REDWOOD LANDFILL
SOLID WASTE FACILITIES
PERMIT REVISION

Final Supplemental
Environmental Impact Report

Volume I: Revisions to the Draft Subsequent
Environmental Impact Report

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Prepared for
County of Marin

225 Bush Street
Suite 1700
San Francisco, CA 94104
(415) 896-5900

8950 Cal Center Drive
Bldg 3, Suite 300
Sacramento, CA 95826
(916) 564-4500

710 Second Avenue
Suite 730
Seattle, WA 98104
(206) 442-0900

2685 Ulmerton Road
Suite 102
Clearwater, FL 33762
(727) 572-5226

ESA | Environmental Science Associates

436 14th Street
Suite 600
Oakland, CA 94612
(510) 839-5066

707 Wilshire Boulevard
Suite 1450
Los Angeles, CA 90017
(213) 599-4300

4001 Office Court
Suite 607
Santa Fe, NM 87507
(505) 992-8860

5850 T.G. Lee Boulevard
Suite 440
Orlando, FL 32822
(407) 851-1155

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INTRODUCTION

MARIN COUNTY PLANNING AND PROJECT REVIEW PROCESS

The Redwood Landfill Solid Waste Facilities Permit Draft Subsequent Environmental Impact Report (DSEIR) was released for public review and comment in July 2003. Marin County circulated the DSEIR for review by public agencies, interested parties, and organizations for a 90-day public comment period, extending the initially scheduled 45-day comment period an additional 45 days. The extended comment period closed October 14, 2003. During the comment period, the Planning Commission held a Public Hearing on July 28, 2003 to take public comment on the DSEIR. The Public Hearing was continued twice (August 18, and September 22, 2003). The County received about 700 written and oral comments on the DSEIR. This Final Environmental Impact Report (FEIR) and Response to Comments document responds to the comments on the DSEIR, pursuant to California Environmental Quality Act (CEQA) Guidelines §15088, and revises the DSEIR as necessary in response to these comments and to new information that has come to light since publication of the DSEIR..

The comments and responses are presented in Chapter 6 of this FEIR. FEIR Chapters 1 through 5 present an annotated revision of DSEIR Chapters 1 through 5 indicating changes necessitated by the responses to comments. Throughout Chapters 1-5, changes to the original text of the DSEIR are indicated as follows:

Additions to the text are underlined

~~Deletions are struck through.~~

Since publication of the DSEIR, the applicant, Redwood Landfill, Inc. (RLI) has revised the proposed project. Changes include reduction of the proposed permitted peak quantities for most incoming materials (including MSW, designated wastes, greenwaste, and biosolids); withdrawal of the proposal to reclassify Area G as a Class II waste unit; clarification of the types of designated waste to be received; and initiation of leachate pumping from the interior of the landfill. These changes are summarized in Master Response 17 in Chapter 6, Comments and Responses, and reflected in revisions to Chapter 2, Project Description. The project modifications would not result in new impacts or substantially more severe impacts than those evaluated in the DSEIR, assuming that the applicant agrees to the implementation of several new or revised mitigation measures identified in this FEIR. Therefore these project changes do not trigger recirculation of the EIR under §15088.5 of the CEQA Guidelines.

The County will circulate this FEIR and Response to Comments document to Responsible and Trustee Agencies that commented on the DSEIR and all interested parties for a 60-day review period. Upon the conclusion of the review, the County Planning Commission will consider whether to recommend certification of the EIR.

The Marin County Environmental Health Services Division (EHS) is certified by the California Integrated Waste Management Board (CIWMB) as the Local Enforcement Agency (LEA). The LEA has the authority to draft a proposed Solid Waste Facilities Permit (SWFP) for CIWMB concurrence. The CIWMB is the hearing body for the permit and the approval authority. The LEA issues the permit locally on behalf of the CIWMB. The LEA is also the CEQA Lead Agency and will make the determination of whether or not to certify the Final EIR. The LEA will conduct a separate and distinct meeting subsequent to EIR certification regarding the proposed permit, prior to submittal of the proposed permit to the CIWMB for concurrence. The meeting will not be for approval or disapproval of the permit. The purpose of the meeting will be to allow interested parties to provide comments regarding the proposed permit to be submitted to the CIWMB, for consideration prior to action on the permit. The LEA will transmit the proposed SWFP to the CIWMB for review. The CIWMB will conduct a public hearing and take action on the SWFP. If the CIWMB concurs in the issuance of the SWFP, the LEA will issue the permit to the applicant.

In certifying the EIR, the LEA would be affirming that the EIR is adequate and complete pursuant to CEQA and the County Environmental Review Guidelines. In conjunction with a decision on the project, the LEA would also find that it reviewed and considered the information contained in the FEIR prior to taking action on the project (CEQA Guidelines §15090). No action can be taken to approve the proposed project until the FEIR has been certified. However, certification of the EIR does not require or ensure approval of the project evaluated in the EIR.

SOLID WASTE FACILITIES PERMIT REVISION PROCESS

RLI is filing an application for a revision of its Solid Waste Facilities Permit (SWFP), which is the subject of this document. RLI also has a Conditional Use Permit (CUP) for operation of the landfill that was issued to the previous owner in 1958. The use permit that was issued at that time was quite broadly written, and contained no expiration date; the landfill is still operating under that CUP. The landfill has not applied for any change to its CUP.

The process for obtaining a SWFP is different than that for a CUP. The SWFP is not issued pursuant to the police power of the local jurisdiction, but is issued by the LEA, whose designation is approved by the CIWMB. As stated above, in the County of Marin, the LEA, as certified by the CIWMB, is the Environmental Health Services Division.

The issues covered under the SWFP are much more limited than the issues addressed under a CUP. For example, most issues dealing with water quality impacts are not under the jurisdiction of the LEA and the CIWMB. Instead, water quality impacts are under the jurisdiction of the Regional Water Quality Control Board (RWQCB), a separate State of California agency. Air quality impacts are not under the jurisdiction of the LEA, but are under the jurisdiction of the Bay

Area Air Quality Management District (BAAQMD). The issues covered by a SWFP are only those specifically enumerated in the Public Resources Code (PRC) §40000 et seq. The decision-making bodies for the SWFP are the CIWMB and the LEA, rather than the Marin County Board of Supervisors.

The process dealing with the SWFP is set out in the California State statutes at PRC §40000 and in the California Code of Regulations (CCR), Title 27 and Title 14. An outline of the general procedure has been produced by the CIWMB, and is included as Figure 1. More detailed information is available on the website of the CIWMB at http://www.ciwmb.ca.gov/LEACentral/Permitting/.

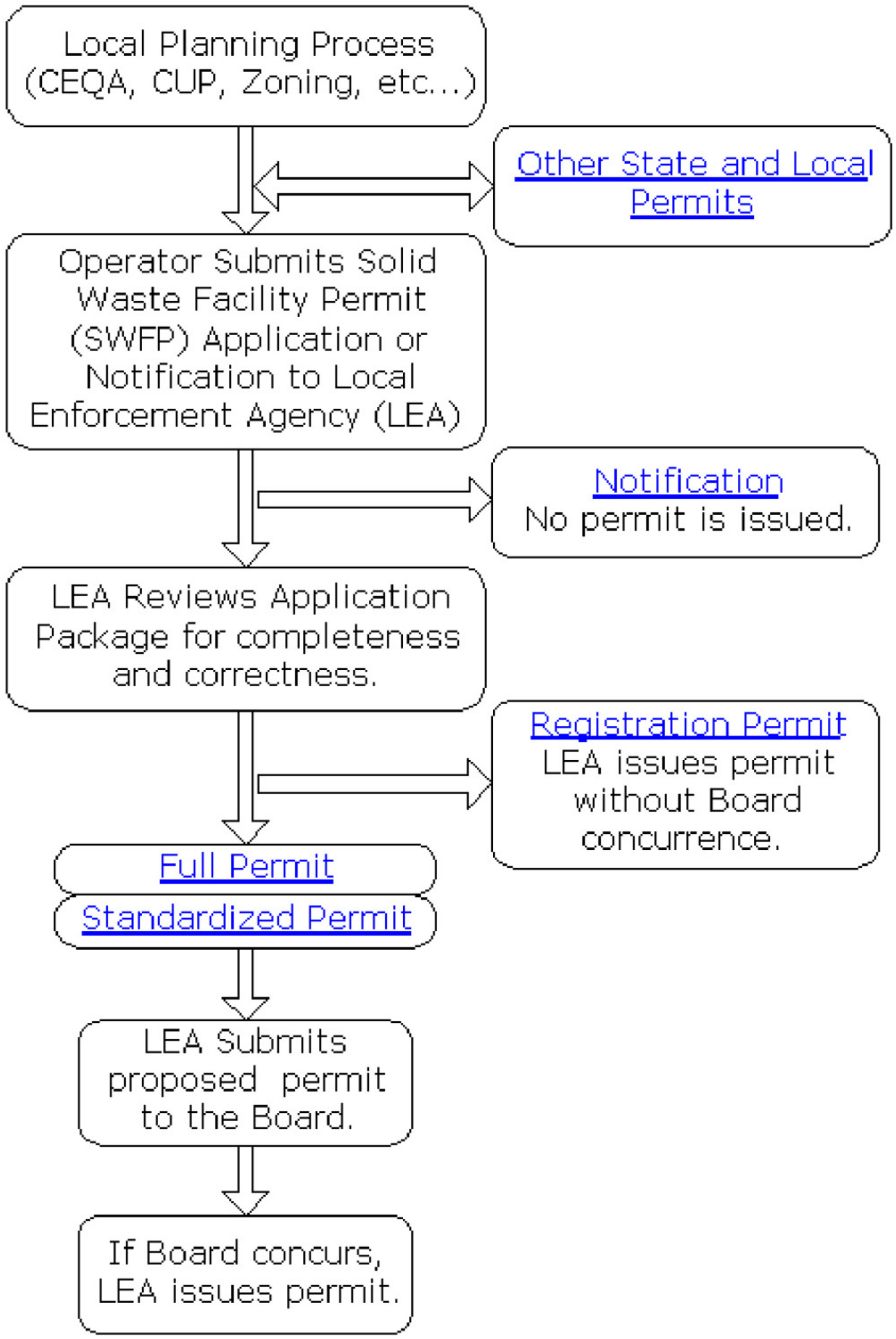
A revision of a SWFP is subject to CEQA, since the revision of the SWFP is a discretionary action. Since the LEA is the initial decision-making body regarding the underlying permit (followed by review and concurrence by the CIWMB), it, as lead agency, is also the agency which makes the decision regarding certification of the EIR for the SWFP. That certification is then subject to review and concurrence by the CIWMB.

In Marin County, the EIR for the project is also subject to review by the Planning Commission, which then makes a recommendation to the decision making body on certification of the EIR. The Marin County Environmental Review Guidelines, Section VI (A), state as follows: "The Planning Commission, as the Body with the greatest expertise for CEQA environmental review, shall review and make a recommendation to the County decision making body as to certification on all EIRs."

Under CEQA law, the environmental document prepared for a project should, to the greatest extent possible, contain all of the environmental impacts involved in the project, even if parts of the project are subject to review and approval by different bodies. For example, the EIR should contain information about air quality impacts and water quality impacts, even though the agencies responsible for decision making in those areas are the BAAQMD (for air quality impacts), and the RWQCB (for water quality impacts), not the LEA, who, with CIWMB concurrence, issues the SWFP.

Water quality issues for the project are under the primary jurisdiction of the RWQCB for the Bay Area. RWQCB staff are working with the LEA staff to review the applicant's Joint Technical Document (JTD) for their respective permits for the landfill, in order to obtain maximum coordination and efficiency. The RWQCB will determine whether to issue Waste Discharge Requirements (WDR), with conditions that were identified as mitigation measures for water quality impacts in the EIR.

Air quality issues for the project are under the primary jurisdiction of the BAAQMD. The BAAQMD will typically issue one or more Permits To Operate and Permits to Construct which will include conditions concerning the air quality issues for which that agency is responsible.



SOURCE: California Integrated Waste Management Board

Redwood Landfill Solid Waste Facilities Permit Revision EIR / 200238 ■

Figure 1
Process for Revision of a
Solid Waste Facilities Permit

Once the permit application is received and deemed complete, there is a statutory timeframe within which the SWFP application must be processed. For more information on this process, please go to the CIWMB website at: http://www.ciwmb.ca.gov/leacentral/permitting/Facts.htm.

SCOPE OF THE EIR

RLI, the project applicant, operates pursuant to a SWFP issued in 1995 by the Marin County LEA, with the concurrence of the CIWMB. Operations permitted in the 1995 SWFP were evaluated in an EIR that was certified by the County in 1994. Since certification of the 1994 FEIR and issuance of the 1995 SWFP, RLI has implemented some changes and proposed others that were not reviewed in the 1994 FEIR or permitted under the 1995 SWFP. The existing and proposed physical and operational modifications at the Redwood Landfill that were not reviewed in the 1994 FEIR are the subject of this EIR. While the project described and analyzed in this EIR is distinct from the project that was the subject of the certified 1994 FEIR, much of the information in that earlier document is germane to this EIR. The analysis in this EIR therefore relies to a considerable extent on the background and analysis contained in the 1994 FEIR. This EIR merely summarizes information that is contained in that previous EIR where that information is still valid and applicable to the current project. This EIR focuses only on the potential environmental impacts of the various elements that make up the current project, and not on the overall impacts of the operation of Redwood Landfill or of already-approved past projects. This EIR is considered a Subsequent EIR, as per State CEQA Guidelines §15162.

APPROACH TO ANALYSIS

CEQA Guidelines §15125(a) addresses how a lead agency should establish the baseline conditions against which potential environmental impacts of a project are measured, as follows:

> An EIR must include a description of the physical environmental conditions in the vicinity of the project, as they exist at the time the notice of preparation is published, or, if no notice of preparation is published, at the time environmental analysis is commenced, from both a local and regional perspective. This environmental setting will normally constitute the baseline physical conditions by which a lead agency determines whether an impact is significant.

The issue of a proper baseline for this project is complicated because some aspects of the project have already been implemented, but without all of the necessary discretionary approvals and prior environmental review. Recent case law provides guidance as to the appropriate baseline for existing, permitted, facilities seeking modifications to permitted operations or activities. In *Fairview Neighbors v. County of Ventura* ([2d Dist. 1999] 70 Cal. App. 4th 238 [82 Cal. Rptr.2d 436]) the Court ruled that for an existing, permitted facility that was seeking a permit for a new or revised aspect of its operation, where the facility's previously permitted operations had previously undergone environmental review, the appropriate baseline should be the existing permitted operations, rather than the level of operations actually occurring at the time of the notice of preparation.

In accordance with this decision, the design, operations, and environmental controls described in the 1995 SWFP and other current permits, based on the 1994 FEIR, as well as other applicable permits that have undergone separate environmental review, constitute the baseline against which potential impacts of the project are measured in this EIR.

DOCUMENTS INCORPORATED BY REFERENCE IN THE EIR

An EIR may, "…incorporate by reference all or portions of another document which is a matter of public record or is generally available to the public" (CEQA Guidelines §15150). Portions of several documents relevant to the environmental analysis for the proposed project have been summarized in various sections throughout the Redwood Landfill Solid Waste Facilities Permit Revision EIR, and are described below. All referenced documents are available at the Marin County Community Development Agency, 3501 Civic Center Drive, Room 308, San Rafael, California, 94903**.**

Marin County Community Development Agency Planning Division and Environmental Health Services, *Phase I: Technical Review /Project Description: Redwood Landfill Solid Waste Facility Permit Technical Review/Project Description and Initial Study*, prepared by Michael Clayton & Associates and John Roberto Associates, August 1999. Describes changes that have occurred at the Redwood Landfill since the last permit revision, as well as proposed changes. This document and the next form the basis for the Project Description (Chapter 2) of this EIR.

Marin County Community Development Agency Planning Division and Environmental Health Services, *Phase II: Final Initial Study Type Review: Redwood Landfill Solid Waste Facility Permit Technical Review/Project Description and Initial Study*, prepared by John Roberto Associates and Michael Clayton & Associates, December 7 1999. Evaluates the changes that have occurred at the Redwood Landfill since the last permit revision, as well as proposed changes, and identifies those that require further review under CEQA. This document and the previous one form the basis for the Project Description (Chapter 2) of this EIR.

Marin County Environmental Health Services, *Redwood Landfill Permit Review Report*, April 1998. Evaluation of proposed operational and design changes at the Redwood Landfill, and their consistency with existing permits. This document is referred to in Chapter 2 (Project Description) of this EIR.

Marin County, *Redwood Landfill Solid Waste Facilities Permit Expansion Project Environmental Impact Report*, SCH # 91033042, prepared by Woodward Clyde, 1994. This EIR evaluated the potential environmental effects of a previous set of proposed changes to operations and design of the Redwood Landfill. It is referred to throughout the current document.

ORGANIZATION OF THE EIR

The FEIR is organized into seven chapters, preceded by the Table of Contents and this introductory section. Chapters 1 through 5 (in Volume I) consist of revised Chapters 1 through 5 of the DSEIR, annotated to indicate changes to the text necessitated by the responses to comments: new language is <u>underlined</u> and deleted language is indicated by ~~strikethrough~~ text.

Chapters 6 and 7 are in Volume II. Chapter 6 contains all comments received during the comment period and responses to those comments, and Chapter 7 identifies the report authors. A brief summary of the contents of the FEIR is presented below.

Introduction: The Introduction describes the Marin County planning and project review process for the proposed project, identifies the technical documents that are incorporated by reference into the EIR, describes the organization of the EIR, and includes a glossary of terms and list of acronyms used in this EIR.

Chapter 1 – Summary: The EIR Summary, prepared in accordance with State CEQA Guidelines §15123, contains an overview of key elements of the EIR. The chapter summarizes the project description and characteristics and presents in table format a comprehensive list of all environmental impacts and mitigation measures identified in the EIR, indicating the level of significance of each impact before and after mitigation. The Summary describes and evaluates the project alternatives as they compare to the proposed project and discusses project consistency with applicable plans and policies. The significant and unavoidable impacts of the project also are identified, as well as any significant irreversible environmental changes, and growth-inducing impacts of the project. Major conclusions, areas of controversy, and issues to be resolved in the EIR are discussed.

Chapter 2 – Project Description: The Project Description is prepared pursuant to State CEQA Guidelines §15124 and contains a discussion of the project attributes through text, figures, and tables. Specifically, this chapter includes an overview of the project, a description of the project site and location, a discussion of objectives for the project, and a discussion of project characteristics.

Chapter 3 – Environmental Setting, Impacts, and Mitigation Measures: The majority of environmental impact evaluation for the proposed project is contained in this chapter. A description of the physical setting for each environmental issue is provided, along with disclosure of the anticipated changes to physical conditions after project implementation. The "setting," for purposes of this EIR, contains the existing physical characteristics of the site and its surroundings. Mitigation measures are included for any significant impact that would result with the proposed project. The social and economic effects of a proposed project are not required to be included in an EIR and are not evaluated as environmental issues in this EIR: Social and economic effects "shall not be treated as significant effects on the environment" (CEQA Guidelines §150131[a]). Therefore, although the EIR may discuss economic or social information in the context of an environmental issue, the EIR focuses on the potential change on the physical environment that may result with the proposed project.

Environmental impacts are numbered throughout this portion of the EIR, beginning with the chapter section number, followed by sequentially numbered impacts. For example, the first impact in Section 3.6 (Land Use) is impact number 3.6.1, and the second impact in this section is 3.6.2. Mitigation measures are numbered to correspond to impacts; therefore, mitigation measures to address Impacts 3.6.1 and 3.6.2 would be Mitigation Measures 3.6.1 and 3.6.2, respectively. The Mitigation Monitoring and Reporting Program (MMRP), which is used to track the implementation of mitigation measures and is included as Appendix A of this EIR, uses the same numbering as that of the EIR text. For example, EIR Impact 3.6.1 is the same as Impact 3.6.1 found in the MMRP.

Chapter 4 – Growth Inducing and Cumulative Effects: Chapter 4 includes CEQA-mandated sections examining the potential growth-inducing effects of the project and the project's cumulative impacts. Cumulative impacts refer to two or more individual effects that, when considered together, are considerable or compound other environmental impacts. In accordance with CEQA Guidelines §15355, the analysis in Chapter 4 examines the potential for cumulative impacts of the project in conjunction with other, related past, present, and foreseeable future projects.

Chapter 5 – Alternatives to the Project: In accordance with CEQA Guidelines §15126.6, Chapter 5 of the EIR presents a range of reasonable alternatives designed to feasibly attain most of the basic objectives of the project and avoid or substantially reduce significant project effects. The potential environmental impacts of the alternatives are discussed in comparison to the impacts that would result from the proposed project and the advantages and disadvantages of each alternative is presented.

Chapter 6 – Comments and Responses: Volume II of this FEIR commences with Chapter 6. Section 6.1 provides an introduction to the comments and response section of the FEIR and Section 6.2 presents a list of those who commented on the DSEIR. A number of issues are addressed in multiple comments. "Master Responses," which consolidate information on these subjects to ensure a more comprehensive response, are presented in Section 6.3. Section 6.4 contains copies of all comment letters received and responses to the comments. Each comment letter is assigned a letter code, from A through OOO, and each comment is numbered in the margin of the comment letter. Responses to the comments follow the letter. The comments and responses are referenced using this alphanumeric system. For example the first comment from the first letter, from the State Clearinghouse, is designated A-1, as is the response to it. Testimony from the Public Hearing is designated PPP and follows the comment letters.

Chapter 7 – EIR Authors, Persons and Organizations Contacted: This chapter identifies the individuals who were involved in the preparation of the EIR. Persons and organizations contacted in preparation of the EIR are referenced at the end of each chapter or section.

Appendices: The EIR contains several appendices of technical or procedural materials that are pertinent to the analysis contained in the body of the document. See the Table of Contents for the full list of appendices. Appendices are bound in Volume II.

GLOSSARY AND LIST OF ACRONYMS

GLOSSARY

The following definitions are of terms used in the EIR.

AB 939 (Assembly Bill 939): enacted the California Integrated Waste Management Act of 1989. California law requiring each city and county to prepare plans detailing how the jurisdiction will meet specified waste diversion goals. The Act establishes a new waste-management hierarchy for the State, emphasizing (in order of importance) source reduction, recycling and composting, and environmentally-safe transformation and environmentally safe landfilling.

Admixture: Materials added to compost at the end of the composting process to improve the characteristics of the compost as a soil amendment or fertilizer.

Aquifer: a geological formation, group of formations, or portion of a formation capable of yielding significant quantities of ground water to wells or springs.

Alternative Daily Cover (ADC): ADC is any non-soil material used for covering waste deposited in a landfill at the end of each working day, that meets regulatory requirements (Title 27 CCR, §20690**)** and the approval of the LEA.

Beneficial Use: beneficially using a waste instead of disposing of it in a landfill. Examples include agricultural land application of ash or dewatered sludge for soil amendment purposes.

California Environmental Quality Act (CEQA): California law requiring the disclosure of environmental effects of proposed projects before discretionary approval can be issued.

Cell: that portion of compacted solid wastes in a landfill that is enclosed by natural soil or cover material during a designated period.

Class II Landfill: landfill permitted to accept municipal solid wasete (MSW) and designated wastes. Class II landfill construction design and operation requires more stringent groundwater protection than Class III landfills.

Class III Landfill: sanitary landfill typically permitted to accept only MSW.

Clay Liner: a continuous layer of clay installed beneath or on the sides of a waste management unit, which acts as a barrier to vertical or lateral movement of fluid, including waste and leachate.

Commercial Solid Wastes: commercial solid wastes include all types of solid wastes generated by stores, offices, and other commercial sources.

Composite Liner: liner system that is constructed of a single clay liner, over which a synthetic liner (such as a liner made of high density polyethylene plastic) is placed in direct contact.

Composting: the process by which discarded organic materials **--** including (for example) tree trimmings, grass clippings, yard waste, agricultural wastes, leaf debris and sewage sludge **--** are converted to usable products through controlled biological decomposition.

Co-composting: Composting of biosolids (sewage sludge) with yard waste or other materials.

Containment System: the portion of the disposal cell that is comprised of the liner and leachate collection and removal system.

County Integrated Waste Management Plan (CoIWMP): plan submitted by each county to the California Integrated Waste Management Board consisting of the following:

- all city and regional agency Source Reduction and Recycling Elements (SRREs) and Household Hazardous Waste Elements (HHWEs);
- SRRE and HHWE prepared for the unincorporated areas of the county;
- the Countywide Siting Element and Summary Plan; and
- the Nondisposal Facility Element.

County Solid Waste Management Plan (CoSWMP): waste management plan required prior to passage of AB939. Under AB 939, the plan is to be superseded by the CoIWMP.

Countywide Siting Element (Countywide Solid Waste Facility Siting Element): under AB 939, each county must prepare a Countywide Siting Element which includes a description of the area to be used for development of adequate transformation or disposal capacity consistent with the development and implementation of the county and city SRREs.

Cover Material: material (usually soil) used at a landfill to cover compacted waste at specific, designated intervals. Its purpose is to serve as a barrier to: the emergence or attraction of vectors, the progress of fires within the landfill, the escape of odor, and excess infiltration of surface water runoff.

Daily Cover: cover material spread and compacted on the entire surface of the active face of the sanitary landfill at least at the end of each operating day in order to control vectors, fire, water infiltration, erosion, and to prevent unsightliness and scavenging.

Designated Waste: can be either 1) non-hazardous waste that consists of or contains pollutants that, under ambient environmental conditions at the landfill, could be released at concentrations in excess of applicable water quality objectives, or that could cause degradation of waters of the state; or 2) hazardous waste that has been granted a variance from hazardous waste management requirements pursuant to §66310 of Title 22 of the California Code of Regulations (CCR).

Dewatered Sludge: residual semi-solid waste from which free liquid has been evaporated, or otherwise removed.

Double Liner: liner system that is constructed of two clay liners, two synthetic liners or one clay liner and one synthetic liner, with a drainage medium placed between the liners.

Fill: compacted solid waste and cover material.

Final Cover: the cover material that represents the permanently exposed final surface of a fill.

Flexible Membrane Liner (FML): a thin liner commonly 60 thousandths of an inch thick (60 mil) made of plastic material, often high-density polyethylene (HDPE). Used in landfills as part of the base liner both as a barrier to protect groundwater from landfill-generated leachate and as a flow surface for leachate. Currently required by federal law for all new MSW landfills and lateral extensions of existing landfills.

Flood Plain: the land area which is subject to flooding in any year from any source.

Generator: the source of materials discharged into the wastestream: the household, commercial establishment, or factory.

Geomembrane — see "Geosynthetic(s)"

Geosynthetics: flexible materials in planar form manufactured to meet specific engineering purposes. The term includes, but is not limited to: "geomembrane," an essentially impermeable membrane used as a barrier to waste solids and fluids, and synonymous with "synthetic liner" and "flexible membrane liner (FML)"; "geocomposite liner (GCL)," a manufactured material using geotextiles, geogrids, geonets, and/or geomembranes in laminated or composite form; "geotextile" (including "geonet"), any permeable textile used with foundation, soil, rock, earth, or any other geotechnical engineering-related material as an integral part of a constructed project, structure, or system.

Groundwater: water below the land surface.

Hazardous Wastes: As defined in California Code of Regulations Title 22, wastes that pose a hazard to human health or the environment due to their flammability, corrosiveness, reactivity, or toxicity to living things.

HDPE (High Density Polyethylene): plastic material commonly used in Flexible Membrane Liners.

Heavy Metals: elements including cadmium, mercury, lead, and arsenic which tend to accumulate in the food chain.

Incinerator: a facility that burns waste (usually MSW, but also hazardous waste) for the purpose of volume reduction.

Intermediate Cover: cover material that is applied on areas where additional cells are not to be constructed for extended periods of time, and therefore, must resist erosion for a longer period of time than daily cover.

Joint Technical Document (JTD): Background document on landfill design, operations, and closure that serves as the basis for both the landfill's Solid Waste Facilities Permit and the Waste Discharge Requirements.

Land Application: the application of ash, sludge or sludge products such as compost to agricultural and nonagricultural lands. Agricultural lands include land used for food crops, feed crops, range, and pasture lands. Nonagricultural lands include forest, reclaimed or disturbed lands, and lands with potential public contact such as ball fields and golf courses. Land application is an alternative to landfill disposal.

Leachate: liquid that has come in contact with or percolated through waste materials and has extracted or dissolved substances therefrom.

LCRS (Leachate Collection and Removal System): a system for collecting and conveying leachate to a central collection point where it can be properly managed.

Leachate Treatment and/or Disposal Facilities: since an efficient liner and LCRS have potential to collect large quantities of leachate, the landfill owner must have an immediate means to dispose of it. Options for disposing of leachate include: 1) on-site treatment and discharge, 2) discharge of untreated leachate to a publicly or privately owned wastewater treatment facility, or 3) pretreatment of the leachate prior to discharge into a wastewater treatment facility.

Lift: In a sanitary landfill, a series of daily cells, placed contiguous to each other, typically along a uniform elevation or height. Once a lift has been completed, the operation moves up on top of the previous lift and begins a new series of daily cells.

Local Enforcement Agency (LEA): county or city agency (other than the government department or agency that is the operating unit for a solid waste facility) given authority to oversee implementation of CIWMB regulations. The LEA may be certified under four categories:

1. permitting, inspection, and enforcement at solid waste landfills
2. incineration
3. transfer and processing stations
4. inspection and enforcement of litter, odor, and nuisance regulations at landfills.

Maximum Credible Earthquake: the maximum earthquake that appears capable of occurring under the presently known geologic framework. In determining the maximum credible earthquake, little regard is given to its probability of occurrence except that its likelihood of occurring is great enough to be of concern.

Maximum Probable Earthquake: the maximum earthquake that is likely to occur during a 100-year interval.

Monofill: a landfill, or part of a landfill for one type of waste only.

Municipal Solid Waste (MSW): solid waste from residential, commercial, and institutional sources that is generally disposed of in Class III landfills.

NPDES (National Pollutant Discharge Elimination System): federal requirement under the Clean Water Act (CWA) that any discharge of a non-point source of pollution into waters of the United States be in conformance with any established water quality management plan developed under the Clean Water Act.

Operator: the person responsible for the overall operation of a landfill facility or part of a landfill facility.

Owner: the person who owns a landfill facility or part of a landfill facility.

Permeability: the measurement of a material's ability to allow the passage of moisture. For landfill applications, it is usually expressed in centimeters per second.

Post Closure Maintenance Period: the period after closure during which the waste could have an adverse effect on the environment.

POTW (Publicly Owned Treatment Work): municipal wastewater treatment plant.

Recycling: the process of collecting, sorting, cleansing, treating, and reconstituting materials that would otherwise become solid waste, and returning them to the economic mainstream in the form of raw material for new products. Does not include the conversion of waste into energy.

Report of Disposal Site Information (RDSI): Previously functioned as part of a permit application to obtain the Solid Waste Facilities Permit from the Local Enforcement Agency (LEA) with concurrence of the California Integrated Waste Management Board. Superseded by the **Joint Technical Document**.

Report of Waste Discharge (RWD): functions as part of a landfill's permit application to the Regional Water Quality Control Board to receive a Waste Discharge Requirement.

Resource Conservation and Recovery Act (RCRA): federal law that specifies (among other things) how municipal solid waste, designated waste, and hazardous wastes are to be properly landfilled.

Resource Recovery: the reclamation or salvage of wastes for reuse, conversion to energy, or recycling.

Run-off: any rainwater, leachate, or other liquid that drains over land *from* any part of a facility.

Run-on: any rainwater, leachate, or other liquid that drains over land *onto* any part of a facility.

Sanitary Landfill: a disposal site employing an engineered method of disposing of solid wastes in a manner that minimizes environmental hazards by spreading, compacting to the smallest practical volume and applying cover material over all exposed wastes at the end of each operating day.

Saturation Zone: that part of the earth's crust in which all voids are filled with water.

Sludge: any solid, semi-solid, or liquid waste generated from a municipal, commercial, or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility exclusive of the treated effluent from a wastewater treatment plant. CCR Title 27 specifies that for co-disposal of sludges in landfills, the sludge must contain at least 20 percent solids if primary sludge, or at least 15 percent solids if the sludge is secondary sludge, mixtures of primary and secondary sludges, or water treatment sludge.

Source Reduction and Recycling Elements (SRREs): In accordance with the California Integrated Waste Management Act of 1989, SRREs are plans for cities and counties to divert 25 percent of solid wastes from landfill disposal by 1995 and 50 percent by the year 2000.

Special Waste: Special waste is waste which is a hazardous waste only because it contains an inorganic substance or substances which cause it to pose a chronic toxicity hazard to human health or the environment and which meets all of the criteria and requirements of CCR Title 22 §66261.122 and has been classified a special waste pursuant to CCR Title 22 §66261.124.

Surface Impoundment: a facility that is a natural topographic depression, human-made excavation, or diked area formed primarily of earthen materials (although it may be lined with human-made materials), that is designed to hold an accumulation of liquid wastes or wastes containing free liquids and that is not an injection well. Examples include: holding storage, settling and aeration pits, ponds, and lagoons.

SWFP (Solid Waste Facilities Permit): permit issued by the Local Enforcement Agency (LEA) authorizing a landfill to operate.

Transformation: incineration, pyrolysis, distillation, gasification, or biological conversion of solid waste.

Unit risk value: the probability of incurring cancer if exposed to 1 microgram per cubic meter (ug/m^3) of the pollutant of concern.

Unstable Areas: locations that are susceptible to natural or human-induced events or forces capable of impairing the integrity of some or all of the landfill structural components responsible for preventing releases from a landfill. Unstable areas are characterized by localized or regional ground subsidence, settling (either slowly, or very rapidly and catastrophically) of over burden, or by slope failure.

Vadose Zone: sub-surface zone between the ground surface and the groundwater level (water table) within the unsaturated zone. Soil voids in this zone contain air and water.

Waste Cell: at a landfill, compacted solid wastes covered with a thin, continuous layer of soil.

Waste Discharge Requirements (WDR): the permit issued by Regional Water Quality Control Board for the discharge of waste to land (i.e., a landfill).

Waste Management Unit: area of land, or a portion of a waste management facility, at which waste is discharged. The term includes containment features and ancillary facilities for precipitation and drainage control and monitoring, and can be applied to landfills or surface impoundments.

Waste Shed: area in which a waste stream is generated.

Waste stream (or wastestream): the body of material composed of discards, by-products, and obsolete objects that is generated by industry, government, and the private commercial and residential sectors. The "wastestream" does not always end up wasted *per se* in landfills or incinerators: some of it will be recycled, composted, salvaged for re-use, or sent to waste-to-energy facilities.

Wetland: those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include, but are not limited to, swamps, marshes, bogs, and similar areas. [as defined by the U.S. Army Corps of Engineers and the U.S. EPA]

Working Face: the area where daily disposal operations are conducted at a landfill: it is usually on a slope, where waste is deposited and compacted with landfill equipment.

ACRONYMS USED IN EIR

The following is a list of acronyms used in the EIR.

AADT: Annual Average Daily Traffic

AB: Assembly Bill

AB 939: Assembly Bill 939

ADC: Alternative Daily Cover

AF: Acre-Feet

ALUP: Airport Land Use Plan

ASWAT: Air Quality Solid Waste Assessment Test

BAAQMD: Bay Area Air Quality Management District

BACT: Best Available Control Technology

Cal/OSHA: California Occupational Safety and Health Administration

Cal-EPA: California Environmental Protection Agency

Caltrans: California Department of Transportation

CAP: Clean Air Plan

CARB: California Air Resources Board

CCAA: California Clean Air Act

CCR: California Code of Regulations

CDF: California Department of Forestry

CDFG: California Department of Fish and Game

CEQA: California Environmental Quality Act

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act

CESA: California Endangered Species Act

CFR: Code of Federal Regulations

CH_4: Methane

CHP: California Highway Patrol

CIWMB: California Integrated Waste Management Board

CIWMP: County Integrated Waste Management Plan

CNDDB: California Natural Diversity Data Base

CNPS: California Native Plant Society

CoSWMP: County Solid Waste Management Plan

CO: Carbon Monoxide

CO_2: Carbon Dioxide

Corps: U.S. Army Corps of Engineers

CUP: Conditional Use Permit

CWHR: California Wildlife Habitat Relationships

CY: Cubic Yards

dBA: Decibels (measured on the “A” scale of frequency)

DOT: U.S. Department of Transportation

DTSC: California Department of Toxic Substances Control

DWR: California Department of Water Resources

EHS: Environmental Health Services

EIR: Environmental Impact Report

Fed/OSHA: Federal Occupational Safety and Health Administration

FEMA: Federal Emergency Management Administration

FESA: Federal Endangered Species Act

FML: Flexible Membrane Liner

FY: Fiscal Year

HAP: Hazardous Air Pollutant

HC: Hydrocarbons

HDPE: High Density Polyethylene

HHW: Household Hazardous Waste

HI: Hazard Index

JTD: Joint Technical Document

LCRS: Leachate Collection and Removal System

LEA: Local Enforcement Agency

LEL: Lower Explosive Limit

LGCS: Landfill Gas Collection System

LOS: Level of Service

MACT: Maximum Achievable Control Technology

MPH: Miles per Hour

MRF: Materials Recovery Facility

MSL: Mean Sea Level

MSW: Municipal Solid Waste

NAAQS: National Ambient Air Quality Standards

NESHAPs: National Emission Standards for Hazardous Air Pollutants

NGVD: National Geodetic Vertical Datum

NIOSH: National Institute of Occupational Safety and Health

NMOC: Non-Methane Organic Compounds

NMWD: North Marin Water District

NO_2: Nitrogen Dioxide

NO_x: Nitrogen Oxides

NOP: Notice of Preparation

NPDES: National Pollutant Discharge Elimination System

NSPS: New Source Performance Standards

O_3: Ozone

OSHA: Occupational Safety and Health Administration

P_b: Lead

PEL: Fed/OSHA Permissible Exposure Limit

PM_{10}: Particulate Matter

POTW: Publicly Owned Treatment Works

PPT: Parts per thousand

PVC: Polyvinyl chloride

RCRA: Resource Conservation and Recovery Act

RCSI: Report of Composting Site Information

RDSI: Report of Disposal Site Information

REL: NIOSH Recommended Exposure Limit

RLI: Redwood Landfill, Inc.

ROG: Reactive Organic Gases

ROWD: Report of Waste Discharge

RWQCB: Regional Water Quality Control Board

SAAQS: State Ambient Air Quality Standards

SO_2: Sulfur Dioxide

SSRE: Source Reduction and Recycling Element

STEL: Short Term Exposure Limit

SWAT: Solid Waste Assessment Test

SWFP: Solid Waste Facilities Permit

SWPPP: Storm Water Pollution Prevention Plan
SWRCB: State Water Resources Control Board

TAC: Toxic Air Contaminant

TI: Traffic Index

TLV: ACGIH Threshold Limit Value

TPD: tons per day

TSDF: Transfer, Storage, and Disposal Facility

TWA: Time-Weighted Average

UBC: Uniform Building Code

U.S. EPA: United States Environmental Protection Agency

USFWS: U.S. Fish and Wildlife Service

VMT: Vehicle Miles Traveled

VOC: Volatile Organic Compounds

VPH: Vehicles per Hour

WDR: Waste Discharge Requirements

WET: Wet Extraction Test

WMI: Waste Management, Inc.

WWTP: Wastewater Treatment Plant

REFERENCES – Introduction

Marin County Community Development Agency Planning Division and Environmental Health Services, *Phase I: Technical Review /Project Description: Redwood Landfill Solid Waste Facility Permit Technical Review/Project Description and Initial Study*, prepared by Michael Clayton & Associates and John Roberto Associates, August 1999a.

Marin County Community Development Agency Planning Division and Environmental Health Services, *Phase II: Final Initial Study Type Review: Redwood Landfill Solid Waste Facility Permit Technical Review/Project Description and Initial Study*, prepared by John Roberto Associates and Michael Clayton & Associates, December 7 1999b.

Marin County Environmental Health Services, *Redwood Landfill Permit Review Report*, April 1998.

Marin County, *Redwood Landfill Solid Waste Facilities Permit Expansion Project Final Environmental Impact Report*, SCH #91033042, prepared by Woodward Clyde, February 1994.

CHAPTER 1
SUMMARY

1.1 INTRODUCTION

This summary section is provided in accordance with State CEQA Guidelines §15123. As stated in the State CEQA Guidelines §15123(a), "[a]n EIR shall contain a brief summary of the proposed action and its consequences. The language of the summary should be as clear and simple as reasonably practical." State CEQA Guidelines §15123(b) states, "[t]he summary shall identify: (1) Each significant effect with proposed mitigation measures and alternatives that would reduce or avoid that effect; (2) Areas of controversy known to the Lead Agency including issues raised by agencies and the public; and (3) Issues to be resolved including the choice among alternatives and whether or how to mitigate the significant effects." Accordingly, this summary includes a brief synopsis of the proposed project and project alternatives, environmental impacts and mitigation measures, cumulative effects and mitigation measures, areas of known controversy, and issues to be resolved in the environmental impact report (EIR). Table 1-2, at the end of this chapter, presents the summary of potential environmental impacts, their level of significance before mitigation, mitigation measures, and levels of significance with mitigation.

1.2 SUMMARY OF IMPACTS AND MITIGATION MEASURES

Chapter 3 (Environmental Setting, Impacts, and Mitigation Measures) of this EIR describes in detail the environmental impacts that would result from implementation of the proposed project. Impacts of a proposed project may be classified as either (1) less than significant (adverse effects that are not substantial according to CEQA); (2) significant (substantial or potentially substantial adverse changes in the environment, for which mitigation measures must be recommended, if feasible); or (3) significant and unavoidable (substantial or potentially substantial adverse changes in the environment that cannot feasibly be reduced with mitigation measures to a less-than-significant level). Significant unavoidable adverse impacts, growth-inducing impacts, and significant irreversible environmental changes that would occur with implementation of the proposed project are discussed in Section 1.6, below. Growth-inducing and cumulative impacts of the project are discussed in Chapter 4.

Table 1-2, at the end of this chapter, summarizes the project's environmental impacts (including cumulative impacts), the level of significance before mitigation, mitigation measures, and the level of significance after mitigation. Please refer to Chapter 3, Environmental Setting, Impacts, and Mitigation Measures, and Chapter 4, Growth-Inducing and Cumulative Effects, for a detailed discussion of these issues.

1.3 SUMMARY OF PROJECT DESCRIPTION

1.3.1 PROJECT DESCRIPTION

Redwood Landfill, Inc. (RLI), a wholly-owned subsidiary of USA Waste of California, Inc., a holding company for the California holdings of Waste Management, Inc., has proposed physical and operational changes to its Redwood Landfill facility in Marin County. In addition, some physical and operational changes, not covered under existing permits and approvals, have taken place since the facility's current Solid Waste Facilities Permit (SWFP) was issued in 1995. The Marin County Environmental Health Services Division (EHS), acting as the Local Enforcement Agency (LEA), requires that the facility's SWFP be revised to reflect existing and proposed modifications and RLI has applied to the EHS for a SWFP revision. Some of the existing or proposed modifications entail revisions to other permits and approvals under which the facility operates, as well.

The project evaluated in this Environmental Impact Report (EIR) thus consists of elements that have already been implemented, but are not covered under existing permits and have not previously been subject to environmental review under the California Environmental Quality Act (CEQA), and elements proposed by RLI for future implementation. The proposed project, which is described in detail in Chapter 2, Project Description, consists of the following main components:

- changes to landfill capacity and design, including increasing the landfill's capacity, modifying the landfill's final contours (without increasing the maximum height or the existing footprint of the landfill)~~, and converting "Area G" of the landfill, which is currently permitted as part of the Class III landfill, to a Class II waste management unit~~;

- changes to waste operations, including changes in the quantity and types of waste received, changes in the types of materials used for daily cover, changes in the facility's sludge processing, changes in the facility's composting operations, and an increase in the allowable number of vehicles using the facility;

- changes to environmental controls at the landfill, including changes to the permitted design of the leachate collection and removal system and perimeter levee reconstruction, changes in surface water management, changes in landfill gas management, changes in landfill cover design, and changes in the approach taken to remediate an un-permitted waste disposal area on the site; and

- changes to the facility's administrative infrastructure, namely the relocation of administrative and ancillary facilities.

A separate but closely related project, involving construction of a new access road and bridge at the intersection of U.S. 101 and Sanitary Landfill Road, is the subject of another Environmental Impact Report, which already has been certified by the Marin County Board of Supervisors.[1] The access road and bridge project ~~also will~~ has also obtained ~~require~~ an encroachment permit from the California Department of Transportation (CalTrans). That project is currently in the

1 Marin County, Community Development Agency, *Redwood Landfill Inc. Interim Access Road Improvements, Final Supplemental EIR*, June, 2002.

construction ~~design~~ phase. This EIR assumes that the access road and bridge will be built prior to project implementation. This assumption is also used in each of the Project Alternatives.

1.3.2 APPROVALS AND ENTITLEMENTS

Redwood Landfill is seeking revisions to the permits that regulate the design and operation of the landfill. These permits include the Solid Waste Facilities Permit, (SWFP), issued by Marin County EHS with the concurrence of the California Integrated Waste Management Board (CIWMB), Waste Discharge Requirements (WDRs) issued by the San Francisco Bay Regional Water Quality Control Board (RWQCB), two Permits to Operate (PTOs), issued by the Bay Area Air Quality Management District (BAAQMD), and a Registration Permit to operate the facility's greenwaste and wood waste composting and biosolids co-composting facility, issued by the EHS with the concurrence of the CIWMB. A complete listing of the current permits for the landfill and permits potentially required for the proposed project is presented in Table 2-1 in Chapter 2 (Project Description).

1.4 ALTERNATIVES TO THE PROJECT

State CEQA Guidelines §15126.6 requires that an EIR include an evaluation of a range of reasonable alternatives to the proposed project or project location that would feasibly attain most of the project objective but which would avoid or substantially reduce any of the significant effects of the project. Chapter 5 (Alternatives to the Project) of this EIR provides an analysis of the impacts anticipated from five alternatives to the proposed project. The EIR alternatives include: (1) No Project Alternative; (2) Status Quo Alternative; (3) Reduced Scale Alternative; (4) Mitigated Alternative; (5) Off-Site Alternative. This section provides a summary of each alternative and the EIR conclusions pertaining to it; these are also summarized in Table 1-1. In Chapter 5, each of these five alternatives is described and its potential environmental impacts and ability to meet basic project objectives are compared with the proposed project.

1.4.1 NO PROJECT ALTERNATIVE

The No Project Alternative analysis is based on the assumption that the Redwood Landfill would continue to operate under the terms of its existing permits. There would be no increase in daily receipt of wastes, no increase in the permitted capacity of the landfill (or change in the landfill's final grades), no change to the design of the landfill's final cover, and no expansion of the compost facility. There would be no change to the permit conditions regarding alternative daily cover (ADC); only N-Viro processed sewage sludge biosolids could be used as ADC. ~~Area G eventually would be developed as a Class III cell (not a Class II cell as proposed) after the RWQCB approved the final liner design, which would need to be consistent with current regulatory requirements~~. Redwood Landfill would complete construction of the leachate collection and recovery system (LCRS) according to the revised design (the perimeter trench design). The Stipulated Notice and Order, which allows the landfill to receive more vehicles than the SWFP allows, would be rescinded, and the maximum daily traffic to the facility would be

415 vehicles (830 vehicle trips). The access bridge at the intersection of U.S. 101 and the landfill access road would be built.

1.4.2 STATUS QUO ALTERNATIVE

The Status Quo Alternative assumes that the Marin County Local Enforcement Agency would issue a new Solid Waste Facilities Permit to Redwood Landfill that would explicitly allow several operational changes that Redwood Landfill has implemented that vary from the existing permit. No other aspects of the proposed project would be approved. The differences between the Status Quo Alternative and the No Project Alternative include the following:

- The terms of the Stipulated Notice and Order would be incorporated into the new permit, allowing an additional 35 vehicles (70 vehicle trips) per day.
- Additional materials that have received interim approval for use as ADC would be designated in the permit for this use;
- The revised design of the LCRS would be included in the new permit.

As with the No Project Alternative, the Status Quo Alternative would involve no increase in daily receipt of wastes, no increase in the permitted capacity of the landfill (or change in the landfill's final grades), no change to the design of the landfill's final cover, and no expansion of the compost facility. ~~Area G eventually would be developed as a Class III cell (not a Class II cell as proposed) after RWQCB approved the final liner design, which would need to be consistent with current regulatory requirements~~. This Alternative further assumes that the access bridge at the intersection of U.S. 101 and the landfill access road would be built.

1.4.3 REDUCED SCALE ALTERNATIVE

The Reduced Scale Alternative differs from both the existing permit conditions and the proposed project in several ways:

- The total maximum daily receipt of waste would be less than the proposed project, but greater than currently permitted;
- The maximum daily number of vehicles entering the site would also be less than the proposed project, but greater than the currently permitted traffic volume;
- The capacity of the landfill would be increased from the currently permitted volume of approximately 19.1 million cubic yards, but the increase would be less than the proposed project (about half of what is proposed – about 26 million cubic yards, versus the project's ~~34.1~~ approximately 33.7 million cubic yards, not including final cover). Consequently, the side slopes of the finished landfill need not be as steep as the proposed project, but steeper than currently permitted;
- ~~Area G would be developed as a Class II cell as proposed in the project.~~
- The increase in the capacity of the composting facility would be less than proposed, but greater than the current capacity.

