides CQA monitoring and testing protocols and frequencies to be performed during construction to assure the regulatory agencies that the construction materials will be tested, installed, and monitored as specified in the design plans and specifications, and that accepted civil engineering practices will be used.

The CQA Plan will be prepared by a registered civil engineer or a certified engineering geologist and will present the requirements and procedures to be implemented during construction in accordance with 27 CCR, Sections 20323 and 20324. Included in the CQA Plan is a discussion of the professional qualifications of personnel who prepare and oversee the CQA program, the reports addressing construction requirements set forth in the design plans, documentation to be completed as part of the CQA program, and appropriate laboratory and field testing procedures and requirements for materials used in constructing the containment systems. The final construction documents will include detailed plans and specifications for all major contract elements as specified in 27 CCR, Section 20324(d)(1)(C). As required in 27 CCR, Section 20324 (c) (1)(B), the CQA Plan (or Report) will also specify the minimum training and experience requirements for contractors, work crews, and inspectors. In accordance with the requirements of 27 CCR, Section 21790, a CQA Plan for the final cover system was prepared and is included as Appendix M. A CQA Plan for the liner is included as Appendix N. The following discussion presents general CQA procedures. In addition to CQA undertaken in accordance with this section, the 2004 supplement to the San Luis Rey Metropolitan Water District (SLRMWD) agreement (Appendix Q) provides for duplicate CQA by a contractor selected by SLRMWD.

C.4.2 RESPONSIBILITY AND AUTHORITY

In accordance with 27 CCR, Section 20324(b)(2), a registered civil engineer or certified engineering geologist will be designated as the CQA Officer and will be responsible for overseeing the CQA program, including observing the installation of the composite liner and final cover system components and evaluating the materials for conformance with the plans and specifications, and all testing completed for the project during and after construction. The responsibilities of the CQA Officer will include:

- Review design plans and specifications for accuracy and completeness.
- Prepare a schedule of CQA inspections and coordinate necessary CQA personnel to conduct inspections.
- Review and interpret data and reports prepared by CQA inspection personnel/monitor.

The CQA inspection personnel/monitor will perform various tests and observations during construction activities as required by 27 CCR, Section 20324(d) through (i), such as:

- Verify that testing equipment is properly calibrated on a regular basis and document the calibration.
- Accurately record test data and organize it in a manner that allows easy reference.
- Evaluate the contractor's construction quality control plans to ensure that they meet or exceed the facility CQA Plan requirements.
- Report observations and test results as the work progresses.

The CQA inspection personnel/monitor will work under the supervision and guidance of the CQA Officer who will be responsible for verifying that all tests are conducted in accordance with the appropriate American Society for Testing and Materials (ASTM) standards or other specified test methods, and that the proper test equipment is used as specified in 27 CCR, Section 20324(e) and (f). The results of all inspections, including work that is unacceptable, will be reported to the CQA Officer.

C.4.3 PERSONNEL PROFESSIONAL QUALIFICATIONS

Under 27 CCR, Section 20324(b)(1) and (2) and as stated above, the design professional that prepares the CQA Plan will be a registered civil engineer or certified engineering geologist, and the CQA program will be overseen by a similarly registered/certified professional. The CQA plans for the final cover and liner containment systems, included as Appendices M and N, respectively, include a delineation of the CQA management organization, as required under 27 CCR, Section 20342(c)(1)(A).

In accordance with 27 CCR, Section 20324(c)(1)(B), the project CQA Report must include a detailed description of the level of experience and training for the contractor, work crew and CQA inspectors for every major phase of construction in order to ensure that the installation methods and procedures required in the containment system design will be properly implemented. This information will also be included in the construction contract documents and is summarized in this section. The CQA team will consist of a CQA Officer and inspectors overseeing the project contractor and work crews and whose qualifications will be as follows:

C.4.3.1 CQA OFFICER

The CQA Officer will have formal academic training in engineering or geology and will be registered as a professional engineer or certified engineering geologist in the State of California. This person should have practical, technical, and managerial experience that will allow the CQA Plan to be properly implemented. The CQA Officer must be able to communicate effectively with the landfill personnel, design engineers, and contractors to facilitate a clear understanding of construction activities and the CQA Plan.

C.4.3.2 GEOTECHNICAL CQA CONSULTANT

The Geotechnical CQA Consultant is the Geotechnical firm responsible for the design and specifications for earthwork and geosynthetic elements of the Project Drawings and Specifications. The Geotechnical CQA Consultant or his/her representative is also responsible for observing, testing, and documenting activities related to quality assurance for all geotechnical and geosynthetic aspects of construction except for engineering and survey control. All completed geotechnical work is subject to approval by the Geotechnical CQA Consultant.

C.4.3.3 GEOTECHNICAL CQA PROJECT DIRECTOR

The Geotechnical CQA Project Director is a geological/geotechnical professional registered in the State of California who, under the employ of the Geotechnical CQA Consultant is responsible for earthwork observation, monitoring and testing.

C.4.3.4 CQA INSPECTION PERSONNEL/MONITOR

CQA inspection personnel/monitor must have formal training and practical experience in inspecting and testing construction work relative to solid waste disposal sites, including conducting and recording inspection activities, preparing daily reports, and performing field testing.

C.4.3.5 GEOSYNTHETIC INSTALLATION CONTRACTOR AND WORK CREW

The Geosynthetic Installation Contractor shall have successfully installed a minimum of 10 million square feet of similar geosynthetic material in solid waste containment structures. The geosynthetic placement superintendent shall have successfully installed a minimum of 5 million square feet of geosynthetic material in solid waste containment structures. The seaming personnel shall have prior experience in the installation of a minimum of 1 million square feet of similar geosynthetic materials. The Contractor shall submit project names, sizes, and references with current telephone numbers. Resumes shall be submitted for the superintendent and seaming personnel.

Prior to installation of the geomembrane, the Geosynthetic Installation Contractor shall instruct workers on safety procedures pursuant to local, State and Federal regulations. The Contractor shall instruct the workers relative to the difficulties and potential hazards involved in handling the geomembrane. In addition, the Contractor shall ensure that workers have and use safety gear and equipment required by regulation. On-site technical supervision and assistance shall be provided at all times during installation of the geosynthetics.

C.4.4 INSPECTION ACTIVITIES AND REPORTING

Throughout the construction of the composite liner and final cover systems, the CQA team will perform inspection, observation and testing, which will be thoroughly documented, as detailed in the approved CQA Plan. The inspection, testing, reporting, and daily summary reporting elements of the CQA Plan identified in 27 CCR, Section 20324(c) and (d)(1) are included in more detail within the final cover and liner CQA plans included as Appendices M and N in this JTD. These activities, which are summarized below, are divided into pre-construction, construction, and post-construction activities.

C.4.4.1 PRE-CONSTRUCTION

Pre-construction inspection activities of the CQA team will generally include:

- Review of design criteria, drawings, and specifications associated with construction of the landfill.
- Inspection of materials proposed for construction (e.g., material properties data sheets for geosynthetic membrane and geosynthetic clay),
- Review of manufacturing operations and finished product specifications and quality control certificates,
- An inspection of the manufacturing process and quality control procedures employed in the manufacturing of the geosynthetic materials.
- Review of fabrication operations (e.g., factory seaming),
- Review of Contractor submittals including shop drawings, material certifications, and conformance data,
- Observations related to the transportation, handling, and storage of the geosynthetic membrane and geosynthetic clay,
- Inspection of the foundation conditions.

Additional detailed descriptions of the pre-construction activities are provided in the CQA plans in Appendices M and N of the JTD. The liner CQA Plan (included as Appendix N in the JTD) describes the geosynthetic pre-installation meeting (Section 4.4) and a plant visit to observe liner material manufacturing (Section 4.6). A discussion of the handling and storage of the geomembrane (HDPE), geosynthetic clay liner, geotextiles, and geocomposite materials are provided under the specific materials section of the CQA Plan.

C.4.4.2 CONSTRUCTION

The construction inspection activities of the CQA team will generally include:

- Review of contractor's submittals, samples, and supporting test reports.
- Review of the contractor's work schedules.
- Verification that materials are as specified in the plans and specifications or as approved by the engineer.
- Observation of all phases of the construction and documentation of the contractor's compliance or noncompliance with the approved plans and specifications, and/or the direction of the engineer. Field tests and visual observations will be used to evaluate construction practices.
- Accommodate seasonal conditions, if warranted.

Testing Program

In accordance with 27 CCR, Sections 20324(e) and (f), laboratory and field testing programs will be implemented prior to incorporation of the material into the containment system and once approved, during construction to evaluate whether all components are constructed according to the design specifications. All field tests will be conducted by CQA personnel or qualified laboratories under the supervision of the CQA personnel.

Test Fill Pad. In accordance with 27 CCR, Section 20324 (g), prior to actual liner construction, a test fill pad (demonstration fill) will be constructed to evaluate both the low-permeability soil proposed for liner construction and the Contractor’s equipment and methods for constructing and maintaining the integrity of the low-permeability liner soils. The test fill pad foundation will be constructed by the Contractor selected to complete liner construction with the designated equipment to determine if the specified density/moisture content/hydraulic conductivity relationships determined in the laboratory can be achieved in the field with the compaction equipment to be used and at the specified lift thickness and to establish the correlation between the design hydraulic conductivity and density at which that conductivity is achieved.

The test fill pad testing will be completed a minimum of two weeks prior to the actual low-permeability liner construction. Soil sampling will be performed by the Geotechnical CQA Monitor(s) during and after construction of the demonstration test fill pad to provide data regarding soil properties obtainable using the proposed design and construction methods. If necessary, the results from the test fill construction and testing program will be used to modify the Project Specifications for low-permeability liner construction. Additional discussion of the test fill pad (Demonstration Fill) and testing program is provided in the CQA Plan for liner construction in Appendix N.

Earthen Fill Materials. At a minimum, in accordance with 27 CCR, Section 20324(h), for compacted earthen fill materials, maximum density/optimum moisture content testing (by ASTM D1557) will be performed at a frequency of one test for every 5000 cubic yards of material placed, or per change in material type. Field compaction testing will be conducted by nuclear gauge at a minimum frequency of four tests per 1000 cubic yards and evaluated by sand cone methods at a minimum frequency of one test per 1000 cubic yards placed. The low permeability layer of the composite liner system will be constructed with import soils derived from a source approved by the Geotechnical CQA Consultant. Import materials to be used in the low-permeability layer will be evaluated by the Geotechnical CQA Consultant according to the following minimum testing schedule in order to characterize material properties:

Low-Permeability Import Material Testing Type and Frequency

Test Description	Test Designation	Minimum Test Frequency
Particle Size Analysis	ASTM D422	One per 2000 yds^3 stockpiled or one per production day (minimum)
Atterberg Limits	ASTM D4318	One per 2000 yds^3 stockpiled or one per production day (minimum)
Classification of Soils for Engineering Purposes	ASTM D2487	One per 2000 yds^3 stockpiled or one per production day (minimum)
Processed Moisture Content (following moisture conditioning)	ASTM D4643 (microwave) or ASTM D2216 (oven)	Two per construction day (both clay mine and landfill site)
Laboratory Permeability	ASTM D5084/EPA 9100 or USBR Modified E-13	One per 10,000 c.y
Moisture/Density Relationship	ASTM D1557	One per 10,000 c.y.
Visual Inspection	ASTM D2488	Daily while stockpiling

No soils other than those obtained from the approved borrow source and/or approved by the Geotechnical CQA Consultant will be used in liner construction.

Select import soils will be screened (if necessary), dried, and/or moisture conditioned until uniformly blended material characteristics and moisture condition are attained. Moisture conditioning will take place at the clay mine prior to delivery to the landfill site, with CQA testing occurring at the clay mine as noted above. CQA testing will also occur at the landfill site. If supplemental moisture is required at the site for conditioning, an appropriate source of water will be determined based on the location of placement of the low-permeability material within the landfill footprint, other water usage needs on the construction day, and the amount of water available from on-site storage. Supplemental moisture conditioning of imported low-permeability soil may need to be halted on a given construction day until an adequate supply of water from an appropriate source is obtained (typically through trucked recycled water or additional on-site storage). Field and laboratory testing for moisture content, in-place dry density, and engineering and permeability properties during construction of the low-permeability layer of the liner system will be completed according to the following minimum schedule:

Low-Permeability Fill Testing Type and Frequency

Test Description	Test Designation	Minimum Test Frequency
Processed Moisture Content (following moisture conditioning)	ASTM D4643 (microwave) or ASTM D2216 (oven)	Two per construction day
Moisture-Density Relationship	ASTM D1557	One per 5,000 cubic yards or per change in material type
In-Place Moisture-Density (Nuclear and/or Drive Ring)	ASTM D2922 ASTM D3017 ASTM D2937	One per 250 cubic yards placed
In-Place Density and Moisture Content (Sand-Cone)	ASTM D1556	One per 1,000 cubic yards placed or 20 percent of total In-Place tests (whichever is greater)
Particle Size Analysis	ASTM D422	One per 5,000 yd^3 (conducted on samples retrieved for laboratory permeability testing)
Atterberg Limits	ASTM D4318	One per 5,000 yd^3 (conducted on samples retrieved for laboratory permeability testing)
Laboratory Permeability	ASTM D5084/EPA 9100 or USBR Modified E-13	One per 5,000 cubic yards placed
Field BAT Permeability		One per 2,500 cubic yards placed
Visual Inspection	ASTM D2488	Daily

Geosynthetic Materials. The project CQA plans (Appendix M and N, Section 6.0) include detailed descriptions of performance requirements and minimum criteria for the geosynthetic materials. The following sections summarize this portion of the CQA plans to be implemented for geosynthetic materials construction.

During delivery of geosynthetic materials, the Contractor or Liner Subcontractor shall ensure that conformance samples are obtained in the presence of the Geotechnical CQA Monitor or his/her designated representative and forwarded to the Independent Testing Laboratory. Unless otherwise specified, conformance samples shall be taken and tested at a rate of one per lot or one per 100,000 square feet, whichever results in the greater number of tests. Testing for interface shear will be conducted at a rate of one per 200,000 square feet. At a minimum, conformance tests will include determination of the following characteristics for the HDPE (composite liner system):

- Density (ASTM D1505A).
- Environmental Stress Crack (ASTM D5397).
- Tear Resistance (ASTM D1004 Die C).
- Carbon black content (ASTM D1603).
- Thickness (ASTM D5199).

- Tensile characteristics (yield strength, elongation at yield, break strength, elongation at break) (ASTM D638).
- Interface shear strength testing as described in the Project Specifications. Direct shear testing for interface strength shall be carried out in accordance with ASTM D-5321 "Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method." Issues and procedures related to soil preparation shall be governed by ASTM D3080.
- Puncture resistance (ASTM D4833).

Where optional procedures are noted in the test method, the requirements of the Project Specifications shall prevail.

The CQA Plan for the final cover system including testing requirements and frequencies for earthen materials and the geosynthetic materials (LLDPE) is included as Appendix M.

Liner System Electrical Leak Location Survey. To aid in CQA monitoring of the as-built liner system, an independent contractor will conduct an electrical leak location survey as part of the final quality control for the geomembrane installation. The method is designed to identify holes in the geomembrane liner after the LCRS gravel, or LCRS gravel and operations layer soil, has been placed. As such, the survey will be performed after the geomembrane has been subjected to construction activities. One last survey will be conducted once the first refuse lift (a minimum of 10 feet) is placed.

The survey involves making point-by-point electrical measurements on the soil above and below the liner and because the geomembrane liner is an electrical insulator, current will flow only through leaks in the liner, producing localized anomalous areas of high current density near the leaks. With the proper implementation of equipment and survey procedures by our survey contractor, the electrical leak location method can detect and locate 0.01 square inch leaks in liners covered with 2 feet of soil (LLSI, 2003; www.leaklocationservices.com).

Documentation. *Daily Summary Reports* **-** In accordance with 27 CCR, Section 20324(d)(1)(A), a summary report will be prepared daily by each technician with supporting inspection data sheets and records of any problems that occur or corrective measures that are implemented throughout the construction period. The daily summary reports will provide a chronological framework for identifying and recording all other reports. Inspection data sheets will contain all observations, and a record of field and/or laboratory tests. At a minimum, daily reports will include the following:

- Date, name of project, and location.
- Weather and site conditions.
- Summary of any meetings conducted and the results of the meetings other than formal periodic meetings.
- Location of daily construction activities and progress.
- Record of equipment and personnel working areas.
- A record of field and/or laboratory tests including the location of work being tested and areas passing final inspection.
- Description and condition of any materials received at the site.
- Record of equipment calibrations or recalibrations and any actions taken as a result of recalibration.
- Site visits by others.
- Identification of construction problems and their solution or disposition summarized into a corrective measures report.

The corrective measures report will include detailed descriptions of materials and/or workmanship that do not meet a specified design and will be cross referenced to the specific inspection data sheets where the problem was identified and corrected.

Daily Construction Reports. Construction reports will be prepared daily by the CQA technicians and reviewed by the CQA Officer. They will include the following items:

- Inspection dates.
- Time spent on the site.
- Activities performed.
- Tests performed.
- Specific locations inspected.
- Methods used in analyzing sample results for the purpose of construction quality assurance.

Acceptance of Completed Components (Acceptance Reports). The CQA Officer will review daily inspection reports, inspection data sheets, and inspection photographs. All inspection reports will be evaluated for internal consistency, accuracy, and completeness.

The above daily reports and problem identification and corrective measures reports will be summarized into periodic acceptance reports, which will indicate that the materials and construction processes have been completed according to the specified design. The acceptance reports will, at a minimum, include inspection summary reports, inspection data sheets, and problem identification and corrective measures reports. These reports will be included in the project files and will be available to regulatory agencies upon request.

Document Control and Storage. During construction, the CQA Officer will be responsible for all CQA documents and on-site organization of the documents for easy access. The CQA Officer will also be responsible for keeping duplicate records of all documentation at another location.

The CQA Officer will be responsible for incorporating any revisions to the CQA Plan and distributing revised copies to the construction contractors and all other relevant parties.

Upon completion of construction, the facility will store all original documents so that they are protected from damage throughout the post-closure maintenance period, yet can be readily accessed.

C.4.4.3 POST-CONSTRUCTION FINAL DOCUMENTATION

At the completion of each phase of liner construction and following final cover construction, a final report will be prepared by the CQA Officer to provide evidence that the CQA Plan was implemented as proposed and that construction proceeded in accordance with design criteria, plans and specifications. The final report will include:

- Daily inspection summary reports.

- Inspection data sheets.
- Photographic reporting data sheets.
- As-built reports.
- Deviations from design and material specifications (with justifying documentation).

A statement that the liner has been built in general conformance with the design specifications, the approved plans, and the approved modifications of the plans and specifications will be provided and included in the final documentation sent to the appropriate regulatory agencies. The report will be signed by the CQA Officer, who is a registered civil engineer or certified engineering geologist.

PART D

DISPOSAL SITE CHARACTERISTICS

SECTION D.1

GENERAL

D.1 GENERAL

D.1.1 INTRODUCTION AND PURPOSE

In order to obtain new or updated WDRs from the RWQCB, an operator must supply information on a site's physical characteristics in accordance with 27 CCR, Section 21750. This section provides the required information and includes site-specific and regional data on topography, climatology, geology, soil characteristics, faulting and seismicity, and water resources (e.g., hydrology). Tables 1 and 2 provide a cross-reference index of the applicable Title 27 requirements and the various subsections in which they are addressed. Much of the information included herein has been summarized from more detailed reports which contain additional information regarding specific project elements. Where appropriate, these reports are referenced and are presented either as an appendix to the JTD or are available upon request. In all cases, these reports are listed in Section D.6 of the JTD.

The purpose of compiling the site characterization information is to provide the RWQCB with adequate site data to determine potential negative impacts to the public and surrounding environment. For example, information regarding the site and regional geology may influence the site's natural waste containment characteristics. Similarly, faulting and seismicity data provide information from which to assess potential geologic hazards such as earthquakes, which in turn can influence a landfill's waste containment system design. The information presented will be considered by the RWQCB in their evaluation of the proposed landfill design, operation and environmental monitoring activities.

D.1.2 GENERAL SETTING

The proposed GCLF is located in northern San Diego County approximately three miles east of I-15 and two miles southwest of the community of Pala (Figure 1). The site is adjacent to SR 76, the San Luis Rey River and lies along the western slope of Gregory Mountain. The GCLF refuse footprint is located south of the river and above the floodplain.

The GCLF will be situated on an approximately 1,770-acre property of which approximately 308.6 acres will be used for landfill activities and 183 acres will be used specifically for refuse disposal. Figure 2 presents the layout of the proposed landfill.

D.1.3 LAND USE

Current land use for the proposed GCLF is discussed in Section B.1.2.4 and shown on Figure 3. The area is primarily rural with agricultural uses on the valley floor. South of the river, there are former fields for dairy cows. Scattered food crops and orchards also surround the landfill property. Directly south of the landfill are citrus and avocado orchards. Other than family pets, mainly cows are within the vicinity of the landfill property. The number and location of structures within one mile of the perimeter of the unit is shown on Figure 5.

As discussed in Section B.1.9, the ultimate post-closure end use for the GCLF will be undeveloped open space. The GCLF is not expected to affect the future development plans of the Palomar Aggregate Rock Quarry, the Calmat-Pala Aggregate Mining, the Pala Band of Mission Indians Gaming Facility, the gas station west of I-15, Dulin Ranch, Lake Ranch Viejo, Brook Hills, Campus Park Specific Plan which includes a 422-acre mixed-use development with 32 acres of industrial uses and 17 acres of commercial uses, or the Sycamore Ranch project. In accordance with Proposition C, the project will dedicate a minimum of 1,313 acres of the project as permanent open space for long-term preservation of sensitive habitat and species.

Additional information regarding existing and proposed land uses can be found in the Final EIR (2003) and Revised Final EIR (2007) for the landfill project.

SECTION D.2

SITE TOPOGRAPHY

D.2 SITE TOPOGRAPHY

D.2.1 INTRODUCTION

Topographic information is provided in the following sections as required under 27 CCR. Topographic information was obtained from an aerial survey flown in 1991 (Figure 27A). The proposed final grading plan for the landfill was prepared in accordance with 27 CCR, Sections 21090(b) and 21142(a) and is shown on Figure 9.

D.2.2 TOPOGRAPHIC SETTING

The GCLF occupies a portion of the San Luis Rey River valley and surrounding canyon, ridge, and mountain systems. Natural surface elevations on the property range from approximately 1,200 feet above mean sea level (amsl) at the head of the canyon at the south, to 300 feet amsl at the mouth of the canyon in the San Luis Rey River drainage. Much of the canyon is steep, rugged terrain containing numerous boulder outcrops on the eastern side with only a few isolated boulders on the west canyon wall. The canyon flattens somewhat at the mouth where it meets the alluvial deposits of the San Luis Rey River drainage. A prominent knoll extends into the drainage channel on the west side of the canyon mouth.

The existing slopes on the lower area of Gregory Canyon are approximately 5:1 (horizontal:vertical), becoming 2:1 at the east edge of the landfill footprint, and are 1:1 and steeper on the upper part of the eastern slope. The western flank of the canyon is defined by a rounded ridgeline, with rather uniform slopes at inclinations of 2:1 to 3:1. Topography within one mile of the site is presented on Figure 30A. Additional topographic information can be found in the Geologic, Hydrogeologic and Geotechnical Investigation Report included in Appendix C.

D.2.3 FLOODPLAIN

As required by 27 CCR, Section 21750, an operator must determine whether the facility is located within a 100-year floodplain. The proposed landfill footprint and borrow/stockpile areas are not located within the designated boundaries of a 100-year floodplain (Reference: FEMA Flood Insurance Rate Maps, June 1997) (Figure 30B). The access road/bridge would be located within the designated boundaries of the 100-year and 500-year floodplains. However, the lowest elevation of the access road/bridge would be 312.0 while the 100-year floodplain at the upstream face is 310.7 feet. Therefore, the access road/bridge is designed to be above the highest record elevation of the 100-year floodplain so that no significant flooding impacts would occur during operations. The landfill perimeter drainage network would collect all surface drainage entering onto the site. Surface water run-on would then be directed to the on-site desilting basins which will discharge to the natural drainage course and into the San Luis Rey River.

SECTION D.3

SITE CLIMATOLOGY

D.3 SITE CLIMATOLOGY

D.3.1 GENERAL

The climate of San Diego County can be best characterized by warm, dry weather during the summer months and cool, seasonal wet weather during the winter months. A semi-permanent, high-pressure cell located over the Pacific Ocean dominates the area. This high-pressure cell maintains clear skies for much of the year. Seasonally, summer temperatures typically average between the low 60s° and low 80s° F. Winter temperatures range between the low 40s° and low 60s° F.

D.3.2 PRECIPITATION

There are no long-term precipitation gauging stations in the vicinity of the GCLF site. Therefore, precipitation information for the site must be extrapolated from weather data available within the region with sufficient precipitation histories, generally 10 to 20 miles from the site, including gauging stations in Escondido to the south, Fallbrook to the west and Lake Henshaw to the east. The rainy season at the GCLF extends from October through April with the most significant rain events occurring December through March. A variety of factors affect the extrapolation of this data, including the distance of the station from the ocean and GCLF, elevation of the station, and local climactic and rainfall patterns. Moreover, rainfall amounts within Gregory Canyon are expected to vary, given the increase in elevation from the north to the south. Average annual rainfall within Gregory Canyon is expected to be in the range of 17.5 to 25.27 inches. Figure 28A shows the isohyetal contours for the proposed project and surrounding area in accordance with 27 CCR, Section 21750 (e)(1). Available evapotranspiration data for Escondido indicate the mean is 4.84 inches, while the minimum (2.52 inches) occurs in December and the maximum (7.33 inches) occurs in July.

A hydrologic evaluation was performed (November 2003 and October 2004) for the site to provide sizing and location information for the site's storm drain facilities. The hydrologic analysis was conducted using the Rational Method

Computer program (in accordance with the San Diego Manual Criteria) to determine the peak flows discharged from the Gregory Canyon watershed under pre-developed conditions. For computer modeling, the watershed (i.e., tributary area) was divided into six sub-basins. The model simulated a 100-year recurrence, 24-hour storm to obtain a peak discharge rate. A run-off coefficient of 0.4 was used for the pre-development analysis since the landfill and surrounding areas are currently in a natural state. The resulting peak flow rate for the pre-developed condition is approximately 765 cubic feet per second (cfs). The program also determined that the post-development peak flows from the site would be approximately 807 cfs, which is a minimal increase of 42 cfs or less than six percent over the flow rate for pre-development conditions.

The run-on and run-off control systems at the GCLF are designed to intercept and convey the calculated 24-hour, 100-year storm event water volumes to desilting basins prior to discharge into off-site natural drainage courses. For more information regarding surface water control, refer to Section C.2.8.

Additional modeling was conducted in 2008 to review and update the storm water management plan for the facility using the Unit Hydrograph Method Analysis (HEC-1). Storm water control facilities were updated to meet newer standards set forth in the RWQCB's MS-4 permit, and to prevent hydromodification impacts to the San Luis Rey River, as provided in the Storm Water Management Report (Appendix I-1) and the SWPPP (Appendix D).

D.3.3 WIND

Figure 28 shows the annual wind speed and directions as recorded at the nearest meteorological station. As indicated, predominant winds are from the west quadrant with an annual mean speed of 6.60 miles per hour (see Figure 28). Winds from the southwest and west-northwest are also common. Weather data is recorded at the McClellan-Palomar Airport.

Locally, the airflow within Gregory Canyon results from a combination of regional wind patterns, subregional land/sea breezes and local up-canyon/down-canyon flows. The land/sea breeze is primarily easterly/westerly while the canyon topography is oriented north/south. Winds within the canyon are predicted to be light due to the conflicting perpendicular flow regimes. Wind directions in the canyon normally follow a pattern of weak south to north drainage at night, a light sea breeze from the south-southwest during the morning, and a strengthening onshore flow from the northwest beginning mid-day and continuing until late evening. The ridgeline east of Gregory Canyon also protects the canyon from the occasional Santa Ana winds that blow from the northeast.

SECTION D.4

GEOLOGY

D.4 GEOLOGY

As required by 27 CCR, Section 21750, the geologic and seismic setting of the GCLF are discussed in the following sections.

D.4.1 REGIONAL GEOLOGY

The GCLF is located in the Peninsular Ranges geomorphic province, which is characterized by northwesterly trending mountain ranges and intervening valleys. This geomorphic province extends from the Los Angeles Basin into Baja California, Mexico. Major drainage systems generally traverse the province in a westerly direction and in northern San Diego County includes, from north to south, the Santa Margarita, San Luis Rey and San Dieguito rivers. The proposed landfill is located in Gregory Canyon, a north-draining canyon located on the south side of the San Luis Rey River valley, the major east-west drainage in the northern part of San Diego County.

Throughout the northern part of San Diego County, there are exposures of Mesozoic intrusive crystalline rocks of the Southern California batholith, and metamorphosed screens of pre-batholithic rocks. These granitoid and older metamorphic rocks have been weathered to various degrees, and are often covered by residual soils, colluvium, or alluvium. The colluvial deposits are typically found along the base of slopes and are formed as the result of the downslope movement of rock and soil by the force of gravity. The alluvial deposits are found to some degree in most drainages, with deposits of considerable thickness present in major river valleys.

The tectonic regime of the region has changed significantly between the time of emplacement of the intrusions of the Southern California batholith and the present. During the Mesozoic, a subduction zone was active off the coast of California. The resulting heating of the crust creates an extensional regime perpendicular to the direction of subduction, which to some extent controls the location of individual intrusions and dikes stemming from these intrusions. In the case of the Mesozoic Southern California batholith, the direction of minimum stress would have been parallel to the direction of subduction (to the northeast), and dikes would have a preferential strike orientation to the northwest, perpendicular to the direction of minimum stress.

Tectonic conditions changed during the Cenozoic, when the East Pacific Rise reached the subduction zone, and the convergent margin was replaced by the transform margin of the San Andreas fault system. Transform, strike-slip motion started between 25 and 20 million years ago in the San Diego region (Atwater, 1970), and since then the tectonic "grain" of the Peninsular Ranges province has been dominated by strike-slip faulting along northwest-trending faults like the San Andreas, San Jacinto, Elsinore, and Rose Canyon faults. The Elsinore fault zone runs about six miles northeast of Gregory Canyon, and is thus the closest of these large structural discontinuities to the site. Like the rest of the mentioned faults, the Elsinore fault zone is the result of the right-slip motion between the North American and Pacific plates.

Of immediate interest to the structural setting of Gregory Canyon is the fact that the "block" between the Elsinore fault zone to the northeast and the Rose Canyon fault zone to the southwest is under a shear stress regime. In effect, the area between both fault zones is being "wrenched" clockwise by the relative motion along these faults. Under these conditions, north-oriented extensional fractures would form. This is the most likely explanation for the predominance of north-striking fractures on the site, and for the dominant orientation of topographic lineaments in the region.

D.4.2 SITE GEOLOGY

Several geologic units occur within the project site (Figure 29). In the lower portions of Gregory Canyon, a thin veneer of unconsolidated residual soils, colluvial, and alluvial deposits mantles a substrate of weathered tonalite. The topographic highs bounding the canyon are formed by igneous intrusive and metamorphic rocks with varying degrees of weathering. The following subsections describe in detail the geologic units that are exposed at the site.

Surficial Soils

According to Woodward-Clyde (1995), the topsoil units encountered in the area vary in thickness from about six inches to three feet, and are composed of silty sand, silty sand with clay, and silty sand with cobbles and boulders. In general, one would expect the steeper, upper slope area of the landfill site to have thinner soil accumulations than the intermediate or lower slope areas. Underlying the topsoil are residual soil horizons or weathered rocks. The grading plan calls for removal of surficial soils over the entire footprint of the landfill.

Alluvium

Two alluvial units have been mapped at lower elevations, near the mouth of Gregory Canyon (Figure 29). The younger unit, Qal-1, is formed by overbank deposits from the active San Luis Rey River channel, which are interbedded with channel deposits from the Gregory Canyon drainage. These deposits are relatively thin and contain gravels, cobbles and boulders, supported by a sandy silt matrix. The older alluvial subunit, Qal-2, is a terrace remnant of older alluvium from the Gregory Canyon drainage.

The alluvial wedge pinches out to the south. The wedge thickens to the north until it eventually merges with the channel deposits of the San Luis Rey River. Near the mouth of the canyon, well GMW-2 traversed through a 50-foot section of alluvial deposits before reaching the underlying bedrock.

Colluvium

Colluvium forms a veneer over most of the surface of the proposed landfill site. In most instances, it consists of silty sand with rock fragments that range in size from gravel to very large boulders. Finer-grained deposits, largely devoid of rock fragments, were encountered in test pits located at the southern end of the canyon (Figure 29). In this area, older colluvium, consisting of clayey sand to sandy clay with varying contents of rock fragments and slight to moderate cementation was encountered.

Rock fragments exposed at the surface of the colluvial veneer vary from gravel- to boulder-size material. Boulders of leucogranodiorite, some in excess of 20 feet in maximum dimension, are present along much of the eastern sideslopes.

The thickness of the colluvial deposits in the project area is highly variable. Cross-section interpretations by Geraghty & Miller (1990) show thickness variations from 2 to 50 feet (see Plate 3 in Appendix C). The upper slope area is likely to be underlain by thin colluvial deposits (less that 10 feet thick) and surficial soils formed on highly weathered crystalline rock. Debris chutes and drainage channels may be locally backfilled with colluvium of moderate thickness, but in general, the upper slopes are not likely to be underlain by thick, laterally continuous deposits of colluvium. Lower slope areas are expected to be underlain by much deeper and laterally extensive colluvial deposits consisting of a matrix of silty sand and clay around larger cobbles and boulders.

Bedrock

Larsen (1948) used the term Bonsall Tonalite to describe the rocks underlying the western ridge of Gregory Canyon, and the term Indian Mountain Leucogranodiorite to describe the light-colored, bold outcrops of granitic rock underlying the eastern ridge. Larsen also mapped an intervening band of metamorphic rock along the lower slopes of the eastern ridge, which he correlated with the sedimentary Triassic/Jurassic Bedford Canyon Formation. Rocks of this unit have relict volcanic textures, however, and are probably best correlated with the Jurassic Santiago Peak volcanics. A description of each of these bedrock materials is presented below. Additional discussion of the metamorphic rocks and the nature of its contacts with the leucogranodiorite and tonalite is provided in Appendix C.

Metamorphic rocks (TJm). Of the 183 acres of the landfill footprint, approximately 12 acres along the eastern side encroach over the outcrop of metamorphic rocks. The metamorphic rocks present along the easterly slopes of Gregory Canyon form a north-south-trending belt of older rock that was intruded (i.e., the action of forcing magma between pre-existing rocks) by magma that formed intrusive rocks (Figure 29). Specifically, the magma that crystallized into the tonalite intruded and intermingled with the metamorphic rock, and both of these units were subsequently intruded by the magma that crystallized into the leucogranodiorite .

The metamorphic rock includes amphibolites and metavolcanic rocks that locally exhibit some migmatitic structure (i.e., alternating dark and light banding in response to partial melting of the rock as it comes in contact with magma). The rocks are generally dark bluish gray, hard, and only slightly weathered with aphanitic to porphyroblastic textures. Relict porphyritic textures suggest a volcanic parent rock for some of the units.

Larsen (1948) correlated these metamorphic rocks with the Bedford Canyon Formation (a sequence of mildly metamorphosed sedimentary rocks represented by deformed slates, schists, quartzites and localized occurrences of marble), which is widespread in the Santa Ana Mountains. At Gregory Canyon, however, there are no outcrops of slates, quartzites or marbles, and there is a preponderance of metavolcanic rocks. It seems more reasonable to correlate the Gregory Canyon sequence with the Jurassic Santiago Peak volcanics, a unit composed of metavolcanic and metasedimentary rocks exposed elsewhere in San Diego County.

Tonalite (Kbt). The tonalite that underlies the western slope and the central portion of Gregory Canyon is an extensive rock unit in the area of the proposed project and Larsen (1948) referred to it as the Bonsall Tonalite. The tonalite is a dark gray, phaneritic rock, with medium- to coarse-crystallinity that varies in composition from tonalite to gabbro. Other common variations noted in the tonalite are the locally veined and streaked appearance and the migmatitic fabric that is observed near the contact with the metamorphic rocks. The rock is also characterized by rare inclusions of the metamorphic rocks, and by numerous leucogranodiorite dikes that include fine-grained aplites and coarse-grained pegmatites. The tonalite comes in contact with the metamorphic rock along the easterly side slopes of Gregory Canyon, although the contact is typically covered by colluvium or obscured by surficial soils. Because the metamorphic rocks were intruded by the tonalite at a relatively high temperature (900° to 1200° C), where the contact was observed in our field investigations, it is irregular and somewhat transitional due to the effects of partial melting of the pre-existing metamorphic rock Based on its map position, as inferred from isolated outcrops of both rock types, the contact appears to dip to the east at angles of 20 to 25 degrees.

The tonalite is moderately to intensely weathered in most outcrops, although small cores of only slightly weathered tonalite do form boulder knobs on the western flank of Gregory Canyon. Moderately weathered tonalite still preserves its phaneritic texture, but is less cohesive than the pristine rock, with the constituent minerals slightly altered to oxides and clays, particularly along the edges. The intensely weathered tonalite is oxidized throughout and has a granular texture that only vaguely reflects the original phaneritic texture. The constituent minerals are partially altered to oxides and clays, and disaggregate easily under pressure. The depth of weathering, as determined in exploratory drilling by Geraghty & Miller (1990), ranges between 65 feet (GMP-3) and 95 feet (GMW-2).

Geraghty and Miller (1990) reported the results of two seismic refraction traverses across the tonalite, and concluded that at depths shallower than 30 feet the seismic wave velocity in weathered tonalite was approximately 3,000 feet per second (ft/sec). At depths greater than 30 feet, seismic wave velocity increased to between 11,000 and 17,000 ft/sec. In general, excavation of materials with seismic velocities greater than 7,000 to 11,000 ft/sec requires blasting.

Leucogranodiorite (Kglg). The leucogranodiorite map unit is a light-colored, biotite-bearing granodiorite that forms the prominent mountain flanking the eastern side of Gregory Canyon (Figure 29). Although this prominent mountain is referred to as Gregory Mountain, Larsen (1948) referred to it as Indian Mountain and to the granodiorite as the Indian Mountain Leucogranodiorite. In hand specimen, the rock has medium- to coarse-crystallinity, is light gray to buff, and has less than five percent dark minerals (biotite and iron-titanium oxides).

Besides forming the core of Gregory Mountain, the leucogranodiorite also forms dikes that cut older units and vary in thickness from less than an inch up to five feet.

The degree of weathering of the leucogranodiorite is generally slight, as can be inferred from the bold outcrops of Gregory Mountain. Though the hardness and coherence of these rocks generally makes them unrippable, no grading is planned in the outcrop area of this unit. In contrast, leucogranodiorite dikes vary in degree of weathering from low to moderate, and should offer no significant resistance to ripping. Moderately weathered dikes are pervasively oxidized and have "cloudy" feldspars, but still preserve their phaneritic texture.

The main body of the leucogranodiorite is in intrusive contact with the metamorphic screen midway along the easterly slope of Gregory Canyon. The contact zone is generally buried under talus, but is narrow and abrupt where it can be observed. Based on its map position, as inferred from the abrupt change in topography, the contact is nearly vertical.

D.4.2.1 DISCONTINUITIES IN OUTCROP

Structural discontinuities (joints, dikes) are common in the rocks that form the substrate of the canyon. Based on an extensive study of structural discontinuities in both outcrop and exploration boreholes, GLA (1997) concluded that the main orientations of discontinuity were:

	Dip direction	Dip angle
Direction 1	270º	65º
Direction 2	90º	80º
Direction 3	255º	60º
Direction 4	330º	65º
Direction 5	360º	45º

If the structural attitudes of fractures and dikes are plotted separately, the stereonet plot for the fractures has primary maxima that correspond to Directions 1 and 2 in the table above, whereas the plot for dikes has maxima that correspond to Directions 3 and 4. Direction 5 may represent the compression counterpart of north oriented (Direction 1) tension fractures. These predominant orientations are consistent with the overall tectonic stress regime of the area, as described in Section D.4.1.

D.4.2.2 DISCONTINUITIES IN BOREHOLES

Fourteen boreholes were logged with an optical borehole imaging probe (BIP), which provides the highest resolution available for fracture and feature analysis in boreholes. This technique is based on direct optical observation of the wall of the borehole and is recorded on videotape for viewing. Based on inspection of the BIP log each fracture is identified with a depth, orientation, and fracture ranking from 0 to 5, with a 0 indicating a closed feature, and 5 indicating a wide aperture fracture or fracture zone. Most of the fractures rank from 0 to 2, with 20 cracks ranked at 3, only two fractures ranked at 4 (GLA, 1997), and none at 5. Structural orientation and spatial distribution patterns of fractures in boreholes were consistent with the analysis of similar outcrop data (Section D.4.2.1).

D.4.3 ENGINEERING AND CHEMICAL PROPERTIES OF GEOLOGIC MATERIALS

A discussion of the geologic materials on the site is provided in Section D.4.2. Laboratory testing was completed by Woodward-Clyde Consultants (WCC; 1995) on soil samples obtained from test pits excavated at the site (Figure 29), to assess the engineering characteristics of the site materials proposed for use in landfill operations. Compaction tests were performed on material finer than the Number 4 sieve. A summary of these test results is presented in Table 10. Strength and compression tests were performed on samples remolded to approximately 90% of their maximum dry density. A summary of these strength test results is presented in Table 11. The results of the consolidation tests are presented in Table 12, and laboratory permeability tests were also performed and are presented in Table 12a. In addition, GLA performed an investigation of the site stratigraphy and nature of the metamorphic rocks on the east side of the site, and a petrographic analysis of the bedrock including rock descriptions and mineralogy. The results of this investigation are summarized in Section 1.2.2 (Bedrock) of the Geologic, Hydrogeologic and Geotechnical Analysis Report (GLA, 2003), in the JTD Appendix C. A discussion of the mineral resources at

TABLE 10
GREGORY CANYON LANDFILL
SUMMARY OF LABORATORY COMPACTION TEST RESULTS

SAMPLE NUMBER	SOIL DESCRIPTION	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE CONTENT (%)
TP2-4	Clayey fine sand (SC)	129.5	10.5
TP3-1	Fine sandy lean clay (CL)	128.0	10.5
TP4-4	Fine sandy lean clay (CL)	131.0	10.0
TP4-5	Silty sand (SM)	131.0	8.5
TP5-3	Silty fine sand (SM)	121.0	12.5
TP8-1	Silty fine sand (SM)	129.5	8.5
TP9-1	Silty fine sand (SM)	132.0	9.5
TP9-2	Silty fine sand (SM)	127.0	10.0
TP10-1	Silty fine sand (SM)	133.5	8.5
TP10-2	Silty fine sand (SM)	133.0	9.0

Source: Final Environmental Impact Report, 2000 (Woodward-Clyde, 1995).

TABLE 11
GREGORY CANYON LANDFILL
SUMMARY OF STRENGTH TEST RESULTS

SAMPLE NUMBER	SAMPLE DEPTH (ft)	SOIL CLASSIFICATION	GEOLOGIC UNIT	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	NORMAL STRESS	COHESION (psf)	FRICTION ANGLE (degrees)
TP2-4	3-5	Clayey fine sand (SC)	Highly Weathered Granite	11	116	Low	440	28
TP3-1	1-2	Fine sandy lean clay (CL)	Residual Soil	11	114	Low	240	28
TP4-5	4-7	Silty sand (SM)	Highly Weathered Tonalite	9	119	Low	500	47
TP5-3	3-5	Silty fine sand (SM)	Highly Weathered Tonalite	13	108	Low	720	32
TP5-3	3-5	Silty fine sand (SM)	Highly Weathered Tonalite	13	109	High	1,500	30
TP8-1	1-2	Silty fine sand (SM)	Colluvium	9	117	Low	650	39
TP9-1	1-3	Silty fine sand (SM)	Colluvium	10	121	Low	770	30
TP9-2	3-6	Silty fine sand (SM)	Highly Weathered Granite	10	114	Low	660	41
TP10-1	1-4	Silty fine sand (SM)	Colluvium	9	120	Low	680	33
TP10-1	1-4	Silty fine sand (SM)	Colluvium	9	120	High	1,120	33
TP10-2	4-7	Silty fine sand (SM)	Older Colluvium	9	120	Low	610	33
TP10-2	4-7	Silty fine sand (SM)	Older Colluvium	9	120	High	150	35

Source: Final Environmental Impact Report, 2000 (Woodward-Clyde, 1995).

TABLE 12
GREGORY CANYON LANDFILL
SUMMARY OF CONSOLIDATION TESTS

SAMPLE NUMBER	DEPTH (ft)	SOIL DESCRIPTION	LIQUID LIMIT	PLASTICITY LIMIT	VIRGIN COMPRESSION INDEX
TP2-4	3 to 5	Clayey Sand (SC)	29	14	12.4
TP4-4	1 to 5	Fine Sandy lean clay (CL)	23	13	16.8
TP9-1	1 to 3	Silty Sand (SM)	--	NP	11.3

Source: Final Environmental Impact Report, 2000 (Woodward-Clyde, 1995).

NP = Non-plastic

All samples inundated with water at 2 ksf.

TABLE 12A
GREGORY CANYON LANDFILL
SUMMARY OF LABORATORY PERMEABILITY TEST RESULTS

SAMPLE NUMBER	SOIL DESCRIPTION	DRY DENSITY (pcf)	NO. 200 SIEVE (%)	HYDRAULIC CONDUCTIVITY* (CM/SEC)
TP2-4	Clayey fine sand (SC)	116	44	3.7×10^{-6}
TP3-1	Fine sandy lean clay (CL)	115	56	3.8×10^{-7}
TP4-4	Fine sandy lean clay (CL)	118	58	7.3×10^{-7}
TP4-5	Silty sand (SM)	118	18	3.5×10^{-4}
TP5-3	Silty fine sand (SM)	109	42	1.1×10^{-6}
TP8-1	Silty fine sand (SM)	116	26	7.4×10^{-7}
TP9-1	Silty fine sand (SM)	119	43	7.3×10^{-7}
TP9-2	Silty fine sand (SM)	114	21	1.6×10^{-4}
TP10-1	Silty fine sand (SM)	120	34	7.8×10^{-6}
TP10-2	Silty fine sand (SM)	120	32	7.6×10^{-6}

* Samples remolded to 90% relative compaction (maximum density per ASTM D-1557) at optimum moisture content.

Source: Final Environmental Impact Report, 2000 (Woodward-Clyde, 1995).

the site and in the surrounding area is included in Section 1.2.4 of the GLA (2003) report (Appendix C).

D.4.4 FAULTING

The site is located within a tectonically active region. Several active faults exist within 60 miles of the property. These include the San Andreas, San Jacinto, Elsinore, and Rose Canyon/Newport-Inglewood fault zones. No known active or potentially active faults have been located on the property. The nearest active faults in the area are the Elsinore Fault, located approximately 6 miles northeast of the site, and the Rose Canyon Fault located about 23 miles southwest of the site. All of these faults are the result of the right-lateral strike-slip motion between the North American and Pacific plates, although the individual fault strands within the Elsinore fault zone may have strike-slip, normal, or thrust fault motions as a result of complex local geometries (Lamar and Rockwell, 1986). The northwest-trending fabric of the fault zone also results in distinctive structural features, including large-scale structural depressions like the Elsinore Trough, and structural highs such as the Agua Tibia Mountains.

Of more immediate interest to the structural setting of Gregory Canyon is the fact that the “block” between the Elsinore fault zone to the northeast and the Rose Canyon fault zone to the southwest is under a shear stress regime (Figure 30). In effect, the area between both fault zones is being "wrenched" clockwise by the relative motion along these faults. Under these conditions, north-oriented extensional fractures would form as shown in the stress diagram of Figure 30. This is the most likely explanation for the predominance of north-striking fractures on the site, and for the dominant orientation of topographic lineaments in the region.

Local Setting. Faulting was evaluated by WCC (1995) for the project and surrounding area based on a review of geologic literature, large- and small-scale stereo aerial photographs, and field reconnaissance data. GLA (1997) augmented the lineament analysis by inspecting historical aerial photographs of the area to identify potential structural discontinuities at or near the GCLF, and concluded that there were no regional, through-going discontinuities across the footprint of the site. Likewise, geologic mapping of the site did not disclose the existence of major faults across the footprint of the landfill, although thin shear zones of limited lateral extent were mapped. Some of these shear zones have been annealed by granitic dikes, which demonstrates that they are Mesozoic in age.

The closest mapped faults to the site are an east-northeast-trending fault first located by Jahns and Wright (1951), and a shear zone described by WCC (1995) (Appendix N, Figure 3). The Jahns and Wright (1951) fault is the only nearby fault depicted in the 1994 Fault Activity Map of California (Jennings, 1994), and it shows no evidence for Cenozoic displacement.

With respect to the potential shear zone located across Highway 76, WCC (1995) noted that there is no evidence to support continuity of the high-angle shear feature (such as lineations or similar exposures) along its general strike to the north or south. From this, they inferred it to be a localized feature. GLA (1999) inspected this outcrop, and concluded that the so-called shear zone was a steep planar contact between metamorphic rocks and hydrothermally-altered gabbro. The gabbro is brecciated (i.e., the rock is not homogeneous, but rather it is formed by an agglomeration of angular blocks), but the fragments do not show tectonic shearing, alignment, or fault gouge between them. A couple of hundred feet east of the contact the rock becomes progressively less brecciated and hydrothermally altered.

The 200-foot zone of brecciated gabbro does not have the characteristic features of a fault zone since such a thick "fault zone" would be indicative of a major fault, and shearing should be pervasive. In fact, there are no prominent shear planes through this portion of the outcrop. In addition, careful inspection of the ravines to the north of the outcrop did not disclose continuation of the breccia, so GLA concludes that it has the shape of a vertical chimney, rather than a planar feature. The limited extent of the breccia zone in the strike direction is uncharacteristic of a major fault zone, as such structures normally extend for several miles. In contrast, intrusive breccia chimneys or pipes are a common feature in shallow plutons (e.g., Norton and Cathles, 1974), and characteristically show the effects of hydrothermal alteration.

To confirm this interpretation, GLA made a careful inspection of the north flank of Gregory Mountain, where the contact would be reasonably expected to project if it were an extensive planar feature. This inspection identified only non-brecciated tonalite/gabbro along the northern flank of Gregory Mountain, thus confirming that the gabbroic breccia does not extend across the San Luis Rey River. The GLA (2003) report provides a discussion of this study and includes photographs of the various contacts in Attachment 2 of Appendix C.

D.4.5 SEISMICITY

The Elsinore fault zone, located approximately six miles from the site, is the most likely source of strong seismic motion in the area of the Gregory Canyon landfill site. The Elsinore fault extends 150 miles from the Mexican border to the northern edge of the Santa Ana Mountains. Five earthquakes of magnitude greater than 5 have been generated along this fault during the last 100 years, three of which had epicenters near Lake Elsinore.

For the GCLF, to apply an additional margin of safety, the site was designed for the Maximum Credible Earthquake (MCE). An MCE event of M7.1 was used for the Elsinore-Julian Fault and M6.8 was used for the Elsinore-Temecula Fault (CDMG, 1996). For this analysis, a deterministic estimation of the peak horizontal acceleration was calculated for the MCE using the computer program EQFAULT (Blake, 2000), which calculates the MCE for all faults in the database within 100 miles of the site using different attenuation relationships. A series of attenuation relationships, based on published seismological papers, were used to produce the range of peak horizontal accelerations presented below.

Maximum Credible Earthquake

Fault Scenario	Range	Mean/Average
Elsinore-Temecula fault M6.8 earthquake 5.5 miles (8.8 km) from the site	0.2g to 0.39g	0.34g
Elsinore-Julian fault M7.1 earthquake 6.0 miles (9.6 km) from the site	0.22g to 0.40g	0.35g
San Andreas fault-Southern Segment M7.4 earthquake 47.7 miles (76.7 km) from the site	0.04g to 0.07g	0.06g
San Jacinto-Anza fault M7.2 earthquake 28.1miles (45.3 km) from the site	0.08g to 0.11g	0.09g
Newport- Inglewood/Rose Canyon fault M6.9 earthquake 22.6 (36.4 km) from the site	0.08g to 0.12g	0.09g

From these estimates, assuming a MCE event, the area of the Gregory Canyon landfill site expansion is likely to experience short-period peak horizontal accelerations between 0.2g and 0.4g for a near-field earthquake and about 0.1g for a far-field earthquake.

D.4.6 STABILITY ANALYSES

As detailed in Appendix C, slope stability analyses were completed taking into account the site's tectonic setting and seismic exposure potential, using the proposed site development plan, available soils characteristics and published geosynthetic material strengths.

The static factor of safety is defined as the ratio of the forces resisting failure to the forces driving failure. Static conditions are those in which no external forces are imposed on the refuse prism. Although the static stability of landfill cut slopes is not regulated per se, the standard of practice has converged on identifying static factors of safety of at least 1.5 for cut slopes that will be unsupported for more than a few years.

Kinematic analyses that were completed to evaluate the cut slopes for the landfill design indicate that large scale, block-slip movement and wedge failure are not likely given the geometry of the dominant directions of discontinuities in Gregory Canyon identified by the geologic investigations. In addition, because the rocks exposed in Gregory Canyon are compact and cohesive, even when weathered, circular failure of the cut slopes is unlikely.

GLA also reviewed the stability of the cut slopes and stockpile slopes in the borrow/stockpile areas. Based on the kenematic considerations and structural features of the rocks exposed at Gregory Canyon, it was concluded that block failures, wedge failures and circular failures of 2:1 (H:V) cut slopes are not likely. For the stockpiles, as provided in GLA's (2003) report (Section 3.3.2 of Appendix C), the computer program SLOPE/W was used to analyze the static stability for two cross-sections through the stockpile slopes. Based on the nature of the materials anticipated to be placed in the stockpiles, a unit weight of 120 pcf, a friction angle of 32° and cohesion of 250 psf were considered reasonable and were used in the slope stability analysis. Results of the analysis indicated a calculated minimum static factor of safety of 1.9. The borrow area cut slopes excavations will be developed to a maximum gradient of 2:1 (H:V). Therefore, potential impacts related to borrow/stockpile area design and slope stability concerns are considered less than significant.

GLA performed slope stability analyses for the proposed liner design and this analysis is summarized in the GLA (2003) report provided in Appendix C (Section 3.3.3) of the JTD. The stability analyses look at the strength parameters of the composite liner system. Section C.2.4 presents a description of the liner design. The interface strengths for each of these liner components can be used to evaluate the stability of the refuse prism and underlying liner system using standard slope stability calculation methods.

In performing the slope stability calculations, only the weakest or most critical elements of the liner system have been used. Specifically, for the analyses, the critical elements are the refuse prism and the interface between the non-woven geotextile and the HDPE membrane. The parameters used in the analyses are as follows:

Material	Unit Weight	Friction Angle	Cohesion
Refuse Fill	80 pcf	30°	200 psf
Smooth HDPE/Geotextile	NA	8°	0 psf
Textured HDPE/Geotextile	NA	14°	0 psf

Cross section A-A' was generated to show the final grade profile of GCLF in the center of the canyon with the landfill configuration and incorporates the most critical section with regard to slope stability for the site (see Figure 3-4 of Appendix C). The slope stability analyses were performed using the computer program SLOPEW (Geo-Slope, 1995). Analytical methods available in the program include Bishop method for circular failure modes, and Spencer and Morgenstern and Price methods for general failure modes including block and non-circular failure surfaces. The static factor of safety for the critical failure plane for section A-A' is calculated to be greater than 1.50, which meets the 27 CCR standard.

The pseudo-static analyses for section A-A′ indicates a factor of safety of 0.85, with a seismic coefficient of 0.15. The yield acceleration (the seismic coefficient that results in a factor of safety of 1.0) for section A-A′ is calculated to be 0.10g.

27 CCR, Section 21750 (f)(5)(C) states that the critical slope of the final refuse prism must have a factor of safety of at least 1.5 under dynamic conditions, and that if this is not the case a more rigorous analysis must be performed to estimate the magnitude of movement under seismic loading conditions. Since the results of pseudo-static (dynamic) analyses failed to yield a factor of safety greater than 1.5, displacement analyses were completed to evaluate the amount of displacement that could occur within the landfill and containment system under seismic loads associated with a M 7.1 earthquake on the nearby Elsinore fault.

Dynamic stability analysis was performed for the MCE site acceleration of 0.4g using the methods of Bray and Rathje (1998). This method calculates the seismically induced permanent displacement for the fill slope due to the postulated MCE and is regarded to be more representative of actual conditions within a landfill than the TNMN computer software, which analyzes for a simple sliding block (Pyke, 1992). The procedure of Bray and Rathje (1998) involves estimating the maximum horizontal equivalent acceleration (MHEA) for the potential sliding wedge based on the slope geometry, material properties, and characteristics of the MCE. For the prescriptive standard design, the following parameters were used:

- Slope Height - 300 feet
- Average Shear Wave Velocity of Refuse Fill – 1,200 feet/second (Bray and Rathje, 1998)
- MCE Site Acceleration – 0.40g
- Mean Period of Shaking – 0.50 seconds (Bray and Rathje, 1998)
- Significant Duration of MCE – -16 seconds (Bray and Rathje, 1998)

Based on the analysis method of Bray and Rathje (1998), the displacements calculated to occur to the total refuse prism and liner is about 0.1 inches for the prescriptive configuration. This is less than the commonly acceptable range of 6 inches to 12 inches (Seed and Bonaparte, 1992). The calculations used to determine the seismic-induced permanent displacement for the GCLF along cross-section A-A′ are provided in Attachment 5 of the GLA (2003) report, included as Appendix C.

In addition, it is believed that the worst case conditions incorporated into these dynamic stability analyses also take into account strong motion from aftershocks as required by 27 CCR, Section 21750(f)(7).

Finally, slope stability calculations were performed for the final cover system for closure of the GCLF. The final cover design assumes a prescriptive low-permeability final cover in accordance with 27 CCR, Section 21090. It consists of a two-foot foundation soil layer, a synthetic barrier layer, and a two-foot thick vegetative soil layer. The vegetative soil layer would consist of on-site soils that are silty sand to sandy silt and compacted to a minimum relative compaction of 90 percent. These soils would be readily available from excavation of the landfill footprint or the borrow/stockpile areas. See Section C.2.2.3 for a discussion of material availability. The barrier layer will consist of a 60-mil thick Linear Low-Density Polyethylene (LLDPE) geomembrane (for deck areas only), textured on both sides. The foundation layer was assumed to consist of compacted random soil. The proposed final grading plan will have an overall slope gradient of 4:1 (horizontal: vertical) including roads and benches at approximately 40-foot vertical intervals and a gradient between benches of 3:1 (horizontal: vertical).

For the slope stability analysis, the interface between the LLDPE geomembrane and the overlying vegetative soil cover was considered the critical surface. The following parameters were considered appropriate and used in the analysis:

Thickness of vegetative soil layer	2 feet
Total density of soil in the vegetative layer	100 pcf
Angle of internal friction at the interface between soil and LLDP geomembrane	27 degrees
Maximum ground acceleration for the postulated MCE at the site	0.40g

The slope stability analysis was conducted considering the final cover as a semi-infinite slope with a gradient of 3:1 (H:V). For the design parameters listed above, the analysis indicated a static factor of safety of 1.53 if the tensile strength of the geomembrane is ignored, and 1.69 when considering the tensile strength of the LLDPE.

The seismic induced permanent displacement due to the postulated seismic exposure of the site was then calculated using the procedure described by Makdisi and Seed (1978). The procedure first requires calculation of yield acceleration (k_y), the acceleration value for which a pseudo-static analysis yields a factor of safety of 1.0. K_y was evaluated and found to be equal to 0.185g. The ratio k_y/k_{max}, where k_{max} is the maximum ground acceleration at the site (0.40g), was then calculated. The value of the estimated permanent displacement was then read from a chart developed by Makdisi and Seed normalized for the period of the waste and related to the magnitude of the earthquake event. Using this procedure, the calculated seismic-induced permanent displacement for the final cover during the postulated maximum credible earthquake at the landfill ranges from 1.7 to 5.1 inches depending on the thickness of the waste prism. Using the methods of Bray and Rathje (1998), the estimated seismic displacement under the loading of the MCE ranges from 0.5 to 3.7 inches, depending on the waste thickness. These estimated displacements are less than the commonly acceptable range of seismic displacement of 6 inches to 12 inches (Seed and Bonaparte, 1992) and would not be expected to inhibit the functional integrity of the cover. In addition, damage to the cover should be evident in post-earthquake inspection and can be easily and quickly repaired as a part of post-earthquake maintenance. The seismic-induced permanent displacement calculations for the prescriptive final cover are provided in Attachment 5 of the GLA (2003) report, included in Appendix C.

D.4.7 GEOLOGIC HAZARDS DUE TO SURFACE AND NEAR SURFACE PROCESSES

Landslides

The potential for landsliding was evaluated by WCC (1995) based on review of stereo aerial photographs and field reconnaissance study and geologic or geomorphic features characteristic of landslides were not observed in or adjacent to the landfill site. However, the natural slopes will be modified by the project and the stability of these man-made cut slopes are of potential concern.

The three most common types of cut-slope failures are block-slip failures, wedge-slip failures, and circular failures. Block-slip failures are most common in slopes that are underlain by bedrock with distinctive partings (e.g., fractures) that dip in the same direction but at a shallower angle than the cut. Wedge-slip failures occur when the bedrock has two or more partings (e.g., a weathered dike and a joint) with orientations such that their line of intersection dips at a shallow angle in the direction of the cut. Finally, circular failures develop where the substrate is loosely consolidated and comparatively homogeneous.

As stated in Section D.4.6, a stability assessment was performed using a kinematic analysis (Norrish and Wyllie, 1996), to see if movement along one or more of the main discontinuity planes is possible. The kinematic analysis shows that large-scale block-slip movement and wedge-failure are not likely given the geometry of the dominant directions of discontinuity in Gregory Canyon. However, mapping should be performed and this conclusion reevaluated as the excavation proceeds. It is also possible that small-scale, localized block falls may occur when fractures daylight the cut or where a higher density of fractures are encountered during excavation.