TABLE 1-1
COMPARISON OF ALTERNATIVES TO THE PROPOSED PROJECT

No Project Alternative	Status Quo Alternative	Reduced Scale Alternative	Mitigated Alternative	Off-Site Alternative
Redwood Landfill would operate under the terms of existing permits. There would be no increase in daily receipt of wastes, no increase in the permitted capacity of the landfill (or change in the landfill's final grades), no change to the design of the landfill's final cover, and no expansion of the compost facility. There would be no change to the permit conditions regarding alternative daily cover (ADC); only N-Viro processed sewage sludge biosolids could be used as ADC. ~~Area G would eventually be developed as a Class III cell, after the RWQCB approves the liner design.~~ The Stipulated Notice and Order, which allows the landfill to receive more vehicles than the Solid Waste Facilities Permit (SWFP) allows, would be rescinded, and the maximum daily traffic to the facility would be 415 vehicles (830 vehicle trips). All on-site alternatives assume that Redwood Landfill would complete construction of the leachate collection and recovery system (LCRS) according to the revised design (the perimeter trench design) and that the access bridge at the intersection of U.S. 101 and the landfill access road would be built.	The Status Quo Alternative assumes that a new SWFP would be issued that explicitly allows several operational changes that Redwood Landfill has implemented that vary from the existing permit. As with the No Project Alternative, there would be no increase in daily receipt of wastes, no increase in the permitted capacity of the landfill (or change in the landfill's final grades), no change to the design of the landfill's final cover, and no expansion of the compost facility. ~~Area G would eventually be developed as a Class III cell, after RWQCB approves the liner design.~~ Unlike the No Project Alternative, additional materials that have received interim approval for use as ADC would be designated in the permit for this use, and the terms of the Stipulated Notice and Order, allowing an additional 32 vehicles (64 vehicle trips) per day, for a total of 447 vehicles (894 vehicle trips) per day, would be incorporated into the new permit. Redwood Landfill would complete construction of the LCRS according to the revised design (the perimeter trench design) and the access bridge at the intersection of U.S. 101 and the landfill access road would be built.	The Reduced Scale Alternative differs from both the existing permit conditions and the proposed project. It would include all mitigation measures proposed by the applicant as part of the project and identified in the EIR, as applicable to this alternative's reduced scale. The total maximum daily receipt of waste would be greater than currently permitted but less than proposed. The capacity of the landfill would be increased by approximately half of the proposed increase. Consequently the final grades of the landfill would not be as steep as the proposed project, but steeper than currently permitted. The revised final cover design would be that proposed for the project. The permitted capacity of the composting facility would be increased but to a lesser extent than proposed. The proposed use of materials for ADC would be permitted, but the permitted quantity of incoming materials would be less than proposed. ~~Area G would be developed as a Class II waste unit, as proposed for the project, after RWQCB approves the liner design. The maximum daily number of vehicles entering the site also would be greater than the currently permitted but less than proposed.~~ Redwood Landfill would complete construction of the LCRS according to the revised design (the perimeter trench design) and the access bridge at the intersection of U.S. 101 and the landfill access road would be built.	The Mitigated Alternative would include all mitigation measures included as part of the project by the applicant, all of the mitigation measures identified in the EIR, and also would include changes that would reduce or eliminate those aspects of the project that have the greatest potential to harm the environment. The increase in the rate of waste acceptance, and acceptance of material for composting and ADC, would be reduced to a level where increases in vehicle, equipment, flare, vaporator, and composting emissions would be below significance thresholds. This level would be approximately 15 percent above the currently permitted rate. Materials proposed for use as ADC would be permitted, but, as noted above, daily receipts would be less than proposed. ~~Area G would be developed as a Class III landfill cell, after RWQCB approves the liner design.~~ Redwood Landfill would complete construction of the LCRS according to the revised design (the perimeter trench design) and the access bridge at the intersection of U.S. 101 and the landfill access road would be built. Redwood Landfill would shift its emphasis from waste disposal to material and energy recovery. Measures aimed at increasing diversion of materials from landfill and increasing energy production at the site would be developed.	The landfill developed under the Off-Site Alternative would be located in a remote upland area zoned for agriculture, with close proximity to the U.S. 101 corridor, and without incompatible adjacent land uses. The landfill site would meet minimum siting criteria from the *1995 Siting Element for Marin County and its Cities* (see Section 3.6, Land Use and Planning), and would be developed to meet all existing state regulatory standards.
Conclusions about Impacts				
This alternative avoids all project-related impacts. ~~However it has an adverse impact that the project avoids, concerning landfill capacity. As demonstrated in Appendix A, with no increase in capacity and no change in permitted rate of receipts, the landfill could reach capacity as early as 2016, which is less than the County's 15-year capacity standard.~~ This alternative also would not benefit from mitigation measures identified to mitigate impacts of the proposed project on biological resources, which also would mitigate existing impacts.	This alternative avoids or reduces to less than significant all project-related impacts. ~~As with the No Project alternative, landfill capacity could be reached as early as 2016, which is less than the County's 15-year capacity standard.~~ This alternative would not benefit from mitigation measures identified to mitigate impacts of the proposed project on biological resources, which also would mitigate existing impacts	Mitigation measures identified in the EIR would apply to this alternative. Project impacts would be reduced, due to the reduced scale of operations generally, but significant unavoidable impacts to air quality would remain. The increased capacity provided under this alternative would be consistent with the County's standard of maintaining at least 15 years of capacity.	This alternative would be structured to avoid or reduce to less-than-significant all project impacts. Beneficial impacts include preservation of landfill capacity, increasing diversion and reducing the landfilling of wastes in this environmentally sensitive location; reducing the need for certain mitigation measures described in the analysis; providing justification for Overriding Considerations if significant impacts are unavoidable; helping to counterbalance any significant unavoidable effects; maximizing consistency with County Integrated Waste Management Plan policies and County energy policies; and providing long-term protection of the environment. Mitigation fees would be used to offset the adverse environmental effects of the project.	In general, this alternative would have impacts that are comparable to or worse than the proposed project, with the exception that any site meeting existing siting criteria would be located outside the floodplain, would have a minimum 5-foot separation from underlying groundwater, and would not be located within the Bayfront conservation zone. Air quality impacts would be similar to those of the project, while impacts on visual resources, biological resources, surface hydrology, and land use would probably be more severe, potentially significant and unavoidable. Impacts pertaining to other topic areas such as noise, public services and utilities, traffic, cultural and mineral resources, and recreation could be more severe depending on proximity to sensitive receptors and other particulars of the site.
Conclusions about Meeting Project Objectives				
Would not meet project objectives.	Would not meet most project objectives	Would entirely meet some project objectives and partly meet others.	Would entirely meet some project objectives and partly meet others.	Would meet some but not all project objectives.

SOURCE: Environmental Science Associates

1.4.4 MITIGATED ALTERNATIVE

The Mitigated Alternative includes all mitigation measures included as part of the project by the applicant, all of the mitigation measures identified in this EIR, and, in addition, changes to the project that would reduce or eliminate those aspects of the project that have the greatest potential to harm the environment. ~~These include the following:~~

~~•Area G would be developed as a Class III landfill cell (not a Class II cell as proposed) after RWQCB approved the final liner design which would need to be in compliance with current regulatory standards;~~

—The increase in the rate of waste acceptance would be limited primarily to increases in certain materials for composting, recycling, and re-use. The Mitigated Alternative would not allow for an increase in receipts of material for disposal in the landfill, except for treated petroleum contaminated soil for use as cover material, up to 100 tons per day of Class B biosolids for direct disposal in the landfill, and another 50 tons per day of Class B biosolids for use as alternative daily cover (ADC). Overall, the Mitigated Alternative would allow for approximately a nine percent increase in the receipt of material above currently-permitted levels. ~~, and acceptance of material for composting, would be reduced to a level where increases in vehicle, equipment, flare, vaporator, and composting emissions would be below significance thresholds. This level would be approximately 15 percent above the currently permitted rate.~~

Redwood Landfill would shift its emphasis from waste disposal to material and energy recovery. Instead of placing emphasis on increasing waste disposal capacity, Redwood Landfill would develop processes and methods aimed at increasing diversion of materials from landfilling, and increasing energy production at the site. This would result in several benefits, including preservation of landfill capacity for Marin County wastes; increasing diversion and reducing landfilling of wastes in this environmentally sensitive location; reducing the need for certain project mitigation measures described in the analysis; providing justification for Overriding Considerations for significant unavoidable impacts of the project, if necessary; helping to counterbalance or avoid altogether the significant unavoidable effects of the proposed project; maximizing consistency with County Integrated Waste Management Plan policies and County energy policies; and providing long-term protection of the environment in accordance with California Public Resources Code (PRC) § 44012.[2] These measures would include the following:

- Instituting a County ordinance to impose a mitigation fee on wastes from other areas of California outside Marin County, and to encourage recycling or composting of materials, rather than landfilling. Mitigation fees would be used to offset the environmental effects of the project, including more rapid consumption of landfill capacity, by funding programs to divert more waste from landfill, and to develop new landfill capacity. The mitigation fees could also be used to mitigate other project impacts;

- Instituting a construction and demolition debris recycling system;

[2] PRC § 44012 states that "When issuing or revising any solid waste facilities permit, the enforcement agency shall ensure that primary consideration is given to protecting public health and safety and preventing environmental damage, and that the long-term protection of the environment is the guiding criterion…."

- Instituting a self-haul waste sorting and recovery operation;
- Establishing a salvage and re-use area for diversion of usable building materials, appliances, and miscellaneous other materials;
- Placing recycling bins in an accessible location so that self-haul customers can drop-off their recyclable and reusable items prior to approaching the scale house. This would provide an economic incentive for people to source-separate and recycle their wastes instead of landfilling them;
- Establishing ~~additional~~ power generation facilities at the site, including wind and solar.

1.4.5 OFF-SITE ALTERNATIVE

The Off-Site alternative generally evaluates the environmental impacts of another, unidentified landfill site meeting minimum siting criteria from the *1995 Siting Element for Marin County and its Cities* (see Section 3.6, Land Use). The analysis assumes that such a site would be located in a remote upland area zoned for agriculture, with close proximity to the U.S. 101 corridor, and without incompatible adjacent land uses. The analysis generally describes the types of environmental impacts that could be expected from developing and operating a landfill at such a site, and compares them to the project's impacts.

1.4.6 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

The Mitigated Alternative has been crafted not only to avoid most of the significant impacts associated with the project, but to be more consistent with Marin County's integrated waste management and energy goals, objectives, and needs. The Mitigated Alternative would yield many positive environmental effects that the project would not. Because the Mitigated Alternative (1) avoids most of the significant impacts of the project; (2) meets or at least partly meets the applicant's objectives, and (3) produces several beneficial environmental effects, including increasing diversion of materials from landfill and using these materials in a beneficial manner, and also increasing renewable energy sources, the Mitigated Alternative is considered the Environmentally Superior Alternative.

1.5 PLAN AND POLICY CONSISTENCY

An evaluation of the proposed project's consistency with the Marin Countywide Plan and various other planning and policy documents is contained in Section 3.6 (Land Use) of this EIR and elsewhere in the document as appropriate. The determination of policy consistency, discussed in this EIR, represents the EIR authors' best judgment (in consultation with County staff) based on strict interpretation of policies. However, policy consistency must ultimately be determined by the Marin County Board of Supervisors and not in this EIR. The Board of Supervisors may reach a different policy conclusion than the EIR, as a result of its review of the entire record.

The EIR finds that the proposed project is inconsistent with some policies contained in the Marin Countywide Plan, notably policies regarding energy conservation (see Impact 3.9.3 in Section 3.9, Public Services, Utilities, and Energy). The EIR further finds several inconsistencies of the project with the policies contained in the various components of the Marin Countywide Integrated Waste Management Plan (see Impacts 3.6.4 and 3.6.5 in Section 3.6, Land Use and Planning). The EIR finds, however, that all of these inconsistencies can be mitigated to less-than-significant levels through the implementation of the mitigation measures specified in the analysis, or through implementation of the Environmentally Superior Alternative. The impacts and mitigation measures are summarized in Table 1-2 at the end of this chapter.

1.6 SUMMARY OF SIGNIFICANT UNAVOIDABLE, GROWTH-INDUCING, AND SIGNIFICANT IRREVERSIBLE IMPACTS

This section summarizes the significant unavoidable adverse impacts, growth-inducing impacts, and significant irreversible effects of the proposed project.

1.6.1 SUMMARY OF SIGNIFICANT UNAVOIDABLE IMPACTS

State CEQA Guidelines §15126.2(b) requires that an EIR describe those impacts that cannot be fully mitigated as part of a proposed project action. In some cases, no feasible mitigation measures are available to reduce significance of environmental impacts. In other cases, mitigation measures may be available in connection with the proposed project, but they do not reduce an impact to a less-than-significant level without substantially altering the basic project characteristics. In both of these cases, impacts are considered to be significant and unavoidable.

This EIR finds that the following significant unavoidable impacts would occur if the proposed project were to be implemented:

AIR QUALITY

Impact 3.2-2: Equipment and truck operations associated with an increase in incoming materials at the landfill would generate additional criteria air pollutant emissions.

Impact 3.2.4: Landfill operations, including vehicle and equipment travel on unpaved surfaces, would generate fugitive dust.

Impact 3.2.5: The project would increase the amount of landfill gas generated and could exceed the capacity of the landfill gas collection and treatment system. In addition, emissions of air pollutants from the landfill gas treatment system, as well as fugitive landfill gas emissions, would increase.

Impact 3.2-11: The combined emissions from project operations would exceed Bay Area Air Quality Management District significance criteria for three air pollutants: reactive organic gasses (ROG), nitrous oxide (NO_x) and large particulate matter (PM-10).

Impact CU-2: The project would incrementally add to cumulative air pollutant emissions.

These impacts are discussed more thoroughly in Chapter 3, Environmental Setting, Impacts, and Mitigation Measures; and in Chapter 4, Growth-Inducing and Cumulative Impacts. In addition to these significant unavoidable impacts of the project, the 1994 FEIR found that traffic safety impacts at the intersection of the landfill entrance and Highway 101 would continue, and that mitigation measures that would reduce the impact to a less-than-significant level, either construction of a freeway interchange at the intersection, or construction of a new frontage road to enable landfill traffic to use the Binford Road interchange, about 2 miles south of the site, were infeasible.[3] Since certification of the 1994 FEIR and approval of that project, improvements to the U.S. 101 – Sanitary Landfill Road intersection have become feasible. As stated above (in Section 1.3.1), that project is the subject of a separate, certified EIR, and its implementation is assumed in the analysis of the proposed project in this EIR. If, however, the access road and bridge are not built, the unavoidable significant impact identified in the 1994 FEIR would remain significant and unavoidable for the current project, which would then require further environmental review before this project could be approved.

1.6.2 SUMMARY OF GROWTH-INDUCING IMPACTS

The CEQA Guidelines (§15126.2[d]) require that an EIR evaluate the growth-inducing impacts of a proposed action. A growth-inducing impact is defined by the CEQA Guidelines as:

> The way in which a proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth…. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.

The proposed solid waste facilities permit revision would have the effect of increasing the ultimate size of Redwood Landfill, the rate at which it can be filled, and the acceptance rate for materials for composting. The project applicant, RLI, does not plan to increase staffing of the landfill if the project is approved; nor would the project attract housing or commercial development to the vicinity of the site; on the contrary, the applicant recently has terminated or opted not to renew the leases of several former tenants at the site; and few people choose to work or live in close proximity to an active sanitary landfill. Since there is sufficient landfill capacity throughout the Bay Area region, and since the availability of landfill capacity is not frequently cited as a constraint to the development of new housing or commercial areas, the increase in total capacity and rate of waste acceptance cannot be seen as removing a significant constraint to regional development. Thus, the increase in total capacity and rate of waste acceptance are not anticipated to induce additional growth in the region.

The proposed project would not involve additional expansion or extension of infrastructure facilities or roadways that could induce unplanned growth adjacent to the landfill. The North Marin Water District (NMWD) recently extended a larger (12-inch-diameter) water main to the site. The planned access bridge at the intersection of U.S. 101 and Landfill Road, which is not a

3 Marin County, Community Development Agency, *Redwood Landfill Solid Waste Facilities Permit Expansion Project, Final EIR*, February 1994, pp 3-117 through 3-127.

part of this project, would serve only the landfill, so it is not expected to induce growth in the area of the highway exit.

1.6.3 SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL CHANGES

None of the impacts of the project is expected to result in significant irreversible environmental changes.

1.7 AREAS OF CONTROVERSY

The proposed project raises issues and some areas of controversy that will be considered by County and other decision-makers. Controversial issues are known through expressions of public opinion that are documented in the record or obtained through public meetings, and through comments on the project provided by staff of various interested governmental agencies. Prior to circulating the DEIR, the County circulated a Notice of Preparation to agencies and interested parties and conducted a public scoping session in the community. Comments on the NOP and those received during the scoping session are provided in Appendix G.

Some areas of controversy are not within the purview of CEQA, because that statute focuses on evaluation of significant effects to the physical environment. The non-environmental issues are included below, however, to help provide information to County and other decision-makers. Those areas of controversy that relate to a physical impact issue within CEQA’s purview, are so noted in the list below.

The areas of controversy expressed in the environmental review process to date are as follows:

1. Redwood Landfill’s existing permits already give the landfill the daily capacity required to accept nearly all of the wastes produced in Marin County, as well as materials from outside of the County. Project approval would greatly increase daily capacity, enabling the applicant to accept more wastes from outside of Marin County. Essentially, the applicant is proposing to make the Redwood Landfill a regional waste disposal facility. While the facility has served as the primary site in the Bay Area for some time for receipt of sewage sludge biosolids from the region, the facility has historically accepted solid waste and organic materials for composting primarily from Marin County itself. Proposed increases in the permitted quantity of solid waste and organics for composting would enable the facility to serve the solid waste disposal and composting needs of jurisdictions throughout the Bay Area and potentially beyond.

2. Historically, diked and drained bay lands have been used for waste disposal in the San Francisco Bay Area. Over the past several decades, however, there has been a trend to close these old Bayfront landfills and shift refuse disposal facilities to dry canyons. The project would involve a substantial expansion of one of the few remaining Bayfront landfills in the Bay Area. While most of the environmental impacts associated with expansion and operation of the landfill on B~~b~~ay M~~m~~ud and adjacent to wetlands can be mitigated to a less-than-significant level, the project would involve continued, and potentially prolonged use of the site as a waste disposal facility.

~~3. The proposal to use Area G as a Class II waste disposal unit calls forth concerns regarding the transporting, handling, and disposal of more dangerous materials than are currently being handled at the site, and the ability of the site to meet the more stringent siting and design criteria for Class II units.~~

3~~4~~. Landfill traffic at the intersection of U.S. 101 and Sanitary Landfill Road has caused a serious safety problem for many years. This was identified in the 1994 FEIR as a significant unavoidable impact, but the applicant has since agreed to pay for construction of a new access road and bridge that would eliminate the safety issue. Construction of the ~~The~~ access road and bridge have begun, but have not yet been completed. ~~not, however, been constructed, and their permitting and financing remain unresolved~~. This EIR assumes in its analysis that the access road and bridge will be completed and will be operational prior to approval of the proposed SWFP revisions. ~~constructed~~. If they are not, the analysis will have to be revised in another round of environmental review.

4~~5~~. The EIR analysis shows that the project, if implemented, would have several significant unavoidable impacts to air quality. The project would result in a substantial increase in the emissions of toxic air contaminants, with consequent effects on human health.

1.8 MAJOR CONCLUSIONS AND ISSUES TO BE RESOLVED

The following major conclusions and issues to be resolved are derived from the analysis in the EIR. The major conclusions of the EIR are presented first, followed by the issues to be resolved. The issues are presented to highlight the topics on which the decision-makers may want to focus special attention.

1.8.1 MAJOR EIR CONCLUSIONS

1. The EIR evaluated a total of ~~77~~ 78 project-based adverse environmental impacts, and 3 adverse cumulative impacts (i.e., impacts that would result cumulatively from the proposed project plus other related projects). Of these, 50 were identified as significant or potentially significant impacts (including 1 cumulative). Feasible mitigation measures are available to reduce all but 5 of the project's significant effects (including 1 cumulative effect) to a less-than significant level.

2. Landfill life expectancy calculations provided by the applicant in their initial application for this project apparently overestimate the increase in site life that the project would provide. ~~While the applicant projects that the site would not reach capacity until the year 2051, separate calculations prepared for this EIR indicate that, if the project is approved, the landfill could close as early as 2024~~. ~~Without the project, the landfill could reach capacity as early as 2016 (see Appendix A)~~. Revised calculations performed by the applicant and calculations performed by the preparer of this report concur that, if the project is approved, the landfill could close as early as 2037. Without the project, the landfill could reach capacity as early as 2024 (see Master Response 21 in Section 6.3).

3. Several conclusions are related to the proposed increase in landfill capacity, which would be accomplished by increasing the steepness of the landfill's side slopes: a. this will result

in a more massive fill structure, which can be expected to result in less-than-significant impacts to visual resources (Impacts 3.1.1 through 3.1.4 and 3.1.7), particularly a minor increase in the degree of obstruction of marshes and hills for motorists on U.S. 101 already caused by the permitted landfill; b. the cumulative analysis finds that the increased mass of the landfill and the construction of facilities at the landfill site will contribute to a less-than-significant cumulative impact on the visual resources of the U.S. 101 corridor between Novato and Petaluma (Impact CU-1); c. geotechnical engineering peer reviews completed for this EIR of the applicant's landfill stability calculations have confirmed the applicant's contention that the proposed increase in the steepness of the side slopes and the increased rate of fill will not adversely impact the stability of the landfill, nor the integrity of its environmental controls, if mitigation measures are implemented (Impacts 3.4.1 through 3.4.3 and 3.5.1); and d. the increased volume of waste placed in the landfill may result in a significant increase in emissions of criteria air pollutants related to the increased production of landfill gas (Impact 3.2.5).

4. The proposal to increase the rate of waste acceptance to approximately double the currently permitted rate will result in several impacts, including impacts related to the projected increase in truck traffic to and from the facility, increased use of heavy equipment on-site, and increases in the production of leachate that must be collected and treated. These impacts are examined in Sections 3.1 (Aesthetics), 3.2 (Air Quality), 3.3 (Biological Resources), 3.5 (Hydrology and Water Quality), 3.7 (Noise), and 3.10 (Transportation and Traffic) of this EIR. The increase in large diesel trucks and equipment can be expected to result in substantial increases in the emissions of criteria air pollutants and toxic air contaminants, leading to a conclusion of significant, unavoidable impacts to air quality (Impacts 3.2.2, 3.2.4, and 3.2.11). The increased use of diesel equipment will also incrementally increase cancer risk for residents within 1.5 miles of the landfill, though the increase, when mitigated, is expected to be below the threshold significance value of 10 new cancer cases per million exposed (Impact 3.2.8). The analyses presented in this EIR assume that the proposed access road and bridge will be constructed to address the ongoing safety problem at the intersection of U.S. 101 and Sanitary Landfill Road. The traffic analysis presented in Section 3.10 therefore concludes that increased truck traffic to the site will not cause a significant traffic or traffic safety impact.

5. The applicant proposes as part of the project to increase the capacity of Redwood Landfill's existing composting facility by approximately four times, from the currently permitted average of about 126 tons per day to a proposed average of about 514 tons per day. This greatly exceeds the required processing capacity for Marin County's compostable greenwaste, food waste, and sewage sludge biosolids. The additional capacity may therefore be expected to be used to process compostable materials from outside Marin County, and to enable the applicant to operate a regional composting facility at the site. Environmental effects of the increased scale (and new location on the site) of the composting operations are examined in Sections 3.2 (Air Quality), 3.3 (Biological Resources), 3.5 (Hydrology and Water Quality), 3.7 (Noise), 3.9 (Public Services, Utilities, and Energy), and 3.10 (Transportation and Traffic) of this EIR. The composting operation

can be expected to increase substantially the emission of reactive organic gasses (ROG), a regulated air pollutant (Impact 3.2.6 and Impact 3.2.11), other criteria air pollutants (Impact 3.2.2, 3.2.4, and 3.2.11), odors (Impact 3.2.9) and to cause a small increase in the release of toxic air contaminants (Impact 3.2.8). There would also be an increase in noise from operation of heavy machinery, in the most noise-sensitive parts of the site (Impact 3.7.3), and in the generation of leachate (contaminated water) that would have to be managed at the site (Impact 3.5.4). Most of these impacts can be reduced to less-than-significant levels through implementation of the mitigation measures specified in this EIR. ROG emissions, however, can only be reduced to less-than-significant levels through use of composting techniques, not proposed for use by the applicant, that enable capture and treatment of gaseous emissions from composting piles. These techniques include static aerated piles and in-vessel composting, combined with use of biofilters. Either of these techniques would add considerable expense to the composting operation.

~~6. The applicant proposes to use Area G of the landfill, which currently is permitted for placement of ordinary municipal solid waste (MSW), for placement of so-called designated wastes, and to reclassify it from a Class III to a Class II waste unitDesignated wastes are wastes that fall below hazardous waste threshold limits for reactivity, corrosivity, ignitability, and toxicity, as well as chemical concentration limits, but pose a risk to human health or the environment if not handled properlyClass II waste units have more stringent siting and design criteria than Class III units (which are meant to contain only ordinary MSW), and must be designed for the specific types of wastes that they will containThe applicant proposes to accept for disposal in Area G municipal solid wastes, sludges, petroleum- or chemically-contaminated soils, or other designated wastes that exceed the constituent concentrations specified in the facility's current Waste Discharge Requirements (see Appendix B) or that require disposal in a composite-lined waste management unitIn general, leachate generated by wastes in a Class II cell could contain more diverse and more highly concentrated inorganic and organic chemicals, compared with leachate typically produced in a Class III landfillIf the Class II containment system were to fail, escaping leachate could pollute the groundwater or nearby surface waters, causing a significant impact (see Impact 3.4.10).~~

~~Although the proposed design for Area G appears to meet the basic regulatory requirements for a liner system, LCRS, and separation from groundwater for a Class II waste disposal unit, the applicant has not indicated the specific waste types to be accepted or the chemical concentration limits of the wastes to be accepted for disposal at Area GIn addition, the Regional Water Quality Control Board must make the final determination on the suitability of the proposed Area G design to contain the specified waste to be placed in it, including a determination on the proposed subdrain system as an engineered alternative to the required five-foot separation between groundwater and the base of the waste unitUntil these determinations are made, use of Area G as a Class II waste unit is considered a significant environmental impactMitigation Measure 3.4.10b requires the applicant to submit a detailed list of material types and chemical concentration limits of wastes proposed to be placed in Area G to Marin County Environmental Health Services and the Regional Water~~

~~Quality Control Board, prior to issuance of a revised Solid Waste Facilities Permit or revised Waste Discharge RequirementsUnder Mitigation Measure 3.4.10.c, if the Regional Water Quality Control Board finds the applicant's proposed design for Area G inadequate for protecting groundwater quality, considering the material types and chemical concentrations proposed to be received, Regional Board staff may suggest modifications to the proposal (including modifications to the design of the unit, lowering constituent concentration limits in materials to be received, or eliminating certain material types to be accepted). The Regional Water Quality Control Board may then re-consider a revised proposal. Mitigation Measure 3.4.10d provides that, if the Regional Water Quality Control Board finds that the applicant's proposed design for Area G is not suitable for any of the material types or chemical concentrations proposed by the applicant for placement in Area G (as per Mitigation Measure 3.4.10b), any revised Solid Waste Facilities Permit or Waste Discharge Requirements will specify that Area G will remain a Class III waste disposal unit, in order to reduce the potential impact to a less-than-significant level.~~

6~~7~~. The applicant has already commenced construction of a leachate collection and removal system (LCRS) around the perimeter of the landfill that varies from that specified in the facility's existing permits. This EIR examines the effectiveness of the new LCRS design to protect groundwater and surface water from being contaminated by leachate from the landfill. The previously evaluated and permitted LCRS, which was part of an integrated design that included reconstruction of the perimeter levee, was constructed only at Area A of the landfill. Subsequent sections of a LCRS trench have been constructed without reconstruction of (or integration with) the perimeter levee. The primary purpose of the perimeter levee is to protect the site from floodwaters; however, another function of the integrated LCRS/reconstructed levee design was to increase the stability of the landfill. Geotechnical engineering peer reviews completed for this EIR of the applicant's new LCRS design concluded that the redesigned LCRS, without levee reconstruction (except at Area A), is adequate for environmental protection and landfill stability. However, in response to RWQCB concerns regarding the effectiveness of the LCRS, and particularly its ability to reduce a possible buildup of leachate within the landfill, the applicant has agreed to further modify the LCRS by pumping leachate from existing and future landfill gas wells in the interior of the landfill. This change is discussed in Master Response 13 in Section 6.3 of this FEIR. Landfill stability of the project is evaluated under Impacts 3.4.1 and 3.4.2, and the adequacy of the new LCRS design to prevent the off-site migration of leachate is evaluated under Impact 3.4.7. The applicant must, however, complete construction of the LCRS (Mitigation Measure 3.4.7e) and complete their planned increase in the elevation and width of the perimeter levee to provide adequate flood protection (Mitigation Measure 3.5.6).

7~~8~~. The applicant's proposal to leave in-place and cover refuse in the un-permitted 11-acre area in the southwestern portion of the site was found to have the potential for significant environmental impacts to water quality (Impact 3.4.11) and public safety (Impact 3.8.4), but not to air quality (Impact 3.2.12). The impacts can, however, be mitigated to less-than-significant levels by utilizing a continuous landfill gas monitoring and alarm system at the relocated administration building, revising the landfill's water quality monitoring and gas monitoring programs as necessary to include this waste unit, and preparing a final Closure and Post-Closure Maintenance Plan that demonstrates that waste in the unit would remain isolated and prevent groundwater degradation.

8~~9~~. The No Project Alternative, the Status Quo Alternative, and the Mitigated Alternative all have the ability to avoid or reduce most or all significant unavoidable impacts associated with the project. ~~As discussed in the Chapter 5, Alternatives to the Project, however, the No Project Alternative and the Status Quo Alternative would conflict with County policy to maintain a minimum of 15 years of landfill disposal capacity. Because the No Project and Status Quo alternative provide less than 15 years of landfill disposal capacity, a County process to identify additional landfill space would be triggered~~. ~~Construction of a new landfill to serve Marin County could result in various environmental impacts, including transportation, air quality, and health effects, as described in the analysis of the Off-Site Alternative in Chapter 5~~. ~~Thus, in addition to triggering a County process to identify additional landfill space, the No Project and Status Quo alternatives could indirectly result in new, significant, physical impacts~~.

The Mitigated Alternative has been crafted not only to avoid the significant impacts associated with the project, but to better meet Marin County's integrated waste management and energy goals, objectives, and needs. The Mitigated Alternative would yield many positive environmental effects that the project would not. Because of the Mitigated Alternative's ability to avoid significant impacts of the project, to meet or at least partly meet the applicant's objectives, and to produce several beneficial environmental effects, the Mitigated Alternative is considered the Environmentally Superior Alternative.

1.8.2 ISSUES TO BE RESOLVED

1. As stated above, the project would enable the transition of Redwood Landfill from a facility that primarily serves the waste disposal and composting needs of Marin County to one with the capacity to serve as a regional facility. Decision-makers will need to make findings of overriding considerations if they determine that the benefits outweigh the significant unavoidable impacts of the project.

2. Marin County has prepared and adopted an Integrated Waste Management Plan which, consistent with the California Integrated Waste Management Act of 1989 (as amended), places greatest emphasis on reducing wastes before they are generated; secondary emphasis on recycling and composting as the preferred means of treating wastes that are generated; and finally on the environmentally safe disposal of wastes that cannot be reduced, recycled, or composted. The project proposes to increase the facility's composting capacity, and to continue to receive some recyclable materials, but landfilling of waste would remain the facility's focus. The Mitigated Alternative was crafted to provide additional opportunities and mechanisms that encourage a more comprehensive evolution of Redwood Landfill into an integrated waste management and alternative energy generation facility that provides a

wider range of waste management opportunities, thereby better meeting the integrated waste management and energy needs of Marin County.

3. Reduction or avoidance of several significant impacts is contingent upon the applicant's completing several crucial structures, which has heretofore been delayed: the proposed Access Road and Bridge at the intersection of U.S. 101 and Sanitary Landfill Road, the landfill's Leachate Collection and Recovery System (LCRS), and improvements to the landfill's perimeter levee. Project approval prior to completion of these structures could result in significant environmental impacts.

~~4. Use of Area G as a Class II disposal unit has the potential to cause several significant environmental impacts. However, clear and concise information regarding the types of materials that would be placed in Area G (if it were approved as a Class II disposal unit) has not been provided, nor have complete engineering studies been provided demonstrating that the site meets regulatory siting criteria for Class II waste management units and that the proposed environmental control systems are adequate.~~

1.9 EFFECTS FOUND NOT TO BE SIGNIFICANT

Table 1-2, at the end of this chapter, includes summary discussions of several impacts that were found not to be significant, and which therefore do not require mitigation.

The Initial Study Type Review[4] conducted for the project prior to commencement of work on the EIR found that several of the proposed or completed changes at the Redwood Landfill do not have the potential to result in any new or more severe significant impacts on the environment. These are discussed in detail in the referenced document, and include the following:

- Changes to the Landfill's service area and haul routes;
- Extension of a 12-inch water main to the southwest corner of the landfill;
- Abandonment of seven leach fields on-site.

The following issue areas were determined not to have the potential for significant adverse effects and were therefore not discussed in detail in the impact analysis of this EIR, for the reasons given:

Cultural Resources. As the project site consists entirely of diked and filled bay lands, and was first developed in the 1950s, there is little likelihood that the site contains any significant cultural resources.

Population and Housing. The project will not result in displacement of existing housing. The project will not induce population growth or create new employment.

[4] Marin County Community Development Agency Planning Division and Environmental Health Services, *Phase II: Final Initial Study Type Review: Redwood Landfill Solid Waste Facility Permit Technical Review/Project Description and Initial Study*, prepared by John Roberto Associates and Michael Clayton & Associates, December 7 1999.

Recreation. There is no recreational use of the site, nor any proposed recreational use of the site. Noise impacts on recreational users of water ways in proximity to the site are discussed in the Noise section.

Mineral Resources. No known mineral resources exist at the project site.

1.10 OTHER SOCIAL AND ECONOMIC IMPACTS FOUND NOT TO BE SIGNIFICANT

As discussed previously, State CEQA Guidelines §15382 provides that "[a]n economic or social change by itself shall not be considered a significant effect on the environment." However, physical impacts associated with social or economic changes may be considered significant. Pursuant to State CEQA Guidelines §15382, purely economic or social impacts would not be considered significant impacts of the proposed project, and are not, therefore, addressed in this EIR. This EIR evaluates all physical impacts that would result from the proposed project and has not identified any physical impacts associated with social or economic changes.

TABLE 1-2
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
Aesthetics		
3.1.1: View from U.S. 101, approximately 1/4 miles from Redwood Landfill, looking northeast. (Less than Significant)	None required.	Less than Significant
3.1.2: View from U.S. 101, south of the landfill entrance road, looking east/northeast. (Less than Significant)	None required.	Less than Significant
3.1.3: View from U.S. 101 approximately 2/3 mile from Redwood Landfill, looking east. (Less than Significant)	None required.	Less than Significant
3.1.4: View from Olompali State Park, approximately 2/3 mile from Redwood Landfill, looking northeast. (Less than Significant)	None required.	Less than Significant
3.1.5: Increased levels of nighttime activities could occur, resulting in adverse impacts on the rural character of the project vicinity due to increased light and glare. (Less than Significant)	None required.	Less than Significant
3.1.6: The increase in waste receipts and compost throughput and the use of a waste tipper could result in increased litter on and near the project site, causing adverse aesthetic impacts in the site vicinity. (Significant)	***Proposed as Part of the Project*** **3.1.6a:** RLI will continue its current litter-control program, which includes the following elements (GeoSyntec, 1998): • compaction of the waste, • application of daily cover, • placement of fixed and portable litter fences around the active working face, • construction of a semi-permanent litter fence on the east and north sides of the landfill adjacent to San Antonio Creek,	The combination of the measures, in particular Measures 3.1.6a, 3.1.6c, and 3.1.6d proposed as part of the project and specified in this EIR, would reduce this impact to a less-than-significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Aesthetics (continued)	• daily use of a clean-up crews to collect litter from the site and surrounding area, and • use of signage to advise haulers that incoming loads must be properly covered and that tarps are to be removed only in designated areas. **3.1.6b:** The tipper is not operated in winds exceeding 50 mph (GeoSyntec, 1998). ***Identified in This Report*** **3.1.6c:** RLI shall update its current litter-control program as necessary to ensure compliance with 27 CCR §20830. The updated program will take into account the use of the waste tipper and the increase in incoming waste and composting receipts, and will indicate the means to prevent litter from escaping the Oxbow area proposed for composting. Measures may include, but are not limited to, the following: • use of additional portable litter fencing in the Oxbow area, • use of higher temporary fences at the working face, as needed to prevent litter from escaping when loads are emptied by the tipper, and • increasing the staff of the daily clean-up crew to adequately police the additional areas proposed for composting. RLI shall submit the updated litter control plan to the LEA for approval prior to project implementation. **Mitigation Measure 3.1.6d:** The waste tipper shall not be operated in wind conditions that would result in windblown litter, regardless of wind speed.	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
<u>Aesthetics</u> (continued)		
3.1.7: Prior to landfill closure, the proposed changes in landfill contours (in conjunction with the revised fill sequencing plan) could increase the visibility of landfill activities as seen from Highway 101. (Less than Significant)	None required.	Less than Significant
CU-1: The project would contribute to the cumulative degradation of the visual character of the surrounding area, particularly the U.S. 101 corridor between Novato and Petaluma. (Less than Significant)	None required.	Less than Significant
<u>Air Quality</u>		
3.2.1: Construction activities would generate substantial amounts of dust, which would result in potential health and nuisance impacts in the immediate project vicinity. (Significant)	***Proposed as Part of the Project*** **3.2.1a:** As described under existing facilities in the Joint Technical Document (JTD) (GeoSyntec, 1998), the applicant controls dust by frequent application of water spray on soil-covered work areas and the use of a dust palliative on the access road and main haul roads, if necessary, to supplement watering. The JTD indicates that the same practices would be continued under the project. ***Identified in This Report*** **3.2.1b:** The applicant shall implement good construction practices to minimize fugitive dust. Such practices shall include general watering of exposed areas, the use of palliatives or other dust suppressants on any unpaved haul roads, and periodic cleaning of paved roads.	The list of measures is recommended by the BAAQMD and constitutes a set of feasible control measures to reduce construction dust emissions at sites greater than four acres. With implementation of these measures, the residual effect would be less than significant.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
Air Quality (continued)	**3.2.1c:** The applicant shall implement a Construction Dust Abatement Program. Construction contractors and landfill staff involved in construction activities at the site shall implement a Construction Dust Abatement Program to reduce the contribution of project construction-related dust emissions to local respirable particulate matter concentrations. Some of these measures are similar to those identified under Measures 3.2.1a and 3.2.1b, but with additional specificity. This program shall include the following elements as needed to reduce fugitive dust to acceptable levels, using the BAAQMD Regulation 6 visible emissions standards as a guide: • Water all active construction areas at least twice daily. • Cover all trucks hauling soil, sand, and other loose materials, or require all trucks to maintain at least 2 feet of freeboard (i.e., the minimum required space between the load and the top of the trailer). • Pave, apply water three times daily, or apply nontoxic soil stabilizers on all unpaved access roads, parking areas, and construction staging areas. • Sweep daily with water sweepers all paved access roads, parking areas, and staging areas at construction sites. • Sweep streets daily with water sweepers, if visible soil material is carried onto adjacent public streets. • Hydroseed or apply nontoxic soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more). • Enclose, cover, water twice daily, or apply nontoxic soil binders to exposed stockpiles (dirt, sand, etc.). • Limit traffic speeds on unpaved roads to 15 miles per hour. • Install silt fences or other erosion-control measures to prevent silt runoff to public roadways.	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
Air Quality (continued)	• Replant vegetation in disturbed areas as quickly as possible. • Designate a person or persons to oversee the implementation of a comprehensive dust control program and to increase watering, as necessary.	
3.2.2: Equipment and truck operations associated with an increase in incoming materials at the landfill would generate additional criteria air pollutant emissions. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.2.2a:** The project applicant shall keep all off-road equipment well-tuned and regularly serviced to minimize exhaust emissions, and shall establish a regular and frequent check-up and service/maintenance program for all operating equipment at the landfill. **3.2.2b:** The project applicant shall use ultra-low sulfur fuel (with low sulfur and low aromatic content) in combination with a fuel additive (such as Puri-NOx) in all diesel-powered off-road equipment to minimize NOx emissions to the extent that these materials are commercially available to Redwood Landfill. Products such as this can reduce NOx emissions by roughly 14 percent. ~~**3.2.2c:** The project applicant shall retard the injection timing on all diesel-powered equipment to minimize NO_X emissions.~~	The combined net increase in NO_X emissions from the increased off-road equipment use and on-road vehicle travel would be about ~~507~~241 pounds per day (Table 3.2-6) over baseline conditions. Given current technologies, converting or modifying diesel equipment could achieve a maximum NO_X reduction of only about 50 percent. Furthermore, Mitigation Measure 3.2.2d~~e~~ would not apply to all vehicles hauling waste to the landfill. It is therefore unlikely that the mitigation measures identified above could achieve a~~n 84 percent~~two thirds reduction in NO_X emissions, the level necessary to reduce emissions from these sources to a level below the BAAQMD's 80 pounds per day significance threshold. Other mitigation measures were considered, including use of emission offset credits and requiring conversion of all fleet vehicles using the facility to alternative fuels. These were found not to be feasible, however;~~:~~ the BAAQMD emissions banking program can be used only to offset stationary source emissions, and there is no means for requiring fleet vehicles other than those owned by the applicant to use alternative fuels or other emission reduction methods. Therefore, even with the

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Air Quality (continued)	**3.2.2~~d~~c:** As off-road equipment ages and requires replacement, the project applicant can be expected to purchase new equipment that incorporates technology that meets more stringent emission standards mandated by CARB. Alternatively, the project applicant may purchase electrically-powered equipment, or equipment fueled by an alternative, less-emitting fuel (e.g., liquefied natural gas [LNG] or compressed natural gas [CNG]). Use of alternative fuel engines can be expected to achieve a reduction in NO_X emissions of at least 37 percent.[1] The purchase of new equipment shall be limited to that which is available on the market at the time of replacement. **3.2.2de:** As collection vehicles are ~~equipment is~~ replaced, the project applicant, including other Waste Management affiliates that regularly haul materials to Redwood Landfill, shall comply with CARB's Solid Waste Collection Vehicle Fleet Rule (contained in Title 13, California Code of Regulations, Sections 2020, 2021, 2021.1, and 2021.2) adopted in September 2003 to address diesel particulate matter. The project applicant shall give preference to add-on technologies or control measures (such as fleet conversions) that also reduce NO_x emissions, while meeting necessary BACT requirements. The types of control measures that may be implemented include such measures as converting their collection fleets to vehicles that operate on alternative, low-emission fuels (such as CNG, LNG, or biodiesel) or ~~shall~~ modification or ~~y or~~ replacement of -diesel engines to reduce NO_X emissions, by such measures as incorporating exhaust gas recirculation (ERG) systems and/or stratified combustion chambers, and/or by using ultra-low sulfur fuel and fuel additives.	implementation of all feasible mitigation measures, this impact will remain significant and should be considered an unavoidable consequence of project approval.

1 Based on the difference in U.S. EPA emissions standards for heavy duty diesel and alternative fuel engines. See U.S. EPA, 1997.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Air Quality (continued)		
3.2.3: Mobile emissions generated by project traffic could increase CO concentrations at intersections in the project vicinity. (Less than Significant)	None required.	Less than Significant
3.2.4: Landfill operations, including vehicle and equipment travel on unpaved surfaces, would generate fugitive dust. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.2.4:** The project applicant shall develop an Operational Dust Mitigation Plan/Program, in conjunction with the ~~LEA and~~ BAAQMD<u> and the LEA</u>, that would achieve at a minimum a dust control efficiency of about 75 percent. Upon completion, the Plan shall be subject to <u>BAAQMD </u>~~LEA~~ review and approval. Components of the Plan should include: • A watering program consistent with current practices. On dry days, apply water to unpaved surfaces at least once every three hours, and to parking areas and infrequently used unpaved surfaces, the active landfill face, active stockpile areas, or other dust prone areas at least twice daily. Apply water to composting operations areas once or twice daily, as needed. On rainy days, apply water to these areas as necessary to reduce visible emissions. • Use of a chemical palliative or dust suppressant to reduce fugitive dust emissions from vehicle travel surfaces. Some chemical stabilizers can contain a considerable fraction of hydrocarbons, and should be selected judiciously. The choice of chemical palliative shall be made with the approval of the~~ LEA,~~ RWQCB, ~~and~~ BAAQMD<u>, and the LEA</u>.	With the implementation of a<u>n</u> ~~LEA~~ approved Operational Dust Mitigation Plan/Program, the net increase in PM-10 emissions from the project would be <u>below 375</u>~~about 156~~ pounds per day<u>, depending primarily on the frequency of water application</u>. Although implementation of dust control measures would substantially help to reduce dust emissions, the impact would remain significant.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Air Quality (continued)	• Posting signs at the site that limit traffic speeds on unpaved roads to 15 miles per hour. • Sweeping daily with water sweepers all paved access roads and parking areas. • Appoint a designated person to oversee implementation of the Operational Dust Mitigation Plan, and make them responsible for ensuring that the Plan is fully implemented.	
3.2.5: The project would increase the amount of landfill gas generated and could exceed the capacity of the landfill gas collection and treatment system. In addition, emissions of air pollutants from the landfill gas treatment system, as well as fugitive landfill gas emissions, would increase. (Significant)	***Proposed as Part of the Project*** **3.2.5a:** The applicant has installed a landfill gas flare capable of accommodating a landfill gas flow rate of up to 4,250 cfm. The flare currently is permitted to operate at a maximum flow rate of 4,000~~2,500~~ cfm. The flare also is used to destroy leachate vapors from the leachate vaporator. **3.2.5b:** The applicant has installed a leachate vaporator that operates at a landfill gas flow rate of 167 cfm. **3.2.5c:** The project applicant shall apply to~~has received from~~ the BAAQMD for -authority to construct ~~three~~ power generation engines to be fueled by landfill gas capable of producing 4 to 5 megawatts of power within two years of concurrence on its revised SWFP by the CIWMB. This will increase the overall capacity available to treat landfill gas, and will also result in the beneficial use of some portion of the landfill gas generated. Operation of the landfill-gas-powered generators will make the project consistent with Policy 4.2 of the Marin Countywide Plan Community Development element (refer to Applicable Plans and Policies in Section 3.9, Public Services, Utilities, and Energy), which calls for exploration and implementation, where possible, of opportunities for cost-effective energy savings that are compatible with other countywide and community goals.	Implementation of Mitigation Measures 3.2.5a, 3.25b and 3.2.5c proposed by the applicant, in combination with Measures 3.2.5d and 3.5.e identified in this report, would ensure that the proposed landfill gas treatment system is permitted to handle the amount of landfill gas that is expected to be captured by the landfill gas collection system. Implementation of Mitigation Measure ~~3.9.3b~~3.2.5c would ensure that the landfill gas that is produced and collected is used in a beneficial manner. However, there is still the potential for the combustion system to increase emissions of CO, NO_x, SO_x, and PM-10 in excess of threshold limits set by the BAAQMD. The impact, therefore, remains significant.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Air Quality (continued)		
	Identified in This Report **3.2.5d:** The applicant shall apply to the BAAQMD to revise limits in the current Permit to Operate the flare, as needed to accommodate increased LFG generation. The flare/vaporator system will be operated/equipped as necessary to ensure BAAQMD emission limits specified in the PTO are maintained. The project applicant shall provide background test data and/or other supporting data as necessary to document to the BAAQMD and LEA that the system would accommodate worst case peak gas emissions. **3.2.5e:** The applicant shall apply for a Permit to Operate the power generation engines within the time frame specified in the Authority to Construct and shall operate the power generation engines in compliance with all BAAQMD regulations and conditions specified in the Permit to Operate. ~~As specified in the current Authority to Construct, t~~The applicant shall continue to maintain records of all compliance demonstration test results as specified in the Authority to Construct. ~~***Recommended in This Report***~~ ~~In addition, implementation of Mitigation Measure 3.9.3b (Section 3.9, Public Services, Utilities, and Energy), to construct the power generators as soon as possible, would ensure maximum beneficial use of landfill gas.~~	
Air Quality (continued)		
3.2.6: The project would increase the amount of ROG emissions from composting/ co-composting activities. (Significant)	***Proposed as Part of the Project*** None.	The administrative and monitoring/reporting procedures and emissions control requirements identified as mitigation

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Air Quality (continued)	***Identified in This Report*** **3.2.6a:** The project applicant shall maintain records of all materials composted (in terms of volume or weight by material type) and shall comply with all applicable rules, regulations and permit conditions. **3.2.6b:** The applicant shall prepare an Emissions Monitoring Plan that includes source testing of windrows used for composting and co-composting to obtain site-specific ROG emissions data. The Monitoring Plan shall require analysis of the effect of various feedstock materials on composting emissions, and a comparison of emissions during wet and dry season periods. The Monitoring Plan shall be subject to BAAQMD ~~and LEA~~ review and approval. **3.2.6c:** The applicant shall also conduct a feasibility study to determine the technologic and economic feasibility of using~~use~~ a composting method that allows for collection and treatment of gaseous emissions from active composting piles, such as an aerated static pile system with biofilters. The target ~~system shall be designed to reduce~~ ROG emissions reduction rate for purposes of the study shall be ~~by~~ a minimum of ~~90~~ 25 percent, such that the increase in emissions would be below the BAAQMD 80 pounds per day significance threshold. The results of the feasibility study shall be provided to the BAAQMD such that BAAQMD staff may consider incorporation of additional requirements to reduce ROG emissions into air permits for the site. The results of the study shall also be submitted to the LEA. If controls are determined to be infeasible or not economical, then the project applicant shall reduce the amount of compostable materials that are accepted at the site by 25 percent on a daily basis.	measures are consistent with the current requirements of the SCAQMD for composting/co-composting facilities. The increase in ROG emissions from the project is predicted to be ~~329~~105 pounds per day. A ~~90~~25 percent reduction in ROG emissions would result in total emissions of ~~51.9~~78.8 pounds per day ~~(10 percent of the total predicted ROG emissions rate of 519 pounds per day)~~. These measures would reduce ROG emissions associated with composting operations to levels below BAAQMD significance thresholds, so the impact would be less than significant after mitigation.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Air Quality (continued)	**3.2.6d:** The applicant shall conduct monitoring in accordance with the approved Monitoring Plan and shall prepare a report summarizing the findings of the monitoring. Copies of the written report shall be provided to the BAAQMD and LEA for incorporation into permits for the site.	
3.2.7: Changes in sludge quantities received and sludge processing/handling activities (other than the proposed air-drying of sludge) could increase ROG emissions at the site. (Less than Significant)	None required.	Less than Significant
3.2.8: Emissions of toxic air contaminants could pose a risk to human health. (Significant)	***Proposed as Part of the Project*** **3.2.8a:** The landfill gas collection and flare system will substantially reduce the rate of emission of TACs from the landfill. **3.2.8b:** Best management practices for the composting and co-composting operation, including scheduled pile turning and managing piles to avoid excessively high temperatures, will reduce the emissions of TACs from composting and co-composting operations.	Mitigation Measure 3.2.8c will reduce this impact to a less-than significant level. Mitigation Measure 3.2-8d will further reduce the significance of this impact.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Air Quality (continued)	***Identified in This Report***	
	3.2.8c: New Federal ~~R~~regulations for offroad diesel equipment were promulgated in May 2004. These regulations require that, starting in 2010, new equipment will have to reduce emissions of NOx and diesel PM by about 90%. However, any equipment already in use at the time of the new regulation would be grandfathered and would not have to meet the new emissions limits. Since this equipment can operate for many years before needing replacement, future emissions would be at a higher rate. If ~~Implement~~ Mitigation Measures 3.2.2a-d~~e~~ (as revised in this FEIR) are adopted on the existing equipment,~~.~~ d~~D~~iesel PM emissions from off-road equipment can be reduced to levels that are less than significant. ~~if these mitigation measures are adopted, since~~ Some of the measures specified to reduce NO_X emissions, such as the use of natural gas as an alternative fuel, would also reduce diesel PM emissions.~~;~~ U~~u~~se of alternative fuels can reduce~~s~~ fine PM emissions by as much as 90 percent**,** and electrically-powered equipment does not emit any diesel PM. Alternatively, all off-road diesel equipment at the site could be retrofitted with diesel particulate traps that are capable of removing over 85 percent of the diesel PM emissions, though this in itself would not reduce NO_X emissions.	
	3.2.8d: Although d~~D~~iesel PM emissions from new on-road trucks~~vehicles~~ after 2007 will~~can~~ be reduced because the trucks will have to comply with the~~reduced~~ Federal ~~R~~regulations, trucks that were purchased before 2007 would not be subject to the new regulations. Diesel PM emissions from the older truck fleet shall be reduced by retrofitting the trucks with ~~through implementation of Mitigation Measure 3.2.2c, and/or the use of~~ particulate traps ~~on fleet vehicles~~.	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
<u>Air Quality</u> (continued)		
3.2.9: Project operations could result in nuisance odor emissions. (Significant)	***Proposed as Part of the Project*** **3.2.9a:** Continuation of current odor management practices. These include: covering landfilled waste at the end of each day with either soil or mixed ADC; applying potassium permanganate to air drying sludge and operation of a vapor phase odor counteractant system around the landfill's southern boundary; and, maintaining windrows in a manner that optimizes the composting process. ***Identified in This Report*** **3.2.9b:** The project applicant shall formulate an Odor Impact Minimization Plan in accordance with the recently revised State composting regulations (Title 14 CCR § 17863.4.) This plan will be submitted to the LEA as part of the application for a solid waste facilities permit for the expanded composting facility. In accordance with the above-cited regulations, the plan shall contain, at a minimum: • an odor monitoring protocol which describes the proximity of possible odor receptors and a method for assessing odor impacts at the locations of the possible odor receptors; and, • a description of meteorological conditions effecting migration of odors and/or transport of odor-causing material off-site. Seasonal variations that effect wind velocity and direction shall also be described; and,	With implementation of these measures, the residual effect would be less than significant.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Air Quality (continued)	• a complaint response protocol that includes the immediate notification of BAAQMD Compliance & Enforcement Division and County LEA staff upon receipt of any odor complaints and the provision of the BAAQMD odor complaint hotline number (1-800-334-ODOR [6367]) to complainants upon receipt of their call; and, • a description of design considerations and/or projected ranges of optimal operation to be employed in minimizing odor, including method and degree of aeration, moisture content of materials, feedstock characteristics, airborne emission production, process water distribution, pad and site drainage and permeability, equipment reliability, personnel training, weather event impacts, utility service interruptions, and site specific concerns; and, • a description of operating procedures for minimizing odor, including aeration, moisture management, feedstock quality, drainage controls, pad maintenance, wastewater pond controls, storage practices (e.g., storage time and pile geometry), contingency plans (i.e., equipment, water, power, and personnel), biofiltration, and tarping.	
3.2.10: The proposal to air-dry stockpiled sewage sludge could result in increased emissions of volatile organic compounds and odors. (Significant)	***Proposed as Part of the Project*** **3.2.10a:** To control odors during drying, the applicant will apply potassium permanganate solution to the surface of the drying sludge and apply an odor counteractant liquid as a vapor phase spray in the drying area.	Implementation of the mitigation measure proposed as part of the project together with either of the above measures identified in this report would reduce this impact to a less-than-significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Air Quality (continued)	***Identified in This Report*** **3.2.10b:** The applicant shall limit the amount of sewage sludge air dried each day to less than 1,800 wet tons (360 dry tons) per day. At an emission rate of .29 pounds per dry ton per day, this would result in emissions lower than 104 pounds of VOCs per day, which represents an increase of less than 80 pounds per day above the currently permitted limit of 24 pounds per day specified in the 1994 FEIR. **3.2.10c:** Alternatively, the applicant could purchase emissions credits from the BAAQMD, resulting in an off-set of VOC (ROG) emissions of any increment above 104 pounds per day. This would enable the applicant to process more than 1,800 wet tons (360 dry tons) per day of sewage sludge.	
3.2.11: The combined emissions from project operations would exceed BAAQMD significance criteria for ROG, NO_X and PM-10. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.2.11:** Implementation of Mitigation Measures 3.2.2 (a-d~~e~~), 3.2.4, 3.2.5(d-~~f~~e), 3.2.6(a-d), and 3.2.10(b or c) would help to mitigate the combined project operational emissions.	Implementation of the above Mitigation Measures would substantially reduce operational emissions from individual elements of the project. However, it is unlikely that the mitigation measures identified above would reduce project ROG, NO_X and PM-10 emissions levels below the BAAQMD's 80 pounds per day significance threshold. Therefore, the combined emissions from project operation would be considered significant and unavoidable.
3.2.12: Leaving buried waste in place in the 11.5 acre unit in the southwest corner of the landfill property could result in fugitive emissions of landfill gas. (Less than Significant)	None required.	Less than Significant

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
Air Quality (continued)		
3.2.13: Transport, handling, and disposal of the proposed increased volume of designated wastes ~~in Area G~~ could result in increased emissions of various air pollutants. (Significant)	***Proposed as Part of the Project*** **3.2.13a:** ~~The applicant proposes not to accept friable asbestos or petroleum-contaminated soils that exceed 50 parts per million of volatile compounds for disposal in Area G.~~The applicant has in place special handling requirements for generators of ash waste and procedures in place that ensure that acceptance and disposal of ash waste does not result in migration of airborne particles. ***Identified in This Report*** None required. ~~**3.2.13b:** The applicant shall be limited to accepting only designated wastes that do not pose a threat to air quality. Prior to issuance of a revised Solid Waste Facilities Permit, the applicant shall submit to the LEA and the BAAQMD a detailed list of material types and constituent concentrations that they propose to accept for disposal in Area G, and will provide evidence of why handling and disposal of these material types and constituent concentrations will not result in emissions of criteria air pollutants or toxic air contaminants beyond threshold limits. This list will be prepared by a specialist with expertise in calculating air emissions from handling and disposal of wastes. The Solid Waste Facilities Permit will include as a condition of the permit that wastes acceptable for disposal in Area G will be limited to those included in the list only.~~	Mitigation Measure 3.2.13~~b~~ would reduce this impact to a less-than-significant level. ~~would provide a firm basis for a conclusion that use of Area G as a Class II disposal unit, as conditioned, would not adversely affect air quality.~~

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
<u>Air Quality</u> (continued) **3.2.14:** Acceptance of a greater quantity of petroleum contaminated soil (meeting Regional Water Quality Control Board acceptance criteria) and use of this material as alternative daily cover could result in increased emissions of volatile organic compounds. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.2.14:** The applicant shall limit the acceptance of PC soils meeting RWQCB acceptance criteria for use as ADC only to those situations in which the PC soils will be exposed to the atmosphere for less than 24 hours. The applicant will ensure that, within 24 hours of receiving PC soils, the PC soils will either be covered with tarps, with waste material, or with other cover material.	Less than Significant
CU-2: The project would incrementally add to cumulative air pollutant emissions. (Significant)	***Proposed as Part of the Project*** **CU-2a:** Implement Mitigation Measure 3.2.1a. ***Identified in This Report*** **CU-2b:** Implementation of the following mitigation measures, identified in Section 3.2, Air Quality, to mitigate project impacts concerning air pollutant emissions, also would help to mitigate the project's contribution to the cumulative impact: Mitigation Measure 3.2.2 (a-e) to reduce impacts from the increased equipment and truck operations associated with the proposed increase in incoming materials, Mitigation Measure 3.2.4 to reduce levels of project-generated fugitive dust, Mitigation Measure 3.2.5 (d-f) to address landfill gas emissions, Mitigation Measure 3.2.6 (a-d) to address ROG emissions from the proposed composting operation, and Mitigation Measure 3.2.10 (b or c) to address VOCs and odor from the air drying of sludge.	The identified mitigation measure would not fully mitigate the project's operational impacts to air quality to a less-than-significant level. Consequently, when project operational impacts are added to impacts from cumulative development, the total emissions will remain well above the BAAQMD recommended significance thresholds and inhibit regional attempts to achieve attainment of air quality standards. The impact would remain significant and should be considered an unavoidable consequence of project approval.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
Biological Resources		
3.3.1: Implementation of the proposed project would result in the loss of degraded California annual (non-native) grassland within the project boundaries, which is used by special-status raptors as foraging habitat. (Less than Significant)	None required.	Less than Significant
3.3.2: Project activities may disturb habitat for special status plant species. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.3.2*:*** No project actions shall be permitted which result in removal of vegetation above the toe of the slope on the marsh side of landfill levees unless preceded by a survey to establish that no sensitive plant species are present.	Less than Significant
3.3.3: Project activities may disturb jurisdictional wetlands. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.3.3*:*** When working near brackish marsh areas, the edge of the marsh shall be clearly marked with orange mesh fencing or equivalent to indicate limits of disturbance.	Implementation of Mitigation Measure 3.3.3 would reduce this impact to a less-than-significant level.
3.3.4: Project activities may have a deleterious effect on special status bird and mammal species. (Significant)	***Proposed as Part of the Project*** None.	Less than Significant

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
<u>Biological Resources</u> (continued)	***Identified in This Report*** **3.3.4:** Levee reconstruction work during the California clapper rail nesting season (February 1 – August 31) shall be avoided, unless surveys by a qualified biologist indicate that black or clapper rails are not nesting within 500 feet of the work area. Proper precautions shall be taken to confine the necessary disturbances to the smallest area possible. Although salt marsh harvest mice were absent from the landfill in 1992, they should be considered potentially present during high tides, when mice may use the outer levee slope as a refuge. Care should be taken to avoid construction that disturbs the outer levee bank during spring tides.	
3.3.5: High noise levels from composting operations in the Oxbow area and in Field 1, and from landfill activities in Areas A and B may disturb California clapper rail nesting. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.3.5a:** Compost machinery, including tubgrinders, trommel screens, and windrow turners, and other composting equipment capable of generating high noise levels shall be positioned to assure that noise levels do not exceed 76 dBA at the marsh boundary east of the levee during clapper rail nesting season (February 1 – August 31). See also Mitigation Measure 3.7-3.	Mitigation Measures 3.3.5a and 3.3.5b would reduce this impact to a less-than-significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
<u>Biological Resources</u> (continued)	**3.3.5b:** If landfill activities are to take place in Areas A or B during clapper rail nesting season (February 1- August 31), they must be preceded by either a biological survey to determine presence or absence of clapper rail nests in the marsh area adjacent to the landfill, or a noise study to determine noise levels from landfill operations at the marsh boundary. Landfill activities may proceed in these areas during nesting season only if it is determined that nests are not present, or that sound levels at the marsh boundary are below 76 dBA.	
3.3.6: Project activities in the vicinity of the 18-acre storm water impoundment could affect California red-legged frogs or western pond turtle. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.3.6:** It is understood that the project involves changes in landfill capacity, design, operations, environmental controls, and infrastructure, and that these changes constitute a system of continuous operational actions as opposed to a discrete project timeframe. To avoid the possibility of "taking" (harming or harassing) red-legged frogs or pond turtles, surveys for their presence will be performed following approved protocols for season and intensity of surveys. For red-legged frogs these are four discrete surveys within a one-week period between May and November; pond turtle surveys could be done concurrently. If no frogs or pond turtles were found, the landfill would be considered operating adjacent to unoccupied habitat and no additional mitigation would be necessary. If frogs or pond turtles are found, the provisions described below will be followed. As an alternative to conducting the above surveys, the following measures will be followed without the surveys.	Mitigation Measure 3.3.6 would reduce this impact to a less-than-significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Biological Resources (continued)	• A 50 ft construction buffer zone will be established between work sites and the storm water pond. The storm water impoundment will be separated from the work areas with “frog-proof” staked fabric silt fencing at the border of the 50 ft buffer zone. The fencing will essentially extend along all areas bordering this impoundment from other landfill areas. The purpose of the fence is to limit site access by construction equipment and limit accidental wildlife movement onto the work sites. The fence shall be buried to a depth of at least 4 inches and be a minimum of 3 feet tall. • An employee education program shall be conducted to explain red-legged frog concerns to landfill employees and contractors. The program shall consist of a brief presentation by persons knowledgeable in species biology and legislative protection and shall include the following: a description of the species and its habitat needs; the occurrence of the species in the project area; status of the species and its protection under the Federal Endangered Species Act, including fines and penalties; and measures being taken to reduce impacts to the species during active landfill or construction operations near sensitive areas. • If a California red-legged frog is identified in the project operational zone, all work in the immediate area shall immediately cease and the USFWS shall be contacted immediately.	
3.3.7: Removal or remodeling of structures could result in the loss of individuals of special status bat species. (Significant)	***Proposed as Part of the Project*** None.	Less than Significant

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
Biological Resources (continued)	***Identified in This Report*** **3.3.7:** Prior to removal of the buildings, they will be inspected for the presence of bats during the spring or summer of the year preceding construction by a qualified wildlife biologist. Should any bats be found, a qualified wildlife biologist holding the appropriate permits will remove and relocate the bats.	
3.3.8: The project could result in the loss of raptor foraging habitat. (Less than Significant)	None required.	Less than Significant
3.3.9: The project could produce litter which may have deleterious effects on wildlife. (Less than Significant)	None required.	Less than Significant
3.3.10: The proposed expanded composting operation could become a means for transmission of the pathogen that causes Sudden Oak Death. (Less than Significant)	None required.	Less than Significant
Geology, Soils, and Seismicity		
3.4.1: A seismic event on one of the active or potentially active Bay Area faults could generate seismic ground motion capable of causing failure of landfill slopes, displacement of perimeter levee slopes, damage to the LCRS, and/or damage to the proposed Area G liner. (Significant)	***Proposed as Part of the Project*** **3.4.1a:** A detailed Post Earthquake Inspection and Corrective Action Plan was prepared by RLI and approved by RWQCB in October 1995 (RLI, 1995a). The plan focuses on damage caused to groundwater monitoring wells, perimeter levees, and the LCRS following a major earthquake event. This plan includes, but is not limited to, the following: • visual inspection for damage, soil settlement, slope failure, tension cracks, ponding of water, and leachate seeps; • evaluation of water level fluctuations and slope inclinometer measurements of soils displacement; and • replacement of damaged wells and repair or reconstruction of the LCRS and perimeter levees.	Implementation of the revised Post Earthquake Inspection and Corrective Action Plan, assuring the applicant's financial responsibilities, and the implementation of the collection and containment plan specified in Measure 3.4.7d would reduce impacts related to seismic damage to a less than significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Geology, Soils, and Seismicity (continued)	If groundwater monitoring performed as part of the Post Earthquake Inspection and Corrective Action Plan detects leachate outside the perimeter levee, the facility's collection and containment plan shall be implemented (refer to Mitigation Measure 3.4.7d, below). **3.4.1b:** Costs to remediate degradation of groundwater or surface water due to earthquake-related landfill and perimeter levee slope displacement, and/or breaching of the leachate collection and removal system will be financially assured by the applicant's Pollution Legal Liability Insurance or an applicant-sponsored trust fund for closure/post-closure activities. ***Identified in This Report*** **3.4.1c:** The applicant shall update the existing Post Earthquake Inspection and Corrective Action Plan to reflect current understanding of ground motion and seismicity in the Bay Area, to address changes to the landfill site resulting from the proposed project, and to reflect geotechnical analyses conducted for the proposed project. The understanding of earthquake probabilities, predicted ground motion, the attenuation of seismic waves, and other aspects of seismology has advanced since the facility's current plan was written in 1995, and the plan shall be revised to reflect this new understanding. Consistent with the current plan, the revised plan shall require immediate inspection and repair of earthquake damage to the landfill slopes, perimeter levees, groundwater wells, and the LCRS. The measures to repair earthquake damage as developed in the revised Post Earthquake Inspection and Corrective Action Plan shall be submitted to the RWQCB for approval and become part of the project. The updated plan also will discuss contingency measures in the event that Redwood Landfill is unusable or inaccessible as a result of a major earthquake in the vicinity.	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Geology, Soils, and Seismicity (continued)		
3.4.2: Static forces acting on native materials underlying the landfill or on the refuse and cover materials could cause displacement of landfill slopes and the perimeter levee, damage to the LCRS, or differential settlement. (Significant)	***Proposed as Part of the Project*** **3.4.2a:** The applicant has developed and will utilize criteria for monitoring the lateral and vertical deformation of Bay Mud during fill placement to provide advance warning of potential instability. If the geotechnical monitoring program indicates an increasing rate of deformation in the monitored slopes, filling activity will stop at impacted areas. The applicant also has developed and will utilize criterion for monitoring pore pressures following fill placement to confirm that sufficient consolidation is achieved prior to placement of the next fill lift (GeoSyntec, 1997b). GeoSyntec recommends staged placement of refuse due to the low strength of the underlying Bay Mud. Based upon results of analyses, GeoSyntec developed an observational approach to monitor the stability of the waste fill at the site (GeoSyntec, 1997b). Geotechnical monitoring consists of installing, monitoring, and collecting data from inclinometers and piezometers. Currently there are 10 inclinometers (numbered I-6 through I-15) and 14 piezometers (numbered P-7 through P-10, P-13 through P-17, P-20, P-21, P-23, and P-24) at the site. Based on the results of collected field data, modification to the fill-sequencing plan may be needed. The modification may consist of limiting refuse placement in certain areas to restrict slope deformations, or taking advantage of stronger foundation conditions by increasing landfill capacity. GeoSyntec provides quantitative criteria to evaluate when the results of the inclinometers and piezometers indicate a slope failure may occur and filling should stop. These criteria, shown in Table 3.4-4, are based on the ratio of vertical and lateral deformations as provided by inclinometer readings and	Mitigation Measure 3.4.2a will be implemented as part of the project and the combination of Mitigation Measures 3.4.2b, 3.4.2c, and 3.4.2d will be implemented to supplement the proposed geotechnical monitoring program. Together these measures are sufficient to protect against slope displacements related to static stability and reduce impacts to a less-than-significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Geology, Soils, and Seismicity (continued)	the rate of excess pore pressure generation for refuse placed as provided by piezometers. The ~~frequency of~~ monitoring and reporting that is included in the geotechnical monitoring program shall occur quarterly, unless the RWQCB or the LEA determines that more frequent monitoring is needed, and will follow ~~that~~ the frequency indicated in the WDRs and/or the SWFP. ***Identified in This Report*** **3.4.2b:** The geotechnical monitoring program developed by GeoSyntec to monitor fill placement shall be conducted under supervision of a geotechnical engineer familiar with landfill operations and the behavior of the underlying Bay Mud. Recommendations of the supervising engineer and activities conducted as part of the monitoring plan shall be documented and included in periodic reports submitted to the County of Marin and, if appropriate, the RWQCB. **3.4.2c:** If refuse placement activities have stopped, due to indications of an increasing rate of deformation in the monitored slopes, as provided under Mitigation Measure 3.4.2a, and geotechnical monitoring continues to indicate exceedance of the threshold values, the supervising engineer shall implement one or more of the following measures to increase the factor of safety of the slope and be within the geotechnical monitoring criteria described above: • remove refuse in critical areas to reduce the driving force of the slope; • construct a berm or install piles at the toe of the slope to provide resistance to slope movement; and/or • implement other engineering measure(s) to reduce the rate of deformation and prevent slope instability.	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
	The appropriate measure or measures to be undertaken shall be assessed by the geotechnical engineer supervising the geotechnical monitoring program, as specified under 3.4.2b.	
<u>Geology, Soils, and Seismicity</u> (continued)	**3.4.2d:** Depending on findings of the geotechnical monitoring program, the fill sequencing plan shall be modified, as needed, to slow the rate of fill if Bay Mud strength is less than anticipated. The change in rate of fill shall be determined by quantitative threshold values that shall be incorporated into the geotechnical monitoring program. Any modifications to the fill sequencing plan shall be reported to the LEA and the RWQCB.	
3.4.3: Differential settlement of the refuse and the underlying Bay Mud, causing cracks in the levee or final cover and damage to the LCRS, could occur as additional refuse is placed on the landfill. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.4.3:** As part of the geotechnical monitoring program, the applicant will inspect quarterly for cracks in cover material and monitor pressure and volume changes in the landfill gas collection system. If measured settlement or deformation rates begin to increase, the inspection frequency will be increased to weekly. If monitoring reveals evidence of differential settlement, the following measures will be implemented, as needed: • if settlement cracks are observed in the levee or final cover, the cracks shall be re-graded to seal them; and • if the LCRS or landfill gas collection system is damaged, pipes shall be repaired and/or replaced.	Implementation of Mitigation Measure 3.4.3 will reduce potential impacts related to differential settlement to less than significant.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
3.4.4: Precipitation contacting the landfill cover and other unpaved areas of the landfill could generate storm water runoff with sufficient velocity to dislodge and transport soil and sediment, resulting in the formation of erosion features that could damage portions of the landfill. (Significant)	***Proposed as Part of the Project*** **3.4.4a:** RLI will maintain a Storm Water Pollution Prevention Plan (SWPPP) as required under their storm water discharge permit. The SWPPP will provide necessary Best Management Practices to control storm water runoff and reduce erosion.	Implementation of Mitigation Measures 3.4.4a, 4b, and 4c combined, in addition to the BMPs contained in Redwood Landfill's existing SWPPP, will reduce erosion-related impacts to a less-than-significant level.
Geology, Soils, and Seismicity (continued)	RLI prepared a SWPPP (RLI, ~~2000~~2003) for compliance with Provision C.2 of the General Industrial Storm Water Discharge Permit issued by the State Water Resources Control Board (SWRCB) and enforced by the Regional Water Quality Control Board (RWQCB), San Francisco Bay Region. In addition, the landfill was designed in accordance with CCR Title 27, §20365, which (as outlined above) specifies requirements and performance standards for precipitation and drainage control for active Class III landfills (GeoSyntec, 1998). **3.4.4b:** According to the applicant's SWPPP (RLI, ~~2000~~2003), sediment and erosion control features implemented include: • placement of yard waste and grass seeds on slopes to promote vegetation of slopes; • top deck berms; • collection inlets; • downdrain pipes; • hay bales; • silt fences; and	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
	• directing storm water flows to the main storm water impoundment in the southern part of the site or a 1/2 acre pond in the western-central portion of the site for settlement of suspended sediments prior to discharging offsite. ~~(The 2000 SWPPP states that storm water flows also may be directed to an approximately one acre impoundment [shown as 1.5 acres in Exhibit 2 of the SWPPP]; however, since the 2000 SWPPP was produced, this impoundment has been incorporated into the Area G waste management unit and is no longer available to accept storm water flows.)~~	
Geology, Soils, and Seismicity (continued)	RLI has stated that the SWPPP will be amended whenever a change in design, construction, operation, or maintenance occurs that has a significant potential for pollutants to discharge to the adjacent waterways. **3.4.4c:** A final landfill closure and post-closure maintenance and monitoring plan, as per federal and state regulations, will need to be implemented (GeoSyntec, 1998). Preliminary closure and post-closure plans were provided in the JTD (GeoSyntec, 1998). Preliminary closure and post-closure maintenance activities proposed to reduce the effects of surface water runoff and erosion were detailed in the JTD's Sections 8 and 9 and included: • Applicable final cover design to reduce infiltration and reduce surface water runoff velocity • Minimum grading requirements for the final cover • Environmental monitoring and control systems including final cover, surface water, and leachate management. According to GeoSyntec (1998), reporting requirements and schedule will be further defined in Final Closure and Post-Closure Maintenance Plans.	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
Geology, Soils, and Seismicity (continued)	***Identified in This Report*** **3.4.4d:** Prior to project implementation the applicant shall update the facility's SWPPP as needed to accurately reflect existing conditions and features. Because Area G is to be developed as a disposal cell, the remaining 1/2 acre stormwater pond in this area, referenced in the 2003 revision of the SWPPP, will eventually be eliminated; such change shall be addressed in a timely revision of the SWPPP. ~~The revision shall include the removal of references to the pond at Area G as an area to which storm water flows could be directed, since the pond is now part of the Area G waste management unit~~. As required by NPDES provisions, the revised SWPPP shall be kept on site and made available to RWQCB staff upon request.	
3.4.5: The existing surface drainage system ~~s~~ may be inadequate for a Class III landfill. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.4.5** Implement Mitigation Measure 3.5.9 (i.e., ~~prior to reclassification of Area G as a Class II unit,~~ the applicant shall produce~~,~~ and present to the ~~LEA and~~ RWQCB for approval~~,~~ a report demonstrating that precipitation and drainage control facilities ~~affecting Area G~~ meet Title 27 requirements, and provide a copy of the report to the LEA ~~for Class II units~~).	Implementation of Mitigation Measure 3.5.9 would reduce the potential impact of inadequate drainage facilities for a Class III landfill to a less-than-significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Geology, Soils, and Seismicity (continued)		
3.4.6: A five-foot separation does not exist between the base of the landfill and the underlying groundwater. (Significant)	***Proposed as Part of the Project*** **3.4.6:** The applicant has proposed a leachate collection and removal system (LCRS) as an engineered alternative to the Title 27 requirement of a minimum separation of five feet between waste and groundwater (GeoSyntec, 1998). According to the applicant, the cost to modify the landfill to meet the five-foot separation requirement would be too great; thus the applicant has filed an exemption request with the RWQCB (GeoSyntec, 1998). Title 27 provides for consideration of engineering alternatives if the minimum five-foot separation between the landfill and underlying groundwater is not possible or would be prohibitively expensive to provide. As described in the Joint Technical Document (GeoSyntec, 1998), the underlying Bay Mud has relatively low permeability (less than 10^{-6} cm/s) and the thickness of the Bay Mud deposit ranges from 7 to 45 feet within the landfill's footprint. Given the thickness of the Bay Mud, its low permeability, and the preferential flow direction of the leachate along the refuse-Bay Mud interface, significant migration of leachate below the site would not occur. The landfill's LCRS (described in greater detail below, under Impact 3.4.7) would intercept leachate flowing along the refuse-Bay Mud interface, and the leachate would be pumped to the onsite leachate pond.	Although implementation of Mitigation Measures 3.4.6 will not increase the physical separation between the landfill and the underlying groundwater, Mitigation Measure 3.4.6 provides an adequate engineering alternative that should prevent the migration of leachate below the landfill and reduce groundwater contamination-related impacts to a less-than-significant level. <u>Implementation of Mitigation Measures 3.4.7(e) (below), which entails pumping leachate from the interior of the landfill, provides an additional safeguard to prevent leachate from migrating off-site or affecting underlying groundwater.</u>

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Geology, Soils, and Seismicity (continued)	The results of a study on a perimeter LCRS and its effect on leachate migration (MET and Sanifill, 1995a) indicate the preferential flow of the leachate for the entire site would be towards the perimeter LCRS. Therefore, because the LCRS prevents the contamination of the underlying groundwater by directing the leachate flow away from the underlying groundwater, the design can be considered an adequate engineered alternative to the five feet separation requirement (Treadwell & Rollo, 2002). Final determination of the adequacy of the applicant's design as an engineered alternative will be made by the RWQCB after the applicant submits a complete design packet. ***Identified in This Report*** None required.	
3.4.7: If not properly designed, the proposed Leachate Collection and Recovery System (LCRS) could allow leachate to migrate off-site and potentially contaminate off-site groundwater and surface water. (Significant)	***Proposed as Part of the Project*** **3.4.7a:** According to the applicant, leachate is managed at the existing facility in accordance with the RWQCB-approved Leachate Management Plan prepared by CH2MHill (1992) (GeoSyntec, 1998). The Joint Technical Document (GeoSyntec, 1998) description of existing leachate management includes the following activities to minimize the production of leachate and promote the reuse of collected leachate. Although not explicitly stated in Chapter 6 (Proposed Facility Modifications) of the Joint Technical document, this analysis assumes these practices will be continued with the proposed project.	Implementation of Mitigation Measures 3.4.7a, 3.4.7b, 3.4.7c, and 3.4.7d, proposed as part of the project and Mitigation Measures 3.4.7e and 3.4.7f, specified in this EIR, in combination with Mitigation Measures 3.4.8 and 3.5.4, would reduce this impact to a less-than-significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
<u>Geology, Soils, and Seismicity</u> (continued)	• placement of well-compacted, vegetation-free intermediate cover (defined in 27 CCR §20164 as cover material placed on all fill surfaces where additional cells are not to be constructed for 180 days or more, to control vectors, fires, odors, blowing litter, scavenging, and drainage) over the refuse; • grading of daily, intermediate, and final cover to minimum 3 percent slopes to promote surface-water runoff from the landfill; • installation and continuous operation of a perimeter LCRS around the landfill; • placement of final cover in phases throughout the life of the landfill as final grades are reached; and • use of collected leachate for dust control on access roads and intermediate covers as approved by regulatory agencies. **3.4.7b:** To address the issue of leachate leakage from the leachate pond, RLI prepared a Leachate Facilities Leak or Spill Contingency Plan (RLI, 1995b). RLI site operations personnel routinely monitor the leachate pond in association with daily activities and the site operations supervisor performs weekly formal monitoring/inspection. **3.4.7c:** Following a significant seismic or rare rainfall event, RLI will initiate an immediate inspection of the leachate pond containment facilities as part of their contingency measures. If any noticeable damage is observed during these inspections, landfill or contracted equipment will be used to repair and control all minor leaks. If a major leak is evident, Redwood will take the following immediate measures to ensure control of the leachate release (RLI, 1995b):	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Geology, Soils, and Seismicity (continued)	• construction of a dike using available soil; • construction of temporary berms; • excavation of additional channels; • construction of a temporary leachate storage pond in the Oxbow area (the Leachate Facilities Leak or Spill Contingency Plan identifies Fields 2 and 3 and the narrow strip between the eastern edge of the existing leachate pond and Field 5 as the location of the contingent leachate pond); and • pump water into onsite ponds as emergency disposal of "clean" leachate in heavy rainfall. (The Leachate Facilities Leak and Spill Contingency Plan, produced in 1995 [RLI, 1995b], does not identify specific "onsite ponds" to which it refers. The plan states that additional pond storage capacity was planned at the time, through the construction of an additional leachate storage/evaporation pond in the summer of 1996.) **3.4.7d:** If groundwater monitoring performed as part of the self-monitoring program detects leachate outside the perimeter levee, RLI shall follow Title 27 CCR regulations (e.g., Section 20385 et seq.) and work with the RWQCB in the development of an Evaluation Monitoring Plan and/or an Engineering Feasibility Study to determine the appropriate site specific methods for evaluating the scope of a release, its mitigation, and subsequent monitoring program or corrective action program pursuant to 27 CCR Section 20385 and Section 20430. The~~the~~ following contingency ~~plan will~~ measures may be appropriate and would be implemented if needed and in coordination with RWQCB requirements:	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Geology, Soils, and Seismicity (continued)	• ~~Containment will involve i~~Installation of a geosynthetic membrane across the length of a trench constructed in the targeted zone along the site perimeter to contain the release. The geosynthetic barrier would reduce the rate of off-site migration of the release while also reducing groundwater inflow to the collection system. • ~~The release will be collected~~ Collection of the leachate by installing a French drain in the trench. A sump in the trench would be pumped to prevent hydraulic head buildup up-gradient of the containment barrier. Mitigation monitoring locations in Bay Mud, refuse, and surface water will determine the necessity for implementing the mitigation measures outlined for this impact (i.e., increase in leachate extraction rate, contingency measures for capture of leachate migration). Financial assurance for the system to capture and/or contain leachate release beyond the perimeter levee would be provided for by applicant insurance. ***Identified in This Report*** **3.4.7e:** ~~Prior to the placement of wastes at Areas E and F, t~~The applicant ~~shall~~ has completed installation of the ~~at these areas a~~ LCRS at Areas E and F~~as was installed at Areas B, C, and D~~.	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Geology, Soils, and Seismicity (continued)	~~Although "installation and continuous operation of a perimeter LCRS around the landfill" is listed as one of the activities performed to manage leachate in Chapter 5, Existing Facility, of the Joint Technical Document (GeoSyntec, 1998), no LCRS is currently in place in Areas E, F, or G. The applicant has proposed a separate LCRS for Area G in conjunction with the proposal to use Area G as a Class II unit (discussed under Impact 3.4.10). If waste were placed in Areas E or F without a LCRS, leachate generation would be a significant impact. Ensuring that the LCRS is in place prior to waste placement at Areas E or F would ensure that this impact at these areas would be less than significant.~~ To further limit the potential for significant leachate accumulation in the landfill, RLI shall undertake a leachate pumping program in coordination with the RWQCB whereby leachate is initially extracted from up to 13 existing landfill gas wells in the interior of the landfill. The pumping shall be selectively monitored for pumping times, rates and recovery to determine well productivity and effectiveness for use in future additions to the pumping program. Chemistry tests on pumped liquids will be selectively conducted to determine the source of gas well liquid in order to differentiate between leachate and groundwater. Additional dual leachate/gas collection wells shall be installed to the base of the landfill or to sea level, whichever is higher, and shall be equipped with leachate extraction pumps. The number and spacing of leachate extraction wells shall be augmented each year until a consistent decrease in leachate volume can be empirically verified and is sufficient to achieve the long-term objective of removing the leachate mound.	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
Geology, Soils, and Seismicity (continued)	Empirical verification of initial leachate volume reduction and verification that an appropriate number of wells and pumps have been installed shall be provided to the RWQCB and shall include the satisfaction of the following performance criteria: 1) Demonstrate, using a refined water balance model approved by the RWQCB, that the leachate extraction rate exceeds the leachate generation rate; and 2) Demonstrate a measurable and quantifiable decrease in leachate volume within the landfill using leachate elevation measurements from either monitoring wells or landfill gas extraction wells located in the interior of the landfill. Once it has been established that the leachate collection and removal system size and pumping rate is sufficient to reduce the leachate volume, the system shall be maintained and operated such that leachate volume is steadily reduced. Leachate levels shall be reduced to a sustainable level over a period of 5- years. The achievement of the sustainable level shall be empirically verified by the achievement of at least one of the following three performance criteria: 1) Demonstrate that the piezometric head in the basal (laterally continuous)- leachate is no greater than 1 ft MSL; 2) Demonstrate that the extracted leachate is chemically indistinguishable from the groundwater in the vicinity of the landfill; or 3) Demonstrate that an inward gradient has been achieved such that leachate flows from the perimeter of the landfill towards the center of the landfill.	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Geology, Soils, and Seismicity (continued)	The performance criteria evaluations shall account for seasonal fluctuations and be capable of demonstrating performance achievement on a year-to-year basis **3.4.7f:** RLI shall update its Leachate Facilities Leak or Spill Contingency Plan to accommodate proposed project changes. At a minimum, the revised plan shall address the following issues: (1) Areas in the Oxbow shown in the existing plan (RLI, 1995b) as the location of the contingent leachate pond (Fields 2 and 3 and the narrow strip between the eastern edge of the existing leachate pond and Field 5) are proposed under the project to be used for composting and co-composting, and Fields 3, 4, and 5 are proposed under the project to be used for composting, co-composting, and are "also available for Class II leachate impoundments." The revised leachate contingency plan shall identify which area or areas will be used for contingent leachate storage or, alternatively, explain/clarify how composting operations and emergency leachate storage will be accommodated in the same area. (Refer to Mitigation Measures 3.5.3a, 3.5.3b, and 3.5.3d regarding leachate potentially generated at these new composting areas.) (2) Because an additional leachate storage/evaporation pond that, according to the 1995 Leachate Facilities Leak and Spill Contingency Plan (RLI, 1995b), was to have been constructed in the summer of 1996 to provide additional pond storage capacity, has not been constructed, the revised plan shall also include the reason(s) that the additional leachate storage/evaporation pond is no longer planned or needed, especially in the event of a leak at the existing 11-acre leachate pond or malfunction of the leachate vaporator.	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Geology, Soils, and Seismicity (continued)	(3) With regard to potential overtopping of the leachate pond during rare rainfall events, the 1995 plan indicated that pumping directly into San Antonio Creek, if leachate water was confirmed to be clean, was the most effective contingency measure to quickly evacuate the leachate pond. The updated leachate contingency plans shall not rely solely on such a measure for leak or spill contingencies, but shall include other contingency measures as discussed under item (1), above (i.e., identification of the location of on-site contingent impoundments), that prevent the off-site release of leachate. The updated Leachate Facilities Leak or Spill Contingency Plan shall be submitted to the LEA and the RWQCB prior to project approval. Approval of use of Oxbow areas for composting, where the applicant has recently constructed a compost pad, shall be conditioned upon approval of the updated leachate contingency plan, in addition to other relevant approvals required as mitigations in this report.	
3.4.8: The increased generation of leachate that would result from the project could surpass the capacity of the LCRS, resulting in the off-site release of leachate and the contamination of off-site groundwater. (Significant)	***Proposed as Part of the Project*** **3.4.8a:** The applicant proposes to use leachate that tests "clean," according to standards established by the RWQCB, for composting quench water, if approved. **3.4.8b:** The applicant has installed a leachate vaporator to destroy collected leachate, as part of the facility's LCRS. The vaporator has not previously been evaluated and is a component of the project evaluated in this EIR.	Implementation of the combination of measures proposed as part of the project and identified in this EIR under this impact and Impact 3.4.7 would reduce this impact to a less-than-significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Geology, Soils, and Seismicity (continued)	In addition, actions undertaken as part of Mitigation Measures 3.4.7a, including the grading of slopes to promote runoff, the timely placement of intermediate and final cover, and the use of leachate for dust control, would help enhance LCRS capacity by limiting leachate generation and making use of the leachate that is generated. ***Identified in This Report*** **3.4.8c:** RLI shall update their Leachate Management Plan so that, at a minimum, a single Leachate Management Plan serves as the current plan for the landfill. The plan shall be consistent with all aspects of the applicant's proposed project and with mitigation measures identified in this SEIR, including the currently-proposed LCRS design;~~,~~ management practices to limit leachate production and manage the leachate that is generated;~~,~~ and the most current leachate flow rates based on the proposed LCRS design, the most recent and comprehensive leachate generation studies, ~~and the much larger capacity provided by the proposed landfill geometry,~~ and empirical data of actual leachate flow rates since installation of the LCRS. The Plan shall demonstrate that the LCRS components and leachate impoundment(s) provide adequate capacity as required under 27 CCR §20340 (i.e., twice the maximum daily volume anticipated), including adequate conveyance and storage capacity during the wettest months of the year. (The MET/Sanifill analysis [1995a] indicated that seasonal flow rates may be as much as 4 to 5 times the calculated values for long-term and short-term flows, for one or two months each year.)	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
Geology, Soils, and Seismicity (continued)	The updated plan shall address and remedy the current situation in which a 1992 study and plan is cited for leachate management practices and the LCRS design (but not for the leachate flow rates it presents), a 1995 study is cited for leachate flow rates, although these ~~cited leachate flow~~ rates are inconsistent with reported actual use ~~based on the currently permitted landfill geometry and fill sequencing, rather than the proposed landfill geometry and fill sequencing (as well as on refined alternatives to the 1992 LCRS design)~~, and estimates of the quantity of leachate expected to be utilized or consumed by various landfill facilities and activities are not provided in a discussion of system capacity, if at all. In demonstrating that adequate leachate capacity exists to prevent the off-site discharge of leachate, the updated plan shall include a complete water balance model that shows ~~diagram and/or a clearly written text presentation showing~~ quantitatively (using both actual flow rates from operation of the LCRS to date, as well as estimated projections) the amount of leachate that is expected to be generated and how it is managed to prevent any off-site discharges. The water balance model ~~demonstration of capacity~~ shall include any elements that are expected by the applicant to be considered by permitting agencies in their assessment of the leacahte system's capacity (e.g., the anticipated quantities of leachate to be used for dust control and quench water [if approved], and the basis for such estimates, if these are to be considered in the assessment of system capacity). The Leachate Management Plan shall incorporate elements of the report required by Mitigation Measure 3.5.4 (concerning composting contact water) to ensure that the plan also addresses leachate generated by the expanded composting operations. The updated Leachate Management Plan shall be submitted to the LEA and RWQCB prior to project approval.	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Geology, Soils, and Seismicity (continued)	RLI shall review annually and if necessary revise the updated Leachate Management Plan, including the water balance model, taking into consideration monitoring results that RLI collects and presents quarterly to the RWQCB and the LEA. These monitoring data shall include the amount of leachate extracted from the landfill, the elevation of leachate within monitoring and extraction wells, and the disposition of collected leachate. RLI shall present the results of the annual review and any revisions to the RWQCB for approval, with a copy sent to the LEA. In addition, the implementation of Mitigation Measure 3.4.7f, updating the landfill's Leachate Facilities Leak and Spill Contingency Plan, will help ensure that adequate capacity exists in the event of a leak in the existing pond.	
3.4.9: Proposed modifications to the final cover design could adversely impact landfill stability or result in the degradation of groundwater or surface water quality. (Significant)	***Proposed as Part of the Project*** **3.4.9a:** To ensure the adequacy of cover materials to resist sliding (failure) under static or dynamic conditions, RLI's geotechnical consultants established the degree of shear strength (resistance to shear, or deformation in a direction parallel to planes of contact) any material used for the cover would need to possess (GeoSyntec, 1998). The required shear strength of a cover material (expressed as the angle of friction, where the lower the angle of friction the weaker is the material and vice versa) varies depending on whether or not seepage would be present, the cohesion of the materials within each layer, and the degree of adhesion between layers in contact. Materials used for the final cover would require the following specified degrees of shear strength.	Implementation of Mitigation Measures 3.4.9a and 3.4.9b will ensure that this impact is reduced to a less-than-significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
<u>Geology, Soils, and Seismicity</u> (continued)	To maintain a static factor of safety against sliding, assuming no seepage, each of the cover materials must have shear strengths of friction angle ϕ greater than 34°, if no cohesion is present, or friction angle ϕ greater than 9°, if 50 lb/ft^2 of cohesion is present. Intermediate values of friction angle ϕ are required for cohesion between 0 and 50 lb/ft^2. Each material interface must have similar shear strength requirements for friction angle δ and adhesion. If seepage is encountered through the entire thickness of the vegetative cover, the required shear strengths become more restrictive. Without cohesion/adhesion, friction angles in excess of 49° would be required, while 50 lb/ft^2 of cohesion/adhesion reduces the requirement to 3°. Because it is unlikely that a 49° friction angle could be achieved with conventional cover materials, only materials that have sufficient cohesion and interfaces with sufficient adhesion will be used. The drainage layer will be properly designed to prevent seepage forces through the entire depth of the vegetative layer and will reduce the shear strength requirement for the long term seepage condition. To prevent permanent seismic displacement in excess of 12 inches, the cover shear strength friction angles must exceed 34° in the absence of cohesion/adhesion and must exceed 9° when coupled with 50 lb/ft^2 cohesion/adhesion (GeoSyntec, 1998). **3.4.9b:** Preconstruction testing will be conducted to ensure that the minimum material strength is achieved. ***Identified in This Report*** None required.	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Geology, Soils, and Seismicity (continued)		
3.4.10: The proposed increase in the acceptance rate for designated waste ~~use of Area G as a Class II landfill~~ could result in groundwater contamination from escaping ~~Class II~~ leachate and waste. (Significant)	***Proposed as Part of the Project*** **3.4.10a:** The applicant has ~~committed to~~ constructed ~~a liner and~~ a perimeter trench LCRS and has agreed to augment the leachate collection system by pumping from wells located in the interior of the landfill (see Mitigation Measure 3.4.7g). ~~in Area G that complies with applicable state and federal regulations governing Class II waste disposal facilities, including an engineered alternative to the requirement to maintain five feet of separation between groundwater and the base of the landfill~~. ***Identified in This Report*** **3.4.10b:** Maintain receipt of designated waste at currently permitted levels. ~~Prior to issuance of a revised Solid Waste Facilities Permit and revised Waste Discharge Requirements, the applicant shall submit a detailed list of material types and chemical concentration limits of wastes proposed for placement in Area G to Marin County Environmental Health Services and the Regional Water Quality Control Board~~.	~~Implementation of~~ Mitigation Measure 3.4.10a, in conjunction with either Mitigation Measures 3.4.10b~~,~~ or 3.4.10c~~, and 3.4.10d~~ would ~~result in a reduction in this impact to a less-than significant level, if the Regional Water Quality Control Board finds that the applicant's design is adequate to protect groundwater quality from the waste material types and chemical concentrations proposed by the applicant for disposal in Area G. However, if the Regional Water Quality Control Board is unable to make such a finding, then further environmental review may be required, as per Mitigation Measure 3.4.10e. In either case, the~~ reduce this impact ~~would be reduced~~ to a less-than-significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Geology, Soils, and Seismicity (continued)	**3.4.10c:** ~~If the Regional Water Quality Control Board finds that the applicant's proposed design for Area G is not adequate for protecting groundwater quality from the material types and chemical concentrations proposed for placement therein (as per Mitigation Measure 3.4.10b), Regional Board staff may suggest to the applicant modifications to their proposal, including modifications to the design of Area G, and lower constituent concentration limits or elimination of certain material types for placement in Area G. The Regional Water Quality Control Board may then re-consider a revised proposal.~~ The applicant could construct a cell that meets Title 27 prescriptive standards for a Class II cell and seek to permit it as such, and, if the cell was so permitted, seek to change the quantity of designated waste received. ~~**3.4.10d:** If the Regional Water Quality Control Board finds that the applicant's proposed design for Area G is adequate for protecting groundwater quality from the material types and chemical concentrations proposed for placement therein (as per Mitigation Measure 3.4.10b), the Regional Board shall provide evidence of this finding, along with any necessary conditions, to the Marin County Local Enforcement Agency (LEA). The LEA will then prepare revisions to the Solid Waste Facilities Permit that incorporate these conditions.~~	
Geology, Soils, and Seismicity (continued)	~~**3.4.10e:** If the Regional Water Quality Control Board is unable to conclude, based on information provided by the applicant, that the proposed design for Area G is suitable for use of this unit as a Class II waste disposal unit, then further consideration of use of Area G as a Class II waste disposal unit will require further environmental review under CEQA after submission of a sufficiently complete proposal by the applicant.~~	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
3.4.11: The proposed management of the buried waste in the southwest corner could result in soil or groundwater contamination. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.4.11a:** Prior to landfill closure, the applicant shall prepare and submit for approval to the RWQCB and the LEA a final Closure and Post-Closure Maintenance plan for this waste unit as required under Title 27, Chapter 3, Subchapter 5, Closure and Post Closure Maintenance. The Closure and Post-Closure plan shall demonstrate that the proposed alternative final cover design and existing base underlying the waste unit, in conjunction with post-closure monitoring, will continue to isolate the waste in the 11.5-acre unit and prevent the degradation of groundwater. The closure and post-closure plan shall demonstrate that the proposed alternative final cover will continue to isolate the waste in this unit from precipitation and irrigation waters at least as well as would a final cover built in accordance with applicable prescriptive standards. This measure is consistent with Title 27 §21090, which provides that the RWQCB can allow any alternative final cover design that it finds will continue to isolate the waste in the unit from precipitation and irrigation waters at least as well as would a final cover built in accordance with applicable prescriptive standards.	Implementation of Mitigation Measure 3.4.11a in conjunction with Mitigation Measure 3.4.11b would reduce the impact of leaving the 11.5-acre waste unit in place to a less-than-significant level if the Closure and Post-Closure Plan for this unit is determined by the RWQCB and LEA to adequately protect groundwater quality. If the RWQCB or LEA find that the applicant's proposed final Closure and Post-Closure Maintenance Plan for this area is inadequate, implementation of Mitigation Measure 3.4.11c <u>in conjunction with Mitigation Measure 3.4.11d</u> would reduce this impact to a less-than significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
<u>Geology, Soils, and Seismicity</u> (continued)	The closure and post-closure plan also shall demonstrate that the proposed alterative liner (i.e., the materials underlying the waste unit) will meet the performance criteria for containing waste and preventing the degradation of waters of the state required under Title 27 Section 20310. The description of the proposed alternative liner will include information on the geologic unit(s) (including thicknesses thereof) underlying the refuse across the 11.5-acre unit. Technical data from extensive groundwater monitoring and Hydrologic Evaluation of Landfill Performance (HELP) model results may be necessary to demonstrate to the RWQCB that no significant groundwater impact will result from the proposed alternative final cover and liner. <u>Pursuant to CEQA Guidelines, the revised Closure and Post-Closure Maintenance Plan will be subject to additional review under CEQA prior to approval.</u> **3.4.11b:** The applicant shall continue to implement the existing groundwater monitoring program for this area. If leachate is detected by the monitoring program, the applicant will implement appropriate measures to prevent the off-site release of such leachate. Such measures may include installation of an extraction well, pumping the detected leachate plume at a rate sufficient to prevent its release off-site, and disposing of the collected leachate at the 11-acre leachate pond. (Because this 11.5-acre waste unit does not have an LCRS trench system, remedial actions here would necessarily be different from those identified for the permitted landfill footprint under 3.4.7d, above.)	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
Geology, Soils, and Seismicity (continued)	**3.4.11c:** If the RWQCB or LEA ~~finds~~ determine that the applicant's ~~proposed~~ revised Closure and Post-Closure Maintenance Plan for this waste unit is inadequate to protect groundwater quality, then the applicant shall excavate the refuse as previously proposed and dispose of it within the permitted landfill footprint. The estimated 65,000 cubic yards of refuse is equivalent to approximately 5 percent of the air space consumed annually, assuming the waste acceptance rate proposed under the project, or about 15 days' worth of landfill space (refer to Appendix A, Site Life Calculations). **Mitigation Measure 3.4.11d:** Without mitigation, excavation of 65,000 cubic yards of refuse would have adverse impacts on air quality due to dust and equipment emissions. If Mitigation Measure 3.4.11c is required, it shall be implemented in conjunction with Mitigation Measures 3.2.1a-c, identified in this EIR, to reduce impacts of construction activities on air quality, and in conjunction with Mitigation Measures 3.2.2a-e, to reduce impacts associated with equipment and truck emissions of criteria air pollutants.	
3.4.12: Due to the increase of load pressure by waste placement and the decrease of pore water velocity during Bay Mud consolidation, a leachate mound could be created that will create sufficient uplift pressure on the landfill to trigger slope failure. (Significant)	***Proposed as Part of the Project*** **3.4.12a:** As described under Impacts 3.4.6 and 3.4.7, the applicant has proposed to install a LCRS around the perimeter of the landfill footprint and will continue to manage leachate in accordance with the facility's RWQCB-approved Leachate Management Plan. The LCRS will include a gravel-filled trench that is lined with a collection pipe and graded to sumps that are spaced along the trench alignment. The sumps are fitted with automatic level control pumping systems that are set to maintain an elevation of -1 feet MSL within the system, to promote the flow of leachate and outboard groundwater toward the LCRS trench (GeoSyntec, 1998). The LCRS will help to prevent leachate mounding within the landfill.	Implementation of the identified measures would reduce potential impacts to less-than-significant levels.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Geology, Soils, and Seismicity (continued)	***Identified in This Report*** **3.4.12b:** If quarterly measurements of leachate elevations in leachate wells indicate that buildup is occurring, the results of geotechnical monitoring required under Impact 3.4.2 shall be evaluated to assess the effect of the leachate mound on slope stability. The assessment shall be conducted under the supervision of the geotechnical engineer familiar with landfill operations and the behavior of the underlying Bay Mud, as specified in Mitigation Measure 3.4.2b. If the geotechnical assessment determines that the leachate elevation ~~uplift pressure~~ needs to be reduced to maintain landfill stability, RLI will immediately undertake steps to reduce the height of the leachate mound ~~shall be reduced~~. Measures that could be taken to reduce the height of the mound include (1) increasing the rate of leachate removal by adjusting the settings on the automatic pumps in the perimeter sumps and in the landfill gas/leachate extraction wells to commence operation at lower leachate levels, and (2) ~~utilizing temporary pumps placed either within the LCRS sump or installed within the landfill where the leachate mound is observed to increase leachate volume removal~~ implementation of Mitigation Measure 3.4.7e.	
3.4.13: Excess pore pressure resulting from infiltration of quench water for composting operations conducted on the permitted landfill area could cause slope instability. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.4.13a:** All composting within the permitted landfill footprint shall be conducted on a low permeability pad that meets permeability specifications established by the RWQCB.	Implementation of the above mitigation measures would reduce the significance of this impact to less-than-significant.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
<u>Geology, Soils, and Seismicity</u> (continued)	**3.4.13b:** Runoff from composting areas within the permitted landfill footprint shall be controlled and transmitted to the leachate collection pond or other leachate storage or treatment area. **3.4.13c:** The applicant shall comply with all provisions of CCR Title 14, §17865 and Subtitle D, 40 CFR 258.28a.	
<u>Hydrology and Water Quality</u>		
3.5.1: Displacement of landfill slopes, the perimeter levee, or damage to the LCRS due to static or dynamic forces could allow leachate or refuse to reach and potentially contaminate surrounding surface water bodies, block adjacent drainages, or allow surrounding floodwaters to flood the landfill. (Significant)	***Proposed as Part of the Project*** **3.5.1a:** Implement Mitigation Measures 3.4.1a and 3.4.1b (regarding RLI's Post Earthquake Inspection and Corrective Action Plan and ensuring that costs to remediate groundwater or surface water degradation resulting from earthquake-caused damage to landfill or levee slopes or the LCRS are financially assured), and Mitigation Measure 3.4.2a (regarding utilization of criteria developed by GeoSyntec for monitoring the lateral and vertical deformation of Bay Mud to provide advance warning or potential landfill instability). ***Identified in This Report*** **3.5.1b:** Implement Mitigation Measure 3.4.1c (i.e., update the facility's Post Earthquake Inspection and Corrective Action Plan to address changes resulting from the project), and Mitigation Measures 3.4.2b (regarding the conduct and reporting of the geotechnical monitoring program), 3.4.2c (regarding actions to take in response to indications of an increasing rate of deformation in the monitored slopes), 3.4.2d (regarding the modification of the fill sequencing plan, as needed, if the strength of the Bay Mud is less than anticipated), and Mitigation Measure 3.4.3 (regarding regular inspection for cracks in cover material and regular monitoring of pressure and volume changes in the landfill gas collection system).	Less than Significant