As previously indicated, circular failures develop where the substrate is loosely consolidated and comparatively homogeneous. All the rocks exposed at Gregory Canyon are compact and cohesive, even when weathered, so a circular failure of the cut slopes is similarly unlikely. As a result, the proposed cut slopes are anticipated to be stable and no significant impacts are anticipated.

Rockfalls

Rockfalls are abrupt movements of independent blocks of rock that become detached from steep slopes. Falling rocks can reach the base of a slope by free-falling, bouncing, rolling down the slope surface, or by some combination of the above. There is clear evidence that rockfalls have occurred at the site during mass wasting of Gregory Mountain located east of the proposed project.

A first scenario was calculated by GLA (1998) for elastic bouncing trajectories, which yield the maximum encroachment of a bouncing rock fragment into the footprint of the landfill. The encroachment distance from the edge of refuse was estimated at 300 feet, and the travel time from the top of the profile to its final resting point was estimated at 22 seconds. GLA (1998) calculated a second scenario, incorporating the more realistic condition that some of the kinetic energy of the falling rock fragment would be dampened by impact. The bouncing rock would stop within a few feet after reaching the limit of refuse with an estimated travel time of 23 seconds. The analysis of this scenario indicated that the bouncing trajectories become smaller in length and traveling height as the bouncing rock fragment moves from the medial to the lower reaches of the slope. A third scenario addressed rolling particles, and suggested that rolling rock fragments could travel as much as 360 feet onto the landfill if unchecked.

Based on this analysis, construction of a "catching" wall or other diversion structure near the edge of the landfill is recommended to effectively mitigate the risk of rock fragments rolling onto the landfill. Rockfall trajectories can reasonably be expected to be even shallower and shorter for profiles with gentler slopes. The conclusions reached through the analysis of this profile are of general application throughout the eastern slope of the landfill site. Siting and design of any rockfall mitigation structure(s) will be performed during the design of the eastern perimeter storm drain channel, and may consist of flexible barriers, drapery or anchored mesh systems. Details as to the design of these systems will be included in the design report required prior to construction of the drainage facilities. Figure 36 shows typical rockfall protection designs.

Debris flows

Earth, mud, and debris flows form when a mass of unconsolidated sediment is mobilized by sudden ground vibration (e.g., an earthquake) or by a sudden increase in weight and pore water pressure (e.g., after soaking of the soil by heavy rains). The initial movement of a flow is enhanced by steep topography and deforestation, but once mobilized flows can spread over gently sloping terrain.

Debris flows cannot be forecasted, but the susceptibility for formation of debris flows on any given site can be estimated by looking for evidence of previous flow events. GLA (1998) reviewed aerial photographs of the site, and concluded that there is a deposit of poorly-sorted colluvium that could have been formed as a debris flow deposit (Figure 29). The deposit forms a landform with a rough lobate shape and comparatively steep boundaries, but lacks levees or pressure ridges, and so could also have been formed by erosion of an older colluvial fan.

The natural development of vegetation will reduce potential debris flow hazards. Special precautions such as diversion structures near the upper reaches would need to be taken if vegetation is destroyed. The diversion structures should be built so as to be permeable, allowing almost free draining of runoff, but should capture high viscosity earth-, mud- or debris.

SECTION D.5

WATER RESOURCES

D.5 WATER RESOURCES

D.5.1 HYDROGEOLOGY

D.5.1.1 REGIONAL HYDROGEOLOGIC SETTING

The GCLF is located within the San Diego Hydrologic Basin, which occupies approximately 3,900 square miles of San Diego County and portions of Orange and Riverside Counties in southwestern California. The hydrologic basin lies within the Peninsular Ranges physiographic province of California. The physiographic province is characterized by a relatively narrow coastal plain on the west, and rugged mountains and steep-walled, narrow valleys inland that generally trend from east to west.

The Gregory Canyon watershed is tributary to the San Luis Rey River and is part of the San Luis Rey Hydrologic Unit. The San Luis Rey River occupies a narrow valley filled with water-bearing alluvial sediments bounded by sedimentary rocks (lower reach of the basin), or igneous and metamorphic rocks (middle and upper reaches of the basin) at the valley margins. The San Luis Rey Hydrologic Unit is divided into three hydrologic areas from east to west, which include the Warner, Monserate and Lower San Luis (Mission). The GCLF is to be constructed in the Monserate Hydrologic Area, which occupies approximately the middle one-third of the San Luis Rey Hydrologic Unit and is further subdivided into three hydrologic subareas which include, from east to west, the La Jolla Amago, Pauma and Pala Hydrologic Subareas. The GCLF is located in the Pala Hydrologic Subarea of the Monserate Hydrologic Area (RWQCB, 1994).

Recharge to the Monserate Hydrologic Area occurs by infiltration of precipitation, subsurface flow from the Warner Hydrologic Area, and infiltration of run-off from the surrounding mountain areas. Surface water flow in the San Luis Rey River is impounded by the dam at Lake Henshaw in the Warner Hydrologic Area, approximately 23 miles upstream of the GCLF.

The alluvial deposits along the San Luis Rey River form narrow elongated groundwater basins. Groundwater moves downgradient through these basins, from east to west, from the Pauma Basin to the Pala Basin to the Bonsall Basin. For these aquifers, the boundaries of each aquifer are drawn where the basement complex (hard crystalline rock) is exposed at the surface and distinct bedrock constrictions in the San Luis Rey valley separate the valley fill into these three separately defined basins (e.g., the Monserate Narrows just west of Rice Canyon Road and Highway 76 separates the Pala and Bonsall Basins). Since groundwater recharge is inconsistent and seasonal, historical depth-to-water measurements from the period 1965 to 1990 for the alluvial aquifer (Pala Basin) indicate that groundwater levels for a particular well may fluctuate from the ground surface to approximately 25 feet below ground surface (bgs) in the center of the river valley (California Department of Water Resources [CDWR], 1971; U.S. Geological Survey [USGS], 1990). Colluvial deposits, consisting of sediments ranging in size from clay to boulders interfinger with the alluvial sands and gravels along the margins of the river valley, and underlie Gregory Canyon as well. The alluvial deposits of the San Luis Rey River, which are composed of clay- to gravel-size material, and the colluvium occupying the valley margins and Gregory Canyon overlie variably weathered bedrock. The waste disposal area within the GCLF generally lies outside of the Pala Basin, and that alluvium would be removed as part of initial construction as discussed in Section B.5.1.3.1 (Figure 10C). Table 12B provides a summary of the aquifer characteristics of the basins both up- and downgradient of the project site as obtained from studies prepared by SDCWA (1997) and NBS Lowry (1995) for SDCWA. The project site is located in the lower reach of the Pala Basin (about 1.6 miles east of Monserate Narrows and the upper reach of Bonsall Basin). As described in Table 12B, the Pala Basin covers approximately 4,500 acres, being nearly eight miles long and averages about 0.5 miles in width (NBS Lowry, 1995).

Total thickness of the alluvial sediments in the Pala Basin ranges from zero at the basin margins to in excess of 165 feet, over the GCLF bridge crossing (GLA, 2000). A study by the USGS (Moreland, 1974) estimated the maximum depth of the alluvium in the Pala Basin at 244 feet (in one well 9S/2W-26G1 located in the far upper reach of the Pala Basin), and an average depth of 150 feet. At well GMW-2 located near the southern edge of the Pala Basin at the mouth of Gregory Canyon, the thickness of alluvium is about 50 feet (G&M 1990).

Reported well yields for alluvium in the Pala Hydrologic Subarea range from 10 to 400 gallons per minute (gpm) (CDWR, 1971). As shown on Table 12B, a

TABLE 12B
GREGORY CANYON LANDFILL
SUMMARY OF AQUIFER CHARACTERISTICS IN THE VICINITY OF THE PROJECT SITE

PARAMETER	BONSALL BASIN[1]	PALA BASIN[2]	PALA/PAUMA BASINS[1]
Aquifer Type	Alluvial/Unconfined[2]	Alluvial/Unconfined[3]	Alluvial/Unconfined[3]
Primary Source of Recharge	Streamflow infiltration from San Luis Rey River[7]	Streamflow infiltration from San Luis Rey River[3]	Streamflow infiltration from San Luis Rey River[3]
Aquifer Composition	Medium to coarse grained sand and gravel[7]	Medium to coarse grained sand and gravel[3, 5]	Medium to coarse grained sand and gravel[3]
Areal Extent of Alluvial Aquifer	5000 acres[7]	4500 acres[2]	8800 acres[4]
Maximum Depth of Alluvium	130 feet[7]	244 feet[3]	240 feet (downstream half); 130 feet (upstream half)[3]
Average Depth of Alluvium	80 feet[7]	150 feet[3]	120 feet[2, 6]
Estimated Storage Capacity	25,000 acre-feet[7]	50,000 acre-feet[5]	120,000 acre-feet[3]
Estimated Mean Storage Coefficient	10 to 12 percent[3]	12 percent[3]	10 to 12 percent[2, 6]
Estimated Mean Hydraulic Conductivity	100 feet per day[6] (range of 60 - 250 feet per day)[3]	80 feet/day (estimated range of 15 - 150 feet/day)[3]	50 - 100 feet per day[3] (range of 15 - 150 feet per day)
Mean Hydraulic Gradient	0.005 feet/feet[7]	0.005 feet/feet[2]	0.005 feet/feet[2]
Average Well Production Capacity	750 gpm (prod. capacity ranges from 400 to 1100 gpm)[7]	1000 gpm (prod. capacity ranges from 300 to 1600 gpm)	750 gpm (prod. capacity ranges from 400 to 1100 gpm)[2]
Range of Total Dissolved Solids Concentrations	600 to 3400 mg/l[6]	200 to 860 mg/l[2]	200 to 900 mg/l[2]
Current Estimated Groundwater Pumping	2500 AFY[7]	2500 AFY[2]	8000 AFY[2]
Estimated Sustainable Yield Without Groundwater Mgmt.	5400 AFY[3]	2500 AFY[3]	8000 AFY[5]

Sources:
1. San Diego County Water Authority (1997). This source combines the Pala and Pauma Basin data.
2. NBS/Lowry (1995)
3. U.S. Geological Survey (Moreland, 1974)
4. Estimated from U.S.G.S. Topographic Maps
5. Woodward Clyde (1990)
6. NBS/Lowry and Stetson Engineers (1992)
7. NBS/Lowry (1994)

J:\Gregory Canyon\1997.0139 Permitting\JTD\JTD 2011 January\TABLE-12B.xls: September 2010; Revised January 2011 more recent study by NBS Lowry (1995) indicates that Pala Basin wells have a higher rate of production estimated to range from 300 to 1,600 gpm. Discrepancies in these production rates may be related to the fact that private domestic and agricultural wells are typically not metered to determine flow. As a result, for any particular study, well yields can only be grossly estimated. Specific capacities for alluvium along the axis of the subarea range from 13 to 115 gallons per minute per foot (gpm/ft) of drawdown (J.A. Moreland, 1974). Alluvium along the axis of the subarea may have hydraulic conductivities ranging from 750 to 1000 gpd/ft^2 (Moreland 1974). The SLRMWD, which controls the water activity in the lower third of the Pala Basin, has calculated the current average pumping rate in the Pala Basin to be 2,400 acre-feet per year (AFY) or approximately 7.8 million gallons per year (Owen, 1995). This result is similar to that calculated by the USGS (J.A. Moreland, 1974) of 2,500 AFY. In addition, the USGS (J.A. Moreland, 1974) has calculated a safe yield for the Pala alluvial basin to be 2,500 AFY. The best recharge areas are located in the central and west-central portions of this basin due to an abundance of coarse sand and gravel deposits and minimal clay material (NBS Lowry, 1995).

Beneath the alluvium/colluvium are granitic and basic crystalline rocks (bedrock). In bedrock, groundwater occurrence and movement depends upon the fracture size, the frequency density, and the interconnection between the fractures, rather than matrix properties as in alluvial soils. Though it is common usage to speak of a bedrock "aquifer" (as distinct from the alluvial aquifer), wells penetrating fractures containing groundwater are not typically a dependable source of water for large-scale agricultural, municipal or industrial uses and may be better defined as an aquiclude (a formation that will not transmit water fast enough to furnish an appreciable supply for a well or spring). Highly productive wells completed in fractured crystalline bedrock generally are located within alluvial valleys or basins, which store groundwater that is likely in hydraulic connection with underlying fractured bedrock. The groundwater contained within the overlying alluvium within an alluvial valley or basin likely serves as a source of groundwater supply to the fractured bedrock (SDCWA, 1997). Based on visual reconnaissance of the project site and review of the USGS 7.5-minute topographic maps (Pala and Bonsall quadrangles), there are no springs within one mile of the project boundaries. For additional information, refer to the Geologic, Hydrogeologic, and Geotechnical Investigation report included in Appendix C, and the Supplemental Hydrogeologic Investigation Report (GLA, 2004) included in Appendix C-1.

Even though not an "aquifer," percolating groundwater is proposed for use at the GCLF to meet some water usage requirements as discussed in Section B.5.3.1.

D.5.1.2 LOCAL HYDROGEOLOGIC SETTING

Gregory Mountain is an elongated, relatively flat-topped prominence, drained to the east, north and west (into Gregory Canyon) by steep, rocky secondary canyons. The potential catchment area of the mountain is large and it clearly dominates recharge to Gregory Canyon. Recharge to Gregory Canyon from the west ridgeline and southern drainage divide, which are relatively minor topographic features by comparison, is believed to be relatively minimal. No permanent springs have been identified in Gregory Canyon. Studies by GLA and others, including the drilling and construction of groundwater monitoring wells, have assisted in evaluating groundwater flow within the project area.

There are two distinct groundwater zones within Gregory Canyon. An alluvial aquifer hosted by the sediment wedge at the mouth of the canyon, and a bedrock aquiclude, better defined as a fracture flow system, hosted by the fractured tonalite that forms the substrate of the canyon. Drilling and well installation data show that the overall direction of groundwater movement in both groundwater systems is to the north, toward the alluvial aquifer of the San Luis Rey River.

Alluvial Aquifer

An alluvial soil wedge occupies the lower reaches of Gregory Canyon, that thickens to the north where it eventually merges with the channel deposits of the San Luis Rey River.

A 1995 study (WCC) concluded that groundwater within the alluvium forms an unconfined aquifer recharged by direct infiltration from precipitation or runoff from the bedrock ridges east and west of the canyon, and by underflow through weathered bedrock. Reported hydraulic conductivities for alluvium in the Pala basin range from 750 to 1,000 gpd/ft^2 (Moreland 1974). WCC (1995) estimated that the hydraulic conductivity of alluvial and colluvial materials in the canyon ranges between 0.9 and 16 gpd/ft^2. The extent of the alluvial aquifer to the south is limited; however, as indicated by dry wells MW-4, WCC-1, WCC-2 and

MW-5. The available data suggest groundwater flow is to the north, under a gradient of about 0.045 ft/ft.

Bedrock Fracture Flow System

There are 26 bedrock monitoring wells within the landfill footprint and along the periphery of the site. Studies conducted to date indicate that groundwater in Gregory Canyon can be characterized as a fracture-controlled, interconnected flow system. This fracture-controlled groundwater communicates with, and recharges the alluvial water in the San Luis Rey River valley (Pala Basin), although contributions from the bedrock are relatively minor relative to the volume of water transmitted through the alluvium.

Wells accessing the water-bearing fractures register water levels defining a systematic piezometric surface. A piezometric surface is slightly different than a water table, in that the bulk of the aquifer is dry and water is only present where an open continuous fracture lies below the piezometric level. The piezometric surface reflects the main elements of the topography and indicates a northerly groundwater flow dominated by Gregory Mountain as the principal recharge area of Gregory Canyon. Derivation of a piezometric surface from wells isolated from one another by non-water bearing rock attests to the hydraulic interconnection of the fracture system.

Subsequent to the Phase 5 hydrogeologic investigation, GLA conducted pumping tests in two wells (GLA-3 and GLA-8) to evaluate the hydraulic properties of the bedrock fracture flow system (GLA, 2001). Results of the pumping tests indicates that in the vicinity of well GLA-3, located at the toe of the landfill, the estimated average hydraulic conductivity is calculated to be about 3.7 ft/day (0.0013 cm/sec). In the vicinity of well GLA-8, located further up the canyon in unweathered tonalite, the estimated average hydraulic conductivity over longer-term conditions is 0.015 ft/day (5.3×10^{-6} cm/sec). A discussion of these two pumping tests is provided in Section 2.2.3 of GLA's (2003) report provided in Appendix C. A summary of the hydraulic conductivity and transmissivity data is also provided in Table 2-2 of Appendix C.

In order to provide an additional demonstration of the proposed groundwater monitoring system to effectively monitor the groundwater from the proposed landfill, GLA conducted a supplemental hydrogeologic investigation in the summer

2004, which included constructing seven bedrock wells to be used in the groundwater monitoring network at the downgradient limit of the landfill. A total of five long-term variable rate or constant rate aquifer pumping tests were performed along with three slug tests (drawdown-recovery) in bedrock wells as part of this supplemental hydrogeologic investigation (GLA, 2004). In addition, the hydraulic properties were calculated from the pumping test data. In these most recent pumping tests, the range of calculated hydraulic conductivity values ranged from 1.75×10^{-5} to 24.6 feet/day (6×10^{-9} to 8.6×10^{-3}, cm/sec) with hydraulic conductivity values highest (0.137 to 24.6 feet/day) in the "canyon" area wells. A discussion of the pumping tests and results is provided in the Supplemental Hydrogeologic Investigation Report (GLA, 2004) included in Appendix C-1.

Review of the sum of work performed to date by GLA and others (including well test results and all drilling logs), suggests that three fracture flow domains can be identified as follows:

- A groundwater flow barrier formed by the unweathered tonalite underlying the west ridgeline;
- A low flow zone forming an extension of the west ridgeline; and
- A maximum flow zone along the axis of Gregory Canyon in the weathered bedrock zone.

As presented in the Supplemental Hydrogeologic Investigation Report (GLA, 2004) (Appendix C-1), boring GLA-17, and wells GLA-4, GLA-9, and GMP-3, drilled along the west ridgeline to depths significantly below the projected equipotential surface are dry (one well, GLA 4 is recharged by a perched water condition), and other wells drilled in unweathered bedrock underlying the northern extension of the west ridgeline (in the low flow zone) recharge very slowly from relatively isolated fractures. Therefore, the west ridgeline is believed to form a groundwater flow barrier.

The line of wells across the mouth of Gregory Canyon inclusive of GLA-14 and GLA-12 (Figure 10C) spans two bedrock domains apparently reflecting two degrees of fracture interconnectivity. Those wells east of and including GLA-13 all show a response to drawdown of other wells in that group. In contrast, wells west of GLA-13 can be characterized as representing a low flow zone, and have not been shown to respond similarly. This does not suggest that the wells in the low flow zone are isolated from each other or from wells east of and including

GLA-13, since the projected equipotential surface includes all of the well data. Rather it suggests that the fraction of connected fractures within the low flow zone is less than in the bedrock domain to the east, assuming no difference in the transmissivity of the fractures. While a smaller well spacing in the low flow zone could be utilized to identify a similar drawdown response, it is not necessary to place additional wells in the low flow zone to detect contaminant transport because all fractures are recharged from the same source.

A contour map of the piezometric surface in the bedrock aquifer was developed for the GCLF, based on the depth to water level measurements made on October 9, 2004 (Appendix C-1, Plate 1). Using standard contouring and the hydrogeologic data obtained from investigations conducted by GLA and others at the site, fracture flow below the equipotential surface is west northwest from the Gregory Mountain recharge area to Gregory Canyon; occurs largely in the weathered zone; and is bounded by unweathered tonalite under the west ridgeline. The groundwater flow direction is effectively parallel to the groundwater flow barrier.

As shown in Table 12C, more recent groundwater level measurements recorded for these wells between December 1996 and March 2009 show no significant variations in the piezometric surface, although an overall decline in the water levels is recognized associated with a long-term regional drought. Therefore, it is concluded that the groundwater flow in the canyon is consistent over time and is thus predictable. For additional information, refer to the Geologic, Hydrogeologic, and Geotechnical Investigation report included in Appendix C, and the Supplemental Hydrogeologic Investigation Report (GLA, 2004) included in Appendix C-1.

Springs

Based on visual reconnaissance of the project site and review of the USGS 7.5-minute topographic maps (Pala and Bonsall quadrangles), there are no springs within one mile of the project boundaries. No permanent springs

TABLE 12C-1
SITE MONITORING WELL INFORMATION
BEDROCK WELLS
GREGORY CANYON LANDFILL

WELL INFORMATION	GLA-1	GLA-2	GLA-3	GLA-4	GLA-5	GLA-7	GLA-8	GLA-10
Elevation of Well (feet MSL):								
Top of Well Casing	343.72	379.39	332.02	904.99	927.92	402.85	633.11	326.59
Total Depth of Well (ft.): At installation	300	95.4	150	250	195	160	300	57.0
Depth of Screened Interval	20-300	70.4-95.4	45-150	30-240	30-190	30-160	15-300	50-57
Depth to Water (from top of well casing (ft.)):								
12/3/96	37.98	69.65	21.81	165.00	41.44	33.46	62.48	-
12/16/96	37.10	69.73	23.84	149.93	42.57	34.82	62.40	22.20
9/13/99	39.36	70.58	25.38	70.57	41.22	37.72	64.85	23.27
3/14/00	38.05	71.11	23.66	60.39	41.29	39.11	63.70	22.01
11/14-15/00	38.82	72.36	24.80	62.53	39.80	41.58	66.21	22.66
12/5-6/00	-	72.23	-	64.71	40.54	-	-	23.30
1/30/01	40.25	72.99	26.78	76.25	40.55	43.43	67.86	23.05
2/26/01	40.09	72.98	26.74	71.60	41.42	43.72	68.13	22.93
3/12/01	39.99	72.95	26.57	70.50	40.58	43.82	67.50	22.73
4/13/01	40.08	73.08	26.55	148.69	40.28	43.92	67.23	22.71
5/14/01	40.22	73.19	26.78	98.09	40.71	44.18	67.67	23.01
6/20/01	40.62	73.25	27.11	74.50	39.66	44.40	68.57	23.19
7/11/01	40.63	73.43	27.24	128.18	40.10	44.54	68.98	23.54
8/29/01	40.80	73.62	27.56	76.72	41.13	44.95	69.67	23.68
9/5/01	40.72	73.53	26.91	74.25	41.16	44.71	67.95	22.96
10/29/01	40.80	73.90	27.54	75.43	41.43	45.50	70.06	23.55
11/28/01	40.68	73.88	27.5	73.64	42.11	45.77	69.92	23.36
12/11/01	40.55	73.25	27.37	73.06	42.25	45.80	69.80	22.49
3/29/02	40.70	73.98	27.48	70.60	NA	46.79	70.96	23.22
8/19/02	41.64	74.19	28.39	69.87	42.57	47.88	72.27	24.45
8/25/04	41.90	75.49	29.08	72.84	39.89	52.16	73.78	24.09
10/9/04	41.78	75.45	28.94	73.09	40.62	52.41	73.89	24.00
12/20/04	39.50	75.00	-	71.57	38.37	51.61	69.60	22.37
4/5/05	34.48	65.61	19.40	72.26	-	40.83	66.99	17.87
8/3/05	36.87	55.53	-	61.62	33.87	36.54	59.53	21.81
11/21/05	37.38	67.28	23.19	59.15	35.63	37.32	58.94	22.16
3/8/06	37.29	68.30	23.27	72.18	38.75	37.45	59.10	22.19
5/16/06	37.10	68.45	23.38	71.95	-	40.20	58.41	21.60
7/26/06	38.49	69.78	24.21	67.98	37.88	40.60	60.62	22.41
9/18/06	38.66	70.32	24.41	71.12	37.85	41.05	62.25	22.46
11/28/06	38.54	70.86	24.46	97.95	37.90	41.82	63.28	22.13
1/31/07	38.44	71.16	24.31	129.35	37.86	42.49	64.01	21.89
3/27/07	38.62	71.60	24.43	144.26	38.56	41.66	64.07	21.91
5/25/07	38.81	71.72	26.62	152.68	-	43.28	65.19	22.20
7/23/07	39.10	72.26	26.07	155.88	40.23	43.73	66.63	22.50
9/24/07	39.09	72.54	25.28	163.19	40.88	44.25	67.89	22.61
11/28/07	39.01	72.75	25.94	132.04	41.91	44.88	68.50	22.37
1/15/08	37.84	72.53	24.32	179.43	41.24	45.21	67.63	20.99
3/10/08	37.37	71.34	21.88	173.73	38.52	44.14	66.65	19.79
6/23/08	38.68	72.42	24.36	128.88	39.96	43.34	66.71	22.15
9/12/08	39.34	73.11	25.27	105.99	41.98	44.23	69.12	22.71
12/15/08	39.15	73.22	25.03	132.40	41.80	45.23	70.30	22.05
3/24/09	37.98	77.83	24.34	70.89	40.64	45.97	69.41	21.36
Elevation of Water Surface (ft. MSL):								
12/3/96	305.74	309.74	310.21	739.99	886.48	369.39	570.63	-
12/16/96	306.62	309.66	308.18	755.06	885.35	368.03	570.71	304.39
9/13/99	304.36	308.81	306.64	834.42	886.70	365.13	568.26	303.32
3/14/00	305.67	308.28	308.36	844.60	886.63	363.74	569.41	304.58
11/14-15/00	304.90	307.03	307.22	842.46	888.12	361.27	566.90	303.93
12/5-6/00	-	307.16	-	840.28	887.38	-	-	303.29
1/30/01	303.47	306.40	305.24	828.74	887.37	359.42	565.25	303.54
2/26/01	303.63	306.41	305.28	833.39	886.50	359.13	564.98	303.66
3/12/01	303.73	306.44	305.45	834.49	887.34	359.03	565.61	303.86
4/13/01	303.64	306.31	305.47	756.30	887.64	358.93	565.88	303.88
5/14/01	303.50	306.2	305.24	806.90	887.21	358.67	565.44	303.58
6/20/01	303.10	306.14	304.91	830.49	888.26	358.45	564.54	303.40
7/11/01	303.09	305.96	304.78	776.81	887.82	358.31	564.13	303.05
8/29/01	302.92	305.77	304.46	828.27	886.79	357.90	563.44	302.91
9/5/01	303.00	305.86	305.11	830.74	886.76	358.14	565.16	303.63
10/29/01	302.92	305.49	304.48	829.56	886.49	357.35	563.05	303.04
11/28/01	303.04	305.51	304.52	831.35	885.81	357.08	563.19	303.23
12/11/01	303.17	306.14	304.65	831.93	885.67	357.05	563.31	304.10
3/29/02	303.02	305.41	304.54	834.39	-	356.06	562.15	303.37

TABLE 12C-1
SITE MONITORING WELL INFORMATION
BEDROCK WELLS
GREGORY CANYON LANDFILL

WELL INFORMATION	GLA-1	GLA-2	GLA-3	GLA-4	GLA-5	GLA-7	GLA-8	GLA-10
8/19/02	302.08	305.20	303.63	835.12	885.35	354.97	560.84	302.14
8/25/04	301.82	303.90	302.94	832.15	888.03	350.69	559.33	302.50
10/9/04	301.94	303.94	303.08	831.90	887.30	350.44	559.22	302.59
12/20/04	304.22	304.39	-	833.42	889.55	351.24	563.51	304.22
4/5/05	309.24	313.78	312.62	832.73	-	362.02	566.12	308.72
8/3/05	306.85	323.86	-	843.37	894.05	366.31	573.58	304.78
11/21/05	306.34	312.11	308.83	845.84	892.29	365.53	574.17	304.43
3/8/06	306.43	311.09	308.75	832.81	889.17	365.40	574.01	304.40
5/16/06	306.62	310.94	308.64	833.04	-	362.65	574.70	304.99
7/26/06	305.23	309.61	307.81	837.01	890.04	362.25	572.49	304.18
9/18/06	305.06	309.07	307.61	833.87	890.07	361.80	570.86	304.13
11/28/06	305.18	308.53	307.56	807.04	890.02	361.03	569.83	304.46
1/31/07	305.28	308.23	307.71	775.64	890.06	360.36	569.10	304.70
3/27/07	305.10	307.79	307.59	760.73	889.36	361.19	569.04	304.68
5/25/07	304.91	307.67	305.40	752.31	-	359.57	567.92	304.39
7/23/07	304.62	307.13	305.95	749.11	887.69	359.12	566.48	304.09
9/24/07	304.63	306.85	306.74	741.80	887.04	358.60	565.22	303.98
11/28/07	304.71	306.64	306.08	772.95	886.01	357.97	564.61	304.22
1/15/08	305.88	306.86	307.70	725.56	886.68	357.64	565.48	305.60
3/10/08	306.35	308.05	310.14	731.26	889.40	358.71	566.46	306.80
6/23/08	305.04	306.97	307.66	776.11	887.96	359.51	566.40	304.44
9/12/08	304.38	306.28	306.75	799.00	885.94	358.62	563.99	303.88
12/15/08	304.57	306.17	306.99	772.59	886.12	357.62	562.81	304.54
3/24/09	305.74	301.56	307.68	834.10	887.28	356.88	563.70	305.23

TABLE 12C-2
SITE MONITORING WELL INFORMATION
BEDROCK WELLS
GREGORY CANYON LANDFILL

WELL INFORMATION	GLA-11	GLA-12	GLA-13	GLA-14	GMW-1	GMW-2	GMW-4	GMP-2
Elevation of Well (feet MSL):								
Top of Well Casing	777.32	345.79	358.15	334.13	331.36	324.64	637.53	437.64
Total Depth of Well (ft.): At installation	243	53	70	56	90	106	116	87.5
Depth of Screened Interval	202.5-242.5	32-52	49.5-69.5	35.5-55.5	48-90	50-106	55-116	45-87
Depth to Water (from top of well casing (ft.)):								
12/3/96	-	-	-	-	-	-	-	-
12/16/96	-	-	-	-	21.89	20.46	65.72	69.54
9/13/99	-	-	-	-	23.37	21.39	68.17	74.42
3/14/00	193.36	36.96	49.25	38.18	22.97	20.03	68.69	73.88
11/14-15/00	194.98	38.08	50.52	38.89	24.12	20.52	71.53	76.33
12/5-6/00	195.30	37.96	50.54	38.73	-	-	-	-
1/30/01	195.72	37.98	50.55	38.58	-	-	-	-
2/26/01	195.59	37.93	50.52	38.51	-	-	-	-
3/12/01	195.57	37.79	50.38	38.41	-	-	-	-
4/13/01	195.36	37.83	50.37	38.35	-	-	-	-
5/14/01	196.36	37.97	50.57	38.50	-	-	-	-
6/20/01	196.25	38.66	50.73	38.66	-	-	-	-
7/11/01	196.86	38.40	51.00	38.83	-	-	-	-
8/29/01	196.74	38.64	51.24	39.05	-	-	-	-
9/5/01	196.63	38.62	51.20	39.05	-	-	-	-
10/29/01	196.98	38.73	51.37	39.27	-	-	-	-
11/28/01	197.08	38.65	51.36	39.05	-	-	-	-
12/11/01	196.62	38.55	51.18	38.89	-	-	-	-
3/29/02	197.14	38.64	51.39	38.75	-	-	-	-
8/19/02	197.79	39.48	52.21	40.31	-	-	-	-
8/25/04	201.20	39.85	53.00	40.90	-	-	-	-
10/9/04	200.73	39.83	52.87	41.32	26.8	21.89	79.97	86.94
12/20/04	201.04	39.22	52.19	39.35	-	-	-	86.44
4/5/05	196.34	34.68	44.10	38.98	18.64	18.02	72.02	75.85
8/3/05	187.53	37.31	47.81	37.68	22.00	-	-	73.28
11/21/05	188.52	37.18	48.34	37.60	22.38	19.72	66.21	74.03
3/8/06	187.81	37.22	48.21	37.43	25.25	19.85	66.41	74.12
5/16/06	191.02	37.30	48.71	37.48	22.62	19.56	65.25	74.03
7/26/06	191.23	37.70	49.50	37.80	23.36	20.22	67.42	79.35
9/18/06	191.48	37.88	49.77	37.93	23.70	20.31	69.05	79.47
11/28/06	192.18	37.85	49.89	37.89	23.70	20.08	70.72	80.34
1/31/07	192.01	37.74	49.89	37.78	23.58	19.93	71.52	80.17
3/27/07	192.25	37.74	49.97	37.87	23.69	19.90	71.50	80.19
5/25/07	192.31	38.01	50.23	38.00	23.95	20.15	72.55	80.31
7/23/07	193.25	38.34	50.55	38.26	24.31	20.08	72.69	81.10
9/24/07	193.39	38.05	50.93	38.09	24.59	20.43	74.33	80.97
11/28/07	193.61	38.37	50.92	39.10	24.50	21.26	75.13	80.92
1/15/08	194.11	37.36	50.12	37.69	23.57	18.79	74.39	Dry
3/10/08	194.24	36.69	47.78	37.20	21.11	18.49	72.45	Dry
6/23/08	194.91	37.95	50.01	37.94	23.63	20.22	72.66	Dry
9/12/08	195.34	38.55	50.95	38.39	24.49	20.59	74.50	Dry
12/15/08	194.81	38.24	50.83	38.25	24.30	20.00	75.64	Dry
3/24/09	195.01	37.62	50.12	37.55	23.60	19.35	75.08	Dry
Elevation of Water Surface (ft. MSL):								
12/3/96	-	-	-	-	-	-	-	-
12/16/96	-	-	-	-	309.47	304.18	571.81	368.10
9/13/99	-	-	-	-	307.99	303.25	569.36	363.22
3/14/00	583.96	308.83	308.90	295.95	308.39	304.61	568.84	363.76
11/14-15/00	582.34	307.71	307.63	295.24	307.24	304.12	566.00	361.31
12/5-6/00	582.02	307.83	307.61	295.40	-	-	-	-
1/30/01	581.60	307.81	307.60	295.55	-	-	-	-
2/26/01	581.73	307.86	307.63	295.62	-	-	-	-
3/12/01	581.75	308.00	307.77	295.72	-	-	-	-
4/13/01	581.96	307.96	307.78	295.78	-	-	-	-
5/14/01	580.96	307.82	307.58	295.63	-	-	-	-
6/20/01	581.07	307.13	307.42	295.47	-	-	-	-
7/11/01	580.46	307.39	307.15	295.30	-	-	-	-
8/29/01	580.58	307.15	306.91	295.08	-	-	-	-
9/5/01	580.69	307.17	306.95	295.08	-	-	-	-
10/29/01	580.34	307.06	306.78	294.86	-	-	-	-
11/28/01	580.24	307.14	306.79	295.08	-	-	-	-

TABLE 12C-2
SITE MONITORING WELL INFORMATION
BEDROCK WELLS
GREGORY CANYON LANDFILL

WELL INFORMATION	GLA-11	GLA-12	GLA-13	GLA-14	GMW-1	GMW-2	GMW-4	GMP-2
12/11/01	580.70	307.24	306.97	295.24	-	-	-	-
3/29/02	580.18	307.15	306.76	295.38	-	-	-	-
8/19/02	579.53	306.31	305.94	293.82	-	-	-	-
8/25/04	576.12	305.94	305.15	293.23	-	-	-	-
10/9/04	576.59	305.96	305.28	292.81	304.56	302.75	557.56	350.70
12/20/04	576.28	306.57	305.96	294.78	-	-	-	351.20
4/5/05	580.98	311.11	314.05	295.15	312.72	306.62	565.51	361.79
8/3/05	589.79	308.48	310.34	296.45	309.36	-	-	364.36
11/21/05	588.80	308.61	309.81	296.53	308.98	304.92	571.32	363.61
3/8/06	589.51	308.57	309.94	296.70	306.11	304.79	571.12	363.52
5/16/06	586.30	308.49	309.44	296.65	308.74	305.08	572.28	363.61
7/26/06	586.09	308.09	308.65	296.33	308.00	304.42	570.11	358.29
9/18/06	585.84	307.91	308.38	296.20	307.66	304.33	568.48	358.17
11/28/06	585.14	307.94	308.26	296.24	307.66	304.56	566.81	357.30
1/31/07	585.31	308.05	308.26	296.35	307.78	304.71	566.01	357.47
3/27/07	585.07	308.05	308.18	296.26	307.67	304.74	566.03	357.45
5/25/07	585.01	307.78	307.92	296.13	307.41	304.49	564.98	357.33
7/23/07	584.07	307.45	307.60	295.87	307.05	304.56	564.84	356.54
9/24/07	583.93	307.74	307.22	296.04	306.77	304.21	563.20	356.67
11/28/07	583.71	307.42	307.23	295.03	306.86	303.38	562.40	356.72
1/15/08	583.21	308.43	308.03	296.44	307.79	305.85	563.14	Dry
3/10/08	583.08	309.10	310.37	296.93	310.25	306.15	565.08	Dry
6/23/08	582.41	307.84	308.14	296.19	307.73	304.42	564.87	Dry
9/12/08	581.98	307.24	307.20	295.74	306.87	304.05	563.03	Dry
12/15/08	582.51	307.55	307.32	295.88	307.06	304.64	561.89	Dry
3/24/09	582.31	308.17	308.03	296.58	307.76	305.29	562.45	Dry

TABLE 12C-3
SITE MONITORING WELL INFORMATION
BEDROCK WELLS
GREGORY CANYON LANDFILL

WELL INFORMATION	GLA-A	GLA-B	GLA-C	GLA-D	GLA-E*	GLA-F*	GLA-G
Elevation of Well (feet MSL):							
Top of Well Casing	380.35	347.04	343.45	367.65	383	374	347.58
Total Depth of Well (ft.): At installation	104	91.0	81	145	153	166	101
Depth of Screened Interval	74-104	51-91	41-81	95-145	80-150	80-165	61-101
Depth to Water (from top of well casing (ft.)):							
12/3/96	-	-	-	-	-	-	-
12/16/96	-	-	-	-	-	-	-
9/13/99	-	-	-	-	-	-	-
3/14/00	-	-	-	-	-	-	-
11/14-15/00	-	-	-	-	-	-	-
12/5-6/00	-	-	-	-	-	-	-
1/30/01	-	-	-	-	-	-	-
2/26/01	-	-	-	-	-	-	-
3/12/01	-	-	-	-	-	-	-
4/13/01	-	-	-	-	-	-	-
5/14/01	-	-	-	-	-	-	-
6/20/01	-	-	-	-	-	-	-
7/11/01	-	-	-	-	-	-	-
8/29/01	-	-	-	-	-	-	-
9/5/01	-	-	-	-	-	-	-
10/29/01	-	-	-	-	-	-	-
11/28/01	-	-	-	-	-	-	-
12/11/01	-	-	-	-	-	-	-
3/29/02	-	-	-	-	-	-	-
8/19/02	-	-	-	-	-	-	-
8/25/04	77.85	42.67	39.79	62.92	-	-	43.25
10/9/04	77.85	42.58	39.71	62.87	77.60	69.70	43.15
12/20/04	77.40	43.55	38.90	62.28	81.63	72.75	43.48
4/5/05	71.53	36.19	34.17	55.06	73.62	64.60	38.87
8/3/05	72.54	40.32	37.52	55.51	75.73	66.18	40.76
11/21/05	72.66	40.42	37.65	56.41	76.14	67.00	40.82
3/8/06	72.92	40.47	38.03	56.03	76.43	67.54	40.63
5/16/06	73.15	40.45	37.58	57.45	76.72	67.90	40.73
7/26/06	73.90	41.07	38.23	58.82	77.36	68.74	41.48
9/18/06	74.23	41.02	38.40	58.71	77.82	69.12	41.57
11/28/06	74.60	40.92	38.28	59.03	78.34	69.50	41.50
1/31/07	74.72	40.80	38.08	59.17	78.58	69.63	41.36
3/27/07	74.86	40.76	38.11	59.40	78.58	69.82	41.47
5/25/07	74.98	41.08	38.28	59.63	79.01	70.05	41.63
7/23/07	75.35	41.38	38.75	60.06	77.38	69.34	41.92
9/24/07	75.64	41.55	38.77	60.44	77.95	69.68	42.03
11/28/07	75.84	41.31	38.63	60.63	78.15	69.73	41.90
1/15/08	75.52	40.21	37.37	60.00	77.79	69.37	40.79
3/10/08	74.31	39.28	36.18	58.45	76.51	67.72	39.97
6/23/08	75.34	40.98	38.22	58.91	77.65	69.14	41.53
9/12/08	75.95	41.59	38.82	60.74	78.28	69.91	42.12
12/15/08	76.00	41.17	38.39	60.73	78.36	69.99	41.72
3/24/09	75.65	40.63	37.74	60.69	78.00	69.55	41.26
Elevation of Water Surface (ft. MSL):							
12/3/96	-	-	-	-	-	-	-
12/16/96	-	-	-	-	-	-	-
9/13/99	-	-	-	-	-	-	-
3/14/00	-	-	-	-	-	-	-
11/14-15/00	-	-	-	-	-	-	-
12/5-6/00	-	-	-	-	-	-	-
1/30/01	-	-	-	-	-	-	-
2/26/01	-	-	-	-	-	-	-
3/12/01	-	-	-	-	-	-	-
4/13/01	-	-	-	-	-	-	-
5/14/01	-	-	-	-	-	-	-
6/20/01	-	-	-	-	-	-	-
7/11/01	-	-	-	-	-	-	-
8/29/01	-	-	-	-	-	-	-
9/5/01	-	-	-	-	-	-	-
10/29/01	-	-	-	-	-	-	-
11/28/01	-	-	-	-	-	-	-

TABLE 12C-3
SITE MONITORING WELL INFORMATION
BEDROCK WELLS
GREGORY CANYON LANDFILL

WELL INFORMATION	GLA-A	GLA-B	GLA-C	GLA-D	GLA-E*	GLA-F*	GLA-G
12/11/01	-	-	-	-	-	-	-
3/29/02	-	-	-	-	-	-	-
8/19/02	-	-	-	-	-	-	-
8/25/04	302.50	304.37	303.66	304.73	-	-	304.33
10/9/04	302.50	304.46	303.74	304.78	305.40	304.30	304.43
12/20/04	302.95	303.49	304.55	305.37	301.37	301.25	304.10
4/5/05	308.82	310.85	309.28	312.59	309.38	309.40	308.71
8/3/05	307.81	306.72	305.93	312.14	307.27	307.82	306.82
11/21/05	307.69	306.62	305.80	311.24	306.86	307.00	306.76
3/8/06	307.43	306.57	305.42	311.62	306.57	306.46	306.95
5/16/06	307.20	306.59	305.87	310.20	306.28	306.10	306.85
7/26/06	306.45	305.97	305.22	308.83	305.64	305.26	306.10
9/18/06	306.12	306.02	305.05	308.94	305.18	304.88	306.01
11/28/06	305.75	306.12	305.17	308.62	304.66	304.50	306.08
1/31/07	305.63	306.24	305.37	308.48	304.42	304.37	306.22
3/27/07	305.49	306.28	305.34	308.25	304.42	304.18	306.11
5/25/07	305.37	305.96	305.17	308.02	303.99	303.95	305.95
7/23/07	305.00	305.66	304.70	307.59	305.62	304.66	305.66
9/24/07	304.71	305.49	304.68	307.21	305.05	304.32	305.55
11/28/07	304.51	305.73	304.82	307.02	304.85	304.27	305.68
1/15/08	304.83	306.83	306.08	307.65	305.21	304.63	306.79
3/10/08	306.04	307.76	307.27	309.20	306.49	306.28	307.61
6/23/08	305.01	306.06	305.23	308.74	305.35	304.86	306.05
9/12/08	304.40	305.45	304.63	306.91	304.72	304.09	305.46
12/15/08	304.35	305.87	305.06	306.92	304.64	304.01	305.86
3/24/09	304.70	306.41	305.71	306.96	305.00	304.45	306.32

Notes:
GLA-E and GLA-F - Reference elevation based on topographic map/not survey.

TABLE 12C-4
SITE MONITORING WELL INFORMATION
ALLUVIAL WELLS
GREGORY CANYON LANDFILL

WELL INFORMATION	GLA-16	MW-3	GMW-3	LUCIO-2R*	MWD-34R*	WCC-1	WCC-2
Elevation of Well (feet MSL):							
Top of Well Casing	307.54	327.58	320.36	310	315	330.38	346.84
Total Depth of Well (ft.): At installation	33.5	24.6	49.5	40	29	30	34
Depth of Screened Interval	9.5-29.5	14.6-24.6	9.5-49.5	10-40	9-29	8-30	14-34
Depth to Water (from top of well casing (ft.)):							
12/3/96	-	-	-	-	-	-	-
12/16/96	-	23.20	16.52	-	-	-	Dry
9/13/99	-	24.10	Dry	-	-	-	-
3/14/00	13.92	22.98	16.32	-	-	-	-
11/14-15/00	15.35	23.56	Dry	-	-	-	-
12/5-6/00	15.06	-	-	-	-	-	-
1/30/01	14.91	-	-	-	-	-	-
2/26/01	14.82	-	-	-	-	-	-
3/12/01	14.60	-	-	-	-	-	-
4/13/01	14.62	-	-	-	-	-	-
5/14/01	14.82	-	-	-	-	-	-
6/20/01	15.07	-	-	-	-	-	-
7/11/01	15.31	-	-	-	-	-	-
8/29/01	15.69	-	-	-	-	-	-
9/5/01	15.73	-	-	-	-	-	-
10/29/01	16.03	-	-	-	-	-	-
11/28/01	15.46	-	-	-	-	-	-
12/11/01	15.20	-	-	-	-	-	-
3/29/02	14.94	-	-	-	-	-	-
8/19/02	16.87	-	-	-	-	-	-
8/25/04	17.22	-	-	-	-	-	-
10/9/04	17.71	23.85	-	-	-	-	-
12/20/04	15.37	-	16.15	13.99	14.25	-	-
4/5/05	12.89	13.95	-	12.49	14.33	-	Dry
8/3/05	14.58	-	16.41	14.54	13.52	-	-
11/21/05	14.60	22.80	16.20	14.11	14.71	Dry	Dry
3/8/06	14.41	23.03	16.15	13.80	13.71	Dry	-
5/16/06	14.28	22.51	15.86	13.55	13.77	Dry	-
7/26/06	14.88	23.20	16.48	14.32	14.08	Dry	-
9/18/06	14.94	23.28	16.55	14.38	14.15	Dry	-
11/28/06	14.76	23.12	16.28	14.25	14.00	20.40	-
1/31/07	14.61	22.94	16.15	14.10	13.93	Dry	-
3/27/07	14.64	23.02	16.05	14.04	13.93	Dry	-
5/25/07	14.81	23.05	16.31	14.19	14.09	Dry	-
7/23/07	14.97	23.23	16.53	14.32	14.41	Dry	-
9/24/07	16.13	23.42	16.52	14.42	15.14	Dry	-
11/28/07	16.19	23.12	16.23	14.25	18.19	Dry	-
1/15/08	14.44	21.68	14.66	12.52	13.51	Dry	-
3/10/08	13.78	21.45	15.08	12.57	13.24	13.11	-
6/23/08	14.88	23.06	16.47	13.82	13.86	Dry	-
9/12/08	15.39	23.52	16.73	13.99	14.21	Dry	-
12/15/08	15.04	22.95	16.14	13.59	13.90	Dry	-
3/24/09	14.08	22.28	15.51	13.33	13.38	19.89	-
Elevation of Water Surface (ft. MSL):							
12/3/96	-	-	-	-	-	-	-
12/16/96	-	304.38	303.84	-	-	-	Dry
9/13/99	-	303.48	Dry	-	-	-	-
3/14/00	293.62	304.60	304.04	-	-	-	-
11/14-15/00	292.19	304.02	Dry	-	-	-	-
12/5-6/00	292.48	-	-	-	-	-	-
1/30/01	292.63	-	-	-	-	-	-
2/26/01	292.72	-	-	-	-	-	-
3/12/01	292.94	-	-	-	-	-	-
4/13/01	292.92	-	-	-	-	-	-
5/14/01	292.72	-	-	-	-	-	-
6/20/01	292.47	-	-	-	-	-	-
7/11/01	292.23	-	-	-	-	-	-
8/29/01	291.85	-	-	-	-	-	-
9/5/01	291.81	-	-	-	-	-	-
10/29/01	291.51	-	-	-	-	-	-

TABLE 12C-4
SITE MONITORING WELL INFORMATION
ALLUVIAL WELLS
GREGORY CANYON LANDFILL

WELL INFORMATION	GLA-16	MW-3	GMW-3	LUCIO-2R*	MWD-34R*	WCC-1	WCC-2
11/28/01	292.08	-	-	-	-	-	-
12/11/01	292.34	-	-	-	-	-	-
3/29/02	292.60	-	-	-	-	-	-
8/19/02	290.67	-	-	-	-	-	-
8//25/04	290.32	-	-	-	-	-	-
10/9/04	289.83	303.73	-	-	-	-	-
12/20/04	292.17	-	304.21	296.01	300.75	-	-
4/5/05	294.65	313.63	-	297.51	300.67	-	Dry
8/3/05	292.96	-	303.95	295.46	301.48	-	-
11/21/05	292.94	304.78	304.16	295.89	300.29	Dry	Dry
3/8/06	293.13	304.55	304.21	296.20	301.29	Dry	-
5/16/06	293.26	305.07	304.50	296.45	301.23	Dry	-
7/26/06	292.66	304.38	303.88	295.68	300.92	Dry	-
9/18/06	292.60	304.30	303.81	295.62	300.85	Dry	-
11/28/06	292.78	304.46	304.08	295.75	301.00	309.98	-
1/31/07	292.93	304.64	304.21	295.90	301.07	Dry	-
3/27/07	292.90	304.56	304.31	295.96	301.07	Dry	-
5/25/07	292.73	304.53	304.05	295.81	300.91	Dry	-
7/23/07	292.57	304.35	303.83	295.68	300.59	Dry	-
9/24/07	291.41	304.16	303.84	295.58	299.86	Dry	-
11/28/07	291.35	304.46	304.13	295.75	296.81	Dry	-
1/15/08	293.10	305.90	305.70	297.48	301.49	Dry	-
3/10/08	293.76	306.13	305.28	297.43	301.76	317.27	-
6/23/08	292.66	304.52	303.89	296.18	301.14	Dry	-
9/12/08	292.15	304.06	303.63	296.01	300.79	Dry	-
12/15/08	292.50	304.63	304.22	296.41	301.10	Dry	-
3/24/09	293.46	305.30	304.85	296.67	301.62	310.49	-

Notes:
* Reference elevation based on topographic map, not survey.

have been identified in Gregory Canyon.

D.5.2 GROUNDWATER QUALITY

Regional Groundwater Quality. Water quality data for wells in the Pala Hydrologic Subarea are sparse. One key indicator of groundwater quality is the total dissolved solids (TDS) concentration. As a result, for aesthetic reasons (i.e., taste, odor, appearance), the state has recommended that the TDS concentration be no greater than 500 mg/l in drinking water supplies. Currently, TDS concentrations in SDCWA imported supplies range from about 500 to 700 mg/l (SDCWA, 1997). Based on available groundwater quality data, the alluvial aquifer in the Pala Basin is good, with groundwater concentrations of TDS estimated in the range of 200 to 860 mg/l (J.A. Moreland, 1974) compared with 600 to 3,400 mg/l TDS for the Bonsall Basin. The average TDS concentration for the Pala Basin is estimated to be 600 mg/l (NBS Lowry, 1995).

Local Groundwater Quality. A limited water quality evaluation was performed in August 1999 from select on-site monitoring wells, residential/production wells, and the San Luis Rey River to assess the groundwater quality in the vicinity of the project site. Specifically, samples were obtained from upgradient monitoring wells GLA-4 and GLA-5 and downgradient wells GLA-2, GLA-7 and GLA-10 (Figure 10). Three residential/production wells were also sampled within the San Luis Rey River valley. One residential well (Verboom Well No. 5) is located on the west side of the site near the Verboom residence, the second residential well coincides with the SLRMWD well #34, and the third residential well is Lucio Well #2, located on the north side of the river on the Lucio Family Dairy property. The samples were analyzed for the indicator parameters (chloride, nitrate as nitrogen, pH, sulfate, TDS and volatile organic compounds [by EPA Method 8260]).

Then, beginning in December 2000, samples were collected quarterly for one year from 15 bedrock wells and four alluvial wells, and analyzed for the full suite of "constituents of concern" (COCs) as defined by the Code of Federal Regulations (40 CFR Part 258, Appendix II). The COCs include a broad range of general chemistry constituents, 17 metals, as well as volatile organic compounds (VOCs), semi-volatile organic compounds, pesticides, herbicides and polychlorinated biphenyls (PCBs). A summary of the water quality data obtained during these four quarters of COC monitoring is provided in Appendix C.

Following construction of the groundwater monitoring network (with the exception of proposed background well GLA-18) and based on RWQCB guidelines to obtain up to 16 baseline data points to characterize naturally-occurring water quality of the site before waste is received by the facility, the groundwater monitoring network and surface water monitoring points were further sampled and tested quarterly for the entire COC list of analytes to develop a statistical database of background (pre-development) water quality chemistries. In anticipation of the landfill construction schedule, a more accelerated sampling and analysis program (e.g., bimonthly) was implemented for a portion of the time to obtain the necessary 16 baseline data. The monitoring program included collection of samples from existing bedrock monitoring wells GLA-2, GLA-4, GLA-5, GLA-11, GLA–12, GLA-13, GLA-14, GMW-1, GLA-A through GLA-G, and alluvial wells GMW-3, Lucio #2R, SLRMWD #34R, and GLA-16. Prior to each sampling event, water levels were also be measured in each of these wells and water level measuring stations GLA-1, GLA-3, GLA-7, GLA-8, and GLA-10.

Samples were also collected and tested for the 40 CFR Part 258, Appendix I list of a minimum of 47 VOCs along with the metal surrogates (chloride, nitrate as nitrogen, sulfate, pH and total dissolved solids [TDS]), calcium, magnesium and sodium, referred to herein as the quarterly monitoring parameters (MPars).

Review of the data collected indicates that TDS in groundwater samples collected from wells sited within Gregory Canyon since the August 1999 sampling event generally ranged from about 300 mg/l to 2500 mg/l in bedrock wells and from 500 to 1000 mg/l in alluvial wells. Based on more than 16 sampling events, only the groundwater sample from upgradient well GLA-4 (with an average value of 474 mg/l) generally met the state recommended maximum contaminant level (MCL) of 500 mg/l for TDS for drinking water and beneficial groundwater use area designation (RWQCB, 1994). Bedrock wells located on the west side of the site including wells GLA-2, GLA-D, GLA-E, and GLA-F, and upgradient well GLA-5 typically were found to contain the highest TDS concentrations. Groundwater samples from the alluvial wells also typically exceed the state recommended MCL for TDS, though the concentrations generally are lower and generally do not exceed the basin objective of 900 mg/L. It should be noted that water delivered by the San Diego County Water Authority and its member agencies to users throughout the County has typical TDS concentrations ranging between 500 and 700 mg/l, and these values are within the range of many of the wells at the Gregory Canyon site. Therefore, with respect to this parameter, the groundwater resource at Gregory Canyon can be considered average for San Diego County, with some areas of the site exhibiting elevated concentrations. Similarly, samples collected from upgradient (background) well GLA-5 contained concentrations of nitrate as nitrogen (averaging 17.6 mg/l) and sulfate (averaging 294 mg/l) above the state recommended MCLs of 10 mg/l and 250 mg/l, respectively. Downgradient bedrock wells GLA-2, GLA-A, GLA-D, GLA-E and GLA-F, GLA-13 and GLA-14, and alluvial well GLA-16 have consistently contained higher concentrations of nitrate as nitrogen and also have exceeded the state and federal MCLs for this constituent. The state recommended MCL for sulfate has only been exceeded in samples from alluvial wells Lucio #2R and SLRMWD#34R.

D.5.3 MONITORING REQUIREMENTS

The groundwater monitoring program to be conducted at the GCLF will comply with 27 CCR, Article 1 requirements as implemented through the WDRs issued by the San Diego RWQCB. The groundwater monitoring system is described in detail in Section B.5.1.3 and the M&RP is included in Appendix G.

As part of the permitting process for the GCLF, and in accordance with 27 CCR §20415 (e)(6), beginning in December 2000, GLA collected quarterly groundwater and surface water samples from both background and compliance sampling locations to assist in the development of a data base on the water quality at least one year prior to landfilling operations at the GCLF. In addition, monthly water level data were obtained over a one year period to establish the highest and lowest expected water levels for the site. Table 12C provides the available water level data obtained through March 2009.

As presented in Section D.5.2, the initial monitoring program included collection of samples from upgradient (background) bedrock wells GLA-4, GLA-5, and GLA-11, and downgradient (point-of-compliance) wells GLA-2, GLA-10, GLA-12, GLA-13, and GLA-14, and from the alluvial aquifer in background (upgradient) well Lucio #2, and downgradient alluvial wells GLA-16, and SLRMWD designated well #34. With further monitoring network well construction, wells GLA-A through GLA–G and existing well GMW-3 were added to the monitoring program. Surface water samples were collected in the San Luis Rey River from surface water stations SLRSW-1 (upstream of Gregory Canyon) and SLRSW-2 (downstream of Gregory Canyon). Samples collected from each of these sample points were analyzed for the full suite of constituents of concern (COCs) provided in the Code of Federal Regulations (40 CFR Part 258, Appendix II). Included in this list of compounds are cyanide, sulfide, 18 metals, VOCs, semivolatile organic compounds (SVOCs), chlorinated herbicides, pesticides and polychlorinated biphenyls (PCBs). In addition, samples were submitted for the metal surrogates including chloride, nitrate, sulfate, pH, and TDS, and three indicator metals – calcium, magnesium and sodium.

In evaluating general water quality, the median values obtained from a minimum of 16 sample rounds of data (and the August 1999 water quality data if available) for each constituent were compared with currently established state and federal MCLs and San Diego RWQCB Basin Objectives. Review of the median data indicates concentrations of TDS and nitrate as nitrogen in some bedrock wells were measured above the upper state MCL, while water quality in the alluvial wells was found to be generally similar in concentrations, also exceeding the state and federal MCLs and occasionally the local basin objectives for TDS. In the alluvial wells, the state and federal MCL for nitrate as nitrogen is exceeded primarily at well GLA-16. Comparison of the surface water sample data with currently established state and federal MCLs and surface water basin objectives indicates that the median TDS concentrations in both surface water samples exceed the basin objective of 500 mg/L.

In the bedrock aquifer, comparison of the median data across the site indicates that samples from upgradient (background) wells GLA-4. GLA-12 and GLA-G contained some of the lowest concentrations of most of the general chemistry constituents and several metals. Samples from downgradient wells GLA-2, GLA-D, GLA-E and GLA-F contained several general chemistry and metals at the highest concentrations in the bedrock aquifer wells. The samples from background well GLA-5, located at the head of the canyon, contained elevated concentrations of nitrate and TDS, and the highest concentrations of sulfate compared with the other bedrock aquifer wells. For the alluvial aquifer, the groundwater data is relatively consistent between the four sampled wells, with slightly higher concentrations measured in well GLA-16 In the surface water, review of the data indicated very little difference between the median values up and downstream of the canyon. This finding is not surprising considering the relatively undisturbed nature of the area.

Review of COC data does not suggest the presence of measurable organic compounds (i.e., VOCs, SVOCs, pesticides, herbicides, or PCBs) in groundwater at the Gregory Canyon site. Few, sporadic low-level detections of VOCs, SVOCs, or pesticides that have been identified were not verified by retest sampling and are concluded to be false positives. The only confirmed organic constituent, methylene chloride, which was measured in samples from wells GLA-4 and GLA-5 in 2006, exhibited rapid declining concentrations and has not been detected in subsequent samples obtained from 2007 to 2009. It is concluded that the majority of the detected VOCs and SVOCs are either common laboratory compounds such as acetone, carbon disulfide, chloroform, methylene chloride and phthalates or are constituents in hydrocarbon-based fuel (such as benzene, toluene, ethylbenzene and xylenes). Because the data obtained to date suggest only sporadic detections of organic compounds, those identified are attributed to laboratory/field-introduced impacts, since there are few on-site sources for these compounds.

D.5.4 SLRMWD AGREEMENT

On April 15, 1996, an agreement was executed by the proponents of the GCLF, the SLRMWD, and several private landowners located downstream of the landfill project. The purpose of the agreement is to ensure that the construction, operation, and closure of the GCLF project are carried out in a manner that will help protect the quality of the water in the Pala Basin, and thus, the other downgradient basins of the San Luis Rey River. A copy of the 1996 SLRMWD Agreement is included in Appendix Q.

Provisions outlined in the landfill agreement include stipulations that address the protection of water supply, water rights, groundwater monitoring, liability, and closure. More specifically, Section 5(a) of the agreement stipulates that water quality reports be provided to the SLRMWD within ten days of receipt of the water quality monitoring results. Section 5(b) addresses the leachate monitoring system and requires that the applicant coordinate with the SLRMWD concerning the number, specifications, location, and frequency of data collection at the monitoring stations. Section 6(c) requires that a reverse osmosis treatment facility be included to provide a groundwater treatment facility that is in place in the event that groundwater impacts are identified. Finally, Section 9(a) addresses financial assurances and cost estimates.

A supplemental agreement was entered into in 2004 to include a collaborative effort between proponents of GCLF and the SLRMWD to develop protocols for collection, handling and analysis of groundwater samples, with the SLRMWD selecting the contractors to perform those services, Gregory Canyon Ltd. will be required to make the arrangements with the selected contractors to perform these services at its expense. A copy of the 2004 supplemental SLRMWD Agreement is included in Appendix Q.

D.5.5 AQUEDUCT RELOCATION OPTION

It is possible that a portion of the existing First San Diego Aqueduct (also known as Pipelines No. 1 and 2) may be relocated further west of the landfill footprint on the western side of the canyon ridge. A new pipeline (Pipeline No. 6) is also proposed at this westerly location. Whether or not the pipelines are relocated, groundwater monitoring will be conducted to ensure that there are no impacts to groundwater or surface water adjacent to these pipelines. A determination as to whether to relocate the pipelines will be made in conjunction with the San Diego County Water Authority. Among the factors to be considered are impacts to the pipelines from earthquakes and blasting. The potential impact from earthquakes is discussed in Section C.2.2.2. The potential impact from blasting was analyzed in Section 4.6.3.4 of the EIR.