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Hydrology and Water Quality (continued)		
3.5.2: The off-site migration of landfill leachate could contaminate nearby surface waters. (Significant)	***Proposed as Part of the Project*** **3.5.2a:** Implement Mitigation Measures 3.4.7a (regarding the continued management of leachate in accordance with the landfill's RWQCB-approved leachate management plan), 3.4.7b (regarding RLI's preparation of a leachate facilities leak and spill contingency plan and regular monitoring of the leachate pond), 3.4.7c (regarding the immediate inspection of leachate pond containment facilities after any significant seismic or rainfall event, and actions to take if a major leak is evident), and 3.4.7d (regarding evaluation and development of a monitoring and corrective action program ~~the implementation of a collection and containment plan~~ if the groundwater monitoring program detects leachate outside the perimeter levee), and Mitigation Measure 3.4.10a (regarding RLI's ~~commitment to~~ construction of a perimeter trench ~~a liner and~~ LCRS and augmentation of the LCRS by the pumping of leachate from wells in the interior of the landfill~~in Area G that complies with applicable state and federal regulations governing Class II waste disposal facilities~~). ***Identified in This Report*** **3.5.2b:** Implement Mitigation Measure 3.4.7e (regarding the installation of a LCRS at Areas E and F and implementation of a pumping program in the interior of the landfill~~prior to the placement of wastes in those areas~~), Mitigation Measure 3.5.3b (to ensure that composting occurs on appropriate pads that are sufficiently impermeable), Mitigation Measure 3.5.3d (to ensure that contact water [leachate] from the proposed composting, co-composting, and sludge processing areas continues to be managed separately from non-contact runoff), and Mitigation Measure 3.4.7f (regarding the landfill's Leachate Facilities Leak or Spill Contingency Plan).	Implementation of the measure proposed as part of the project in combination with the measures identified in this report would reduce this impact to a less-than-significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Hydrology and Water Quality (continued)		
3.5.3: The proposal to no longer manage water that has contacted compost, co-compost, sludge, and materials proposed to be used as ADC, separately from non-contact water could degrade the water quality of the storm water impoundment and ultimately transport contaminants to off-site surface waters. (Significant)	***Proposed as Part of the Project*** **3.5.3a:** Outside of areas with a LCRS, future composting/co-composting activities will be conducted on appropriate composting pads to limit infiltration and to control run-off (GeoSyntec, 1998). Based on the applicant's "Comments and Project Clarification Discussion [on the project]" (RLI/WM, 2000), wet-weather composting will not take place in unlined areas. Thus, year-round composting will take place only on lined pads (i.e., lined with 2 feet of clay, as in Fields 1 and 2). Pads will be designed and constructed to promote surface drainage and prevent ponding. Portions of the composting pads may be surfaced with 6 to 12 inches of gravel, asphalt, or other suitable material to provide for all weather access (GeoSyntec, 1998). Dry-weather composting will be conducted on pads comprised of a minimum of either 1 foot of native soils or recompacted imported soils possessing a maximum saturated hydraulic conductivity of 1×10^{-6} centimeters per second. ***Identified in This Report*** **3.5.3b:** For composting operations outside the landfill footprint, including any operations in the area currently known as the main sludge impoundment, pads used for both wet weather and dry weather operations must meet permeability specifications established by the RWQCB. Although Bay Mud is generally a low-permeability soil, lenses of more permeable sand or organic material are known to occur within it. The applicant shall provide documentation to the RWQCB of site-specific studies documenting that areas proposed to be used for composting meet RWQCB specifications throughout the proposed area.	The combination of Mitigation Measures 3.5.3a, 3.5.3b, 3.5.3c, and 3.5.3d will ensure that this impact is reduced to a less-than-significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
Hydrology and Water Quality (continued)	**3.5.3c:** For composting or co-composting operations conducted on any portion of the landfill that already has a LCRS (i.e., within the permitted 223-acre landfill footprint), implement Mitigation Measure 3.4.13c (regarding Title 14 Section 17865 requirements for the siting of composting facilities on landfills). See also Impact 3.4.13 (regarding potential excess pore pressure resulting from the infiltration of quench water) in Section 3.4, Geology, Soils, and Seismicity. **3.5.3d:** To ensure storm water discharges do not contaminate off-site receiving waters, all contact water shall continue to be managed separately from non-contact water and retained on site. Storm water management shall include the following measures: 1. Composting operations areas outside of the landfill footprint, including areas used for active composting, stockpiling of feedstock and curing or finished compost, maturing piles, and other processing, shall be fitted with leachate collection systems, such as site grading and perimeter drain systems, that prevent pooling of liquids, that collect any free liquid, including leachate, excess quench water, and other liquids, and that convey the collected liquid to the leachate collection pond or other leachate treatment facility. 2. Areas used for wet season handling, storage, or stockpiling of dried sludge, materials to be used for ADC, or other materials capable of producing contaminated runoff shall be fitted with impermeable pads and leachate collections systems, or the materials themselves shall be protected from contact with rainwater.	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
<u>Hydrology and Water Quality</u> (continued)		
3.5.4: Insufficient capacity to contain contact-water runoff from new areas proposed to be used for composting and co-composting would result in the off-site release of contact water and the potential degradation of nearby surface waters. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.5.4:** The applicant shall produce and present to the LEA and RWQCB for approval a report demonstrating that sufficient capacity exists to contain contact water from areas outside the landfill footprint, proposed to be used for composting, co-composting and sludge processing, that would result from a 100-year storm event. Approval of use of these areas for composting, co-composting, and sludge processing shall be conditioned upon submittal and approval that this standard has been met. Because the amount of contact water generated at Redwood Landfill would increase as a result of the expanded composting area~~, and Area G, which currently is available as back-up for contact water storage, will no longer be available for back-up storage when it is developed as either a Class III or Class II waste management unit~~, RLI will have to demonstrate to the satisfaction of the LEA and the RWQCB where, within the landfill boundaries, contact water from this area would be directed, and that such contact-water impoundment will have sufficient capacity to accommodate run-off from a 100-year storm event. Storage capacity shall be adequate to contain contact water generated from a storm occurring mid- or late-season, when the impoundment could have water in it from previous storms.	RLI's demonstration to the LEA and RWQCB that sufficient capacity exists at the site to contain contact water from the composting, co-composting, and sludge processing areas outside the landfill footprint would reduce this impact to a less-than-significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
Hydrology and Water Quality (continued)		
3.5.5: The use of leachate as quench water could contaminate groundwater and surface water. (Significant)	***Proposed as Part of the Project*** **3.5.5a:** The applicant will test leachate to be used as quench water quarterly, consistent with current testing and use protocols applied to the use of leachate for dust control. The leachate will be used for quench water as long as, and only if, it meets RWQCB-approved standards established for the use of leachate for dust control at the site. This measure will be reflected as a requirement in the Solid Waste Facilities Permit as well as the landfill's Waste Discharge Requirements. The current program to reuse leachate for dust control, upon which the program to reuse leachate for quench water will be based, requires RLI to sample the leachate pond on a quarterly basis prior to use for dust control to insure that levels of chemical constituents are at "clean" standards. Reporting of the leachate sampling is included with the Self Monitoring Program associated with Redwood Landfill's Waste Discharge Requirements. Written detection monitoring reports, which include compliance evaluation summaries, are filed by the 15th day of the month following the report period; an annual report also is required, by January 31 for the previous calendar year. **3.5.5b:** Implement Mitigation Measure 3.5.3a. ***Identified in This Report*** **3.5.5c:** Implement Mitigation Measures 3.5.3b, 3.5.3c, and 3.5.3d.	Implementation of these measures would reduce impacts to less-than-significant levels.
3.5.6: Areas outside the 223-acre landfill footprint, including areas proposed for composting and co-composting operations and the relocated administration facilities, are within the 100-year flood plain. (Significant)	***Proposed as Part of the Project*** None.	Implementing the planned increases in the height and width of the perimeter levee would reduce this impact to a less-than-significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Hydrology and Water Quality (continued)	***Identified in This Report*** **3.5.6:** To ensure the site and project elements are protected from potential impacts of flooding, the applicant shall complete their planned increase in the height of the perimeter levee that encompasses the entire landfill site (i.e., the approximately 380 acres of the 420-acre Southern Area currently located within levees) to 9 feet above msl and their planned increase in the width of the perimeter levee to 10 feet prior to implementation of project elements in the Oxbow or other areas outside the permitted 223-acre landfill footprint. The applicant's Joint Technical Document (JTD) (GeoSyntec, 1998) states on page 4-21 that the perimeter levee is approximately four miles long and separates the site from adjacent sloughs. As part of the description of the existing facility (pages 5-1 and 5-2) the JTD states that the perimeter levee encompasses approximately 380 acres of the 420-acre Southern Area of the landfill property, and that the height of the perimeter levee will be increased to 9 feet above mean sea level around the entire landfill, and that the crest will be widened to 10 feet. These changes to the perimeter levee are not specified as project elements, and elsewhere in the JTD some ambiguity exists as to whether references to a perimeter levee refer to a levee around only the permitted landfill footprint (approximately 223 acres) or around the entire landfill site (approximately 380 acres of which are within existing levees). This analysis assumes that as part of the facility's existing operation, as stated on the aforementioned pages, RLI intends to increase the perimeter levee that encompasses the entire 380 acres of the 420-acre Southern Area to 9 feet above msl and to widen its crest to 10 feet.	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Hydrology and Water Quality (continued)	Because the base flood elevation for the 100-year storm is 6 to 7 feet ngvd (approximately equivalent to mean sea level), increasing the levee to 9 feet would protect the landfill property from the 100-year flood. Increasing the width should contribute support to the levee's stability and ability to withstand the dynamic forces of the river at flood stage. The 223-acre landfill footprint already is located outside the 100-year flood plain due to existing levees. The portion of the site outside the landfill footprint remains vulnerable to flooding until these planned changes to the perimeter levee are completed.	
3.5.7: If surface water drainage systems are not properly managed, storm water contacting the landfill surface could erode landfill cover materials and cause the sedimentation of onsite drainage systems, and potentially, the sedimentation and/or contamination of off-site receiving surface waters. (Significant)	***Proposed as Part of the Project*** **3.5.7:** Implement Mitigation Measures 3.4.4a, 4b, 4c, and 4d (to implement an updated SWPPP and prepare and eventually implement a final closure and post-closure maintenance plan). As discussed under Impact 3.4.4 in Section 3.4, Geology, Soils, and Seismicity, implementation of these measures would reduce the potential impacts of storm-generated erosion and help ensure the proper management of the site's drainage system. Implementation of these measure, combined with requirements specified in Title 27 for precipitation and drainage controls as well as the existing drainage facilities and management practices at the landfill would reduce this impact to a less-than-significant level. ***Identified in This Report*** No additional measures required.	Less than Significant
3.5.8: Construction activities, including grading and related activities at the proposed composting areas could increase soil erosion and result in the transport of sediments and other contaminants to off-site surface waters. (Significant)	***Proposed as Part of the Project*** None.	Implementation of this measure would reduce this impact to a less-than-significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
Hydrology and Water Quality (continued)	***Identified in This Report*** **3.5.8:** Prior to construction, the applicant will prepare a construction Storm Water Pollution Prevention Plan (SWPPP) to minimize impacts to storm water runoff quality from construction activities. The construction SWPPP will be kept on site and available to RWQCB and LEA staff upon request.	
3.5.9: The existing drainage system may be insufficient to accommodate the 1~~,~~00~~0~~-year, 24-hour precipitation event required of Class III landfills~~, as Area G is proposed to be classified~~. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.5.9:** The applicant shall produce and present to the~~ LEA and~~ RWQCB for approval a report demonstrating that sufficient capacity exists in the precipitation and drainage control facilities ~~affecting or affected by Area G~~ to accommodate the 1,00~~0~~-year 24-hour precipitation event as required by Title 27. . A copy of the report shall also be provided to the LEA. The report shall include information about the anticipated elevation of flows in San Antonio Creek during the 100-year flood; if existing and any new discharge outlets to San Antonio Creek are below this elevation, such drains shall be equipped with flap gates to prevent flood waters from entering the outlets, as two existing drains are equipped to prevent flood tides from entering. ~~Approval of use of this area as a Class II unit shall be conditioned, in part, upon submittal and approval that this standard has been met.~~ The final engineering design specifications for the permanent and major temporary drainage facilities capable of meeting the requirements specified in Title 27, Table 4.1 shall be developed by a registered engineer and shall include drainage facilities for all areas of the landfill property. These specifications shall become part of the project.	Less than Significant

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
3.5.10: The proposed use of various alternative daily cover (ADC) materials could have an adverse impact on water quality. (Significant)	***Proposed as Part of the Project*** None.	Less than Significant
Hydrology and Water Quality (continued)	***Identified in This Report*** **3.5.10a:** As described under "working face operations in wet weather" in Redwood Landfill's current Storm Water Pollution Prevention Plan (Redwood Landfill, 2003~~2000~~), when rain occurs or is forecast or imminent, RLI shall cover the ADC applied that day with impermeable tarps to prevent rainwater contact with the ADC. **3.5.10b:** The operator shall not use ADC, or shall cover it with a geosynthetic blanket after application at the working face ~~Dirt shall continue to be used as the cover material~~ on any day preceding closed days (e.g., Saturdays); ADC may continue to be used as the daily cover the rest of the week (i.e., Monday through Friday; the landfill is closed on Sunday). **3.5.10c:** In conjunction with implementing Mitigation Measure 3.5.3, above, water contacting ADC shall be considered, and managed as, contact water. Thus water contacting ADC shall be managed separately from non-contact water and retained on site.	
Land Use		
3.6.1: Implementation of the proposed project would intensify landfill operations in the project area, which could result in land use conflicts with adjacent land uses. (Less than Significant)	None required.	Less than Significant

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
<u>Land Use</u> (continued) **3.6.2:** Development of the proposed project could result in conflicts with operations at Gnoss Field. (Significant)	***Proposed as Part of the Project*** **3.6.2a:** The applicant proposes to continue their existing bird control program. Redwood Landfill's bird control program focuses on gulls, the predominant avian scavengers at the site, and consists of using pyrotechnic devices to discourage gulls from landing or circling overhead during refuse placement and compaction. The devices provide noise (bang or whistle), a flash of light, smoke, and the sound of the propellant. RLI focuses its deterrent efforts when the birds first begin to arrive in the morning (shortly after dawn) and the morning hours, having found that this results in fewer gulls approaching the site during the rest of the day. RLI also may use a gas-fired cannon, which emits a loud blast, in conjunction with the pyrotechnic devices. Redwood Landfill periodically re-evaluates and revises bird control techniques as necessary. **3.6.2b:** The applicant proposes no change in the number or type of lights used for nighttime operations. There are no records that indicate that the existing use of lights at the landfill poses a hazard to operations at Gnoss Field. ***Identified in This Report*** **3.6.2c:** To ensure that nighttime activities do not interfere with operations at Gnoss Field, lights used during nighttime landfill operations will not be colored, will be shielded and directed downward to reduce glare, and will be placed in an irregular pattern in order not to appear to be a runway. The applicant shall notify the Gnoss Field Airport prior to any change in the way lighting is used for nighttime operations.	The combination of Mitigation Measures 3.6.2a, 3.6.2b, 3.6.2c, and 3.6.2d will ensure that this impact is reduced to a less-than-significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
Land Use (continued)	**3.6.2d:** If bird activity at the landfill, including the areas outside the permitted landfill footprint proposed for composting, increases as a result of the project, as determined by the LEA during regular site inspections, RLI shall adjust its existing bird control program as necessary to ensure that the facility does not pose a bird hazard to aircraft. RLI shall modify as necessary the demonstration required in 40 CFR Part 258, §258.10 (a) and 27 CCR, §20270(a) (that the landfill does not pose a bird hazard to aircraft).	
3.6.3: Implementation of the proposed project could result in conflicts with agricultural uses. (Less than Significant)	None required.	Less than Significant
3.6.4: 3.6.4: The project would conflict with Goals 1, 6, and 9 of the Source Reduction and Recycling Element of the Integrated Waste Management Plan for Marin County and its Cities. (Significant)	***Proposed as Part of the Project*** **3.6.4a:** The applicant is proposing to increase the capacity of the existing composting/co-composting facility. ***Identified in This Report*** **3.6.4b:** The following measures will be required as conditions of a revised Solid Waste Facilities Permit, or through other actions, as noted: • RLI will be required to implement additional diversion programs at the landfill, such as construction and demolition debris recovery, recovery of materials from self-haul and debris box loads, salvage of building materials and other reusable items, increased opportunity for drop-off of source-separated materials, and other measures as detailed in the Mitigated Alternative (see Chapter 5);	These measures would reduce the project's inconsistency with County Integrated Waste Management Plan goals. In addition, these measures could reduce some of the project's impacts, and could provide justification for Overriding Considerations that may be needed for project approval. Together, these mitigation measures will reduce this impact to a less-than-significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
<u>Land Use</u> (continued)	• The County will consider the enactment of an ordinance that would impose a mitigation fee on waste imported to Redwood Landfill from areas of California outside Marin County. The mitigation fee will be used to develop additional landfill capacity, to develop diversion programs, and to offset other project impacts, including significant, unavoidable air quality impacts (see section 3.2, Air Quality and Chapter 4, Cumulative Impacts).	
3.6.5: The project would conflict with Summary Plan Goal 12, which is to insure that all residents of Marin County have access to a program that safely and effectively manages household hazardous waste, and Summary Plan Policy 14, to develop an effective program for managing household hazardous waste generated in the county. (Significant)	***Proposed as Part of the Project*** **3.6.5a:** RLI currently accepts used motor oil and automotive batteries at the landfill, and does not plan to discontinue this service. ***Identified in This Report*** **3.6.5b:** Redwood Landfill shall provide facilities for residents to drop-off oil filters, antifreeze, fluorescent light tubes, latex paint, and cathode ray tubes, in addition to used motor oil and automotive batteries, which are currently accepted.	Implementation of this measure would reduce this impact to a less-than-significant level.
3.6.6: The project could conflict with Siting Element Exclusionary Criterion E6. (Less than Significant)	None required.	Less than Significant
3.6.7: The project would increase the rate of fill of the landfill, which could result in a conflict with Summary Plan Goal 13 and Siting Element Goal 1, which require the County to assure 15 years of disposal capacity. (Less than Significant)	None required.	Less than Significant

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
<u>Noise</u>		
3.7.1: Noise from increased levels of landfill operational activities and for construction at the landfill could increase ambient noise levels for the closest sensitive land uses. (Less than Significant)	None required.	Less than Significant
3.7.2: Noise from increased levels of landfill operational activities and for construction at the landfill could increase ambient noise levels for less sensitive land uses. (Less than Significant)	None required.	Less than Significant
3.7.3: Use of equipment for composting operations in the Oxbow area and other areas proposed for composting operations could cause an increase in the ambient noise level for adjacent land uses. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.7.3a:** Operating hours for the tubgrinder shall be restricted to 7 a.m. to 7 p.m. **3.7.3b:** The tubgrinder shall be operated at least 600 feet from the outer edge (creek side) of the road along the perimeter levee. **3.7.3c:** Alternatively, the landfill operator could construct an earthen berm between the tubgrinder operations area and all parts of the eastern landfill boundary within 600 feet of the tubgrinder location. The earthen berm must be at least as high as the highest part of the tubgrinder itself. Compost windrows could be substituted for the earthen berm, as long as they are as high as the highest part of the tubgrinder, and located between the tubgrinder operations area and the eastern landfill boundary.	Mitigation Measure 3.7.3a, in conjunction with either Mitigation Measure 3.7.3b *or* 3.7.3c can be expected to reduce the noise level at San Antonio Creek from composting operations to less than 65 dBA L_{dn}, which would reduce the impact to a less-than-significant level.

TABLE 1-2 (Continued) SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
Noise (continued)		
3.7.4: Noise from increased levels of landfill traffic could increase ambient noise levels for nearby land uses. (Less than Significant)	None required.	Less than Significant
Public Health and Safety		
3.8.1: Receipt of designated wastes, in particular, spill or upset conditions resulting from the receipt and handling of designated wastes, could expose site workers or the general public to unacceptable contaminant levels. (Significant)	***Proposed as Part of the Project*** **3.8.1a:** The project applicant has prepared and implements a worker health and safety program. ***Identified in This Report*** **3.8.1b:** Implement Mitigation Measure 3.2.~~13~~10b (limit acceptance of designated wastes currently accepted at the landfill to the currently permitted level of 20 TPD) which ~~ose that are determined not to pose a threat to air quality and provide to the LEA and BAAQMD detailed information including material types and handling procedures), Mitigation Measure 3.4.10b (submit a detailed list of material types and chemical concentration limits of wastes proposed for placement in Area G to the LEA and the RWQCB, and an engineering study demonstrating the effectiveness of the liner and LCRS proposed for Area G in protecting groundwater and the surrounding environment from constituents in the waste and leachate generated by it), and Mitigation Measure 3.4.10c (if the RWQCB finds the proposed design is not adequate, modify the proposal as appropriate, potentially modifying the design of Area G, lowering the constituent concentrations in waste to be accepted, or eliminating certain material types proposed to be~~	Implementation of Mitigation Measures 3.8.1a~~,~~ and 3.8.1b~~, and 3.8.1c~~ will reduce this impact to a less-than-significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Public Health and Safety (continued)	~~placed in the unit~~). ~~Implementation of these measures~~ would reduce to a less-than-significant level the potential for ~~help to limit exposure of~~ workers or members of the public using the facility to be exposed to unacceptable contaminant levels associated with the landfill's receipt of designated wastes. ~~**3.8.1c:** The applicant shall modify the facility's injury and illness prevention program to address the receipt and appropriate handling of the wastes proposed to be accepted at Area G (as specified under Mitigation Measures 3.2.13b and 3.4.10b), and submit the modified program to the LEA for approval prior to approval of Area G as a Class II unit.~~	
3.8.2: Expanding the composting operations could increase the health threat to workers from exposure to *Aspergillus fumigatus* and endotoxins. (Significant)	***Proposed as Part of the Project*** **3.8.2a:** Redwood Landfill's existing composting operation includes dust control measures, such as the addition of water (using a water truck or portable sprinkler system) to composting windrows as needed to control dust and to maintain the appropriate moisture content for the composting process (GeoSyntec, 1998). Because bioaerosols and endotoxins are both carried on dust particles (particulate matter), measures to control dust at Redwood Landfill also will help limit the dispersal of *Aspergillus fumigatus* and endotoxins. ***Identified in This Report*** **3.8.2b:** Implement Mitigation Measure 3.2-4 (development and implementation of a Dust Mitigation Plan/Program).	Implementation of Mitigation Measures 3.8.2a, 3.8.2b, and 3.8.2c to control dust and limit the generation and dispersal of dust and spores would reduce potential impacts of exposure to *Aspergillus fumigatus* and endotoxins to a less-than-significant level.

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
Public Health and Safety (continued)	**3.8.2c:** The project applicant shall follow sound composting management practices, including maintaining moisture, temperature and pH levels, and properly aerating, turning and mixing the composting materials. Specifically, the following practices will help minimize the generation and dispersal of dust and fungus spores during composting operations and thus limit exposure: • Refrain from turning, screening, or loading activities on windy days; • Use water sprays or mists during grinding, screening, and pile turning activities; • Maintain proper moisture levels in active composting piles; • Maintain good housekeeping practices, including site cleanliness; and • Provide employee training and the use of personal protective equipment.	
3.8.3: The proposed changes to the management of water that has contacted sludge and composting and co-composting materials could degrade water quality and impact public health. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.8.3:** Implement Mitigation Measures 3.5.3a, 3.5.3b, 3.5.3c, and 3.5.3d regarding the conduct of composting outside and within the permitted landfill footprint and the management of contact water and storm water.	Less than Significant

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
Public Health and Safety (continued)		
3.8.4: Landfill gas migrating from the 11.5-acre waste unit in the southwest corner of the site could become trapped beneath the nearby relocated administration building and accumulate to explosive levels. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.8.4:** The project applicant shall continue to implement the continuous monitoring of landfill gas levels in the relocated administration building, as is currently the practice at the existing administration building. Continuous monitoring is conducted using a GasTech gas sensing device and alarm system. In addition, the other existing gas monitoring programs at the landfill site shall be reviewed and modified if necessary to include monitoring of the 11.5-acre waste unit. The other monitoring includes quarterly monitoring by an outside consultant using portable gas detection equipment and weekly monitoring by RLI using a GasTech combustible gas indicator, in accordance with the terms of the landfill's Permit to Operate from BAAQMD.	Mitigation Measure 3.8.4 will reduce the severity of this impact to a less-than-significant level.
3.8.5: Increased refuse and composting throughput could result in increases in gulls and other scavenging birds at the site, thus increasing the risk of bird strikes for aircraft approaching or departing from the nearby County airport, Gnoss Field. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.8.5:** Implement Mitigation Measure 3.6.2d (i.e., modification of RLI's bird control program if needed to address increased bird activity at the site).	Less than Significant
3.8.6: The proposed increase in landfilled material will result in an increase in the size of the working face, potentially causing an increase in the occurrence of vectors at the landfill. (Less than Significant)	None required.	Less than Significant

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Public Services, Utilities, and Energy		
3.9.1: The proposed increase in composting throughput could increase the risk of fire occurring at the composting facility. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.9.1:** For composting operations in new areas of the project site, RLI shall adhere to management practices established in the Registration Permit for the current composting operation and the terms and conditions established for the green waste and food waste pilot program.	Less than Significant
3.9.2: The proposed increase in composting operations could place burdensome demands on public water supplies, exceeding available capacity, especially during periods of drought. (Significant)	***Proposed as Part of the Project*** None. ***Identified in This Report*** **3.9.2:** During periods of drought RLI shall use only water from non-potable sources for dust control and/or quench water for the expanded composting operation.	Less than Significant
3.9.3: On-site activities, primarily the increased use of landfill equipment and vehicles, would increase energy consumption. (Significant)	***Proposed as Part of the Project*** **3.9.3a:** RLI shall apply to the ~~has applied for and received from~~ BAAQMD for Authority to Construct power generation engines capable of producing four to five megawatts of power within two years of concurrence on the revised SWFP by the CIWMB.~~three landfill-gas-powered, internal combustion generators (BAAQMD, 2002~~). ~~The Authority to Construct expires two years from the date of issuance unless substantial use of the authority has begun~~.	Less than Significant

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
Public Services, Utilities, and Energy (continued)	***Identified in This Report*** **3.9.3b:** Implement Mitigation Measures 3.2.5c and 3.2.5e (apply for an authority to construct power generation engines with a capacity to produce four to five megawatts of power within two years of concurrence on the revised SWFP by the CIWMB, and apply for a Permit to Operate the engines.) Consistent with County policies regarding best energy management practices, RLI shall ~~install the proposed power generation engines, pursuant to the Authority to Construct issued by the BAAQMD, and~~ commence operation of these engines as soon as possible. The experience of other landfills indicates that electricity generated by the landfill gas could replace (partly or entirely) electricity currently provided by PG&E, and eventually (if not immediately) provide sufficient power to be sold to offsite users. The use of landfill gas to provide for the facility's electricity needs would serve to offset partly the increased consumption of diesel fuel for project operations. The applicant also shall install additional power generation engines in order to offset some use of the LFG flare. ~~According to the Authority to Construct, the three proposed power generation engines have a combined capacity to accommodate landfill gas flows of 1,446 cubic feet per minute (cfm), while the total capacity of the gas flare is 4,250 cfm, and total LFG generation is projected to reach 7,549 cfm by 2024.~~ ~~Of this projected total generation, 5,662 cfm would be collected by the LFG collection system (assuming collection efficiency of 75 percent) and directed to the flare, vaporator and generators (as discussed under Impact 3.2.5)~~. Currently, use of the flare is required to abate the emission of all collected LFG except the	

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

ENVIRONMENTAL IMPACT AND SIGNIFICANCE LEVEL	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Public Services, Utilities, and Energy (continued)	relatively small amount used by the leachate vaporator, as well as to destroy the vapor produced by the vaporator. The flare also could potentially be used to destroy exhaust emissions from the vaporator and the future power generation engines. However, rather than using the flare at full capacity as the generation of LFG increases, an increasing share of LFG could be diverted to generate additional electrical power if additional generation engines were installed. Even with the additional power generation engines installed, some use of the flare will continue to be required, for final destruction of leachate vapor as well as for destruction of combustion exhaust emissions from the vaporator and, potentially, from the power generation engines. However, operation of additional power generation engines potentially would provide a more productive use of much of the collected LFG than simply flaring it.	
Transportation and Traffic		
3.10.1: Traffic generated by the project would affect traffic levels of service on the Highway 101 mainline in the project area. (Less than Significant)	None required.	Less than Significant
3.10.2: Traffic generated by the project would affect traffic levels of service at the Highway 101 / Sanitary Landfill Road intersection. (Less than Significant)	None required.	Less than Significant
3.10.3: Traffic generated by the project would affect traffic levels of service at the Highway 101 ramp junction areas of the interim access road. (Less than Significant)	None required.	Less than Significant
3.10.4: Traffic generated by the project would affect traffic safety on Highway 101 in the project area. (Less than Significant)	None required.	Less than Significant

TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Environmental Impact and Significance Level	Mitigation Measures	Level of Significance After Mitigation
Cumulative Impacts		
CU-1: The project would contribute to the cumulative degradation of the visual character of the surrounding area, particularly the U.S. 101 corridor between Novato and Petaluma. (Less than Significant)	None required.	
CU-2: The project would incrementally add to cumulative air pollutant emissions. (Significant)	**CU-2a:** Implement Mitigation Measure 3.2.1a. **CU-2b:** Implementation of the following mitigation measures, identified in Section 3.2, Air Quality, to mitigate project impacts concerning air pollutant emissions, also would help to mitigate the project's contribution to the cumulative impact: Mitigation Measure 3.2.2 (a-d~~e~~) to reduce impacts from the increased equipment and truck operations associated with the proposed increase in incoming materials, Mitigation Measure 3.2.4 to reduce levels of project-generated fugitive dust, Mitigation Measure 3.2.5 (a-e~~d-f~~) to address landfill gas emissions, Mitigation Measure 3.2.6 (a-d) to address ROG emissions from the proposed composting operation, and Mitigation Measure 3.2.10 (b or c) to address VOCs and odor from the air drying of sludge.	The identified mitigation measure would not fully mitigate the project's operational impacts to air quality to a less-than-significant level. Consequently, when project operational impacts are added to impacts from cumulative development, the total emissions will remain well above the BAAQMD recommended significance thresholds and inhibit regional attempts to achieve attainment of air quality standards. The impact would remain significant and should be considered an unavoidable consequence of project approval.
CU-3: The project would contribute to cumulative increases in traffic on roadway facilities in the project area in 2020. (Less than Significant)	None required.	Less than Significant

CHAPTER 2

PROJECT DESCRIPTION

The project consists of a revision to the existing Solid Waste Facilities Permit (SWFP), Waste Discharge Requirements (WDRs), Permit to Operate (PTO), and other permits, that would authorize Redwood Landfill, Inc., the project applicant, to make certain changes in landfill capacity, design, operations, environmental controls, and infrastructure at Redwood Landfill, its existing Class III sanitary landfill in northeastern Marin County. This Chapter describes in detail each of the proposed changes that make up the project. The description presented below provides the basis for the environmental impact analysis presented in Chapters 3 and 4.

2.1 PROJECT OVERVIEW AND BACKGROUND

2.1.1 PROJECT OVERVIEW

Redwood Landfill, Inc. (RLI), a wholly-owned subsidiary of USA Waste of California, Inc., a holding company for the California holdings of Waste Management, Inc., has proposed physical and operational changes to its Redwood Landfill facility in Marin County. In addition, some physical and operational changes, not covered under existing permits and approvals, have taken place since the facility's current Solid Waste Facilities Permit (SWFP) was issued in 1995. The Marin County Environmental Health Services Division (EHS), acting as the Local Enforcement Agency (LEA), requires that the facility's SWFP be revised to reflect existing and proposed modifications and RLI has applied to the EHS for a SWFP revision. Some of the existing or proposed modifications entail revisions to other permits and approvals under which the facility operates, as well, including the Registration Permit governing RLI's Biosolids Co-Composting Facility, issued by the EHS with the concurrence of the California Integrated Waste Management Board (CIWMB), the facility's Waste Discharge Requirements (WDRs), issued by the San Francisco Bay Area Regional Water Quality Control Board (RWQCB), and the facility's Permit to Operate (PTO), issued by the Bay Area Air Quality Management District (BAAQMD). The project evaluated in this Environmental Impact Report (EIR) thus consists of elements that have already been implemented, but are not covered under existing permits and have not previously been subject to environmental review under the California Environmental Quality Act (CEQA), and elements proposed by RLI for future implementation. In addition, one element that was previously approved but that has not yet been implemented (moving the landfill's administrative offices) is revisited in order to ascertain whether the current proposal is consistent with that which was approved, and is evaluated for potential cumulative impacts when seen in combination with the current project. The proposed project, which is described in detail in Section 2.5, below, consists of the following main components:

- changes to landfill capacity and design, including increasing the landfill's capacity, and modifying the landfill's final contours (without increasing the height or footprint of the landfill)~~, and converting "Area G" of the landfill, which is currently permitted as part of the Class III landfill, to a Class II waste management unit~~;

- changes to waste operations, including changes in the quantity and types of waste received, changes in the types of materials used for daily cover, changes in the facility's sludge processing, changes in the facility's composting operations, and an increase in the allowable number of vehicles using the facility;

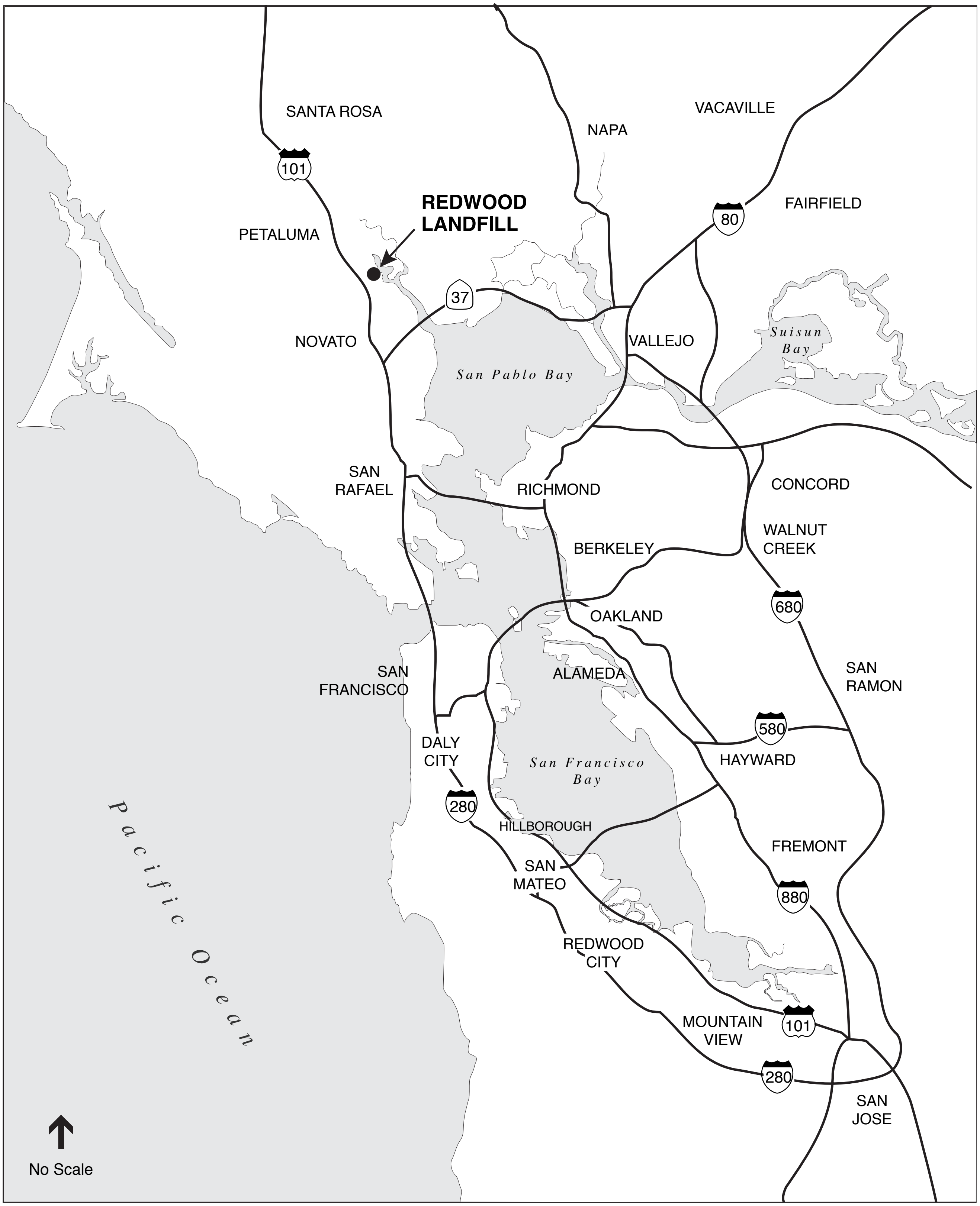
- changes to environmental controls at the landfill, including changes to the permitted design of the leachate collection and removal system and perimeter levee reconstruction, changes in surface water management, changes in landfill gas management, changes in landfill cover design, and changes in the approach taken to remediate an unpermitted waste disposal area on the site; and

- changes to the facility's administrative infrastructure, namely the relocation of administrative and ancillary facilities.

2.1.2 HISTORY AND BACKGROUND OF THE PROJECT

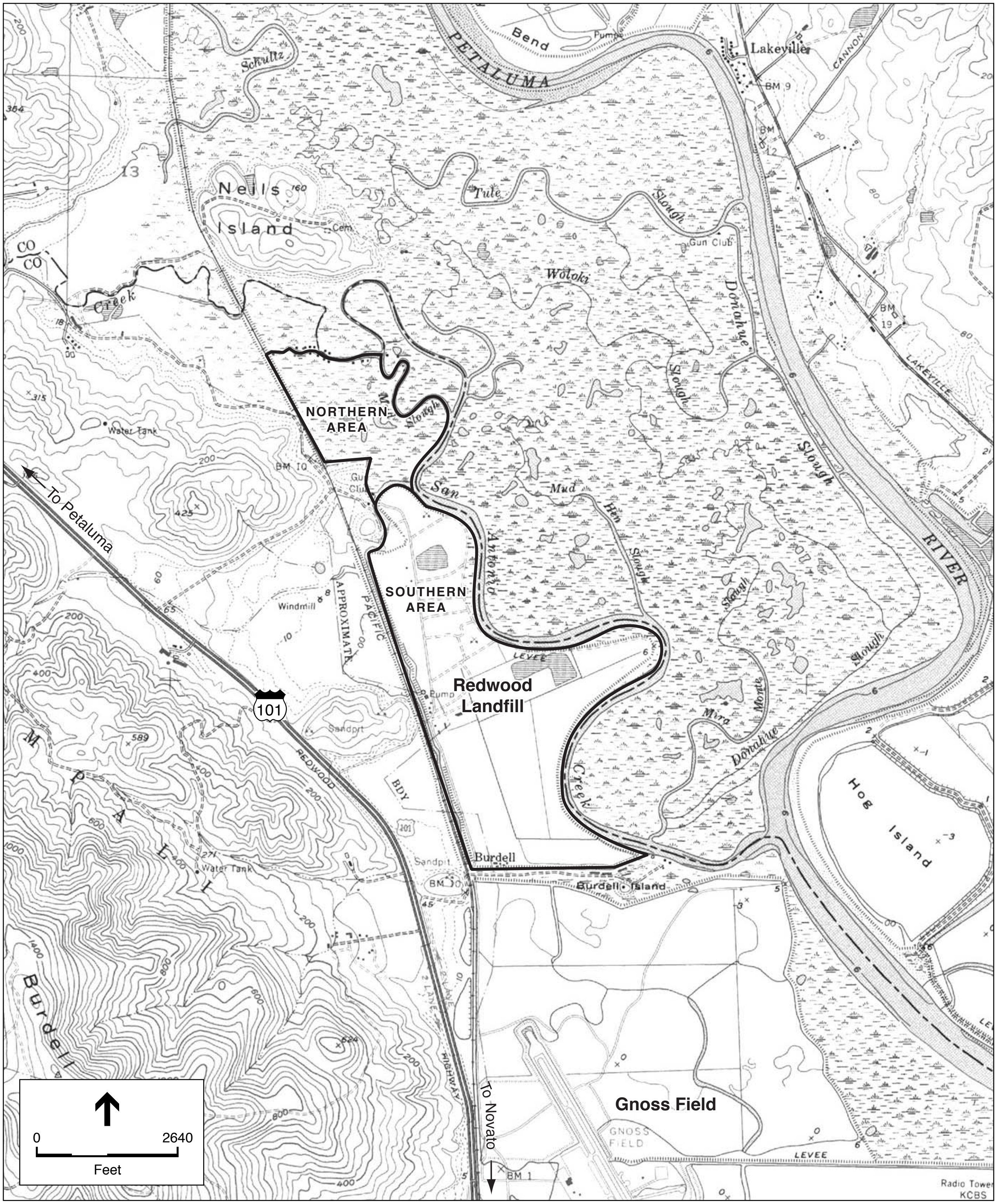
Redwood Landfill is located north of Novato on the Petaluma River in Marin County (see Figure 2-1). Beginning in the 1940s or 1950s, the land at the project site was converted from wetland to agricultural land. To accomplish this conversion, a perimeter levee partially surrounding the site was constructed using Bay Mud dredged from the sloughs and creek at the site. The landfill originally operated pursuant to a Use Permit issued in 1958 by Marin County and a garbage dump permit issued by the County's EHS. The landfill began receiving waste in 1958, and has handled the majority of Marin County's solid waste at its current location since then. Although the Use Permit approved a 600-acre site, the permitted boundary of the landfill facility encompasses 420 acres of the site, known as the "420-Acre Southern Area"(see Figure 2-2). ~~(~~The approximately 180-acre "Northern Area" ~~currently~~ has recently been ~~is proposed to be~~ acquired by Marin Audubon Society as part of a Petaluma Marsh Expansion Project (Caltrans, 2000). ~~RLI is willing to sell this portion of the property (Marin Audubon Society, 1998) and a parcel map to divide the landfill parcel ownership has been submitted to the County and is pending recordation (Steger, 2003).~~

RLI also holds a quarry permit (permit #Q-76-01, originally issued in 1976) from the Marin County Department of Public Works to quarry soil on an adjacent property for landfill cover material. The quarry is located immediately north of the landfill access road. When needed, cover soil is removed from the borrow area and transported by off-road trucks to the working face, where it is stockpiled for use as daily cover when alternative cover is not used. At present, use of this source of cover materials is minimized due to the availability of alternative daily cover (ADC), clean soil delivered by franchise haulers and commercial customers, deliveries of petroleum contaminated soils that meet the facility's acceptance criteria, and periodic deliveries of dredged sediments (GeoSyntec, 1998).



SOURCE: Environmental Science Associates

Figure 2-1
Regional Location



SOURCE: Environmental Science Associates

Figure 2-2
Site Map

Since 1978, the landfill's operations have been governed by a Solid Waste Facilities Permit (SWFP). The facility's first SWFP was issued by the Marin County EHS with the concurrence of the California Waste Management Board (CWMB), the predecessor of the California Integrated Waste Management Board (CIWMB). In 1990 RLI applied to the EHS for a revised SWFP to incorporate changes that had occurred at the facility since 1978 as well as proposed changes, and to respond to regulatory changes promulgated in the Integrated Waste Management Act of 1989 (Assembly Bill 939). An EIR was prepared to analyze potential environmental impacts of the proposed permit revisions (Marin County, 1994); the Final EIR (FEIR) was certified by the County in 1994 and a revised SWFP was issued by EHS, with the concurrence of the CWIMB, in 1995.

As noted, since certification of the 1994 FEIR and issuance of the 1995 SWFP, RLI has implemented some changes and proposed others that were not reviewed in the 1994 FEIR or permitted under the 1995 SWFP. These changes, both those implemented and those proposed, were examined by Marin County in an Initial Study Type Review (Marin County, 1999a and 1999b) to ascertain which were subject to CEQA and which required further environmental review. These existing and proposed changes found in the Initial Study Type Review to require further environmental review constitute the project evaluated in this EIR.

A separate but closely related project, involving construction of a new access road and bridge at the intersection of U.S. 101 and Sanitary Landfill Road, is the subject of another Environmental Impact Report (Marin County, 2002), which has already been certified by the Marin County Board of Supervisors. The access road and bridge project ~~will~~ have also received ~~require~~ an encroachment permit from the California Department of Transportation (CalTrans). That project is currently in the construction ~~design~~ phase. This EIR assumes that the access road and bridge will be built prior to project implementation. This assumption is also used in each of the Project Alternatives, except the Off-Site Alternative.