D.5.6 WATER USAGE

Existing beneficial uses and water quality objectives have been established by the RWQCB (1975 and 1994) for surface and groundwater in the vicinity of Gregory Canyon. The GCLF is located in the San Diego Hydrologic Basin. A Basin Plan was initially approved by the SWRCB in March 1975 and an update to the Plan was drafted in 1994 (RWQCB 1994). Beneficial uses of surface water in the Pala Hydrologic Subarea include municipal or domestic, agricultural, and industrial service supply. However, because surface water is generally seasonal and the supply is unreliable, beneficial uses for municipal and industrial service supply are restricted. In addition, surface waters provide beneficial uses for water- and non-water-contact recreation. Despite the unreliability of surface water, it provides a water supply to vegetation and maintains wildlife habitats. Surface water in the Pala Hydrologic Subarea provides warm-water habitat to sustain aquatic organisms.

Traditionally the Pala Basin groundwater has been used for agricultural and livestock purposes, although more recently a few commercial materials companies were established in the basin. The Pala Basin groundwater provides nearly all of the potable water supply for the Pala Indian Reservation (upgradient of the landfill), the SLRMWD (downgradient of the landfill), and for other municipal and agricultural purposes in the basin (NBS Lowry, 1995). It is anticipated that the Pala Basin groundwater will continue to be used for municipal and agricultural uses in the future. The SWRCB has established general water quality objectives whereby existing water quality superior to the established water quality objectives is to be maintained unless provided for otherwise by SWRCB Resolution No. 68-16.

A detailed discussion of beneficial uses is contained in the "Updated Evaluation of Hydrogeomorphology and Beneficial Uses at Gregory Canyon" included in Appendix I-1.

The locations of known off-site wells in the vicinity of Gregory Canyon were investigated as part of the Phase 5 Hydrogeologic Investigation (GLA, 1997). To supplement this survey, water well Drillers Reports were obtained from the State Department of Water Resources to locate all wells within one mile outside of the facilities boundaries in accordance with 27 CCR, Section 21750(h)(1). Facility boundary is defined as the boundary surrounding the entire area on which solid waste facility activities occur and are permitted. Figure 30A shows the off-site wells identified within one mile of the GCLF boundaries. Table 12D provides a summary of the well information for these wells. However, it should be noted that unlike the 1997 survey, field verification was not performed as part of this supplemental well search.

The largest concentration of wells is in the alluvial basin of the San Luis Rey River, with a few additional wells serving dwellings and orchards in Rice and Couser Canyons. According to the operators of orchards south of Gregory Canyon that were interviewed in 1997, irrigation water for these orchards is derived primarily from the First San Diego Aqueduct and not from wells.

Several SDCWA member agencies and other water agencies have either implemented groundwater projects or are planning or evaluating potential projects to develop potable water supply within the San Luis Rey River Basin. Within the Lower San Luis Rey River Hydrologic Area, the City of Oceanside is extracting 2,200 AFY of groundwater from the Mission Basin and that project is being expanded to include an additional 4,900 AFY of potable water supply. A conceptual project has been identified by the City of Oceanside to expand groundwater development in the Mission Basin by an additional 15,300 AFY of supply. In addition, the Rainbow Municipal Water District is evaluating the development of 3,000 AFY of potable supply from the Bonsall Basin. For the Monserate Hydrologic Area, in which Gregory Canyon is located, the Yuima Municipal Water District is pumping up to 2,700 AFY from the Pauma Basin (SDCWA, 1997).

SDCWA assigned a high score to the Pala/Pauma Basins, along with several other groundwater basins and surface reservoirs, during its initial "Regional Screening of New Sources of Water." Accordingly, these basins were targeted for further analysis under the "Analysis of Alternatives." However, the resulting analysis of alternatives ranked the Pala/Pauma groundwater basins in a lower group (less attractive), and therefore they were not considered further as a viable new source of water. Primary reasons for the low ranking included very low groundwater elevations that would require extensive pumping facilities for water conveyance, relatively little emergency storage capacity, and the need for extensive infrastructure including wells and connecting pipelines throughout the basin (SDCWA, 1997). As stated above, the Bonsall Basin is being considered for development by the Rainbow Municipal Water District to provide an additional 3,000 AFY of potable water supply.

TABLE 12D
WATER WELLS WITHIN ONE MILE OF THE
GREGORY CANYON LANDFILL*

Well Location (T/R/Sec.)	Well Owner	Owner Address	Depth (ft.) To First Water	Depth (ft.) To Static Water	Screened Material	Drilling Method	Well Casing Diameter	Well Casing Material	Well Seal	Slot Size	Perforation Interval	Name of Driller	Date of Construction	Use of Well
T9S, R2W, Sec 28L2S	Chuck U: Hlein	Pala, CA 92059	NA	12	Alluvium	Rotary	12" (0-77')	Steel	Cement	Mill Slot	27-77'	Fain, Valley Center	9/14/1972	Irrigation
T9S, R2W, Sec 28L3S	Norris Patton	Pala, CA 92059	NA	12	Alluvium	Rotary	12" (0-62')	Steel	Cement	Mill Slot	32-62'	Fain, Valley Center	9/18/1972	Irrigation
T9S, R2W, Sec. 28N2	James Brackett	Pala, CA 92059	8	8	Alluvium	NA	10" (to 62')	Steel	NA	1/8x1-1/2"	NA	Vaughn Maynard & Sons, Santa Ana	11/28/1952	NA
T9S, R2W, Sec. 28	Pala Rey Youth Camp	Bellflower, CA 90706	NA	NA	Alluvium	Rotary	10-3/4" (3-104')	Steel	Cement to 40'	5/32 x 2-1/2"	45-103'	Multi Water Systems, Escondido	12/28/1982	Community
T9S, R2W, Sec. 29R1	J.C. Marthen	Pala, CA 92059	6	6	Alluvium	Cable	8" (0-59'), 12" (0-59')	Steel	Neat Cement	1/8 x 2-1/2"	8" (50-59'), 12" (10-46')	Acme, Valley Center	1/9/1967	Irr./Dom.
T9S, R2W, Sec. 29	Mordigan Nurseries	Lawndale, CA 92060	30	18	Bedrock	Air	8" (0-20')	Steel	Cement to 20'	None	None	Fain, Valley Center	1/24/1981	Irrigation
T9S, R2W, Sec. 29	Roy Goran	Fallbrook CA 92028	125	100+	Bedrock	Air	8" (0-20')	Steel	Cement to 20'	NA	None	Fain, Valley Center	7/10/1979	Test
T9S, R2W, Sec. 29	Ben Anderson	Pala CA 92059	NA	17	Alluvium	NA	19.5"(0-20'), 10.25"(20-30'), 10"(30-70')	Steel	Cement to 30'	0.070	30-70	Acme, Escondido	7/17/1992	Irrigation
T9S, R2W, Sec. 29	Ben Anderson	Pala CA 92059	NA	15	Alluvium	NA	8.125" (0-20'), 8.249" (20-65')	Steel	Cement to 20'	0.060	25-65	Acme, Escondido	10/17/1995	Irrigation
T9S, R2W, Sec. 30	Eden Rose Farms	Fallbrook CA 92028	65	NA	Bedrock	Rotary	8"(1-63'), 6.25" (0-112')	Steel	Sand/Cmt Slurry	NA	NA	3D, Temecula	4/28/1992	Irrigation
T9S, R2W, Sec. 30	Stephen Ciko	Huntington Beach CA 92649	35	25	Bedrock	Rotary	10" (0-23'), 8" (0-91')	Steel	Cement to 20'	NA	30-40', 80-90'	Fain, Valley Center	7/27/1993	Irrigation
T9S, R2W, Sec. 30	Peter Glusac	Fallbrook CA 92028	NA	85	Bedrock	Air Rotary	8" (0-20')	Steel	Bentonite to 20'	NA	NA	Stehly Bros. Valley Center	8/7/1998	Irrigation
T9S, R2W, Sec. 30	Jim Rostvet	Poway, CA 92064	NA	NA	Bedrock	Air	12.75"(0-20')	Steel	Cement to 20'	Open	None	Acme, Escondido	3/5/1999	Domestic
T9S, R2W, Sec. 31R01	Bill Verboom	Buena Park, CA	NA	14	Alluvium	Rotary	8" (2-70')	Steel	NA	1/8 x 2"	30-66'	Burt's, El Cajon	8/4/1966	Other
T9S, R2W, Sec. 31	Hodge Brothers	Pala CA 92059	NA	NA	Alluvium	Rotary	16" (0-50'), 10.75" (0-101')	Steel	Cement to 50'	see Notes	53-101	American, Aguanga	7/7/1978	Ag./Comm.
T9S, R2W, Sec. 31	Hodge Brothers	Pala CA 92059	NA	NA	Bedrock	Air	6-5/8" (0-230')	Steel	Cement to 50'	1/8 x 2-1/2"	65-190, 210-230	American, Aguanga	3/4/1981	Irr./ Dairy
T9S, R2W, Sec. 31	Hodge Brothers	Pala CA 92059	NA	NA	Bedrock	Rotary	6-5/8" (0-238')	Steel	Cement to 50'	1/8 x 2-1/2"	70-238	American, Aguanga	3/18/1981	Irr./ Dairy
T9S, R2W, Sec. 31	Hodge Brothers	Pala CA 92059	40	25	Bedrock	Rotary	6-5/8" (0-441')	Steel	Cement to 59'	1/8 x 2-1/2"	84-291', 307-330', 350-368'	American, Aguanga	5/6/1981	Dom./ Dairy
T9S, R2W, Sec. 31P03	Hodge Brothers	Pala CA 92059	15	20	Bedrock	Air	6-5/8" (0-268')	Steel	Cement to 50'	1/8 x 2-1/2"	105-266	American, Aguanga	1/26/1983	Dom./Dairy
T9S, R2W, Sec. 31	Hodge Brothers	Pala CA 92059	NA	NA	Bedrock	Rotary	6-5/8" (0-204')	Steel	Cement to 50'	1/8 x 2-1/2"	62-162	American, Aguanga	2/9/1983	Dairy
T9S, R2W, Sec. 31	Harold White	Fallbrook CA 92028	NA	45	Bedrock	Air Rotary	8"(0-20'), 4.5"(0-300')	Steel/PVC	Cement to 20'	0.032	0-300'	Bob Beeman, Ramona	9/25/1992	Irrigation
T9S, R2W, Sec. 31	Ron & Linda Williams	Fallbrook CA 92028	NA	30	Bedrock	Air Rotary	8" (0-136')	Steel	Bentonite to 136'	NA	NA	Stehly Bros. Valley Center	8/6/1998	Irrigation
T9S, R2W, Sec. 31	Ron & Linda Williams	Fallbrook CA 92028	70	40	Bedrock	Air Rotary	8" (0-141')	Steel	Bentonite to 20'	1/4"	81-141"	Stehly Bros. Valley Center	4/20/1999	Irrigation
T9S, R2W, Sec. 32	Pete Verboom	Pala CA 92059	NA	6	Alluvium	Rotary	8" (0-80')	Steel	Cement to 40'	Johnson SS	55-65'	American, Aguanga	7/11/1980	Dom./Comm.
T9S, R2W, Sec. 32L1	Joe Lucio Dairy	Pala CA 92059	NA	NA	Alluvium	NA	10" (0-69')	Steel	NA	NA	NA	NA	1959	Domestic
T9S, R2W, Sec. 32M1S	Joe Lucio Dairy	Pala CA 92059	30	13	Alluvium	Cable	10" (0-60')	Steel	Cement	1/4x2", 0.070"	1/4x2" (30-39'),0.070" (60-67')	Acme, Valley Center	1/27/1975	Domestic
T9S, R2W, Sec. 32	SDG&E	Pala CA 92059	NA	13	Alluvium	Rotary	23.5"(0-20'), 12"(20-75')	Steel/SS	Cement to 20'	NA	35-75"	Fain, Valley Center	5/2/1995	Irrigation
T9S, R2W, Sec. 33	Pala Rey Youth Camp	Bellflower, CA 90706	8	8	Alluvium	Rotary	8-5/8" (0-80')	Steel	Concrete to 40'	1/2 x 3"	40-80	Howard Pump, Inc., Barstow	7/5/1978	Youth Camp
T9S, R2W, Sec. 33	Pala Rey Youth Camp	Bellflower, CA 90706	86	NA	Bedrock	Rotary	6" (0-191')	Plastic	Cement to 50'	1/4"	131-191	Multi Water Systems, Escondido	10/24/1979	Domestic
T10S, R2W, Sec. 4	R.W. Zarvell	Valley Center, 92082	88	NA	Bedrock	Air Rotary	6-5/8" (2-37')	Steel	Cement to 37"	NA	NA	Multi Water Systems, Escondido	10/30/1982	Domestic
T10S, R2W, Sec. 5D01	Bill Verboom	Buena Park, CA	NA	12	Alluvium	Rotary	8" (2-80')	Steel	NA	1/8 x 2"	40-80'	Burt's, El Cajon	8/8/1966	Irrigation
T10S, R2W, Sec. 5	Russell Hunt	Valley Center, 92082	92	30	Bedrock	Air	8" (0-22'), 6" (0-50'), 4" (0-350')	Steel/PVC	Cement to 20'	1/8 x 6"	NA	Fain, Valley Center	12/3/1977	Domestic
T10S, R2W, Sec. 5	Pioneer Developers	Fallbrook CA 92028	20	12	Alluvium	Rotary	8" (0-107')	Steel	Cement to 20'	3/32 x 2-1/2"	21-61	Fain, Valley Center	12/1/1978	Irrigation
T10S, R2W, Sec. 5	Marshall R. Urist, M.D.	Los Angeles, CA 90024	27	6	Bedrock	Air	8" (0-26'), 4" (0-100')	Steel	Cement to 26'	NA	NA	Acme, Escondido	11/6/1985	Irrigation
T10S, R2W, Sec. 6A1	Bill Verboom	Pala CA 92059	6	9	Alluvium	Cable	24" (0-51'), 8" (0-67')	Steel	Concrete	0.100"	56-67'	Acme, Valley Center	7/23/1969	Domestic
T10S, R2W, Sec. 6B2	Pala Rey Ranch	Pala CA 92059	0	8	Alluvium	Rotary	6" (0-62')	Steel	Cement	0.040 SS-304	40-60'	Fain, Valley Center	9/15/1977	Irrigation
T10S, R2W, Sec. 6	Pala Rey Ranch	Pala CA 92059	NA	10	Alluvium	Rotary	20" (0-20'), 10" (0-92')	Steel	Cement	0.050 SS	50-70'	Fain, Valley Center	12/11/1978	Irrigation
T10S, R2W, Sec. 6	NPI Calif.	Perris, CA 92370	12	8	Alluv./Bdrk.	Rotary	8" (0-90'), 6" (0-132')	Steel	Cement to 132'	NA	None	Fain, Valley Center	10/17/1986	Irrigation
T10S, R2W, Sec. 6	NPI Calif.	Perris, CA 92370	12	10	Alluv./Bdrk.	Rotary	12" (0-115')	Steel	Cement to 115'	NA	None	Fain, Valley Center	11/5/1986	Irrigation
T10S, R2W, Sec. 6F6	Robert Pankey	Bonsall, CA 92003	NA	8	Alluvium	Rotary	20" (0-20'), 12" (0-73')	Steel	Cement to 20'	0.050	23-73'	Fain, Valley Center	6/30/1978	Irrigation
T10S, R2W, Sec. 7	Isreel J. Kachuck	Santa Ana, CA 92705	10	3	Alluv./Bdrk.	Rotary	12" (0-20'), 8" (0-75')	Steel	Cement to 20'	1/8 x 6"	20-70'	Fain, Valley Center	3/8/1985	Irrigation
T10S, R2W, Sec. 8	William J. Nequette	Chatsworth, CA 91311	60	30	Bedrock	Air	7" (0-20')	Steel	Cement to 20'	None	None	Fain, Valley Center	7/31/1979	Domestic
T10S, R2W, Sec. 8	George Hamminger	Incline Village, NV 89450	NA	NA	Bedrock	Air Rotary	6" (0-66')	PVC	Cement to 20'	NA	NA	Randazzo, Valley Center	9/28/1993	Domestic
T10S, R2W, Sec. 8	Bob Grandon	Valley Center, 92082	NA	10	Bedrock	Air Rotary	8.25" (0-25')	Steel	Cement to 25'	NA	NA	Randazzo, Valley Center	7/26/1991	Domestic
T10S, R2W, Sec. 8	Bob Grandon	Valley Center, 92082	NA	100	Bedrock	Air Rotary	6.25" (0-98')	Steel	Cement to 22'	NA	NA	Randazzo, Valley Center	12/13/1993	Domestic
T10S, R2W, Sec. 8	Henry Avocado Co.	Escondido, CA 92027	NA	12	Bedrock	Air	12.75"(0-60'), 8.249"(60-123')	Steel	Cement to75'	None	None (open)	Acme, Escondido	5/2/1994	Irrigation
T10S, R2W, Sec. 9J1S	Garth Tagge	Pala CA 92059	52	37	Bedrock	Cable	8" (0-79')	Steel	Cement to 20'	6 x 3/16"	48-79'	Acme, Valley Center	6/13/1968	Irr./Dom.
T10S, R2W, Sec. 9	Glen L. Oleson	Pala CA 92059	610	500+	Bedrock	Air	8" (0-20')	Steel	Cement to 20'	NA	None	Fain, Valley Center	7/30/1980	Irrigation
T10S, R2W, Sec. 9	Dan LaVine	Valley Center, 92082	NA	20	Bedrock	Air Rotary	8" (0-25')	Steel	Cement to 25'	NA	NA	Stehly Bros. Valley Center	12/21/1996	Irrigation
T10S, R2W, Sec. 9	Dan LaVine	Valley Center, 92082	NA	20	Bedrock	Air Rotary	8" (0-22')	Steel	Cement to 22'	NA	NA	Stehly Bros. Valley Center	12/27/1996	Irrigation
T10S, R2W, Sec. 9	Frank Hill/Kimball Spence	Valley Center, 92082	NA	150	Bedrock	Air Rotary	8" (1-20')	Steel	Cement to 20'	NA	NA	R.R. Beale, Inc., Alpine	1/30/1995	Irrigation
T10S, R2W, Sec. 9	John Newhouse	Lake Forrest, IL 60045	60	30	Bedrock	Air	8" (0-30')	Steel	Cement to 30'	NA	None	Fain, Valley Center	2/7/1981	Irrigation
T10S, R2W, Sec. 9	John Newhouse	Lake Forrest, IL 60045	52	50	Bedrock	Air	8" (0-85')	Steel	Cement to 20'	1/8 x 6"	50-70	Fain, Valley Center	10/9/1982	Irrigation

Notes: *Well locations are presented on Figure 30A.
NA = Not Available/Not Applicable
Well data provided by State of California Department of Water Resources Water Well Drillers Report

Other Wells - No well log data provided

T9S, R2W, Sec. 28K1S	Depth to groundwater - 6 to 29 ft.
T10S, R2W, Sec. 6C2S	Depth to groundwater - 5 to 7 ft.
T10S, R2W, Sec. 6F1S	Depth to groundwater - 8 to 27 ft.
T10S, R2W, Sec. 6F2S	Depth to groundwater - 10 to 58 ft.
T10S, R2W, Sec. 6G1S	Depth to groundwater - 5 to 10 ft.

SECTION D.6

REFERENCES AND RESOURCES

D.6 REFERENCES AND RESOURCES

1. Atwater, T., 1990, Implications of Plate Tectonics for the Cenozoic Tectonic Evolution of Western North America, Geological Society of America Bulletin Vol. 81, p. 3513-3536.

2. Blake, T.F., 2000, EQFAULT, Version 3.00, Deterministic Estimation of Peak Acceleration from Digitized Faults.

3. Bray, J.D. and E.M. Rathje, 1998, Earthquake-Induced Displacements of Solid Waste Landfills, Journal of Geotechnical and Geoenvironmental Engineering, ASCE, Vol. 124, No. 3, (March 1998).

4. California Department of Water Resources, 1971, Water wells in the San Luis Rey River Valley Area, San Diego County, California: Bulletin No. 91-18.

5. California Division of Mines and Geology, 1996, California Fault Parameters- 1996 Draft: Electronic database, http://www.consrv.ca.gov/dmg/shezp/shaking/index.htm

6. GeoLogic Associates, 2003, Geologic, Hydrogeologic and Geotechnical Investigations Report, Gregory Canyon Landfill, Gregory Canyon, San Diego County, California (May 2003).

7. GeoLogic Associates, 2001, Memorandum, Results of Slope Stability Analysis, Prescriptive Design, Gregory Canyon Landfill, Gregory Canyon, San Diego County, California (May 22, 2001).

8. GeoLogic Associates, 2001, Phase 5 Supplemental Investigation, Results of Pumping Tests, Gregory Canyon Landfill, San Diego County, California (January 2001).

9. GeoLogic Associates, 1999, Technical Memorandum, Geology and Soils, Proposed Gregory Canyon Landfill (November 18, 1999).

10. GeoLogic Associates, 1998, Phase 6 - Geotechnical Investigation for the Gregory Canyon Proposed Landfill Site: Consultant's Report to Gregory Canyon Ltd.

11. GeoLogic Associates, 1997, Phase 5 - Hydrogeologic Investigation for the Gregory Canyon Proposed Landfill Site: Consultant's Report to Gregory Canyon Ltd.

12. Geo-Slope, 1995, SLOPE/W, Slope Stability Analysis for Windows, Version 3.

13. Geotechnical Consultants, 1989, Preliminary Assessment of Geologic and Hydrogeologic Conditions, Gregory Canyon Site: Draft Environmental Impact Report, Environmental Impact Statement for the North County Class III Landfill, San Diego County, California.

14. Geraghty & Miller, 1988, Phase I Hydrogeologic Investigation - Proposed North County Landfill, San Diego, California: Consultant's Report to Waste Management of North America, Western Region.

15. Geraghty & Miller, 1990, Phase II Investigation - Proposed Gregory Canyon Class III Landfill, San Diego County, California: Consultant's Report to Waste Management of North America, Western Region.

16. Jahns, R.H. and L.A. Wright, 1951, Gem- and Lithium-Bearing Pegmatites of the Pala District, San Diego County, California, California Department of Natural Resources Special Report 7-a, 72 pp.

17. Jennings, C.W., 1994, Fault activity map of California and adjacent areas: California Department of Conservation, Division of Mines and Geology, Geologic Data Map No. 6.

18. Lamar, D.L. and T.K. Rockwell, 1986, An Overview of the Tectonics of the Elsinore Fault Zone: in Neotectonics and Faulting in Southern California – Guidebook and Volume, Geological Society of America Cordilleran Section, 82nd Annual Meeting, p. 149-158.

19. Larsen, E.S., 1948, Batholith and Associated Rocks of the Corona, Elsinore and San Luis Rey Quadrangles, Southern California: Geological Society of America Memoir 29, 182 pp.

20. Moreland, J.A, 1974, Hydrologic- and Salt-Balance Investigations Utilizing Digital Models. Lower San Luis Rey River area, San Diego County, California: U.S. Geological Survey Water Resources Investigations Bulletin 24-74.

21. NBS Lowry Engineers and Planners, 1995, Emergency Water Storage for San Diego County, Groundwater Feasibility Study (prepared for San Diego County Water Authority).

22. Norrish, N.I., and D.C. Wyllie, 1996, Rock Slope Stability Analysis: in Turner, A.K., Schuster, R.L., (eds.), Landslides – Investigation and Mitigation, Transportation Research Board Special Report 247, p. 391-428.

23. Norton, N. and R. Cathles, 1974, Breccia Pipes – Products of Exsolved Vapor from Magmas, Economic Geology, Vol. 68, p. 540-546.

24. Pyke, R., 1992, TNMN Computer Program, Performs Finite Displacement Analysis using Digitized Accelerograms, Version 1.2

25. Seed, R.B., Bonaparte, R., 1992, Seismic Analysis and Design of Lined Waste Fills: Current Practice: Proceedings of the ASCE Special Conference on Stability and Performance of Slopes and Embankments - II, ASCE, (New York, N.Y.), p.1152-1187.

26. San Diego County Water Authority, 1997, Groundwater Report, (June, 1997).

27. U. S. Geological Survey, 1990, Water Well Database: Electronic database.

28. Wells, D.L., and Coppersmith, K.J., 1994, New Empirical Relationships Among Magnitude, Rupture Length, Rupture Width, Rupture Area, and Surface Displacement: Seismological Society of America Bulletin, v. 84, no. 4, p. 974-1002.

29. Woodward-Clyde, 1995, Geology and Hydrogeology report, Gregory Canyon Landfill, Pala, San Diego County, California: Consultant's Report to Gregory Canyon Ltd. (March, 1995).

PART E

PRELIMINARY CLOSURE AND POST-CLOSURE MAINTENANCE PLAN

SECTION E.1

CLOSURE PLAN

E.1 CLOSURE PLAN

E.1.1 INTRODUCTION AND PURPOSE

Closure of the GCLF will be performed in accordance with the applicable regulatory standards included in 27 CCR, Chapters 3 and 4 and 40 CFR, Subpart F. The purpose of Part E is to develop sufficient information regarding the proposed closure design and post-closure maintenance to estimate the associated costs presented in Part F. The estimated costs will then become the basis for properly funding GCLF's closure and post-closure maintenance account.

The components and systems required for closure of the GCLF include the final grading, final cover design, drainage and erosion control systems, landfill gas monitoring/control system, leachate control system (including modification), site security, and structure removal of environmental control systems (during final cover placement). A description of these closure components as well as a schedule for construction of the GCLF closure improvements is presented in the following subsections. The maximum extent of closure assumes closure of the entire landfill.

E.1.2 FINAL GRADING

This section describes the final grading contours for the GCLF. General construction procedures will be utilized to promote lateral run-off of surface water and minimize the effects of settlement. Perimeter maintenance and deck access roads will be used to maintain the final cover and environmental control systems throughout the post-closure maintenance period. Topographic information, dated 1991, has been utilized to create the base map for the final grading plan and other closure design plans.

The final grading plan (Figure 9) shows that the maximum elevation of the landfill, including the final cover system, will be 1,100 feet amsl. The final deck area will have a minimum grade of three percent to promote drainage and allow for future settlement. Minor filling changes and shaping of the proposed final contours may be conducted during closure construction to maintain the minimum design gradients and promote lateral run-off of precipitation based on actual field conditions present at the end of active disposal operations.

The final landfill slopes will be designed with an overall gradient of approximately 3.5:1. The benches will be 15 to 20 feet wide placed approximately every 40 vertical feet, sloped inward at approximately six percent and have an overall horizontal gradient of three percent in order to convey storm water to the bench downdrain inlets and/or perimeter drainage channels.

The final grading configuration was designed and approved by a registered civil engineer in accordance with 27 CCR, Section 21090 (b)(1)(C).

E.1.3 FINAL COVER

The purpose of a final cover is to provide long-term minimization of surface water intrusion, to isolate wastes from the ground surface, and to reduce the potential for odors and gas emissions. The cover also provides a base for vegetation, which will reduce drainage velocities and erosion. In addition, the final cover configuration is designed to accommodate settlement, subsidence and the effects of seismic events throughout the minimum 30-year post-closure maintenance period and beyond.

E.1.3.1 FINAL COVER DESIGN

E.1.3.1.1 REGULATORY DESIGN STANDARDS

California Final Cover Prescriptive Design Standard

The minimum final cover standards for the GCLF, as outlined in the closure and post-closure requirements for Class III landfills contained in 27 CCR, Section 21090 include:

- Foundation Layer: A minimum two-foot thick layer of soil placed immediately over the entire surface of the last lift of refuse. This layer shall have the appropriate engineering properties, so as to provide a relatively unyielding surface upon which to place and compact the low-hydraulic-conductivity layer.

- Low-Hydraulic-Conductivity Layer: A minimum one-foot thick layer of clean low-hydraulic-conductivity soil containing no waste or leachate placed over the foundation layer. The low-hydraulic-conductivity (or low through-flow rate) soils shall be placed on top of the foundation layer and compacted to attain a hydraulic conductivity, which is the lesser of either;

  - 1×10^{-6} cm/sec.
  - The hydraulic conductivity of any bottom liner system or underlying natural geologic materials.

- Erosion Resistant Layer: A minimum one-foot thick layer of soil containing no waste or leachate placed on top of all portions of the low-hydraulic conductivity layer. Vegetation root depths must not exceed the topsoil layer thickness. Vegetation is to be replanted, as needed, to provide effective erosion resistance.

The final cover should be designed to allow for minimal maintenance. The final grading design for areas flatter than 5:1 (horizontal:vertical) shall have a gradient of at least three percent, to prevent ponding and accommodate settlement.

Federal Final Cover Prescriptive Design Standard

The minimum final cover standards for the GCLF, as outlined in the closure criteria of 40 CFR, Subpart F, Section 258.60, include:

- A cover with a permeability less than or equal to the hydraulic-conductivity of any bottom liner system or natural sub-soils present, or a permeability no greater than 1×10^{-5} cm/sec, whichever is less. The infiltration layer shall consist of a minimum 18 inches of earthen material.
- A cover which minimizes erosion of the final cover by the use of an erosion resistant layer that contains a minimum six inches of earthen material and is capable of sustaining native plant growth.

E.1.3.1.2 FINAL COVER DESIGN

Several factors were taken into consideration in establishing the final cover design for the GCLF including the overall geometry of the landfill, the double composite liner design, local climatic conditions (i.e., semi-arid environment, low rainfall, high evaporation rate), potential landfill settlement, final cover performance, erosion protection, vegetative growth and end use at closure.

Based on these site conditions and the regulatory requirements discussed above, it was determined that a final cover design utilizing a 60-mil linear low-density polyethylene (LLDPE) geomembrane as the barrier layer component of the final cover system would be necessary for the GCLF.

Therefore, the overall final cover design for the GCLF will consist of the following: a minimum two-foot thick foundation layer composed of random soil materials, a barrier layer consisting of a synthetic cover (i.e., a 60-mil LLDPE geomembrane); a HDPE drainage geocomposite layer (on the deck areas only); and a two-foot vegetative layer of silty sand to sandy silt available from Borrow/Stockpile A. See Sections B.1.7 and C.2.2.3 for a discussion of material availability. A typical cross-section of the final cover system (deck and slope areas) is shown on Figure 31.

An alternative to the prescriptive final cover system may be considered at a later time, as allowed for in 40 CFR 258.60.

E.1.3.1.3 FINAL COVER STABILITY

An evaluation of the stability of the final cover design for the GCLF was performed and is included in Appendix C. For this stability analysis, the interface between the LLDPE geomembrane and the overlying vegetative soil cover was considered as the critical surface. The factors considered and used in the analysis included the thickness of the vegetative soil layer, total density of the soil in the vegetative layer, angle of internal friction at the interface between soil and LLDPE geomembrane, and maximum ground acceleration for the postulated maximum credible earthquake (MCE) at the site. The slope stability analysis was conducted considering the final cover as a semi-infinite slope with a gradient of 3:1.

The analysis indicated a static factor of safety of 1.5 and a pseudo-static factor of safety of 0.96 using a seismic coefficient of 0.15. Since the pseudo-static factor of safety was less than 1.5, an additional analysis was made to estimate the seismic induced permanent displacement during the postulated seismic exposure of the site. Using the Bray and Rathje (1998) procedure, the seismic displacement under the loading of the MCE is estimated at approximately three inches. This amount of displacement will not impair the functional integrity of the final cover. The affects from a seismic event on the final cover can be easily repaired as a part of post-earthquake maintenance.

E.1.3.1.4 FINAL COVER CONSTRUCTION

Clearing and Grubbing

Prior to final grading and placement of the final cover, all existing vegetative materials will be removed from the foundation surface without disturbing the underlying refuse. All materials generated by the clearing and grubbing operation will be disposed of in the refuse area and covered with a minimum of two feet of foundation layer material.

Foundation Layer

The foundation layer is to be a minimum of two-feet thick. Foundation layer soils will be added in those areas of the refuse footprint which contain interim cover material with a total depth of less than two feet. The thickness of interim cover for the refuse area will be evaluated, as necessary, by potholing prior to closure. The foundation layer will be compacted in accordance with the CQA Plan included in Appendix M. The foundation layer material on the deck area will be graded to a minimum slope of three percent.

For purposes of cost estimating, one foot of cover soils have been assumed to be in-place at the time of closure. Adjustments during foundation layer grading will be made, as necessary, based on the results of the existing cover depth evaluation.

Barrier Layer

The barrier layer for the GCLF will consist of a 60-mil LLDPE geomembrane. The geomembrane will be overlain in deck areas by a geocomposite drainage layer (e.g., geonet) designed to convey liquids, which may build up over the geomembrane. The geonet is sandwiched between two layers of non-woven geotextile. The geonet will facilitate lateral drainage of any water accumulating over the LLDPE.

Vegetative Layer

Vegetative Cover

The vegetative cover will consist of a minimum two-foot thick soil layer placed in accordance with the CQA Plan (Appendix M). Vegetative materials to be planted in the cover will be selected to fulfill two important functions: erosion and moisture control. Plants selected for the cover must exhibit suitable erosion control characteristics such as spreading roots, fast growth, adequate soil coverage and long lasting/self propagating reproduction patterns. Other physical characteristics required by 27 CCR, Section 21090 (a)(3) include low maintenance and low water demand.

The final vegetative cover will be comprised of plant and grass species native to the region of the landfill site. Plant species selected as the final vegetative cover will adapt to a non-irrigated environment and will maintain beneficial erosion control and aesthetic characteristics within the local climatic environment. The installation of the vegetative cover will normally occur in the fall, prior to the seasonal growing period. All vegetative cover plants will be seeded. Generally, the seeding process includes two installation methodologies, drill-seeding and/or hydro-mulching. The drill seeding method occurs on all accessible areas with a final slope gradient of 3:1 or less. Drill-seeding applies seed in direct contact with the vegetative cover soil and requires no water during installation. Hydro-mulching applies the seed, fertilizer, fiber (mulch), water and tackifier (soil stabilizer) to the surface of the vegetative cover. The hydro-mulching process will occur in two steps. The first application applies the seed, fertilizer, and a small amount of fiber onto the soil surface. The second application covers the seed with the tackifier and a heavy mulch layer to insulate the seed layer.

When established, the vegetative cover will appear as a low-profile fine- (grasses) to medium-textured (shrubs) vegetative open space, similar to adjacent natural areas. Plant species will include native seasonal grasses, legumes, wildflowers, and low growing perennial shrubs. This combination of plant species will provide for an uneven distribution of roots without penetrating beyond the overall depth of the vegetative layer. Plant species utilized at the site after closure will be consistent with the non-irrigated open space end use.

E.1.4 LANDFILL SETTLEMENT

E.1.4.1 SETTLEMENT ANALYSIS

This section describes the method of analysis used to estimate the total potential refuse settlement that may occur at the GCLF during the post-closure period. Three principal settlement mechanisms exist for a typical municipal waste landfill: consolidation induced settlement resulting from the loss of fluids from the refuse prism; shrinkage related settlement occurring as a result of biochemical decomposition such as fermentation and decay; and compaction related settlement resulting from the reorientation of solids into a more dense configuration. In addition to these “classic” settlement mechanisms, dynamic settlement can occur during and shortly after earthquake events, when soil and/or refuse particles may densify as a result of shaking.

It is theoretically possible to quantify the settlement expected to result from each of the phenomena described above. However, the data available for the GCLF, and, in fact, virtually all landfills, are insufficient to make a site-specific analysis. Therefore, the analysis presented herein is based on historic settlement ranges for existing landfills in Southern California.

Conclusions presented by Hagerty, Pavoni and Hur (1973) and the Los Angeles County Sanitation Districts (Huitric, 1981) indicate that recorded landfill settlements are typically up to 40 percent of original refuse thickness. This compares well with a general "Rule of Thumb" in the profession suggesting an approximate 20 to 30 percent volume loss. For the purposes of this analysis, a 30 percent total settlement occurring logarithmically over an approximate 30-year period was considered to be a conservative assumption.

The most consistent refuse settlement estimates are obtained by modeling the refuse prism as a three-dimensional net, calculating the settlement at each node with a time-dependent exponential decay function and adding the total settlement for each node of the net. Total settlement contours are then generated by subtracting total settlement from the proposed final grades.

To estimate the historical rates of refuse accumulation, a two-dimensional grid was established over the footprint of the refuse prisms, with a nodal spacing of 250 feet. The third dimension in the model net was then the net change in elevation between discrete time intervals, as determined from the fill phasing plans. Each layer of the model represented three to four years of landfill operation.

Figures 32A and 32B shows the landfill surface elevations at the time of landfill closure, and the estimated landfill elevations 10, 20, and 30 years after closure. As also shown on Figure 32B, total potential settlement after 30 years might be as much as 60 feet in the southern half of the landfill prism, where, at closure, the landfill is the thickest. Because the final configuration of the landfill is expected to vary over time, the proposed final grading design, combined with the cover maintenance procedures, was developed to accommodate the estimated settlement. The settlement analysis performed on the GCLF is included in Appendix C.

E.1.4.2 SURVEY/SETTLEMENT MONUMENTATION

In order to monitor the future settlement of the landfill, survey monuments will be installed on the landfill in accordance with 27 CCR, Section 20950 (d). These monuments are proposed to consist of galvanized pipe, two inches in diameter and six inches in length placed in blocks of concrete, 24-inches in diameter by eight inches in depth. A nail and tag will be placed in the center of each monument for identification.

Two settlement monuments and two permanent survey monuments will be placed on the landfill area in accordance with 27 CCR, Section 20950. These monuments will provide both horizontal and vertical control points by which to monitor settlement of the final fill contours throughout the post-closure maintenance period. In addition, an aerial photographic survey of the GCLF will be performed and provided to the RWQCB, LEA, and CalRecycle upon completion of closure activities in accordance with 27 CCR, Section 21090 (e)(1). The settlement monuments will be surveyed upon completion of all closure construction activities. In accordance with 27 CCR, Section 21090(e)(2), the operator will prepare an iso-settlement map of the entire permitted site every five years throughout the post-closure maintenance period.

E.1.5 CLOSED LANDFILL STABILITY

A slope stability analysis is required by 27 CCR, Section 21090 when the closure design includes final slope faces steeper than 3:1 (horizontal to vertical) or a synthetic component in the final cover configuration. The proposed final slopes for the GCLF do not exceed 3:1 but, the final cover design includes a barrier layer which consists of a synthetic component (e.g., LLDPE). Therefore, a slope stability analysis was conducted pursuant to 27 CCR, Section 21750(f)(5) to review the integrity of final slopes under both static and dynamic conditions. The results of the slope stability analysis are included in Appendix C.

E.1.6 CONSTRUCTION QUALITY ASSURANCE (CQA)

The construction of the final cover system shall be carried out in accordance with a CQA Plan prepared in compliance with 27 CCR, Sections 20323 and 20324, which has been certified by an appropriately registered engineer or a certified engineering geologist. The CQA Plan will provide evidence that suitable materials and standard construction practices are used to place the final cover system and to document that placement is consistent with the closure plan design specifications in 27 CCR, Section 20324. A CQA Plan reflecting the final cover design for the GCLF has been developed and included as Appendix M. This plan reflects typical CQA procedures necessary to document the construction of the final cover system for purposes of estimating the associated cost. This plan will be updated, if necessary, if a closure design change is made and/or when the final closure plan is prepared. Elements of the CQA Plan include: project description and definitions, qualifications and responsibilities, requirements for the final cover evaluation, inspection standards, testing frequencies, meetings and documentation.

E.1.7 DRAINAGE AND EROSION CONTROL

E.1.7.1 DRAINAGE CONTROL SYSTEM DESIGN

The primary function of the GCLF drainage control system is to collect and convey stormwater in a controlled manner to minimize erosion and to inhibit infiltration of stormwater or precipitation into the refuse prism. The following sections describe the site hydrology and the drainage control features.

E.1.7.1.1 HYDROLOGY

A hydrology study for the proposed conditions at the site was conducted in accordance with 27 CCR, Section 20365. The objective of the hydrology study was to calculate stormwater run-off for sizing and location information related to the site's storm drain facilities at closure.

The 2003 version of the San Diego County Hydrology Manual and Rational Method of Hydrology were used to calculate peak discharge rates for a 24-hour, 100-year storm event. A computer program developed by Advanced Engineering Software was used to compute the run-off. The hydrology study map indicating drainage sub-areas and discharge points and calculations for on-site and off-site flows are shown on Figure 18. A hydrology/hydraulics analysis is included as Appendix I and additional hydrology information is presented in Section C.2.8.2.

E.1.7.1.2 FINAL DRAINAGE CONTROL SYSTEM

The final drainage control system for the GCLF is shown on Figure 17. The final surface area of the landfill decks will be graded at a minimum three percent gradient to prevent ponding and promote lateral runoff.

The final drainage control system will include exterior slope downdrains, engineered deck area gradients and drainage berms, deck inlets, bench drains and inlets, buried drain pipes, trapezoidal channels, and two desilting basins. Some of the interim drainage control features may be utilized as part of the final drainage control system for the site. For additional drainage control details, refer to Section C.2.8.

E.1.7.2 SOIL LOSS ANALYSIS

The Universal Soil Loss Equation (USLE) was used to evaluate potential soil losses within the watershed boundary of the GCLF site both in a pre-development condition and after closure throughout the post-closure maintenance period. The USLE was intended for analysis of meadows and cropland soil loss. However, with certain engineered assumptions, it can be applied to soil cover over landfills.

The USLE is:

$$A = RKLSCP$$

where

A	=	average soil loss, in tons/acre
R	=	rainfall and run-off erosivity index
K	=	soil erodibility factor, tons/acre
L	=	slope-length factor
S	=	slope-steepness factor
C	=	cover-management factor
P	=	practice factor

The soil loss analysis performed is based on a "closed landfill" condition. At closure, the potential soil loss is minimal because the landfill will have a compacted final cover, an erosion control surface of vegetation and a storm drain system installed which all contribute to controlling soil erosion.

The following USLE constants were utilized:

R = 50	Value for Southern California
K = 0.26	Soil Erodibility
LS = 8.0	Dependent upon length gradient
C = 0.03	Based on vegetative material
P = 0.60	Practice factor

For the purpose of the soil loss analysis, the landfill was divided into regions based upon the average slopes of the final grades and surface drainage. The average soil loss for the GCLF is 1.9 tons/acre/year, which is below the two tons/acre/year allowed by CalRecycle. Over the 30-year post-closure maintenance period, the average soil loss over the entire site will be approximately 0.31 inches. The 30-year soil loss represents 0.7 percent of the total final cover thickness. The landfill soil loss analysis data is presented in Appendix L. The soil loss analysis map is shown in Figure 27.

As mentioned above, a soil loss analysis was prepared to estimate the loss of soil that might occur under ambient (pre-development) conditions (see Appendix L). Based on the results of the second analysis, the soil for the existing, pre-development condition was determined to be approximately four tons/acre/year. This is approximately twice the calculated soil loss for the closed landfill condition.

E.1.7.3 EROSION CONTROL

The landfill closure design has three primary erosion control features that will reduce the potential for soil erosion due to water and wind. These features include fill area grading, vegetation, and a slope bench system.

The decks will be graded for sheet flow run-off with a minimum gradient of approximately three percent. The final vegetative cover and borrow site will be comprised of plant species native to the GCLF area. Plant species for erosion control will adapt to a non-irrigated environment and will maintain beneficial erosion control and aesthetic characteristics within the local climatic environment.

Closure construction BMPs (i.e., straw wattle, coir logs, sand bags, etc.) will be utilized until vegetation is re-established.

The slope benches and/or access roads will be placed at 40-foot vertical intervals on the landfill slope. The final slope bench system will reduce the length of travel of run-off on the slope face thus reducing the opportunity for rilling and gullying.

E.1.8 GAS CONTROL AND MONITORING SYSTEMS

The purpose and intent of gas monitoring during closure and post-closure is to protect public health and safety and the environment. The installation and operation of the GCLF gas migration monitoring system will be in accordance with 27 CCR, Section 20920 and will be completed prior to closure. Sections B.5.2 and C.2.7 provide information regarding the landfill gas control systems. The system will be taken off line in stages as the final cover is constructed. The vertical well head(s) will be extended to accommodate the final cover thickness and synthetic boots will be installed around the well heads and welded to the synthetic barrier layer. The header system will be reinstalled and well heads reconnected to bring the system back on-line.

E.1.9 LIQUIDS MANAGEMENT SYSTEMS

The liquids management systems are described in Section C.2.5. All of these systems will be in-place at closure and maintained throughout the post-closure period.

E.1.9.1 LCRS

The containment system design for the GCLF includes a LCRS above the liner to collect and convey leachate that may be generated within the refuse prism. The LCRS has been designed on the basis of maximum anticipated leachate generation for the disposal area. The general LCRS design will consist of a granular drainage blanket constructed immediately above the liner in the bottom liner areas. A network of leachate collection pipes placed within the granular drainage blanket will convey accumulated fluid by gravity flow to the mouth of the canyon to be discharged into two double-walled collection tanks. This system will be in-place at closure and maintained throughout the post-closure period. The LCRS design over slope liner areas consists of gravel pipe collectors wrapped with a geotextile filter fabric placed on the interior benches along the slopes. For details of the LCRS, refer to Sections B.5.1.1 and C.2.5.

E.1.9.2 SUBDRAIN SYSTEM

Even though the GCLF bottom grades are a minimum of five feet above the piezometer surface and therefore, groundwater is not anticipated, a subdrain system is proposed to be constructed beneath the GCLF waste containment system. The subdrain system will collect and control any groundwater, if it intersects the subgrade excavation along the bottom and/or side slopes.

The subdrain system for the GCLF will be placed beneath the composite liner and will consist of a one-foot thick gravel blanket and gravel filled trenches with slotted collector pipes in the bottom areas. The floor subdrain system is a redundant system in which the permeable gravel pack and the pipe can both convey over a million gallons of water per day. A geotextile layer separates the gravel layer from the low-permeability soil layer on the landfill floor. This geotextile layer prevents the floor subdrain from clogging.

Although groundwater seeping into the subgrade excavation is not anticipated, if it occurs, it will be collected in the subdrain system and will gravity drain to a single collection point at the toe of the landfill. If present, the subdrain system discharge will be monitored for contamination in accordance with the WDR parameters. Any contaminated water will be treated at the landfill by the on-site RO system, other groundwater treatment as discussed in B.5.1.8, or transported to an appropriate off-site disposal facility. The subdrain system is further described in Section C.2.3.

E.1.9.3 GROUNDWATER TREATMENT SYSTEM

The agreement between the San Luis Rey Municipal Water District and the applicant requires the installation of an RO system. The RO system will be installed in the southwestern portion of the ancillary facilities area. For details on the RO system as well as the GAC system for contaminated groundwater treatment, refer to Section B.5.1.8.

E.1.10 SITE SECURITY/SIGNAGE

A perimeter fence and gates, and topographic features will provide site security at the GCLF. In accordance with 27 CCR, Section 21135**,** signs will be posted at all points of access to the GCLF 60 days prior to the last receipt of waste at the site and for a period not less than 180 days after the facility has received the final shipment of waste. Signs will state the intended date of last receipt, the site and location of alternative solid waste management facilities and a number to call in case of emergency. A notice shall be placed in a local newspaper 30 days prior to the last receipt of waste, including the intended date of the last receipt of waste at the site and the location of alternative solid waste management facilities.

In accordance with 27 CCR, Section 21135, all points of access to the site will be restricted as of the date of the final shipment of waste. The operator will secure all points of access with a lock and gate and place signs at all access points prohibiting unauthorized entry. These measures are intended to reduce incidents of vandalism and illegal disposal of wastes during the post-closure maintenance period.

E.1.11 STRUCTURE REMOVAL/DECOMMISSIONING OF ENVIRONMENTAL CONTROL SYSTEMS

Site structures not deemed essential for closure construction or post-closure maintenance will be dismantled and removed in accordance with 27 CCR, Section 21137. For the GCLF, these structures include the scales and scalehouse, maintenance building and administration/visitor center.

All structures and foundations will be demolished and properly disposed of at the site. Scale pits and excavations remaining from demolished foundations will be backfilled with inert soils and compacted. The scales and associated mechanisms, office supplies and computer equipment for the scalehouse will be removed and salvaged.

At this time, there are no plans to decommission any of the proposed environmental control systems at the GCLF at closure or throughout the post-closure maintenance period. If deemed necessary, any decommissioning of boreholes, monitoring wells or piezometers will be conducted in accordance with the appropriate regulatory agency requirements (including notifications, as required) and in general accordance with post-closure maintenance plan procedures.

E.1.12 CLOSURE IMPLEMENTATION SCHEDULE

E.1.12.1 CLOSURE PROCESS

A closure implementation schedule for the GCLF is presented in Table 13, which delineates the estimated time frame to complete each closure task described in this PCPCMP.

Closure construction will begin with mobilization of equipment and materials. The type of equipment and required personnel expected to be utilized during closure construction includes but is not limited to, the following:

- Equipment
  - Scrapers
  - Dozers
  - Loaders
  - Compactors
  - Trucks
  - Soil Screening Equipment
  - Motor Grader
  - Water Truck

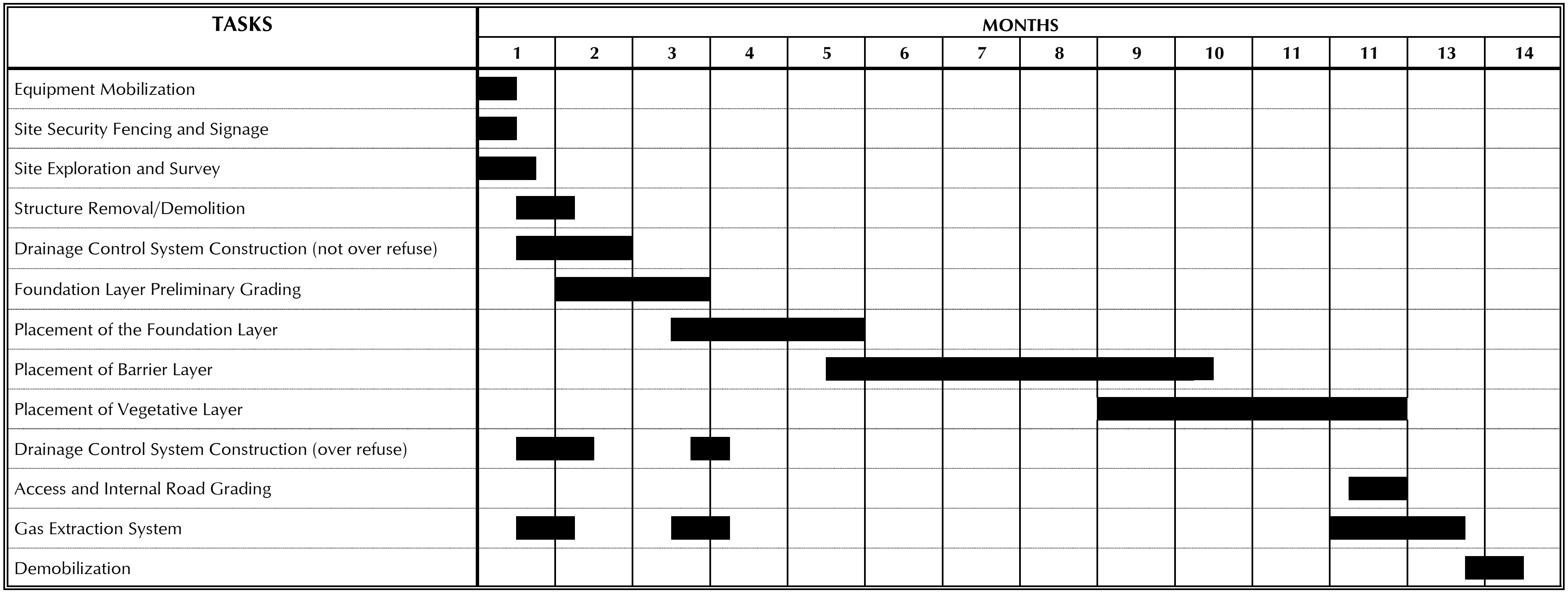
- Personnel
  - Construction Manager
  - Field Inspector(s)
  - Engineer(s)
  - Geotechnical Engineer/Geologist
  - Geotechnical Technician(s)
  - Labor Crews
  - Equipment Operators
  - Surveyors
  - Mechanics

E.1.12.2 CONSTRUCTION SCHEDULE

As required under 40 CFR 258.60, the start of closure construction activities will commence within 30 days after the final shipment of waste.

Closure construction activities will include the following tasks conducted over the corresponding time lines:

TABLE 13
GREGORY CANYON LANDFILL
CLOSURE IMPLEMENTATION SCHEDULE



J:\Gregory Canyon\1997.0139 Permitting\JTD\JTD 2011 January\Table 13-Implementation.XLS: September 2010; Revised January 2011

▪	Equipment Mobilization	2 weeks
▪	Site Security Fencing and Signage	2 weeks
▪	Site Exploration and Survey	3 weeks
▪	Structure Removal/Demolition	3 weeks
▪	Drainage Control Systems Construction (not over refuse)	6 weeks
▪	Foundation Layer Preliminary Grading (including clearing and grubbing)	8 weeks
▪	Placement of the Foundation Layer	10 weeks
▪	Placement of Barrier Layer	20 weeks
▪	Placement of Vegetative Layer	16 weeks
▪	Drainage Control Systems Construction (over refuse)	6 weeks
▪	Access and Internal Road Grading	3 weeks
▪	Gas Extraction System	13 weeks
▪	Demobilization	3 weeks

Some of these activities can be conducted concurrently; therefore, closure construction should occur over a period of approximately 14 months as shown on Table 13.

E.1.12.3 CONSTRUCTION MANAGEMENT

A construction manager will be on-site during the entire period of closure construction. The construction manager will be responsible for supervision of construction of the various features included in the closure plan. The construction manager will coordinate the activities of the on-site contractor(s) and will provide liaison among the design engineer and the contractors. Other key staff may include a site engineer and construction inspector(s). A survey crew and a geotechnical CQA crew will also be present, as required.

Survey Control

The survey control crew, under the direction of the selected contractor, will be responsible for the surveyed location of the closure plan improvements and for record drawing information. They will be responsible for establishing that the various components of the cover conform to the grade and/or thickness requirements of the construction drawings and specifications.

CQA For Final Cover Placement

The construction specifications will include a CQA Plan for final cover placement as part of the final closure plan. A geotechnical CQA crew, under the direction of a Geotechnical Engineer, will be on-site full-time during the placement of the final cover to monitor compliance with cover design and installation methods included in the CQA Plan. The CQA personnel will have day-to-day responsibility to oversee cover placement and to evaluate whether the cover is constructed according to the project specifications.

E.1.13 STRUCTURES OUTSIDE PROPERTY BOUNDARIES

In accordance with 27 CCR, Section 21790 (b)(2), a map (Figure 5) has been prepared showing structures on adjacent properties within 1,000 feet of the GCLF property boundary.

SECTION E.2

POST-CLOSURE MAINTENANCE PLAN

E.2 POST-CLOSURE MAINTENANCE PLAN

E.2.1 INTRODUCTION

Post-closure maintenance of the closed GCLF will be performed in accordance with the applicable regulatory standards presented in 27 CCR, Chapters 3 and 4, and 40 CFR Section 258.61. Post-closure maintenance activities for the GCLF will consist of:

- Landfill Gas Migration System Monitoring and Maintenance.
- Groundwater System Monitoring and Maintenance.
- Stormwater Monitoring.
- Final Cover Inspection and Maintenance.
- Settlement Monitoring and Maintenance.
- Vegetative Cover Inspection and Maintenance.
- Main Access Road and Bridge Maintenance.
- Drainage Control System Inspection and Maintenance.
- Site Security Inspection and Maintenance.

E.2.2 RESPONSIBLE PARTIES

The following is a listing of the responsible parties who will be involved in post-closure maintenance and monitoring activities at the GCLF. Questions pertaining to this PCPCMP and associated activities should be directed to the Gregory Canyon Limited contact.

Landfill Owner/Operator

Gregory Canyon Limited
160 Industrial Street, Suite 200
San Marcos, California 92708
Jim Simmons, Authorized Representative
Telephone No.: (760) 471-2365

A Site Engineer will be responsible for post-closure activities at the GCLF.

Prior to any transfer of ownership during the closure or post-closure maintenance period, responsible parties shall inform the new owner of current regulations, conditions, and agreements assigned to assure compliance.

Additionally, the responsible parties will be responsible of notifying the EA regarding title change within 30 days providing name, firm, mailing address, and telephone number of the new owner in accordance with 27 CCR, Section 21200.

E.2.3 LANDFILL GAS CONTROL AND MIGRATION SYSTEMS MONITORING AND MAINTENANCE

The landfill gas migration monitoring program described in this section provides the procedures proposed to detect migrating landfill gas outside the limits of the landfill.

E.2.3.1 LANDFILL GAS MIGRATION MONITORING PROCEDURES

Monitoring procedures for the gas migration monitoring system will first include inspection of the monitoring probes for visual damage or deficiencies. All probes will be monitored for total hydrocarbons and Total Organic Compounds (TOCs), measured as methane. The monitoring events will be conducted on a quarterly basis, as required by 27 CCR, Section 20933 (a).

At least one void volume will be evacuated from the probe cavity before gas concentrations are measured. The level of total hydrocarbons measured will be obtained by using the following equipment:

- For high-range measurements, a unit capable of measuring 0 to 100 percent by volume will be utilized (e.g., Gas Extraction Monitor [GEM] 500).
- For low-range measurements, a portable Flame Ionization Detector (FID) such as an Organic Vapor Analyzer (OVA) will be used (0-1,000 ppm).

Sample Forms A and B which are to be used by the landfill gas monitoring personnel are included in Appendix O.

E.2.3.2 LANDFILL GAS MIGRATION MONITORING REPORTING

As required by 27 CCR, Section 20934(a), the results of the gas migration monitoring program will be submitted to the EA within 90 days of sampling unless the compliance levels of methane are exceeded in which case notification procedures are provided below. The results will include the concentration of TOCs, measured as methane, in each probe along with information regarding the general conditions under which the sample was obtained. Should the compliance levels be exceeded in any probe, the above-mentioned regulatory agency shall receive verbal notification of the problem within five working days, and indicate what has been done or is planning to be done to resolve the problem. The results will be verified by reviewing the probe readings, possible liquid interference, control well influence, and barometric pressure effects. In accordance with 27 CCR, Section 20937(a)(4), a letter will also be submitted to the EA within ten working days, describing the nature and extent of the problem and the proposed immediate corrective measures that need to be taken to protect public health and safety, and the environment.

E.2.3.3 MAINTENANCE OF LANDFILL GAS MIGRATION MONITORING SYSTEM

The landfill gas control systems will be regularly inspected in conjunction with scheduled monitoring tasks. System components will be repaired and replaced to maintain full system capabilities as intended at initial installation.

Preventative maintenance will be carried out on all mechanical equipment at manufacturer's recommended intervals. This includes cleaning, lubrication, and replacement of worn parts. The accessible portions of gas collection piping will be thoroughly inspected semi-annually for detection of potential failure points and necessary repairs will be noted and implemented.

E.2.3.4 MAINTENANCE OF LANDFILL GAS CONTROL SYSTEM

The following sections cover maintenance requirements for the landfill gas extraction system and associated piping system.

Gas Extraction System

The general maintenance of the landfill gas extraction/control system involves weekly inspections by operating personnel of all wells, pipelines, mainline valves, and mainline sample points.

Operating personnel will be provided with all of the necessary equipment to perform these services. This includes dedicated vehicles, measuring and monitoring equipment, tools and other necessary supplies. An operations log will be kept to provide a continuous record of systems operations. Entries will be made on all routine maintenance activities, emergency repairs, major and minor modifications and adjustments. In addition, all equipment failures, temporary shutdowns, line separations, and blockages will also be documented.

Vertical Gas Extraction Well Maintenance

One of the principal problems affecting vertical wells is breakage or shearing of the well casing caused by settlement or subsidence of the landfill. Damage by heavy equipment can also occur.

Even if a vertical well is broken or sheared, it may not reduce the well performance relative to gas extraction. The well bore and down hole piping may continue to provide a functional conduit for gas extraction. The historic flow characteristics of each well will enable the operator to determine when a sudden drop occurs, indicating a new well may be required.

Another problem encountered in vertical well systems is the settlement of the landfill around the well casing. As settlement occurs, periodic adjustment of the well casing will be required.

If a problem is discovered with a gas well, the following maintenance procedures will be initiated.

- The damaged well or well to be adjusted to grade will be isolated from the gas collection lateral to avoid excess dilution of the gas in the header with outside air.

- Necessary replacement parts will be installed or the well will be adjusted to grade as required.
- The well will then be reconnected to the lateral and returned to service.

All necessary maintenance and/or repairs will be documented using the sample form included as Figure 33.

Vertical Gas Extraction Well Replacement

<u>Drilling</u>

- Gas extraction wells may be redrilled or replaced for various reasons. The following are the most common:
  - The well may be rendered useless due to high temperatures or subsurface fires.
  - The well may be sheared off underground due to landfill subsidence and settlement.
  - The well may be a low producer of landfill gas because of plugged perforations in the casing.
  - Additional coverage in an area is required and more wells are necessary.

- Procedures for redrilling, adding or replacing a gas well are as follows:
  - Choosing the location will be based upon the need for environmental emissions control.
  - The vegetation cover material will be excavated and the synthetic barrier layer cut in the area for drilling. Once the well has been installed, a synthetic boot will be slipped over the well head and then welded to the surrounding synthetic barrier layer. The vegetative material will then be back filled and compacted to 90% relative density. All cover penetration and repair activities will be conducted in accordance with the approved QA/QC Plan developed as part of the final closure plan.
  - The drill rig will be set up on the location chosen by Gregory Canyon Limited. The drilling procedure will meet all regulatory requirements.
  - The well design casing diameter, perforations, gravel packs, borehole diameter, and well seals will be selected by Gregory Canyon Limited.
  - The maintenance crew will construct the proper bentonite seal and install the valve vault.
  - The crew will also connect the well to the gas collection lateral.

Abandonment

- When abandoning the well, the following procedures will be followed:
    - The annular space of the well will be filled with sand to 25 feet below ground surface.
    - An attempt will be made to pull the top joint of the well casing. If this cannot be accomplished, dirt will be removed around the casing to a depth of three feet and the casing cut.
    - The annular space of the well will be filled from 25 feet below grade to ground surface with natural sodium bentonite chips. The well will then be filled with clean water.
    - The area will then be covered with final cover.

- Well abandonment procedures will be recorded on a form as shown in Figure 34.