2.2 PURPOSE AND NEED FOR THE PROJECT

RLI's stated purpose for the proposed project is "to respond to changing physical conditions, changes in regulations, increases in recycling efforts, and necessary responsiveness to changes in waste markets." The project would accomplish the following objectives:

- allow for processing and reuse of sludge by existing approved or conditionally approved alternative methods, and reducing the amount of sludge received;
- stabilize overall site revenue, in turn helping to stabilize in-county waste disposal fees, by phasing in increased permitted receipts of non-hazardous solid waste to offset revenue reductions from planned reductions in sludge receipts;
- allow for acceptance of types and quantities of waste (produced within the County and the region) not currently acceptable at the Class III landfill~~, by constructing Area G as a Class II waste management unit~~; and
- respond to new geotechnical information that has been gathered since 1992 and used to refine and develop new site slope stability analyses and a new fill sequencing plan.

2.3 REGULATORY PERMIT REQUIREMENTS AND STATUS

The primary permits related to the operation of the Redwood Landfill are the SWFP, issued by Marin County EHS with the concurrence of the California Integrated Waste Management Board (CIWMB), the Waste Discharge Requirements (WDRs) issued by the San Francisco Bay Regional Water Quality Control Board (RWQCB), two Permits to Operate (PTOs), issued by the Bay Area Air Quality Management District (BAAQMD), and a Registration Permit to operate the facility's biosolids co-composting facility, issued by the EHS with the concurrence of the CIWMB. A complete listing of the current permits for the landfill and permits potentially required for the proposed project is presented in Table 2-1.

The current WDR order was issued May 24, 1995 by the RWQCB in response to RLI's July 14, 1994 submission of a Report of Waste Discharge (ROWD) (HLA, 1994). WDRs establish design, operation, and monitoring requirements to protect the quality of surface and ground water in the State of California. The primary purpose of the 1995 WDRs was to update the groundwater, surface water, and leachate monitoring programs, approve vertical expansion of the landfill, and incorporate limits for sludge and petroleum-contaminated soils acceptable for disposal into the landfill.

The ~~current~~ PTO for Redwood Landfill ~~was updated by the BAAQMD on August 29, 2002 and~~ is reissued annually by the BAAQMD. This permit regulates throughput, sludge processing, composting, yard waste/green waste stockpiles and processing, equipment and landfill emissions, and landfill gas collection and flaring activities at the landfill. Redwood also has a PTO from the BAAQMD for a gasoline dispensing facility. This PTO also is reissued annually. ~~; the current permit expires in May 2003.~~

The current Registration Permit for the co-composting facility was issued by the EHS with the concurrence of the CIWMB on July 11, 1996. The purpose of the Registration Permit is to ensure adequate regulatory oversight of the co-composting operation. The Registration Permit was issued under the CIWMB's tiered regulatory structure, which is designed to provide a level of regulatory oversight commensurate with the potential public health and safety impacts associated with the scale and nature of a solid waste handling or disposal activity. The CIWMB has established five tiers including the full SWFP. These are, from the highest level of regulation to the lowest, full, standardized, registration, enforcement agency notification, and excluded. Permits are issued by the LEA, in this case the EHS, with the concurrence of the CIWMB. Under composting regulations promulgated by the CIWMB in April 2003 revising Chapter 3.1 of Title 14, §17857.1 provides that composting facilities that have more that 12,500 cubic yards of feedstock, active and finished compost or chipped and ground material on site at any one time are required to obtain a Compostable Materials Handling Facility Permit pursuant to Title 27 requirements. (As provided in §17855.4, a facility that had previously obtained a Registration or Standardized Permit is permitted to continue to operate in accordance with its permit until the LEA conducts a permit review.)

TABLE 2-1
CURRENT PERMIT AND APPROVAL STATUS—REDWOOD LANDFILL

Permit Type	Permitting Agency	Permit Authority	Date of Permit	Revision
WATER QUALITY				
Waste Discharge Requirements, Order No. 95-110	CRWQCB	SWRCB Resolution No. 93-62 implementing Parts 257 and 258 of Title 40CFR (Subtitle D)	24 May 1995	Will require revision to address proposed ~~reclassification of Area G,~~ changes in the type and quantities of waste received, changes in the LCRS, and changes in the management of contact water.
Hazardous Waste and Hazardous Materials Management Regulatory Program Permit	Marin County Department of Public Works		15 January 1998	
NPDES General Industrial Activities Storm Water Discharge Permit	CRWQCB	Federal Regulation	15 January 1992 24 October 1992	May require revision, since the applicant is proposing changes that would affect the storm water management system.
Solid Waste Assessment Test Approval—Water Quality	CRWQCB	California Water Code §13273	1 March 1993	No further requirements.
AIR QUALITY				
Permit to Operate Plant No. 1179 for solid waste landfill operation, sewage sludge processing, and the landfill gas collection and flaring system	BAAQMD	Regulation 8, Rule 34—Control of Volatile Organic Compound Emissions from landfills	~~29 August 2002~~ Reissued annually	Will require revision to address increased emissions for landfill and traffic, green and wood waste processing, increased composting, stockpiles and alternative daily cover. May require revision to address the types and quantities of materials proposed for ~~to be~~ disposal. ~~ed at proposed Class II area (Area G).~~
Permit to Operate G# 8573 Gasoline Dispensing Facility	BAAQMD	Regulation 8, Rule 7—Gasoline Dispensing Facilities	~~May 2002~~Reissued annually	Renewed annually; will not require revision as a result of the project.
Authority to Construct, Application No.3540, for 3 Gas-Fired Electrical Generators	BAAQMD	Regulation 8, Rule 34-Solid Waste Disposal Sites; Regulation 9, Rule 1-Sulfur Dioxide; Regulation 9, Rule 8-Nitrogen Oxides and Carbon Monoxide from Stationary Internal Combustion Engines	July 18, 2002	Permit has expired. Will require new Authority to Construct and, after initial set-up period, a ~~a~~ Permit to Operate. ~~after initial start-up period.~~
Solid Waste Assessment Test Approval—Air Quality	BAAQMD	California Health and Safety Code §48505.5	1994	No further requirements.

TABLE 2-1 (Continued)
CURRENT PERMIT AND APPROVAL STATUS—REDWOOD LANDFILL

Permit Type	Permitting Agency	Permit Authority	Date of Permit	Revision
CEQA				
EIR Certification	Marin County Community Development Agency	CEQA, §2100 et. seq., of Public Resource Code	24 May 1994	EIR required to address changes in operations and proposed modifications relative to elements previously evaluated.
OTHER				
Section 10/404 Permit	U.S. Army Corps of Engineers	Clean Water Act Sections 10 and 404	6 January 1995	No further requirements.
Quarry Permit Q-76-01 (for adjacent parcel, State Mine I.D. 91-21-0001)	Marin County Department of Public Works	Marin County Code Chapter 23.06	16 April 1976	No revision required or requested.
LAND USE AND PLANNING				
Conditional Use Permit	Marin County Board of Supervisors	Marin County Land Use Plan	4 March 1958	No revision required or requested.
General Plan Consistency	Marin County Community Development Agency	Marin County Land Use Plan	Filed 27 March 1990	No revision required or requested.
Zoning Consistency	Marin County Community Development Agency	Marin County Land Use Plan	Filed 27 March 1990	No revision required or requested.
County Integrated Waste Management Plan Consistency	Marin County Community Development Agency Environmental Health Services	Marin County Office of Waste Management		Next periodic revision of Countywide Siting Element would need to be revised to reflect proposed changes in capacity at Redwood Landfill. NDFE would need revision to reflect changes in composting operations.
PUBLIC AND ENVIRONMENTAL HEALTH				
SWFP 21-AA-0001	LEA with concurrence from the CIWMB	Chapter 3 of Title 14 CCR—Minimum Standards for the Handling and Disposal of Solid Waste	28 July 1995	Revised permit required to incorporate proposed physical and operational changes.
Registration Permit 21-AA-0001-A	LEA with concurrence from the CIWMB	Chapter 3.1 of Title 14 CCR Compostable Materials Handling Operations and Facilities Regulatory Requirements	11 July 1996	Will require a Compostable Materials Handling Permit, pursuant to §17854 of Title 14 compostable materials regulations, promulgated 4 April 2003, and Title 27.

TABLE 2-1 (Continued)
CURRENT PERMIT AND APPROVAL STATUS—REDWOOD LANDFILL

Permit Type	Permitting Agency	Permit Authority	Date of Permit	Revision
GENERAL				
Onsite [Sewage] Holding Tanks (5) Permit No. 95-70	Marin County Community Development Agency Environmental Health Services	Marin County	2 February 1996	Septic system permit revisions will be required for the abandonment of the existing system at the current administration building. The applicant shall apply for permits for replacement sewage holding tanks at the new location of the administrative facilities.
Building Permits	Marin County Building Department	Marin County Code		Construction of buildings and other structures on the landfill will require plan review and a building permit
Grading Permit	Marin County Public Works Department	Marin County Code § 23.08		Grading permit is required for construction within the landfill property boundary.
Landfill Perimeter Clearance Statement	Novato Fire Protection District	Public Resources Code	1 October 1994	No revision required or requested.

BAAQMD	Bay Area Air Quality Management Board
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CIWMB	California Integrated Waste Management Board
CRWQCB	California Regional Water Quality Control Board
LEA	Marin County Community Development Agency; Environmental Health Services Division is the designated Local Enforcement Agency
EIR	Environmental Impact Report
NDFE	Non-Disposal Facility Element
NPDES	National Pollutant Discharge Elimination System
SWFP	Solid Waste Facilities Permit
SWRCB	California State Water Resources Control Board

2.4 LOCATION AND ACCESS

Redwood Landfill is located in Marin County approximately 4 miles north of the City of Novato and 7 miles southeast of the City of Petaluma (which is in Sonoma County) (see Figure 2-1). The site is accessible from a private access road off of U.S. Highway 101.

The facility is located on diked historic baylands along the western margin of the Petaluma Valley (see Figure 2-2). The valley is bordered by the Sonoma Mountains to the east and by other highlands, including Burdell Mountain, to the west. The facility is nearly surrounded by a network of manmade and natural sloughs, including San Antonio Creek, Mud Slough, West Slough, and South Slough.[1] All of these sloughs are tributaries of the Petaluma River, which flows into San Pablo Bay. The environmental setting of the site is described further in Chapter 3.

Redwood Landfill is situated on approximately 600 acres, of which only 420 acres are used for waste disposal and related operations. In the 420 acres, referred to as the 420-Acre Southern Area, a perimeter levee surrounds approximately 380 acres, the total area available for municipal solid waste and sewage sludge processing and disposal operations and composting operations. The 380-acre area includes approximately 60 acres referred to as the Oxbow, and 50 acres known as the Original 50-Acre Permitted Area, and an approximately 222.5~~3~~-acre area that is permitted for disposal (referred to herein as the landfill footprint).[2] In addition, the 380-acre area includes administration areas, drainage channels and runoff impoundments, a runoff detention basin, and other ancillary features. Current[3] land uses and facilities are shown in Figure 2-3.

2.5 PROJECT ELEMENTS

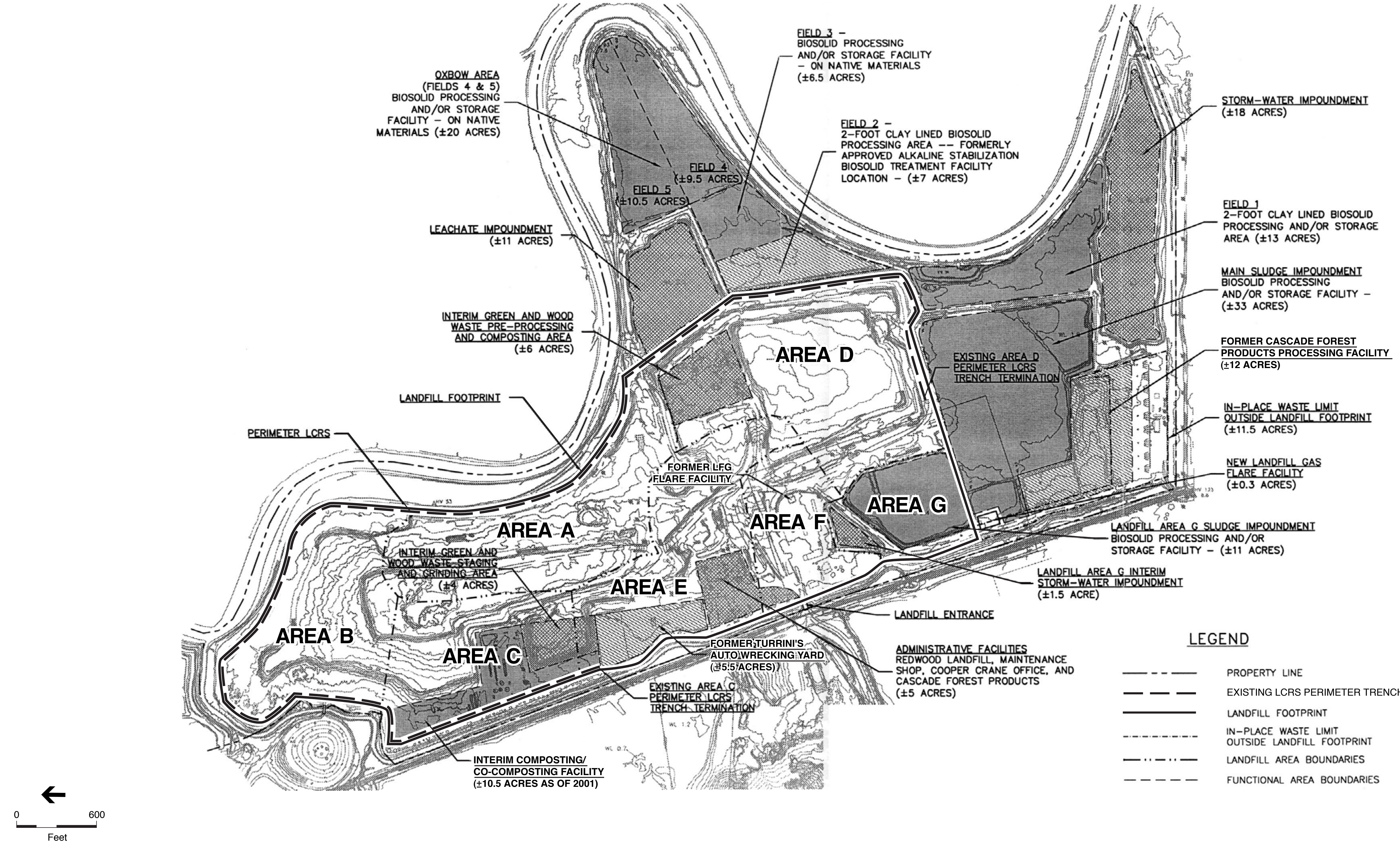
2.5.1 LANDFILL CAPACITY AND DESIGN

The applicant proposes ~~three~~ two changes to the basic physical design of the landfill. These are, 1) an increase in the total capacity of the landfill; and 2) changes to the landfill's final contours, including an increase in the steepness of landfill side slopes, an increase in the length of intervals between mid-slope benches, and a decrease in the width of the benches. This section also describes the applicant's intended use of Area G, a permitted area of the landfill that the applicant had formerly proposed for permitting and use as a Class II waste management unit. The applicant has now withdrawn this proposal and intends to use Area G as a Class III waste management unit. ~~; and 3) the use of "Area G," which is currently permitted as part of the Class III landfill, as a Class II waste management unit.~~

1 "South Slough" refers to the slough that runs along the southern boundary of the site, which is unnamed but commonly referred to as South Slough.

2 Although the 1994 FEIR and current SWFP state that the disposal area/landfill footprint is 210 acres, the most recent measurements of the landfill footprint indicate that it is 222.5 acres (Marin County, 1999a).

3 Land uses and facilities shown are current as of mid-year 2002; in general, minor changes to the interior configuration of an active, permitted landfill can occur regularly to accommodate ongoing fill operations.



SOURCE: Redwood Landfill, Inc., 1998

Figure 2-3
Existing Site Plan

INCREASE IN TOTAL CAPACITY OF LANDFILL

The applicant proposes to increase the total capacity of the landfill from the currently permitted 19.1 million cubic yards to 34.~~6245~~774 million cubic yards. This latter figure (34.~~6245~~744 million cubic yards) would represent *total* landfill volume; that is, the space between the landfill base, at –5 feet mean sea level, and the proposed final landfill grade. This space, known as "*airspace*" would accommodate the landfill lining system, waste placed in the fill, daily cover, intermediate cover, and final cover, so that the actual volume of waste placed in the landfill (*net* volume) would be considerably less than the *total* volume (see facility life expectancy calculations in Volume 2, Master Response 21~~Appendix A~~). The proposed total volume of 34.~~6245~~744 million cubic yards represents a substantial increase in the landfill's permitted capacity. As described in the following subsection, this increase would be achieved, not by increasing the footprint of the landfill,[4] nor by increasing the height of the landfill, but by changing the landfill contours, including an increase in the steepness of the side slopes, and a decrease in the width and frequency of the benches on the slopes. With the proposed increase in the average and peak amount of waste that can be landfilled each day (see Section 2.5.2, Waste Operations, below), the increase in capacity will extend the operating life of the landfill by at least thirteen ~~several~~ years, depending on the actual rate of fill (see Table MR21-1 in Volume 2)~~Appendix A~~).

The greater volume and mass associated with the proposed greater capacity of the landfill, given that the area to be landfilled and the landfill height will remain unchanged, means that the static and dynamic forces the landfill will exert on the underlying Bay Mud and the perimeter levee will be greater than those analyzed in the 1994 FEIR. Chapter 3 of this EIR evaluates the potential impacts on water quality and landfill stability of the proposed increase in landfill capacity. This evaluation is carried out in conjunction with the analysis of the proposed changes in the Leachate Collection and Removal System (LCRS). As described in Section 2.5.3, Environmental Controls, below, the applicant has already completed ~~begun~~ construction of the perimeter LCRS without reconstruction of the perimeter levee.~~, and proposes to continue construction of the LCRS with this new design~~. The stability analysis of the larger, steeper fill must take into account the structural characteristics of the re-designed LCRS, since the old design, which included reconstruction of the perimeter levee, was considered essential to landfill stability.

CHANGES IN LANDFILL FINAL CONTOURS AND FILL SEQUENCING

The proposed changes to the design of the landfill that will result in an increase in the landfill's total capacity include increasing the inclination of the landfill's slopes, narrowing the slope benches, and increasing the distance between benches. Benches are breaks in the slope that are used to flatten the effective slope, which increases slope stability, and to control surface run-off. The applicant proposes to increase the landfill's slopes from the currently permitted maximum of

[4] As discussed in the next subsection, the location and alignment of the toe of the landfill has been adjusted to accommodate the new perimeter levee design, as a result of which the permitted landfill footprint will require a minor adjustment. This realignment of the landfill toe was required to ensure the stability of the landfill slopes, would not substantively alter the landfill capacity (although it may account for a small part of the increase), and is not considered a discrete part of the project.

4:1 (four feet horizontal for each foot of vertical rise) to 3:1. Bench widths will decrease from the currently permitted widths of 25-100 feet to 25 feet, and the bench intervals (the vertical distance between benches) will increase from 15 feet to 50 feet (see Figures 2-4, 2-5, and 2-6).

The applicant is not proposing changes in the landfill's footprint (except as noted below regarding the toe of the final waste fill slope), nor in the final height of the landfill, but is proposing changes to the Fill Sequencing Plan, which describes how landfilling will progress around the site in order to achieve and maintain the stability of the landfill. These changes included a delay in the development of Areas E and F until the administration facilities and former landfill tenants were relocated. The lease for the last remaining tenant, Turrini's Auto Wrecking, terminated in May 2002 and filling in Area E subsequently commenced. ~~for a short time; at present, filling in Area E has ceased pending construction of the LCRS required for that area~~. Relocation of the administration offices is underway as of June, 2005. ~~has been planned to take place some time after the last tenant was relocated~~. Minor adjustment also have been made to the alignment and location of the toe of the final waste fill slope to ensure stability and accommodate the redesigned perimeter LCRS system. The project also includes a minor revision to the final slope of the top of the landfill, from the currently permitted 4 percent slope to a proposed range of 3-5 percent. A 4 percent slope may be expressed as 25:1 (i.e., twenty five feet of horizontal for each one foot of vertical rise); a 3 percent slope as 33:1, and a 5 percent slope as 20:1.

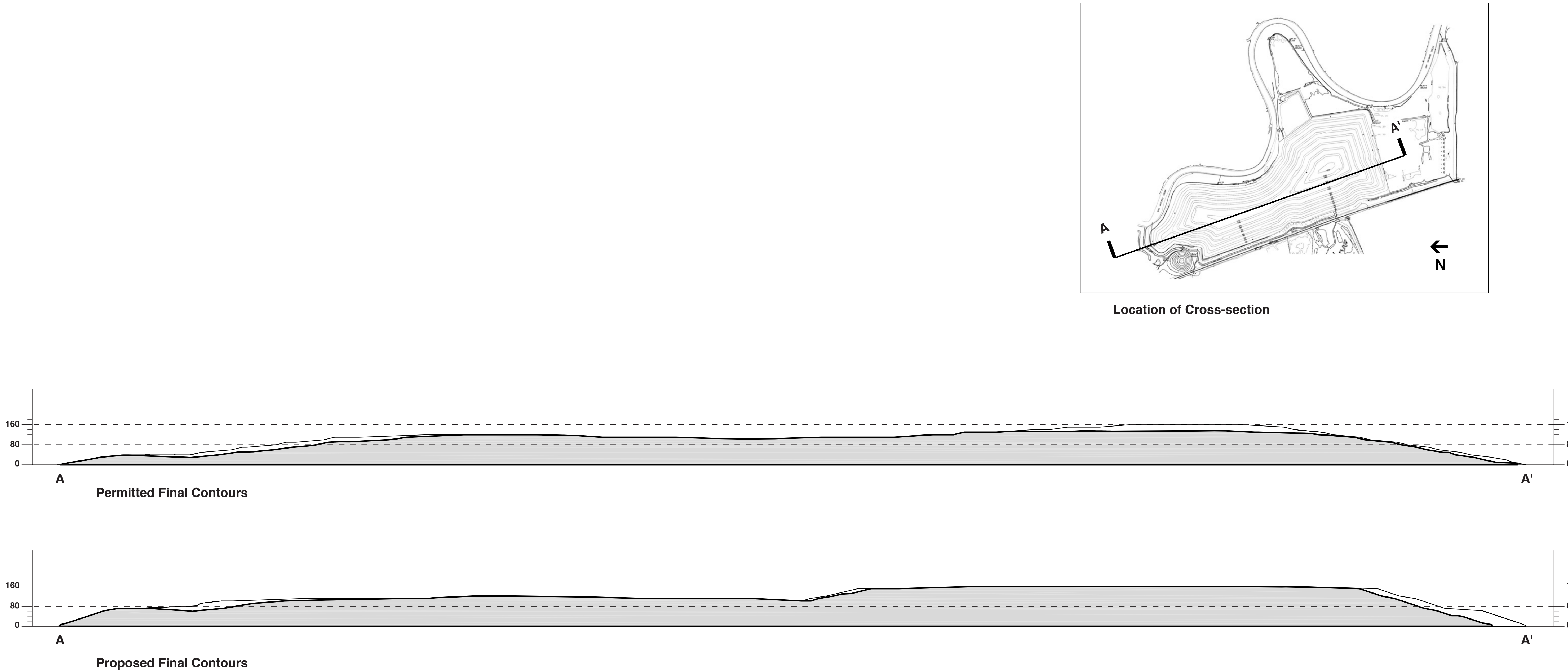
The proposed changes to the landfill's contours will result in a steeper-sided, more massive fill structure. This EIR evaluates the potential impacts that the proposed changes to the landfill's final contours and fill sequencing may have on landfill stability (especially given the already-completed ~~and proposed future~~ construction of the LCRS without reconstruction of the perimeter levee, discussed in Section 2.5.3, below); on groundwater and surface water quality and hydrology; and on visual resources.

USE OF AREA G ~~AS A CLASS II DISPOSAL SITE~~

Redwood Landfill is currently permitted as a Class III landfill.[5] This means that the landfill can accept only nonhazardous waste for disposal. Types of nonhazardous solid waste that may be accepted at the landfill include residential waste, agricultural waste, commercial waste, construction and demolition wastes, asbestos-containing material (material with less than 1 percent friable asbestos content), and tires. The RWQCB may also, at its discretion, allow Class III landfills to accept certain types of "designated waste." Designated waste is defined (in the California Water Code, §13173) as either: (1) nonhazardous waste that consists of or contains pollutants that, under ambient environmental conditions at a waste management unit could be released in concentrations exceeding applicable water quality objectives, or that could reasonably be expected to affect beneficial uses of the waters of the state as contained in the appropriate state water quality control plan; or (2) hazardous waste that has been granted a variance from hazardous waste management requirements pursuant to §25143 of the Health and Safety Code.[6]

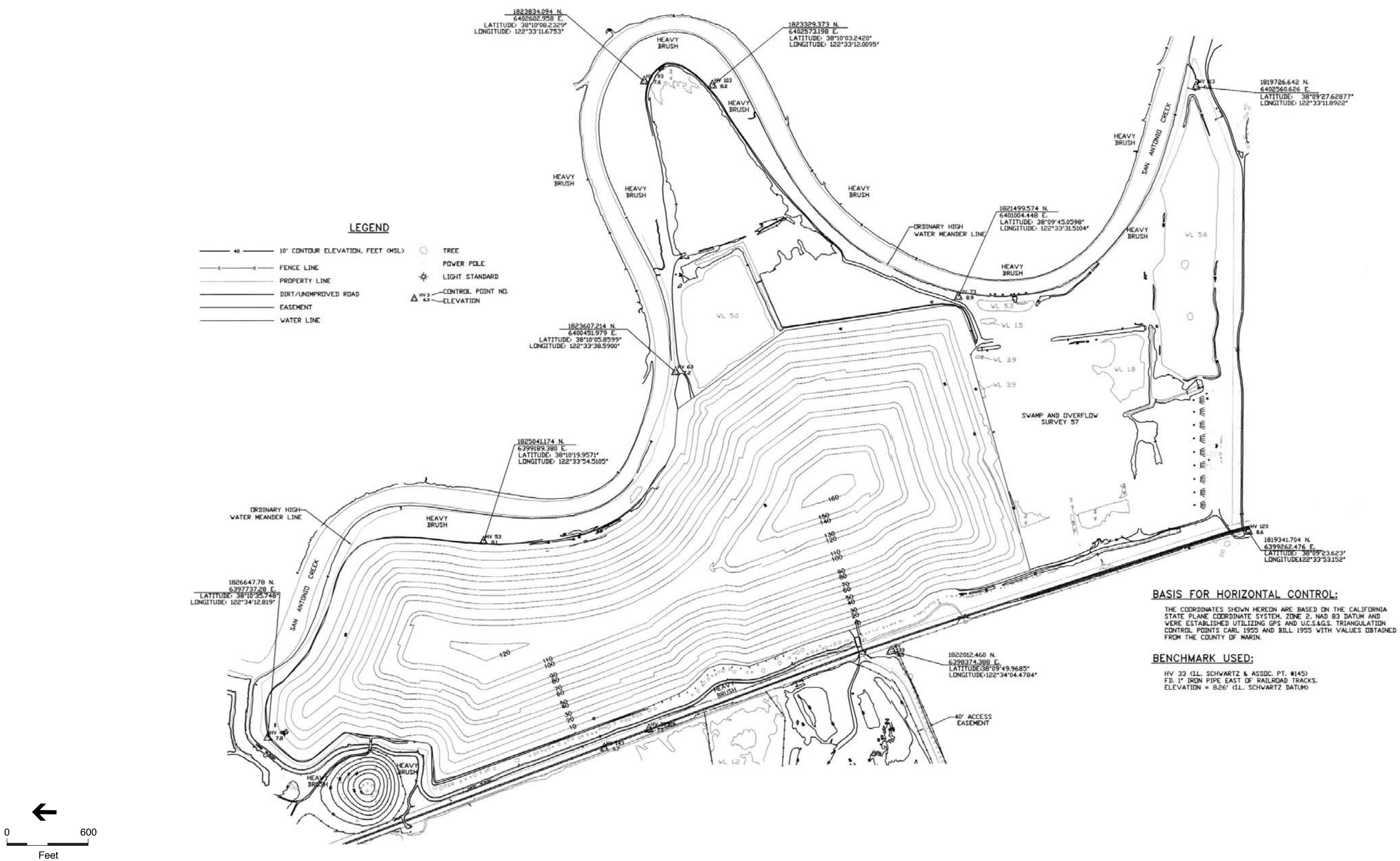
5 The facility also has areas outside of the permitted solid waste disposal area that are used for sludge processing, and a Class II waste management unit that holds leachate (the 11-acre leachate impoundment). See Figure 2-3.

6 Designated wastes that fall within the second definition are similar to "Special Wastes," which are defined in CCR Title 22 (Section 66260.10) as wastes that are hazardous only because they pose a chronic toxicity hazard if



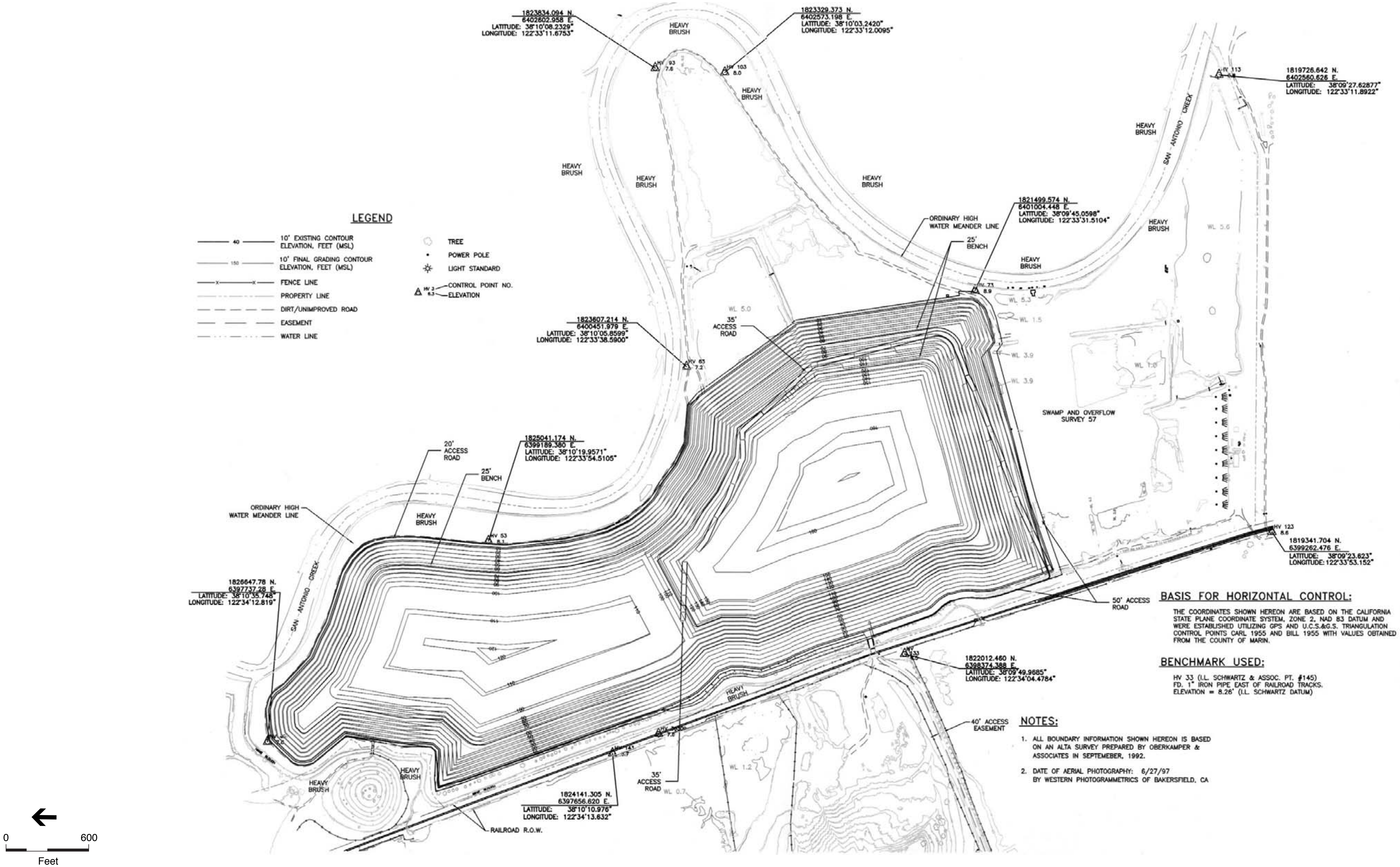
SOURCE: Redwood Landfill, Inc., GeoSyntec Consultants

Figure 2-4
Comparison of Currently Permitted
and Proposed Final Contours



SOURCE: Redwood Landfill, Inc., GeoSyntec Consultants

Figure 2-5
Permitted Final Contours
(Plan View)



SOURCE: Redwood Landfill, Inc., GeoSyntec Consultants

Figure 2-6
Proposed Final Contours
(Plan View)

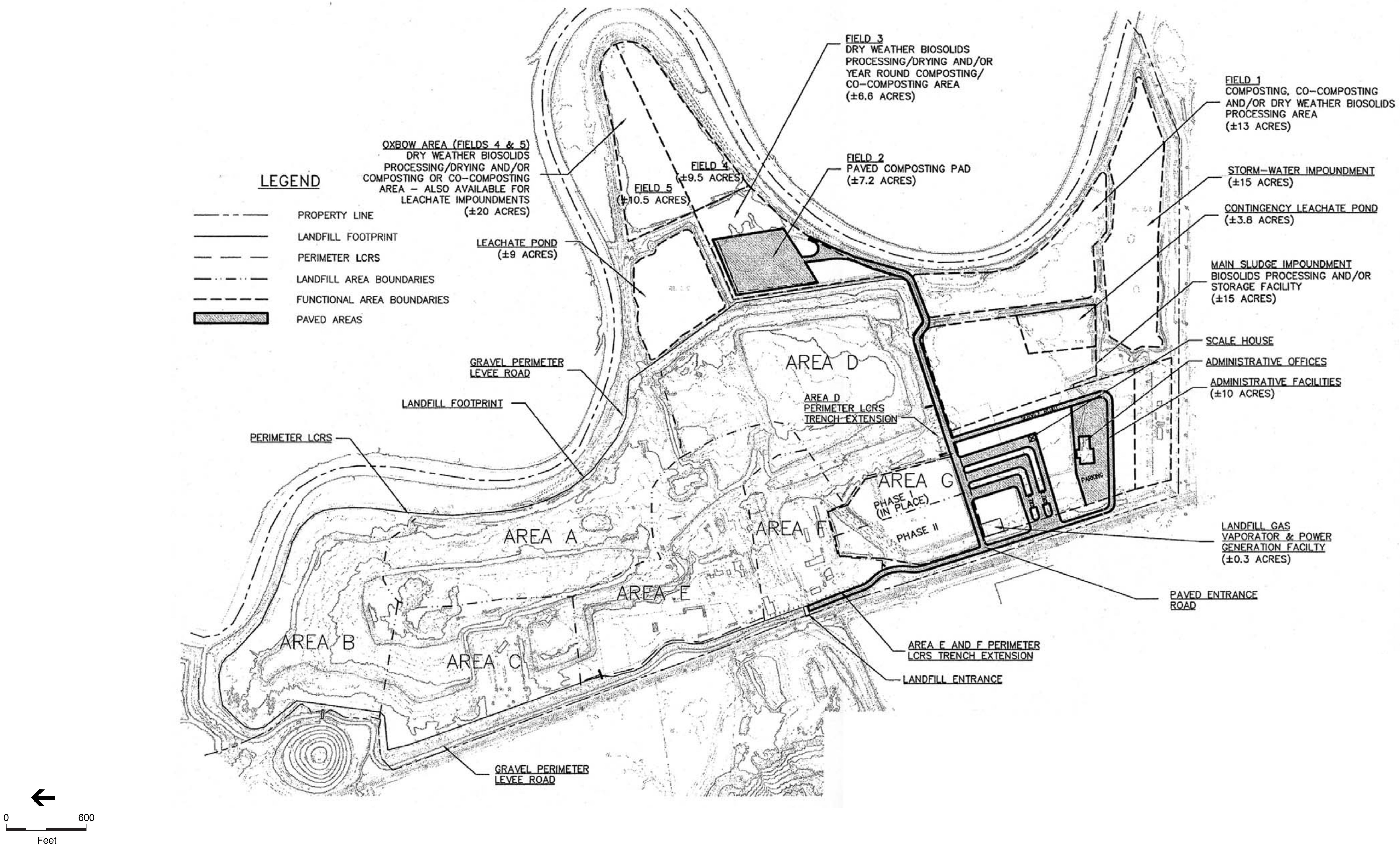
Designated wastes that may be accepted at RLI under the terms of the 1995 WDRs and the 1995 SWFP include dewatered non-hazardous sludge (generally containing at least 20 percent solids), and up to 20 tons per day of designated wastes other than sludge, including incinerator ash, grit and grease, storm drain cleanings, nonhazardous holding tank pumpings from food processing facilities, treated wood (e.g., telephone and power poles, pier docks), dredge and fill material, triple-rinsed chemical containers, and petroleum-contaminated soils that are permitted under waste acceptance criteria approved by the RWQCB. The RWQCB allows RLI to dispose all of these materials in the existing Class III landfill, as long as they meet the established waste acceptance criteria (see Appendix B).

The applicant formerly proposed~~s~~ to use the 14.5-acre Area G (refer to Figure 2-7, Proposed Site Plan) of the landfill, which currently is permitted as part of the Class III landfill, as a Class II cell. This would have required a revision of both the SWFP and the WDRs to re-classify Area G as a Class II waste management unit and to allow disposal of certain waste materials that are not acceptable in Class III landfills. Class II landfills have more stringent environmental controls necessary for safe disposal of certain designated wastes for which Class III facilities are inadequate. These controls include more stringent siting criteria and higher-standard liner systems. The applicant has, however, withdrawn this proposal, and now intends to use Area G as a Class III landfill, as originally intended.

~~Title 27 of the California Code of Regulations (§20310[b]) requires that "each Class II Unit ... be designed and constructed for the containment of the specific wastes which will be discharged." The applicant has proposed accepting for disposal in Area G municipal solid wastes, sludges, petroleum or chemically contaminated soils, or other designated wastes that exceed the constituent concentrations identified in item B.5 of the existing WDRs (see Appendix B) or that require, by regulations or private contract, the disposal of such waste into a composite lined waste management unit, but not including friable asbestos or petroleum-contaminated soils that exceed 50 parts per million of volatile compounds. The applicant has not made any more specific proposals regarding the types of wastes that they intend to accept for disposal in Area G.~~

~~Therefore, this EIR evaluates the consistency of the proposed design and construction of Area G with the state and federal regulatory standards for Class II units. The actual acceptance criteria for waste types, properties, and chemical concentration limits for placement in Area G would need to be written into the revised WDRs issued by the RWQCB. The BAAQMD also would address the handling and disposal of the more highly contaminated petroleum contaminated soils proposed to be received at Area G as a Class II unit, in its revision of the landfill's primary PTO.~~

About 11 acres of Area G formerly were used for sludge storage and processing, but all sludge has been removed from the site and this area is currently vacant. The remainder of Area G consists of a former 1.5 acre storm water pond (previously part of Area F) and approximately 2 acres used for a haul road (these components of the 14.5-acre area that now constitutes Area G are shown in Figure 2-3). The existing permitted design for the landfill calls for the entirety of Area G to be converted to a disposal area. ~~, and for landfilling to begin in this area in the near future~~. This is an essential component of the Fill Sequencing Plan, a major aim of which is to



SOURCE: Geosyntec Consultants,1998, Figure 6-1, modified by Environmental Science Associates

Figure 2-7
Proposed Site Plan
(Revised)

maintain the stability of the landfill. ~~The applicant has stated that construction of Area G for use as a landfill will begin under the terms of the existing permit, and that no designated waste requiring disposal in a Class II cell will be deposited there prior to project approval~~. ~~The applicant had requested permission from the RWQCB and the LEA to begin construction of Area G in June or July of 2001~~. Construction began in June 2003, with the approval of the RWQCB.

~~RLI has prepared and submitted to the RWQCB a design for using Area G as a Class II waste management unit (Geosyntec, 1997)~~. ~~The Area G design, which is considered a part of the project, has been developed to isolate waste from the surrounding environment, including the existing disposal area, and allows for containment, collection, and removal of leachate~~. ~~The design of the landfill containment system for Area G includes a geosynthetic membrane/clay liner system, and consists of the following elements:~~

~~In floor areas, a composite liner and leachate collection and removal system consisting of:~~

- ~~Prepared base grading/subgrade of excavated native materials or compacted fill;~~

- ~~6-inch minimum thickness capillary break/underdrain system, which provides a positive barrier to capillary rise and thus effectively separates ground water from the containment system. The capillary break/underdrain system would consist of a blanket layer of crushed and processed concrete, quarried granular material, or equivalent, encapsulated by an 8 ounce per square yard geotextile filter layer, and 6-inch diameter high density polyethylene (HDPE) perforated collection piping and granular bedding material;~~

- ~~24-inch minimum thickness compacted clay liner (CCL), with a hydraulic conductivity of 1×10^{-7} cm/s or less, which would act as the secondary liner in the composite liner system and thus reduce the potential for leakage or diffusion;~~

- ~~60-mil (60 thousandths of an inch) thick HDPE geomembrane liner over the CCL, which would act as the primary liner in the composite liner system and further reduce the potential for leakage or diffusion;~~

- ~~8 ounces per square yard geotextile cushion layer to protect the HDPE geomembrane from granular material in the LCRS;~~

- ~~12-inch minimum thickness leachate collection and removal system (LCRS) consisting of a blanket layer of granular material, with a minimum hydraulic conductivity of 1-cm/s (one centimeter per second) and 6-inch diameter HDPE perforated collection piping, to efficiently collect leachate on top of the composite liner system and transmit it to the leachate sump for removal;~~

- ~~8 ounces per square yard geotextile filter layer overlying the LCRS to prevent clogging of the drainage material by migration of fines from above; and~~

- ~~12-inch minimum thickness operations layer to protect the containment system during future waste placement.~~

~~In side slopes, a composite liner and leachate collection and removal system consisting of:~~

- ~~compacted general fill or excavated existing soil embankment forming the prepared subgrade;~~

- ~~geocomposite (geotextile/geonet/geotextile) capillary break/underdrain system~~. ~~The geonet would be sandwiched between two geotextile layers, each 8 ounces per square yard, and would have a minimum transmissivity of 1 x~~ ~~10^{-5} m^2/s~~. ~~This would provide a positive barrier to capillary rise and thus effectively separate ground water from the liner system;~~

- ~~a 24-inch minimum thickness compacted clay layer (CCL) with a hydraulic conductivity of 1 x~~ ~~10^{-7} cm/s or less, which would act as the secondary liner in the composite liner system and thus reduce the potential for leakage or diffusion;~~

- ~~60-mil thick HDPE geomembrane liner over the CCL, which would act as the primary liner in the composite liner system and further reduces the potential for leakage or diffusion;~~

- ~~8 ounces per square yard geotextile cushion layer to protect the HDPE geomembrane from operations layer material;~~

- ~~12-inch minimum thickness leachate collection and removal system (LCRS), consisting of a blanket layer of granular material, with a minimum hydraulic conductivity of 1 cm/s, to efficiently collect leachate on top of the composite liner system and transmit it to the leachate sump for removal;~~

- ~~8 ounces per square yard geotextile filter layer overlying the LCRS to prevent clogging of the drainage material by migration of fines from above; and~~

- ~~12-inch thick operations layer to protect the containment system from exposure to the elements and during future waste placement.~~

~~Leachate collected from the Area G LCRS would be pumped via HDPE force mains to a leachate vaporator system located at the landfill gas flare facility (see discussion under Section 2.5.3, below)~~. ~~The blanket LCRS system, which would be constructed over the composite liner, would drain into sumps in the interior of the cell~~. ~~The sub-drain system would be constructed below the entire cell's footprint~~. ~~This sub-drain system would act as the perimeter LCRS for Area G, and would also provide a mechanism for relieving pore pressure and consolidation water developed due to the loading of the waste mass as landfill development progresses. The existing perimeter LCRS would be connected to the Area G sub-drain system at the cell's southeastern and northwestern limits, where the cell diverges inward from the permitted landfill footprint (see Proposed Site Plan, Figure 2-7).~~

~~Chapter 3 of this EIR evaluates the potential health risks and potential impacts to air quality and water quality of using Area G as a Class II waste management unit.~~

2.5.2 WASTE OPERATIONS

The project includes several changes to the operation of Redwood Landfill, as currently allowed in the 1995 SWFP. These operational changes include 1) changes in the quantity and type of waste materials received for disposal; 2) use of additional materials, or combinations of materials, as alternative daily cover (ADC); 3) changes in the processing of sewage sludge; 4) changes to the existing composting operation, including an increase in the scale of the composting facility, and use of additional materials as compost feedstock; 5) changes in equipment used on site; and 6) an increase in the number of vehicles permitted to enter the site each day.

CHANGES IN QUANTITY AND TYPE OF MATERIALS RECEIVED

The applicant proposes the following changes in the quantity and type of materials that could be received at the landfill:

- an increase in peak and daily average receipt of solid waste;
- a decrease in peak and daily average receipt of non-hazardous sludge (also called Class B biosolids);
- an increase in the amount of designated wastes (including petroleum contaminated soil meeting RWQCB acceptance criteria for contaminant concentration) already permitted for acceptance at the landfill; ~~the acceptance of unspecified liquid and/or solid designated wastes, including municipal solid wastes, sludges, petroleum- or chemically-contaminated soils, or other designated wastes exceeding the constituent concentrations identified in the facility's existing WDRs (not including friable asbestos or petroleum-contaminated soils that exceed 50 parts per million of volatile compounds) (to be placed in Area G, which, as discussed above, would be developed as a Class II waste management unit);~~
- ~~an increase in peak daily receipt for recyclable materials,~~ an increase in peak and average daily receipt of materials for composting, and the addition of food waste to be used for composting; and
- an increase in the amount of ~~petroleum-contaminated soil meeting the RWQCB's contaminant concentration criteria for disposal in the Class III landfill and~~ clean soil ~~(both~~ for use as cover material~~)~~.

Table 2-2 describes in more detail the currently permitted quantity of each type of material accepted at the landfill, and the changes proposed under the project. Originally, the applicant had proposed phasing in the increase in material receipts over a two-year period following issuance of a new permit, but later modified their proposal to eliminate this phasing (Roycroft, 2002).

USE OF VARIOUS MATERIALS FOR ALTERNATIVE DAILY COVER (ADC)

The applicant proposes using the following materials as Alternative Daily Cover (ADC):

- green waste/wood waste,
- dried sludge,
- wet sludge mixed with soil,
- wet sludge mixed with greenwaste, and
- compost.

ADC is any non-soil material used for covering waste deposited in a landfill at the end of each working day, that meets regulatory requirements (Title 27 CCR, §20690**)** and the approval of the LEA. Use of ADC has several advantages. It replaces soil, which is normally used for daily cover. Soil is in short supply at some landfills, and must be imported at high cost and with related

~~TABLE 2-2~~
~~PERMITTED AND PROPOSED TYPES AND QUANTITIES OF MATERIALS~~
~~(Tons Per Day)~~

Material Type	Currently Permitted		Proposed		Change	
	Average	Peak Day	Average	Peak Day	Average	Peak Day
Landfilled						
Non-hazardous general waste [1]	N/S	1,270	1,350	1,900	N/A	630
Non-hazardous sludge (Class B biosolids) for direct disposal or to main impoundment [1]	550	1,000	71	160	479	840
Class II petroleum contaminated (PC) soil (not meeting RWQCB criteria) [2]	N/S	N/S	500	1,000	500	1,000
Other designated wastes (including PC soil meeting RWQCB waste acceptance criteria) [2]	N/S	20	200	500	N/A	480
Total Landfilled Waste	**N/S** [3]	**2,290**	**2,121**	**3,560**	**N/A**	**1,270**
Recycable. Reusable, Compostable						
Non-hazardous separated or commingled materials (not including green/yard/wood waste, PC soils, or clean soils)[4]	10	10	10	20	0	10
Compostable						
Green/yard/wood waste (includes material for composting and ADC)[5]	42	238	400	700	358	463
Biosolids (Class B) (for composting)[5]	84	307	82	185	-2	123
Food Waste[6]	-	-	32	60	32	60
Subtotal: Compostable[7]	126	545	514	945	388	400
Materials used for interim, daily, and alternative daily cover						
Petroleum contaminated (PC) soil meeting RWQCB criteria (for ADC)[8]	N/S	N/S	640	800	640	800
Clean soil (for cover)	0	0	500	800	500	800
Biosolids (Class B) (for ADC)[9]	N/S	N/S	47	106	47	106
Subtotal Cover Materials[10]	550	1,000	1,187	1,706	N/A	N/A
Total Recyclable, Reusable, Compostable	**N/A**	**555**	**1,711**	**2,670**	**N/A**	**2,116**
TOTAL	**N/A**	**2,845**	**3,832**	**6,230**	**N/A**	**3,385**
Total biosolids (Class B) for all purposes - Full and Registration Tier SWFPs - (for purpose of comparison)	634	1,307	200	450	434	857

TABLE 2-2 (Revised)
PERMITTED AND PROPOSED TYPES AND QUANTITIES OF MATERIALS
(Tons Per Day)

Material Type	Currently Permitted		Proposed		Change	
	Average	**Peak Day**	**Average**	**Peak Day**	**Average**	**Peak Day**
Landfilled						
Non-hazardous general waste [1]	N/S	1,270	1,850	1,850	N/A	580
Non-hazardous sludge (Class B biosolids) for direct disposal or to main impoundment			100	100	100	100
Class II petroleum contaminated (PC) soil (not meeting RWQCB criteria) [2]	N/S	N/S	0	0	0	0
Other designated wastes (including PC soil meeting RWQCB waste acceptance criteria) [2]	N/S	20	200	200	N/A	180
Total Landfilled Waste	**N/S** [3]	**1,290**	**2,150**	**2,150**	**N/A**	**860**
Recycable. Reusable, Compostable						
Non-hazardous separated or commingled materials (not including green/yard/wood waste, PC soils, or clean soils)[4]	10	10	10	10	0	0
Compostable						
Green/yard/wood waste (includes material for composting and ADC)[5]	42	238	400	400	358	162
Biosolids (Class B) (for composting)[5]	84	307	82	82	-2	-225
Food Waste[6]	-	-	32	32	32	32
Subtotal: Compostable[7]	126	545	514	514	388	-31
Materials used for interim, daily, and alternative daily cover						
Petroleum contaminated (PC) soil meeting RWQCB criteria (for ADC)[8]	N/S	N/S	640	800	640	800
Clean soil (for cover)	N/S	N/S	500	800	500	800
Biosolids (Class B) (for ADC)[9]	424	455	50	50	-500	-950
Subtotal Cover Materials[10]	424	455	1,190	1,650	1,190	N/A
Total Recyclable, Reusable, Compostable, and Cover Material	**560**	**1,010**	**1,714**	**2,174**	**N/A**	**1,619**
TOTAL	**N/A**	**2,300**	**3,864**	**4,324**	**N/A**	**1,479**
Total biosolids (Class B) for all purposes - Full and Registration Tier SWFPs - (for purpose of comparison)	550	1,000	232	232	-318	-768

TABLE 2-2
PERMITTED AND PROPOSED TYPES AND QUANTITIES OF MATERIALS
(Tons Per Day)

Key: N/A: Not applicable; N/S: Not specified in permits

Note: Some totals may not sum due to rounding.