Piping System

Identification of operational problems in the piping systems requires consistent monitoring. Well connector pipes may break or separate from the gas lateral; control valves may fail, clog or lose adjustment and need to be readjusted; horizontal collectors may become disconnected and liquid accumulation in headers or drains may cause blockage or restrictions.

Gas collection header and condensate drain line inspections will be part of the routine post-closure maintenance operations. The pipelines will be exposed to landfill settlement and movement, construction activities and heavy equipment operations.

Vacuum leaks may cause odors and/or an audible hissing sound. Pipeline breaks or separations, if not discovered in normal field inspections, will produce secondary effects which are easily diagnosed. For example, methane concentrations drop as the oxygen content of the collected gas increases due to air intrusion. Broken or damaged piping will be replaced after the section has been isolated from the rest of the system.

Any pipeline maintenance conducted will be recorded on the form as shown in Figure 35.

Well Head Connection

The gas well head connections are also susceptible to landfill settlement. If the header connection to the well does not allow for flexibility, then a rupture or crack could occur allowing outside air to dilute the gas in the header and diminish the well's performance. This maintenance problem which can be costly in repairs and down time, will be minimized by the use of a high-strength, silicone rubber, flexible coupling. The coupling will be chemically compatible with the landfill gases and will allow differential settlement between well head and lateral piping.

Maintenance Schedule

The majority of the components of the landfill gas control system will be inspected on a weekly basis. Maintenance for these systems is as required and as described in this section.

A full stock of spare parts will be kept at GCLF which will allow for timely repairs and/or replacements of components such as piping, valves, fittings, etc. Table 14 shows the schedule on the frequency of inspection and maintenance to be performed on the gas control system.

E.2.4 SURFACE EMISSIONS MONITORING PROCEDURES

The surface emissions monitoring program described in this section gives the methods and procedures required to monitor the effectiveness of controlling migrating landfill gas through the final cover in accordance with SDAPCD Rule 59.

The landfill gas control system is the primary mechanism for controlling surface gas emissions. The air monitoring procedures outlined below are to comply with SDAPCD surface emissions standards.

E.2.4.1 INSTANTANEOUS SURFACE EMISSIONS SAMPLING

Instantaneous sampling of the surface of the landfill will be collected over the entire landfill area utilizing a grid system that will be developed. This sampling

TABLE 14
GREGORY CANYON LANDFILL
POST-CLOSURE MAINTENANCE SCHEDULE

MAINTENANCE ACTIVITY	FREQUENCY
FINAL COVER MAINTENANCE	
A. Inspection	Quarterly
B. Repair	As-Required
MAIN ACCESS ROAD AND BRIDGE	
A. Inspection	Quarterly
B. Repair	As-Required
DRAINAGE FACILITIES MAINTENANCE	
A. Bench Drains & Inlet Structures	Quarterly
B. Downdrain Systems	Quarterly
C. Deck Drainage System	Quarterly
D. Asphalt Drainage Channels, Pipes and Ditches	As-Required
E. Detention Basin	Quarterly
LANDFILL GAS RECOVERY SYSTEM MAINTENANCE	
A. Gas Extraction Well Maintenance	Weekly
B. Gas Extraction Well Replacement	As-Required
C. Piping System	Weekly
D. Condensate Conveyance Lines and Collection Tanks	Weekly
E. Flare Station	Annually or as required
GAS MIGRATION CONTROL/MONITORING SYSTEM MAINTENANCE	
A. Inspection	Quarterly
B. Maintenance	As-Required
LANDSCAPE AND IRRIGATION MAINTENANCE	
A. Weed Control	Semi-Annual or as required
B. Rodent Control	Annually or as required
C. Reseeding and Mulching	Semi-Annual
SURVEY MONUMENTATION MAINTENANCE	
A. Disposal Area Monuments	Annually
FENCE MAINTENANCE	
A. Inspection	Quarterly
B. Maintenance and Repair	Quarterly or as-required
GROUNDWATER MONITORING SYSTEM AND MAINTENANCE	
A. Inspection	Quarterly
B. Well Maintenance	As-Required
C. Well Replacement	As-Required

will identify specific locations where excessive landfill gas emissions are occurring and where repair of the final cover may be required.

The objectives of the surface sampling is to identify specific areas where surface gas emissions exceed 500 ppm by volume expressed as methane as required by SDAPCD, or any other applicable standard as promulgated, and to measure the effective operation of the gas collection system and final cover.

E.2.4.2 AMBIENT AIR SAMPLES AT THE PERIMETER OF THE SITE

Ambient air samples will be collected inside the refuse footprint area within 10-feet of the landfill perimeter on days when meteorological conditions are representative for the locations of known downslope wind drainage. Sampling will not be conducted when it is raining or when average wind speeds are greater than 15 miles per hour for any 30 minute period or when the instantaneous wind speed is greater that 25 miles per hour. These samples will be collected seasonally during stable meteorological conditions for the winter and summer seasons. All samples will be analyzed for total organic compounds, toxic air contaminants and criteria pollutants except ozone emitted to the atmosphere as required by SDAPCD.

E.2.5 WATER QUALITY MONITORING SYSTEM AND MAINTENANCE

The monitoring program that will be instituted at the GCLF is designed to detect potential migration of contaminants from the landfill. The monitoring program for the GCLF will be performed in accordance with 27 CCR, Chapter 3, Subchapter 3. The water quality monitoring program will be conducted throughout the post-closure maintenance period following site closure.

E.2.5.1 GROUNDWATER MONITORING PROCEDURES

The groundwater monitoring system at the GCLF is described in Section B.5.1.3. Article 1 groundwater monitoring costs are included in the post-closure cost estimate. However, any future corrective action program or capital improvement costs will be covered under a separate account maintained by Gregory Canyon Limited, and financial assurance as required by 27 CCR will be provided.

It is expected that modifications to program frequency and protocols will take place depending upon changing conditions, and the results of monitoring and improved technologies. This Plan will be amended to include any changes in the monitoring program or modifications to the system, including the installation of any proposed remediation systems.

E.2.5.2 GROUNDWATER MONITORING REPORTING

Monitoring will be performed in accordance with 27 CCR, Chapter 3, Subchapter 3, Article 1. Sample collection, storage and analysis will be performed in accordance with the most recent version of Standard USEPA Methods and in accordance with the most current M&RP (Appendix G) approved by the RWQCB.

All samples will be analyzed on a quarterly basis for routine monitoring parameters and VOCs. Constituents of Concern (COC) monitoring will be performed every five years in accordance with 27 CCR, Chapter 3, Subchapter 2. The COC report may be combined with any monitoring report or the annual summary report having a reporting period that ends at the same time.

E.2.5.3 GROUNDWATER MONITORING SYSTEMS MAINTENANCE

The groundwater monitoring wells will be serviced and maintained to allow the wells to perform to the standards for which they were designed. Monitoring wells will be inspected prior to each monitoring event to determine if the well has been tampered with or damaged. All necessary maintenance and/or repairs for wells are to be documented using a form similar to sample Form C included in Appendix O.

If a monitoring well is damaged, it may need to be repaired or replaced using a method approved by the RWQCB. The Site Engineer will oversee the well replacement process including abandonment (if necessary) as well as coordination with the RWQCB.

If a groundwater monitoring well becomes unusable or irreparable, it will be abandoned following RWQCB procedures, San Diego County Department of Environmental Health Services regulations and the most current guidelines in the "California Well Standards: California Department of Water Resources" (DWR Bulletin 74-90).

E.2.6 WATER TREATMENT SYSTEM MAINTENANCE

The RO system or GAC (if installed) will be maintained routinely. All filtration elements will be changed on a regular schedule depending on the ultimate water inflow rate. Residual sludges will be disposed off-site to an approved facility.

E.2.7 STORMWATER MONITORING

A stormwater monitoring program was developed for the GCLF in accordance with the General Permits to Discharge Stormwater (i.e., construction and industrial) administered by the RWQCB in compliance with NPDES regulations. The program includes specific procedures for inspection, sampling, observations and reporting. A SWPPP was prepared and will be amended, as necessary, to reflect any changes in operation and design as a result of ongoing or closure operations. The SWPPP and the MPRR are included in Appendix D.

E.2.8 FINAL COVER INSPECTION AND MAINTENANCE

The purpose of the completed final cover is to:

- Minimize stormwater infiltration into and through the closed landfill,
- Minimize the venting of gas generated in the facility,
- Isolate the buried wastes from the surface,
- Promote drainage,
- Minimize erosion or abrasion of the cover, and
- Accommodate settlement and subsidence so that cover integrity is maintained.

The primary purpose of the final cover maintenance procedures is to maintain the integrity of the completed final cover over the long-term and provide maintenance, scheduling and documentation so that materials and maintenance practices are consistent with the final cover design specifications. Quarterly visual inspections of the final cover will include identification of erosion and settlement problems.

The Site Engineer will be responsible for documenting the location and extent of any repairs.

E.2.8.1 INSPECTION PROCEDURES

All employees with access to the site will be instructed to report any final cover surface cracking, ponding or unusual surface conditions to the Site Engineer, who will record the information in the site logbook at the time they are observed. Scheduled, formal inspections will be performed on a quarterly basis by grid walking the site to visually observe the following:

- Evidence of erosion
- Visible depressions
- Ponded water
- Odor
- Exposed refuse
- Cracks
- Settlement and subsidence
- Slope failure
- Leachate seeps

Additionally, the drainage control facilities will also be inspected quarterly, as described in Section E.2.12, for improper operation and resultant effects on the surrounding final cover.

A formal report of findings is to be presented to the Site Engineer. This report will be reviewed with Gregory Canyon Limited and the report will be maintained at the record library.

E.2.8.2 MAINTENANCE PROCEDURES

The final cover design for the GCLF consists of a minimum 24-inch foundation layer, 60-mil LLDPE geocomposite barrier layer, including a geonet with a non-woven geotextile on each side for the deck areas, and a 24-inch vegetative layer. Figure 31 shows a typical cross-section of the final cover system design.

All final cover repair and/or reconstruction activities shall be conducted in a manner directed at maintaining the integrity of the as-built final cover system. Repair of fill materials should be performed in six to eight-inch layers consistent with the layers and procedures utilized during the original final cover construction. Additionally, the repair of the geosynthetic cover will also be consistent with the procedures used during initial installation.

The methods of repair discussed in the subsequent paragraphs are recommended for the following three modes of final cover distress:

- Penetration into or through the final cover associated with any installation or maintenance of gas or groundwater system components.
- Settlement related sags and drainage interruptions, which interfere with the controlled flow and discharge of surface waters from the closed landfill surface.
- Surface erosion associated with intense rains.

Final cover repair activities will be conducted and documented as specified in the CQA Plan (Appendix M). In addition, any repair involving removal of the synthetic cover must be approved by the Site Engineer and the synthetic cover installer must be contacted to cut and subsequently patch and seal the synthetics. The CQA inspector shall observe all fill placed in the foundation or low-permeability zones of layered systems and all geosynthetics installed.

Elective Penetration

Elective penetration of the final cover associated with installation or maintenance of gas or groundwater monitoring system components should be initiated in coordination and with the approval of the Site Engineer. All earthwork should be completed in accordance with the procedures contained in the CQA Plan (Appendix M).

Care should be taken during excavation not to damage the geosynthetic cover beyond which is reasonably necessary. Damaged synthetics will need to be replaced with new material placed and overlapped, in accordance with the CQA.

For boring excavations, the annular space between the well casing and the boring wall will be backfilled with final cover fill material and tamped to achieve specified compaction.

Sags, Ponding, Drainage Interruptions and/or Surface Erosion

Significant depressions in the final cover, as observed during routine site inspections, will be promptly repaired with the goal of repairing all depressions prior to the onset of the rainy season (October to April). A channel capable of draining the lowest point of the sag may be constructed if ponding is anticipated for a prolonged period. Additional soils can also be placed so that the intended flow of surface water is re-established. The Site Engineer will be responsible for directing fill placement in the sag area only in order to facilitate drainage. Record of the depths and limits of fill placement will be maintained.

In addition, if post-closure maintenance to the final cover necessitates stripping of the vegetative cover to make repairs, only the affected area would be redirected to the buried storm pipe again until the native vegetation condition criteria is achieved.

E.2.9 LANDFILL SETTLEMENT MONITORING AND MONUMENT MAINTENANCE

E.2.9.1 SURVEY RECORD

Regulatory requirements dictate that, upon completion of closure construction activities, a survey record of the closed landfill be established and recorded with the title of the property, with the County Recorders office and copies be made available to CalRecycle, LEA and kept on-site at the administration offices. The survey of record will include the following information:

- The date closure construction was completed;
- Boundaries of the disposal area;
- The location and telephone number of where the closure and post-closure plans can be obtained; and
- A statement that the future site use is restricted in accordance with the post-closure maintenance plan.

A discussion of the site's operating record requirements is included in Section A.3.1.

E.2.9.2 SURVEY/SETTLEMENT MONUMENTS

In accordance with 27 CCR, Section 20950 (d), survey/settlement monuments are to be established at the landfill so that facilities constructed during closure can be located and controls can be provided from which to monitor future landfill settlement. After completion of the final cover, settlement monuments will be set on the landfill in the disposal area as shown on Figure 9. These monuments will be used to monitor settlement within the closed landfill and will allow for a determination of the actual settlement that occurs over the post-closure maintenance period.

Additionally, 27 CCR, Section 21090 (e)(2) requires operators to produce iso-settlement maps every five years throughout the post-closure maintenance period or until settlement has ceased. Prior to an aerial survey, the monuments will be surveyed for horizontal and vertical control so that an accurate disposal area topographic map can be developed. Aerial "targets" will be placed over these monuments after the survey has been completed and an aerial topographic map will be generated to provide an up-to-date contour map of the disposal area.

Prior to a scheduled survey of the monuments, an inspection will be performed to ensure that the monuments are intact and usable. The monument will be cleared of all debris and vegetation to allow for visual location of the monument and accurate readings. Should a monument be damaged or missing, a new monument will be placed at that location so that the continuity of the previous survey data will be maintained.

If a monument is within an area requiring regrading and/or other reconstruction, it shall be replaced at approximately the same horizontal location and a note shall be placed to identify the new elevation.

E.2.10 VEGETATIVE COVER INSPECTION AND MAINTENANCE

The GCLF vegetative cover is designed to provide year round non-irrigated open space erosion control. This PCPCMP describes the vegetative cover maintenance procedures to be implemented upon closure and conducted throughout the post-closure period. The cover will be established as a grassland and partial inland valley sage plant community. Long-term succession and establishment of the plant material will simulate the natural cycles and appearance of the adjacent open space areas.

A total of three post-closure activities are identified as integral to the maintenance of the vegetative cover. These activities include weed control, rodent control, and reseeding.

<u>Weed Control</u>

The intent of the weed control program is to properly identify weeds or other plant materials unsuitable for erosion control and/or unsuitable for the establishment of the final cover system. Problematic weeds may be prone to invasiveness, unsightliness, fire, and may possess root systems too deep for the final cover. Monitoring activities should occur semi-annually during and following the winter rain cycle and should identify new growth of problematic weeds. Once problematic weeds are identified, eradication methods should occur prior to seed production. Recommended eradication methods include hand removal and/or biologically friendly chemical control/removal.

<u>Rodent Control</u>

Rodent burrowing could potentially damage the vegetative layer of the final cover. However, a large rodent population is not expected at the GCLF and rodent activity should remain at harmless levels since the native vegetation does not offer excessive food availability or shelter from natural predators. Monitoring of rodent activity will occur in the spring months when food is most available. Rodent control measures will be implemented, as needed, as discussed in Section B.5.3.2.

Reseeding and Mulching

As post-closure activities and operations are performed, the vegetative cover may be damaged or removed. At these times, reseeding will be necessary to maintain adequate erosion control. All reseeding should conform to Final Closure landscape specifications. Hydro-mulching would be performed on areas too steep or too large for drill or hand-seeding. Drill-seeding would be utilized in large, flat areas. A hand-held "whirly-bird" spreader followed by hand-raking would be the recommended form of seed application for smaller areas (approximately one acre).

E.2.11 MAIN ACCESS ROAD AND BRIDGE MAINTENANCE

The main access road and bridge will require general maintenance. After a significant storm event and on a quarterly basis, the access roads and bridge will be inspected to determine if any potholing, erosion and/or structural damage has occurred. If any deficiencies are noted, the affected area will be repaired. Access roadways will also be inspected quarterly and will be resurfaced every five years, as necessary. Major bridge repairs may be made by an outside contractor selected by Gregory Canyon Limited.

E.2.12 DRAINAGE CONTROL SYSTEM INSPECTION AND MAINTENANCE

The following sections delineate the various maintenance activities to be performed on the landfill drainage control facilities for the site.

After the drainage control system has been in service for several years, a more definitive inspection and maintenance schedule can be developed identifying those areas that must be inspected annually and those areas that must be inspected prior to and after a storm and those areas that require maintenance before the wet season.

E.2.12.1 DECK DRAINAGE CONTROL SYSTEM FEATURES MAINTENANCE

Inspection for proper deck surface drainage will be performed in conjunction with the final cover procedures described in Section E.2.8. It is important that maintenance vehicles utilize access roads provided on the decks and benches whenever possible to reduced surface rutting which could interfere with the designed drainage patterns.

E.2.12.2 DOWNDRAINS, DRAINAGE PIPES AND CHANNELS AND DITCHES

A visual inspection of each open channel and downdrain will be conducted to identify any of the following deficiencies:

- Cracking
- Settlement
- Spalling

The following corrective measures can be taken for deficiencies identified during the inspection.

Cracking
- Construction of expansion/control joints.
- Resurface.

Settlement
- Grout injection.
- Complete replacement with subgrade rework.

Spalling
- Sandblast affected area and resurface.
- Sawcut and remove affected area, dowel into existing undamaged section and resurface.

E.2.12.3 OVERALL DRAINAGE CONTROL SYSTEM MAINTENANCE SCHEDULE

The on-site drainage control facilities must be free of debris and operational at all times. In order to provide the desired protection against flooding and erosion damage, routine inspections of the drainage control system will be conducted. A written report will be prepared for all scheduled inspections and will be kept on file with the Site Engineer. In addition, all inspection forms will be maintained in the operating record file as required by 40 CFR, 258.29. Form E included in Appendix O is a standard inspection form which can be used for this purpose.

E.2.13 SITE SECURITY INSPECTION AND MAINTENANCE

Security fencing, access gates and signs will be inspected quarterly to ensure that the integrity of site security has been maintained. The gates will be inspected to check that the locking mechanisms are intact and workable. Any necessary repairs or replacements will be made during the quarterly inspection.

E.2.14 EQUIPMENT, LABOR AND MATERIAL REQUIREMENTS

E.2.14.1 EQUIPMENT

The equipment schedule presented in Table 15 delineates the specific type of equipment, instruments and tools expected to be used for post-closure maintenance. Any required equipment, not kept on-site, will be rented on an "as needed" basis.

E.2.14.2 LABOR

The labor necessary to monitor and maintain the GCLF during post-closure will be directed and coordinated by a designated Site Engineer. The Site Engineer will conduct the inspections.

The maintenance and staff person as well as all consultants performing various activities, such as surveying or drilling, will be under the direction of the Site Engineer. The Site Engineer will conduct ongoing training of all personnel and consultants, including emergency response notification procedures, generally in accordance with Section B.4.4.2 but also specific to site activities occurring during the post-closure management period.

The projected maintenance schedule for each of the post-closure activities is shown on Table 14. The primary purpose of this schedule is to identify the frequency of mandatory inspections for the various systems. The frequency of monitoring the gas migration system, sampling and analysis for the groundwater/vadose zone and survey of the settlement monuments will be in accordance with the monitoring schedule presented in Table 16.

TABLE 15
GREGORY CANYON LANDFILL
POST-CLOSURE EQUIPMENT SCHEDULE

	Small Dozer	Dump Truck	Motor Grader	Backhoe w/ Bucket Loader	Compactor	Sheepsfoot Compactor	Tampers	Water Truck	Vacuum Truck	Pickup Truck	Flatbed Truck	Boom Truck	Portable Generator	Air Compressor	Concrete Mixer	Sand Blasting Unit	Hydro-mulching Machine	Grouting Equipment	Transfer Pumps
EQUIPMENT REQUIREMENTS																			
Final Cover Maintenance																			
Inspection										■									
Repair	■	■	■	■	■	■	■	■		■								■	
Drainage Facilities Maintenance																			
Bench Drains and Inlet Structures		■	■	■			■	■	■	■	■	■	■	■	■				
Down Drain Systems				■			■	■		■	■	■	■	■					
Deck Drainage System		■	■	■				■		■									
Concrete Drainage Channels								■		■		■	■	■	■	■		■	
Liquids Management System Maintenance																			
Pumps										■		■	■	■					■
Sumps and Storage Tanks									■	■			■						
Condensate Drain Line				■			■			■			■						
Transfer Pump and Pipeline									■	■		■	■						■
Drain Line				■						■									
Landfill Gas Recovery System Maintenance																			
Gas Extraction Well Maintenance										■	■	■	■	■					
Gas Extraction Well Replacement										■	■		■						
Piping System										■	■	■	■						
Gas Flares										■	■		■						
Blowers										■	■		■						
Gas Migration Control System Maintenance																			
Perimeter Probes										■	■		■						
Perimeter Wells										■	■		■	■					
Piping System										■	■		■	■					
Landscape and Irrigation Maintenance																			
Weed Control								■		■	■			■					
Rodent Control										■									
Reseeding and Mulching								■		■	■			■			■		
Survey Monumentation Maintenance																			
Disposal Area Monuments										■									
Perimeter Fence Maintenance																			
Fence Maintenance and Repair										■	■	■	■						
Groundwater Monitoring																			
Well Maintenance										■	■	■	■	■					
Well Replacement										■	■		■	■	■				
Article 1 Monitoring										■									
Gas Recovery System Monitoring										■									
Gas Migration Control System Monitoring										■									
Surface Emissions Monitoring										■									

TABLE 15
GREGORY CANYON LANDFILL
POST-CLOSURE EQUIPMENT SCHEDULE

	Well Pumps	Drill Rig	Sounding Device	Groundwater Sampling Equipment	Pump Truck	Tooling Truck	Cuttings Container	Welding Equipment	Cable Pullers	Winches	Waterjet Spray Unit	Bucket Line Machine	Fire Hydrant Hose	Nozzles	Gas Sampling Equipment	Surface Sampling Equipment	OVA Meters	Gas Chroma-tography	Blowers for Ventilation	Safety Equipment	Respiratory Equipment
EQUIPMENT REQUIREMENTS																					
Final Cover Maintenance																					
Inspection																					
Repair	■	■	■	■	■	■	■	■												■	
Drainage Facilities Maintenance																					
Bench Drains and Inlet Structures								■	■		■		■	■					■	■	■
Down Drain Systems								■	■	■	■	■	■	■					■	■	■
Deck Drainage System								■	■		■		■	■					■	■	■
Concrete Drainage Channels, Pipes and Ditches											■		■	■						■	
Liquids Management System Maintenance																					
Pumps																				■	
Sumps and Storage Tanks																			■	■	■
Spring Seepage Control System																				■	
Condensate Drain Line																			■	■	■
Transfer Pump and Pipeline																				■	■
Drain Line																				■	■
Landfill Gas Recovery System Maintenance																					
Gas Extraction Well Maintenance																				■	■
Gas Extraction Well Replacement		■				■	■												■	■	■
Piping System																			■	■	■
Gas Flares																	■		■	■	■
Blowers						■											■			■	
Gas Migration Control System Maintenance																					
Perimeter Probes																				■	
Perimeter Wells																				■	
Piping System																				■	
Landscape and Irrigation Maintenance																					
Weed Control																				■	
Rodent Control																				■	
Reseeding and Mulching																				■	
Survey Monumentation Maintenance																					
Disposal Area Monuments																				■	
Perimeter Fence Maintenance																					
Fence Maintenance and Repair																				■	
Groundwater Monitoring																					
Well Maintenance																				■	
Well Replacement		■			■	■	■													■	
Article 1 Monitoring	■		■	■																■	
Gas Recovery System Monitoring															■		■	■		■	
Gas Migration Control System Monitoring															■		■	■		■	
Surface Emissions Monitoring															■	■				■	

TABLE 16
GREGORY CANYON LANDFILL
POST-CLOSURE MONITORING SCHEDULE

MONITORING ACTIVITY	FREQUENCY
ARTICLE 1 MONITORING	
A. Leachate/Groundwater Sampling	Quarterly
B. Constituents of Concern Monitoring	Every 5 years
C. Groundwater Elevation/Flow Rate/Direction	Every 5 years
D. Surface Water Monitoring	Quarterly
GAS RECOVERY SYSTEM MONITORING	
A. Collection Headers	Quarterly
B. Wells	Quarterly
C. Sampling Gas in Collection Headers and Probes	Quarterly
GAS MIGRATION CONTROL SYSTEMS MONITORING	
A. Perimeter Probes	Quarterly
D. Structures	Quarterly
SURFACE EMISSIONS MONITORING	
A. Integrated Surface Emissions (50 PPM Rule)	Annually
B. Visual Inspection of Landfill Surfaces	Monthly
C. Ambient Air Samples at Perimeter of the Site	Annually
SURVEY MONUMENTS	
A. Aerial Survey	Every 5 years

SECTION E.3

POST-CLOSURE EMERGENCY RESPONSE PLAN

E.3 POST-CLOSURE EMERGENCY RESPONSE PLAN

E.3.1 PURPOSE AND SCOPE

This Emergency Response Plan (ERP) was prepared in accordance with 27 CCR, Sections 21130 and 21132, as part of the GCLF PCPCMP. The ERP identifies occurrences that may exceed the design of the site and endanger public health or the environment. The ERP also sets forth actions which will minimize the effects of these catastrophic events. The provisions of this ERP will be carried out immediately whenever an event occurs such as a fire, explosion, flood, earthquake, vandalism, surface drainage problems or release of any waste product which may threaten public health and/or the environment.

E.3.2 SITE SAFETY OFFICER

The Site Manager will have the responsibility of the Site Safety Officer (SSO). An alternate will also be designated by both of these individuals. The SSO and alternate will be trained to handle all emergency situations. The main responsibility of the SSO is to oversee the management of all emergency response procedures implemented at the landfill. The SSO is required to be thoroughly familiar with all aspects of the ERP as well as the waste containment system features, environmental control systems, post-closure maintenance activities, the location and characteristics of buried refuse, the location of facility records and the overall site layout. In addition, the SSO shall be given the authority to commit any of the available resources necessary to carry out the ERP. Qualifications of the SSO and alternate will include general safety training, hazardous communication training, and hazardous materials recognition training.

E.3.3 EMERGENCY RESPONSE NOTIFICATION PROCEDURE

An ERP will be prepared and maintained at the GCLF. Site personnel will be trained based on the procedures included in the ERP as discussed in Section B.4.2.2. When any member of the site's maintenance personnel discover or witness an event which constitutes an emergency situation they shall determine the nature, source, and location of the emergency situation and immediately report the occurrence to the Site Engineer, who will notify the SSO. The SSO will notify all of the appropriate emergency response agencies to provide assistance to site personnel. If an emergency event occurs when field personnel are not on-site, the general public will be able to call the telephone number posted on a sign at the site entrance to notify the SSO.

E.3.4 EMERGENCY RESPONSE PROCEDURES

General emergency response procedures for fire, explosions, earthquakes, floods, vandalism, release of waste products to air and soil, or surface drainage problems, are described below.

- Remove all non-essential employees from the vicinity of the incident.
- Remove non-essential equipment, if it can be done safely, from the vicinity of the incident.
- Determine and identify the nearest source of available equipment and supplies for responding to the incident.
- When practicable, the SSO may utilize on-site personnel to control the incident.
- The Site Engineer or his designee will be responsible for site personnel safety. The Site Engineer will communicate any damage and/or injury reports to the SSO and will coordinate all emergency actions directed by the SSO.
- Site personnel will be available for inspection of the landfill after an incident occurs. All crew members will be supplied with appropriate personal protective clothing, as required by the SSO, when conducting inspections of the site for possible design failure. All findings will be reported to the SSO for action.
- The SSO will immediately begin surveillance in those areas of the facility affected by the incident. In addition, monitoring will be conducted to prevent an incident from affecting other areas of the facility or adjacent properties.
- The operator will maintain a small stockpile of final cover material for those events which may require immediate cover placement to minimize waste releases, to repair severe cracks, or to fill in large erosion gullies.

The type of equipment and materials that should be available for emergencies include a cellular phone, first aid kit, air supplies, fire extinguisher, final cover material, and sandbags.

E.3.5 FIRE AND/OR EXPLOSIONS

The following procedures will be followed during incidents of fire and/or explosions:

- Contact the appropriate fire protection agency, with the San Diego County Fire Authority, of which the GCLF is within the sphere of influence, or the County of San Diego, to provide fire protection, even if on-site capabilities are deemed adequate to extinguish fires or control future explosions. On-site landfill personnel will be instructed to follow the fire department's directions and give their full cooperation.
- In the event of an off-site fire near the landfill, such as a structural fire, the operator will lend its personnel and equipment, if available, to the Fire Department to fight the fire.

E.3.6 FLOOD

The landfill footprint and borrow/stockpile areas are not located within the designated boundaries of a 100-year floodplain. The access road/bridge would be located within the designated boundaries of the 100-year and 500-year floodplains. However, the lowest elevation of the access road/bridge would be 312.0 while the 100-year floodplain at the upstream is 310.7 feet. Therefore, the access road/bridge is designed to be above the highest record elevation of the 100-year floodplain so that no significant flooding impacts would occur during operations. The landfill perimeter drainage network would collect all surface drainage flowing toward the landfill footprint.

The following procedures will be followed if flood waters occur at the GCLF in excess of the handling capability of the stormwater control system:

- Earthen berms may be constructed in areas prone to flooding.
- If berming is ineffective, the operator may cut a diversion channel to avoid inundation of the refuse cell.
- Sand bags may be used in conjunction with berms or diversion channels.

E.3.7 EARTHQUAKE

The following procedures will be performed following an earthquake incident:

- Employees driving in the field during an earthquake should stop their vehicle and get out, if it can be done in a safe manner.
- After the earthquake has subsided, site personnel shall report to the site entrance gate for a roll call. If medical care is required, the procedures in Section E.3.13 shall be followed. An inspection of the site shall then be made and a report given to the SSO.
- Cracks observed in the final cover after an earthquake should be inspected with a combustible gas analyzer. The location of venting and the gas concentrations will be determined and reported to the SSO. Excavation and refill of the smaller surface cracks will be completed immediately. More extensive corrective actions will be authorized by the Site Engineer in accordance with a CQA Plan.

E.3.8 SURFACE DRAINAGE PROBLEMS

In the event of a surface drainage problem, the following procedures shall be followed:

- The operator will investigate the problem and determine a necessary course of action.
- If a surface inlet is blocked with debris, all necessary labor forces and equipment will be implemented under the direction of the operator to remove the blockage.
- If a storm drain is damaged, a plan will be prepared and implemented by the operator to repair the problem.
- After the drainage problem is corrected, an assessment of possible damage or erosion will be conducted and all necessary repairs will be made.

E.3.9 VANDALISM

The following procedures will be followed during incidents of vandalism:

- Repair (i.e., replace, repaint) any portion of the property which has been vandalized.

- Immediately repair any vandalism which affects site security and/or environmental control/monitoring systems.

E.3.10 UNDERGROUND FIRES

Underground landfill fires or elevated subsurface temperatures occur due to air intrusion into the refuse cell. Indicators of this condition are as follows:

- Unusual depression-like settlement with tension cracks.
- Smoke/steam.
- Unusual odor.
- High levels of carbon monoxide.

Should any of the above indicators be noted, the first course of action would be placement of soil to cover the depression and/or cracks. If this measure does not correct the problem, additional measures listed below may be taken under the direction of the SSO and/or operator.

- Monitor nearby landfill gas extraction wellheads for increases in background gas temperature, in nitrogen/oxygen ratios, and carbon monoxide concentrations, and decreases in methane and carbon dioxide concentrations. Elevated temperatures, carbon monoxide concentrations, and nitrogen/oxygen ratios, above background levels may indicate subsurface combustion.
- Information collected from the landfill gas extraction wells may be a means of determining the vertical extent (shallow versus deep) of the elevated temperatures and underground fires based on the depths of the extraction well screen interval.
- Close suspected landfill gas wells that surround the area.
- Install synthetic well bore seals on wells having insufficient seals, to minimize air intrusion at the well casing interface.
- Routinely hydrate the landfill surface in the fire area with water to seal settlement and desiccation cracks in the cover soil.
- Excavate cover soil and waste material exhibiting elevated temperatures while at the same time adding water to the excavation to inhibit air intrusion into the waste; then backfilling the excavation with compacted clean soil (this procedure for shallow fires only).

- When the elevated subsurface tempeature/underground fire is located at a vertical extraction well, inject water into the wellhead to cool the waste mass. In addition, excavate cover soil directly around the wellhead while at the same time adding water into the excavation to inhibit possible air intrusion into the underlying waste; then backfilling the excavation with compacted clean soil.

E.3.11 EMERGENCY RESPONSE PLAN ORIENTATION

Contacts should be made with appropriate emergency response agency representatives and the following information should be conveyed:

- Familiarize them with the layout of the facility, the properties of the waste materials deposited, and the evacuation routes.
- Establish understandings between the responding Police/Sheriff and Fire Departments and designate which agency has primary emergency authority during an incident.
- Establish understandings between emergency response teams, emergency response contractors, and equipment suppliers for smooth coordination of emergency response actions.

E.3.12 EVACUATION PROCEDURES

During and/or after an incident, the SSO in consultation with other emergency personnel, such as the fire department, will assess the potential for injury to any persons located on adjacent properties. If the assessment concludes that an imminent threat to public health is possible, an evacuation of the nearby area will be initiated. Situations which warrant partial or complete evacuation of site personnel and/or local residents are as follows:

- Explosions resulting in airborne debris including particles and large fragments.
- Fires that cannot be readily contained or are spreading to other parts of the facility; or when fire could generate highly toxic fumes, or create a danger of igniting potentially explosive substances which may be stored on-site.

The SSO will immediately notify the Sheriff Department and all other appropriate emergency response agencies. The SSO will check that the entrance gate is unlocked and resecured as required.

E.3.13 MEDICAL CARE PROCEDURES

Should an emergency situation result in personal injury, immediate steps will be taken to determine the cause and extent of the injury and to render first aid. The SSO will be notified in all cases and the paramedics will be called when required. If further medical attention is necessary, the injured person will be transported to the nearest medical facility.

E.3.14 AMENDMENTS TO THE EMERGENCY RESPONSE PLAN

The ERP will be reviewed and can be amended, in accordance with the criteria listed in 27 CCR, Section 21130(c). The amendment criteria are as follows:

- A failure or release occurs for which the plan did not provide an appropriate response.
- The post-closure use and/or structures on the site change and these changes are not addressed in the existing plan.
- The EA, the RWQCB or CalRecycle notifies the operator in writing that the current emergency response plan is inadequate under the provisions of this section. The notifying agency shall include within the written notice those items that must be considered for the plan to be in compliance with this section. The operator shall submit an amended ERP to the EA, the RWQCB and CalRecycle within 30 days of receipt of notification that the plan is inadequate.

Whenever the ERP is amended, a written copy will be submitted to the EA, the RWQCB and CalRecycle. Finally, procedures similar to those outlined in this ERP will be applied to emergency events occurring during active operations prior to closure and post-closure maintenance of the GCLF. As provided in Section E.2.1.4.2, all site personnel will receive ongoing training in emergency response notification procedures.

SECTION E.4

PROFESSIONAL CERTIFICATION OF ACCURACY

E.4 PROFESSIONAL CERTIFICATION OF ACCURACY

Current regulations require that a registered civil engineer or a certified engineering geologist prepare and certify the accuracy of closure plans for all Class III landfills. The Gregory Canyon Landfill Preliminary Closure/Post-Closure Maintenance Plan has been prepared in accordance with 27 CCR, Chapters 3 and 4 and 40 CFR, Part 258 as certified by Mr. Bryan A. Stirrat, a California Registered Civil Engineer, Registration Number C 22631.

Respectfully Submitted:

REGISTERED PROFESSIONAL ENGINEER
BRYAN A.
STIRRAT
22631
Exp. 12-31-11
CIVIL
STATE OF CALIFORNIA

Bryan A. Stirrat, P.E.
R.C.E. No. C 22631

PART F

CLOSURE/POST-CLOSURE MAINTENANCE COST ESTIMATE

SECTION F.1

CLOSURE/POST-CLOSURE MAINTENANCE COST ESTIMATE

F.1 CLOSURE/POST-CLOSURE MAINTENANCE COST ESTIMATE

F.1.1 INTRODUCTION

In order to establish the basis for the proper level of funding to close and provide post-closure maintenance for the GCLF in an environmentally sound manner, a cost estimate was prepared reflecting the closure design and post-closure maintenance procedures presented in Sections E.1 and E.2 of this JTD. This estimate was then combined with an estimate for construction management/quality assurance services to determine the total closure cost. This closure and post-closure cost estimate then serves as the basis to fund the closure account over the life of the landfill.

F.1.2 CLOSURE COST ESTIMATE

The Plan features are grouped into categories for convenience in presenting the cost estimate. A brief description of the components included in each category is given below. The total closure cost estimate, as projected in 2010 dollars, is shown on Table 17. The back-up information supporting the cost estimate is included in Appendix R.

F.1.2.1 FINAL COVER

Based on the proposed final grading plan, the approximate area which will require placement of final cover is 191 acres. The final cover for the GCLF will consist of a minimum two-foot thick foundation layer composed of random soil materials, a barrier layer consisting of a synthetic cover (i.e., a 60-mil LLDPE geomembrane); a drainage medium; and a two-foot vegetative layer of random soils. The cost of constructing the final cover includes site preparation, site grading, final cover placement and settlement monument installation.

F.1.2.2 FINAL COVER CONSTRUCTION QUALITY ASSURANCE MONITORING AND TESTING

Costs for construction quality assurance include the final cover placement tests, inspections and reporting.

TABLE 17

GREGORY CANYON LANDFILL
2010 CLOSURE COST ESTIMATE

Item No.	Description	Estimated Quantity		Unit Price	Total
1	**FINAL COVER** [1.0]				
	Mobilization/Demobilization	-	ls	$413,706	$413,706
	Clear and Grub	185	ac	$1,345	$248,825
	Slope Area (3.5:1) 181 AC (Including Slope Adjustment Factor)				
	Preliminary Grading	181	ac	$3,155	$571,055
	Foundation Layer 24" Thick (Assumes 12" In Place)	292,013	cy	$3.62	$1,057,087
	60 Mil LLDPE Geomembrane [1.1]	7,884,360	sf	$0.80	$6,307,488
	Vegetative Cover 24" Thick (soil component only) [1.1]	584,027	cy	$7.68	$4,485,327
	Deck Area 4 Acres				
	Preliminary Grading	4	ac	$3,155	$12,620
	Foundation Layer 12" Thick (Assumes 12" In Place)	6,453	cy	$3.62	$23,360
	60 Mil LLDPE Geomembrane [1.1]	174,240	sf	$0.80	$139,392
	Drainage Geocomposite [1.3]	174,240	sf	$0.81	$141,134
	Vegetative Cover 24" Thick (soil component only) [1.1]	12,907	cy	$7.13	$92,027
	Bench Improvements/Additional Grading [1.2]	90,000	cy	$3.62	$325,800
	Settlement Monuments	4	ea	$1,551	$6,204
					$13,824,025
2	**FINAL COVER CONSTRUCTION QUALITY ASSURANCE MONITORING AND TESTING** [2.0]				
	Field Personnel/Monitoring/Reporting	12	mos	$31,719	$380,628
					$380,628
3	**DRAINAGE CONTROL SYSTEM** [3.0]				
	Perimeter AC Road Crossings (75 sf per crossing, 11 crossings)	825	sf	$7.95	$6,559
	Drainage Control System	185	ac	$4,344	$803,640
	Perimeter 48" HDPE Corrugated smooth wall drain pipe [3.1]	10,242	lf	$90	$921,780
	Perimeter open trapezoidal channel	10,242	lf	$55	$563,310
	Perimeter V-Ditch	10,242	lf	$32	$327,744
	24" drainage inlet from v-ditch to perimeter drain HDPE pipe	11	ea	$2,000	$22,000
					$2,645,033
4	**EROSION CONTROL (REVEGETATION)**				
	Soil Preparation	185	ac	$1,241	$229,585
	Hydroseeding [4.0]	185	ac	$3,206	$593,110
	Erosion Control [4.1]	185	ac	$1,138	$210,530
					$1,033,225
5	**LANDFILL GAS CONTROL SYSTEM** [5.0]				
	Extend Well Heads/Replacement	223	ea	$3,206	$714,938
	Synthetic Boots	223	ea	$517	$115,291
	Main Collection Header	3,885	lf	$69	$268,065
	Lateral Piping	14,485	lf	$32	$463,520
	Exp. Valves, Joints, Ports, Flare Sta., Sumps Etc.	-	ls	$500,584	$500,584
					$2,062,398
6	**STRUCTURE REMOVAL/ABANDONMENT** [6.0]				
	Demolition	-	ls	$206,853	$206,853
					$206,853
7	**SITE SECURITY** [7.0]				
	Signage	2	ea	$517	$1,034
					$1,034
8	**ENGINEERING DESIGN & SUPPORT** [8.0]				
	Engineering Design and Support	-	ls	$806,128	$806,128
					$806,128
9	**CONSTRUCTION MANAGEMENT**				
	Construction Office Trailer	14	mos	$569	$7,966
	Construction Office Equipment	14	mos	$569	$7,966
	Telephone-Power-Water	14	mos	$414	$5,796
	Construction Manager	14	mos	$34,935	$489,090
	Office Administration	14	mos	$989	$13,846
	Review Record Drawings	-	ls	$12,088	$12,088
					$536,752
10	**FINAL CLOSURE AND POST-CLOSURE MAINTENANCE PLAN (FCPCMP) PREPARATION** [10.0]				
	Report Preparation	-	ls	$201,532	$201,532
					$201,532
				Subtotal Closure Cost	**$21,697,608**
				20% Contingency [11.0]	**$4,339,522**
				Total Closure Cost	**$26,037,130**

TABLE 17

GREGORY CANYON LANDFILL
2010 CLOSURE COST ESTIMATE

Notes:

1) Groundwater Monitoring/Remediation and Leachate Control will all be in place prior to closure construction. Monitoring, Repairing, and Operation & Maintenance costs are included in the Annual Post closure Cost Estimate.

2) Total Cost Column is rounded to the nearest dollar amount.

Footnotes:

1.0 Based on average unit costs from actual contractor bids for Phelan Landfill - 2007 Final Closure Construction Plan Bids (San Bernardino County, CA) and Santiago Canyon Landfill - 2001 Closure construction bids (Orange County, CA) adjusted for increase in site acreage for Gregory Canyon. Additionally, Santiago Canyon bids were adjusted to 2008 values with the CalRecycle Inflation Factors (2001-2007). Due to an update in the 2008 associated costs performed in 2010, these costs were applied to the CalRecycle inflationary increase factor for 2008 and 2009 to obtain the 2010 value.

1.1 Based on average unit cost from contractor bids for Victorville Landfill - 2008 Phase 1B, Stage 1 Composite Liner System Construction (San Bernardino County, CA) , assuming the use of on-site soil. Due to an update in the 2008 associated costs performed in 2010, these costs were applied to the CalRecycle inflationary increase factor for 2008 and 2009 to obtain the 2010 value.

1.2 Includes additional grading/material required to bring subgrade to grade for drainage. Due to an update in the 2008 associated costs performed in 2010, these costs were applied to the CalRecycle inflationary increase factor for 2008 and 2009 to obtain the 2010 value.

1.3 Based on average unit costs from the bid comparison for Fairmead Landfill - 2008 Summary of Bids for Construction of Unit 3, Cell 2 (Madera County, CA). Due to an update in the 2008 associated costs performed in 2010, these costs were applied to the CalRecycle inflationary increase factor for 2008 and 2009 to obtain the 2010 value.

2.0 Based on prevailing wages as defined by the Director of Industrial Relations (Group 1, Craft: Building/Construction Inspector and Field Soils and Material Tester) and typical unit costs. See attached calculation table. Due to an update in the 2008 associated costs performed in 2010, these costs were applied to the CalRecycle inflationary increase factor for 2008 and 2009 to obtain the 2010 value.

3.0 Based on drainage related costs from actual contractor bids for Santiago Canyon Landfill - 2001 Closure construction bids (Orange County, CA) adjusted to 2008 values with the CalRecycle Inflation Factors (2001-2007) and for increase in site acreage for Gregory Canyon. Due to an update in the 2008 associated costs performed in 2010, these costs were applied to the CalRecycle inflationary increase factor for 2008 and 2009 to obtain the 2010 value.

3.1 Based on average cost of actual contractor bids for Highway 59 Landfill New Vehicle Weigh in Facility, Merced County, Ca (May 13, 2010)

4.0 Based on CalTrans Storm Water Quality Handbooks - Project Planning and Design Guide Appendix C May 2007 (Includes costs of seeding and hydromulching). Due to an update in the 2008 associated costs performed in 2010, these costs were applied to the CalRecycle inflationary increase factor for 2008 and 2009 to obtain the 2010 value.

4.1 Includes additional erosion control improvements such as fiber rolls silt fences and sand bag chevrons, based on a average per ac cost for Santiago and Phelan Landfill Closures. Due to an update in the 2008 associated costs performed in 2010, these costs were applied to the CalRecycle inflationary increase factor for 2008 and 2009 to obtain the 2010 value.

5.0 Based on existing contracts between Bryan A. Stirrat & Associates and County of San Bernardino for providing landfill gas services to San Bernardino County. Due to an update in the 2008 associated costs performed in 2010, these costs were applied to the CalRecycle inflationary increase factor for 2008 and 2009 to obtain the 2010 value.

6.0 Based on demolition related costs from actual contractor bids for Santiago Canyon Landfill - 2001 Closure construction bids (Orange County, CA) that are adjusted to 2008 values with the CalRecycle (2001-2007) Inflation Factors (includes demolition of existing operation office/furnish and install new field office and demolition/salvage of scale house and scales). Due to an update in the 2008 associated costs performed in 2010, these costs were applied to the CalRecycle inflationary increase factor for 2008 and 2009 to obtain the 2010 value.

7.0 Assumes site security fencing and gates are in place at time of closure construction. Due to an update in the 2008 associated costs performed in 2010, these costs were applied to the CalRecycle inflationary increase factor for 2008 and 2009 to obtain the 2010 value.

8.0 Assumes approximately 4% for engineering design and support and 1% for final closure and post closure maintenance plan for a sum of approximately 5% (industry standard) of the total closure construction cost.

TABLE 17

GREGORY CANYON LANDFILL
2010 CLOSURE COST ESTIMATE

9.0 Based on BAS RS 900 Rate Sheet. See attached table for detailed breakdown. Due to an update in the 2008 associated costs performed in 2010, costs not included on the RS900 sheet were applied to the CalRecycle inflationary increase factor for 2008 and 2009 to obtain the 2010 value.

10.0 Assumes approximately 4% for engineering design and support and 1% for final closure and post closure maintenance plan for a sum of approximately 5% (industry standard) of total closure construction cost. Due to an update in the 2008 associated costs performed in 2010, these costs were applied to the CalRecycle inflationary increase factor for 2008 and 2009 to obtain the 2010 value.

11.0 20% Contingency Pursuant to Title 27 CCR, Section 21820(a)(4).

*See Attachment for additional back up rates, contracts, detail cost estimates, etc.

F.1.2.3 DRAINAGE CONTROL SYSTEM

Costs for the drainage control system include the construction of the splash walls, the removal and replacement of inlet structures, and downdrains.

F.1.2.4 EROSION CONTROL (REVEGETATION)

This category covers the cost of landscaping construction which includes soil preparation and planting of vegetative materials.

F.1.2.5 LANDFILL GAS CONTROL SYSTEM

This category includes the cost of installation of modification of the vertical gas extraction wells and header system during placement of the final cover system.

F.1.2.6 STRUCTURE REMOVAL/ABANDONMENT

This category includes costs for dismantling and removal of the fee scales and landfill scales including backfill of the pits, the household hazardous waste area, and administrative office.

F.1.2.7 SITE SECURITY

This category includes costs for required signage at closure.

F.1.2.8 ENGINEERING DESIGN & SUPPORT

This category includes costs for the preparation of construction level engineering design plans and specifications for bid purposes. This cost is assumed to be 5.0 percent of the construction cost.

F.1.2.9 CONSTRUCTION MANAGEMENT

The construction management cost for the GCLF is based on the closure construction period of 14 months.

F.1.2.10 FINAL CLOSURE AND POST-CLOSURE MAINTENANCE PLAN (FCPCMP) PREPARATION

This category covers the cost to prepare the Final CPCMP.

F.1.2.11 CONTINGENCY

A 20 percent contingency factor has been added to the construction cost estimate.

F.1.3 POST-CLOSURE MAINTENANCE COST ESTIMATE

The post-closure maintenance cost estimate has been prepared utilizing information contained in Section E.2 and estimates of manpower, materials and equipment to maintain the GCLF in compliance with current applicable regulations.

The total annual maintenance and monitoring cost estimate for post-closure is shown on Table 18. These costs are projected in 2010 dollars, assuming no change in the regulatory environment with respect to the GCLF. The back-up information supporting the cost estimate is included in Appendix R. The total 30-year post-closure cost estimate was calculated by multiplying the annual cost estimate from Table 18 by 30. The total 30-year post closure cost obligation does not factor in inflation or interest over the funding period. The actual future value of the 30-year total may be different. Annual funding will be calculated year to year in accordance with 27CCR, Section 22225.

It should be noted that the maintenance and monitoring costs presented have been projected utilizing current regulations and applicable requirements. In the event that changes occur in the regulatory conditions pertaining to the GCLF, these estimates will be adjusted accordingly, if necessary, and submitted to the CalRecycle, EA and RWQCB. Groundwater monitoring costs estimated in Table 18 reflects the proposed detection monitoring program for the GCLF.

TABLE 18

GREGORY CANYON LANDFILL
ANNUAL POST-CLOSURE MAINTENANCE AND MONITORING
2010 COST ESTIMATE

Item No.	Description	Estimated Quantity		Unit Price	Total
1	**LANDFILL GAS CONTROL SYSTEM/CONDENSATE MONITORING AND MAINTENANCE** [1.0]				
	Flare Station Operation & Maintenance	52	wks	$3,120	$162,240
	System Monitoring (Well Field Monitoring)	12	mos	$2,609	$31,308
	Condensate System Monitoring and Maintenance (Hourly costs includes materials)	52	wks	$570	$29,640
	Installation of additional gas extraction wells as needed (Assume one well per year with an approximate depth of 100 ft)	100	ft	$100	$10,000
	Gas Control System Maintenance/Replacement (replacement of piping, valves, etc. and non-routine maintenance calls)	-	ls	$100,000	$100,000
					$333,188
2	**LANDFILL GAS MIGRATION/VADOSE ZONE MONITORING SYSTEM MONITORING AND MAINTENANCE** [2.0]				
	Gas Migration Monitoring System Monitoring @ four casings/probe	12	mos	$914	$10,968
	Probe Maintenance/Replacement (Assume one probe per year at a depth of 100 feet)	100	ft	$100	$10,000
	Instantaneous Surface Monitoring (Assume 50,000 sqft/grid per AQMD Rule 1150.1)	4	qrtrs	$3,059	$12,236
	Integrated Surface Sampling	4	qrtrs	$3,887	$15,548
	Flare Source Testing	-	ls	$25,000	$25,000
	Gas Collection System Sampling	12	mos	$517	$6,204
	Ambient Air Sampling	12	mos	$2,896	$34,752
					$114,708
3	**GROUNDWATER MONITORING AND MAINTENANCE** [3.0]				
	Routine Monitoring	12	mos	$6,981	$83,772
	Operation & Maintenance	-	-	$9,308	$9,308
					$93,080
4	**SURFACE WATER MONITORING** [4.0]				
	Monitoring and Analysis Cost	-	ls	$4,137	$4,137
					$4,137
5	**LEACHATE MONITORING/TREATMENT**				
	Monitoring and Treatment [5.0]	-	ls	$5,171	$5,171
					$5,171
6	**FINAL COVER INSPECTION/MAINTENANCE AND REPAIR**				
	Inspection [6.0]	-	-	-	-
	Cover Repair				
	Heavy Equipment (D-6) [6.1]	128	hrs	$77.91	$9,972
	Heavy Equipment (920 Loader) [6.1]	80	hrs	$41.76	$3,341
	Heavy Equipment (3 AXL Truck) [6.1]	80	hrs	$54.74	$4,379
	Labor [6.2]	288	hrs	$119.16	$34,318
	Project Engineering Geologist (Field) [6.3]	128	hrs	$119.00	$15,232
	Staff Engineering Geologist (Reporting) [6.3]	40	hrs	$96.00	$3,840
					$71,082
7	**LANDFILL SETTLEMENT MONITORING AND MONUMENT MAINTENANCE** [7.0]				
	Aerial Survey (Once per 5 years)($20,700/survey)	-	-	$4,140	$4,140
	Settlement Report [7.1]				
	Engineer (Project Engineer)	16	hrs	$150	$2,400
	Reporting (Administrative Assistant)	10	hrs	$89	$890
					$7,430
8	**EROSION CONTROL (REVEGETATION)**				
	Vegetation [8.0]	-	ls	$128,771	$128,771
	Rodent Control [8.1]	185	ac	$13.45	$2,500
					$131,271
9	**ACCESS ROAD MAINTENANCE**				
	Labor/Materials (2" AC overlay of 10% of the road/yr) [9.0]	14,425	sf	$1.14	$16,445
					$16,445
10	**DRAINAGE CONTROL SYSTEM INSPECTION AND MAINTENANCE**				
	Drainage Improvements/Maintenance [10.0]	-	ls	$26,450	$26,450
					$26,450
11	**SITE SECURITY INSPECTION AND MAINTENANCE**				
	Maintenance/Repair [11.0]	150	lf	$26	$3,900
					$3,900
12	**SITE ADMINISTRATION** [12.0]				
	Site Engineer	1040	hrs	$108	$112,320
	Landfill Operations Supervisor[12.1]	1040	hrs	$63.45	$65,988
					$178,308
TOTAL ANNUAL POST-CLOSURE MAINTENANCE AND MONITORING COSTS					**$985,170**
TOTAL 30 YEAR POST-CLOSURE MAINTENANCE AND MONITORING COSTS					**$29,555,100**

Note: Total Cost Column is rounded to the nearest dollar amount.

TABLE 18

GREGORY CANYON LANDFILL
ANNUAL POST-CLOSURE MAINTENANCE AND MONITORING
2010 COST ESTIMATE

Footnotes:

1.0 - Based on existing contracts between Bryan A. Stirrat & Associates and County of San Bernardino for providing landfill gas services to San Bernardino County. See attached table for detailed breakdown.

2.0 - Based on existing contracts between Bryan A. Stirrat & Associates (BAS) and County of San Bernardino for providing landfill gas services to San Bernardino County. See attached table for detailed breakdown.

3.0 - Based on existing contract between BAS and OC Waste & Recycling for providing groundwater and leachate collection landfill system monitoring. 2008 costs updated in 2010 using CalRecycle's inflationary increases.

4.0 - See attached table for detail breakdown of costs.

5.0 - It is assumed leachate production will drop dramatically over the post-closure maintenance period after the placement of a cap at closure. All leachate produced during post-clsoure will be disposed of by injection into the LFG flare systems. The costs in this category reflects maintenance and repair of the leachate injection system nozzles and other infrastructure. 2008 costs were updated in 2010 using CalRecycle's inflationary increases.

6.0 - Inspection to be performed by Site Engineer; costs included in item 12.0.

6.1 - Based on CalTrans Labor Surcharge and Equipment Rental Rates for D-6H, 920 Loader, and 3AXL truck.

6.2 - Based on prevailing wages as defined by the Director of Industrial Relations (Group 8, Craft: Operating Engineer) with industry standard multiplier of approximately 3.0 to account for overhead costs.

6.3 - Based on current Geo-Logic Associates Rate for a Project Geologist and Staff Geologist. 2008 rates were updated in 2010 using CalRecycle's inflationary increases.

7.0 - Inspection to be performed by Site Engineer, costs included in item 12.0.

7.1 - Based on current BAS rate schedule for a project engineer and administrative assistant.

8.0 - Based on CalTrans Storm Water Quality Handbooks - Project Planning and Design Guide Appendix C May 2007 (Includes costs of seeding and hydromulching) $3,100/acre-hydroseeding, assuming 10% revegetation per year and $0.05/sqft for weeding for first 5 years. 2008 rate was updated in 2010 using CalRecycle's inflationary increases.

8.1 - Based on existing 2008 contract for rodent control between OC Waste & Recycling and Terminix at Coyote Canyon Landfill adjusted for the FRB Landfill acreage. Updated in 2010 using CalRecycle's inflationary increases.

9.0 - Based on unit costs from Olinda Alpha Landfill - 2008 Pavement Rehabilitation Project Final Bid Schedule (Orange County, CA) See Detail item 9. Inspection to be performed by Site Engineer, costs included in item 12.0.

10.0 - Based on drainage control system closure cost. Assumes 5% replacement/improvement per year. Inspection to be performed by Site Engineer, costs included in item 12.0.

11.0 - Based on average bid costs from Coyote Canyon Landfill - 2007 Security Gates and Fencing Construction (Orange County, CA) and assuming 1% replacement a year with the total fence length of approximately 15,000 LF; 2007 averaged cost wast increased using CalRecycle's 2010 inflationary increase rates. Inspection to be performed by Site Engineer; costs included in item 12.0.

12.0 - Based on current BAS rate schedule. (Engineer II)

12.1 - Based on Director of Industrial Relations general prevailing wage determinations made for 2010. Unit price is set by Operating Engineer Craft, Group 8 with additional CalTrans 11% Labor Surcharge. See Appendix R, General Prevailing Wages - Director of Industrial Relations & Caltrans Labor Surcharge Rates.

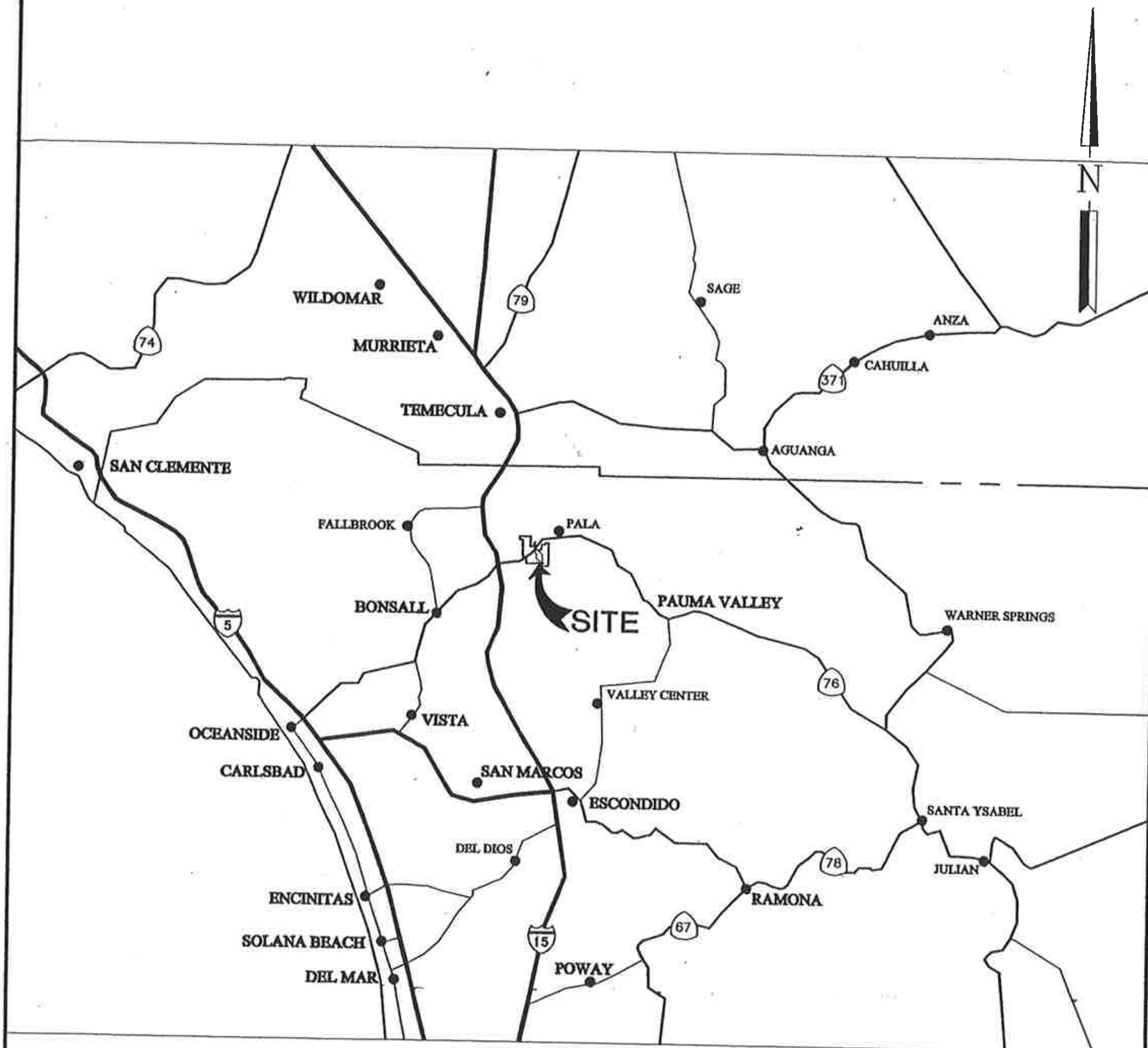
*See Attachments for additional back up rates, contracts, detailed cost estimate breakdown, etc.

F.1.4 DEMONSTRATION OF FINANCIAL RESPONSIBILITY

Closure/Post-Closure/Corrective Action Program (CAP) Maintenance Fund

In accordance with 27 CCR, Chapter 6 and 40 CFR, Subpart G, an operator must demonstrate financial assurance for the proper closure, post-closure maintenance and corrective action for reasonably foreseeable releases at a landfill. A Trust Agreement demonstrating coverage for closure and post-closure maintenance costs has been provided (Appendix P). A financial instrument to be used for corrective actions will be established and approved prior to the onset of disposal operations. In addition, the approved financial instrument will name the RWQCB as the beneficiary in accordance with 27 CCR, Section 22222.

FIGURES



VICINITY MAP

NTS

FIGURE 1

BAS (909) 860-7777 BRYAN A. STIRRAT & ASSOCIATES CIVIL AND ENVIRONMENTAL ENGINEERS 1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765	GREGORY CANYON LANDFILL VICINITY MAP	JOB NO. 97139-300 DATE 02-99 DRAWN BY B.A.B. CHECKED BY J.B.

H:/DWG/GREGORY/VICINITY

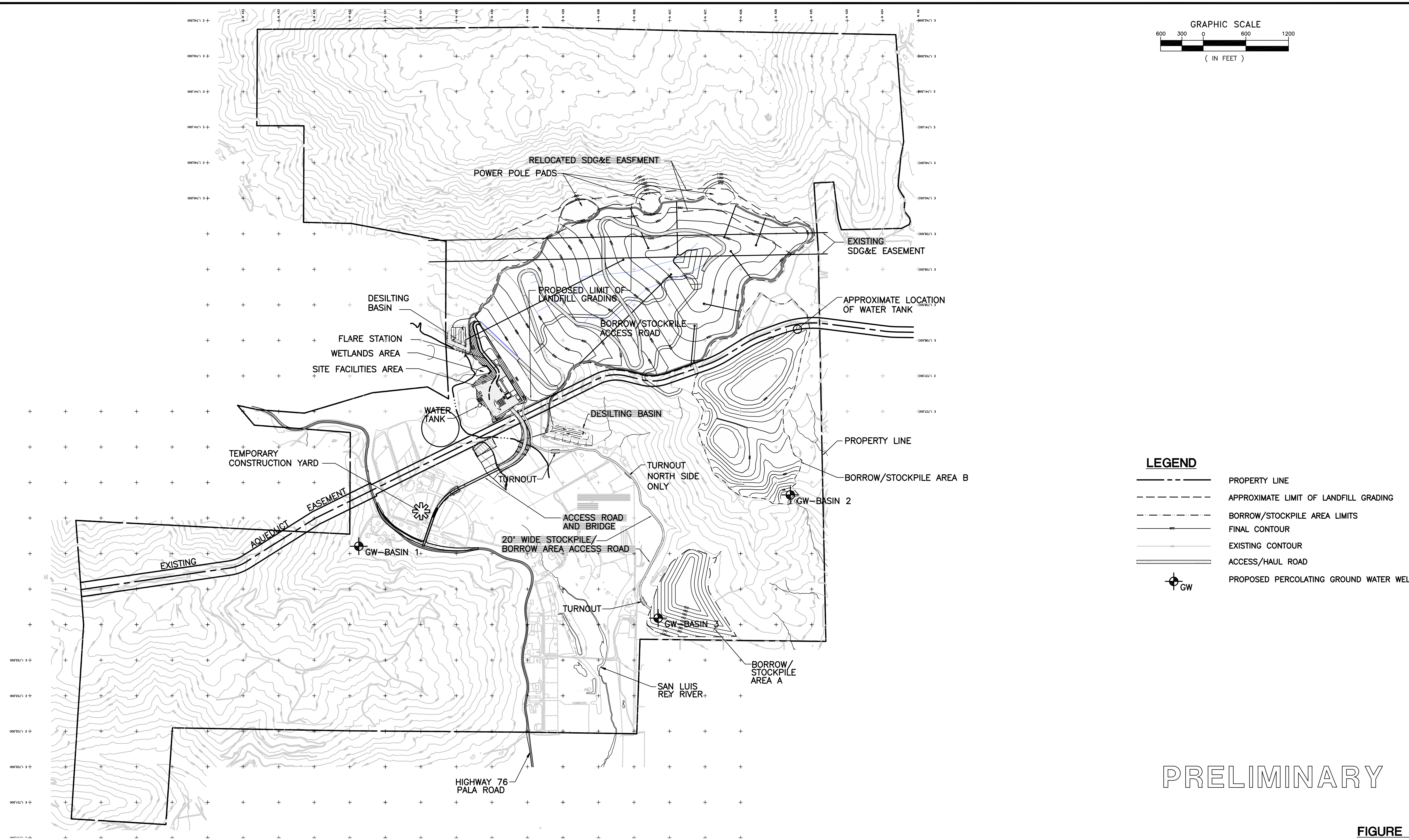


FIGURE 2

NO.	REVISION DESCRIPTION	BY:

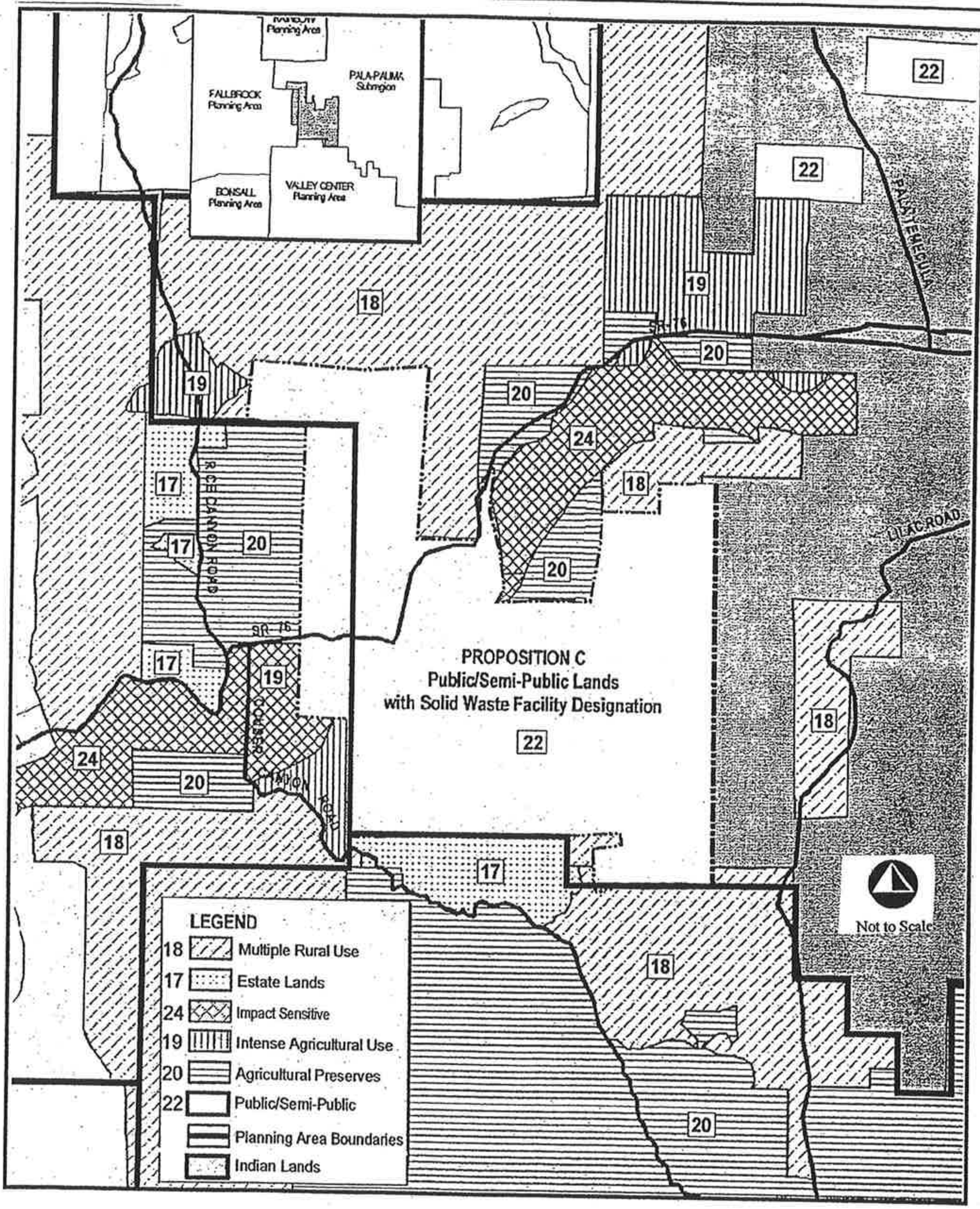
BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
SITE MAP

DESIGNED BY : E.L.S.	SCALE : AS SHOWN	
DRAWN BY : M.T.B.	DATE : 3-2002	FILE NO.: 30-0066FIG
CHECKED BY :	DATE :	
APPROVED BY :	DATE :	SHEET 2 OF 25

H:\DWG\GREGORY\2010\JTD\FIGURES\30-0066FIG.DWG

FOR PERMIT PURPOSES ONLY – NOT FOR CONSTRUCTION



SOURCE: DRAFT ENVIRONMENTAL IMPACT REPORT 1999

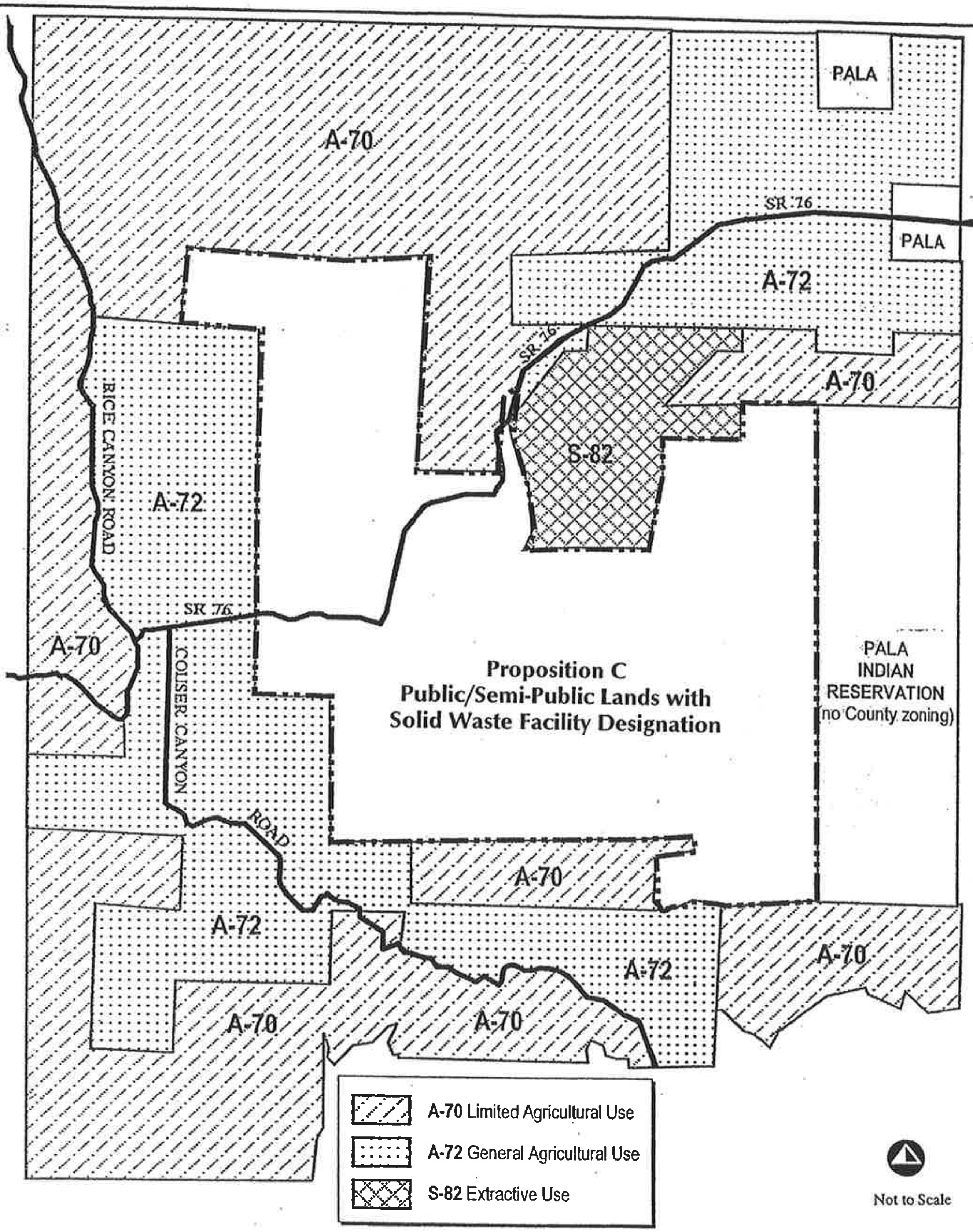
FIGURE 3

BAS (909) 860-7777
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765

GREGORY CANYON LANDFILL

GENERAL PLAN
LAND USE DESIGNATIONS

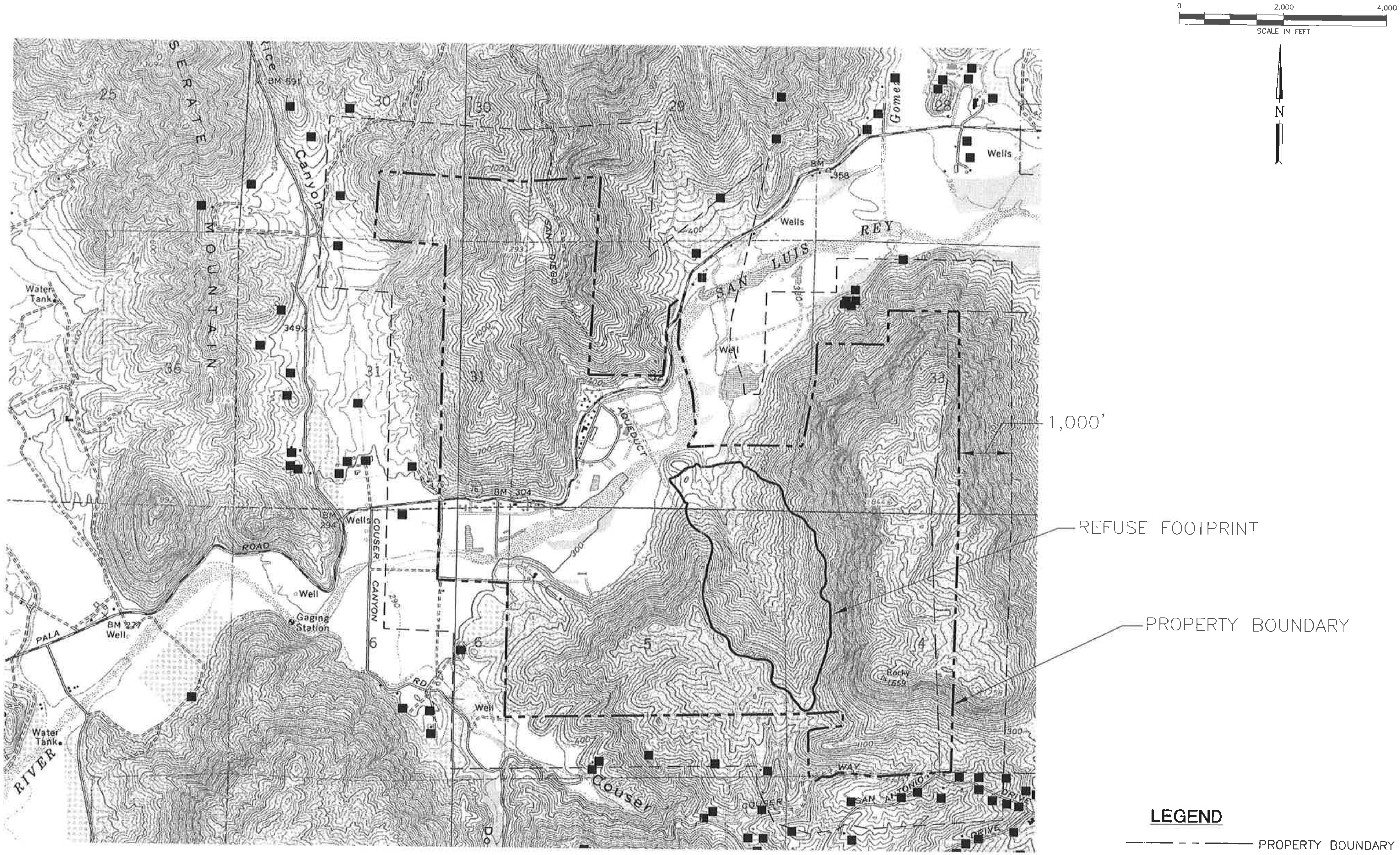
JOB NO. 97139-2
DATE 3-1999
DRAWN BY T.J.S.
CHECKED BY J.B.



SOURCE: DRAFT ENVIRONMENTAL IMPACT REPORT, 1999 (COUNTY OF SAN DIEGO, 1997)

FIGURE 4

BAS (909) 860-7777 BRYAN A. STIRRAT & ASSOCIATES CIVIL AND ENVIRONMENTAL ENGINEERS 1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765	GREGORY CANYON LANDFILL ZONING MAP	JOB NO. 97139-300 DATE 02-99 DRAWN BY B.A.B. CHECKED BY J.B.



LEGEND

- PROPERTY BOUNDARY
- LIMIT OF 1000 FT SETBACK
- ■ STRUCTURES (PROBABLY HOUSES)

SOURCE: KTU&A, PCR SERVICES CORPORATION

FIGURE 5

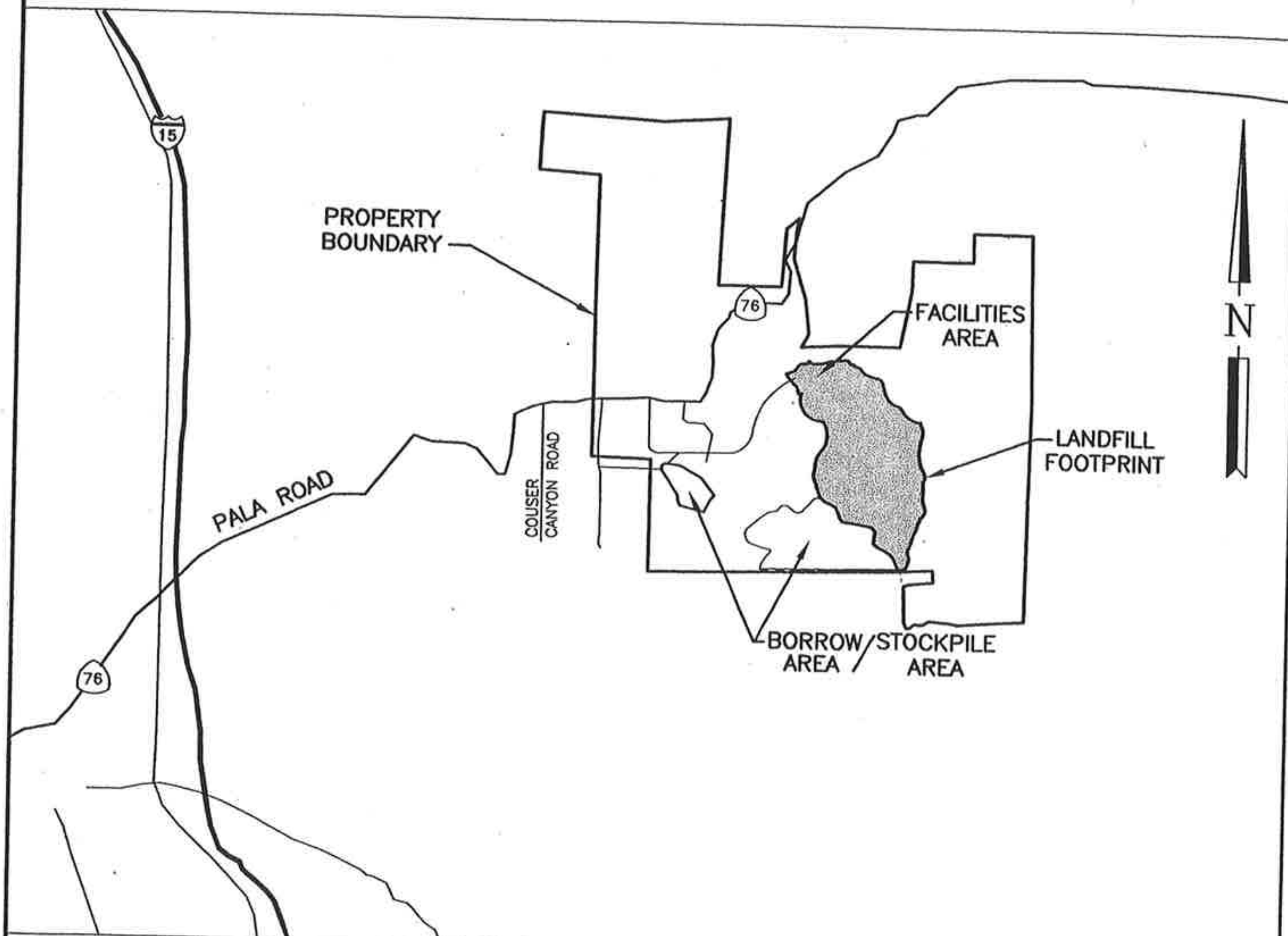
GREGORY CANYON LANDFILL

EXISTING STRUCTURES LOCATION MAP

JOB NO. 97139-800
DATE 6-2001
DRAWN BY J.P.J.
FILE NAME 171053DB

(909) 860-7777

BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765



LOCATION MAP

NTS

FIGURE 6

BAS (909) 860-7777

BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765

GREGORY CANYON LANDFILL

LOCATION MAP

JOB NO.	97139-300
DATE	11-99
DRAWN BY	M.T.B
FILE NAME	17845DB.DWG

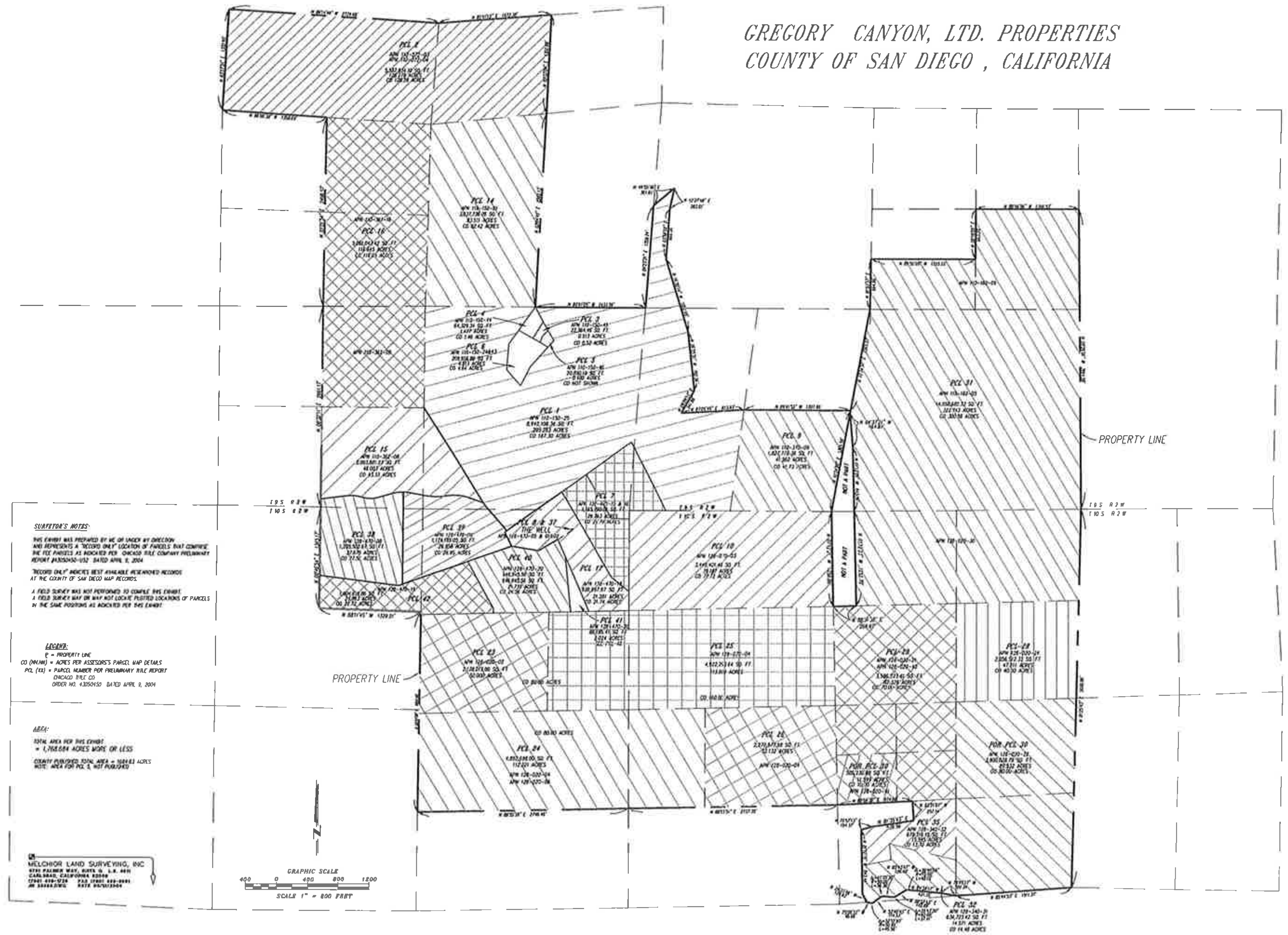


FIGURE 6A

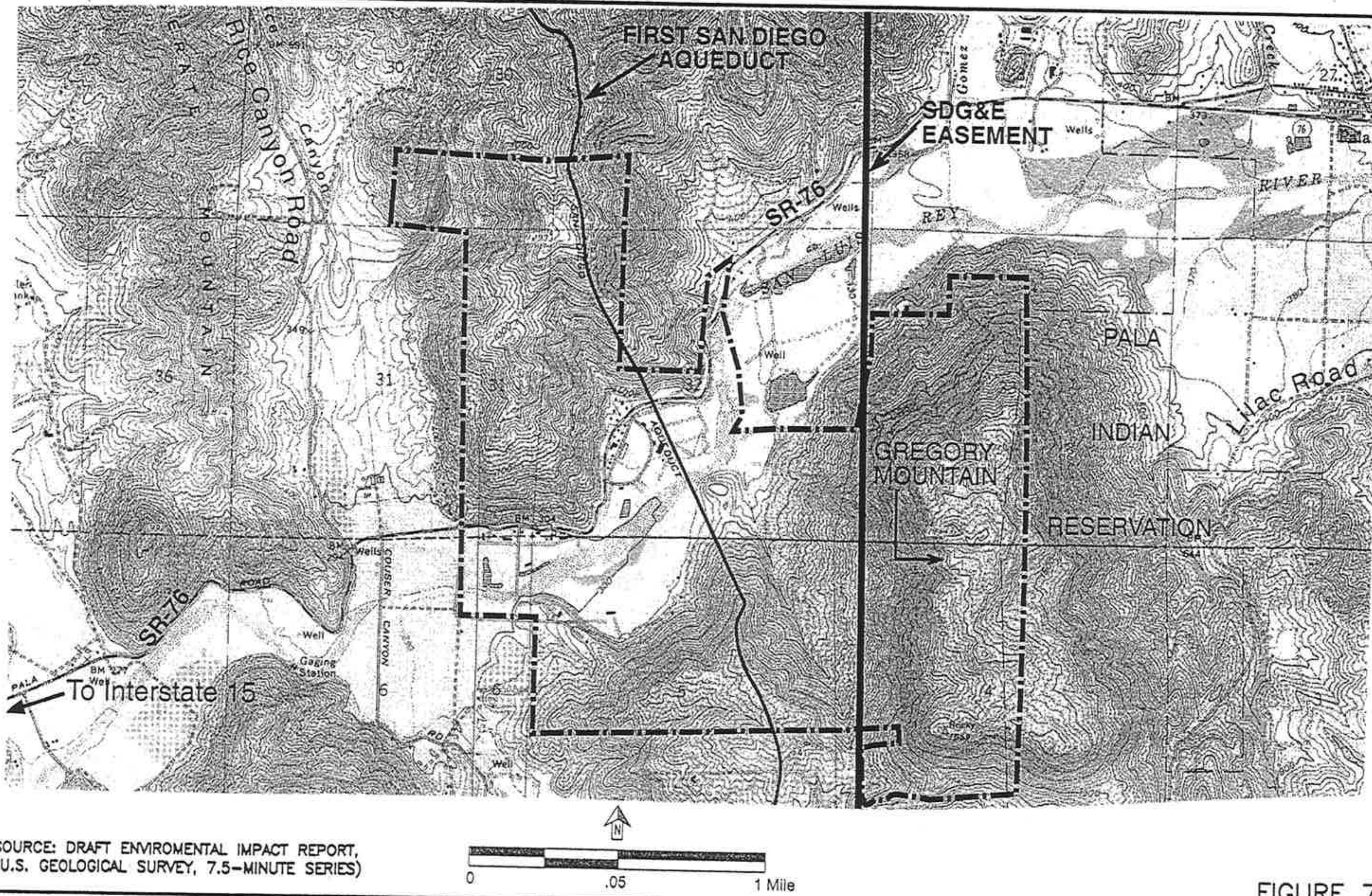
NO.	REVISION DESCRIPTION	BY:
2	BASED ON LEA COMMENTS	

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
PARCEL MAP

DESIGNED BY :	SCALE : AS SHOWN	
DRAWN BY : M.T.B.	DATE : 6-2004	FILE NO.: PARCEL MAP.DWG
CHECKED BY :	DATE :	SHEET 1 OF 1
APPROVED BY :	DATE :	

FOR PERMIT PURPOSES ONLY - NOT FOR CONSTRUCTION



SOURCE: DRAFT ENVIROMENTAL IMPACT REPORT, (U.S. GEOLOGICAL SURVEY, 7.5-MINUTE SERIES)

FIGURE 7

BAS
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765
(909) 860-7777

GREGORY CANYON LANDFILL

EXISTING FIRST SAN DIEGO AQUEDUCT AND SDG&E EASEMENT

JOB NO.	97139-300
DATE	12-2000
DRAWN BY	J.J.G
CHECKED BY	J.B.

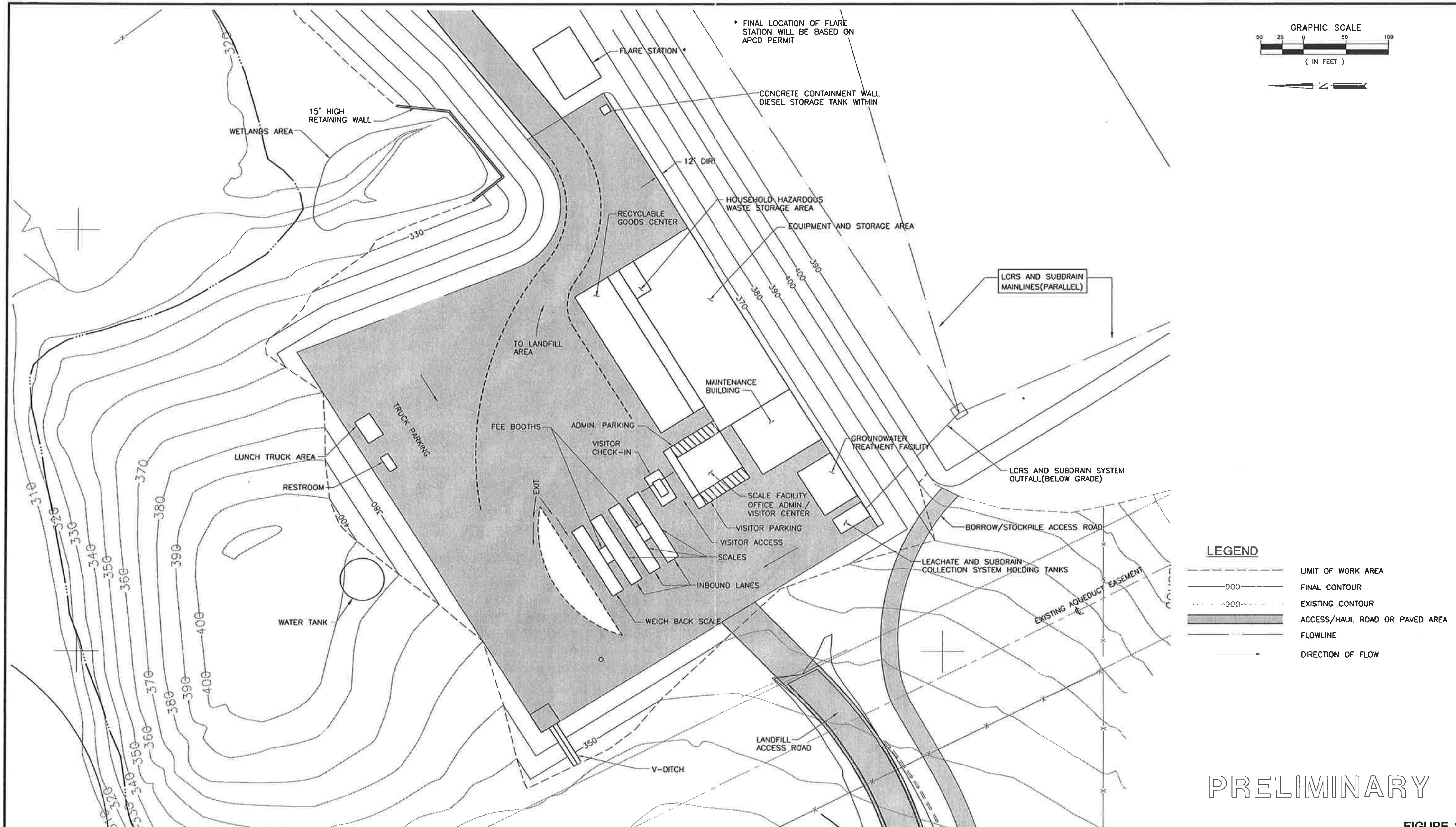


FIGURE 8

NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
SITE FACILITIES PLAN

DESIGNED BY : E.L.S.	SCALE : AS SHOWN	
DRAWN BY : M.T.B./J.P.J.	DATE : 5-2003	FILE NO.: 26048DB.DWG
CHECKED BY :	DATE :	DRAWING 3
APPROVED BY :	DATE :	

FOR PERMIT PURPOSES ONLY – NOT FOR CONSTRUCTION

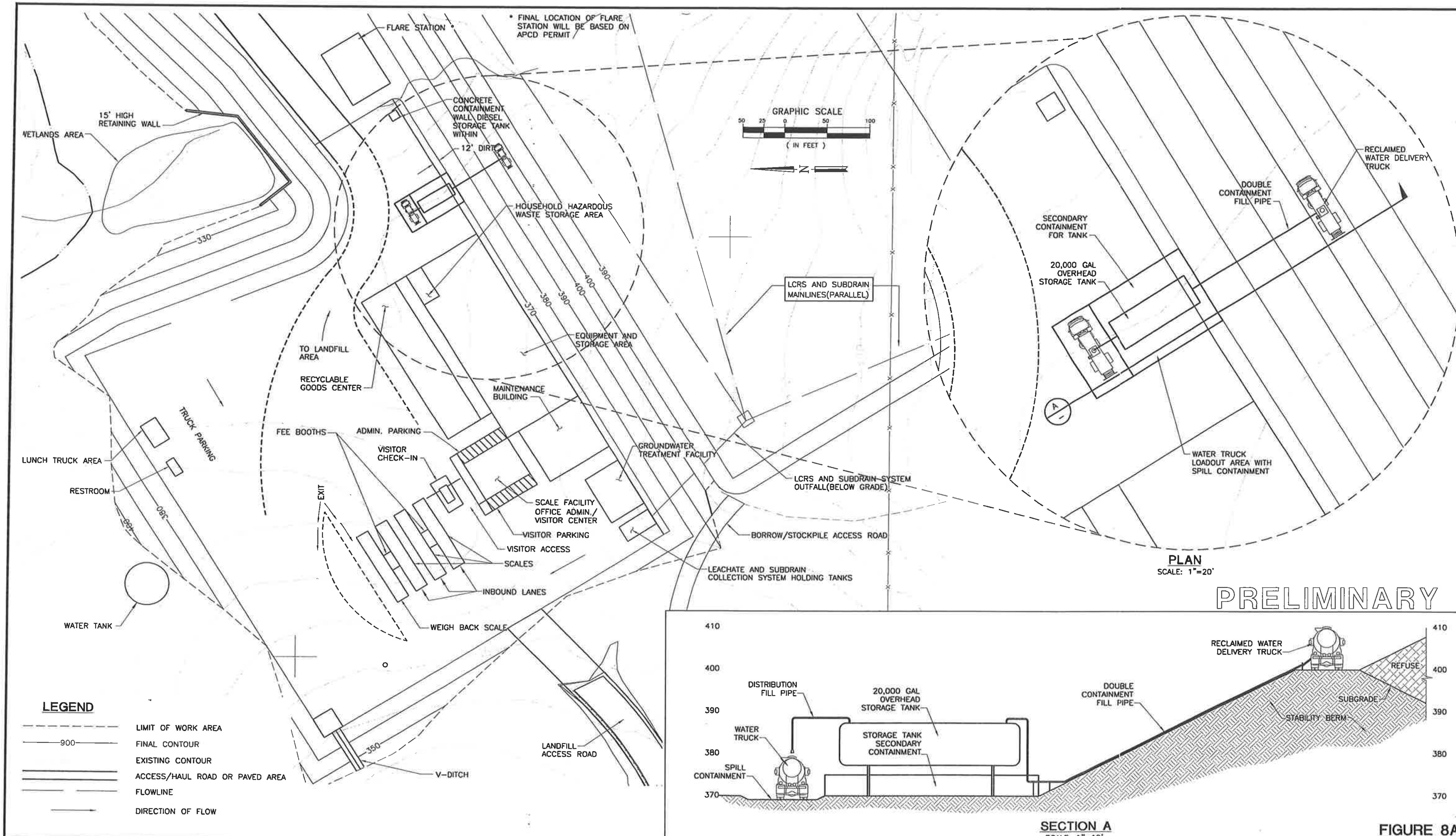


FIGURE 8A

NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
RECLAIMED WATER OFF-LOAD STATION

DESIGNED BY : E.L.S.	SCALE : AS SHOWN	
DRAWN BY : CAL	DATE : 2-2006	FILE NO.: 26226DB
CHECKED BY :	DATE :	SHEET 1 OF 1
APPROVED BY :	DATE :	

FOR PERMIT PURPOSES ONLY – NOT FOR CONSTRUCTION

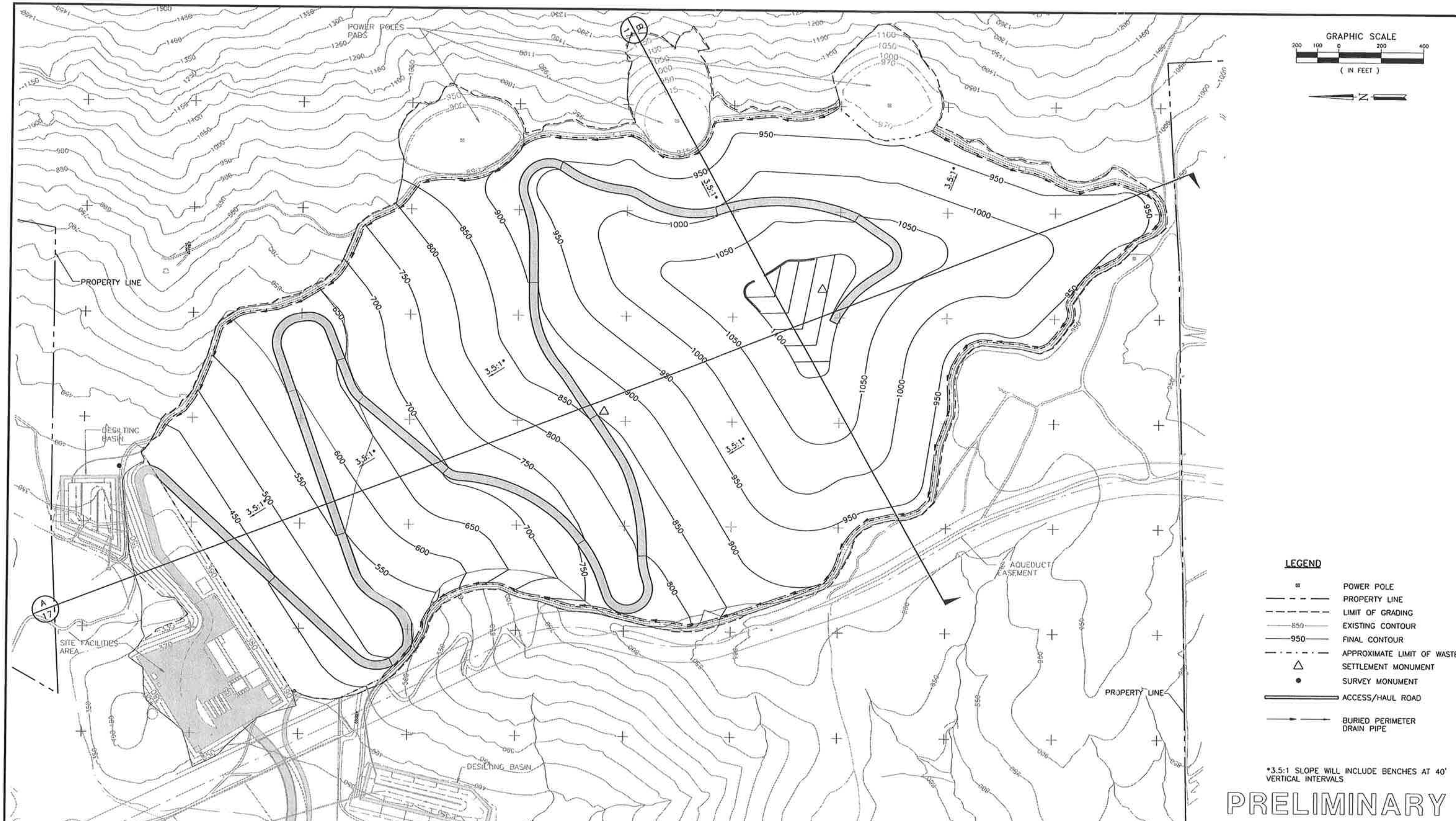


FIGURE 9

NO.	REVISION DESCRIPTION	BY:

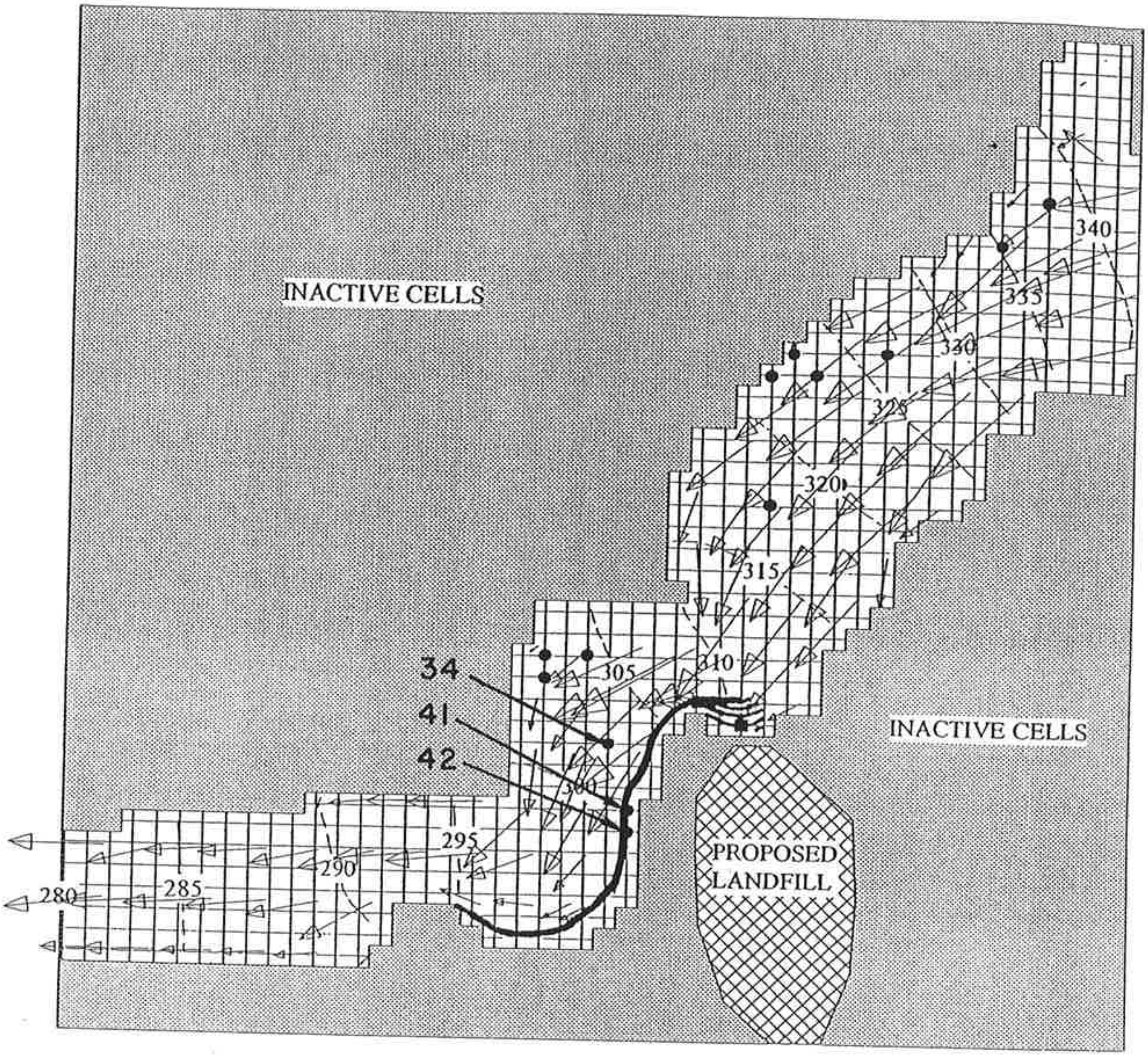
BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL

MASTER FILL PLAN

DESIGNED BY : E.L.S.	SCALE : AS SHOWN	
DRAWN BY : M.T.B.	DATE : 8-2000	FILE NO.: 27349DB.DWG
CHECKED BY :	DATE :	
APPROVED BY :	DATE :	DRAWING 6

FOR PERMIT PURPOSES ONLY – NOT FOR CONSTRUCTION



CASE 1. EQUIPOTENTIAL LEVELS SIMILAR TO THE ONES MEASURED CURRENTLY (APPROXIMATELY 10 FEET LOWER THAN GROUND SURFACE)

- ● Pumping well
- ■ Hypothetical point of release
- 315 Equipotential line (in feet amsl)
- Groundwater flow velocity vectors
- Release pathway

2,000 feet

SOURCE : GEOLOGIC ASSOCIATES, 1995

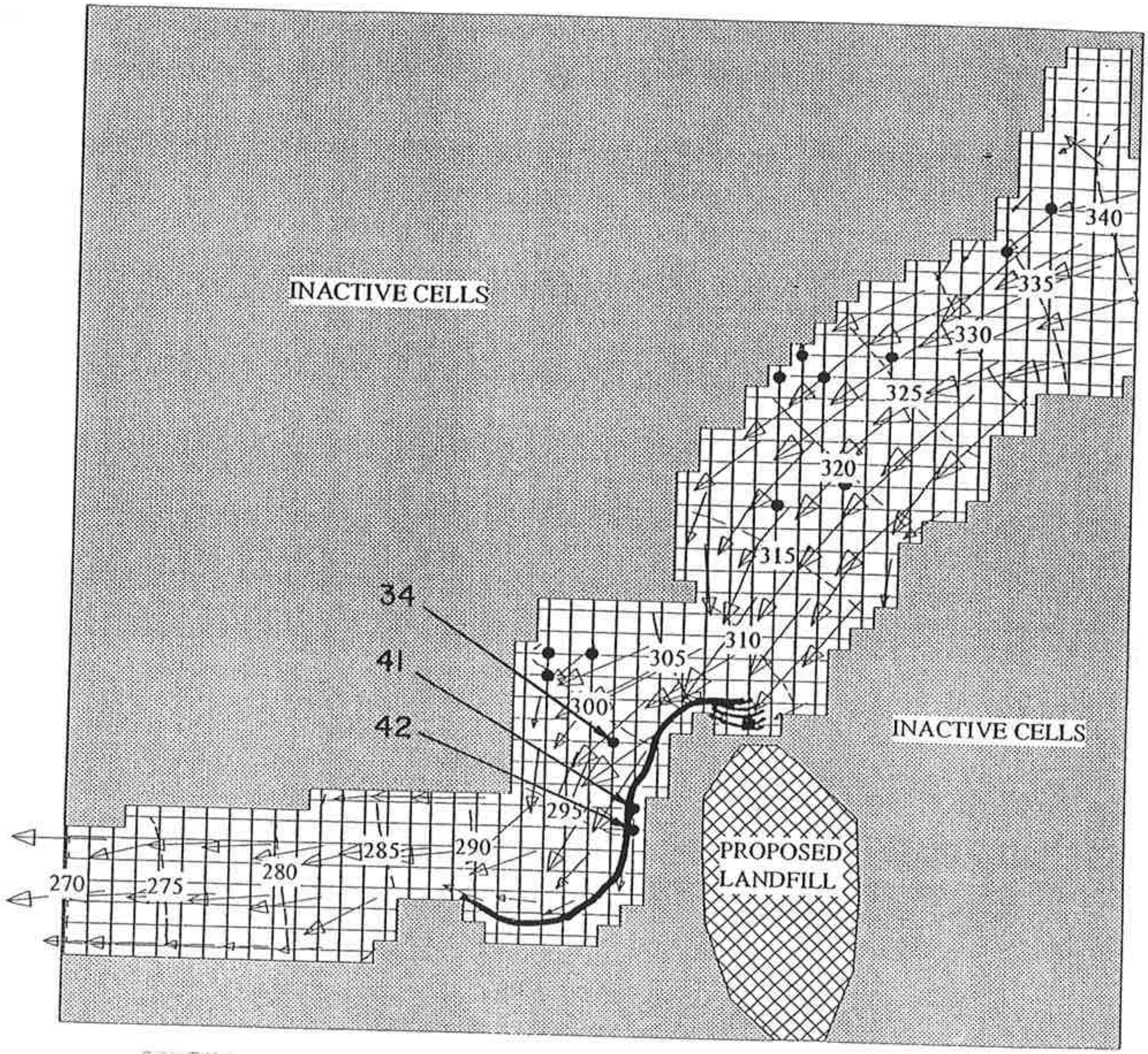
FIGURE 10A

BAS (909) 860-7777
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765

GREGORY CANYON LANDFILL

MODEL 1 - CONTAMINANT TRANSPORT PATHS

JOB NO. 97139-800
DATE 6-2001
DRAWN BY J.P.J.
FILE NAME: –



CASE 2. EQUIPOTENTIAL LEVELS 20 FEET LOWER THAN GROUND ALONG SURFACE ALONG THE WESTERN EDGE OF THE MODEL

- ● Pumping well
- ■ Hypothetical point of release
- 315 Equipotential line (in feet amsl)
- Groundwater flow velocity vectors
- Release pathway

2,000 feet

SOURCE : GEOLOGIC ASSOCIATES, 1995

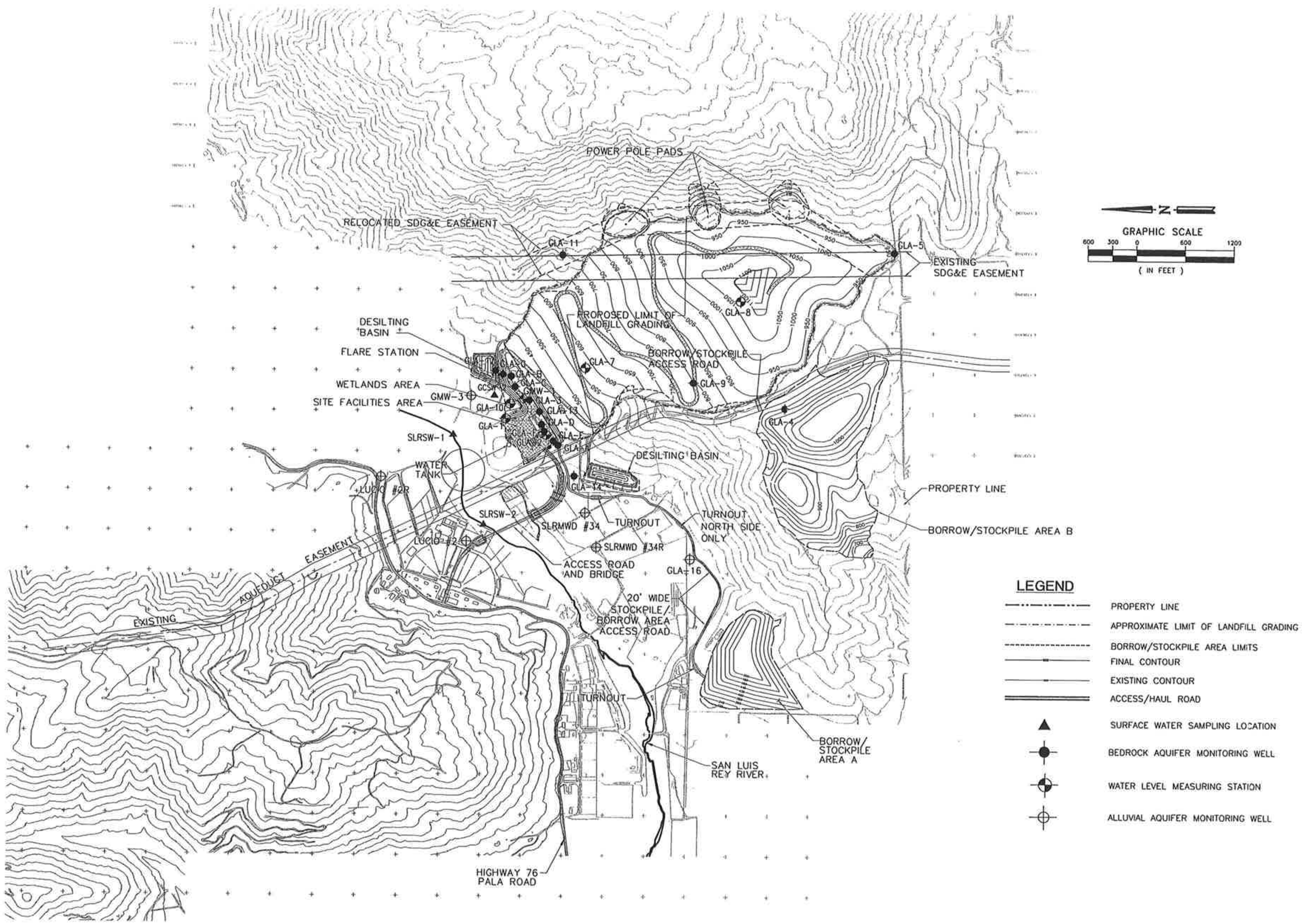
FIGURE 10B

BAS
(909) 860-7777
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765

GREGORY CANYON LANDFILL

MODEL 2 : CONTAMINANT TRANSPORT PATHS

JOB NO. 97139-800
DATE 6-2001
DRAWN BY J.P.J.
FILE NAME: –



PRELIMINARY

FIGURE 10C

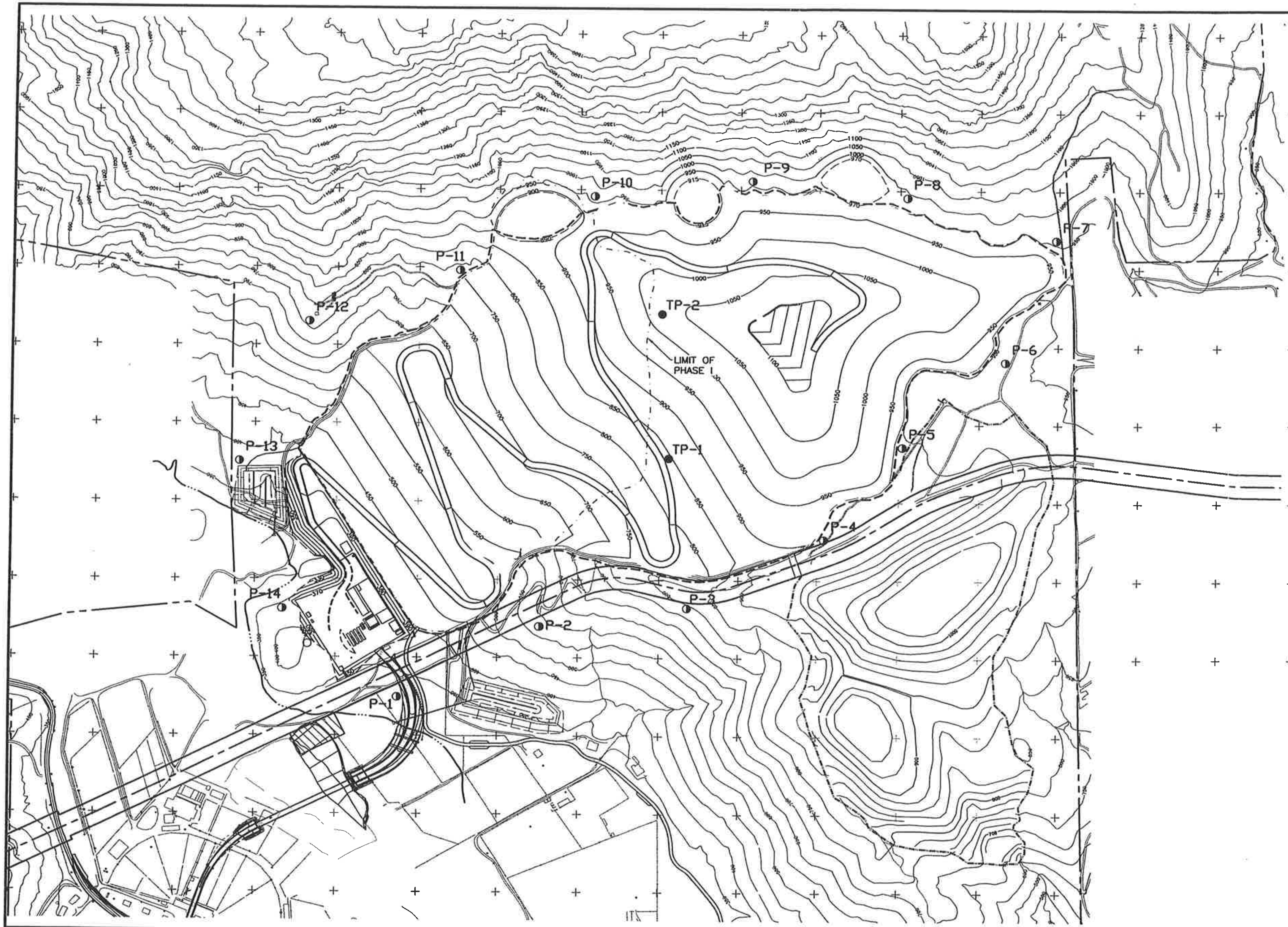
NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
PROPOSED DETECTION MONITORING NETWORK

DESIGNED BY : S.B.	SCALE : AS SHOWN	
DRAWN BY : C.A.L.	DATE : 10-2004	FILE NO.: 171991DB.DWG
CHECKED BY :	DATE :	-
APPROVED BY :	DATE :	

FOR PERMIT PURPOSES ONLY – NOT FOR CONSTRUCTION



GRAPHIC SCALE

300 150 0 300 600

(IN FEET)

N

LEGEND

- PROPERTY LINE
- APPROXIMATE LIMIT OF LANDFILL GRADING
- BORROW/STOCKPILE AREA LIMITS
- FINAL CONTOUR
- EXISTING CONTOUR
- ACCESS/HAUL ROAD
- P-1 LANDFILL GAS MIGRATION MONITORING PROBE
- TP-1 TEMPORARY LANDFILL GAS MIGRATION MONITORING PROBE

DISTANCE BETWEEN LFG PERIMETER PROBES ALONG COMPLIANCE BOUNDARY

PROBES	FEET	TEMPORARY PROBES	FEET
P1–P2	992		
P2–P3	923		
P3–P4	968	P3–TP1	966
P4–P5	765	TP1–TP2	927
P5–P6	842	TP2–P10	898
P6–P7	845		
P7–P8	977		
P8–P9	974		
P9–P10	992		
P10–P11	960		
P11–P12	984		
P12–P13	994		
P13–P14	983		
P14–P1	904		

PRELIMINARY

FIGURE 10D

NO.	REVISION DESCRIPTION	BY:

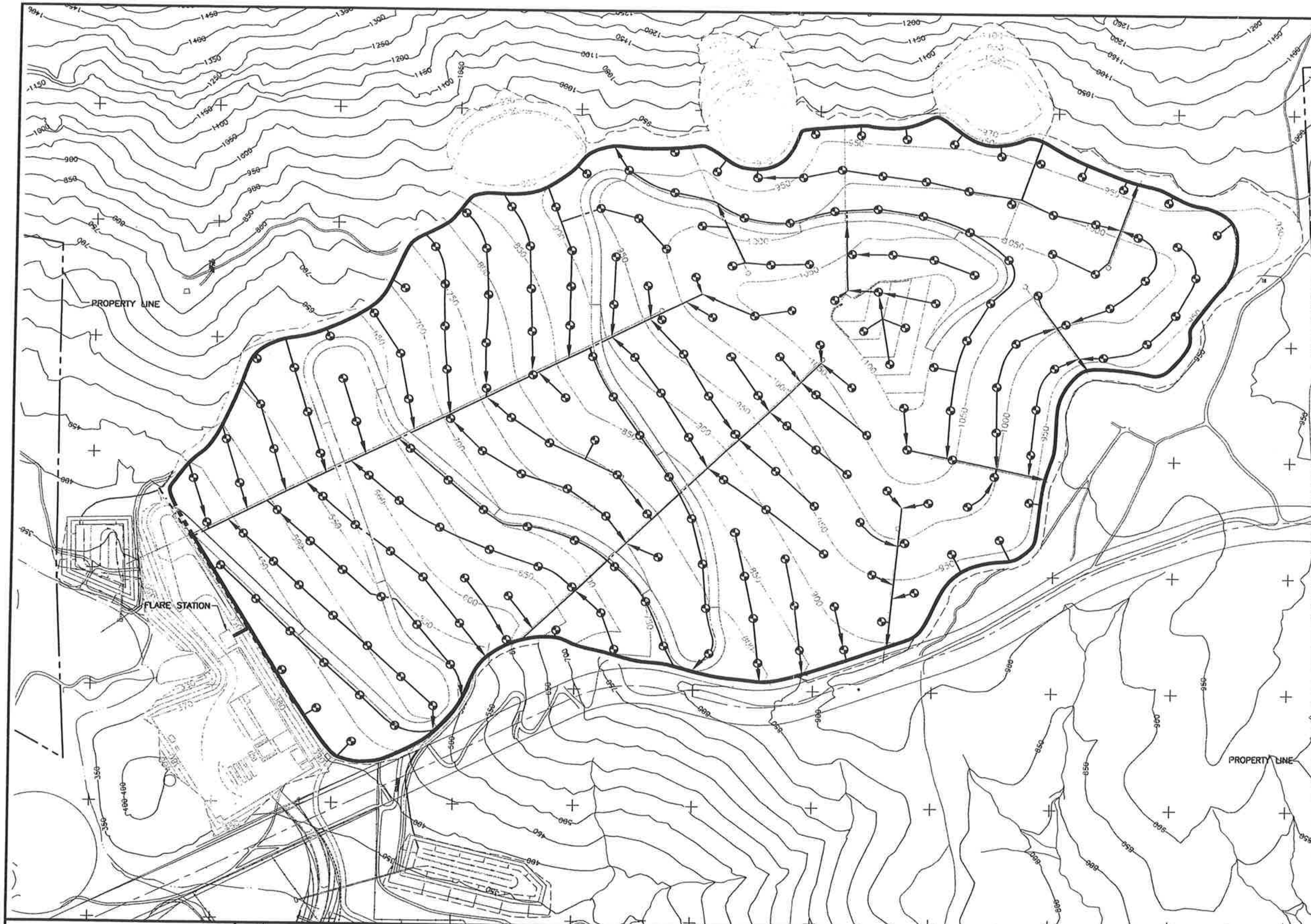
BAS

BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
MONITORING PROBE LOCATIONS

DESIGNED BY : C.A.L.	SCALE : AS SHOWN	
DRAWN BY : J.M.L.	DATE : 2-2009	FILE NO.: 865710B
CHECKED BY : P.W.	DATE : 2-2009	
APPROVED BY : P.W./S.N.	DATE : 2-2009	–

FOR PERMIT PURPOSES ONLY – NOT FOR CONSTRUCTION



GRAPHIC SCALE

200 100 0 200 400

(IN FEET)
1 inch = ft.