1~~1~~ ~~Current SWFP specifies 1000 (550 daily average) TPD of non-hazardous sludge under "landfilled materials only." However, the project record indicates these quantities were to be stabilized (alkaline treatment) and used as ADC or in co-composting, not landfilled. Quantities for co-composting are specified in the Registration Permit (and in note 5, below). Total permitted and proposed biosolids receipts for all purposes are presented at the end of this table.~~ Applicant's revised proposal shifts 500 TPD (peak and average) to MSW (referred to as "Class III waste") from amount previously proposed as designated waste "to replace previous Class II waste proposal;" see comment K-58.

2 Petroleum-contaminated soils are included in the SWFP list of permitted designated wastes; the permitted peak daily tonnage for all designated waste is 20 tons. Therefore, for calculating change from existing, "non-specified" for PC soils alone is assumed to be "0" tons to avoid double counting. RWQCB waste acceptance criteria refers to the criteria specified in Redwood Landfill's current WDRs (see Appendix B).

3 Current (actual) average for landfilled materials is approximately 1200 TPD. (Refer to site-life calculations in Appendix A.)

4 Includes concrete and asphalt; newspapers, cardboard, glass, and aluminum; used motor oil; auto batteries; white goods; and scrap metal.

5 Peaks for existing composting operation based on Peak Loading volumes in Registration Permit (950 cy/day green waste and 350 cy/day biosolids), converted to weight (for consistency and comparison) using conversion factors in the Report of Composting Site Information (1998) (i.e., 1.14 cy/ton of (wet) biosolids; 4 cy unprocessed green waste/ton). Currently permitted average daily tonnage derived from permitted annual loading (up to 52,000 cy green waste and up to 35,000 cy biosolids, assuming a 312-day year (6 days/week) for green waste, a 365-day year for biosolids, and the aforementioned volume-to-weight conversion factors.

6 Average daily based on total of 10,000 tons per year (Roycroft, 2002), assuming a 312-day year.

7 Subtotal includes green waste also used for ADC.

8 Petroleum-contaminated soil meeting RWQCB waste acceptance criteria is currently included in SWFP under designated waste, and accounted for above; therefore, for calculating change from existing, "non-specified" here is assumed to be "0" tons to avoid double counting.

9 Current SWFP specifies 1,000 (550 daily average) TPD of non-hazardous sludge under "landfilled materials only." However, the project record indicates these quantities were to be stabilized (alkaline treatment) and used as ADC or in co-composting, not landfilled. The portion of this total permitted to be used in co-composting is specified in the Registration Permit (and in note 5, above). The total permitted and proposed biosolids receipts for all purposes is 550 average and 1,000 peak TPD, as shown in this line.
~~No amount of biosolids is specified for use as ADC in existing permits, although, as discussed in note /1/, the project record suggests the amount listed for landfilling (in the SWFP and in this table) was intended for use as ADC and co-composting. Since that amount is shown as in the current permit, this line assumes "0" permitted for ADC to avoid double-counting permitted quanities.~~

10 Subtotal does not include green waste used for ADC; total incoming green waste is presented under "compostable" materials.

SOURCES: SWFP (Marin County, 1995); Joint Technical Document (GeoSyntec, 1998); Report of Composting Site Information (RLI, 1998); Glen Roycroft, P.E., Waste Management, Inc., letter to Daniel Sicular, Environmental Science Associate, August 23, 2002; Meserve, 2004.

environmental and traffic impacts. ADC is a beneficial use for some materials that may not be marketable or otherwise usable after recovery. The State of California's Integrated Waste

Management Board considers ADC "diversion" for the purposes of compliance with AB 939, the California Integrated Waste Management Act. This means that use of most materials as ADC "counts" toward cities' and counties' state-mandated goal (to have been accomplished by the year 2000) of reducing the amount of wastes landfilled by 50 percent.

The 1995 SWFP allows RLI to use alkaline-stabilized sludge containing at least 50 percent solids as ADC. In 1995, Marin County Environmental Health Services (the LEA) and the RWQCB approved for a six-month demonstration the use of air-dried sludge, wet sludge mixed with soil, and wet sludge mixed with shredded green material as ADC. In 1996, the LEA, finding the project adequately demonstrated the suitability of these materials as ADC, approved the continued use of these materials as ADC, "…until such time as the SWFP is revised" (Janofsky, 1996). This project component would allow RLI to continue to use these materials as ADC on a long-term basis.

RLI's current practices, which would be continued under the project, involve mixing green waste and wood waste materials with wet sludge at an approximate ratio of 2:1 by volume (green waste and wood waste to sludge) to create a material suitable for use asADC. Mixing takes place, and would continue to take place, on an impermeable pad with leachate and storm water containment in place. RLI also currently accepts up to 20 tons per day of petroleum contaminated (PC) soils that meet Regional Water Quality Control Board (RWQCB) criteria for contaminant concentrations, and uses this material for ADC. The applicant proposes to increase the amount of PC soils that meet these criteria to 640 tons per day average and 800 tons per day peak, and to use this material for ADC.

This EIR evaluates the potential environmental impacts, including impacts on air quality and water quality, of using the various proposed materials, including the increased volume of PC soils that meet RWQCB criteria, as ADC. ~~While the applicant proposes to accept petroleum contaminated soils with higher petroleum concentrations for disposal in Area G, the proposal does not include use of these soils as ADC. Therefore, use as ADC of petroleum contaminated soils with constituent concentrations that exceed RWQCB criteria is not considered part of the project, and is not analyzed in this EIR.~~

CHANGES IN SLUDGE PROCESSING

The 1995 SWFP allows RLI to accept and process up to 1,000 tons per day maximum, and 550 tons per day average, of non-hazardous sewage sludge. Sewage sludge, which is also called "biosolids" when it is put to beneficial use, is the solid constituent of treated wastewater, and is produced at municipal and other wastewater treatment plants. Few Bay Area landfills are permitted to accept sewage sludge in large quantities, and RLI has for some time been the primary disposal site for sewage sludge from the region. Recently, the United States Environmental Protection Agency (U.S. EPA) approved other disposal alternatives (such as landspreading) for sewage sludge meeting specified minimum requirements, and the quantity of sewage sludge disposed at RLI has decreased.

The 1995 SWFP allows RLI to process sludge by air drying only until 1996. For several years beginning in 1991, RLI used a chemical fixation process known as "N-Viro" for processing sludge prior to disposal or use as ADC. The N-Viro process incorporates the use of by-products from the cement industry (cement kiln dust and alkaline by-products) to pasteurize and stabilize sludge pathogens and odors that remain after wastewater treatment. The 1995 SWFP requires RLI to conduct the N-Viro process in a ventilated building with an odor control system.

Despite this requirement, RLI never fully implemented the N-Viro process: N-Viro was used only on a pilot basis, and the ventilated building and odor control system were never constructed. RLI has now discontinued use of the N-Viro process, and proposes to abandon this processing method altogether. RLI proposes to accept a reduced quantity of sewage sludge, and to process it by the following methods:

- Air drying, for two consecutive spring seasons following permitting of the process, with no further air drying after that time. Air drying would be used to deplete RLI's existing stockpile of wet sludge, which is contained in the Main Sludge Impoundment. Air-dried sludge would be used as ADC. Air drying is accomplished by broadcast spreading and turning for approximately 3-4 days until the sludge reaches 50 percent solids. Air drying is proposed at the rate of about 3,000 wet tons per day (600 dry tons) for the period from late April through June, a period of typically dry weather when winds are favorable to avoid potential odor problems. Also, in order to control odors, RLI proposes to apply a potassium permanganate solution to the surface of the material when it is drying, and to apply an odor counteractant liquid as a vapor phase spray in the sludge drying area. RLI also proposes to use other unspecified odor control technologies in the future.

- Direct disposal of wet sludge in the Class III disposal area consistent with current RWQCB approvals. In 1995, the RWQCB allowed RLI to dispose of wet sludge (20 percent solids) in the landfill at a ratio of one part wet sludge to 9.5 parts municipal solid wastes, in order to maintain a minimum solid to liquids ratio of 5:1 by weight (Kolb, 1995).

- Mixing of wet sludge with soil, ground green waste, and/or ground wood waste for use as ADC.

- Composting of wet sludge with green waste and other materials (co-composting).

Sludge accepted at the site and not immediately processed by direct disposal, use as ADC, or co-composting would be placed temporarily in the Main Sludge Impoundment, as is the current practice (see Figures 2-3 and 2-7).[7] This area is underlain by approximately 20-30 feet of native, low-permeability Bay Mud (GeoSyntec, 1998). Contact water from the Main Sludge Impoundment would be pumped to the 11-acre leachate impoundment (a Class II waste management unit) for storage, as is the current practice.

This EIR evaluates the potential environmental impacts on air quality (emissions of odors and volatile organic compounds), and water quality (groundwater and surface water quality) of RLI's proposal to alter its sludge processing and disposal methods. Because a mitigation measure specified in the 1994 FEIR for reduction of emissions from sludge drying (the use of the N-Viro process) was never fully implemented, the impact identified in the 1994 FEIR regarding

7 A comparison of the existing and proposed site plans indicates that the size of the Main Sludge Impoundment would be reduced under the project from its current size of 33 acres to 29 acres, according to figures provided by the applicant (GeoSyntec, 1998).

emissions of volatile organic compounds was never mitigated. Therefore, this EIR assumes that the impact from the previous project remains.

CHANGES IN COMPOSTING OPERATIONS

Composting is the controlled biological decomposition of organic wastes into a stable product that can be used as a soil amendment, a soil substitute, or a mulch. Composting involves blending materials to achieve a moisture level and a chemical composition that are optimal for the profusion of certain bacteria, which hasten decomposition of the material. Composting falls into two broad categories, depending on the type of bacteria involved. Anaerobic composting involves anaerobic bacteria, which thrive in low-oxygen environments. It is a low-heat, relatively slow process. Gaseous emissions from anaerobic composting include hydrogen sulfide, which produces a typical “rotten egg” odor, and methane, which is an inflammable gas. Anaerobic composting is often used for treatment of raw sewage.

Aerobic composting employs the services of aerobic bacteria, which thrive in the presence of oxygen.[8] The gaseous emissions of aerobic composting piles consist primarily of carbon dioxide and water vapor; properly managed piles do not emit foul odors. The rapid metabolic activity of these bacteria produces heat, and aerobic composting piles may reach temperatures as high as 170 degrees Fahrenheit. The high heat in the piles pasteurizes the compost and kills weed seeds; properly produced compost is a nearly sterile product. As a soil amendment, compost increases moisture holding capacity, increases cation exchange capacity (the ability of plants to take up nutrients from the soil), and builds soil tilth (the capability of soil to be tilled and cultivated, and the soil’s ability to support plant growth). Co-composting is composting that uses as a feedstock sewage sludge biosolids, as well as other waste products such as ground green waste or wood waste. Co-composting usually utilizes an aerobic composting system.

Prior to April 2003, composting facilities (including co-composting) in California were permitted by the State CIWMB and the local LEA under a tiered permitting structure that consisted of five tiers, including “Registration” and “Standardized” tiers, as well as the full Solid Waste Facilities Permit (SWFP). The types of feedstocks accepted at a facility and the volume of material stockpiled and processed determined under which tier a facility would come. Under revised composting regulations promulgated by the CIWMB on April 4, 2003, there are essentially two divisions: a composting operation that has up to 12,500 cubic yards of feedstock, compost or chipped and ground material on-site is required to comply with LEA notification requirements and to be inspected by the LEA at least once every three months, and a composting operation with more than 12,5000 cubic yards of material on site is required to obtain a “Compostable Materials Handling Facility Permit.” Facilities with an existing Registration or Standardized Permit may continue to operate in accordance with its permit until the LEA conducts a permit review and determines that that the Compostable Materials Handling Facility Permit is required.

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8 Within modern landfills, organic materials undergo an initial period of aerobic decomposition until the oxygen in the landfill is exhausted, after which anaerobic decomposition occurs. In a properly constructed and managed landfill, however, low moisture levels inhibit all decomposition, and organic materials tend to desiccate.

Until recently RLI operated a co-composting facility under the terms of a separate “Registration Tier” solid waste facilities permit issued by the LEA in 1996 (see Figure 2-8).[9] The terms of RLI’s Registration Permit included:

- Use of green waste, wood waste, and Class B biosolids (sludge) as feedstocks. Biosolids are classified under federal regulations (40 CFR, Part 503) as “Class B” if pathogens are detectable, but have been reduced to levels that do not pose a threat to public health and the environment as long as actions are taken to prevent exposure to the biosolids after their use or disposal. Properly managed aerobic composting further reduces the pathogens in biosolids to non-detectable levels.

- Maximum of 10,000 cubic yards of active compost and feedstock on site at any give time.

- Maximum of 1,300 cubic yards of feedstock received in one day, including up to 950 cubic yards of green waste and up to 350 cubic yards of Class B biosolids. (For purposes of comparison with proposed tonnages, these volumes translate to roughly 238 tons per day of green waste and 307 tons per day of biosolids, for a total peak daily throughput of 545 tons, based on volume-to-weight conversion factors[10] presented in RLI’s Report of Composting Site Information [1998]. Note also that the biosolids receipts for composting are considered within – and not in addition to – the total amount permitted for acceptance at the landfill each day – 550 tons per day average and 1,000 tons per day peak.)

- Annual upper limit of 87,000 cubic yards of feedstock, including 52,000 cubic yards of wood and green waste and 35,000 cubic yards of Class B biosolids. This equals 167 cubic yards daily average of green waste (assuming 312 operating days per year) and 96 cubic yards daily average of biosolids, assuming 365 operating days. Using RLI’s volume to weight conversion factors this is roughly equivalent to 42 tons per day of green waste and 84 tons per day of biosolids

- Use of admixtures (materials added at the end of the composting process to improve the characteristics of the material as a soil amendment or fertilizer) up to 10,000 tons (40,000 cubic yards) per year (308 cubic yards per day peak).

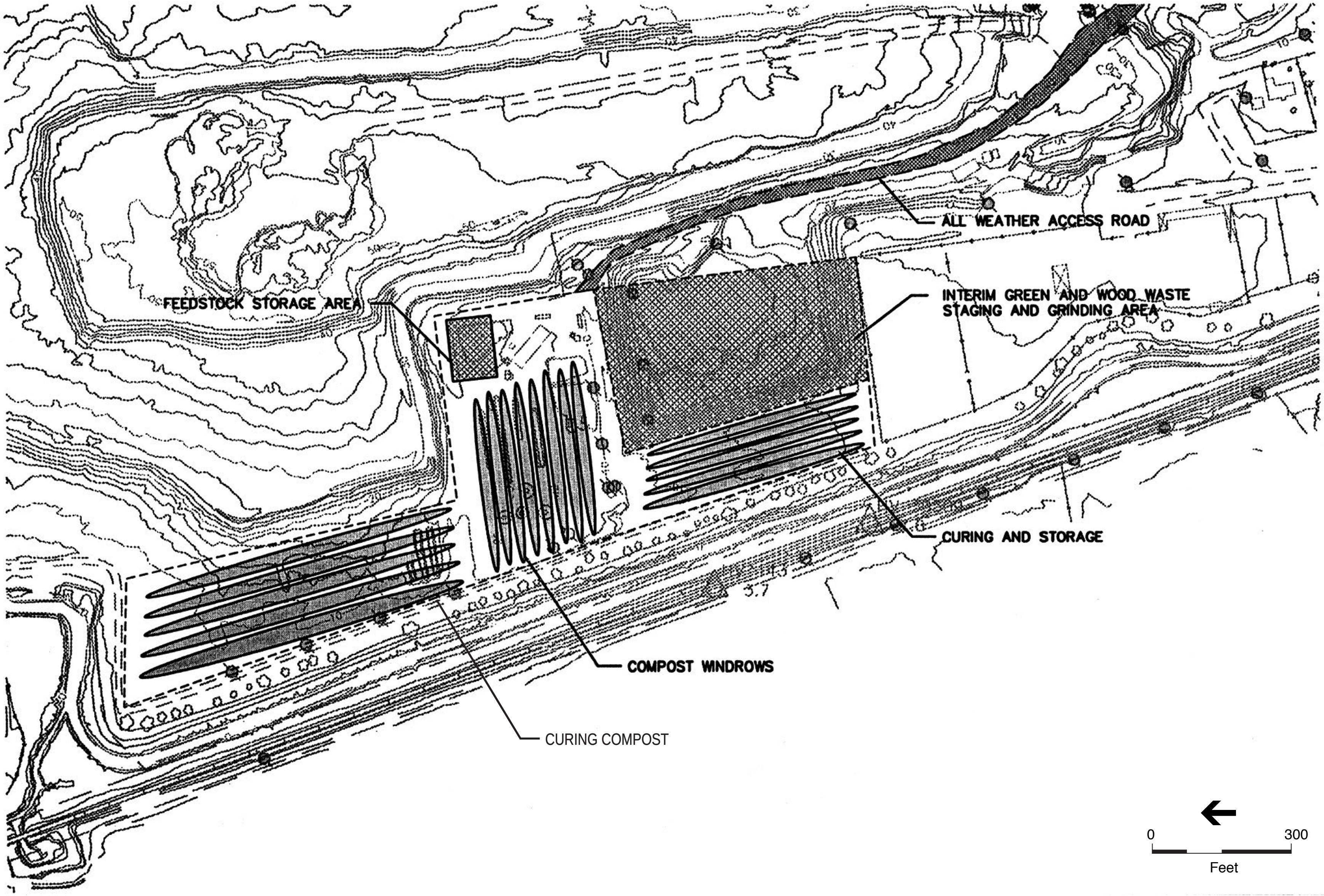
- Permitted size of the composting facility is 50 acres, with an operating area of 15 acres.

- Hours of operation of the compost facility are Monday through Friday, 6:00 am to 9:00 pm, and Saturday 7:00 am to 4:00 pm. The greenwaste drop-off area at the landfill is open to the general public the same hours as the landfill (as specified in the landfill’s SWFP): 7:00 am to 3:00 pm weekdays, 8:00 am to 3:30 pm Saturdays.

- Maximum of five incoming vehicles and fifteen outgoing vehicles per day (i.e., 20 round trips or 40 one-way trips per day, since different-size vehicles would carry feedstock and finished product).

9 According to the LEA, RLI ~~in the past year RLI has~~ filled ~~half~~ the acreage of the compost pad, but has constructed a new pad in Field 2 in the Oxbow area, which is consistent with the revised proposed site plan (Figure 2-7) ~~and has yet to construct the equivalent elsewhere~~. ~~Therefore the terms and conditions of the 1996 Registration Permit currently are not valid with respect to the availability of a compost pad meeting specified standards.~~

10 The volume-to-weight conversion assumes 4 cubic yards per ton of green waste and 1.14 cubic yards per ton of biosolids.



SOURCE: GeoSyntec Consultants, 1998

NOTE: Interim Composting/Co-Composting Facility Layout as shown in Joint Technical Document.

Figure 2-8
Interim Composting/
Co-Composting Facility Layout

In addition, the 1995 WDRs for the landfill stipulate that co-composting operations using nonhazardous sludge may be permitted provided that co-composting takes place on a surface with a composite liner or clay liner and with a leachate collection and removal system.

As part of the project, the applicant proposes to operate the composting facility at a scale of operations that would, until recently, have required a higher-tier permit known as a Standardized Permit. Standardized Permits were used for larger facilities and for facilities that handled a broader range of feedstocks than were allowed under Registration Permits. Under the revised composting regulations (14 CCR §17857.1), the increased composting volume proposed as a project component would require a "Compostable Materials Handling Facility Permit," which is equivalent to a full Solid Waste Facilities Permit.

The basic operation of the composting facility would not change. Currently, the facility processes two separate composting streams: one consisting of green waste and wood waste only, and a second consisting of green waste and wood waste mixed with sewage sludge biosolids. In the green waste and wood waste composting process, these materials are ground, mixed, and moisture conditioned, then placed in windrows, or elongated piles, where active composting takes place. The piles are turned periodically during active composting to ensure that there is sufficient oxygen to maintain aerobic activity, and to subject all of the material in the pile to the highest heat in the center. Following the active phase of composting, materials are stacked in a separate pile to allow them to "cure" (complete the biological and chemical processes involved in decomposition), and then screened to remove oversized material. RLI markets finished compost to bulk buyers such as landscapers and topsoil blenders.

The second composting stream, which includes biosolids, is known as co-composting. The co-composting process is similar to that used for green waste and wood waste alone. Biosolids are mixed with ground green waste and wood waste, moisture balanced, then placed in windrows on an impermeable pad. Following the active phase of co-composting, materials are cured, screened, and sold to bulk buyers. Oversized material is generally re-introduced back into the composting process or used as ADC.

The project includes the following changes to the existing permitted operation:

- Relocation of the existing composting/co-composting facility and operations ~~within the landfill footprint~~ from the interim location in the vicinity of Area C to the <u>Oxbow</u> area <u>and Field 1,</u> ~~north of Area D,~~ as shown in Figure 2-7.

- ~~Use of areas outside the permitted landfill footprint for windrow composting and co-composting~~. ~~Proposed areas include Fields 1-5 in and near the Oxbow area (approximately 46 acres) and approximately 29 acres of the Main Sludge Impoundment~~.

- During the dry season only, some composting activities would take place directly on native soil (not on lined pads). During the rainy season, composting activities ~~outside of the permitted landfill footprint~~ would take place only on clay-lined or paved areas (RLI/WM, 2000). As shown in Figure 2-3, Fields 3, 4, and 5 consist of native materials and Fields 1 and 2 are lined with 2 feet of clay (GeoSyntec, 1998). <u>As shown in Figure 2-7, the applicant is proposing to line a 7.2 acre area within Field 2 for use as an all-weather</u>

composting pad. Although the applicant originally proposed year-round composting and/or co-composting for all these areas (GeoSyntec, 1998), RLI has since indicated that they do not plan to conduct composting activities on unlined areas during wet weather (RLI/WM, 2000). Instead, RLI would utilize Fields 1 and 2 ~~existing paved areas at the former Cascade Forest Products facility~~ for wet season composting ~~or improve other (unspecified) areas off of the landfill footprint with low permeable material for conducting wet season composting operations~~ (RLI/WM, 2000 and Figure 2-7). ~~Because Fields 1 and 2 are underlain by a two-foot clay liner, the applicant has not specified any other areas to be surfaced with low permeable materials for wet-season composting, and has not specified any areas of the former Cascade Forest Products facility (also proposed as the future site of the relocated administration facilities) to be used for composting, t~~This EIR assumes that Fields 1 and 2 are proposed to be used for year-round composting or co-composting and that Fields 3, 4, and 5 are proposed to be used only for dry-weather composting.

- Increase in the peak and average daily receipts of green waste and wood waste to a maximum of ~~700 tons and~~ 400 tons~~, respectively~~.[11]

- Addition of food waste as a composting feedstock, with a proposed peak ~~of 60 tons per day~~ and ~~an~~ average of 32 tons per day.

- Decrease in the peak receipt of Class B biosolids for composting from 350 cubic yards per day (approximately 307 tons) to ~~185~~ 82 tons (approximately 93~~211~~ cubic yards) per day, and decrease in the average daily receipt[12] from 99 cubic yards (approximately 84 tons per day) to 82 tons (approximately 93 cubic yards) per day.

- Use of additives and amendments, including sawdust, bark fines, and peat moss, at a maximum rate of 80,000 cubic yards (or 20,000 tons) per year. Although this material is not considered feedstock, receipt of this material (approximately 77 tons per day, assuming delivery five days per week), would contribute to truck traffic at the site. (The proposed increase in vehicle trips to the site is discussed under section 2.5.2, below.)

- Use of water from the leachate impoundment for “quench” water, i.e., water used for wetting the windrows, in addition to the existing water supplies (currently the water supplies are the storm water impoundment and the facility’s potable water supply).

- Use of a vapor phase odor counteractant system to control odors.

- Routing water that has contacted composting and co-composting material and/or sludge to the storm water impoundment.

No change in the hours of operation of the compost facility or of the green waste drop-off area are proposed.

This EIR evaluates RLI’s proposal to conduct a larger-scale composting operation, which now would be under a Compostable Materials Handling Facility Permit, with the operational and design changes enumerated above. The EIR examines potential impacts to water quality, air quality, traffic, traffic safety, and public health that may arise from this aspect of the project.

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11 RLI also proposes to use shredded greenwaste and wood waste as ADC (as indicated in section B.2, above). The proposed receipt of 400 tpd, average~~,~~ and ~~700 tpd,~~ peak~~,~~ includes materials that would be used for ADC as well as for composting.

12 Based on permitted annual loading and assuming a 365-day year.

CHANGES IN EQUIPMENT USED ON SITE

In the summer of 1997 RLI acquired and began using a waste tipper at the landfill. This apparatus runs on diesel fuel and is used to empty large transfer trailers of their waste contents. Prior to this time the waste receipts were received primarily in smaller refuse vehicles that did not require this equipment. Use of a waste tipper was not considered in the 1994 FEIR. While the applicant is not proposing other changes in the equipment used at the landfill, this EIR will analyze the potential litter impacts from use of the tipper and air quality and noise impacts of increased use of existing equipment that may result from handling a greater volume of waste~~-~~.

INCREASE IN ALLOWABLE NUMBER OF VEHICLE TRIPS

The existing 1995 SWFP specifies the following traffic characteristics for the landfill:

- Total permitted traffic volume is 830 vehicle trips per day (415 vehicles in and 415 vehicles out), excluding construction traffic.
- Waste hauling-related traffic limited to 820 vehicle trips per day (410 vehicles in and 410 vehicles out; vehicle type or size not specified).
- Traffic for removal of recovered materials is limited to ten vehicle trips per day (5 vehicles in and 5 vehicles out).
- The 1996 Registration Permit for the composting facility allows up to 5 incoming waste material vehicles (bringing compost feedstock) and 15 outgoing waste material vehicles (carrying finished compost).

Construction traffic is not specified, though it is explicitly excluded from total permitted traffic volume, nor is traffic related to employees driving to and from work, public users, and visitors.

In 1999, the LEA issued a Stipulated Notice and Order that allows RLI to exceed the number of vehicle trips permitted in the 1995 SWFP, until such time as a new SWFP is issued. The Stipulated Notice and Order allows an additional 64 vehicle trips per day (32 vehicles in and 32 vehicles out) above the permitted 830 vehicle trips per day, provided they are limited to private and small commercial self-haulers.

The applicant proposes to increase the number of vehicles permitted to enter the landfill per day to 1,180 vehicle trips per day (590~~900~~ vehicles in and 590 vehicles out) on a regular basis, including 1,080 ~~840~~ waste-carrying vehicles trips[13] (540 vehicles in and 540 vehicles out) and 100~~60~~ vehicle trips (50 vehicles in and 50 vehicles out) for employees, visitors, and deliveries, and, in addition, up to ~~1~~200 construction vehicles trips per day (100 vehicles in and 100 vehicles out) on a seasonal or occasional basis. The additional vehicles (including regular and occasional) would generate a total of 550~~1,170~~ new vehicle trips per day (275~~585~~ vehicles in and 275~~585~~ vehicles out). It is likely that many of the additional vehicle trips will consist of large trucks hauling waste and other materials from outside Marin County.

[13] This number includes vehicles carrying waste to be landfilled, composting feedstock and amendments used in the composting process, and outgoing finished compost.

This increase in the permitted volume of traffic, and potential impacts on traffic and traffic safety and on air quality are evaluated in this EIR.

2.5.3 ENVIRONMENTAL CONTROLS

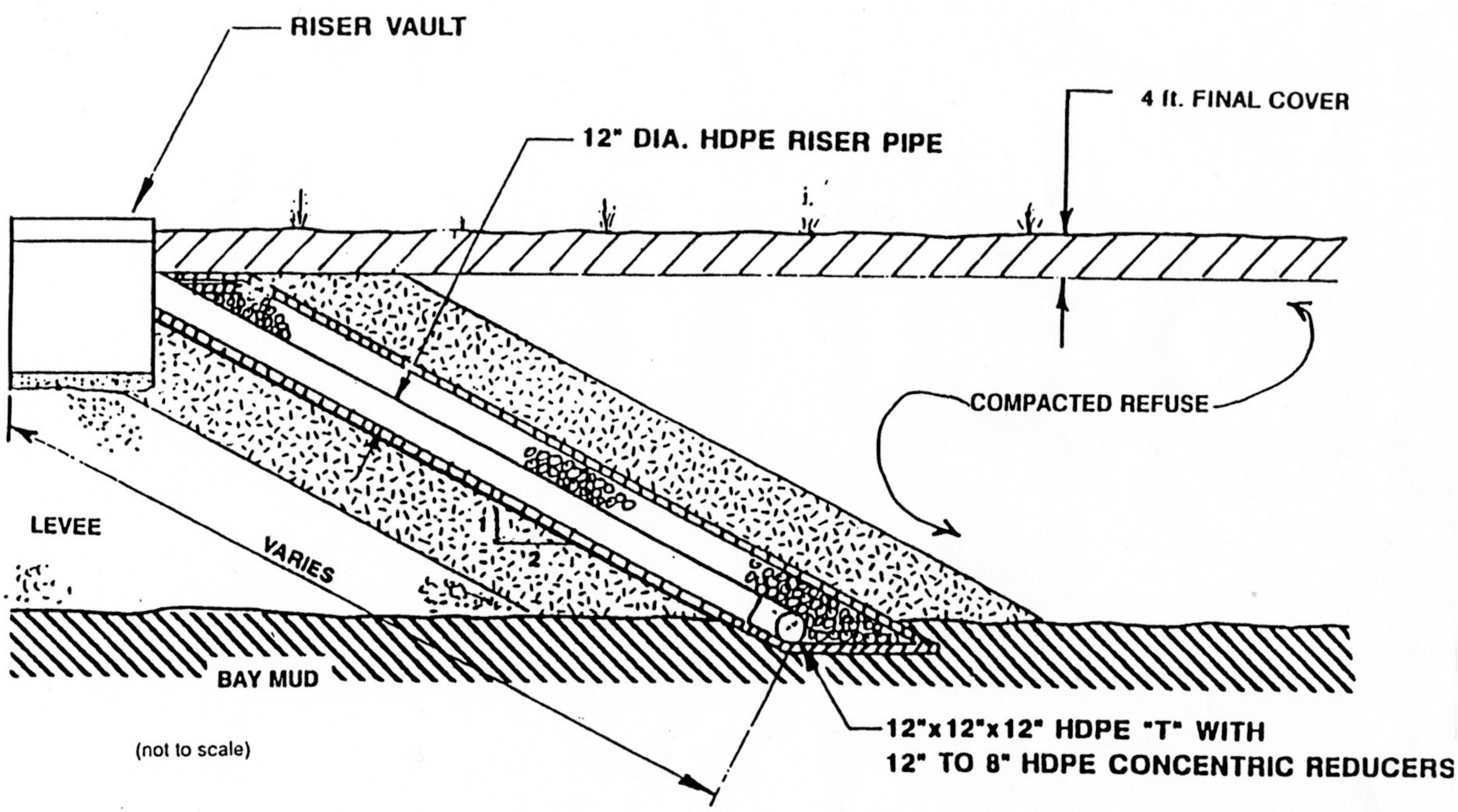
CHANGES TO THE PERMITTED LEACHATE COLLECTION AND REMOVAL SYSTEM (LCRS) AND PERIMETER LEVEE

An essential component of sanitary landfill design is a leachate collection and removal system (LCRS). Water that infiltrates into a mass of landfilled waste percolates through it, and creates a free liquid known as leachate. In addition, decomposition of organic matter, particularly under anaerobic conditions, may involve a phase change from solid to liquid, which may also result in the production of leachate. Leachate may contain varying levels of inorganic, organic, and biological contaminants. Leachate tends to work its way to the base of a landfill where, in the absence of proper environmental controls, including a liner and a LCRS, it may contaminate groundwater and surface water. A LCRS is a system for collecting leachate and transmitting it to the surface for treatment and eventual disposal. A LCRS typically consists of a series of sumps or trenches into which leachate flows by gravity; a system of pipes and pumps to collect the leachate and convey it to the surface; and surface facilities for conveyance, storage and treatment of the leachate.

The existing 1995 SWFP specifies a LCRS that is incorporated into the design of a reconstructed perimeter levee (see Figure 2-9). The levee, which already exists, is required to protect the site from flooding; the re-constructed levee is also designed to increase the stability of the landfill. The integrated LCRS/levee design was implemented along Area A, in 1991 (refer to Figure 2-3 or Figure 2-7).

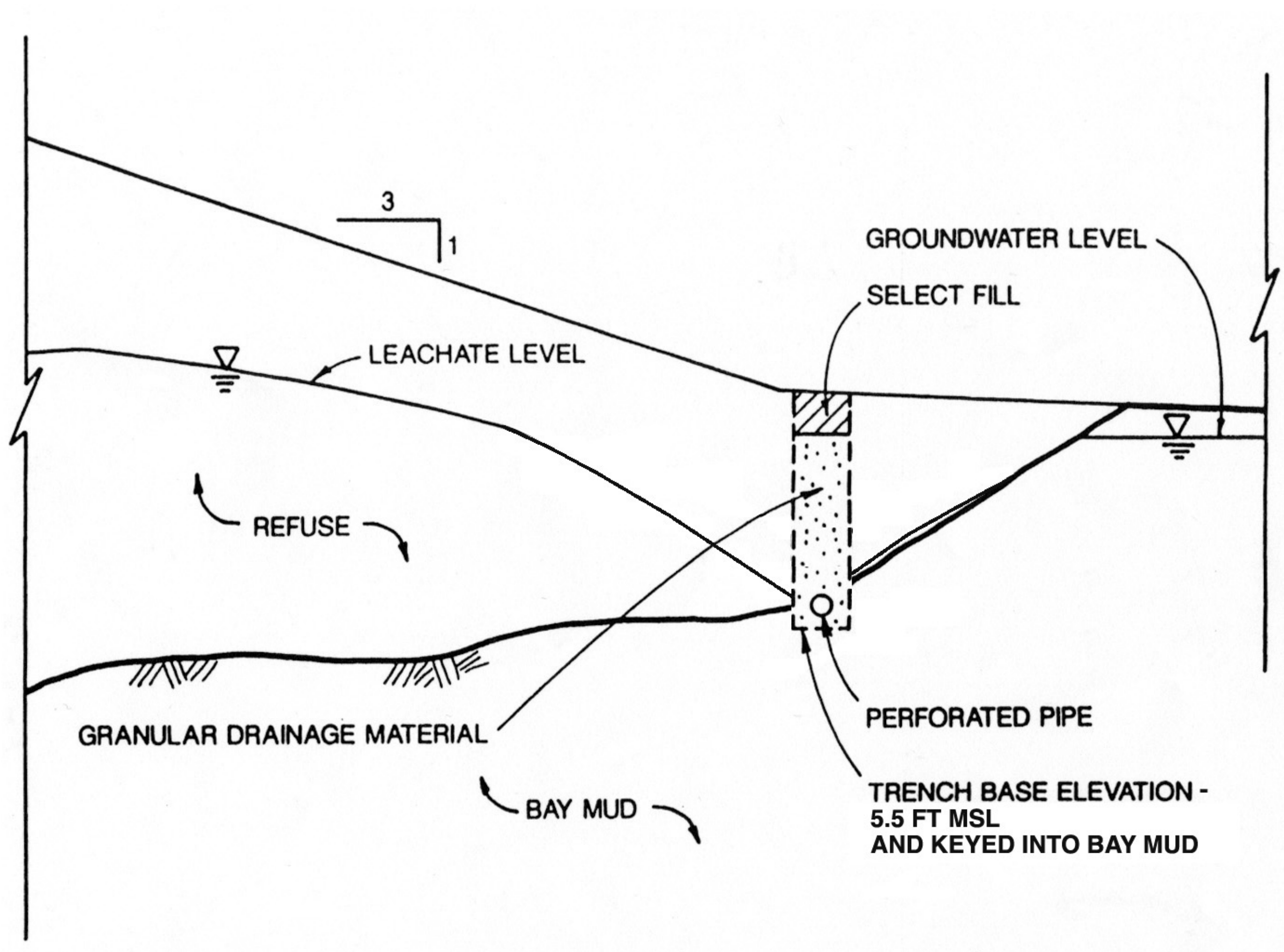
Subsequent to issuance of the 1995 SWFP, RLI has completed ~~constructed~~ construction of the LCRS ~~at landfill Areas B, C, and D~~, but without construction or reconstruction of the perimeter levee. These sections of the LCRS consist of a perimeter trench keyed into Bay Mud, installation of a corrugated conveyance pipe on the bottom of the trench, backfilling of the trench with permeable drain rock, and capping to prevent infiltration of surface waters (see Figure 2-10). Leachate is transported through the pipe to sumps from whence the leachate is pumped to the surface and discharged through surface conveyance piping to the 11-acre on-site leachate impoundment. Cleanouts are provided every 500 feet to maintain the pipe. This design is based on a study by CH2M Hill (1992), and modified during construction as documented in Golder (1996a and Golder 1996b).

The construction of the perimeter LCRS ~~at Areas B, C, and D and future construction of additional sections of the LCRS,~~ without construction or re-construction of an integral perimeter levee system, is inconsistent with the 1995 SWFP and the 1994 FEIR, and is therefore considered a part of the project and evaluated in this EIR. While the 1995 WDRs approved construction of the redesigned LCRS (without reconstruction of the levee), the RWQCB (Friedman, 1999) has stated that it considers “this leachate system merely as a correction action to prevent leachate migration,” but that the system “does not constitute an engineered alternative to compliance with



SOURCE: Redwood Landfill SWFP Expansion Project 1994 FEIR, Volume II

Figure 2-9
Permitted LCRS Design



SOURCE: CH2M-Hill, 1992

Figure 2-10
Proposed LCRS Design

Subtitle D requirements," or "answer the question as to whether the existing levee system has sufficient static or dynamic stability to support the proposed waste increases."

Although the perimeter levee was not reconstructed ~~and is not currently proposed to be reconstructed~~ as part of an integrated LCRS-levee design, except at Area A, its height and width are planned to be increased. The 1998 Joint Technical Document states that the perimeter levee, which is approximately 4 miles long, encompasses approximately 380 acres, and separates the site from adjacent sloughs, will be increased from its current height of approximately 6-9 feet above mean sea level (msl), to 9 feet above msl, and that its crest will be widened from the current width of approximately 4 feet to 10 feet (GeoSyntec, 1998).[14] Typical side slopes for the reconstructed levee will be 2:1 (two feet horizontal for every one foot vertical) or flatter, as dictated by the applicant's slope stability analysis.

The environmental impact analysis in Chapter 3 evaluates the re-designed LCRS to determine whether it is adequate to protect surface water and groundwater quality, whether construction of the LCRS without construction or reconstruction of the integrated perimeter levee will provide adequate stability for the landfill, given the proposed final contours, and whether the proposal to raise and widen the levee will provide adequate flood protection. The environmental impact analysis focuses on the potential impacts of the re-designed LCRS~~'s~~ with respect to landfill stability, the potential for landfill slope failure, the potential lateral migration of the landfill mass and of leachate, and the likelihood of flooding.

CHANGES IN SURFACE WATER MANAGEMENT

Surface water management is not directly addressed in the existing 1995 SWFP, but is the subject of the 1995 Waste Discharge Requirements and the facility's NPDES General Permit and Storm Water Pollution Prevention Plan. RLI proposes two changes to its current management of surface water:

- Changes in gradient and benching of the landfill's side slopes, which would affect velocity and conveyance of storm water;
- Changes in the management of water that has come into contact with sludge, compost, and co-compost. The applicant proposes to direct such "contact water" through a series of open ditches to the 18-acre storm water impoundment, located at the southern edge of the site. This contact water would be sampled twice each year and would be directed to the storm water impoundment only if it tested "clean"; if it does not, it would be directed to the leachate collection pond. "Clean" is defined as having constituent concentrations below

[14] Page 4-21 of the Joint Technical Document (JTD) (GeoSyntec, 1998) states that the perimeter levee is approximately four miles long and separates the site from adjacent sloughs. The JTD description of the existing facility (page 5-1) states that the perimeter levee encompasses approximately 380 acres of the 420 acre Southern Area of the landfill property, and (on page 5-3) that the height of the perimeter levee "will be increased to 9 feet msl, around the entire landfill, and the crest widened to 10 ft." Elsewhere in the JTD some ambiguity exists as to whether references to a perimeter levee refer to a levee around only the permitted landfill footprint (approximately 223 acres) or around the entire landfill site (approximately 380 acres of which are within existing levees). This analysis assumes that as part of the facility's existing operation, as stated on the aforementioned pages, RLI intends to increase the perimeter levee that encompasses the entire 380 acres of the 420-acre Southern Area to 9 feet above msl and to widen its crest to 10 feet.

surface water background levels, specifically, non-detectable levels of organic pollutants (per U.S. EPA Method 8260), and lower than background levels of inorganic pollutants.

Currently, contact water and non-contact water (i.e., water that has not been in contact with waste, sludge, compost or co-compost) are managed as separate, discrete components of the site's drainage system. Contact water from the composting operation and sludge processing areas is directed to the 11-acre leachate collection pond, located in the Oxbow, or is retained within the sludge processing areas. Water in the leachate collection pond is left to evaporate or, if it tests "clean," is used for dust control. Non-contact water is directed to the storm water impoundment or discharged directly off site. Water in the storm water impoundment is used for dust control, for compost process water ("quench" water), or is discharged to the surface waters surrounding the landfill.

The 1994 FEIR did not evaluate the adequacy of the storm water system for handling runoff from a landfill with the final contours that the applicant is now proposing. Neither did the 1994 FEIR evaluate the potential impacts of conveying compost and sludge contact water to the storm water impoundment, nor the mixing of contact and non-contact water in the storm water impoundment, nor the discharge of such water to the surface waters surrounding the landfill. The landfill's Report of Waste Discharge (HLA, 1994) indicates that all contact water is directed only to the leachate impoundment, and the facility's current Storm Water Pollution Prevention Plan (RLI, 2000) describes the facility's drainage system as having two distinct components to keep contact water separate from non-contact water. The 1995 SWFP does not describe permitted surface water drainage and management facilities and the 1995 WDRs do not permit the proposed changes. Therefore, these proposed changes are considered aspects of the project, and are evaluated in this EIR. The EIR evaluates the adequacy of the storm water system and the potential for erosion and water quality impacts, given the proposed final contours of the landfill; and evaluates the potential water quality and public health impacts of the proposed use of the storm water impoundment for storage of contact water.

LANDFILL GAS MANAGEMENT

The project includes revisions to the facility's landfill gas management system that were not evaluated in the 1994 FEIR or contemplated in existing permits.

Solid waste deposited in landfills is subject to anaerobic decomposition (decomposition by bacteria that thrive in the absence of oxygen). Landfill gas, consisting primarily of methane and carbon dioxide, is a by-product of anaerobic decomposition. Landfill gas also contains trace quantities of various toxic air contaminants. Landfill gas management systems are designed to collect and incinerate gas in order to minimize the release of landfill gas to the atmosphere, minimize the danger of explosion, avoid adverse health effects of exposure to toxic elements in the gas, and prevent the degradation of groundwater quality.

Redwood Landfill's existing gas management system consists of a series of vertical extraction wells connected to a system of horizontal trenches and header pipes that carry gas to a flare facility. At the time of the 1994 FEIR and the 1995 SWFP, RLI's landfill gas management system included a flare facility located in Area F, within the landfill footprint. The FEIR evaluated the potential impacts of a system generally similar to the one that has been constructed in a similar location, in the southwest area of the landfill property, outside the permitted landfill footprint.

Three aspects of the landfill gas management system, however, represent major changes to the system evaluated in the 1994 FEIR and therefore constitute aspects of the project that are evaluated in this EIR. These are: 1) the projected volume of gas produced, collected, and treated, which is related to the volume of waste placed in the landfill; 2) the use of a "vaporator" system for destruction of leachate; and 3) the construction and use of ~~three~~ one or more landfill-gas-fired engines that would burn landfill gas to generate electricity.[15]

While incineration of landfill gas is highly effective in reducing potentially harmful constituents contained in the gas, the collection system itself does not capture all of the gas produced. Some untreated gas escapes to the atmosphere, and has the potential to contribute to air pollution and to expose people to toxic air contaminants. Uncollected gas also can migrate laterally beyond the confines of a landfill and contaminate groundwater. The proposal to increase the mass of the landfill would result in a corresponding increase in the generation of landfill gas, and presumably, in the escape of landfill gas to the atmosphere and the possibility of lateral migration of gas. The existing landfill gas management system would need to be adequate to handle increased generation of landfill gas resulting from the increased mass of the landfill. The project would also require the landfill gas management system to handle a greater volume of gas, potentially with higher concentrations of toxic air contaminants from the proposed increased rate of disposal of designated wastes. ~~proposed use of Area G as a Class II disposal area~~. In anticipation of the increased generation of landfill gas expected to result from the project, the flare facility that was constructed is larger (40 feet tall rather than 25 feet) and has a larger capacity than that evaluated in the 1994 FEIR. The new flare and a leachate vaporator system (described below) were constructed adjacent to the southwest corner of Area G, just outside the landfill footprint, not far from the originally proposed location (evaluated in the 1994 FEIR) adjacent to the relocated administration facility.

RLI has installed a leachate vaporator system for destruction of some of the leachate that the landfill produces. The vaporator depends on the landfill gas management system, since it uses landfill gas as an energy source for heating and vaporizing leachate, and then injects the vapor (steam) into the gas flare for final incineration. A leachate vaporator system was not evaluated in the 1994 FEIR and is not described in the facility's existing solid waste facilities permit. The leachate vaporator system is currently operating under the terms of a Permit to Operate issued by the Bay Area Air Quality Management District

This EIR analyzes the potential air quality and public health effects of the leachate vaporator system, as well as the potential air quality, water quality, visual, and public health effects of the

15 The BAAQMD issued an Authority to Construct permit for each of ~~the~~ three engines in the summer of 2002 that ~~will~~ remained valid for up to two years, and which alloweds~~s~~ RLI to operate the engines for a 60-day start-up period, during which time their performance would ~~ill~~ be assessed by the BAAQMD, pending final permitting. RLI did not, however, install the engines and the Authority to Construct has expired.

landfill gas management system, including the installation and use of one or more landfill gas-fired engines for generation of power.

LANDFILL COVER DESIGN

RLI proposes to alter the design of the final landfill cover that was evaluated in the 1994 FEIR. The final cover is the permanent covering placed on a closed landfill or landfill area, and must meet design and performance standards for protecting the landfill from infiltration of water, for drainage, and for supporting vegetation. The final cover design evaluated in the 1994 FEIR consisted of:

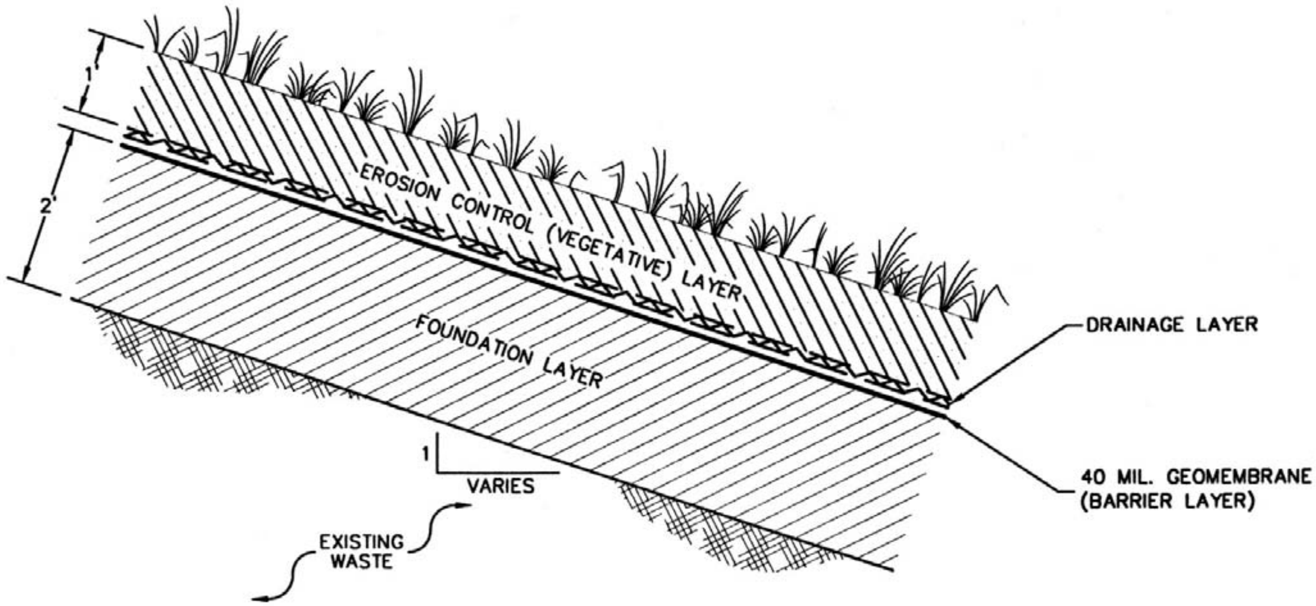
- a two-foot thick foundation layer,
- a barrier/drainage layer consisting of a one-foot thick layer of compacted, low-permeability soil,
- a flexible membrane liner overlying the low-permeability soil layer, and
- a one-foot thick soil layer for supporting vegetation.

The proposal would change the final cover design from a four-foot thick cover to a three-foot thick cover designed to have the performance characteristics of the previous design. The primary change would occur in the barrier/drainage layer, where the previously proposed one-foot layer of compacted, low-permeability soil would be replaced by a minimum 40-mil (40 thousandths of an inch) thick geomembrane barrier layer overlain by either a synthetic geotextile or geocomposite drainage net, or a naturally permeable soil such as sand (see Figure 2-11). The geomembrane barrier layer is proposed as an engineered alternative to the regulatory prescriptive requirement of a 1-foot thi~~n~~ck layer of low permeability soil (GeoSyntec, 1998).

The final cover must work in concert with the final side slopes and base of the landfill to provide long-term protection of the surrounding environment and stability of the landfill itself. The cover, sides, and base of the landfill should form a continuous seal around the landfilled waste. Because much of the Redwood Landfill does not have an engineered base liner, but rather depends on the naturally low permeability of the Bay Mud to protect groundwater quality, the connections between cover, side slopes, and base are of particular concern. This EIR examines the proposed modifications to the final cover design, and evaluates the potential impacts of the modified design on groundwater and surface water quality, and on the landfill’s static and dynamic stability after closure.

REMEDIATION OF 11.5-ACRE UNPERMITTED WASTE DISPOSAL AREA

In the extreme southwestern corner of RLI’s property, outside of the permitted landfill footprint, there is an 11.5-acre area of buried refuse that dates back to the landfill’s early history (see Figure 2-3). This area is not served with a leachate collection system or a landfill gas management system, and the material that is presently covering the refuse is not an approved final cover. The area is currently being used for access roads and until recently was used for storage of



Not to Scale

SOURCE: GeoSyntec Consultants, 1998

Figure 2-11
Proposed Final Cover Design

materials by Cascade Forest Products. RLI has three monitoring wells in this area, and landfill gas has been detected at this site.

The 1994 FEIR was based on RLI's previous plans for this area, which consisted of excavating the buried refuse and placing it in the permitted landfill. RLI now proposes to leave this material in place, and to cover it with an approved final cover. This could potentially result in significant impacts not contemplated in the 1994 FEIR. This EIR, therefore, evaluates the potential impacts on water quality, air quality, and public health of leaving this material in place and covering it.

2.5.4 FACILITY INFRASTRUCTURE

RELOCATION OF ADMINISTRATIVE AND ANCILLARY FACILITIES

RLI requests a revision to the SWFP to allow them to relocate the landfill's administrative offices, maintenance facilities, and ancillary facilities to the former Cascade Forest Products building and site located in the southwest corner of the property (see Figure 2-7). RLI previously proposed this move, and this action was analyzed in the 1994 FEIR. Since the certification of the 1994 FEIR and the issuance of the 1995 SWFP, however, RLI modified its proposal to instead use this site for the Cascade Forest Products Facility, which blended organic materials, including compost, and produced soil amendments for sale in bulk and in bags. The County reviewed and approved this proposal in 1997. Cascade Forest Products has recently vacated the site, and RLI is once again proposing to relocate their administrative offices and other facilities to this site. The move would involve some remodeling of existing buildings, and changes in internal circulation patterns at the site.

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CHAPTER 3

ENVIRONMENTAL SETTING, IMPACTS, AND MITIGATION MEASURES

3.1 AESTHETICS

This section analyzes the potential impacts the proposed project would have on visual quality in the project vicinity. The aesthetics evaluation focuses on physical changes in the landfill's form associated with the proposed revised final contours; the addition of the landfill gas vaporator, which has been constructed but was not evaluated in the previous 1994 FEIR; and the potential for litter on and off the site as a result of the proposed increase in waste receipts. While no change in hours of operation for either the landfill or the composting facility is proposed, and landfill operations are permitted during nighttime hours, the proposed increase in incoming material (including general waste, composting feedstock, and petroleum-contaminated soil) may result in more nighttime activity than currently takes place. Therefore, this section also presents a discussion of the aesthetic effects of light and glare associated with the facility's nighttime operations.

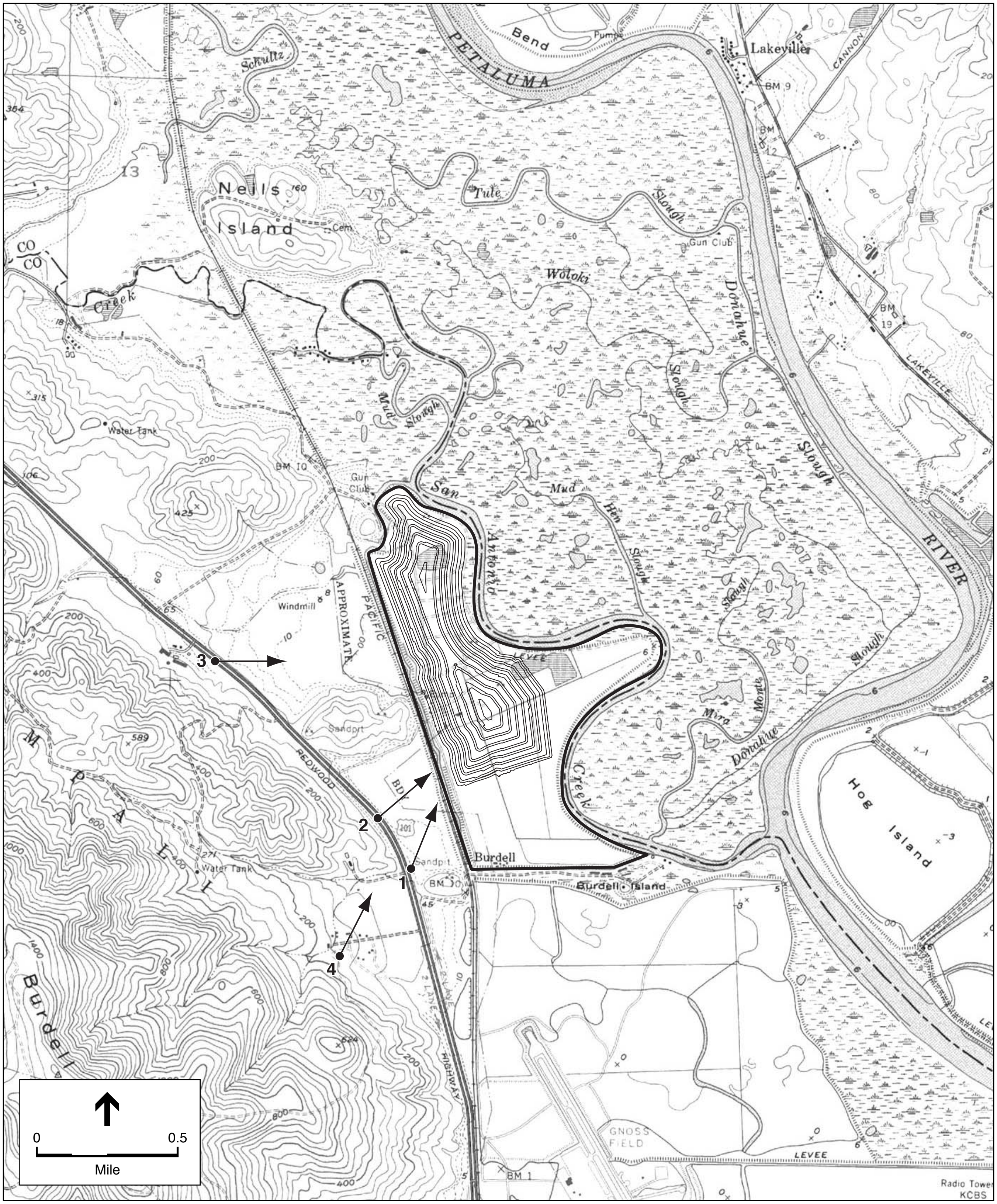
3.1.1 SETTING

VISUAL CHARACTER OF THE REGION AND PROJECT VICINITY

Redwood Landfill is located in a rural landscape. The visual character of the project vicinity is shaped by rolling grass- and tree-covered hills flanking the flat Petaluma River valley. The valley is approximately two to two and a half miles wide at the site. The landfill site is located on drained marshlands on the west side of the valley and is bordered on the east by San Antonio Creek with marshlands, mudflats, and sloughs extending eastward across the valley from San Antonio Creek to the Petaluma River. The Sonoma Mountains, part of the Coast Ranges, rise to the east of the Petaluma River to form the eastern flank of the valley. Another segment of the Coast Ranges that includes Mt. Burdell and the oak-studded hills of Olompali State Park forms the valley's western flank. U.S. 101 is the major north-south artery in the project vicinity. The highway, which trends in a northwesterly-southeasterly direction west of the landfill, is roughly 600 feet west of the southern end of the site and 2,000 feet west of the northern end. The Lakeville Highway is located across the flat river valley east of the Petaluma River, approximately 1.5 to 2 miles away.

SCENIC VISTAS, PUBLIC VIEWS, AND SIGNIFICANT FEATURES

Due to the rolling topography in the project vicinity, few scenic vistas or public vantage points include views of the landfill. The predominant views of the landfill are from Highway 101 and Olompali State Park. Figure 3.1-1 identifies four vantage points with views that include the landfill – three from Highway 101 and one from Olompali State Park – considered in this analysis. Figures 3.1-2 and 3.1-3 present existing views toward the landfill from these points. The vantage points were selected to show common views of the landfill as well as to coincide, for purposes of comparison, with vantage points used in the visual quality analysis presented in the 1994 FEIR. Views of the landfill from Highway 101 are typically brief and intermittent due to highway travel speeds, the intervening topography and vegetation, and the direction and curvature of the road.



SOURCE: Environmental Science Associates

Figure 3.1-1
Vantage Point Location Map

Vantage Point 1 - View from U.S. 101 Approximately 1/4 Mile from Redwood Landfill, Looking Northeast

Vantage Point 2 - View from U.S. 101 South of Landfill Entrance Road, Looking East/Northeast

SOURCE: Environmental Science Associates

Figure 3.1-2
Existing Views from Vantage Point 1
and Vantage Point 2

Vantage Point 3 - View from U.S. 101 Approximately 2/3 Mile from Redwood Landfill, Looking East

Vantage Point 4 - View from Olompali State Park, Approximately 2/3 Mile from Redwood Landfill, Looking Northeast

SOURCE: Environmental Science Associates

Figure 3.1-3
Existing Views from Vantage Point 3
and Vantage Point 4

The landfill also can be seen from Lakeville highway, approximately 1.5 to 2 miles to the east. Although there is little intervening topography and vegetation, the landfill is not a significant feature of the landscape as seen from this highway due to the intervening distance and the hills that rise behind the landfill to the west, which dominate the horizon and therefore tend to overshadow the landfill when viewed from the east.

There are no officially designated state scenic highways in Marin County at present. The nearest eligible state scenic highway is a 1.8-mile section of Highway 101 that extends from State Route 37 near Ignacio north to an unconstructed section of State Route 37 in Novato (Caltrans, 2002).

APPLICABLE PLANS AND POLICIES

The Marin Countywide Plan

The project site is located within the “Inland Rural Corridor,” one of three major planning corridors identified in the Marin Countywide ~~’s general~~ P~~p~~lan (the General Plan), and the Bayfront Conservation Area, an overlay zone established in the Countywide ~~general p~~Plan to identify and conserve bayfront resources (Marin County, 1994). Bayfront Conservation Area policies include protection of scenic quality. The following objectives and polices of the ~~general~~ Countywide ~~p~~Plan Environmental Quality Element (1994) are relevant to the proposed project. (These and other Environmental Quality Element policies related to the Bayfront Conservation Zone are incorporated into the Countywide ~~general p~~Plan’s Community Development Element, as well.)

> Objective EQ-2. Resource Conservation Areas. To identify and conserve specific resources through General Plan polices based upon important environmental factors in Marin County as well as to preserve, protect and enhance existing species and habitat diversity in Marin County.
>
> Policy EQ-2.72. Viewshed Protection. The County shall protect visual access to the bayfront and scenic vistas of water and distinct shorelines through its land use and development review procedures. This viewshed protection is essential for the preservation of Marin County and San Francisco Bay identity, for the enhancement of aesthetic qualities, and for visual and psychological relief from adjacent urban environments.
>
> Policy EQ-2.73. View Corridor Identification and Enhancement. Existing built elements, such as overhead utilities, which distract from the shoreline and marsh landscape should be eliminated or blended into the environment. Sites with opportunities for near and distant views of the bayfront and bay should be identified, protected, and enhanced by improvements (turnouts, benches, etc.) where possible. View corridors and a low profile should be maintained on adjoining sites as well.
>
> Policy EQ-2.74. Design for Waterfront Development. Waterfront development should be designed for openness and to permit optimal views for public enjoyment of the bayfront.
>
> Objective EQ-3: The Built Environment. To establish a method and approach for managing the built environment within the context of the natural environment and available resources of Marin County.

> Policy EQ-3.11. Visual Quality and Views. Visual qualities and the view potential of the natural and built environment shall be considered in any project or operation review. Tree-cutting and damage shall be avoided whenever possible.

> Policy EQ-3.26. Rural Character and Lighting. Development in rural portions of the County (particularly in West Marin communities) should be consistent with the rural character of the area and should provide lighting which is subtle and harmonious with the rural environment.

Table 3.1-1 summarizes the project's consistency with the applicable general plan objectives and policies.

California Code of Regulations Title 27

In addition to Marin County policies pertaining to visual quality, Title 27 of the California Code of Regulations (CCR) requires landfills to control litter, which can have adverse effects on visual quality, as follows:

> §20830 Litter Control. Litter shall be controlled, routinely collected and disposed of properly. Windblown materials shall be controlled to prevent injury to the public and personnel. Controls shall prevent the accumulation, or off-site migration, of litter in quantities that create a nuisance or cause other problems.

RLI's current litter-control practices include the following: compaction of the waste, application of daily cover, placement of fixed and portable litter fences around the active working face, construction of a semi-permanent litter fence on the east and north sides of the landfill adjacent to San Antonio Creek, and using clean up crews to collect litter from the site and surrounding area on a daily basis (GeoSyntec, 1998).

3.1.2 IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

The visual character of a landscape depends on such attributes as color, texture, complexity, and the form of landscape components. Impacts on visual resources are evaluated and determined by comparing changes in these attributes that would result from the project. The reduction of a view's complexity, or the obstruction of or encroachment upon background or middle ground views all would contribute to the significance of impacts. Consistent with CEQA Guidelines Appendix G (Environmental Checklist) the project would have a significant impact on visual resources if it:

- obstructed or substantially encroached upon a scenic vista;
- degraded the visual character of the site and its surroundings by introducing physical features that are substantially out of character with adjacent land uses; or

TABLE 3.1-1
PROJECT CONSISTENCY WITH MARIN COUNTYWIDE PLAN AESTHETIC OBJECTIVES AND POLICIES

Countywide Plan Objective and Policies	Consistent With Countywide Plan?	Analysis
Objective EQ-2	Yes	The landfill is located within the Bayfront Conservation Area; the project does not propose expansion of the landfill footprint or encroachment onto Bayfront lands or other adjacent habitats.
Policy EQ-2.72	Yes	While the steeper side slopes of the proposed final landfill contours would block visual access to limited areas of the hills on the east side of the valley, compared with the currently permitted final contours, the project would not impede visual access to bayfront lands from the common vantage points in the project vicinity (refer to Figures 3.1-2 through 3.1-7). Therefore the project is consistent with County policies to protect visual access to bayfront areas.
Policy EQ-2.73	Yes	Sites with opportunities for near or distant views of bayfront lands have been identified in the project vicinity. However, as discussed under EQ-2.72. changes to the landfill contours would not affect views to bayfront lands, which have already been impacted. Regarding built elements, RLI has installed a leachate vaporator system (which works in conjunction with the landfill gas flare) just outside the southwest corner of the landfill footprint. The vaporator system which, in addition to the vaporator and flare, includes a blower building, process tank, and in the future would include a co-generation unit, constitutes minor industrial facilities that are visible from Highway 101 (see Figure 3.1-2) and are not inconsistent with this policy. Other changes with respect to built elements, such as relocation of maintenance structures and the relocation of the landfill's administrative offices to the existing building formerly occupied by Cascade Forest Products, would not affect views to bayfront lands. As with currently permitted site operations, during the life of the landfill, on-site utility lines would occasionally be moved to accommodate landfill operations, and eventually all utility lines would be placed underground outside the landfill footprint.
Policy EQ-2.74	Yes	The development of the landfill at the site as proposed under the project, compared with currently permitted landfill operations and design, would not substantially alter the degree of openness at the landfill site, and would not substantially alter views or public enjoyment of bayfront lands.
Objective EQ.3	Yes	The project is consistent with the relevant polices developed to meet this objective, as discussed under policies EQ-3.11 and EQ-3. 26, below.
Policy EQ-3.11	Yes	This EIR considers the visual qualities and view potential of the natural and built environment in the project vicinity. No tree cutting or damage would result from the project.
Policy EQ-3.26	Yes	Nighttime landfill operations and the nighttime receipt of sludge and of solid waste loads from commercial haulers are currently permitted; no changes are proposed to the current fixed lighting at the site or the use of portable lighting at the landfill face. (It is also noted that, although in a rural area, the landfill is not located in West Marin but near the eastern boundary of the County.) While the proposed increase in waste receipts may result in a more continuous stream of trucks entering and leaving the site during nighttime hours, the increase in traffic would not be so pronounced as to alter the rural character of the area.

- altered the natural landscape characteristics of the site to such a scale or degree that the change appears as a substantial, obvious, and disharmonious modification of the overall scene;
- conflicted with adopted plans or policies regarding visual resources; or
- introduced a new source of light or glare.

The project would not have an adverse effect on a state scenic highway since there are no designated state scenic highways in the project vicinity.

METHODOLOGY

The hilly topography in the project vicinity obscures the landfill from many nearby public vantage points; except for views from the nearby highway, public areas with relatively unobstructed views of the landfill are located at considerable distances from the site. This analysis therefore focuses on views from along Highway 101 west of the project site – the most commonly frequented vantage points in proximity to the landfill – and on views from Olompali State Park, also located to the west. The project's potential effects on visual quality from greater distances, notably from Lakeville Highway east of the site and areas within or near the City of Novato, to the south, also were considered. However, at such distances, impacts on visual resources resulting from the proposed project were substantially reduced and determined to be barely discernable, if not indistinguishable, from visual impacts that would result from the currently permitted landfill.

As noted, Figure 3.1-1 identifies four vantage points from which the landfill can be seen and Figures 3.1-2 and 3.1-3 show the existing setting as seen from these points. Simulations of the permitted and proposed final contours of the landfill from each vantage point are presented in conjunction with the impact analysis that follows.

Impact 3.1.1: View from U.S. 101, approximately 1/4 miles from Redwood Landfill, looking northeast. (Less than Significant)

Figure 3.1-4 presents simulations of the view of the currently-permitted and proposed final landfill grades from U.S. 101 at a point approximately in line with the Redwood Landfill's southern property boundary (Vantage Point 1 on Figure 3.1-1).[1] The landfill is in the middle ground of this view, with the Sonoma Mountains in the background and the grassland between U.S. 101 and the landfill's western boundary in the foreground. As this comparison shows, the steeper slopes of the proposed final grades would obstruct a portion of the Sonoma Mountains, particularly at the southern end of the landfill (right side of the figures), that would remain visible in the background with the currently permitted final grades.

1 This view corresponds to that shown in Figure 3.8-2 of the 1994 FEIR.

Vantage Point 1 - Permitted

Vantage Point 1 - Proposed

SOURCE: Environmental Science Associates

Figure 3.1-4
Views from Vantage Point 1
Permitted and Proposed Final Contours

Although the proposed final contours would obscure an incremental area of the Sonoma Mountains as seen from this vantage point, the additional area that is obscured from view is minor, when compared with the currently permitted final contours, especially given the limited duration of views from this point on the highway. In addition, according to the applicant's preliminary closure plan (GeoSyntec, 1998), the final cover of the landfill would be planted with a native grass seed mix[2] intended to blend with the surrounding environment. Vegetating the final slopes with local, native grasses would further minimize the incremental visual impacts of the proposed final cover. Because the landfill already blocks views of Bayfront lands and marshes, and because the project would not result in any additional blocking of views of Bayfront lands or marshes, the project would not result in an impact to views of Bayfront lands and marshes.

The new, 40-foot high landfill gas flare is prominently visible in front of the south end of the landfill, as seen in the existing (Figure 3.1-2) and future (Figure 3.1-4) views from this vantage point. This flare replaces a smaller flare previously located in Area F, within the landfill footprint. Relocation of the flare and other ancillary facilities outside the landfill footprint, to allow disposal activities to proceed at its former location, was considered in the 1994 FEIR. The relocated flare evaluated in the 1994 FEIR was 25 feet high and was to be located farther south, near the proposed administration building, and set farther back from the western property line than is the new flare. The new flare is 40 feet high and 12 feet wide and is located just outside the southwest corner of the landfill footprint. This larger flare is designed to handle higher flow rates of landfill gas that are expected to be generated in the future (GeoSyntec, 1998) and was constructed in conjunction with the new leachate vaporator system. The other ancillary facilities to be relocated to the southwest corner of the site include maintenance structures and a fuel facility. The administration offices would be relocated to the building formerly used by Cascade Forest Products.

The flare, vaporator system components, and other structures represent industrial facilities at the site that are, or in the future would be, visible to varying degrees from this vantage point. The flare itself is plainly visible, as discussed, while other components of the vaporator system are barely discernable due to intervening vegetation. The maintenance facilities currently located within the landfill footprint have not yet been relocated. The ~~ree~~ power generation engine or engines that are planned components of the system are not yet constructed.~~, although an Authority to Construct has been issued by the BAAQMD)~~. Although the flare and, to a lesser degree, the other facilities would be seen from this point on U.S. 101, they would appear as relatively unremarkable facilities associated with the landfill and would not dominate the landscape. In addition, industrial equipment previously maintained in this location for the Cascade Forest Products operation would be removed in conjunction with relocating the landfill facilities. The impact of the new and relocated facilities on visual resources as seen from this vantage point will be reduced by vegetative screening – specifically, native plantings in the field of view and interim reclamation – identified as a mitigation measure in the 1994 FEIR.

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[2] According to the Preliminary Closure Plan in the Redwood Landfill Joint Technical Document (GeoSyntec, 1998), the specific vegetation seed mix for the final cover is yet to be established and will be covered in the facility's Final Closure Plan.

Because only a minor additional area of the Sonoma Mountains would be obscured from view, the final slopes of the landfill would be vegetated with native grasses intended to blend in with the surround environment, and the landfill gas flare and other ancillary facilities previously analyzed in the 1994 EIR appear as unremarkable facilities which would be visually screened by native plantings as identified in the 1994 EIR~~,~~ when the relocation of some these facilities was first evaluated, the impacts of the proposed project on visual resources from this vantage point would be less than significant.

Mitigation: None required.

Impact 3.1.2: View from U.S. 101, south of the landfill entrance road, looking east/northeast. (Less than Significant)

Figure 3.1-5 presents simulations of the currently-permitted and proposed final landfill grades as seen from Vantage Point 2 (on Figure 3.1-1).[3] A comparison of the south (right) side of the currently-permitted and proposed landfill grades in this view reveals the steeper side slopes and less frequent benching of the proposed final grades. In addition, the view from this vantage point shows that, with the steeper slopes, the crest of the landfill would extend to the north at a higher elevation than would the currently permitted final configuration. The final landfill cover would be planted with native grasses and plants that would harmonize with existing vegetation, as previously noted. As the comparison shows, the differences between the permitted and proposed final grades as seen from this vantage point are relatively minor; therefore, the impact on visual resources of the proposed modifications of the final contours as seen from this vantage point would be less than significant.

Mitigation: None required.

Impact 3.1.3: View from U.S. 101 approximately 2/3 mile from Redwood Landfill, looking east. (Less than Significant)

Figure 3.1-6 presents simulations of the currently-permitted and proposed final landfill grades from U.S. 101 at a point approximately in line with Redwood Landfill's northern boundary (Vantage Point 3 on Figure 3.1-1).[4] The most apparent difference in the currently-permitted and proposed final grades as seen from this vantage point is the relatively pronounced slope between the northern and southern halves of the proposed landfill design (i.e., the northern side slope of the southern half of the landfill). While discernible, however, the difference between the permitted and proposed final grade in terms of impacts on visual resources is minor, as the two

3 This view corresponds to that shown in Figure 3.8-5 of the 1994 FEIR.
4 This view corresponds to that shown in Figure 3.8-4 of the 1994 FEIR.

Vantage Point 2 - Permitted

Vantage Point 2 - Proposed

SOURCE: Environmental Science Associates

Figure 3.1-5
Views from Vantage Point 2
Permitted and Proposed Final Contours

Vantage Point 3 - Permitted

Vantage Point 3 - Proposed

SOURCE: Environmental Science Associates

Figure 3.1-6
Views from Vantage Point 3
Permitted and Proposed Final Contours

simulations show. Therefore, from this vantage point, the potential impacts on visual resources of the revised final grades would be less than significant.

Mitigation: None required.

Impact 3.1.4: View from Olompali State Park, approximately 2/3 mile from Redwood Landfill, looking northeast. (Less than Significant)

Figure 3.1-7 presents simulations of the currently-permitted and proposed final landfill grades from Olompali State Park (Vantage Point 4 in Figure 3.1-1).[5] As this figure shows, both the permitted and proposed final landfill grades would be clearly visible from this vantage point at Olompoli State Park. As in the previous view (Figure 3.1-6), a relatively pronounced slope is apparent between the northern and southern halves of the landfill crest, and, as in the previous view, the steeper slope between the southern and northern halves of the landfill in the proposed design is more noticeable than is the slope in the currently permitted design. From this vantage point, a very small additional portion of the Sonoma Mountains would be obscured from view. As a comparison of these two simulations indicates, the impact of the proposed final landfill design on visual resources compared with the currently permitted design, as seen from this vantage point, would not be significant.

Mitigation: None required.

Impact 3.1.5: Increased levels of nighttime activities could occur, resulting in adverse impacts on the rural character of the project vicinity due to increased light and glare. (Less than Significant)

Figure 3.1-8 shows a nighttime view of the site under existing conditions, as seen from Vantage Point 1 (on Figure 3.1-1). The proposed increase in waste receipts (see Table 2-2 in Chapter 2, Project Description) may result in a higher level of nighttime activity (e.g., a steadier stream of haul trucks entering and leaving the site). However, nighttime activities are currently permitted (landfill operations from 8 p.m. [prior day] to 4:30 p.m.; receipt of waste from commercial haulers from midnight until 3 p.m., and receipt of sludge 24 hours per day). The applicant does not propose any change in hours of operation or in nighttime lighting used at the site, which was evaluated in the 1994 FEIR. As discussed in Section 3.10, Transportation and Traffic, the proposed increases in traffic (including seasonal or occasional construction traffic) under the project would more than double currently permitted traffic. However, based on the temporal distribution of daily traffic in the hourly traffic report for the Redwood Landfill for the month of July 2001, traffic between midnight and 6 a.m. represented 15 percent of the total traffic, with an average of seven trucks per hour. Doubling this number of trucks entering and leaving the site

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5 This view corresponds to that shown in Figure 3.8-6 of the 1994 FEIR.

Vantage Point 4 - Permitted

Vantage Point 4 - Proposed

SOURCE: Environmental Science Associates

Figure 3.1-7
Views from Vantage Point 4
Permitted and Proposed Final Contours

Vantage Point 1 - View from U.S. 101 Approximately 1/4 Mile from Redwood Landfill, Looking Northeast

SOURCE: Environmental Science Associates

Figure 3.1-8
Existing Nighttime View
from Vantage Point 1

during nighttime hours would not have a substantial adverse affect on the rural character of the area due to increased light and glare, as seen from the most common vantage points in the vicinity, those previously identified along U.S. 101.

Although no changes in the use of portable lighting at the face is proposed, the lights needed for the nighttime operation are bright (each light plant contains four 1000-watt bulbs [110,000 lumens] at the end of 20-30 foot high masts). Implementation of Measures 3.6.2b and 3.62c (refer to Section 3.6, Land Use) would serve also to limit the potential adverse aesthetic impacts of nighttime lighting on areas outside the landfill boundary.

Because the applicant does not propose any change in hours of operation or in the portable lighting to be used at the landfill working face, and because the likely increase in nighttime traffic would not be sufficient to alter the rural character of the site vicinity, the impacts of the project on the rural character of the area due to light and glare would be less than significant.

Mitigation: None required.

Impact 3.1.6: The increase in waste receipts and compost throughput and the use of a waste tipper could result in increased litter on and near the project site, causing adverse aesthetic impacts in the site vicinity. (Significant)

As described in the Project Description, since publication of the 1994 FEIR, RLI has acquired a waste tipper that is used to empty large transfer trailers. Because the use of this equipment allows the tipping of larger vehicles than ones that are self-tipping, there is increased potential for the emptied waste to be caught and carried by the wind than with smaller, self-tipping dump trucks. Use of the tipper could therefore contribute to an increase in litter escaping from the working face, potentially to areas off site, and visually degrade the landscape in the vicinity of the landfill. In addition, the substantial increase in waste and composting receipts proposed by the project could result in a proportional increase in the occurrence of litter at the site and the potential for its escape off site.

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.1.6a: RLI will continue its current litter-control program, which includes the following elements (GeoSyntec, 1998):

- compaction of the waste,
- application of daily cover,
- placement of fixed and portable litter fences around the active working face,
- construction of a semi-permanent litter fence on the east and north sides of the landfill adjacent to San Antonio Creek,
- daily use of a clean-up crews to collect litter from the site and surrounding area, and

- use of signage to advise haulers that incoming loads must be properly covered and that tarps are to be removed only in designated areas.

Mitigation Measure 3.1.6b: The tipper is not operated in winds exceeding 50 mph (GeoSyntec, 1998).

Mitigation Measures Identified in This Report

Mitigation Measure 3.1.6c: RLI shall update its current litter-control program as necessary to ensure compliance with 27 CCR §20830. The updated program will take into account the use of the waste tipper and the increase in incoming waste and composting receipts, and will indicate the means to prevent litter from escaping the Oxbow area proposed for composting. Measures may include, but are not limited to, the following:

- use of additional portable litter fencing in the Oxbow area,
- use of higher temporary fences at the working face, as needed to prevent litter from escaping when loads are emptied by the tipper, and
- increasing the staff of the daily clean-up crew to adequately police the additional areas proposed for composting.

RLI shall submit the updated litter control plan to the LEA for approval prior to project implementation.

Mitigation Measure 3.1.6d: The waste tipper shall not be operated in wind conditions that would result in windblown litter, regardless of wind speed.

Level of Significance After Mitigation

The combination of the measure proposed as part of the project and specified in this EIR would reduce this impact to a less-than-significant level.

Impact 3.1.7: Prior to landfill closure, the proposed changes in landfill contours (in conjunction with the revised fill sequencing plan) could increase the visibility of landfill activities as seen from Highway 101. (Less than Significant)

When landfilling activities take place along the western edge of the disposal area (in successive lifts over the life of the landfill), the increased slope angle will bring the work area incrementally closer to the highway, thus incrementally increasing the visibility of refuse handling operations at the working face. This incremental increase in visibility of the working face could be exacerbated by the use of a waste tipper to tip the large transfer vehicles. The increased visibility of the working face and this new piece of equipment as seen from U.S. 101 could potentially detract from the surrounding natural landscape. However, as noted above, views of the landfill from U.S. 101 are transitory, and, as indicated in Figures 3.1-4 to 3.1-7, the differences between the proposed and currently permitted landfill configurations as seen from points along U.S. 101 would be minor. Therefore this impact would be insignificant.

Mitigation: None required.

REFERENCES – Aesthetics

California Department of Transportation (Caltrans), 2002. California Scenic Highway System: A list of eligible and officially designated routes, www.dot.ca.gov/hq/LandArch/scenic/cahisys.htm (site accessed August 13 2002).

GeoSyntec Consultants (GeoSyntec), 1998. J*oint Technical Document: Redwood Landfill, Marin County, California*. Prepared for Redwood Landfill, Inc., 27 March 1998.

Marin County, 1994. *The Marin Countywide Plan: Environmental Quality Element*, adopted January 1994.

3.2 AIR QUALITY

As described in Chapter 1, Summary, the project elements evaluated in this EIR are to some extent elements that have already been implemented, but are not covered under existing permits and have not previously been subject to environmental review under the California Environmental Quality Act (CEQA).

This section evaluates the potential air quality impacts resulting from implementation of the following project elements: a) the increase in landfill capacity; b) changes in the quantity and types of waste received; c) changes in the types of materials used as ADC~~; d) the development of a Class II waste cell~~ ~~;~~ d~~e~~) changes in methods of processing sewage sludge; e~~f~~) expansion of composting/co-composting operations; f~~g~~) changes in equipment used on site and types and numbers of vehicles hauling materials to and from the landfill; g~~h~~) revisions to the facility's landfill gas management system; and, h~~i~~) air emissions associated with the proposed change in management of the 11.5-acre unpermitted waste disposal area. This section also discusses potential health effects of emissions toxic air contaminants (TACs) and other types of pollutants.

The proposed changes in surface water management and landfill cover design are expected to have a negligible effect on air quality and are therefore excluded from further analysis in this section. Refer to Section 3.8, Public Health and Safety, for a discussion of the potential for the proposed changes in management of the 11.5-acre unpermitted waste disposal area to result in the migration of landfill gas and the associated explosion risk.

In accordance with the Court's decision in *Fairview Neighbors v. County of Ventura* ([2d Dist. 1999] 70 Cal. App. 4th 238 [82 Cal. Rptr.2d 436]), the design, operations, and environmental controls described in the 1995 Solid Waste Facilities Permit and other current permits, based on the 1994 FEIR, as well as other applicable permits that have undergone separate environmental review, will constitute the baseline against which potential impacts of the project will be measured in this EIR.[1] For the purposes of this air quality analysis, the current activities allowed under the 1996 Registration Permit for the composting/co-composting facility and the current Permit to Operate for the landfill are part of the baseline conditions.

3.2.1 SETTING

Federal and state air quality standards have been established for six ambient air pollutants, primarily to protect human health and welfare. The six "criteria air pollutants" for which federal and state ambient standards have been established are: ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), suspended particulate matter (PM-2.5 and PM-10), and lead (Pb). Documented health effects from air pollution include acute respiratory infections, chronic bronchitis, pulmonary emphysema, and bronchial asthma.

1 For an existing permitted facility that is seeking a permit for a new or revised aspect of its operation, where the facility's previously permitted operations had previously undergone environmental review, the appropriate baseline should be the existing permitted operations, rather than the level of operations actually occurring at the time of the notice of preparation.

Non-criteria air pollutants or toxic air contaminants (TACs) are airborne substances that are capable of causing short-term (acute) and/or long-term (chronic or carcinogenic, i.e., cancer causing) adverse human health effects (i.e., injury or illness). TACs include both organic and inorganic chemical substances. They may be emitted from a variety of common sources including gasoline stations, automobiles, dry cleaners, industrial operations, and painting operations. Landfills are also sources of TACs. TACs are regulated separately from the criteria air pollutants at both federal and state levels.

CLIMATE AND METEOROLOGY

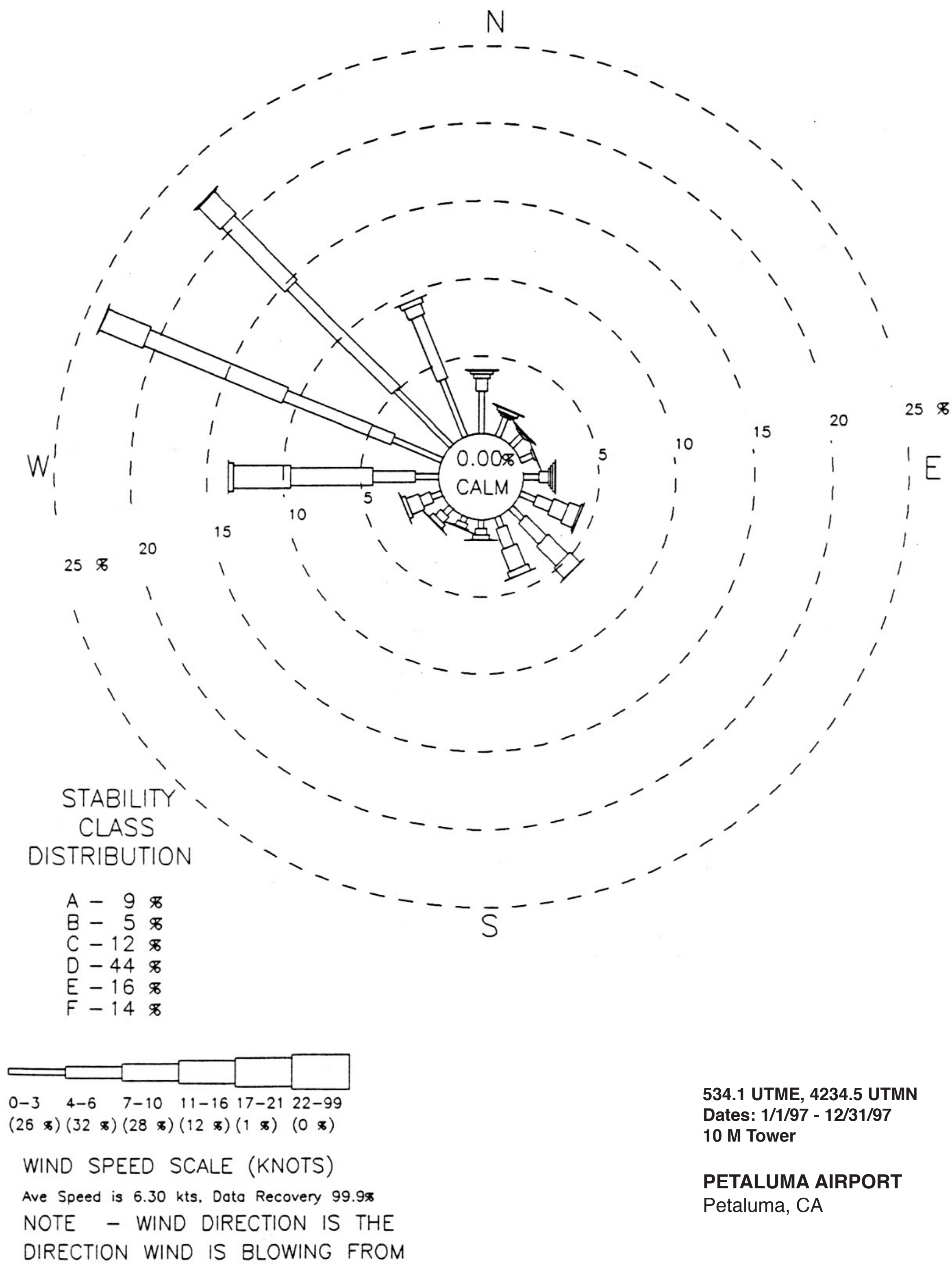
The primary factors that determine air quality are the locations of air pollutant sources and the amounts of pollutants emitted. Meteorological and topographical conditions are also important factors. Atmospheric conditions such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants.

The San Francisco Bay Area climate is Mediterranean in character, with mild, rainy winter weather from November through March, and warm, dry weather from June through September. Movements of marine air, which in large part determine the temperature, humidity, wind, and precipitation throughout the year, depend upon the location and strength of the dominant Pacific high-pressure system and the coastal temperature gradient. Within the Bay Area, average air temperature increases as distance from the coast and bay increases.

In the summer, the Pacific high-pressure system typically remains near the coast of California. Subsidence of warm air associated with the Pacific high-pressure system creates frequent summer temperature inversions. Subsidence inversions may be several hundred to several thousand feet deep, effectively trapping pollutants in a small volume of air near the ground. In the winter, the Pacific high-pressure system moves southward, allowing ocean-formed storms to move through the region. Frequent storms and infrequent periods of sustained sunny weather are not conducive to smog formation. Stagnant atmospheric conditions can exist for several days between storms. Radiational cooling during the winter evenings, however, sometimes creates thin inversion layers and concentrates air pollutant emissions near the ground.

Redwood Landfill is located in Marin County, which is bound to the west by the Pacific Ocean, to the east by San Pablo Bay, to the south by the Golden Gate, and to the north by the Petaluma Gap. There are few mountains in the County above 1,500 feet. Much of the County’s terrain is about 800 to 1,000 feet, which is usually not high enough to block the marine layer.

Wind speeds are highest along the coast at the western edge of the County. The complex terrain in central Marin creates sufficient friction to slow the airflow such that wind speeds are slower in non-coastal areas. The annual average wind speed at Hamilton Air Force Base, just south of the project site, is five miles per hour. Average winds speeds are strongest during summer months, while winter months are the calmest. Prevailing winds throughout Marin County are generally from the northwest. Figure 3.2-1 shows wind rose data (velocity and direction) from Petaluma Airport, which is located approximately 6 miles northwest of the site.



SOURCE: Environmental Science Associates

Figure 3.2-1
Wind Rose
Petaluma Airport 1997

The eastern areas of the County, such as at Redwood Landfill, have warmer weather than the western side due to the distance from the ocean and the hills that separate the eastern County areas from the coast. Temperatures in eastern County areas are moderated by the cooling effect of the Bay in the summer and the warming effect of the bay in the winter. The average maximum summer temperatures in the project site vicinity are in the low-80s and the average minimum winter temperatures are in the low-40s (BAAQMD, 1999).

Air pollution potential is highest in the eastern areas of Marin County, where most of the population is located in semi-sheltered valleys. While the County does not have many polluting industries, the air quality on its eastern side, particularly along the U.S. 101 corridor, may be affected by emissions from increasing motor vehicle use within and throughout the County (BAAQMD, 1999).

LAWS, REGULATIONS, AND PLANS

Federal

The 1977 federal Clean Air Act (CAA) required the United States Environmental Protection Agency (U.S. EPA) to identify National Ambient Air Quality Standards (national standards) to protect public health and welfare. National standards have been established for the six “criteria air pollutants,” so-called because the U.S. EPA publishes criteria documents to justify the choice of standards. Criteria pollutant standards are listed in Table 3.2-1.

In June of 1997, the U.S. EPA adopted new ozone and PM-10 national standards. The U.S. EPA changed the 1-hour ozone national standard of 0.12 ppm to an 8-hour standard of 0.08 ppm. The 1-hour standard continues to apply in areas that violated the standard at that time. The U.S. EPA has also adopted a standard for particulate matter of less than 2.5 microns (PM-2.5).” Although these new standards have been adopted, sufficient air quality monitoring data are not available to determine attainment status. Therefore, the evaluation of air quality impacts and attainment status discussed herein refers only to the pre-June 1997 standards for these pollutants.

Pursuant to the 1990 federal Clean Air Act Amendments, the U.S. EPA classified air basins (or portions thereof) as either “attainment” or “nonattainment” for each criteria air pollutant, based on whether the national standards had been achieved. The project site lies within the San Francisco Bay Area Air Basin (Air Basin), which the U.S. EPA recently reclassified as nonattainment for ozone, precursors of which would be emitted by project-generated vehicle traffic and landfill operation. The Air Basin is classified as an attainment area for carbon monoxide, sulfur dioxide and lead (which would not be substantially emitted by the proposed project) and is unclassified for respirable particulate matter (which would be emitted primarily by project construction activities and vehicle travel over unpaved surfaces) and nitrogen dioxide (CARB, 2002). “Unclassified” is defined by the Clean Air Act Amendments as any area that cannot be classified, on the basis of available information, as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

TABLE 3.2-1
STATE AND NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	State of California[a,c]	National[b,c]
Ozone[d]	1 hour	0.09 ppm (180 $\mu g/m^3$)	0.12 ppm (235 $\mu g/m^3$)
	8 hour	NA	0.08 ppm (160 $\mu g/m^3$)
Carbon Monoxide	1 hour	20 ppm (23,000 $\mu g/m^3$)	35 ppm (40,000 $\mu g/m^3$)
	8 hour	9.0 ppm (10,000 $\mu g/m^3$)	9 ppm (10,000 $\mu g/m^3$)
Nitrogen Dioxide	1 hour	0.25 ppm (470 $\mu g/m^3$)	NA
	Annual	NA	0.053 ppm (100 $\mu g/m^3$)
Sulfur Dioxide	1 hour	0.25 ppm (655 $\mu g/m^3$)	NA
	3 hour	NA	0.5 ppm (1,300 $\mu g/m^3$)
	24 hour	0.04 ppm (105 $\mu g/m^3$)	0.14 ppm (365 $\mu g/m^3$)
	Annual	NA	0.03 ppm (80 $\mu g/m^3$)
Particulate Matter (PM-10)	24 hour	50 $\mu g/m^3$	150 $\mu g/m^3$
	Annual	20 $\mu g/m^3$	50 $\mu g/m^3$
Fine Particulate Matter	24 hour	NA[e]	65 $\mu g/m^3$
(PM-2.5)	Annual	~~NA[f]~~12[f]	15 $\mu g/m^3$
Sulfates	24 hour	25 $\mu g/m^3$	NA
Lead	30 day	1.5 $\mu g/m^3$	NA
	Calendar Quarter	NA	1.5 $\mu g/m^3$
Hydrogen Sulfide	1 hour	0.03 ppm (42 $\mu g/m^3$)	NA
Vinyl Chloride	24 hour	0.010 ppm (26 $\mu g/m^3$)	NA

a California standards for ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, and particulate matter are values that are not to be exceeded. All other California standards shown are values not to be equaled or exceeded.

b National standards, other than for ozone and particulate matter and those based on annual averages, are not to be exceeded more than once per year. For the 1-hour ozone standard, the standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one. The 8-hour ozone standard is met at a monitoring site when the three-year average of the annual fourth-highest daily maximum 8-hour average ozone concentration is less than or equal to 0.08 ppm.

c ppm = parts per million by volume; $\mu g/m^3$ = micrograms per cubic meter.

d New standards effective September 16, 1997 (40 Code of Federal Regulations 50.7 and 50.10).

e Proposed State 24-hour standard is currently under review.

f ~~On June 20, 2002, CARB adopted an annual PM-2.5 standard of 12 $\mu g/m^3$, but the adopted standard has not yet been promulgated~~. On July 5, 2003, the annual PM-2.5 standard of 12 $\mu g/m^3$ became effective after approval by the Office of Administrative Law.

NA = No existing standard for this parameter under the jurisdiction indicated.

SOURCE: California Air Resources Board, http://www.arb.ca.gov/, 2004~~2~~.

Regulation of TACs, termed Hazardous Air Pollutants (HAPs) under federal regulations, is achieved through federal and State controls on individual sources. The 1977 Clean Air Act Amendments required the U.S. EPA to identify National Emission Standards for Hazardous Air Pollutants (NESHAPs) to protect public health and welfare. These substances include certain volatile organic chemicals, pesticides, herbicides, and radionuclides that present a tangible hazard, based on scientific studies of exposure to humans and other mammals. There is uncertainty in the precise degree of hazard.

The 1990 Clean Air Act Amendments offer a technology-based and performance-based approach to reducing air toxics from major sources of air pollution, followed by a risk-based approach to address any remaining, or residual risks. Under the 1990 Clean Air Act Amendments, designated HAPs are also regulated under a two-phase strategy. Under the technology based-approach, the U.S. EPA develops standards for controlling the routine emissions of air toxics from each major type of facility within an industry group (or source category). These standards require facilities to install controls, known as Maximum Achievable Control Technology (MACT), based on emissions levels that are already being achieved by better-controlled and lower-emitting sources in an industry. MACT includes measures, methods and techniques, such as material substitutions, work practices, and operational improvements, aimed at reducing toxic air emissions. The U.S. EPA has issued MACT standards covering over 80 source categories of major industrial sources, such as chemical plants, oil refineries, and steel mills, as well as categories of smaller sources, such as dry cleaners, commercial sterilizers, and chromium electroplating facilities. The MACT Rule and standards for municipal solid waste (MSW) landfill was promulgated in final on January 16, 2003 (40 CFR Part 63), and its requirements relative to Redwood Landfill took effect on January 16, 2004. The primary requirements of the new rule are the preparation and implementation of a Start-up, Shutdown, and Malfunction (SSM) plan for the landfill gas collection and control system and preparation and submittal of semi-annual compliance reports (U.S. EPA, 2003a).. ~~The second phase of control involves determining the residual health risk represented by an air toxics emissions source after implementation of MACT standards.~~

New landfills are also regulated under Section 111(b) of the federal Clean Air Act Amendments; existing landfills will be controlled under the guidelines of Section 111(d). Collectively, these regulations are known as New Source Performance Standards (NSPS). NSPS and its associated Emission Guidelines (EG) for MSW landfills substantially affect landfill operations. Because of this regulation, owners and operators of MSW landfills are required, some for the first time, to evaluate and possibly control landfill gas emissions. The intent of the NSPS rule and EG is to reduce emissions of landfill gas, which is produced as a by-product of the decomposition of organic materials in the landfill, and the volatilization of various compounds in the landfill. The pollutants of concern contained in landfill gas are non-methane organic compounds (NMOC) and methane. Compliance requirements are based on the design capacity of the landfill and its NMOC emission rate to be calculated using the U.S. EPA's Landfill Gas Emissions Model. If a landfill exceeds a threshold of 50 Megagrams (Mg) per year, which is roughly equivalent to 250 pounds per day, of NMOC, then the operator must install a landfill gas collection and control system to extract and destructively combust landfill gas (i.e., in a flare, boiler, or engine generator). About 39 percent of the NMOC emissions are considered components of a class of gasses known as "reactive organic gases" (ROG), an ozone precursor (as discussed under "air quality plans," below). Operations, monitoring, record keeping, and reporting for the collection/control system must be implemented in accordance with regulatory~~ed~~ requirements. Redwood Landfill's existing landfill gas collection system and proposed modifications to that system are described later in this section.