NOTES:

1. ARROWS INDICATE LFG CONDENSATE FLOW DIRECTION.
2. SECONDARY HEADERS/LATERALS SHOWN ARE LOCATED ON OUTSIDE OF BENCHES. PIPING AND WELL LOCATIONS WILL VARY DEPENDING ON FUTURE GRADING AND DRAINAGE PLANS.

LEGEND

—1500—	FINAL GRADE INDEX CONTOUR
— - —	PROPERTY LINE
━━━	PRIMARY GAS EXTRACTION HEADER
———	SECONDARY GAS COLLECTION HEADER/WELL LATERAL
⊕	PROPOSED VERTICAL GAS EXTRACTION WELL
═══	ACCESS/HAUL ROAD

FIGURE 11

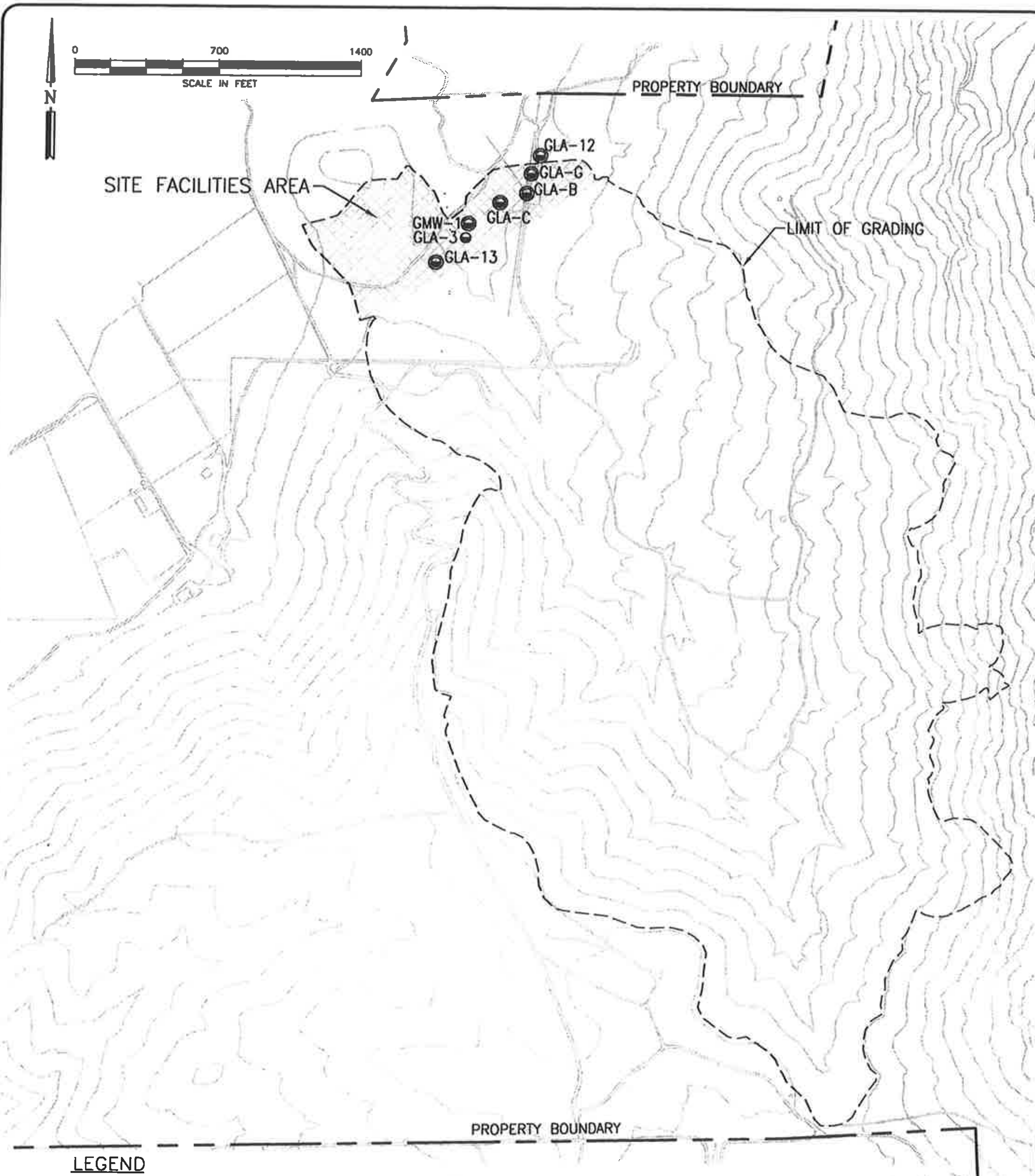
NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
GAS CONTROL PLAN

DESIGNED BY : SNA	SCALE : AS SHOWN	
DRAWN BY : SNA	DATE : SEPT-03	FILE NO.: GASPLAN2.DWG
CHECKED BY :	DATE :	DRAWING 8
APPROVED BY :	DATE :	

FOR PERMIT PURPOSES ONLY – NOT FOR CONSTRUCTION



LEGEND

- BEDROCK/WATER SUPPLY WELL
- PROPERTY BOUNDARY
- LIMIT OF GRADING

NOTE:
OTHER WELLS DRILLED FOR MONITORING PURPOSES ARE NOT SHOWN ON THIS FIGURE.

SOURCE: GEO-LOGIC ASSOCIATES, WATER SUPPLY REPORT

FIGURE 11A

BAS
(909) 860-7777
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765

GREGORY CANYON LANDFILL

WATER SUPPLY WELLS LOCATION MAP

JOB NO.	97139
DATE	05-2007
DRAWN BY	VL - CAL
FILE NAME	172832DB

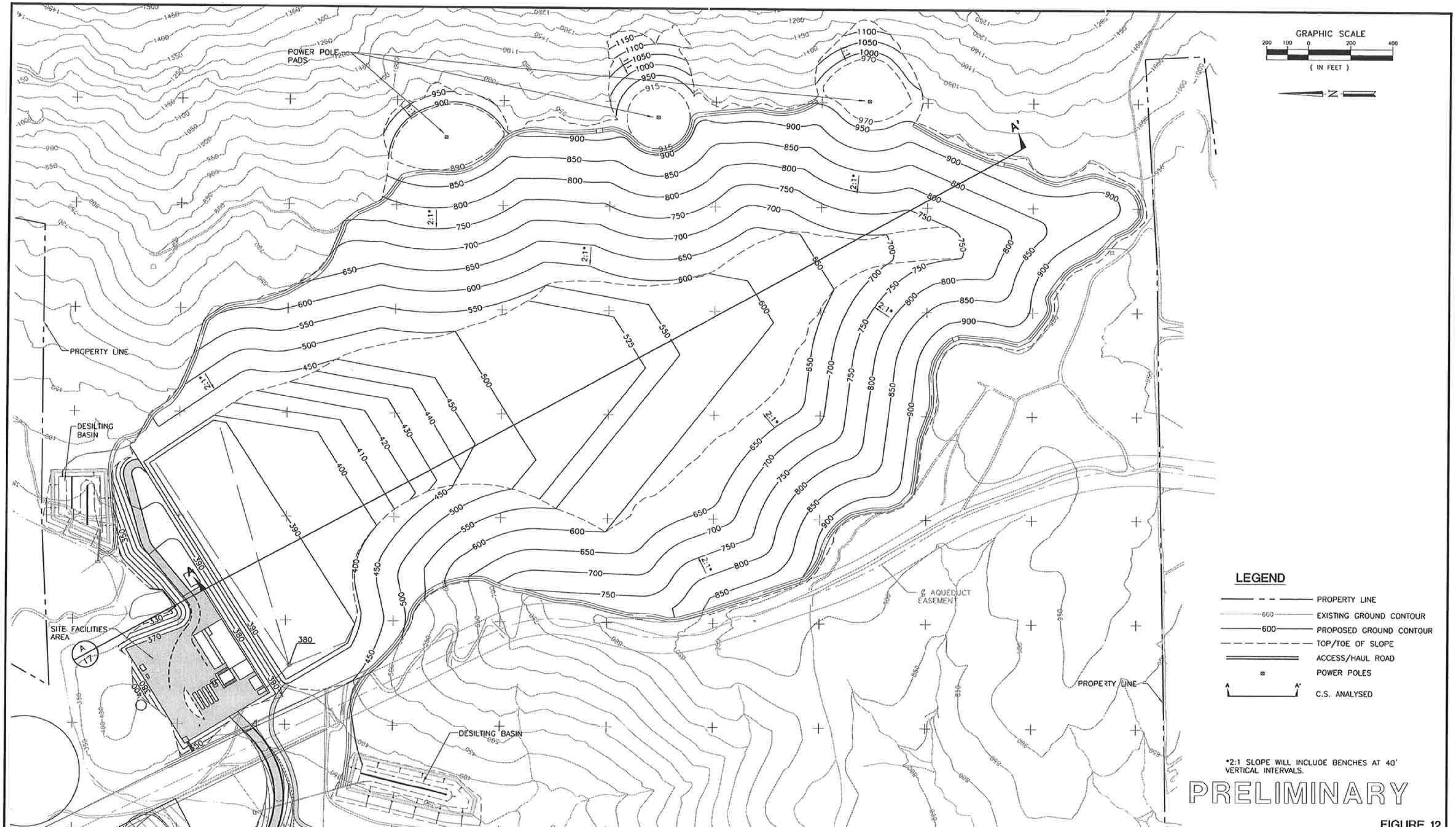


FIGURE 12

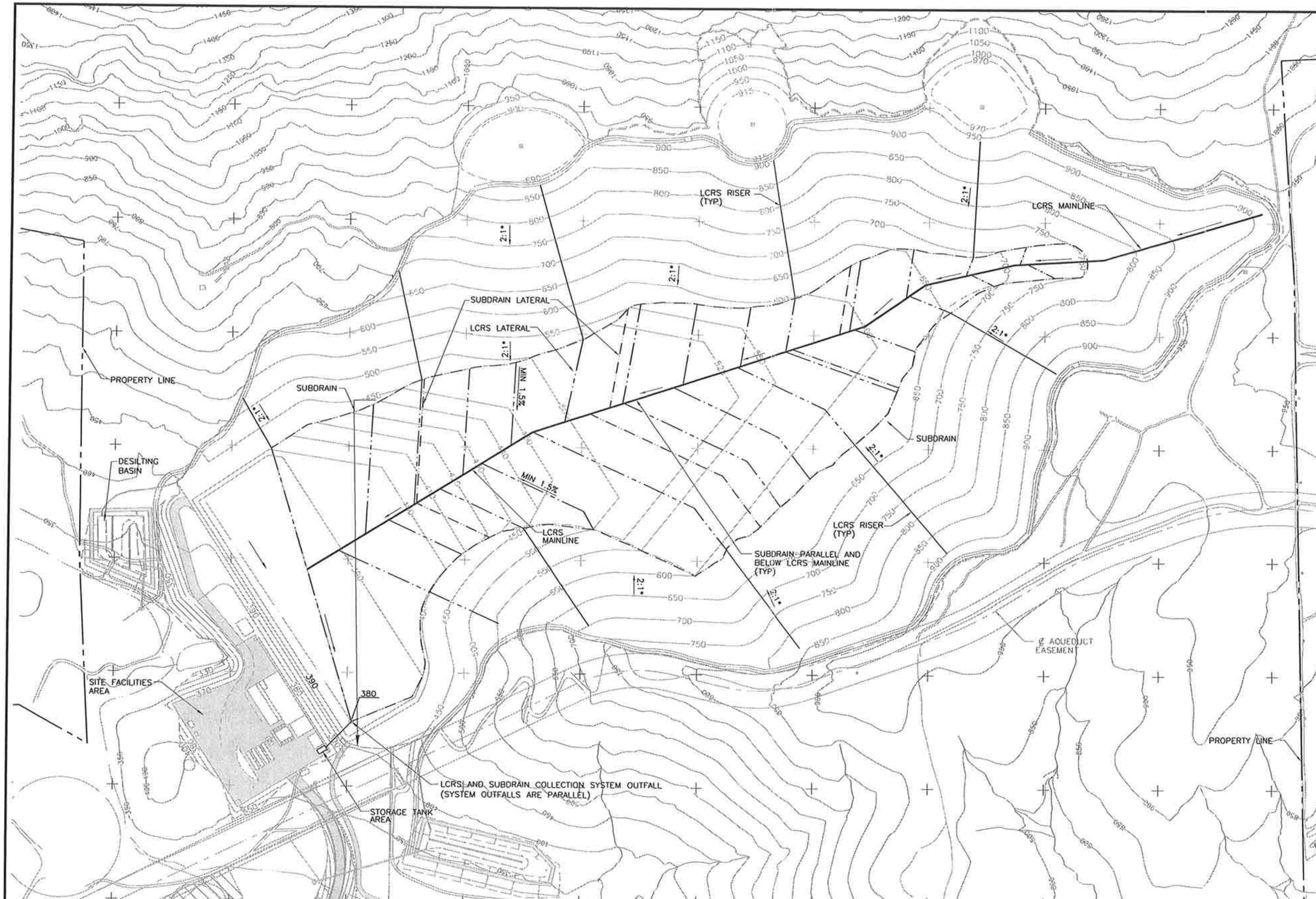
NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
MASTER EXCAVATION PLAN

DESIGNED BY : E.L.S.	SCALE : AS SHOWN	
DRAWN BY : J.P.J.	DATE : 6-2001	FILE NO. 28129DB.DWG
CHECKED BY :	DATE :	DRAWING 4
APPROVED BY :	DATE :	

FOR PERMIT PURPOSES ONLY — NOT FOR CONSTRUCTION



GRAPHIC SCALE

200 100 0 200 400

(IN FEET)

N

NOTES:

1. CONCEPTUAL LAYOUT ONLY. CHANGES WILL BE MADE WITH EACH PHASE OF DEVELOPMENT.

LEGEND

- LCRS RISER/CLEANOUT
- LCRS LATERAL
- SUBDRAIN
- PROPERTY LINE
- 600 EXISTING GROUND CONTOUR

PRELIMINARY

FIGURE 13

NO.	REVISION DESCRIPTION	BY:

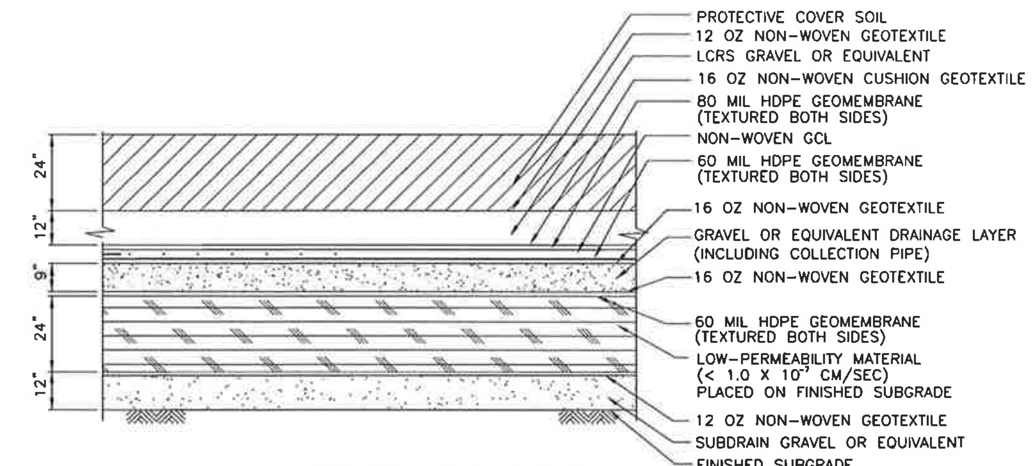
BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL

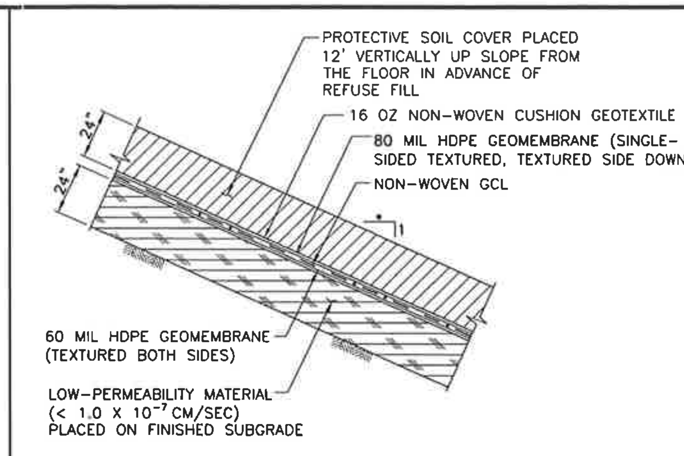
LCRS/SUBDRAIN SYSTEM LAYOUT PLAN

DESIGNED BY : T.W.	SCALE : AS SHOWN	
DRAWN BY : J.P.J.	DATE : 3-2002	FILE NO. 25098DB.DWG
CHECKED BY :	DATE :	DRAWING 5
APPROVED BY :	DATE :	

FOR PERMIT PURPOSES ONLY – NOT FOR CONSTRUCTION

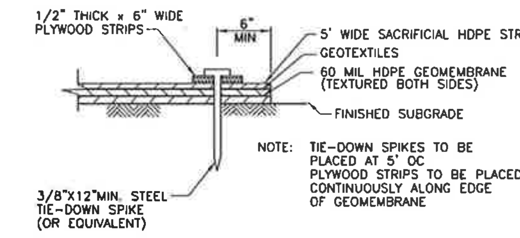


BOTTOM LINER SECTION
NTS
1/17



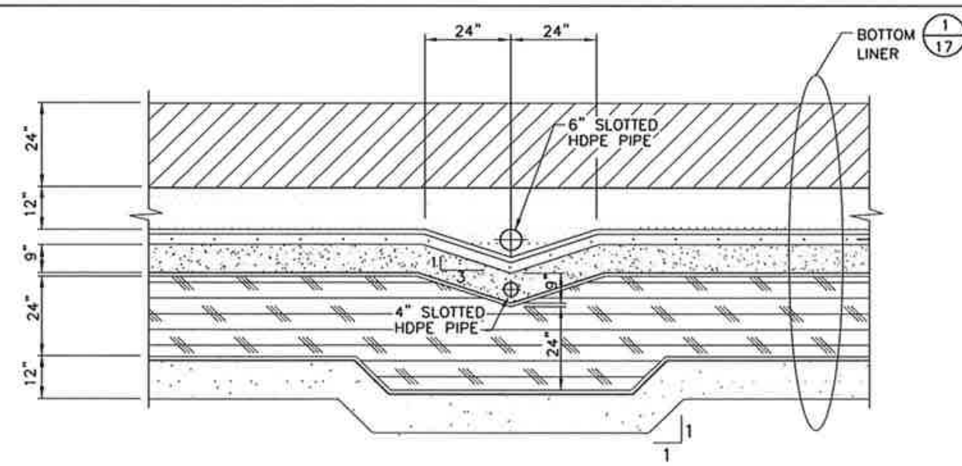
* PER PLAN (2:1 MAXIMUM)

SLOPE LINER SECTION
NTS
2/17

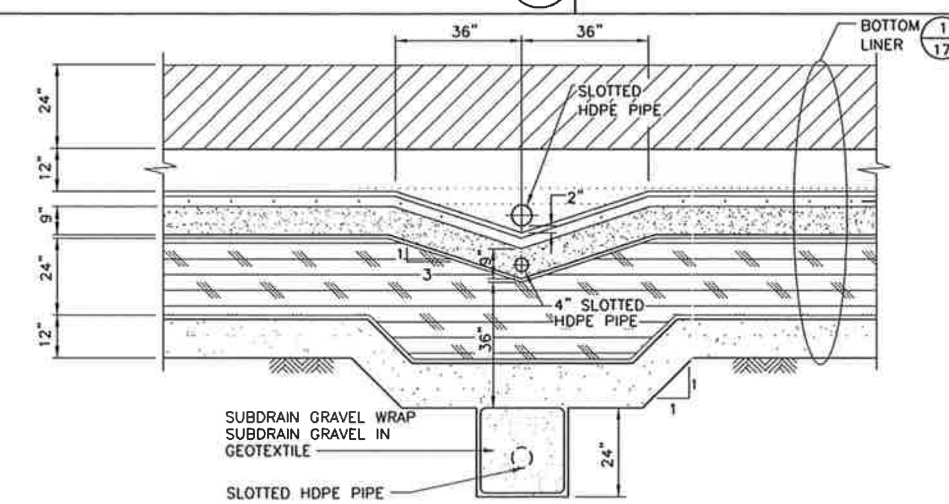


TIE-DOWN FOR SLOPE

TIE-DOWN FOR LINER TERMINATION ALONG SLOPE
NTS
3/17

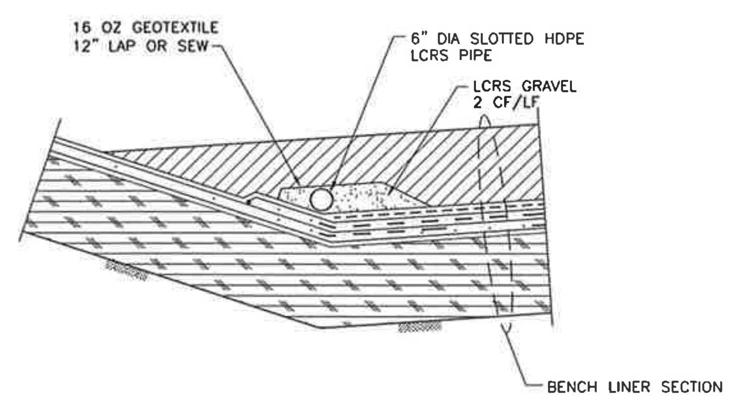


TRENCH FOR LCRS LATERAL

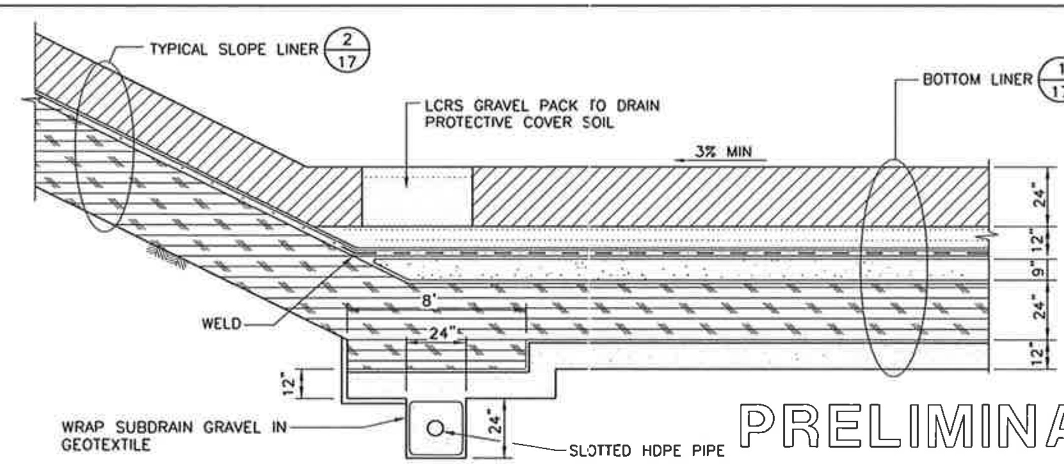


LCRS MAINLINE

LCRS SECTIONS
NTS
4/17



LCRS BENCH COLLECTOR
NTS
5/17



PRELIMINARY

TYPICAL BOTTOM AND SLOPE LINER TRANSITION
NTS
6/17

FIGURE 14

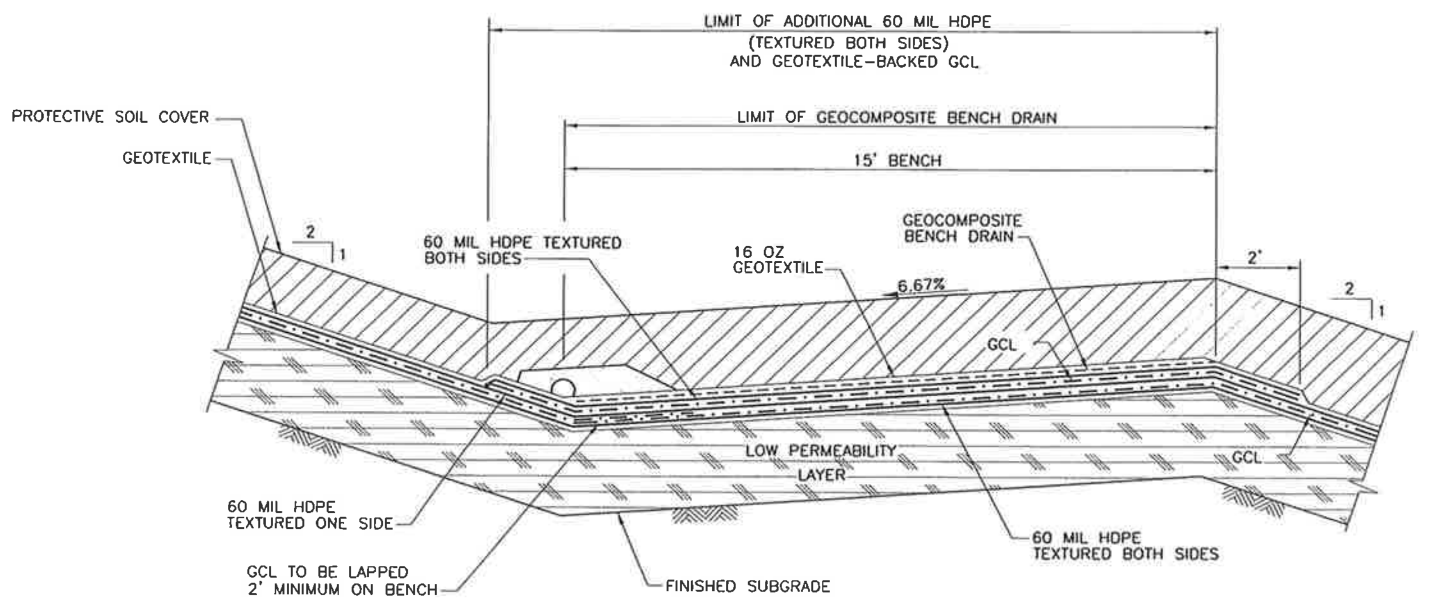
NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
DETAIL SHEET

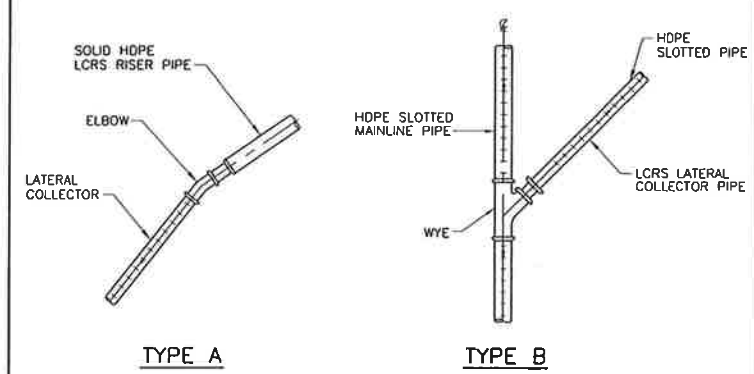
DESIGNED BY : T.W.	SCALE : AS SHOWN	
DRAWN BY : J.P.J.	DATE : REV 1-05	FILE NO.: 29159DB.DWG
CHECKED BY :	DATE :	DRAWING 18
APPROVED BY :	DATE :	

FOR PERMIT PURPOSES ONLY – NOT FOR CONSTRUCTION

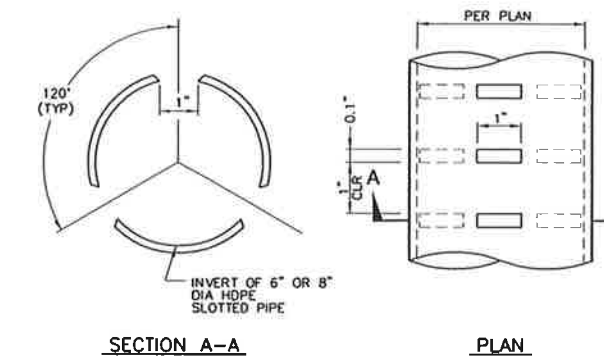


NOTE:
1. TYPICAL BENCH SECTION LOCATED EVERY 40' VERTICALLY FROM TOE
2. SINGLE-SIDED TEXTURED GEOMEMBRANES MAY BE USED IN SOME AREAS

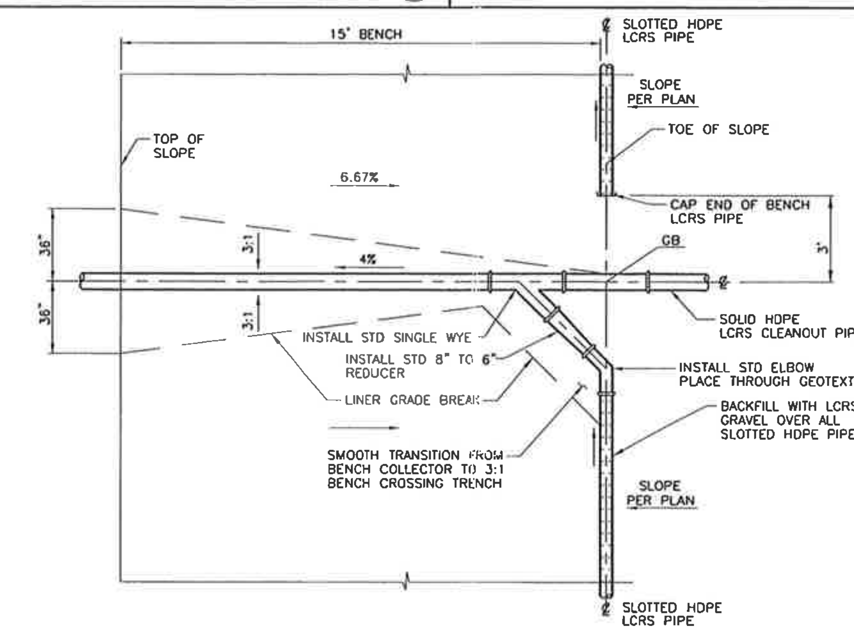
TYPICAL BENCH SECTION
NTS
1/18



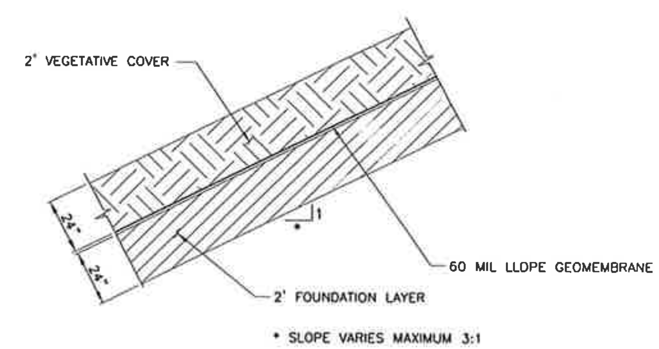
LCRS LATERAL COLLECTOR JUNCTION
NTS
2/18



SLOTTED LCRS PIPE
NTS
3/18

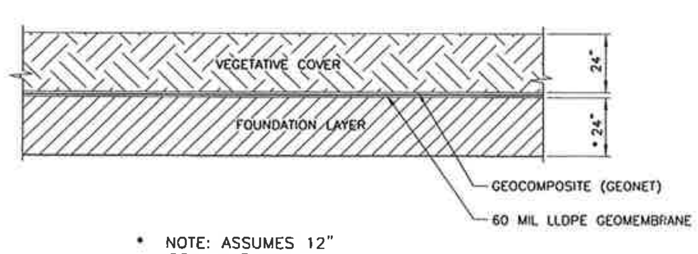


LCRS BENCH COLLECTOR AND RISER JUNCTION
NTS
4/18



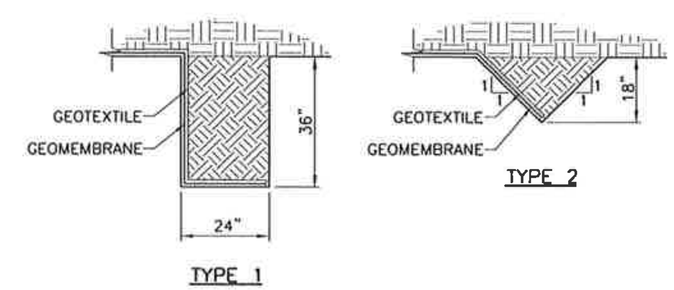
* SLOPE VARIES MAXIMUM 3:1

TYPICAL SLOPE COVER SECTION
NTS
5/18

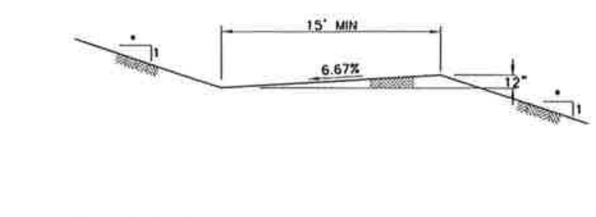


* NOTE: ASSUMES 12" SOIL IN PLACE

TYPICAL DECK COVER SECTION
NTS
6/18



TYPICAL ANCHOR TRENCH
NTS
7/18



* SLOPE VARIES PER PLAN

PRELIMINARY

TYPICAL BENCH
NTS
8/18

FIGURE 15

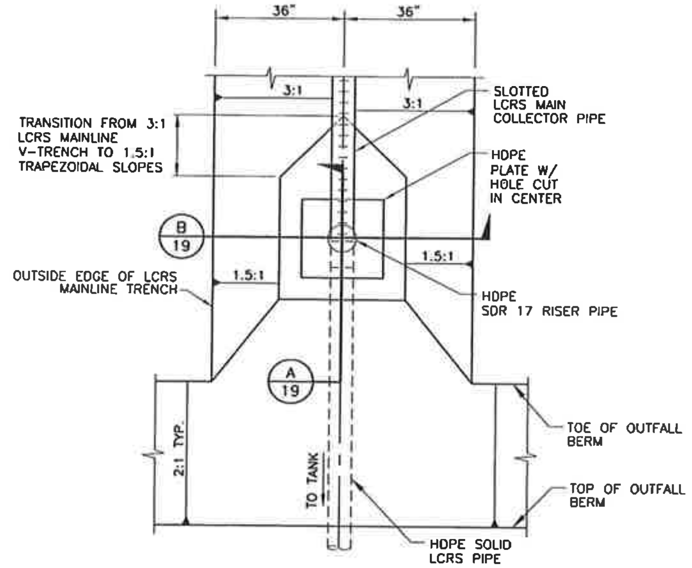
NO.	REVISION DESCRIPTION	BY:

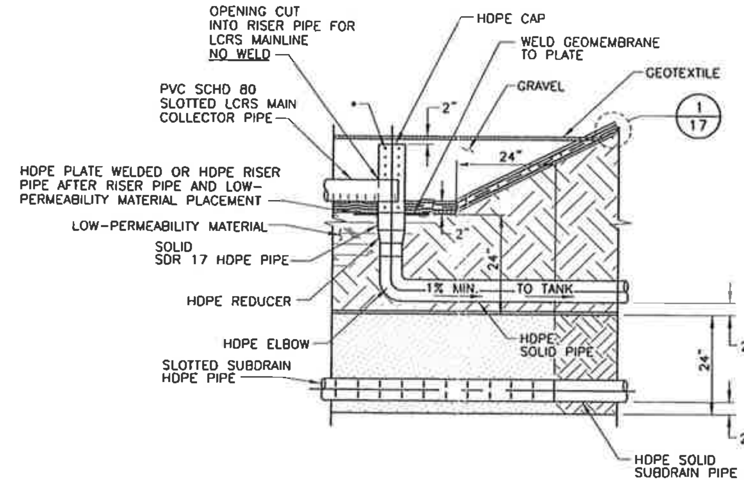
BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
DETAIL SHEET

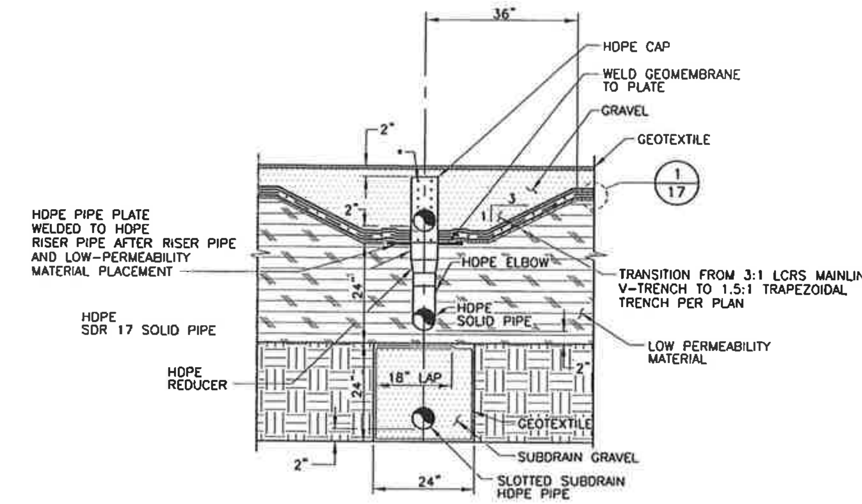
DESIGNED BY : G.V.N.	SCALE : AS SHOWN	
DRAWN BY : T.J.S./J.P.J.	DATE : 9-2001	FILE NO.: 291600B.DWG
CHECKED BY :	DATE :	DRAWING 19
APPROVED BY :	DATE :	

FOR PERMIT PURPOSES ONLY – NOT FOR CONSTRUCTION





SECTION (A/19)
NTS



SECTION (B/19)
NTS

LCRS AND SUBDRAIN OUTFALL PLAN

NTS

(1/19)

PRELIMINARY

FIGURE 15A

NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

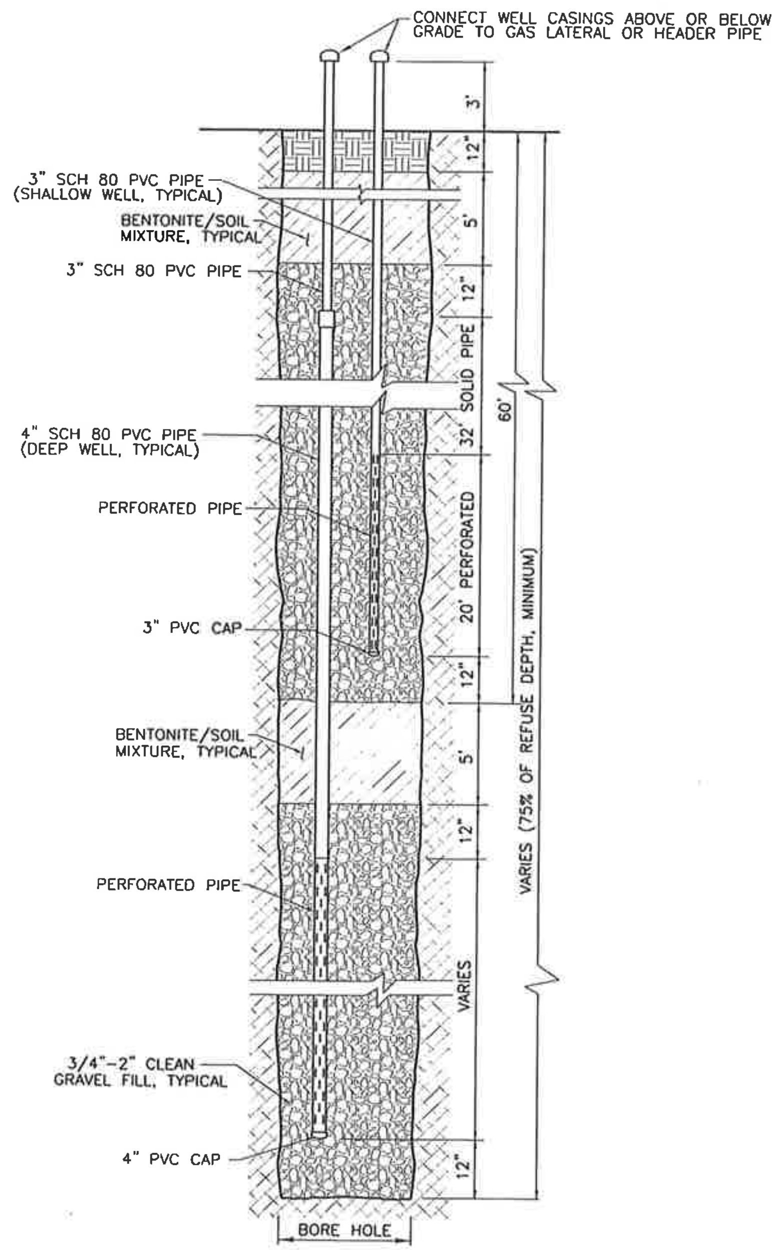
GREGORY CANYON LANDFILL

DETAIL SHEET

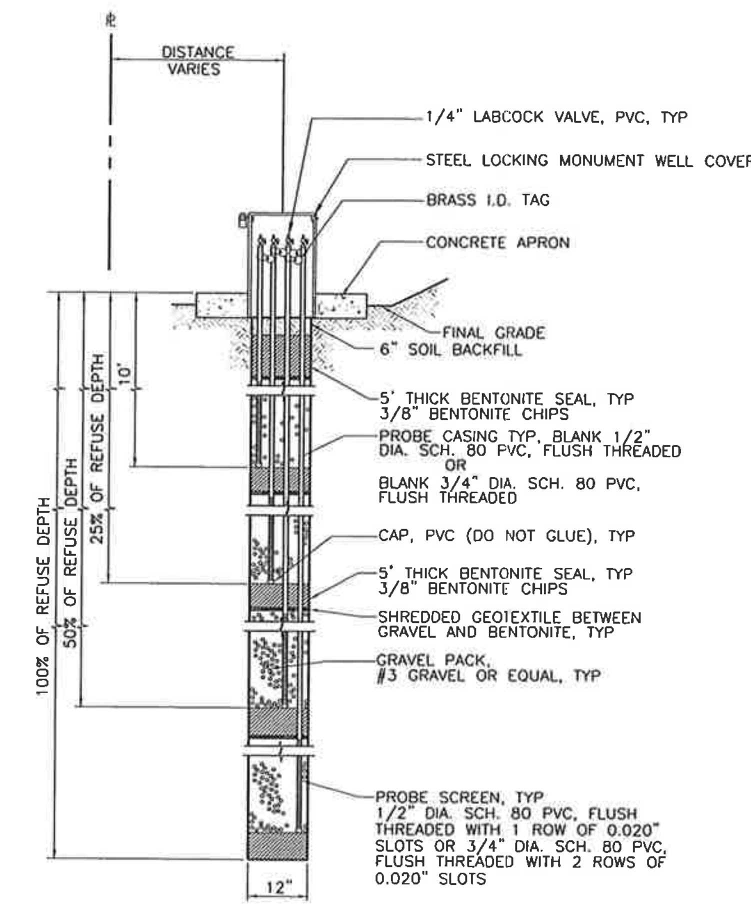
DESIGNED BY : T.W.	SCALE : AS SHOWN	
DRAWN BY : J.P.J.	DATE : 9-2001	FILE NO.: 29161DB.DWG
CHECKED BY :	DATE :	DRAWING 20
APPROVED BY :	DATE :	

H:\dwg\projects\2001\29161db.dwg 05/20/2003 13:06

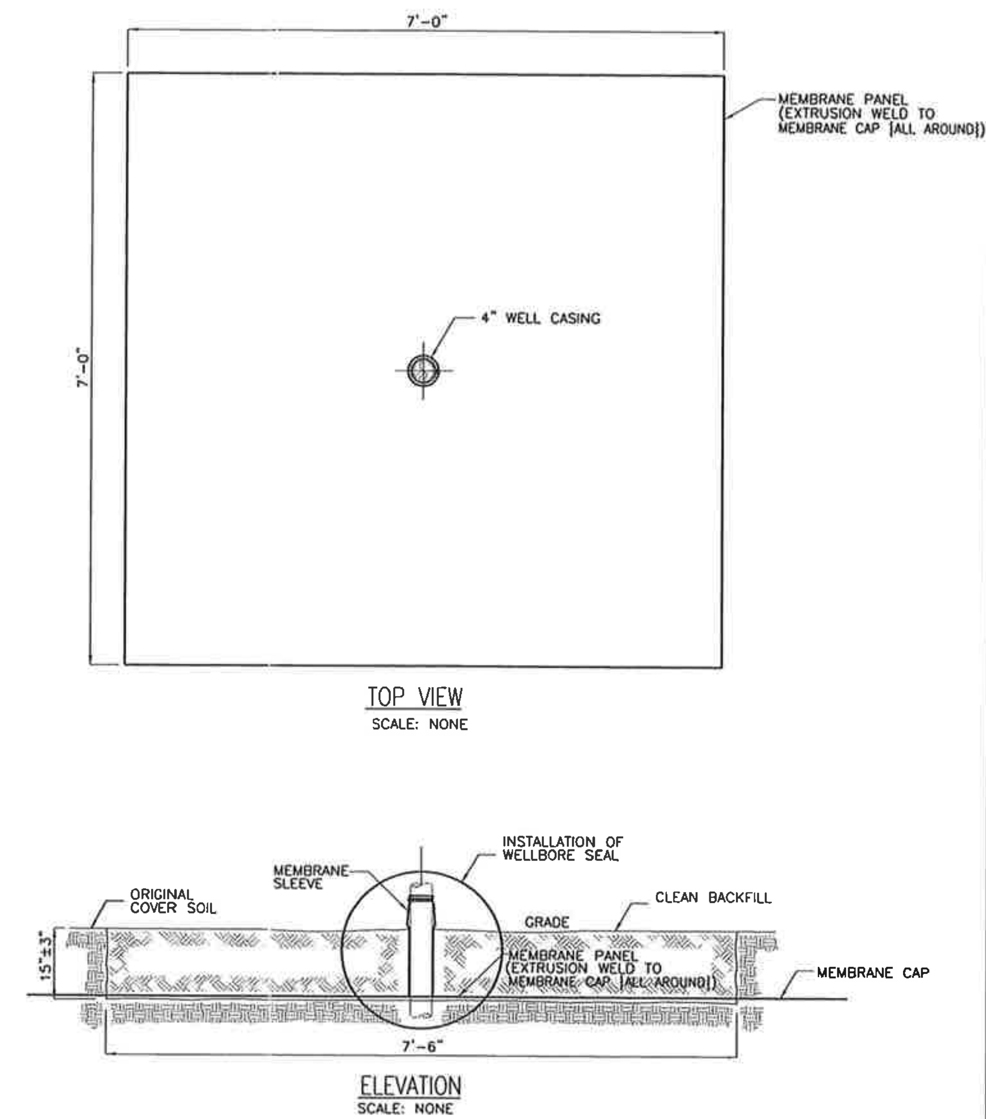
FOR PERMIT PURPOSES ONLY – NOT FOR CONSTRUCTION



TYPICAL GAS EXTRACTION WELL DETAIL
NTS
1/22



TYPICAL GAS MONITORING PROBE
NTS
2/22



TYPICAL WELLBORE SEAL TO MEMBRANE CAP CONNECTION DETAIL
NTS
3/22

PRELIMINARY

FIGURE 16

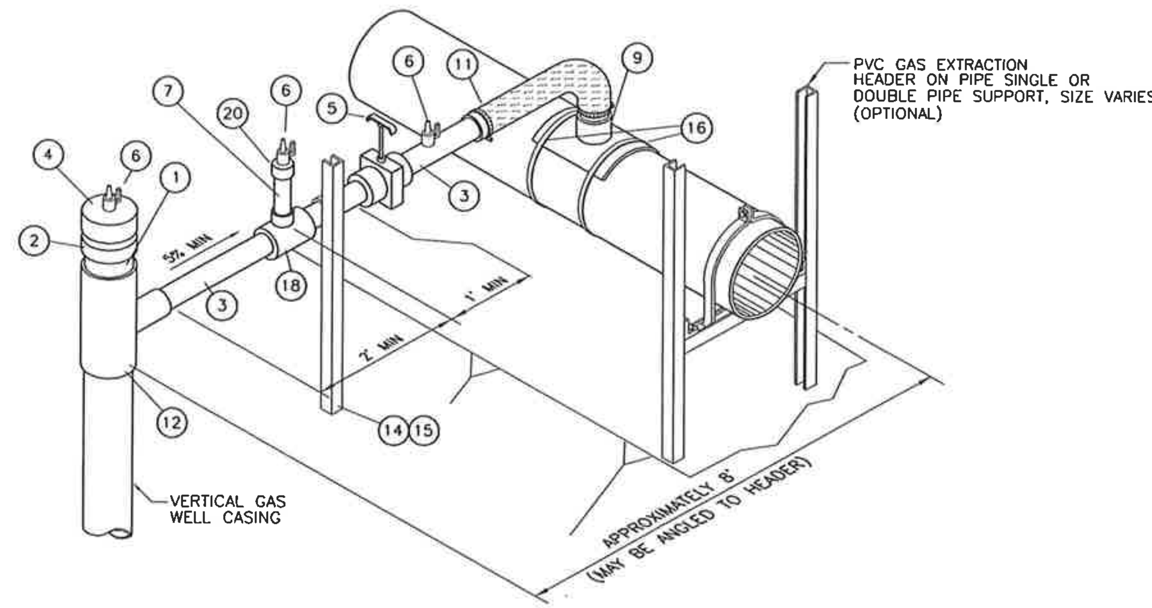
NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
GAS SYSTEM DETAIL SHEET

DESIGNED BY : G.V.N.	SCALE : AS SHOWN	
DRAWN BY : T.J.S.	DATE : 8-1998	FILE NO.: 29163DB.DWG
CHECKED BY :	DATE :	DRAWING 23
APPROVED BY :	DATE :	

FOR PERMIT PURPOSES ONLY - NOT FOR CONSTRUCTION



TYPICAL SINGLE EXTRACTION WELL CONNECTION DETAIL

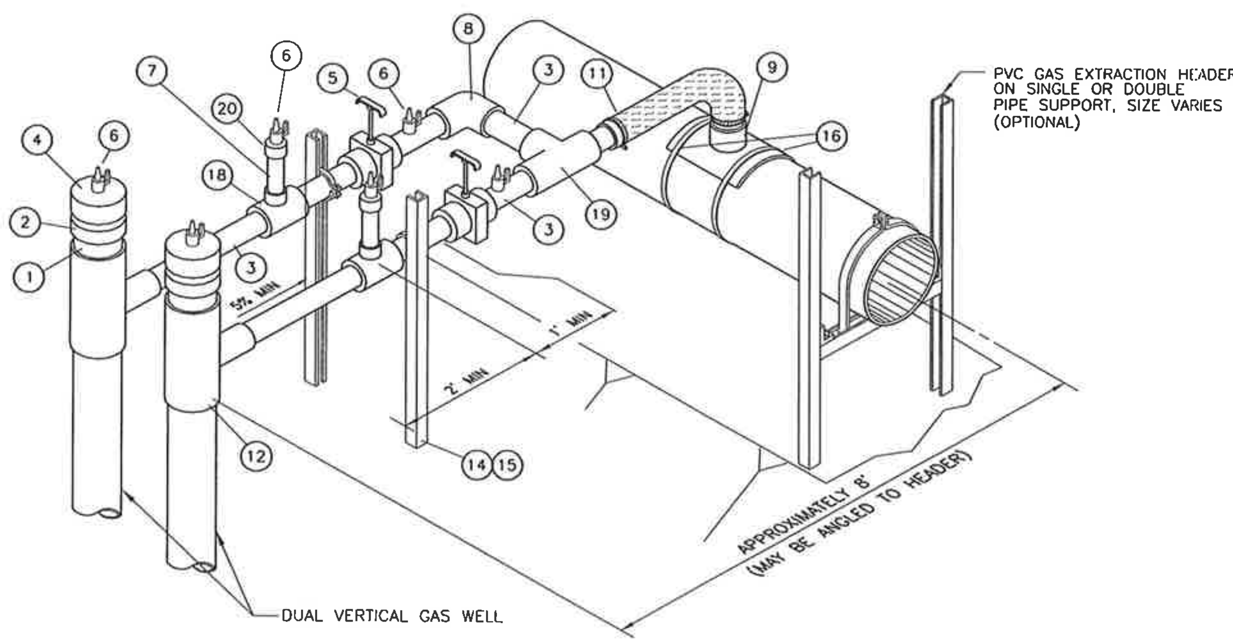
NTS

1/21

GAS SYSTEM APPURTENANCES

ITEM	DESCRIPTION
1	SCH 80 PVC PIPE
2	MALE ADAPTER, SOC x MPT
3	SCH 80 PVC PIPE
4	THREADED PVC CAP
5	GATE VALVE, SOC, PVC BODY, W/SLIDE TYPE GATE
6	LABCOCK VALVE AND MPT x HOSE
7	SCH 80 PVC PIPE
8	90° ELBOW, PVC, SCH 80, SOC
9	SADDLE, HEADER SIZE x 2", PVC
10	STAINLESS STEEL WIRE ROPE, 3/32" DIA.
11	FLEX HOSE, PVC WITH POWERLOCK CLAMPS
12	PVC TEE, SCH 80, SOC
13	N-TYPE COMPRESSION SLEEVE, SST
14	CHANNEL, GALVANIZED
15	PIPE CLAMP
16	STAINLESS STEEL BAND CLAMP (BAND-IT)
17	PVC REDUCER, SOC
18	PVC TEE, SxSxS, SCH 80
19	PVC TEE, SxSxS, SCH 80
20	PVC CAP
21	SCH 40 PVC PIPE

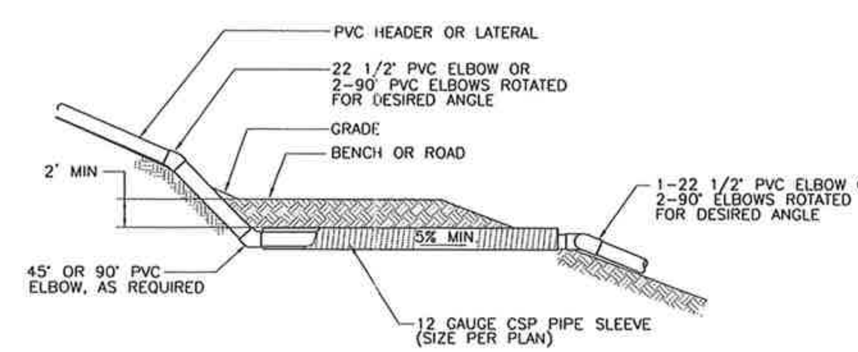
NOTE:
GENERAL DESCRIPTIONS ONLY
ACTUAL SIZES WILL VARY PER CONSTRUCTION DRAWINGS



TYPICAL DUAL GAS EXTRACTION WELL CONNECTION DETAIL

NTS

2/21



NOTE:
AIR, CONDENSATE, & IRRIGATION LINES NOT SHOWN IN CSP SLEEVE (IF REQUIRED).

PRELIMINARY

TYPICAL BENCH CROSSING DETAIL

NTS

FIGURE 16A

3/21

NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
GAS SYSTEM DETAIL SHEET

DESIGNED BY : G.V.N.	SCALE : AS SHOWN	
DRAWN BY : T.J.S.	DATE : 8-1998	FILE NO.: 29162DB.DWG
CHECKED BY :	DATE :	DRAWING 22
APPROVED BY :	DATE :	

FOR PERMIT PURPOSES ONLY - NOT FOR CONSTRUCTION

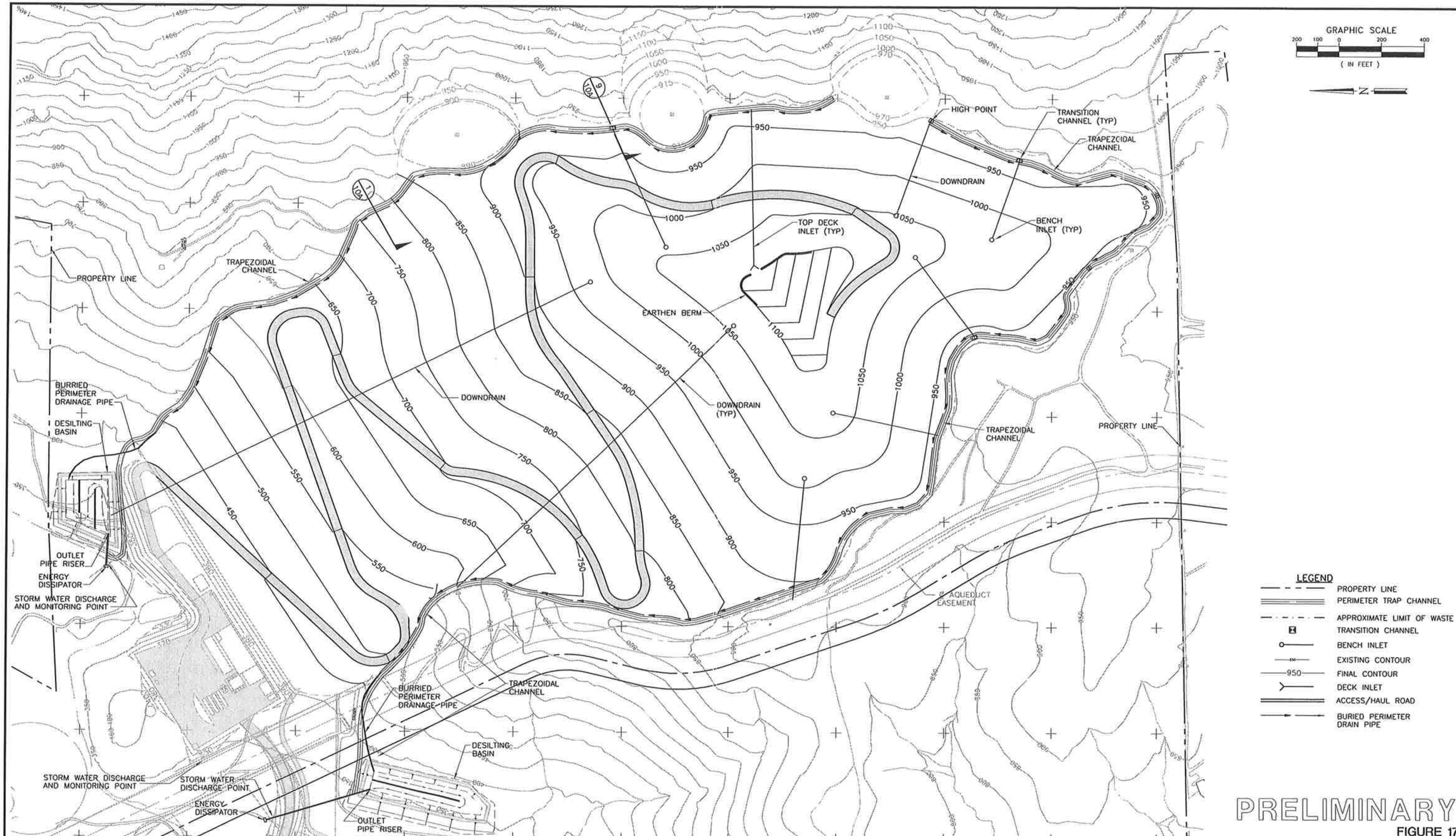


FIGURE 17

NO.	REVISION DESCRIPTION	BY:

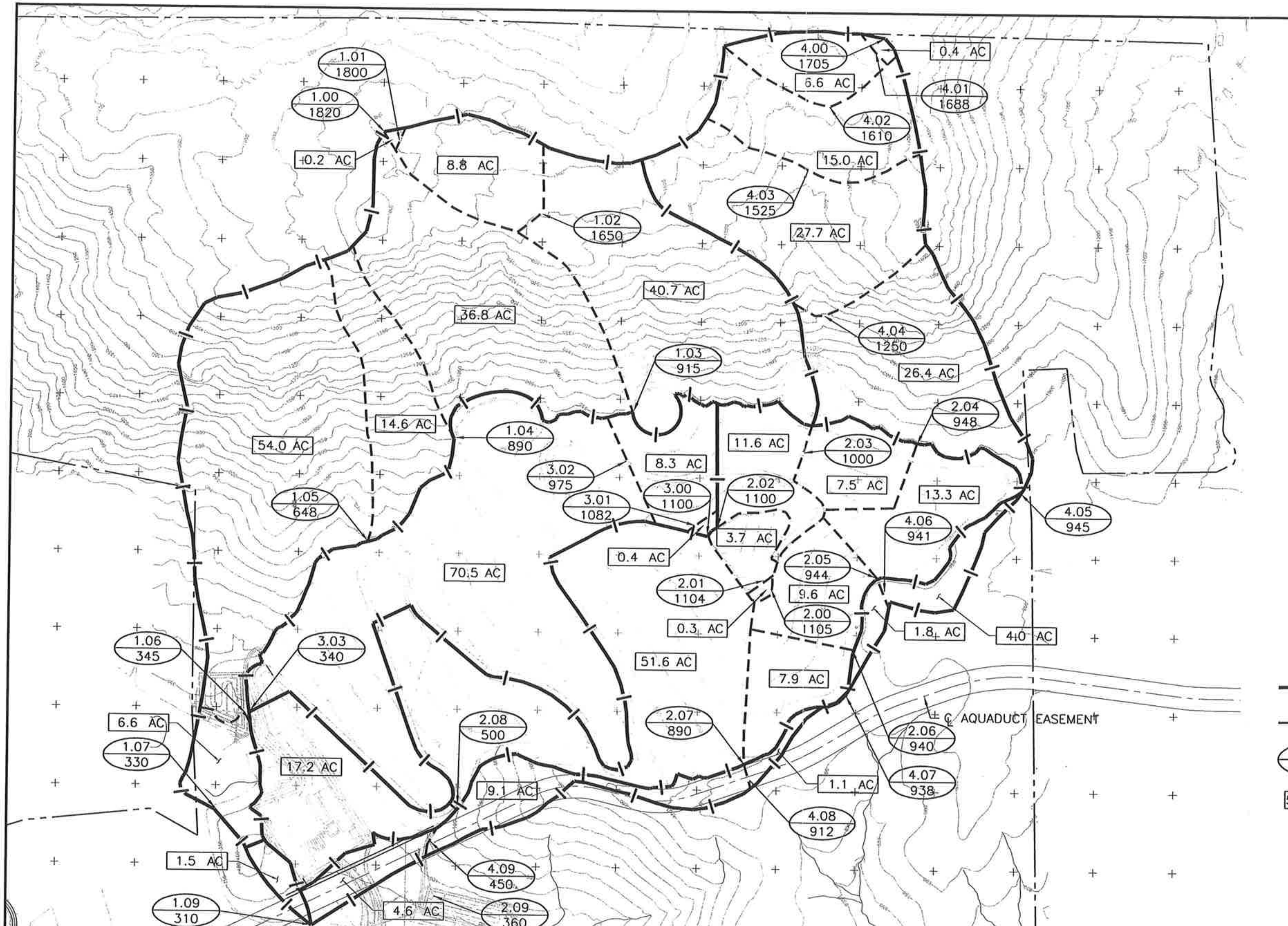
BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL

FINAL DRAINAGE PLAN

DESIGNED BY : C.M.	SCALE : AS SHOWN	
DRAWN BY : J.P.J.	DATE : 4-2002	FILE NO.: 340570B.DWG
CHECKED BY :	DATE :	DRAWING 7
APPROVED BY :	DATE :	

FOR PERMIT PURPOSES ONLY – NOT FOR CONSTRUCTION



GREGORY CANYON LANDFILL
100-YEAR RUNOFF SUMMARY TABLE

NODES NO.	SUB AREA (ACRES)	RUNOFF (CFS)	SUBAREA (ACRES)	RUNOFF (CFS)	COMMENTS
1.00-1.01	0.20	0.56	0.20	0.56	INITIAL
1.01-1.02	8.80	18.88	9.00	19.31	
1.02-1.03	40.70	79.14	49.70	96.64	
1.03-1.04	36.80	66.36	86.50	155.99	
1.04-1.05	14.60	25.50	101.10	176.61	
1.05-1.06	54.00	91.66	155.10	263.26	
1.06-1.07	6.60	10.74	161.70	263.26	
1.07			161.70	263.26	CONFLUENCE
4.00-4.01	0.40	1.12	0.40	1.12	INITIAL
4.01-4.02	6.60	15.84	7.00	16.80	
4.02-4.03	15.00	33.96	22.00	49.81	
4.03-4.04	27.70	58.49	49.70	104.94	
4.04-4.05	26.40	51.04	76.10	147.12	
4.05-4.06	4.00	6.81	80.10	147.12	
4.06-4.07	1.80	2.88	81.90	147.12	
4.07-4.08	1.10	1.71	83.00	147.12	
4.08-4.09	9.10	13.56	92.10	147.12	
4.08-4.09	4.60	6.85	96.70	147.12	ADDITIONAL
1.09			96.70	147.12	CONFLUENCE
2.00-2.01	0.30	0.62	0.30	0.62	INITIAL
2.01-2.02	3.70	5.84	4.00	6.31	
2.02-2.03	11.60	17.04	15.60	22.92	
2.03-2.04	7.50	10.25	23.10	31.57	
2.04-2.05	13.30	14.81	36.40	40.53	ADDITIONAL
2.05-2.06	9.60	10.44	46.00	50.04	ADDITIONAL
2.06-2.07	7.90	8.40	53.90	57.28	ADDITIONAL
2.07-2.08	51.60	53.48	105.50	109.35	ADDITIONAL
2.08-2.09	17.20	17.70	122.70	150.06	ADDITIONAL
3.00-3.01	0.40	1.12	0.40	1.12	INITIAL
3.01-3.02	8.30	19.78	8.70	20.73	
3.02-3.03	70.50	132.06	79.20	148.36	

FIGURE 18

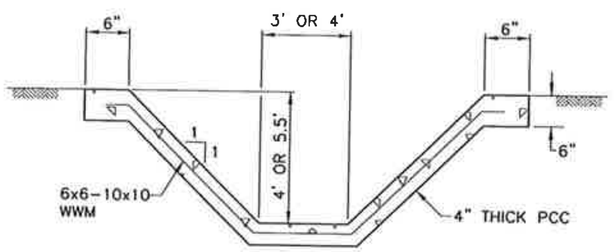
NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

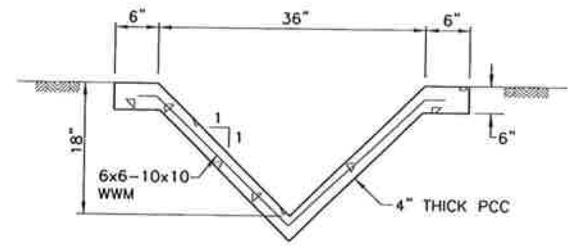
GREGORY CANYON LANDFILL
100-YEAR DEVELOPED CONDITION
HYDROLOGY MAP

DESIGNED BY : C.M.	SCALE : AS SHOWN		
DRAWN BY : J.P.J.	DATE : 9-2004	FILE NO.: 241850B.DWG	
CHECKED BY :	DATE :	DRAWING 24	
APPROVED BY :	DATE :		

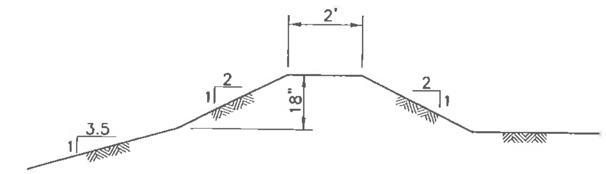
FOR PERMIT PURPOSES ONLY - NOT FOR CONSTRUCTION



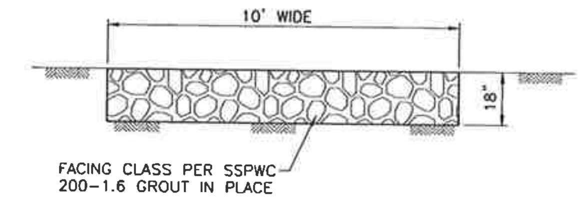
PCC TRAPEZOIDAL CHANNEL
NTS
1/20



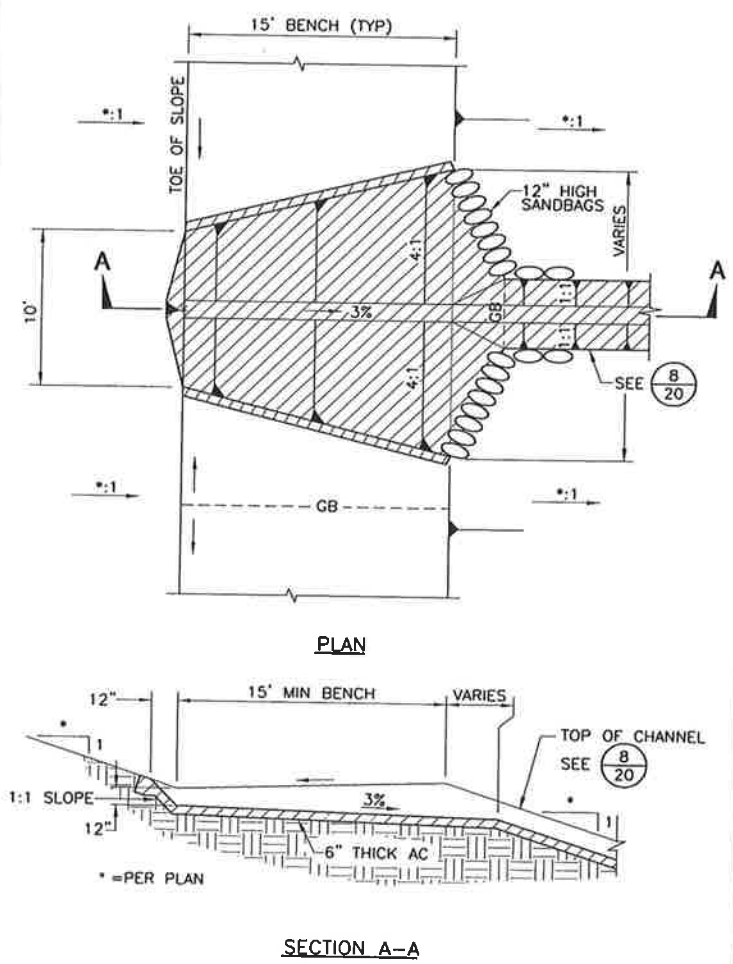
PCC V-DITCH
NTS
2/20



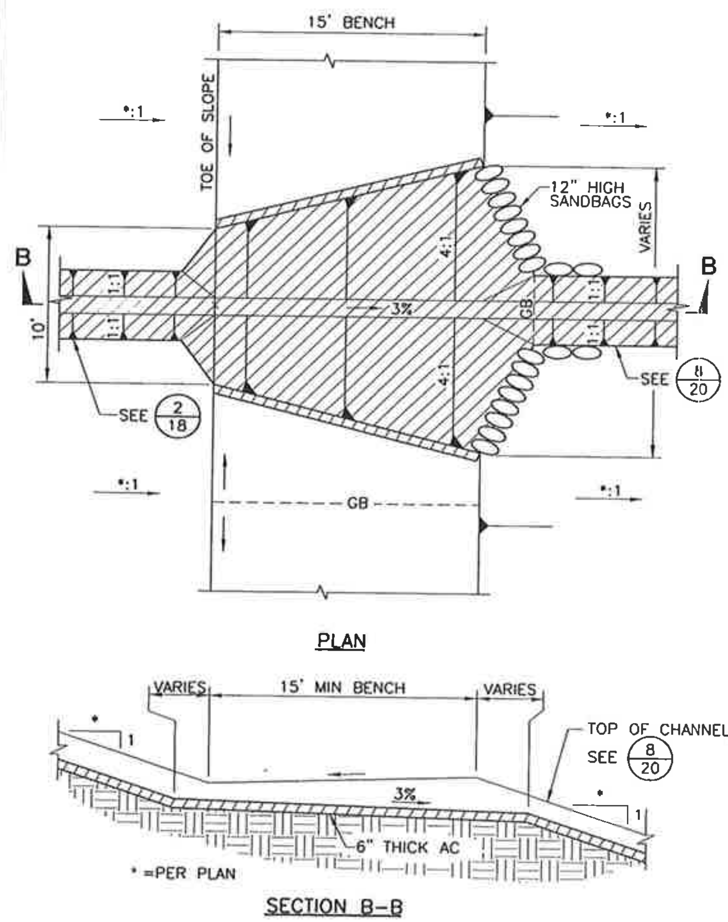
TOP DECK EARTHEN BERM
NTS
3/20



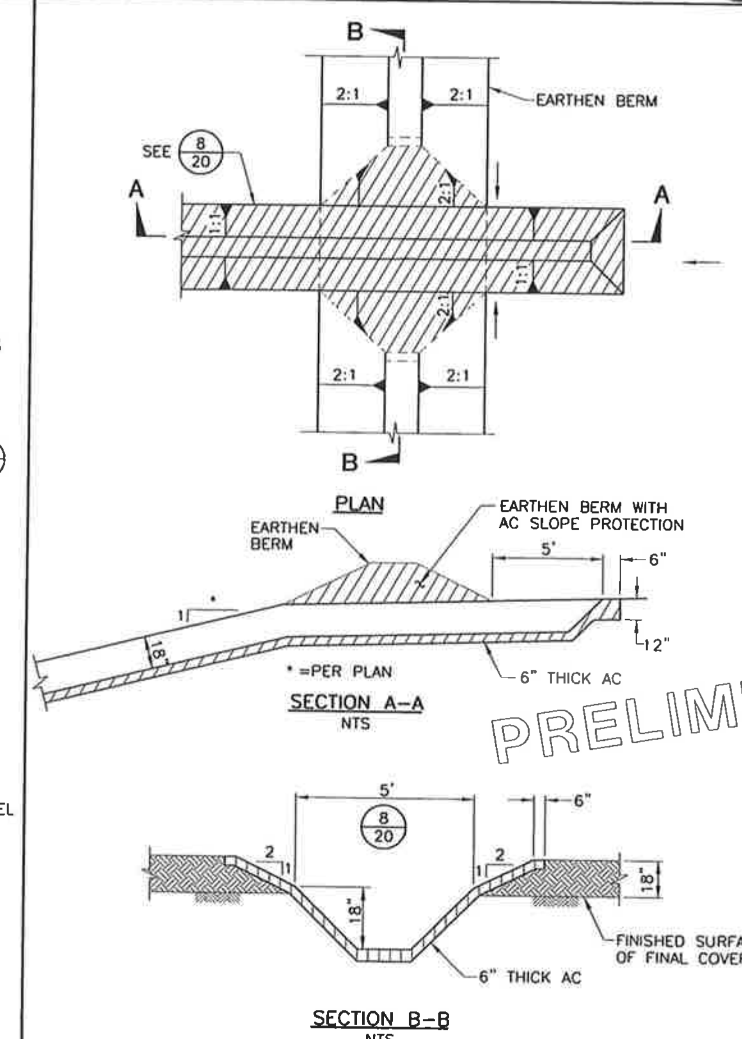
GROUTED RIPRAP
NTS
4/20



TYPICAL BENCH INLET
NTS
5/20

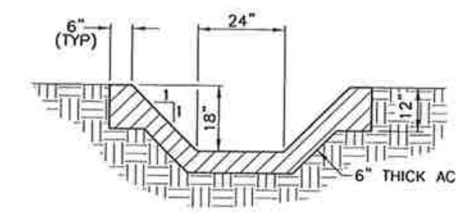


AC DOWNDRAIN BENCH CROSSING
NTS
6/20

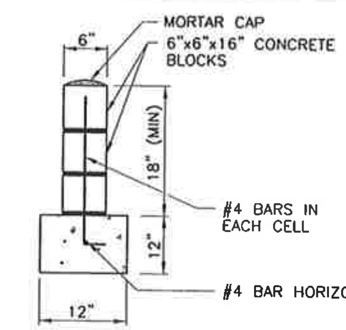


PRELIMINARY

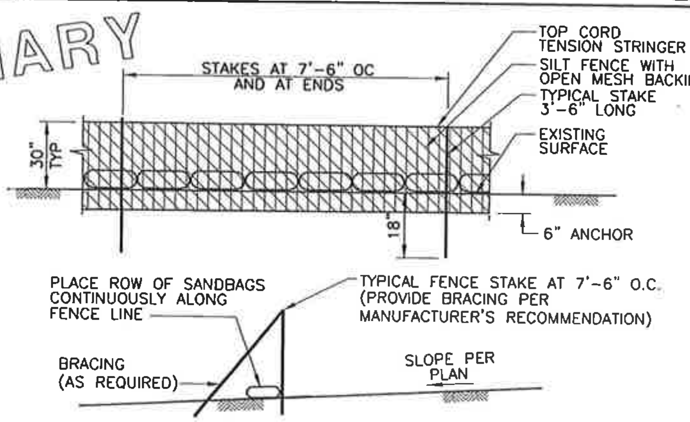
TOP DECK INLET
NTS
7/20



AC DOWNDRAIN TRAPEZOIDAL CHANNEL
NTS
8/20



SPLASH WALL
NTS
9/20



SILT FENCE DETAIL
NTS
10/20

FIGURE 19

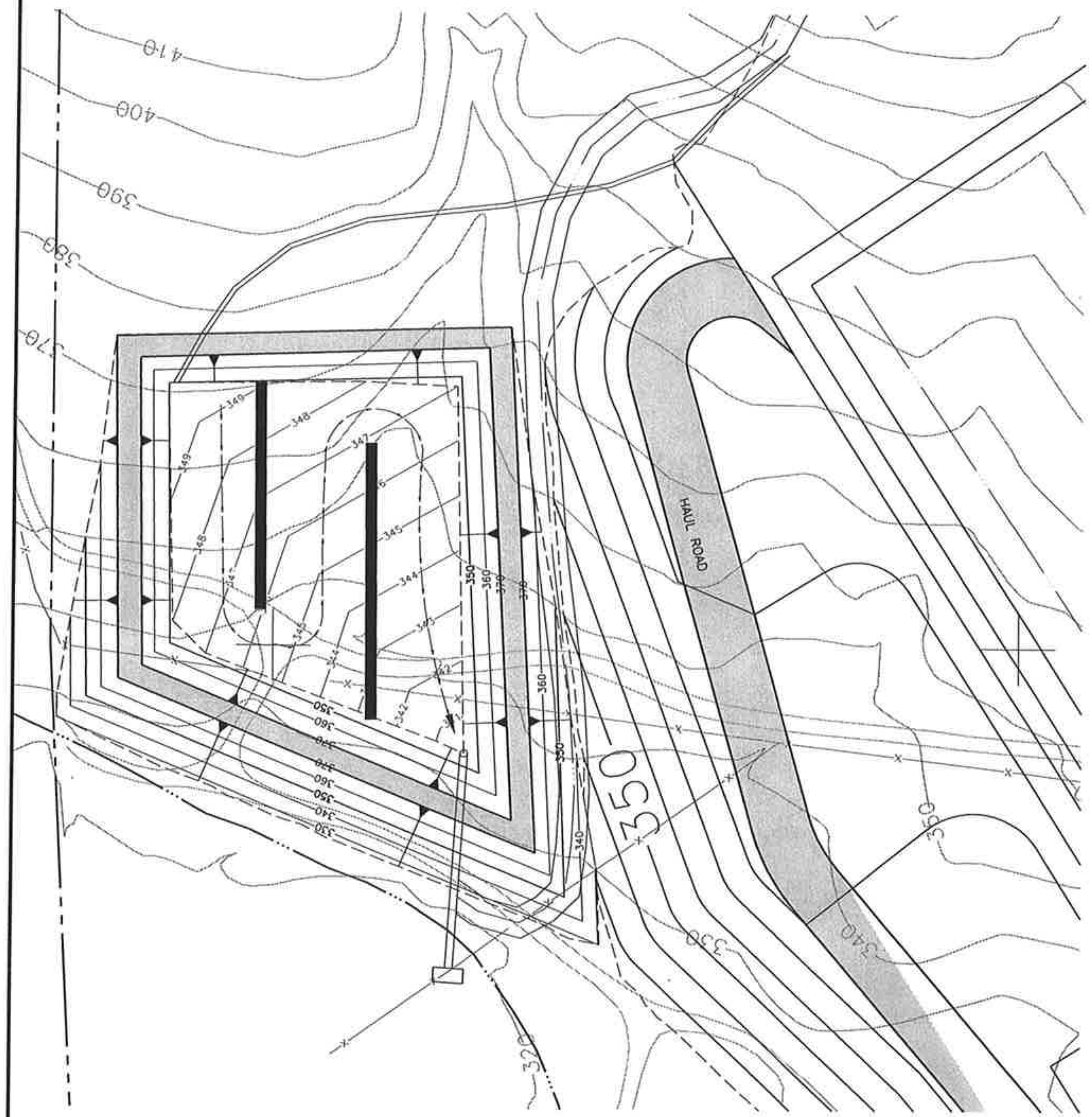
NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

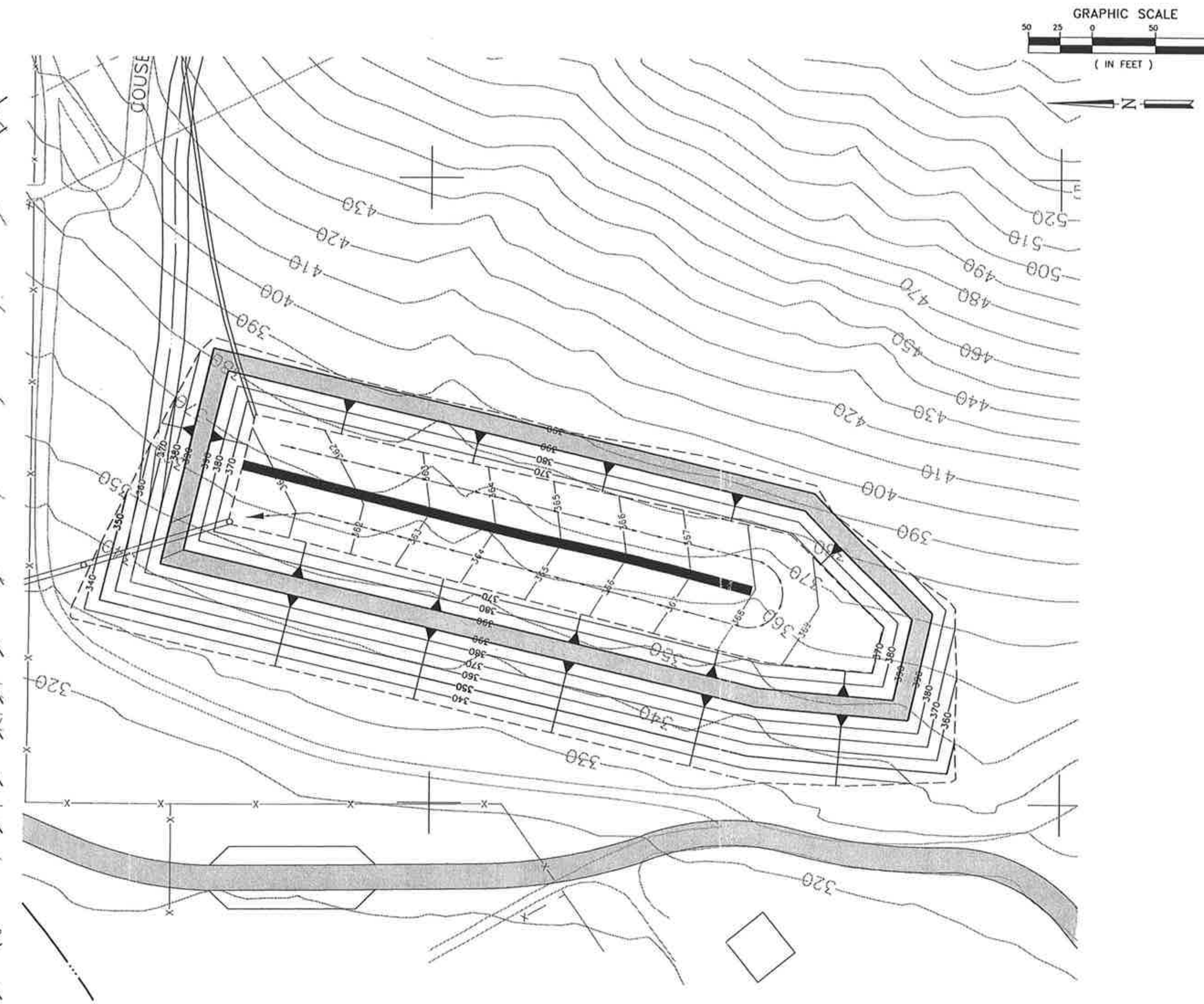
GREGORY CANYON LANDFILL
DETAIL SHEET

DESIGNED BY : G.V.N.	SCALE : AS SHOWN	
DRAWN BY : T.J.S.	DATE : 8-1998	FILE NO.: 29158DB
CHECKED BY :	DATE :	
APPROVED BY :	DATE :	DRAWING 21

FOR PERMIT PURPOSES ONLY - NOT FOR CONSTRUCTION



EASTERN DESILTING BASIN



WESTERN DESILTING BASIN

LEGEND

- PROPERTY LINE
- LIMIT OF REFUSE/PHASE I EXCAVATION
- TOP/TOE OF SLOPE
- 900 FINAL CONTOUR
- 900 EXISTING CONTOUR
- ACCESS/HAUL ROAD

PRELIMINARY

FIGURE 20

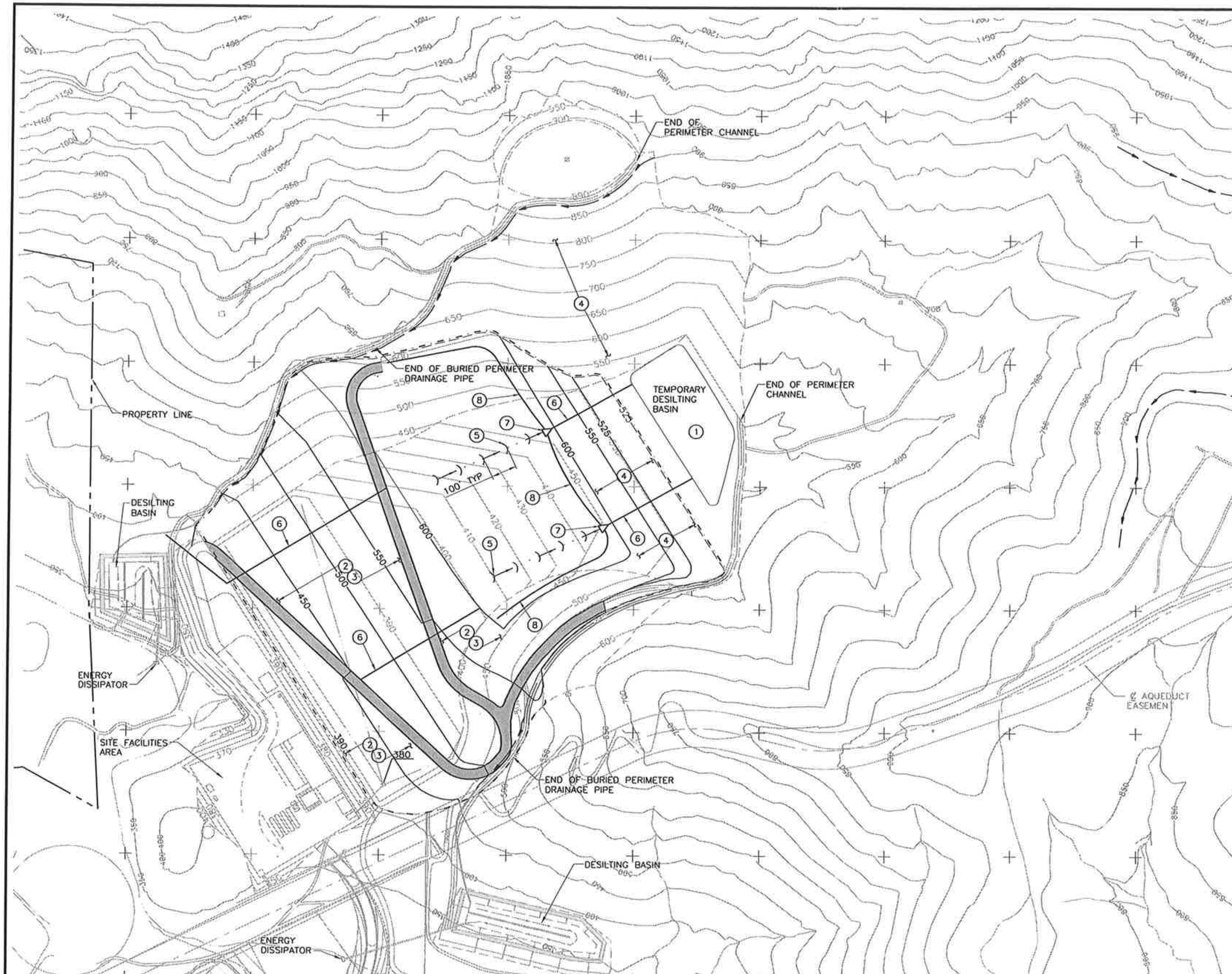
NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
DESILTING BASIN GRADING PLAN

DESIGNED BY : E.L.S.	SCALE : AS SHOWN	
DRAWN BY : M.T.B.	DATE : 11-1999	FILE NO.: 27498DB.DWG
CHECKED BY :	DATE :	DRAWING 26
APPROVED BY :	DATE :	

FOR PERMIT PURPOSES ONLY - NOT FOR CONSTRUCTION



GRAPHIC SCALE

200 100 0 200 400

(IN FEET)

N

BMP NOTES

1. CONSTRUCT TEMPORARY DESILTING BASIN
2. INSTALL STRAW MULCH (6/10A)
3. APPLY HYDROSEED TO PROMOTE VEGETATION
4. TRACKING OF SLOPES (7/10A)
5. INSTALL BIO LOG CHECK DAMS (4/10A)
6. INSTALL METAL FLUME DOWNDRAIN (11/10A)
7. INSTALL TOP DECK INLET (5/10A)
8. INSTALL TOP DECK BERM (5/10A)

LEGEND

- PROPERTY LINE
- 600 EXISTING GROUND CONTOUR
- 600 PROPOSED GROUND CONTOUR
- TOP/TOE OF SLOPE
- ACCESS/HAUL ROAD
- POWER POLES
- LIMIT OF PHASE I FILL
- BURIED PERIMETER DRAIN PIPE
- PERIMETER TRAP CHANNEL

PRELIMINARY

FIGURE 21

NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL

PHASE I FILL PLAN AND TYPICAL BMP IMPLEMENTATION

DESIGNED BY : T.W.	SCALE : AS SHOWN	
DRAWN BY : J.P.J.	DATE : 10-2001	FILE NO. 171047DB.DWG
CHECKED BY :	DATE :	DRAWING 10
APPROVED BY :	DATE :	

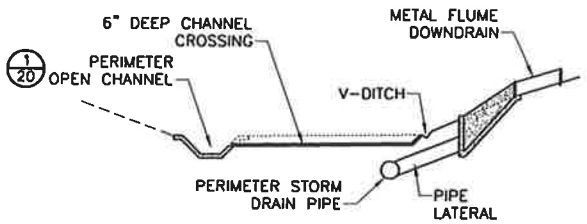
FOR PERMIT PURPOSES ONLY – NOT FOR CONSTRUCTION

NOTE:

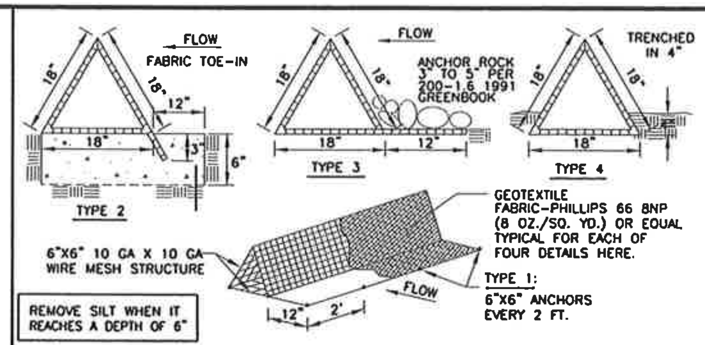
1) THE PERIMETER OPEN CHANNEL SHALL CONVEY RUNOFF FROM NATURAL UNDISTURBED AREAS AND DISTURBED AREAS THAT HAVE ESTABLISHED VEGETATION FOR MORE THAN TWO YEARS. RUNOFF FROM THIS CHANNEL SHALL BYPASS PROPOSED DESILTING BASINS.

2) THE PERIMETER STORM DRAIN PIPE SHALL CONVEY RUNOFF FROM DISTURBED AREAS AND WILL DISCHARGE TO PROPOSED DESILTING BASINS.

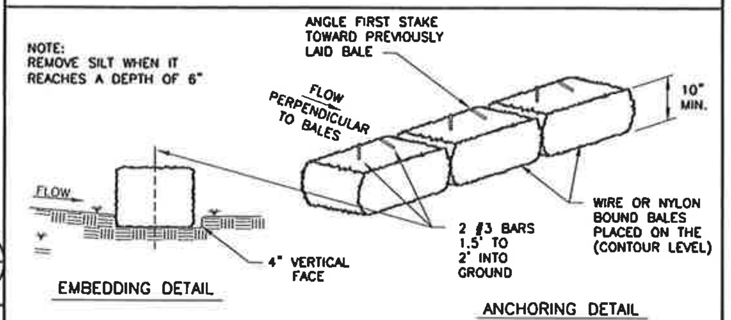
3) RUNOFF FROM THE METAL FLUME MAY BE DIVERTED TO THE CHANNEL CROSSING AND INTO THE PERIMETER OPEN CHANNEL ONCE THE TRIBUTARY AREAS TO THE METAL FLUME HAVE ESTABLISHED VEGETATION FOR MORE THAN TWO YEARS.



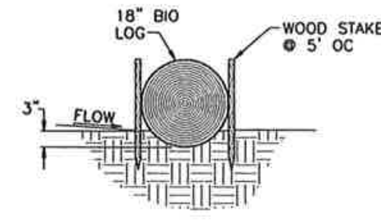
SECTION B-B
NTS
1/10A



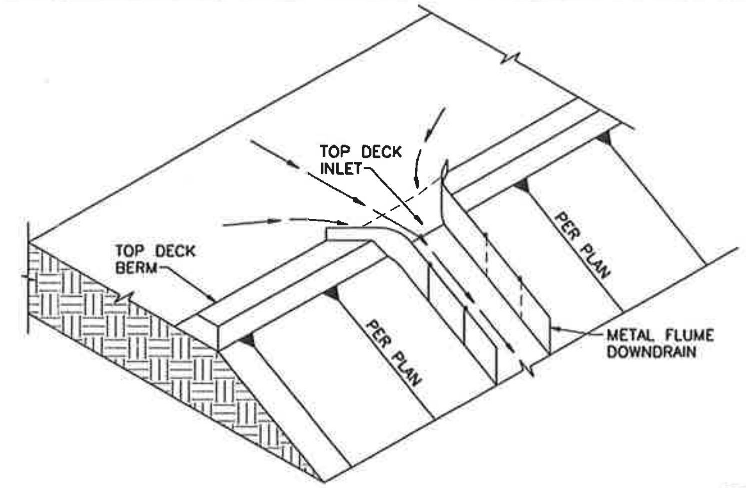
TRIANGULAR SEDIMENT FILTER DIKE
NTS
2/10A



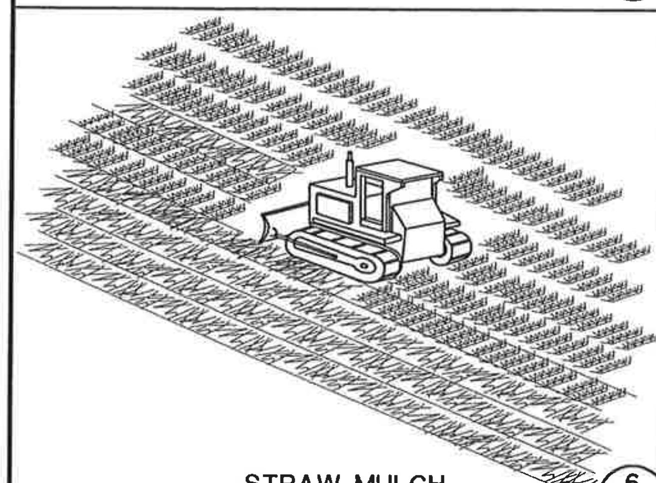
HAY BALE DIKE
NTS
3/10A



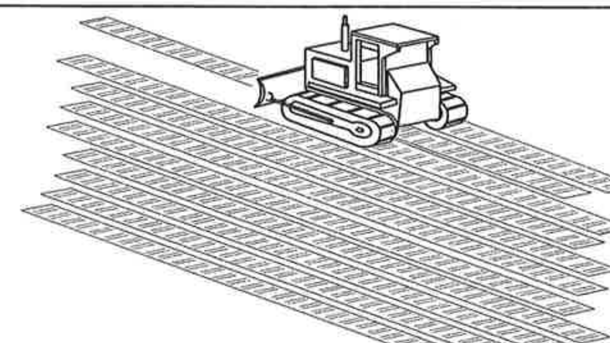
BIO LOG
NTS
4/10A



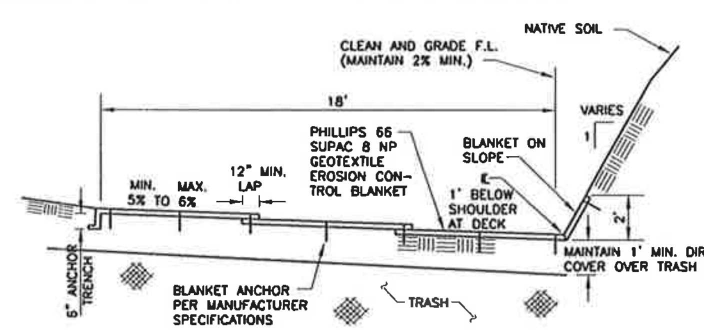
TOP DECK INLET AND BERM
NTS
5/10A



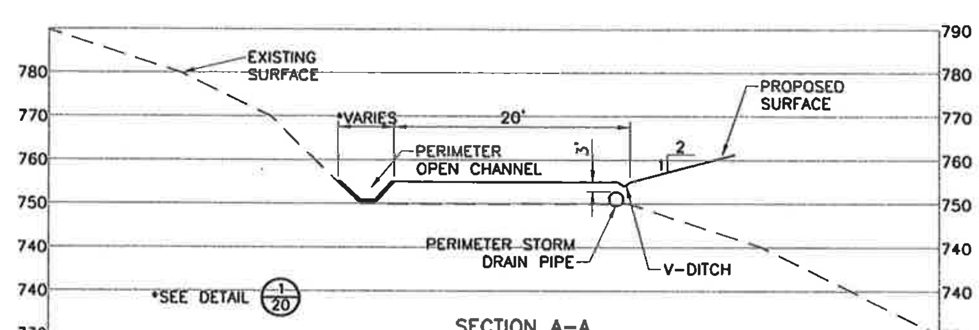
STRAW MULCH
NTS
6/10A



TRACKING
NTS
7/10A

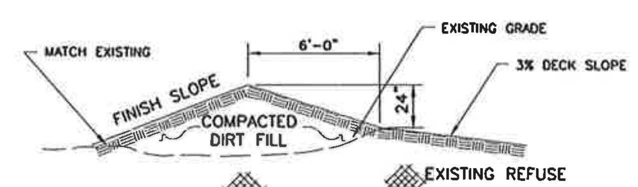


EROSION CONTROL BLANKET
NTS
8/10A

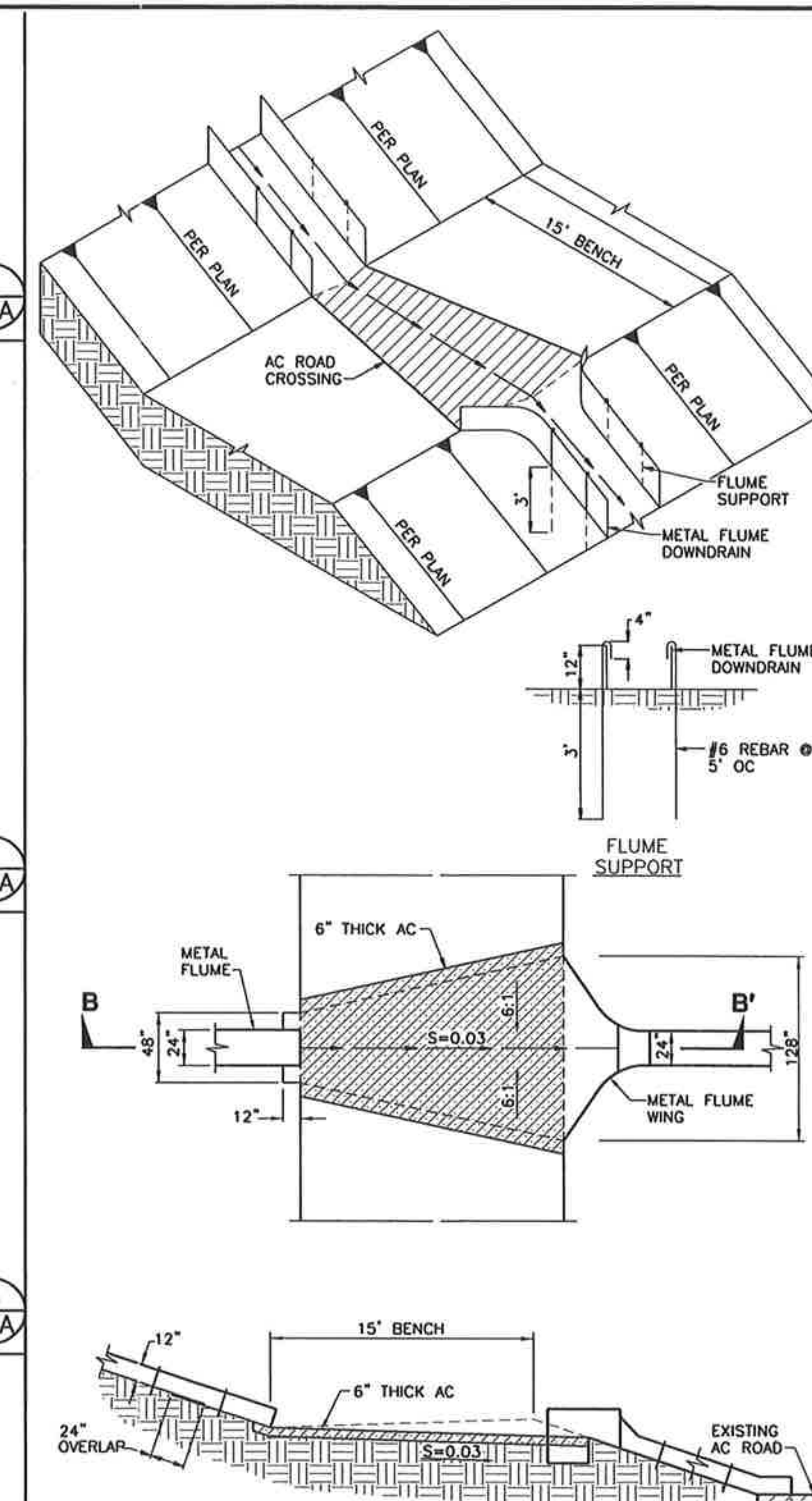


TYP. BERM @ TOP OF FILL SLOPES
NTS
9/10A

THIS BERM SHALL BE CONSTRUCTED (OR EXISTING BERMS REPAIRED) WHERE CALLED FOR ON PLANS, TO PREVENT SLOPE EROSION IN CASE OF LOCALIZED REFUSE SETTLEMENT.



TYP. BERM @ TOP OF FILL SLOPES
NTS
10/10A



PRELIMINARY

TYPICAL BENCH CROSSING DETAIL
NTS
11/10A

FIGURE 21A

NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
BMP DETAILS AND SECTIONS

DESIGNED BY : A.C.R.	SCALE : AS SHOWN	
DRAWN BY : C.A.L.	DATE : 4-2002	FILE NO.: 294020B.DWG
CHECKED BY :	DATE :	
APPROVED BY :	DATE :	DRAWING 11

FOR PERMIT PURPOSES ONLY - NOT FOR CONSTRUCTION

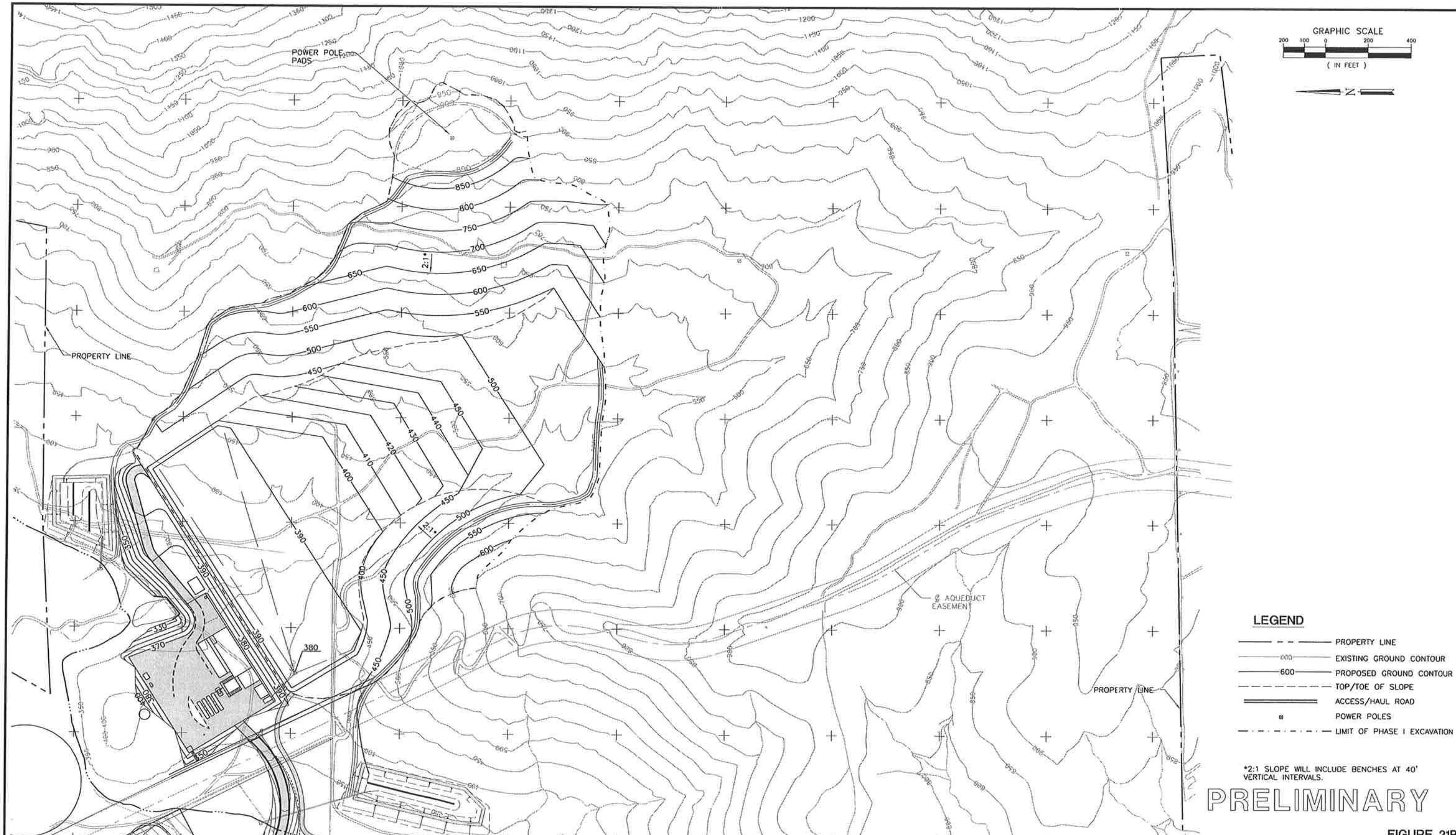


FIGURE 21B

NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
PHASE I EXCAVATION PLAN

DESIGNED BY : T.W.	SCALE : AS SHOWN	
DRAWN BY : J.P.J.	DATE : 6-2001	FILE NO. 1710390B.DWG
CHECKED BY :	DATE :	DRAWING 9
APPROVED BY :	DATE :	

05/21/2001 10:34

FOR PERMIT PURPOSES ONLY - NOT FOR CONSTRUCTION

GRAPHIC SCALE

200 100 0 200 400

(IN FEET)

N

LEGEND

- PROPERTY LINE
- EXISTING GROUND CONTOUR (600)
- PROPOSED GROUND CONTOUR (600)
- TOP/TOE OF SLOPE
- ACCESS/HAUL ROAD
- POWER POLES
- LIMIT OF PHASE II EXCAVATION
- PIPE
- PERIMETER TRAP CHANNEL

*2:1 SLOPE WILL INCLUDE BENCHES AT 40' VERTICAL INTERVALS.

PRELIMINARY

FIGURE 22

NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
PHASE II EXCAVATION PLAN

DESIGNED BY : T.W.	SCALE : AS SHOWN		
DRAWN BY : J.P.J.	DATE : 6-2001	FILE NO. 171048DB.DWG	
CHECKED BY :	DATE :	DRAWING 12	
APPROVED BY :	DATE :		

FOR PERMIT PURPOSES ONLY - NOT FOR CONSTRUCTION

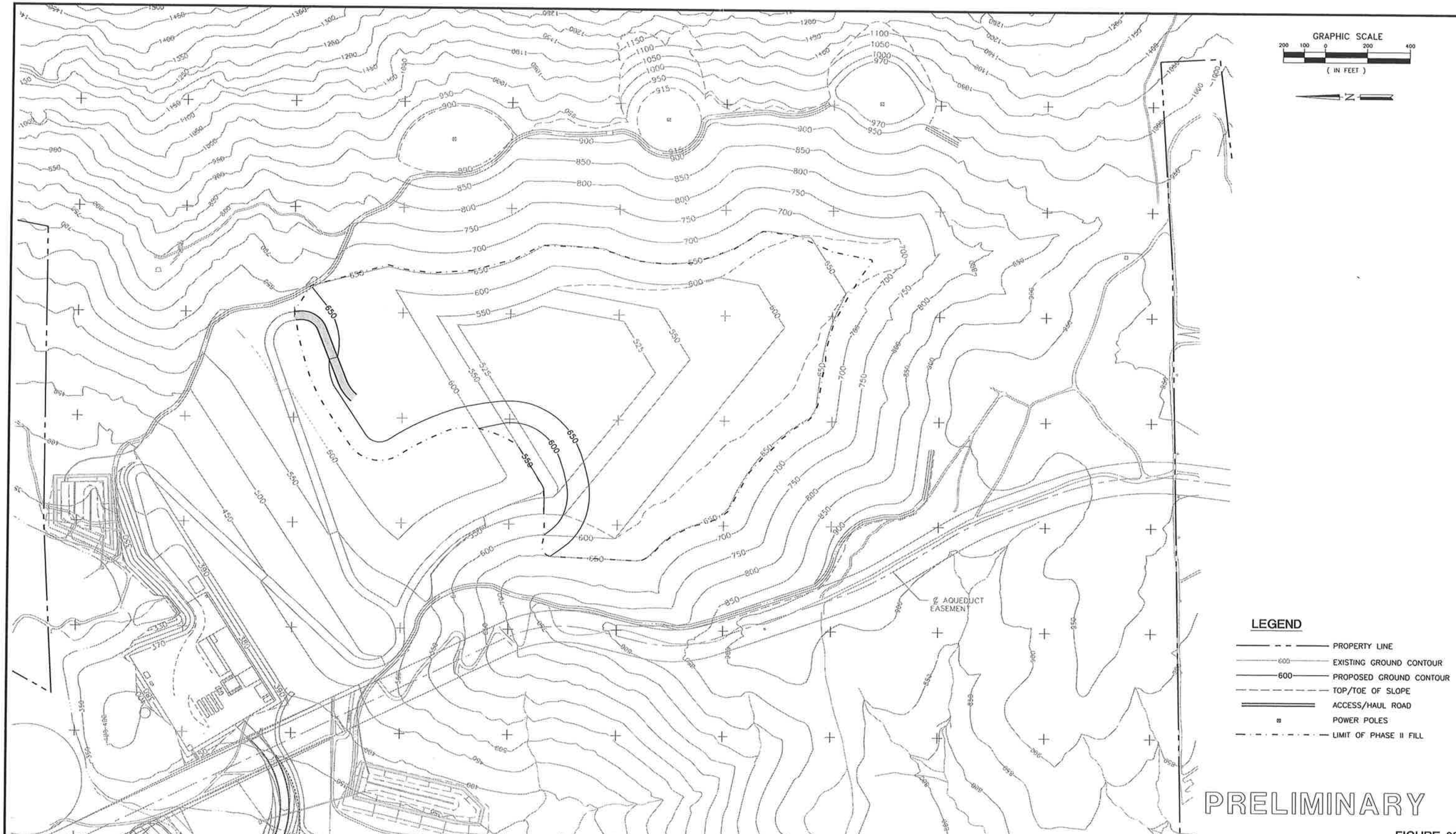


FIGURE 23

NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
PHASE II FILL PLAN

DESIGNED BY : T.W.	SCALE : AS SHOWN	
DRAWN BY : J.P.J.	DATE : 6-2001	FILE NO. 171049DB.DWG
CHECKED BY :	DATE :	DRAWING 13
APPROVED BY :	DATE :	

FOR PERMIT PURPOSES ONLY – NOT FOR CONSTRUCTION

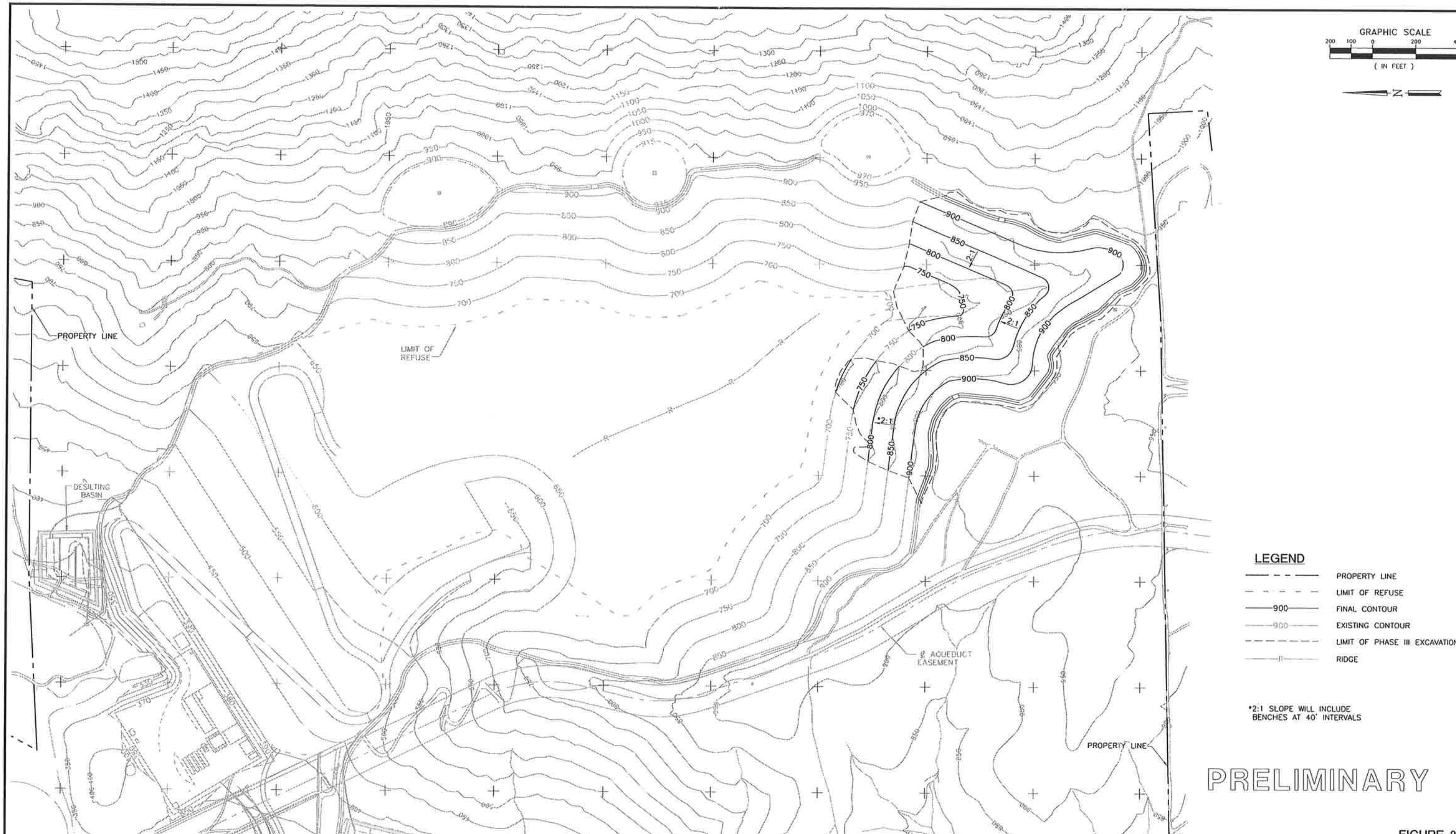


FIGURE 24

NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
PHASE III EXCAVATION

DESIGNED BY : E.L.S.	SCALE : AS SHOWN	
DRAWN BY : M.T.B.	DATE : 8-2000	FILE NO.: 28038DB.DWG
CHECKED BY :	DATE :	
APPROVED BY :	DATE :	DRAWING 14

FOR PERMIT PURPOSES ONLY – NOT FOR CONSTRUCTION

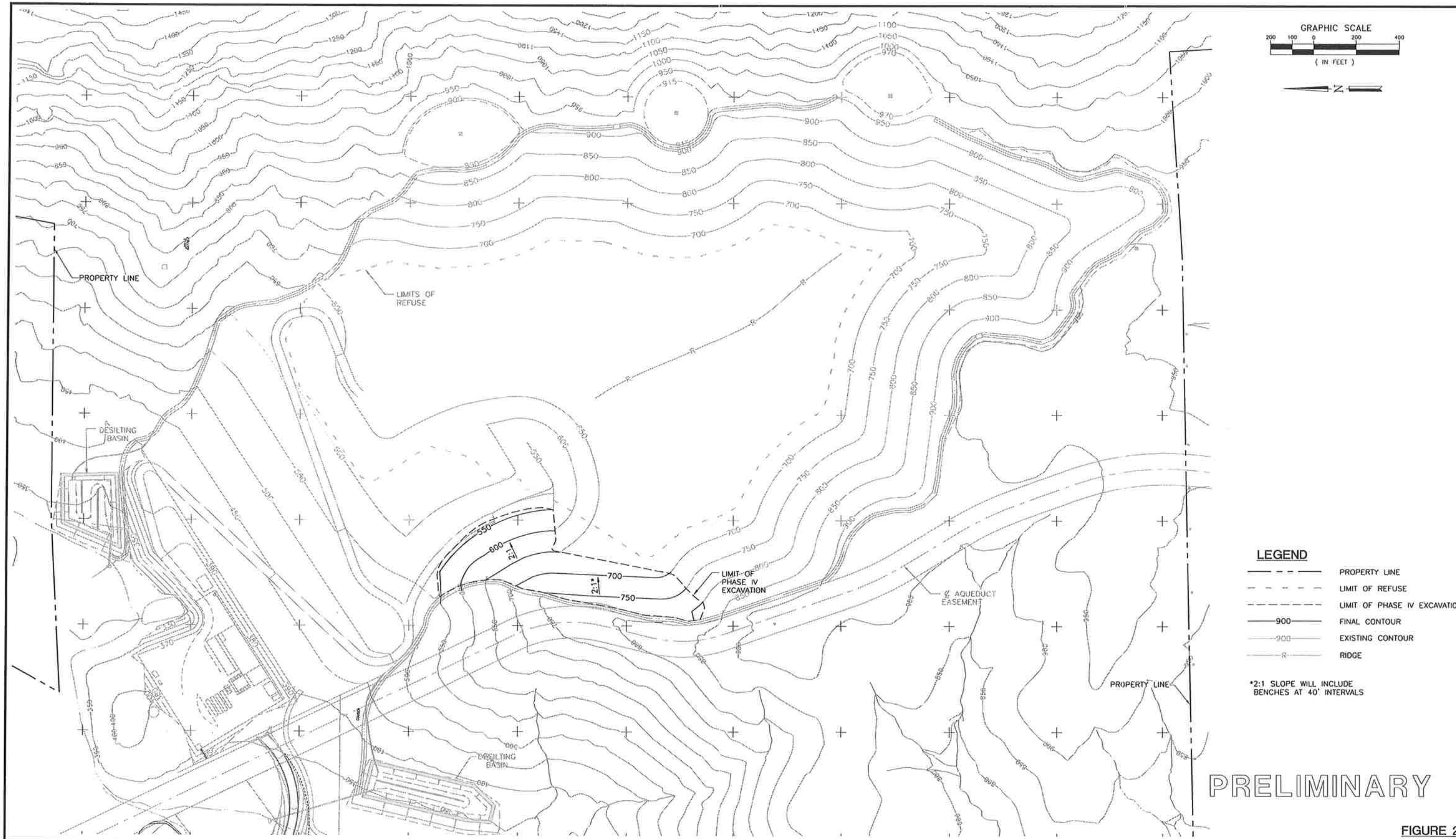


FIGURE 25

NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL

PHASE IV EXCAVATION

DESIGNED BY : E.L.S.	SCALE : AS SHOWN	
DRAWN BY : M.T.B.	DATE : 7-2000	FILE NO.: 280390B.DWG
CHECKED BY :	DATE :	DRAWING 15
APPROVED BY :	DATE :	

FOR PERMIT PURPOSES ONLY - NOT FOR CONSTRUCTION

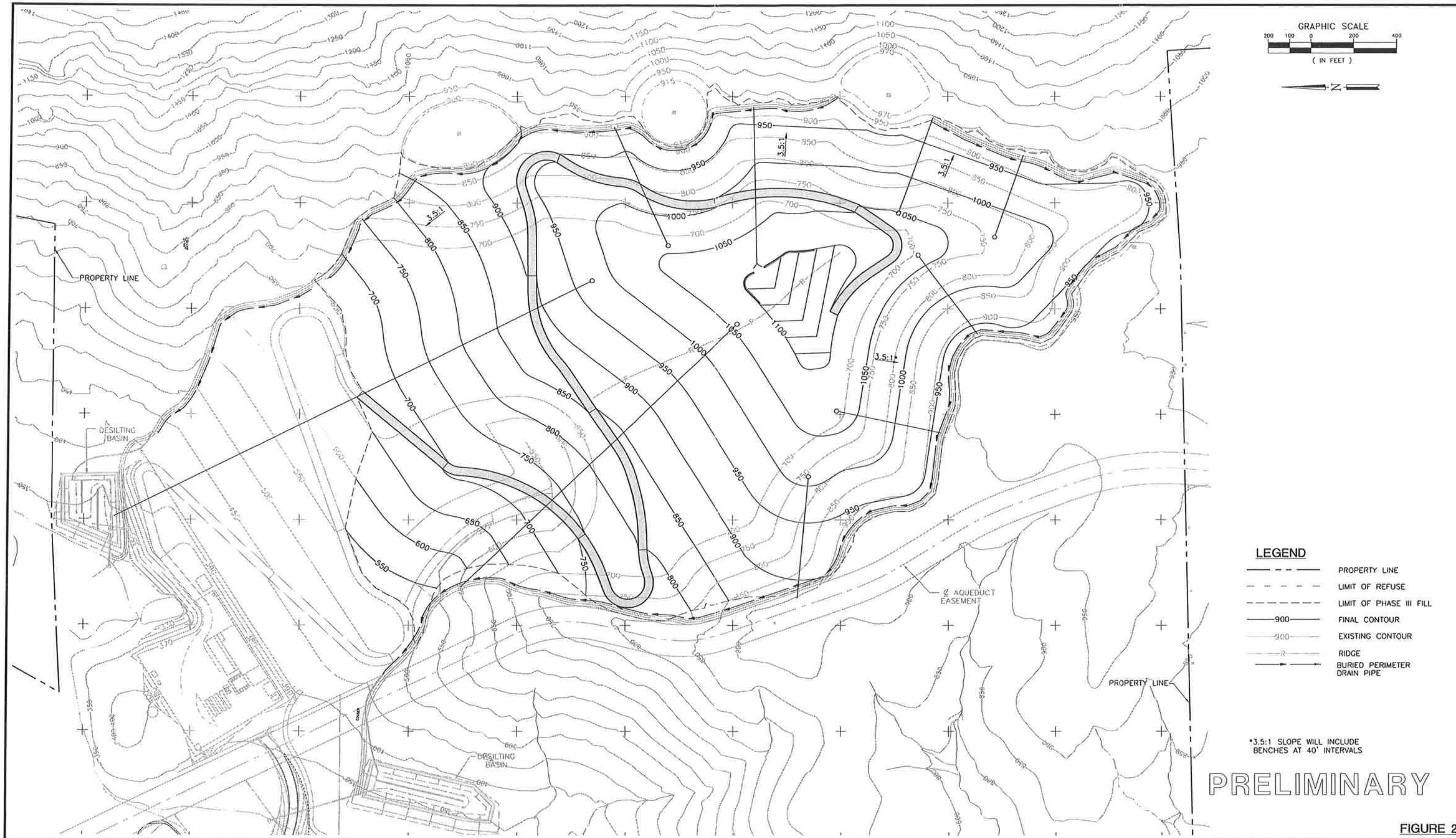


FIGURE 26

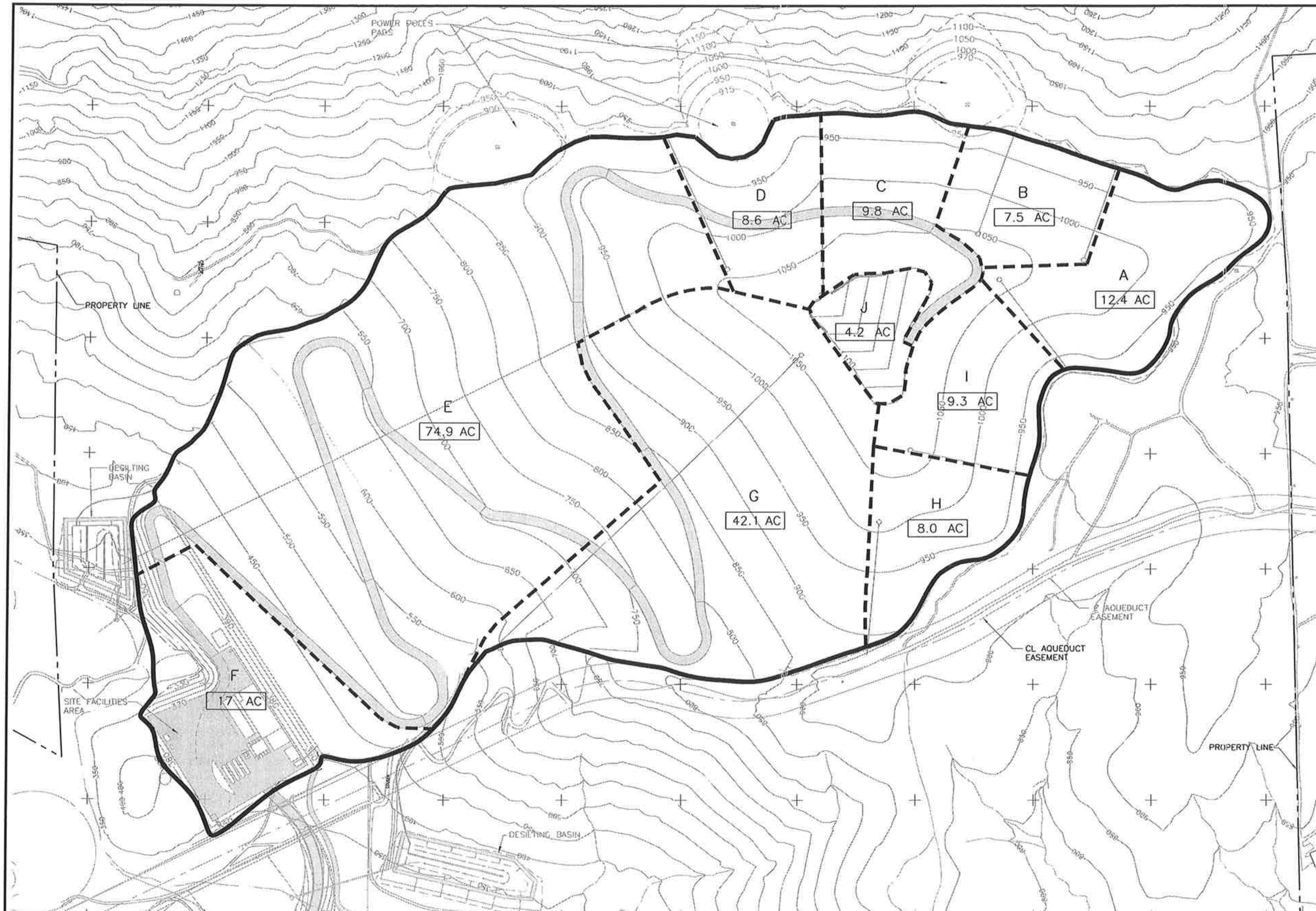
NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
PHASE III FILL

DESIGNED BY : E.L.S.	SCALE : AS SHOWN	
DRAWN BY : M.T.B./J.P.J.	DATE : 7-2000	FILE NO.: 27348DB.DWG
CHECKED BY :	DATE :	DRAWING 16
APPROVED BY :	DATE :	

FOR PERMIT PURPOSES ONLY – NOT FOR CONSTRUCTION



GRAPHIC SCALE

200 100 0 200 400

(IN FEET)
1 inch = ft.

STUDY AREA BOUNDARY
STUDY SUBAREA BOUNDARY
PROPERTY LINE
A SUBAREA NAME
0.5 AC AREA IN ACRES

GREGORY CANYON LANDFILL
SOIL LOSS SUMMARY TABLE

STUDY AREA	AREA (ACRES)	ANNUAL SOIL LOSS (TONS/YR)	VOLUME (CY)
A	12.4	23.5	17.19
B	7.5	14.0	10.40
C	9.8	18.3	13.59
D	8.6	16.1	11.93
E	74.9	140.2	103.86
F	17.0	31.8	23.57
G	42.1	78.8	58.38
H	8.0	15.0	11.09
I	9.3	17.4	12.90
J	4.2	7.9	5.82
TOTAL	193.8	362.8	268.7

AVERAGE SOIL LOSS = 1.9 tons/ac/yr

PRELIMINARY

FIGURE 27

NO.	REVISION DESCRIPTION	BY:

BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL
SOIL LOSS
ANALYSIS MAP

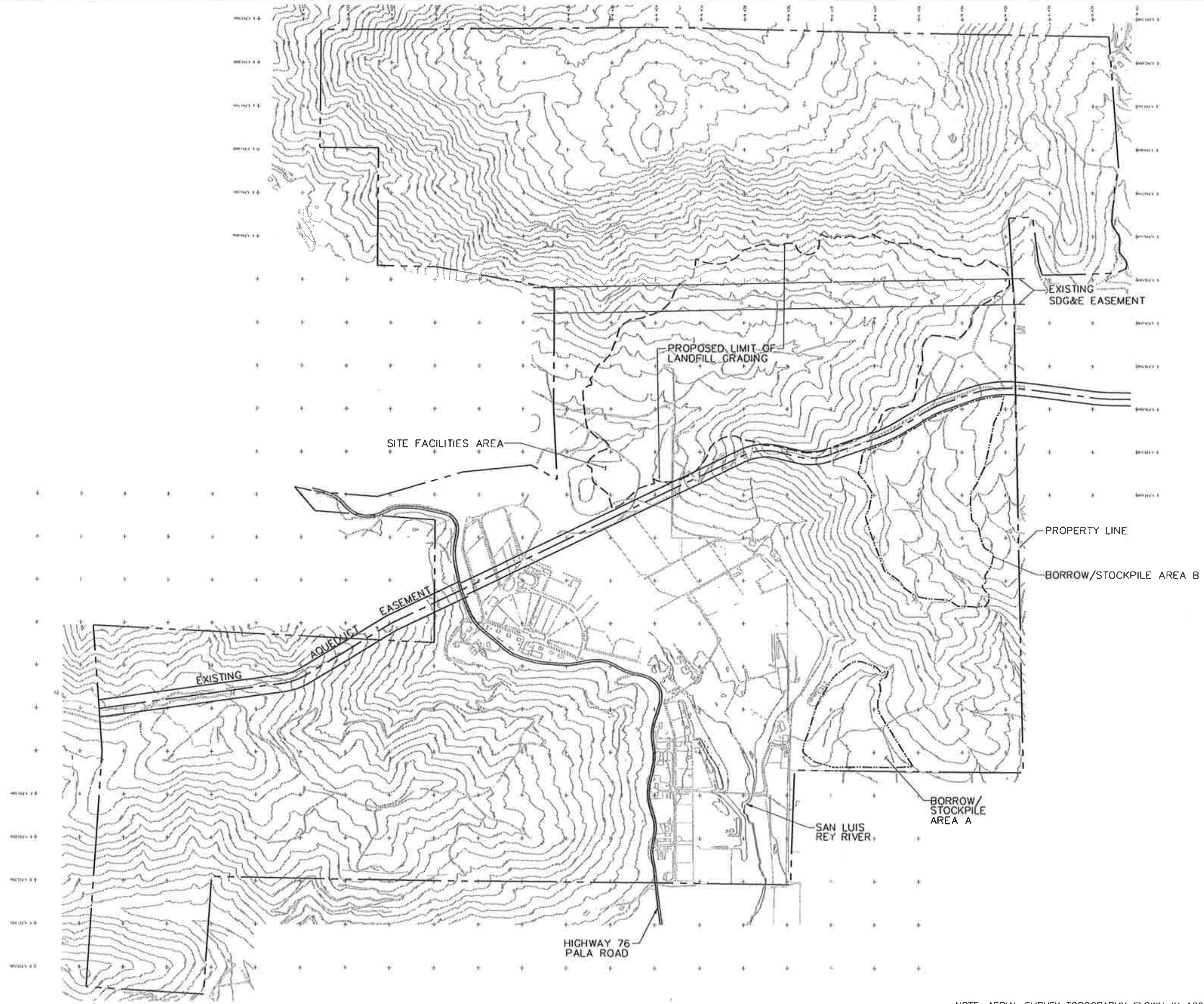
DESIGNED BY : G.V.N.	SCALE : AS SHOWN	
DRAWN BY : J.P.J.	DATE : 6-2001	FILE NO.: 44027DB.DWG
CHECKED BY :	DATE :	DRAWING 25
APPROVED BY :	DATE :	

FOR PERMIT PURPOSES ONLY - NOT FOR CONSTRUCTION

GRAPHIC SCALE

600 300 0 600 1200

(IN FEET)



LEGEND

- PROPERTY LINE
- APPROXIMATE LIMIT OF LANDFILL GRADING
- BORROW/STOCKPILE AREA LIMITS
- EXISTING CONTOUR
- ACCESS/HAUL ROAD

PRELIMINARY

NOTE: AERIAL SURVEY TOPOGRAPHY FLOWN IN 1991

FIGURE 27A

NO.	REVISION DESCRIPTION	BY:

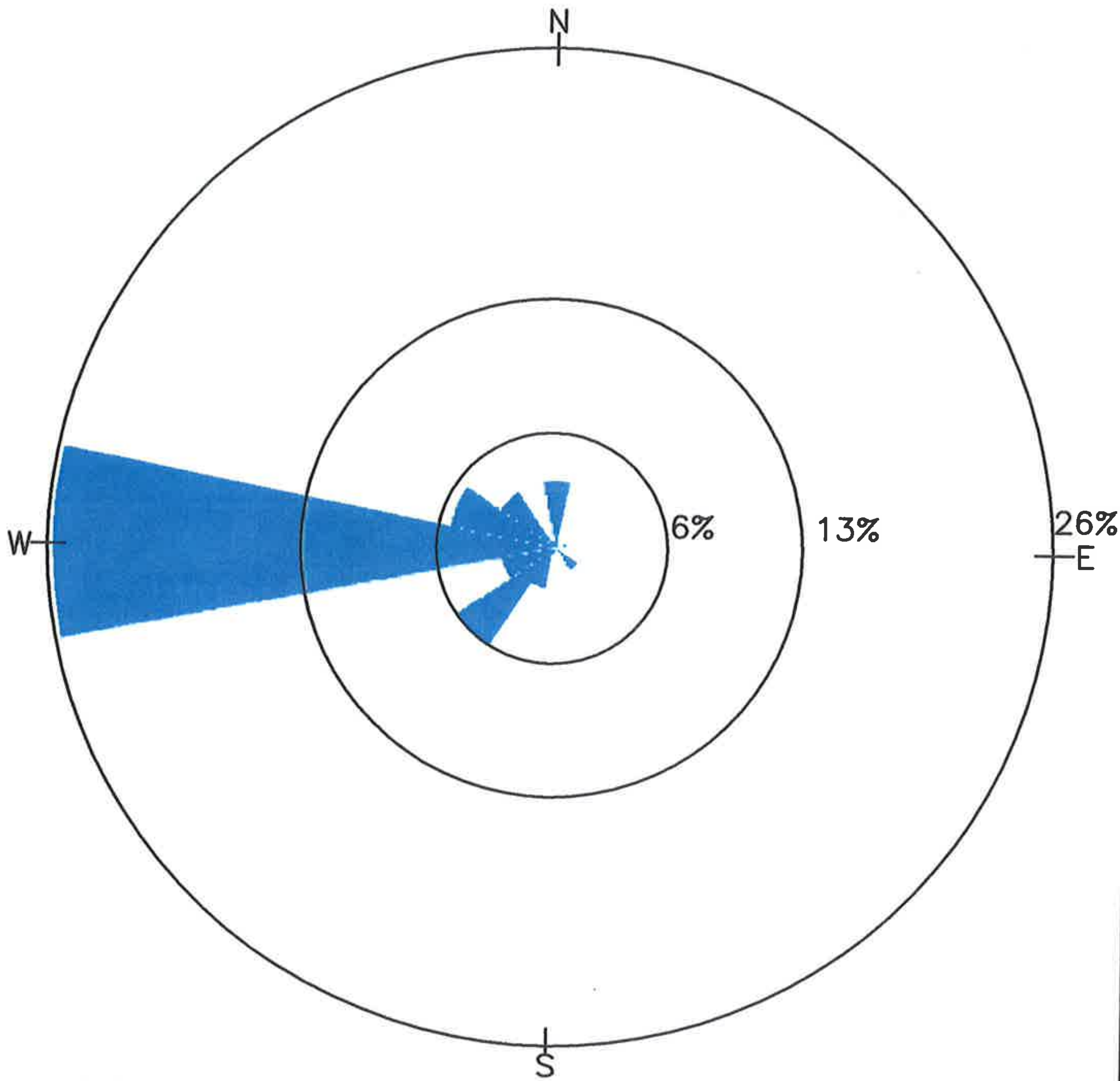
BAS
BRYAN A. STIRRAT & ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
1360 E. VALLEY VISTA DRIVE
DIAMOND BAR, CALIFORNIA 91765
(909) 860-7777

GREGORY CANYON LANDFILL

PRE-DEVELOPMENT TOPOGRAPHY

DESIGNED BY : E.L.S.	SCALE : AS SHOWN	
DRAWN BY : J.P.J.	DATE : 10-2002	FILE NO.: 171743DB.DWG
CHECKED BY :	DATE :	DRAWING 28
APPROVED BY :	DATE :	

FOR PERMIT PURPOSES ONLY – NOT FOR CONSTRUCTION



LEGEND

WIND FREQUENCY DISTRIBUTION

STATION: McCLELLAN – PALOMAR AIRPORT

SOURCE: www.windpower.org (2003)

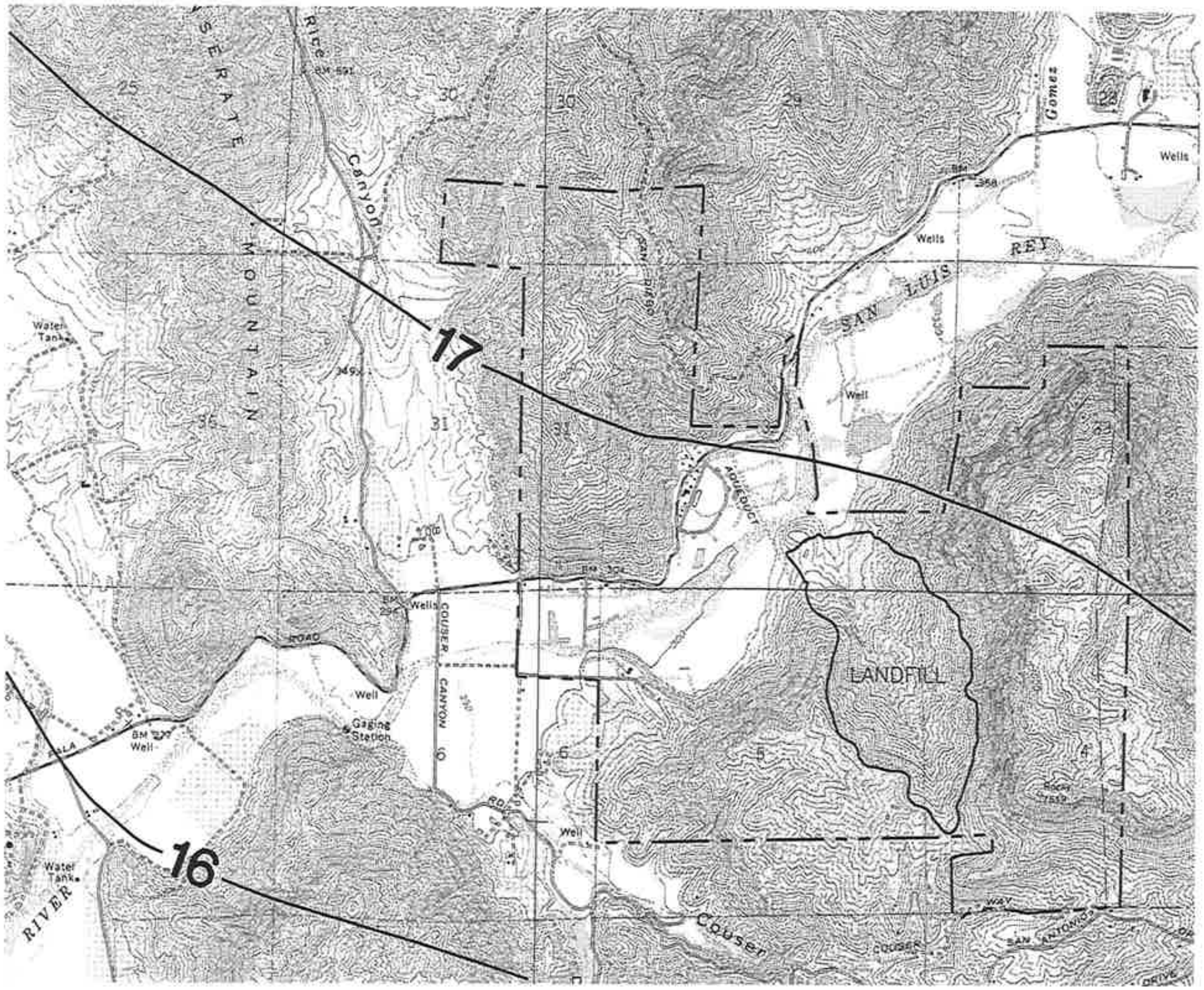
FIGURE 28

BAS
(909) 860–7777
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765

GREGORY CANYON LANDFILL

ANNUAL WIND ROSE

JOB NO.	97139–7
DATE	11–2003
DRAWN BY	C.A.L.
FILE NAME	17176008



0 3,000 6,000
SCALE IN FEET

N

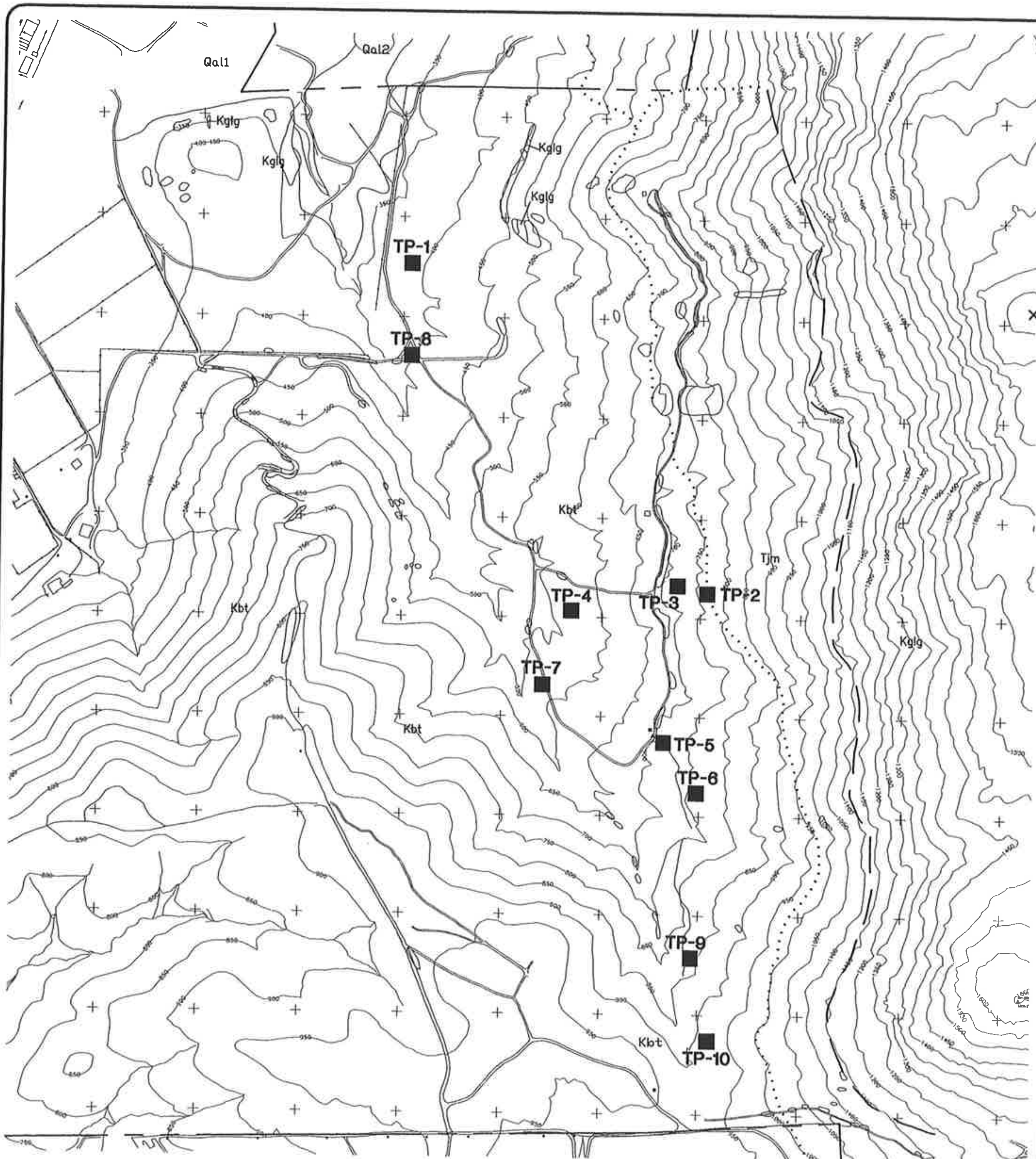
LEGEND

——17—— ISOHYETAL CONTOUR

—— - - —— PROPERTY BOUNDARY

FIGURE 28A

BAS (909) 860-7777 BRYAN A. STIRRAT & ASSOCIATES CIVIL AND ENVIRONMENTAL ENGINEERS 1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765	GREGORY CANYON LANDFILL **ISOHYETAL MAP**	JOB NO. 97139-800 DATE 11-2003 DRAWN BY J.P.J. FILE NAME: 171052DB



TP-1 ■ TEST PITS EXCAVATED BY WOODWARD CLYDE CONSULTANTS (1995)

SOURCES : GEOLOGIC ASSOCIATES, 1995; DAVID EVANS AND ASSOCIATES INC., 1999; PCR SERVICES CORPORATION, 1999

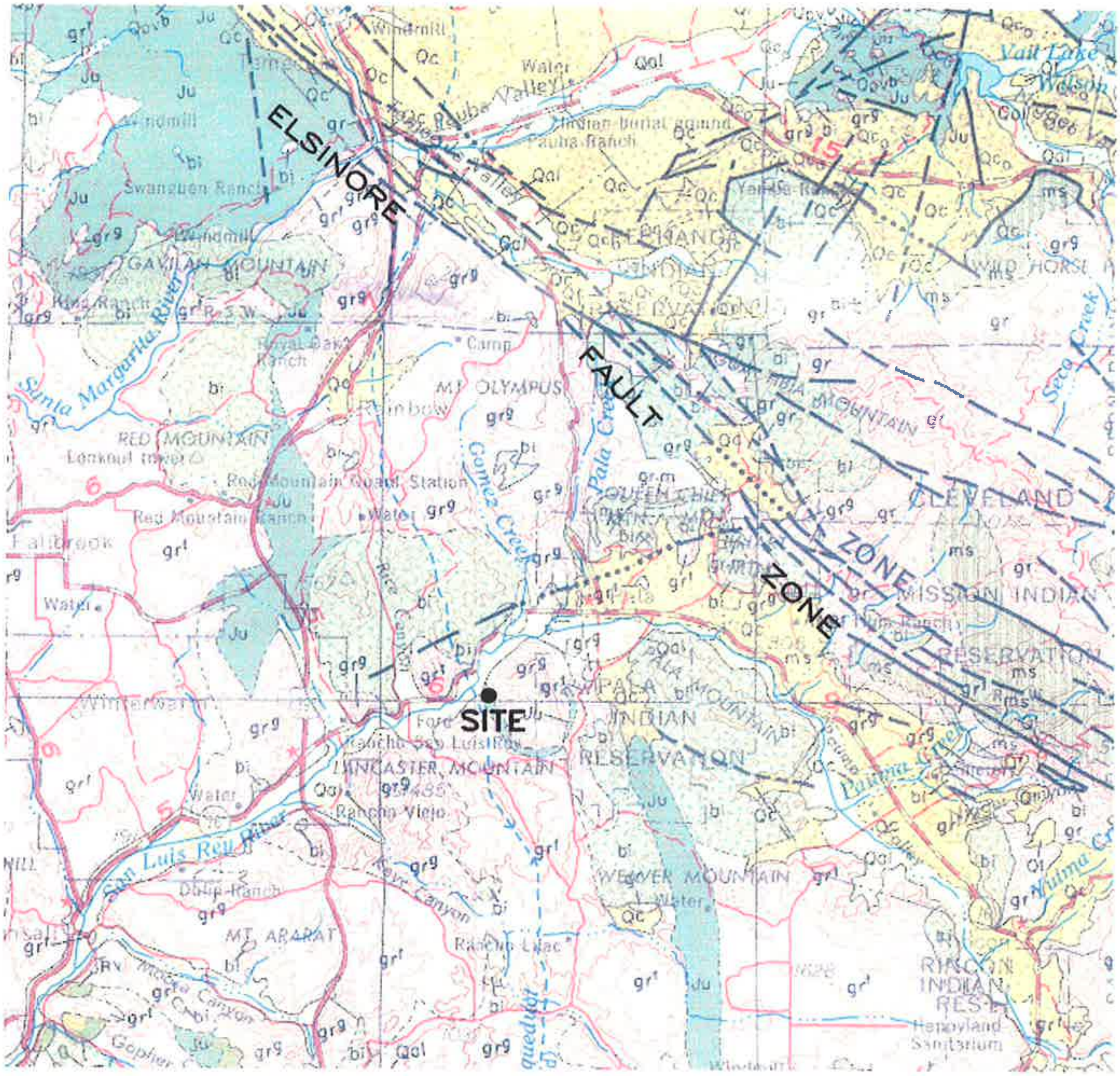
FIGURE 29

(909) 860-7777
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765

GREGORY CANYON LANDFILL

GEOLOGIC MAP OF THE SITE

JOB NO. 97139-800
DATE 6-2001
DRAWN BY J.P.J.
FILE NAME: 171050DB



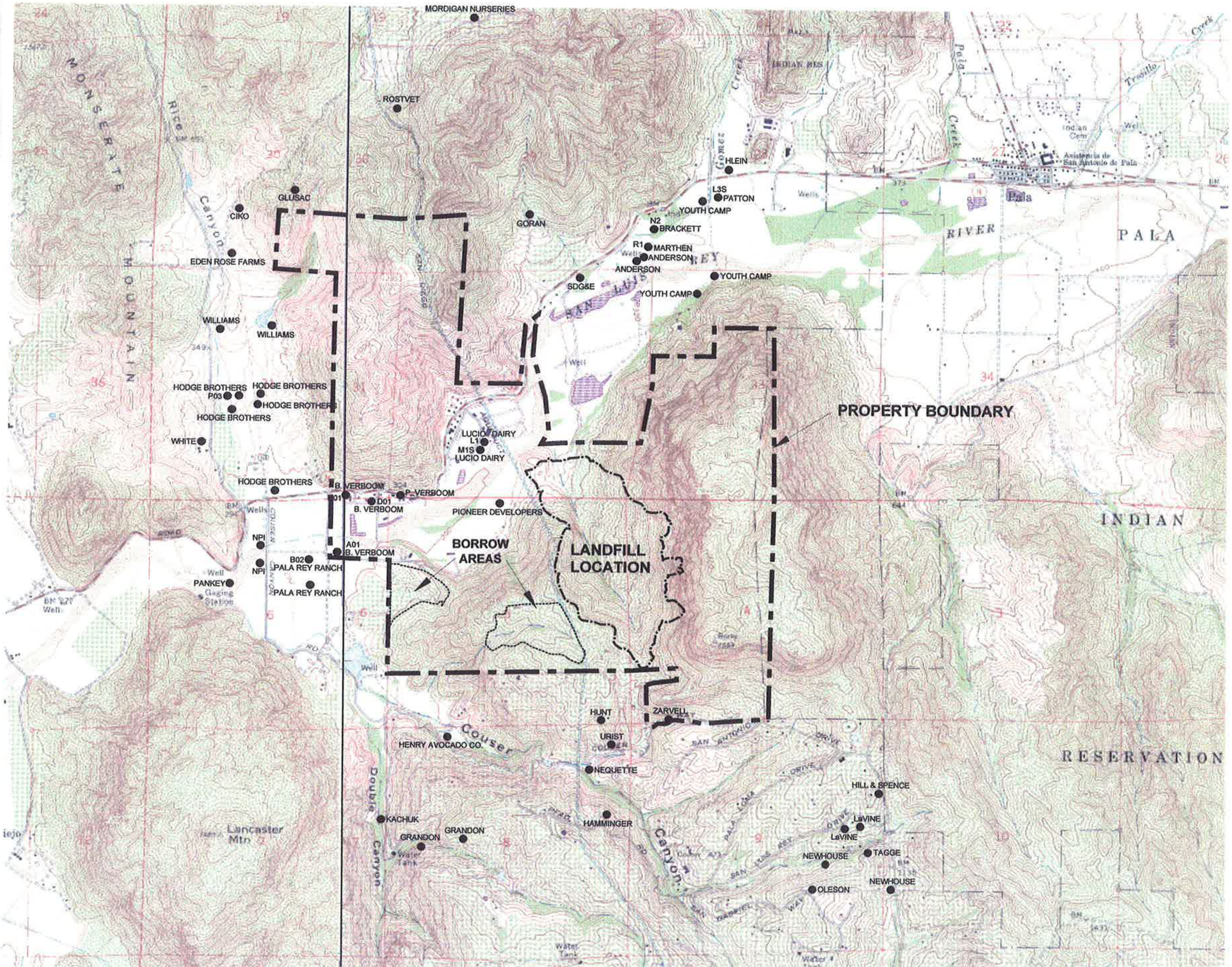
REFERENCE: CDMG, GEOLOGIC MAP OF CALIFORNIA, SANTA ANA SHEET (1965)

N

APPROXIMATE SCALE: 1" = 14,000'

FIGURE 30

BAS (909) 860-7777 BRYAN A. STIRRAT & ASSOCIATES CIVIL AND ENVIRONMENTAL ENGINEERS 1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765	GREGORY CANYON LANDFILL	JOB NO. 97139-7
	REGIONAL TECTONIC SETTING	DATE 11/13/03
		DRAWN BY C.A.L.
		FILE NAME 17175808.DWG



C:\-VLDWGS\1995\9539-GREGORY CANYON\TDWELLS1MI.DS4

EXPLANATION:

ROSTVET ● APPROXIMATE LOCATION OF LOCAL GROUNDWATER WELL (NOT FIELD VERIFIED)

REFERENCE:

USGS 7.5 MINUTE PALA (1988) AND BONSALL (1975) CALIFORNIA QUADRANGLES

CALIFORNIA DEPARTMENT OF WATER RESOURCES WATER WELL DRILLERS REPORTS.

APPROXIMATE SCALE: 1" = 2300'

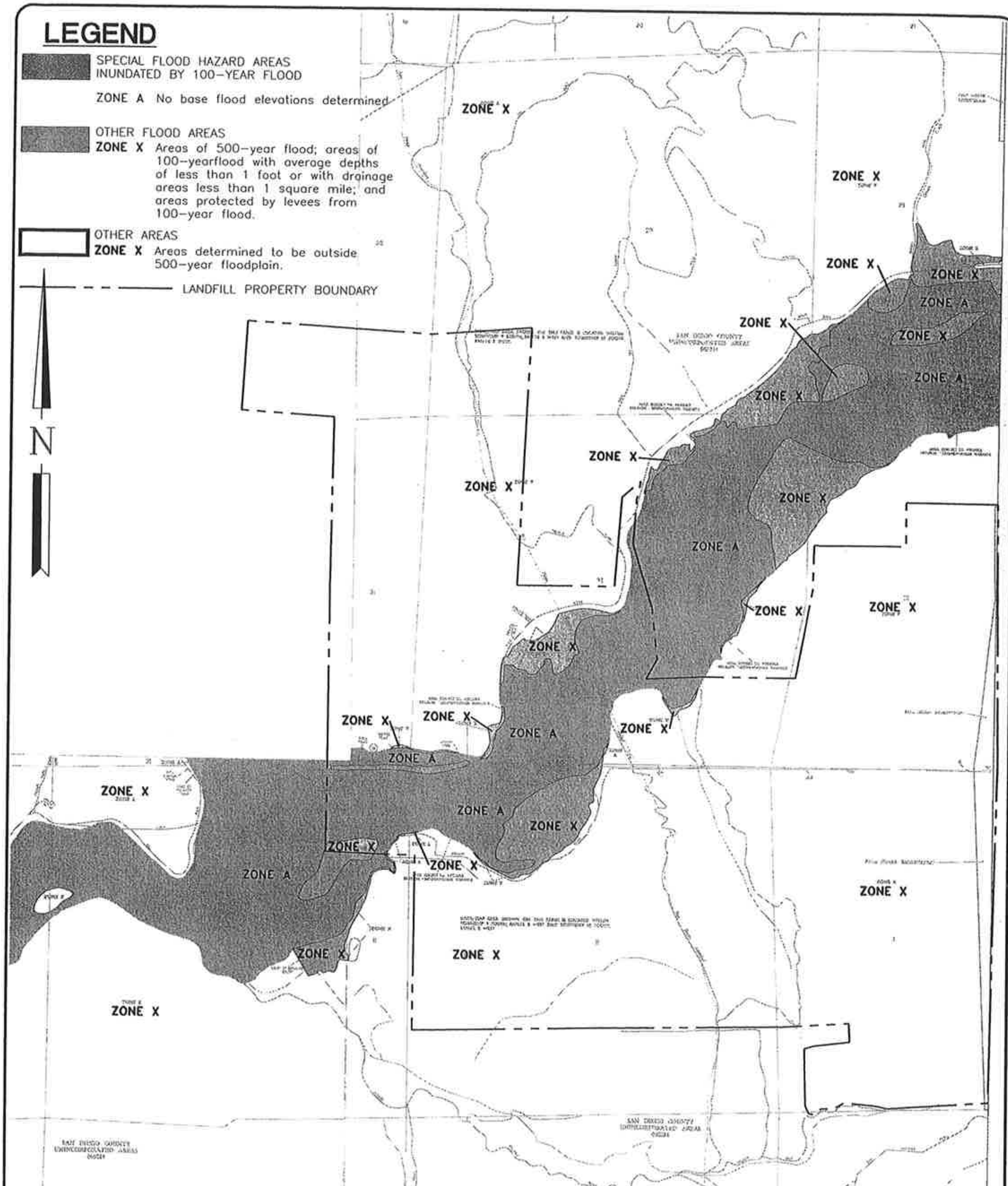
FIGURE 30A

GREGORY CANYON LANDFILL

KNOWN WELLS WITHIN 1-MILE RADIUS

BAS
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765
(909) 860-7777

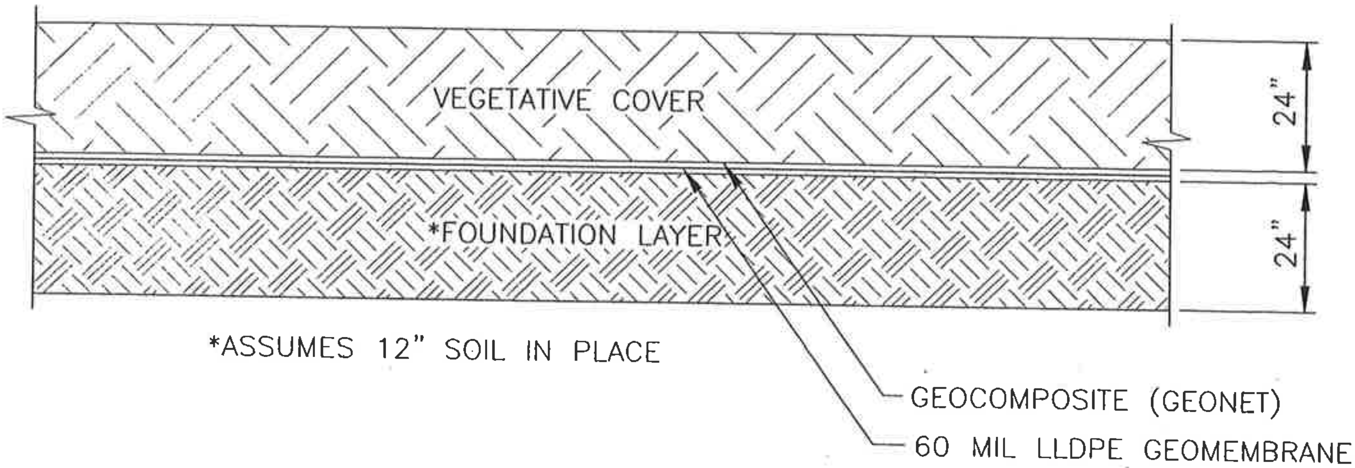
JOB NO.	97139
DATE	7-2001
DRAWN BY	V.L.
CHECKED BY:	S.B.



REFERENCE: FLOOD INSURANCE RATE MAP (FIRM) SAN DIEGO COUNTY, CA. AND INCORPORATED AREAS MAP NOS. 06073C0503F, 06073C0501F ,06073C0484F (JUNE 19, 1997)

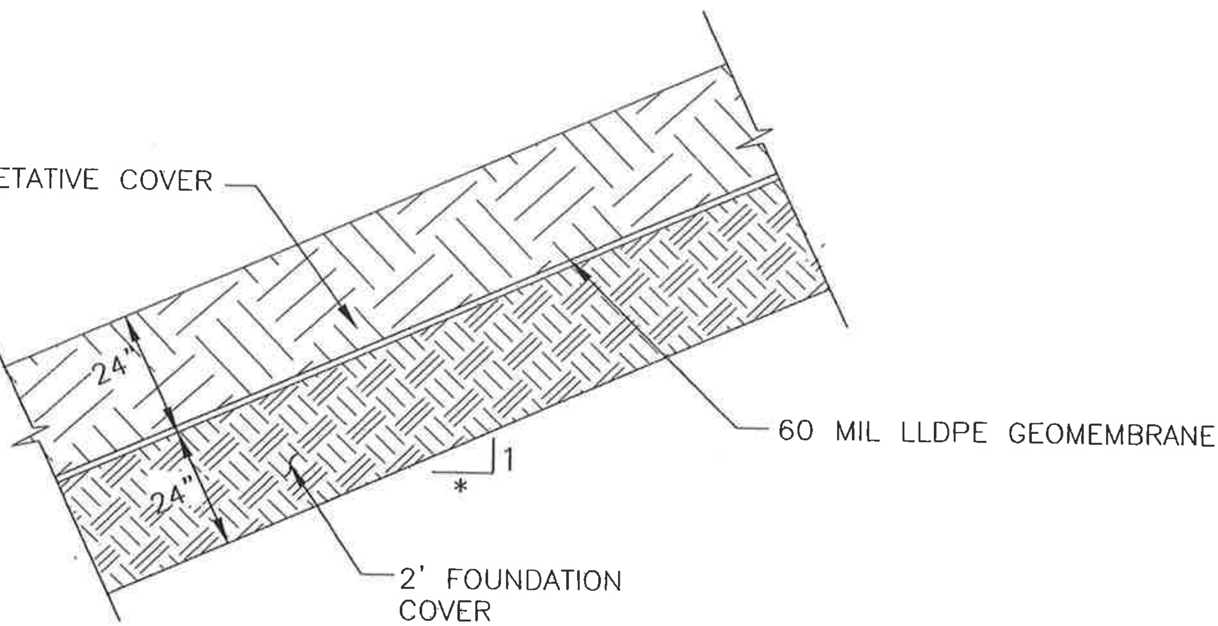
FIGURE 30B

(909) 860-7777 BRYAN A. STIRRAT & ASSOCIATES CIVIL AND ENVIRONMENTAL ENGINEERS 1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765	GREGORY CANYON LANDFILL **FLOOD PLAIN MAP**	JOB NO. 97139-7 DATE 3-2004 DRAWN BY M.T.B. FILE NAME 171861DB



TYPICAL DECK COVER SECTION

NTS



* SLOPE VARIES MAXIMUM 3:1

TYPICAL SLOPE COVER SECTION

NTS

FIGURE 31

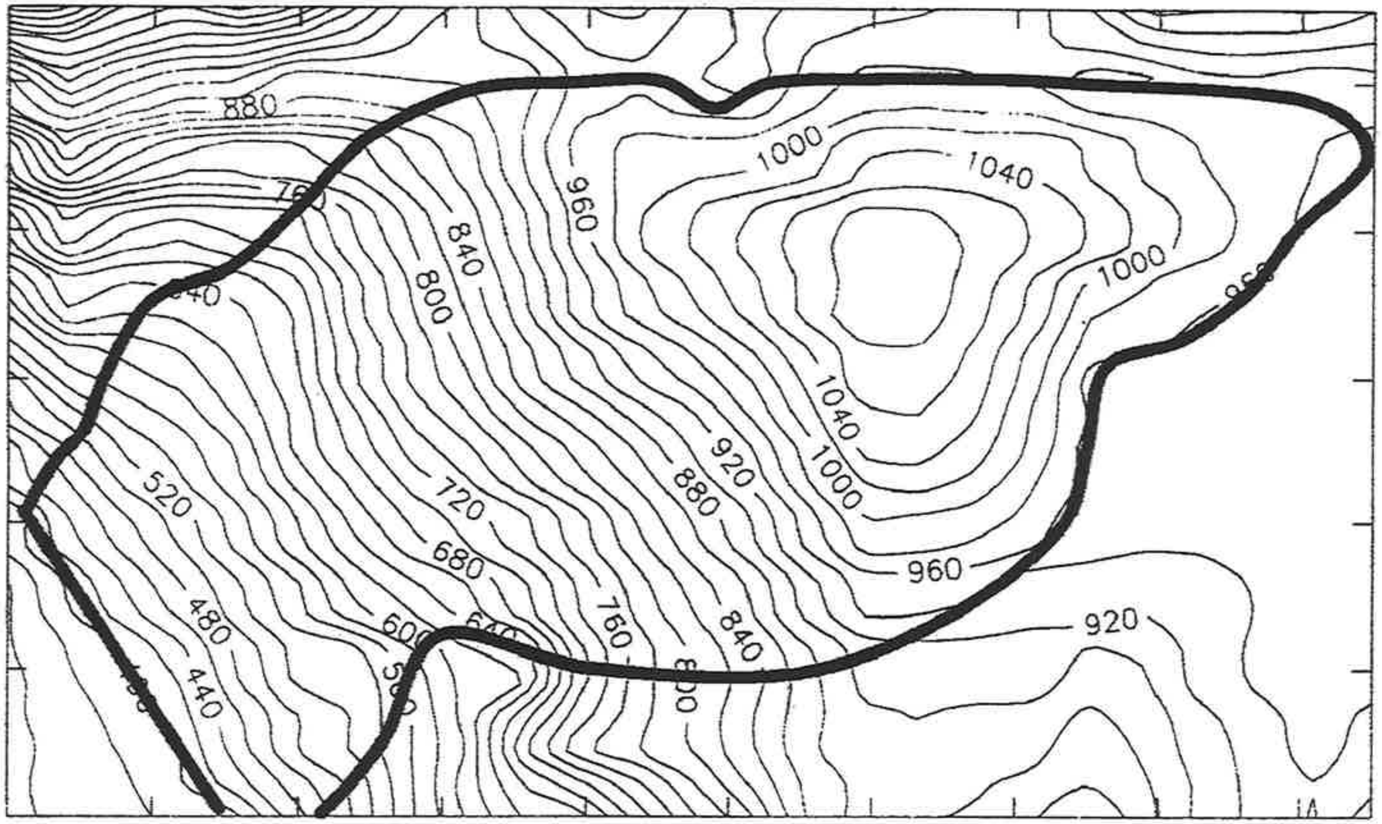
BAS
(909) 860-7777
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765

GREGORY CANYON LANDFILL

TYPICAL DECK AND SLOPE COVER SECTION

JOB NO. 97139-300
DATE 3-2002
DRAWN BY K.K.S.
CHECKED BY L.O.

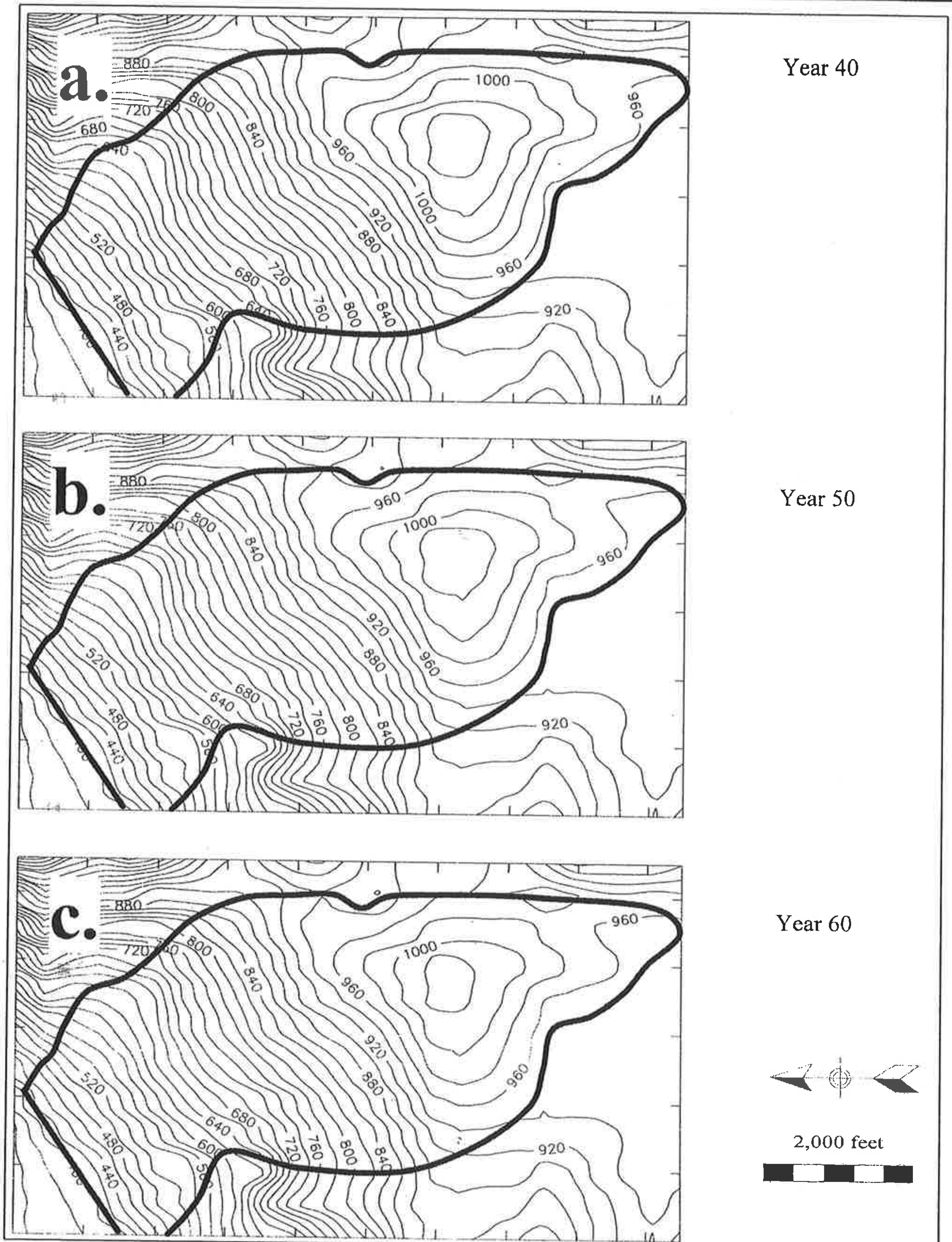
G:/DWG/FIG/17666DB.DWG



Year 30 - Final closure

FIGURE 32A

BAS (909) 860-7777 BRYAN A. STIRRAT & ASSOCIATES CIVIL AND ENVIRONMENTAL ENGINEERS 1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765	GREGORY CANYON LANDFILL	JOB NO. X
	SETTLEMENT CONTOUR MAP AT CLOSURE	DATE 5/29/03
		DRAWN BY C.A.L.
		FILE NAME: 171600DB



SOURCE: GEOLOGIC, HYDROGEOLOGIC AND GEOTECHNICAL INVESTIGATIONS REPORT, GLA (MAY 2003)

FIGURE 32B

BAS
(909) 860-7777
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765

GREGORY CANYON LANDFILL

SETTLEMENT CONTOUR MAP
POST-CLOSURE

JOB NO.	X
DATE	5/29/03
DRAWN BY	C.A.L.
FILE NAME	171599DB

FIGURE 33
GREGORY CANYON LANDFILL
GAS EXTRACTION WELL MAINTENANCE RECORD

DATE: ____________________

WELL NO.: ________________

WORK ORDER NO.: ________

____

TYPE OF WORK

- Seal ☐
- Casing ☐
- Discharge ☐
- Valves ☐
- Probes ☐

WORK PERFORMED: ____

____

____

____

____

____

SKETCH:

SIGNED BY: ______________________________

FIGURE 34
GREGORY CANYON LANDFILL
WELL ABANDONMENT RECORD

DATE: ____________________

WELL NO.: ____________________

WORK ORDER NO.: ____________________

____

TYPE OF WORK

- Clay Seal Installed ☐
- Casing Removed ☐
- Water Added ☐
- Well Back Filled ☐

WORK PERFORMED: ____________________

SKETCH:

SIGNED BY: ____________________

FIGURE 35
GREGORY CANYON LANDFILL
CONDENSATE PIPING MAINTENANCE RECORD

DATE: ____________________

LINE I.D.: ____________________

LOCATION: ____________________

WORK ORDER NO.: ____________________

TYPE OF WORK

Pipeline ☐

Fitting ☐

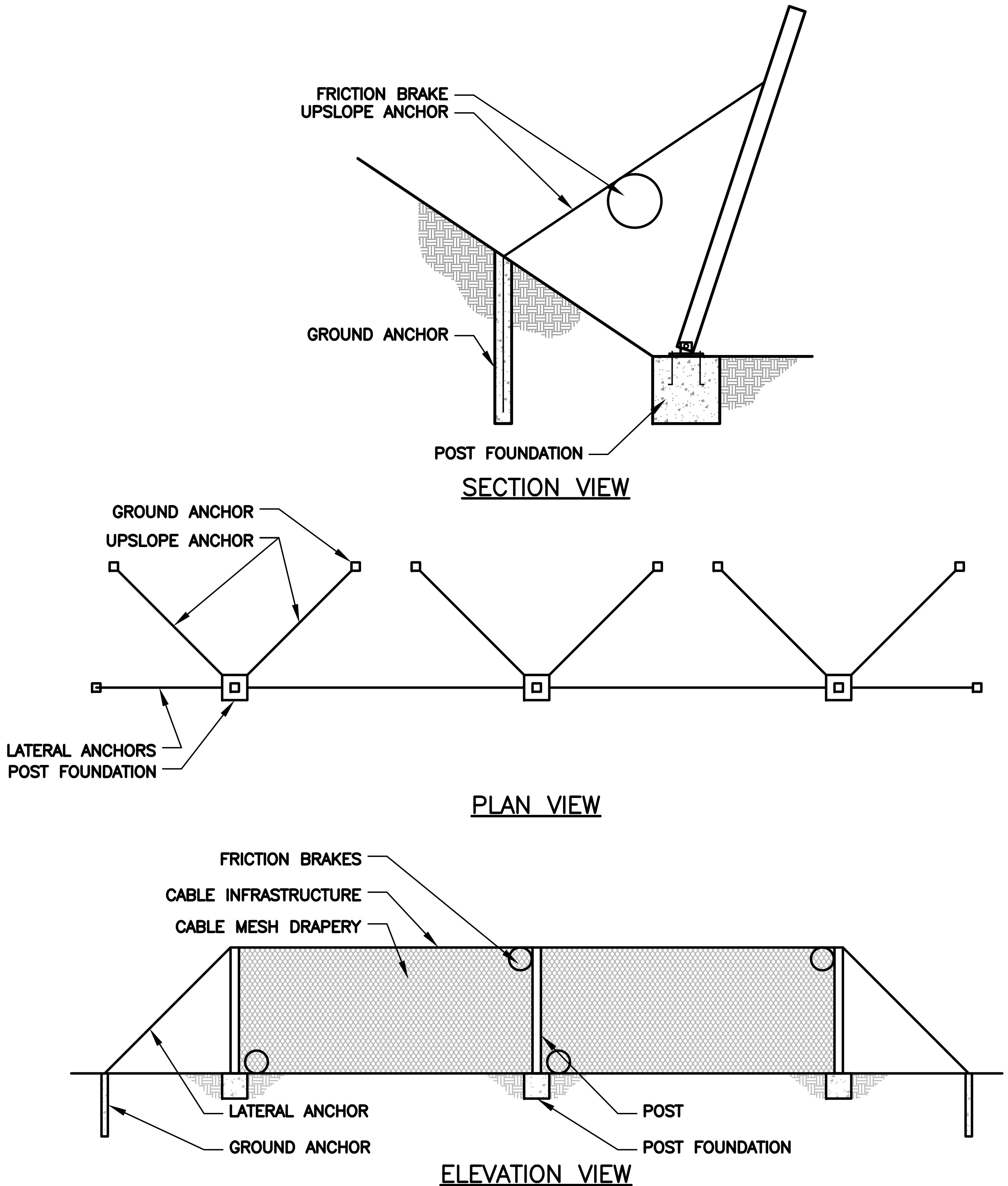
Valve ☐

WORK PERFORMED: ____________________

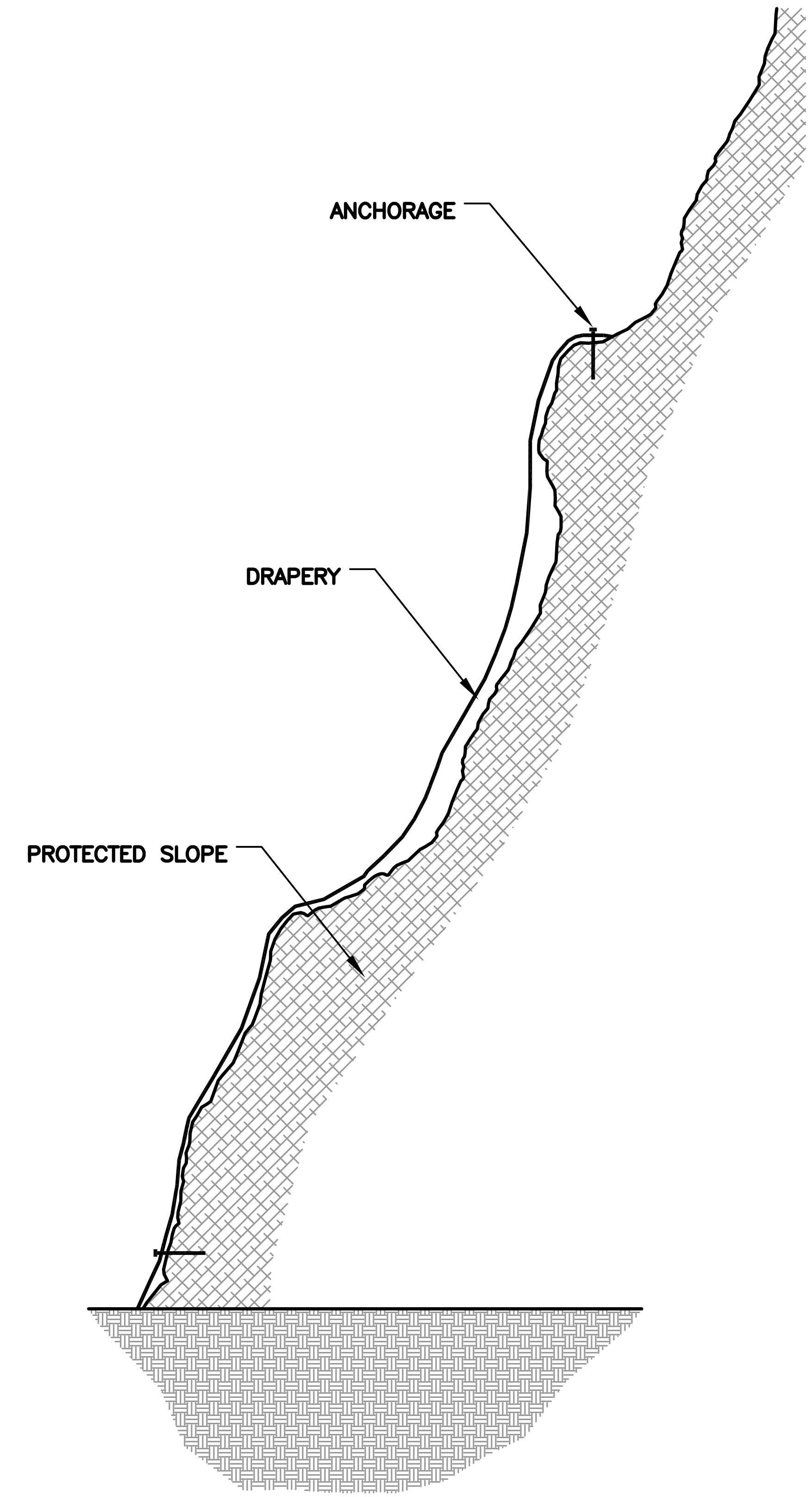
SKETCH:

SIGNED BY: ____________________

(L:\gregory\97139\REPORTS\OCT 2003 JTD-COMBINED\CONDENST.XLS:11/14/2003)



FLEXIBLE ROCKFALL FENCES
N.T.S.



CABLE & MESH DRAPERY
N.T.S.

FIGURE 36

GREGORY CANYON LANDFILL
TYPICAL ROCKFALL PROTECTION

JOB NO. 2009.0139
DATE 01-2011
DRAWN BY J.M.L.
FILE NAME: 30-0080FIG.DWG

(909) 860-7777
BRYAN A. STIRRAT & ASSOCIATES
CIVIL AND ENVIRONMENTAL ENGINEERS
1360 VALLEY VISTA DRIVE DIAMOND BAR, CA 91765

H:\DWG\GREGORY\2010\JTD\FIGURES\30-0080FIG