The NSPS rule applies to all new MSW landfills. A new landfill is defined as a MSW landfill that started construction, or began initial waste acceptance on or after May 30, 1991. A landfill modification (e.g., an expansion) that occurred after May 30, 1991 is also subject to the NSPS rule. MSW landfills that meet the above criteria and have a design capacity greater than 2.5 million Mg of waste must evaluate NMOC emissions to determine applicability of the NSPS rule.

The EG apply to all existing landfills that have a site capacity of at least 2.5 million Mg of waste and which either received waste on or before November 8, 1987, or for which construction began prior to May 30, 1991. The requirements of the EG are similar to those of NSPS, except that the state in which the landfill is located plays a role in establishing applicable standards and implementation plans. The NSPS rule and EG apply to Redwood Landfill. The EG Rule in the Bay Area is embodied in BAAQMD Regulation 8, Rule 34. BAAQMD Rule 34 incorporates the various federal requirements of the NSPS and is discussed further below.

Under the Federal 1990 Clean Air Act Amendments (40 Code of Federal Regulations [CFR], Part 70), major sources of criteria pollutants or HAPs are required to obtain a federally-enforceable Title V operating permit. Title V programs are developed at the state or local level, as outlined in 40 CFR, Part 70. All landfills subject to NSPS or EG are also subject to Title V. A Title V permit acts as an umbrella permit, which consolidates all federal, state, and local air quality regulations and requirements into one permit.

Redwood Landfill has been issued a Title V permit since publication of the DSEIR. The current Title V permit was issued on November 10, 2004. The current Title V permit is available for review in full on the BAAQMD's website at http://www.baaqmd.gov/pmt/title_v/public_notices.asp or at the District's offices at 939 Ellis Street, San Francisco, California 94109.

The current Title V permit requires that reports of all monitoring must be submitted to the District at least once every six months, except where an applicable requirement specifies more frequent reporting. The reporting process also includes an annual compliance certification that must list each applicable requirement, the compliance status, whether compliance was continuous or intermittent, the method used to determine compliance, and any other specific information required by the permit.

The permit includes 19 sources and 3 abatement devices that have each been issued a BAAQMD Permit to Operate. The Title V permit requires the permit holder to comply with:

- All generally applicable requirements, including those specified in the BAAQMD and SIP Rules and Regulations and other federal requirements. These requirements apply in a general manner to the facility and/or sources exempt from the requirement to obtain a District Permit to Operate. The District has determined that the generally applicable requirements will not be violated under normal, routine operations, and that no additional periodic monitoring or reporting to demonstrate compliance is warranted.

- All source-specific applicable requirements that apply to sources operating under a BAAQMD Permit to Operate. These include BAAQMD Regulations and Rules, federal regulations codified in the Code of Federal Regulations (i.e., Standards of Performance for New Stationary Sources – General Provisions and Standards of Performance for Municipal Solid Waste Landfills, National Emission Standards for Hazardous Air Pollutants: General Provisions and Municipal Solid Waste Landfills), SIP Regulations, CARB Executive Orders that apply to the gasoline dispensing facility, and any additional BAAQMD permit conditions.

All of the above are addressed at length in Redwood Landfill's Title V permit.
~~An application for a Title V permit has been submitted for Redwood Landfill (Site No. A1179), but as yet no action has been taken on it.~~

State

The California Air Resources Board (CARB) manages air quality, regulates mobile emissions sources, and oversees the activities of county Air Pollution Control Districts and regional Air Quality Management Districts. CARB regulates local air quality indirectly by establishing state ambient air quality standards and vehicle emissions standards, and by conducting research, planning, and coordinating activities.

California has adopted ambient standards that are more stringent than the federal standards for the criteria air pollutants. These are shown in Table 3.2-1. Under the California Clean Air Act (CCAA), patterned after the federal CAA, areas have been designated as attainment or nonattainment with respect to the state standards. The San Francisco Bay Area Air Basin is a nonattainment area for ozone and respirable particulate matter with respect to state standards (CARB, 2002). The Air Basin is designated as an attainment area for carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead.

California State law defines TACs as air pollutants having carcinogenic effects. The State Air Toxics Program was established in 1983 under Assembly Bill (AB) 1807 (Tanner). A total of 243 substances have been designated TACs under California law; they include the 189 (federal) HAPs adopted in accordance with AB 2728. The Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB 2588) seeks to identify and evaluate risk from air toxics sources; AB 2588 does not regulate air toxics emissions. Toxic air contaminant emissions from individual facilities are quantified and prioritized. "High-priority" facilities are required to perform a health risk assessment and, if specific thresholds are violated, are required to communicate the results to the public in the form of notices and public meetings. Depending on the risk levels, emitting facilities are required to implement varying levels of risk reduction measures. The Bay Area Air Quality

Management District (BAAQMD) implements AB 2588, and is responsible for prioritizing facilities that emit air toxics.

California has implemented air emissions regulations for landfills under the state's air pollution control authority. The state has established control criteria, collection and control system requirements, testing and reporting requirements, and exemption criteria for MSW landfills. Control criteria include levels of tested air contaminants, average maximum concentrations of total organics over a certain area, and maximum concentration of organic compounds such as methane at any location (U.S. EPA, 1991).

~~The Calderon Amendments to the California Health and Safety Code (Section 41805.05) require that all landfills perform gas and ambient air testing for at least 10 compounds (vinyl chloride, benzene, ethylene dibromide, ethylene dichloride, methylene chloride, perchloroethylene, carbon tetrachloride, methyl chloroform, trichloroethylene, and chloroform) and any other substances deemed appropriate by CARB or the local air district on or before July 1, 1987~~. ~~The primary objective of these tests, the air quality solid waste assessment test (Air SWAT), is to provide a screening basis to characterize landfill air releases and subsurface gas migration at landfills~~.

Local

BAAQMD is the agency empowered to regulate air pollutant emissions in the San Francisco Bay Area Air Basin. BAAQMD is responsible for implementing emissions standards and other requirements of federal and state laws. BAAQMD operates a regional network of monitoring stations that provides information on meteorology and ambient concentrations of air pollutants. The BAAQMD has the largest monitoring station network in the nation for monitoring TACs. Emissions of criteria air pollutants are regulated through both emissions limitations and the state standards.

Generally, emissions from stationary and area sources are regulated by the BAAQMD under the purview of the permit process. The BAAQMD conducts an engineering estimate of potential air emissions, and based on the findings may require the implementation of Best Available Control Technology (BACT) to control air pollution. Unlike the federal MACT, which is directed at TAC emissions, BACT is primarily intended to reduce criteria air pollutants and their precursors. BACT is already specified for most emission sources. In addition to specifying air pollution control equipment, the BAAQMD may impose restrictions on throughput volumes and total emission quantities. In order to have no net increase in air emissions, the BAAQMD may also require project sponsors that apply for a permit to construct new or modified facilities to offset emissions, at times at ratios higher than 1:1. Such offsets can come from emissions reductions elsewhere in the facility (e.g., for landfills, improved gas collection from existing cells), or from "emissions credits" that can be purchased from the BAAQMD's "Emissions Bank," set up for emissions trading purposes. Emissions of TACs are evaluated by the BAAQMD on a case-by-case basis under a policy-based new source review program called "Risk Screening/Risk Management Procedures."

The BAAQMD's Regulation 8, Rule 34 (Rule 8-34) requires solid waste disposal sites to install a gas collection system to limit emissions of non-methane organic compounds and methane from decomposing waste at solid waste disposal sites. Rule 8-34 is the primary rule that affects LFG emissions from disposal sites under BAAQMD regulation. Rule 8-34 was originally adopted on May 2, 1984, but was significantly revised on October 6, 1999. Most of the changes in the revised rule became effective on July 1, 2002. The following requirements reflect those that became effective on July 1, 2002.

Rule 8-34 requires that an operator collect and process landfill gasses through a gas collection system and emission control system in a manner such that the following requirements are met: 1) the gas collection and control system must be operated continuously, unless an exception is granted by BAAQMD due to lack of landfill gas generation; 2) there are no component leaks that exceed 1,000 parts per million (ppm) by volume measured as methane at any component that contains landfill gas, unless the leak has been discovered by the operator, recorded appropriately, and repaired within 7 days; and, either 3) the collected gases are processed in an enclosed ground type flare, which reduces the amount of NMOC in the collected gases by at least 98 percent by weight or emits less than 30 ppm by volume of NMOC at the outlet, dry basis, expressed as methane, corrected to 3% oxygen; or 4) the collected gases are processed in an emission control system device, or series of devices, other than a flare, which reduces the amount of NMOC in the collected gases by at least 98 percent by weight or emits less than 120 ppm by volume of NMOC at the outlet, dry basis, expressed as methane, corrected to 3% oxygen.

With respect to landfill surface requirements, Rule 8-34 requires that at no point on the landfill surface shall there be a surface leak that exceeds 500 ppm by volume, expressed as methane above background, other than non-repeatable, momentary readings, unless the landfill surface leak has been discovered by the operator and repaired in a manner consistent with BAAQMD requirements.

Regarding Gas Collection System Installation requirements, Rule 8-34 requires that gas collection wells or other approved gas collection system components be installed and operational in the landfill within 60 days of the earliest of the following dates: 1) the date in which the initial solid waste has been in place for a period of 2 years or more, for inactive or closed areas or cells or areas at final grade; or 2) the date in which the initial solid waste has been in place for a period of 5 years or more, for active areas or cells; or 3) the date in which a cumulative total of 1,000,000 tons of decomposable solid waste has been placed in an area or cell.

Lastly, Rule 8-34 imposes the following wellhead requirements for each wellhead in the collection system: 1) each wellhead shall operate under a vacuum (negative pressure); and 2) the landfill gas temperature in each wellhead shall be less than 55 degrees Celsius; and, either 3) the nitrogen concentration in each wellhead shall be less than 20% by volume; or 4) the oxygen concentration in each wellhead shall be less than 5% by volume.

In addition, Rule 8-34 imposes stringent administrative, monitoring and recordkeeping requirements on landfill operators, and includes a manual of procedures for implementing the Rule 8-34 requirements.

~~In compliance with Rule 34, surface air tests must be conducted, and if methane levels of over 1,000 parts per million (ppm) are detected, the landfill surface cover must be improved~~.

Landfills operating under existing permits are required to submit an application to the BAAQMD for a modification of the existing permit if the type or quantity of air emissions change from that approved under the existing permit. If emissions of TACs exceed the BAAQMD's trigger levels, the landfills are required to perform a screening level health-risk assessment.

The BAAQMD is responsible for regulating those portions of Redwood Landfill that have air emissions and the potential to affect air quality, with the exception of odors from the composting/co-composting operations. In accordance with AB 59, which became law in 1995, odors from composting operations are regulated by the California Integrated Waste Management Board (CIWMB) through its local enforcement branch known as the Local Enforcement Agency (LEA). The Marin County Environmental Health Services Division (EHS) is the LEA for Marin County. Odors associated with other activities at the landfill (e.g., landfilling, green waste and wood waste processing, and sludge handling) are regulated by the BAAQMD.

The applicable Permits to Operate (PTOs) issued by the BAAQMD and local air quality plans are described below.

Permit to Operate

Operations at Redwood Landfill are regulated under a consolidated ~~two~~ PTO~~s~~. The ~~current primary~~ PTO for Redwood Landfill (referred to in the permit as Plant #1179) ~~was updated by the BAAQMD on August 29, 2002, and~~ is reissued by the BAAQMD annually. This permit covers landfill operations as described in the 1994 FEIR and covered under the 1995 SWFP, with the exception that it reflects the existing landfill gas collection system. The current system includes a larger flare with greater control efficiency than envisioned in the 1994 FEIR and use of a leachate vaporator. The current PTO also covers composting operations, including use of the tub grinder, and soil and cover material stockpiles. The specific sources and abatement devices that are listed under the current PTO are listed below.

BAAQMD Source # [a]	**Source Description**
S-2	Sewage Sludge Storage, Main Pond
S-5	Active MSW Landfill and Active Landfill Gas Collection System
S-25	Yard and Green Waste Stockpiles
S-41	Yard and Green Waste Shredding
S-28	Co-Compost Biosolids Feed Stockpile
S-34	Active Compost and Co-Compost Windrows and Associated Activities
S-35	Compost and Co-Compost Curing Piles and Associated Activities
S-37	Compost and Co-Compost Final Product Storage Piles
S-38	On-Site Material Hauling
S-39	Trommel Screening Process (powered by either electric motors or S-48)
S-40	Tub Grinder (Diesel-Fired) (used in association with S-41)
S-45	Pumpmaster Engine (Diesel-Fired)
S-46	Tipper (Diesel-Fired)
S-47	PACO Water Pump Engine (Diesel-Fired)
S-48	Retec Power Screens Engine (Diesel-Fired)
S-49	Diesel-Engine for Back-up Generator

BAAQMD Source # [a]	Source Description
S-42	Soil and Cover Material Stockpiles
S-50	Landfill Gas Leachate Evaporator (5 MM Btu/hour)
S-55	Gasoline Dispensing Facility (1above ground tank and 1 gasoline nozzle)
A-19	Water Spray for Dust Control (controls sources S-5, S-25, S-34, S-35, S-37, S-39 and S-42)
A-41	Water Spray for Dust Control (controls source S-41)
A-50	Landfill Gas Flare (120 MM Btu/hour) (controls source S-5)

[a] S = Source, A = Abatement Device

~~The BAAQMD has also issued a PTO to RLI for operation of a gasoline dispensing facility at the landfill, which is also reviewed annually~~. ~~The current permit for the gasoline dispensing facility expires in May 2003.~~Many of these sources have permit conditions on their operation that serve to control emissions.

Air Quality Plans

Ozone Attainment Plans are prepared by local air districts to comply with the national ozone standard and Clean Air Plans are prepared to comply with the state ozone standard. As such, the BAAQMD has published its *Bay Area 2000 Clean Air Plan*, which is the third triennial update of the District's original *Bay Area 1991 Clean Air Plan*. The goal of the plan is to improve air quality by reducing emissions of certain pollutants (ROG and nitrogen oxides [NO_X]) that lead to the formation of ozone, through tighter industry controls, cleaner cars and trucks, cleaner fuels, and increased commute alternatives. The plan encourages cities and counties to adopt measures in support of this goal (BAAQMD, 2000).

In addition, the *Bay Area 2001 Ozone Attainment Plan* responds to the U.S. EPA's proposed partial disapproval of the Bay Area's *Bay Area 1999 Ozone Attainment Plan* and finding of failure to attain the national one-hour standard for ozone. The *2001 Plan* provides for attainment by 2006 through implementation of stationary source, mobile source, and transportation control measures (BAAQMD, et al., 2001a). The co-lead agencies (the BAAQMD, the Metropolitan Transportation Commission [MTC], and the Association of Bay Area Governments [ABAG]) authoring the Plan granted final approval on October 24, 2001. Subsequent CARB approval was granted on November 1, 2001. The Plan is currently under review by the U.S. EPA.

EXISTING AIR QUALITY IN THE PROJECT VICINITY

Criteria Air Pollutants

The air quality of the Air Basin is determined by routinely monitoring changes in the quantities of criteria pollutants in the ambient environment. Air quality in the area is a function of the criteria pollutants emitted locally, the existing regional ambient air quality, and the meteorological and topographic factors which influence the intrusion of pollutants into the area from sources outside the immediate vicinity.

The BAAQMD's monitoring station located closest to the project site is in the City of San Rafael, roughly 15 miles south of the project site. Data collected at this station is considered to be generally representative of air quality ~~at the project site~~in the region surrounding the project site.

Table 3.2-2 summarizes the highest annual concentrations of ozone, carbon monoxide, and PM-10 for the most recent years available (1997-2001) and compares ambient air pollutant

TABLE 3.2-2
SAN RAFAEL AIR POLLUTANT SUMMARY (1997-2001)

Pollutant	**State Standard**[b]	**Monitoring Data by Year**				
		1997	**1998**	**1999**	**2000**	**2001**
San Rafael						
Ozone (O_3):						
Highest 1-hr. average, ppm[a]	0.09	**0.11**	0.07	**0.10**	0.07	0.09
Number of exceedances		1	0	2	0	0
Carbon Monoxide (CO):						
Highest 1-hr. average, ppm	20	6	6	6	4	5
Number of exceedances		0	0	0	0	0
Highest 8-hr. average, ppm	9.0	2.6	3.3	2.9	2.3	2.4
Number of exceedances		0	0	0	0	0
Particulate Matter (PM-10):						
Highest 24-hr. average, $\mu g/m^3$	50	**72**	**52**	**76**	40	**79**
Exceedances/Samples[c]		2/61	1/61	2/61	0/61	2/61
Annual Geometric Mean, $\mu g/m^3$	30	20	18	19	18	18

a ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter.
b State standard, not to be exceeded.
c PM-10 is usually measured every sixth day (rather than continuously like the other pollutants). "Exceedances/samples" indicates the number of exceedances of the state standard that occurred in a given year and the total number of samples that were taken that year.

NOTE: Values shown in **bold** type exceed the applicable standard.

SOURCE: California Air Resources Board (CARB), www.arb.ca.gov/adam, 2002.

concentrations with the state standards, which are more stringent than the corresponding national standards. The health effects of each of these pollutants, and the sources and concentrations of these pollutants are discussed below.

Ozone

Ozone is not emitted directly into the atmosphere, but is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving hydrocarbons and nitrogen oxides (NO_x). Significant ozone production generally requires about three hours in a stable atmosphere with strong sunlight. Ozone is a regional air pollutant because its precursors are transported and diffused by wind concurrently with ozone production. Motor vehicles are the major source of ozone precursors in the Bay Area. Ozone causes eye and respiratory irritation, reduces resistance to lung infection, and may aggravate pulmonary conditions in persons with lung disease. Ozone also damages vegetation and untreated rubber. As shown in Table 3.2-2, the state ozone standard was violated in two of the past five years at the San Rafael monitoring station.

Carbon Monoxide (CO)

Carbon monoxide is an odorless, invisible gas usually formed as the result of incomplete combustion of organic substances. Motor vehicles are the major contributors to CO generation. Ambient CO concentrations normally correspond closely to the spatial and temporal distributions of vehicular traffic. Wind speed and atmospheric mixing also influence CO concentrations. Under inversion conditions, CO concentrations may be distributed more uniformly over an area out to some distance from vehicular sources. High concentrations of CO in respired air can impair the ability of the human body to absorb oxygen into the bloodstream, thereby aggravating cardiovascular disease and causing fatigue, headaches, and dizziness. As shown in Table 3.2-2, measured CO levels at the San Rafael monitoring station have not violated the state one-hour or the eight-hour standard in the last five years.

Respirable Particulate Matter (PM-10)

PM-10 consists of particulates 10 microns (a micron is one one-millionth of a meter) or less in diameter and PM-2.5 consists of particulates 2.5 microns or less in diameter. Both PM-10 and PM-2.5 represent fractions of particulate matter, which can be inhaled deeply into the lungs and cause adverse health effects. Particulates in the atmosphere result from many kinds of dust- and fumes-producing industrial and agricultural operations, combustion, and atmospheric photochemical reactions. Some of these operations, such as demolition and construction activities, contribute to increases in local particulate matter concentrations, while others, such as vehicular traffic, affect regional particulate matter concentrations.

Natural sources of particulates include wind erosion from exposed surfaces. Very small particles of certain substances (e.g., sulfates and nitrates) can cause lung damage directly, or can contain adsorbed gases (e.g., chlorides or ammonium) that may be injurious to health. Particulates can also damage materials and reduce visibility.

Table 3.2-2 shows that while the PM-10 standard was violated in four of the past five years that monitoring data is available, the violations occurred only about two percent of the time during the sampling period.

Other Criteria Air Pollutants

The standards for nitrogen dioxide, sulfur dioxide, and lead are being met within the region, and trends in historical data of ambient concentrations of these pollutants show no signs of violating state or federal standards in the future (CARB, 2002).

Non-Criteria Air Pollutants

CARB and BAAQMD operate a toxic air contaminants monitoring network within major urban areas of the Bay Area; the monitored data are used to determine the average annual concentrations of toxic air contaminants as input to the identification process, and to assess the effectiveness of controls. The toxic air contaminant network is a complimentary program to the criteria air pollutant network. The Bay Area monitoring network includes 17 stations that measure volatile organic compounds (VOCs) (CARB, 2001). Samples are collected every 12 days over a 24-hour period. The closest monitoring station to Redwood Landfill is in the City of San Rafael and is the same station that measures criteria air pollutant concentrations (BAAQMD, 2001b). The station measures ambient air concentrations of 12 different toxic air contaminant (TAC) species as gaseous air pollutants. Some of these same species are also emitted from the project. The most recent monitoring data for the station (the year 2000) are shown in Table 3.2-3).

TABLE 3.2-3
SAN RAFAEL TOXIC AIR CONTAMINANT (TAC) MONITORING DATA (2000)

Pollutant	Annual Concentration (ppb)
Vinyl chloride	<0.30
Dichloromethane	0.43
Chloroform	0.02
Ethylene Dibromide	<0.10
1,1,1 Trichlrorethane	0.16
Carbon Tetrachloride	0.10
Trichloroethylene	<0.08
Benzene	0.57
Ethylene Dibromide	<0.02
Perchloroethylene	0.28
Toluene	1.25
Methyl tertiary butyl ether	0.56

SOURCE: Bay Area Air Quality Management District

VOCs are organic compounds that can vaporize easily at ambient temperatures. Some VOCs are highly reactive and play a critical role in the formation of ozone. These compounds are also referred to as reactive organic gases (ROG). Other VOCs have adverse, chronic, and acute health effects. In some cases, VOCs can be both highly reactive and potentially toxic. Sources of VOCs in the Bay Area include motor vehicles, waste burning, gasoline marketing, industrial processes, and dry cleaning operations. In this section, the terms ROG and VOC are both used, reflecting the near synonymy of the terms, and their appearance in various background documents and regulations.

EXISTING EMISSIONS AT REDWOOD LANDFILL

Criteria Air Pollutants

Landfill Gas Emissions

Municipal solid waste (MSW) landfills are potential sources of gas mixtures generated from the natural decomposition of organic wastes and vapors from volatile compounds present in the waste. Volatile organics are produced by biological processes or chemical reactions in the landfill. Transport mechanisms, such as diffusion, convection, and displacement, transport a volatile constituent present in the vapor phase to the surface and into the atmosphere. The major factors affecting the air emission production mechanisms are composition of waste, moisture content, temperature, age of landfill, pH, and availability of oxygen and nutrients for bacteria. The major factors affecting transport are soil porosity, concentration gradient, compatibility of waste, amount of compaction, overburden weight, and rate of precipitation and evaporation (U.S. EPA, 1991). Methane production is stimulated by waste that has a high percentage of biodegradable materials (e.g., food and garden waste, sludge, paper, wood). Other materials present in waste (such as heavy metals) hamper the growth and activity of methane-forming bacteria.

Landfill gas, consisting primarily of methane and carbon dioxide (CO_2), is produced by the actions of microorganisms in the landfill under anaerobic conditions. Initial decomposition is aerobic, until the oxygen supply is exhausted. Anaerobic decomposition produces relatively high concentrations of CO_2 and methane. Landfill gas consists of approximately 50 percent CO_2 by volume, 50 percent methane, and trace amounts of NMOC. Other constituents of landfill gas can include ammonia, hydrogen sulfide, nitrogen, hydrogen chloride and CO, along with a variety of VOCs. Organic air emissions from landfills may include some toxic compounds and hazardous compounds with carcinogenic and non-carcinogenic health effects. The five major effects of landfill gas emissions are human health and vegetation effects from ozone produced by NMOC emissions, carcinogenicity and other possible non-cancer health effects, global warming effects from methane emissions, explosion hazards, and odor nuisance (U.S. EPA, 1991).

Landfill gas production from a given refuse fill will typically continue for many years, though the active gas production life is dependent on site-specific conditions. Generation life may range from a few years to hundreds of years, depending on these conditions.

The 1995 SWFP and the current ~~2002~~ PTO for Redwood Landfill limit the ~~current~~ capacity of the landfill to 19.1 million cubic yards. The U.S. EPA's Landfill Gas Emissions Model (LandGEM) Version 2 was used to estimate landfill gas production rates for the landfill. (See Appendix D, Table D-7 for details.) While incineration of collected landfill gas is highly effective in reducing potentially harmful constituents contained in the gas, the collection system itself does not capture all of the gas produced. Some untreated gas escapes to the atmosphere, and has the potential to contribute to air pollution and to expose people to toxic air contaminants. The landfill gas collection system is assumed to have a landfill gas recovery efficiency of 75 percent; the remaining 25 percent of the unrecovered gas, referred to as fugitive landfill gas, is emitted directly to the atmosphere.

Based on monthly monitoring data from 2001, the current landfill gas flow rate through the landfill gas collection system is about 1,800 cubic feet per minute (cfm) with an average of 50 percent methane content (Reco Project, 2001). Based on modeling, total gas generation in 2001 (including gas not recovered by the landfill gas collection system) is about 2,400 cfm; at a 75 percent rate of capture, the model predicts that 1,802 cfm was being produced in 2001, which closely matches the 2001 monitoring data (Appendix D, Table D-7a). Assuming the maximum rate of fill allowable under the existing permit (see Appendix A),[2,3] the peak landfill gas generation rate of 6,325 cfm would occur in 2016 (Appendix D, Table D-7b) when the landfill would reach permitted capacity and close (refer to Appendix A). In 2016, under current permit conditions, the total production of ROG emissions is estimated to be 473 pounds per day. Fugitive ROG emissions (from the 25 percent of the landfill gas not collected and directed to the landfill gas collection system) would be about 118 pounds per day, and about 355 pounds per day would be collected and treated by the flare system. Assuming the flare system destroys 98 percent of the ROG that enters it, as required by the PTO, the residual ROG emissions from the flare system would be about 7 pounds per day. These are considered the baseline levels for landfill gas ROG emissions for the purpose of the analysis presented in Impact 3.2.5. These emissions are shown in Table 3.2-4.

TABLE 3.2-4
ESTIMATED REDWOOD LANDFILL BASELINE EMISSIONS

	Emissions (pounds per day)				
Emission Source	**CO**	**ROG**	**NO_x**	**PM-10**	**SO_x**
Fugitive Landfill Gas[a]	--	118	--	--	--
Flare Emissions	--	7	--	--	--
Composting/Co-Composting	--	~~190~~ 171	--	--	--
Sludge as ADC and Disposed	--	~~70~~ 38	--	--	--
Sludge ~~Handling[b]~~Air Drying[b]	--	24	--	--	--
Off-Road Equipment	19	7	115	3	--
Fugitive Dust	--	--	--	~~131~~ 817	--
On-Road Vehicles	~~97~~ 158	7	~~141~~ 76	~~17~~ 16	1
TOTAL	**~~116~~ 177**	**~~353~~ 372**	**~~256~~ 191**	**~~151~~ 836**	**1**

a Reflects fugitive landfill gas emissions emitted directly to the atmosphere.
b Based on emissions factor for VOCs for N-Viro process with emissions controls for 500 wet tons per day, as specified in the 1994 FEIR.

2 This estimate assumes the use of Area G.
3 This estimate is based on the maximum permitted daily tonnage for general refuse and the current actual daily tonnage for sludge. RLI currently is permitted to receive more sludge than the quantity reflected here; however, because sludge receipts have declined since the 1995 SWFP was issued and are not planned or proposed to increase above the current acceptance rate, the current acceptance rate for sludge was considered to provide a more realistic and accurate basis for calculating landfill gas generation as well as expected site~~ life (Appendix A)~~.

In addition to ROG, combustion of landfill gas produces other criteria air pollutants, including NO_X, CO, SO_X, and PM-10. The applicant has not, however, provided usable rates of emissions from the existing flare system on which an analysis can be based. Therefore, there are no baseline emissions for these pollutants shown in Table 3.2-4. Increases in emissions of these pollutants under the project is, however, considered in Impact 3.2.5.

Burning landfill gas destroys most of the ROG emissions (as demonstrated above), but causes emissions of combustion by-products. These by-products include particulates, SO_2, NO_X, CO, ROG, and trace amounts of non-criteria air pollutants. There is insufficient information from the applicant to quantify the maximum rate of emissions of these pollutants that can be expected under the landfill's current permits.

Emissions from Composting/Co-Composting Operations

Operation of the composting and co-composting facility at Redwood Landfill is permitted under a Registration Permit issued by the LEA in 1996. The Registration Permit allows green waste and/or wood waste composting and co-composting of biosolids (sludge) with green waste and/or wood waste. Table 2-2 in Chapter 2, Project Description, shows the permitted throughput that comprises baseline conditions.

Composting/co-composting is done by windrow method, in accordance with the methods evaluated in the 1994 FEIR and allowed for under the 1995 SWFP. The current PTO for the landfill covers composting/co-composting activities and the use of a tub grinder for materials processing. The windrows are maintained in a manner that optimizes composting conditions and minimizes fugitive dust, odors, and other composting emissions, as described in Chapter 2, Project Description.

Aside from odorous emissions, the primary criteria pollutants of concern from windrow composting are particulate matter, PM-10, and ROG, as described below.

Particulates (PM-10). Composting/co-composting activities that generate PM-10 include material grinding, windrow construction, pile turning, and the loading of finished compost onto trucks for transfer off-site. PM-10 generated during material processing is covered under the PTO for the site, as described above.

Keeping compost and feedstock moist and moistening compost prior to tearing down windrows are practices that help control dust (U.S. EPA, 1994). Due to the above practices, dust abatement practices required under the current PTO, and maintenance of appropriate moisture levels within the compost windrows to facilitate the composting process, PM-10 emissions from composting are not expected to be substantial and are excluded from the baseline emissions inventory contained in Table 3.2-4. Composting by windrow also generates ammonia. Ammonia is a precursor of PM-10, particularly aerosol ammonium nitrate and ammonium sulfides.

Reactive Organic Gases (ROG). Recent studies and information produced by the South Coast Air Quality Management District (SCAQMD) and the CIWMB have focused on quantifying and measuring ROG emissions from composting/co-composting activities. The early findings of these studies suggest that composting/co-composting activities may be a significant source of ROG emissions. Emissions are produced during composting when microorganisms feeding on organic materials consume oxygen in a process that releases carbon dioxide, water vapor, heat and ROG. In 2002, the SCAQMD published a draft Technology Assessment on various composting methods (including windrow composting of green/wood waste materials and biosolids co-composting) that establishes composite emission factors of 3.8 and 1.78 pounds of ROG per ton of green/wood material and mixed putrescibles (including food waste, and biosolids mixed with green/wood waste) composted by windrow method, respectively (SCAQMD, 2002).[4] These composite emission factors reflect total emissions during the active and curing phases of composting.

In an effort to measure the accuracy of the seemingly high ROG emission factor developed by SCAQMD for green waste composting facilities, the CIWMB has conducted independent source testing at the same green waste processing facilities where SCAQMD conducted source testing (the CIWMB did not, however, test emissions from co-composting operations). The results of the testing are summarized in two recently published Technical Summary Reports (CIWMB, 2002a; CIWMB, 2002b). Using a different air emissions test method than the SCAQMD, the CIWMB study found ~~ROG~~ VOC emissions from green waste composting by windrow method to be roughly 27 percent of those measured by SCAQMD. ROG is a subset of the CIWMB factor for green/wood waste composting. As such, the CIWMB factor used to estimate green/wood waste composting emissions has been adjusted further to reflect 39 percent ROG in the VOCs. ~~As such, b~~By applying the CIWMB emission factor for greenwaste composting, and the SCAQMD factor for co-composting, baseline composting ROG emissions at Redwood Landfill at the maximum permitted composting rate would be ~~190~~ 171 pounds per day[5] (see Table D-6 in Appendix D for details). This figure is shown as the baseline for composting emissions in Table 3.2-4.

The information available for quantifying ROG emissions from composting facilities is still new and subject to further scrutiny and debate. Information is provided here to inform decisionmakers of the potential emissions associated with composting. Site-specific information is not available for the windrows at Redwood Landfill, but collection of such information is identified as a part of a mitigation measure discussed later in this section.

Emissions from Sludge Processing

The 1995 SWFP allows the landfill to accept and process up to 1,000 tons per day, and an average of 550 tons per day, of sewage sludge or biosolids. These materials are accepted for disposal and/or use as ADC or for composting. Since issuance of the Registration Permit for the composting operation, the amount of biosolids that can be accepted is reduced by the amount of

[4] The emission factor cited in the SCAQMD study is expressed in terms of volatile organic compounds (VOCs). VOCs are organic compounds that evaporate readily at normal temperatures and include gases and other compounds (e.g., organic compounds in the form of vapor). ROG is the gaseous and major component of VOCs that reacts more readily in the atmosphere to form ozone. For the purposes of this analysis and comparison to BAAQMD significance criteria, SCAQMD's VOC emission factor for composting is used synonymously with ROG.

[5] This assumes that of the ~~276~~ 171 pounds per day calculated using the SCAQMD factor, green waste and wood waste composting accounted for 12~~17~~ pounds per day and co-composting accounted for 159 pounds per day.

greenwaste and woodwaste accepted for composting, which may be accepted at a maximum rate of 42 tons per day average and 238 tons per day peak. Therefore, the total amount of biosolids that may be accepted in a day for all purposes is 508 tons per day average and 762 tons per day peak (see Table 2-2 in Chapter 2). In addition, ~~T~~the 1995 SWFP permitted the processing of sludge by air drying until September, 1996 at a rate of 500 tons per day. VOC emissions from air drying had not been directly measured at the site at the time that the 1994 FEIR was written. However, VOC emissions from air drying of sludge were assumed to be equivalent to emission rates obtained from testing of a different sludge treatment process. Based on this assumed emission rate, VOC emissions from air drying of sludge were found to be significant and unavoidable in the 1994 FEIR.

In addition to air drying, the 1994 FEIR also evaluated the use of a chemical fixation process (or alkaline stabilization process) known as "N-Viro" for processing or air drying up to 500 wet tons per day of sludge prior to use as ADC. The 1994 FEIR evaluated and the 1995 SWFP required that the N-Viro process be conducted in a ventilated building with an emissions control system, in order to reduce odor and VOC emissions, with a requirement to reduce VOC emissions by 90 percent and odors by 95 percent. With this mitigation measure, the FEIR found that sludge processing would produce about 24 pounds per day of VOCs, and therefore this impact would have been reduced to a less-than-significant level. As noted, the 1995 SWFP required phasing out of air drying altogether by September, 1996.

Subsequent to certification of the 1994 FEIR and issuance of the 1995 SWFP, the applicant commissioned source tests of odor and VOC emissions from air drying of sludge (J.M. Smith & Associates, 1997). This occurred in May, 1997. These tests revealed that VOC emissions from air drying of sludge were actually less on a unit basis (i.e., per wet ton of sludge treated) than the N-Viro process. This apparently is due to the nature of the N-Viro process itself; as part of the chemical reaction, large quantities of VOCs are released from the sludge undergoing treatment. VOC emission rates from air drying of sludge obtained in the 1997 study indicate that, on a unit-basis, air drying of sludge produces VOCs at the rate of .29 pounds per dry ton of sludge treated per day. The 1997 study cites a 1991 study conducted by Webster Environmental Associates at the Redwood Landfill of the N-Viro demonstration project that found a VOC emission rate of 8.55 pounds per day of VOCs per dry ton of sludge treated. The 1997 study concludes that, even with the 90 percent reduction required for the emission control system, the N-Viro process would produce nearly three times as much VOC emissions as air drying, on a unit basis. However, the 1994 FEIR derives emission factors from a different study of VOC emissions from the N-Viro process conducted by the East Bay Municipal Utilities District (EBMUD). This study found an emission rate for the N-Viro process (without emissions controls) of 1.3 pounds per day of VOCs per dry ton of sludge treated (about 15 percent of the emission rate from the Webster study). Because the 1994 FEIR used the EBMUD study's emission rate in its analysis and as a basis for specifying the 90 percent reduction requirement for the stipulated emission control system that was also written into the 1995 SWFP, the same lower value (i.e., the emission rate identified in the EBMUD study) is repeated here and is used to derive the figure of 24 pounds per day shown in Table 3.2-4 as the baseline for VOC emissions from sludge treatment.[6]

The applicant never implemented the mitigation measure specified in the 1994 FEIR that required processing of sludge with the N-Viro process to be conducted in a building with emissions controls. However, as a baseline condition, the current analysis uses the projected VOC emission rate from use of the N-Viro process with emission controls to process via air drying up to 500 wet tons per day of sludge. This rate, shown in Table 3.2-4 (in the table the emissions are expressed as ROG), is 24 pounds per day, as stated in the 1994 FEIR.

Because specific emissions data are not available for the direct disposal of sludge or sludge as ADC, baseline emissions for these processing mechanisms were estimated using the same emission factor as for air drying. Assuming a VOC emission rate of 0.29 pounds per dry ton treated, and that 455 TPD of wet sludge is equivalent to 152 TPD of dry sludge, the resultant emissions would be roughly 26 pounds per day. In addition, evaporative emissions from stockpiled sludge are estimated to be about 12 pounds per day (GeoSyntec Consultants, 1998). The baseline emissions from sludge processing (via disposal and/or use as ADC) and storage is estimated to be 38 pounds per day, as shown in Table 3.2-4.

Other Emissions Sources

Other existing sources of criteria pollutants at Redwood Landfill include operation of off-road heavy-duty diesel equipment, such as bulldozers and compactors, fugitive dust, and vehicle travel to and from the landfill. Equipment operations result in exhaust emissions, as well as emissions of PM-10 from disturbance of earth, dumping of waste, and application of daily cover. Diesel trucks bringing waste to the landfill are a regional source of NO_x.

Baseline off-road equipment emissions estimates shown in Table 3.2-4 were based on information provided by the applicant regarding the number and type of equipment used and the hours of use. Baseline conditions reflect the project conditions evaluated in the 1994 FEIR and permitted under the 1995 SWFP, since the landfill is operating at near its permitted daily capacity. Trommels and screens used in connection with composting activities are electric-powered and are therefore left out of Table 3.2-4. (See Table D-4 in Appendix D for detailed assumptions and calculations.) Emissions of fugitive dust at Redwood Landfill were calculated on the basis of equipment use, waste receipts, vehicle travel over unpaved (gravel and dirt) and paved surfaces at the landfill, and landfill surface area and cover stockpiles exposed to wind erosion and published emission factors (U.S. EPA, 1995a; U.S. EPA 1995b; U.S. EPA 1995c; U.S. EPA 1998b; U.S. EPA 2003b; U.S. EPA 2003c~~SCAQMD, 1993~~). Estimated baseline fugitive dust emissions are shown in Table 3.2-4. (See Table D-5 in Appendix D for detailed assumptions and calculations.)

6 Note further that the 1994 FEIR uses a different ratio of sludge measured on a wet basis to sludge measured on a dry basis: about 2:1, as opposed to the 4:1 figure used in the 1997 study and in the current Joint Technical Document.

Baseline emissions estimates shown in Table 3.2-4 for on-road vehicles are based on daily trip generation information provided in Section 3.10, Transportation and Traffic, an assumed trip length of 10 miles that was used in the 1994 FEIR, EMFAC 2002 Version 2.2 ~~1~~ composite vehicle emissions factors, and an assumed average speed of 55 miles per hour (mph). EMFAC 2002~~1~~ is a motor vehicle emissions factor model developed by CARB. The estimates for PM-10 include exhaust, tire wear, brake wear, and entrained road dust. (See Tables D-1 and D-2 in Appendix D for detailed assumptions and calculations.)

Non-Criteria Air Pollutants

An Air Quality Solid Waste Assessment Test (Air SWAT) was conducted in 1988 to monitor landfill gas and identify potential environmental impacts related to gas generation and migration off site. The Air SWAT report indicated that ambient air quality in the vicinity of the landfill is not being degraded by landfill operations and that there is an extremely low probability of surface migration of landfill gas from the site. During the Air SWAT test the only toxic air contaminant noted during 72 hours of ambient air monitoring was benzene, at a level of 5.1 parts per billion (by volume) (ppbv), which was likely influenced by heavy equipment operating in the area at the time (GeoSyntec Consultants, 1998). In general, ambient benzene levels have declined dramatically since 1996 with the advent of Phase 2 reformulated gasoline (BAAQMD, 2001b).

Additionally, a study conducted by HLA shows that landfill gas does not vent through the daily and intermediate cover material at detectable concentrations (GeoSyntec Consultants, 1998).

Odorous Emissions

While offensive odors rarely cause any physical harm, they still can be very unpleasant, leading to considerable distress among the public and often generating citizen complaints to local governments and the BAAQMD.

Odors associated with Redwood Landfill emanate from several different sources, including Class III municipal waste disposal operations, the handling of sewage sludge, and composting/co-composting activities. In 1996, RLI conducted a comprehensive study of odors at the landfill (J.M. Smith & Associates, 1996). The study showed that the primary source of odor complaints at the landfill was linked to sludge handling activities. Major odorous compounds from sludge handling include ammonia, reduced sulfur or hydrogen sulfide (characterized as “rotten egg” or “refinery odor” smell), mercaptans (“natural gas” smell), and trimethylamines (“fishy” smell). Some of these compounds are also associated with gas emissions generated by landfilling operations and composting/co-composting activities.

Existing Odor Controls

At Redwood Landfill, landfilled waste is covered at the end of each day with either soil or mixed ADC in part to control odors. Some of the ADC materials help to restrict odor emissions from the landfilled waste. Absorbent materials within the landfilled waste, such as paper products, also aid in controlling odors from waste materials.

Under the 1995 SWFP, air-dried sludge and sludge used as ADC were to be treated through an alkaline stabilization process (also known as the N-Viro process). The landfill has discontinued this practice and instead sprays the surface of air-drying sludge with potassium permanganate solution to control odor. RLI has also installed a vapor phase odor counteractant system around its southern boundary. This system can provide continuous odor control when required. This newer system was not evaluated in the 1994 FEIR, but serves as the baseline for odor impact evaluation in this EIR.

The applicant controls odors from composting activities by maintaining windrows in a manner that optimizes the composting process (i.e., proper aeration, moisture content, temperature, and carbon to nitrogen ratio). Portable lines connected to the perimeter vapor phase odor counteractant system are utilized when necessary at the composting/co-composting facility. Other topical odor control products are also used on windrows when necessary to control odors.

Odor Complaint History

BAAQMD records show that odor complaints received related to Redwood Landfill have dropped significantly since 1999. Table 3.2-5 shows the number of confirmed and unconfirmed complaints in the past five years and a brief characterization of the types of odors observed. For confidentiality reasons, the BAAQMD does not provide the name or origin information on complaints received. Each of these complaints has been investigated by a BAAQMD inspector and was either found to be confirmed or unconfirmed (i.e., the odor either did not exist at the time of the investigation or was attributed to another odor source). Confirmed complaints include those in which BAAQMD inspectors confirmed that an odor was present and traceable to the landfill (Allen, 2002). The decrease in the number of complaints since 1999 may be attributed to the cessation of the practice of broadcast air-drying of sludge (though air drying of sludge is proposed to resume for a limited time under the project) as well as the change in management of the landfill and implementation of the new odor control and mitigation program for sludge handling operations.

Records maintained by RLI show that most complaints have been filed by residents south of the site in the City of Novato, which is consistent with the predominant wind direction (see Figure 3.2-1). RLI also maintains that the confirmed complaint in 2001 (see Table 3.2-5) was not attributed to Redwood Landfill and is working with BAAQMD staff to rectify their records (Roycroft, 2002).

SENSITIVE RECEPTORS

Some receptors are considered more sensitive than others to air pollutants. The reasons for greater sensitivity than average include pre-existing health problems, proximity to the emissions source, or duration of exposure to air pollutants. Land uses such as primary and secondary schools, hospitals, and convalescent homes are considered to be relatively sensitive to poor air quality because the very young, the old, and the infirm are more susceptible to respiratory infections and other air quality-related health problems than the general public. Residential areas are considered sensitive to poor air quality because people in residential areas are often at home for extended

TABLE 3.2-5
ODOR COMPLAINTS AT REDWOOD LANDFILL, 1997-2001

Year	# of BAAQMD Complaints	# of Confirmed Complaints	Odor Description
1997	19	2	Horrible; human waste; garbage; rotten food; sewage sludge; very bad smell; stinks.
1998	15	0	Horrible; human waste; garbage; rotten; sewage sludge; very bad smell; manure; sweet.
1999	19	0	Horrible; human waste; sewage sludge; very bad smell; foul; sour
2000	2	0	Human waste; disgusting.
2001	1	1	Sewage sludge.

SOURCE: Carol Allen, Senior Air Quality Engineer, Permit Services Division, BAAQMD, fax transmittal, August 19, 2002.

periods. Recreational land uses are moderately sensitive to air pollution, because vigorous exercise associated with recreation places a high demand on the human respiratory function.

The nearest sensitive receptors to the site include residential uses and recreational site users. The nearest existing residential developments are the Buck Center (a medical research center that also includes on-site residential units), a residential development on Bahia Lagoon, and Rush Creek Estates within the Novato city limits, and single-family and limited agricultural/residential land uses west of U.S. 101, along San Antonio Creek north of the landfill, and along Atherton Avenue south of the landfill in an unincorporated area of the County near Novato. The Buck Center is located west of U.S. 101 and south of Olompali State Park, approximately 1.5 miles southwest of the Redwood Landfill boundary. The Bahia residential development on Bahia Lagoon is approximately 2.5 miles from the southern border of the landfill property. The parcel immediately to the south of the landfill property includes Mira ~~Vista~~Monte Marina. Use of the marina is limited. San Antonio Creek, which forms the eastern boundary of the landfill, is used for water recreation.

3.2.2 IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

According to Appendix G of the *CEQA Guidelines*, a project would generally have a significant effect on the environment if it would (Governor's Office of Planning and Research, 2001):

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation;

- Result in a cumulatively considerable net increase of any nonattainment pollutant;
- Expose sensitive receptors to substantial pollutant concentrations; or
- Create objectionable odors affecting a substantial number of people.

CEQA Guidelines Section 15125(d) further states that an EIR shall discuss "any inconsistencies between a proposed project and applicable general plans and regional plans. Such regional plans include, but are not limited to, the applicable air quality attainment or maintenance plan (or State Implementation Plan). . .".

The BAAQMD has published a set of recommendations that provide specific guidance on evaluating projects under CEQA relative to the above general criteria (BAAQMD, 1999). The BAAQMD has established significance criteria for criteria air pollutants, toxic air contaminants, and odors. These criteria are discussed below.

For temporary construction-phase impacts, the BAAQMD recommends a qualitative approach that focuses on the dust control measures that would be implemented. If appropriate mitigation measures are implemented to control PM-10 emissions, the impact from construction would be less than significant.

For some pollutants, dispersion modeling is conducted to estimate pollutant concentrations that can then be compared directly to their corresponding ambient air quality standards. However, since air pollutant concentration modeling is not appropriate or feasible for all pollutants (particularly those associated with regional impacts rather than local impacts), emissions-based thresholds are used to supplement the above general CEQA criteria. For evaluating operational-phase emissions, the BAAQMD recommends that local agencies consider individual development projects exceeding the following thresholds to have a significant impact on the environment:

- Cause a net increase in pollutant emissions of reactive organic gases (ROG), NO_x, or PM-10 exceeding 80 pounds per day or 15 tons per year.
- Cause a net increase in carbon monoxide emissions exceeding 550 pounds per day, reduce roadway Level of Service for intersections operating at Level of Service D, E or F (see Section 3.10, Transportation and Traffic), cause a reduction of intersection Level of Service to D, E or F, or increase traffic volumes on nearby roadways by 10 percent or more, and violate state CO concentration standards, as determined by the modeling of CO emissions. The level of significance of CO emissions from mobile sources is determined by modeling the ambient CO concentration under project conditions and comparing the resultant 1- and 8-hour concentrations to the respective state CO standards of 20.0 and 9.0 parts per million.

With respect to odors, the BAAQMD's significance criteria are more subjective and are based on the number of odor complaints generated by a project. Generally, the BAAQMD considers any project with the potential to frequently expose members of the public to objectionable odors to cause a significant impact. For comparative purposes, the BAAQMD considers odor impacts for projects locating near an existing source of odors to be significant if there has been either: 1) more than one confirmed complaint per year averaged over a three-year period; or 2) three unconfirmed complaints per year averaged over a three-year period.

Lastly, the BAAQMD recommends that cumulative air quality effects be discussed with reference to the consistency of a project to the Bay Area 2000 Clean Air Plan. BAAQMD recommendations are used herein to identify significant effects of the project and significant cumulative effects.

SIGNIFICANCE CRITERIA FOR TACS

The significance of TAC emissions from the project is dependent on the chance of contracting cancer from exposure to the TACs or of having adverse health effects from exposure to non-carcinogenic TACs.

Cancer Risk

Cancer risk is defined as the lifetime probability of developing cancer from exposure to carcinogenic substances. Cancer risks are expressed as the chances in one million of contracting cancer, for example one cancer case among one million people exposed. Incremental cancer risks are determined by summing the individual risk for each TAC.

A project is considered to be significant if the incremental cancer risk at a receptor exceeds 10 in a million. This includes regulation under AB2588 as well as Proposition 65, both of which require public notification if the incremental risk equals or exceeds 10 in one million. BAAQMD CEQA Guidelines also recommend that the cancer risk significance threshold be 10 in a million. The incremental risk from exposure to a given toxic air contaminant (TAC) is calculated by multiplying the concentration (or dosage level) of the given TAC by its specific unit risk factor or potency slope. The unit risk factor or potency slope of a TAC is derived from epidemiological studies, and the published values are based on the assumption that a person would be exposed to the given TAC at that dosage constantly for 70 years. This assumption is considered to be very conservative for several reasons, one being that it is assumed the source emitting the TAC would also be operating at the given rate for 70 years. Since it is difficult to prove that a source would not be operating for that period of time, the guidelines do not allow for exposure levels and risks to be adjusted by the number of years that a source might be operational, except for temporary construction projects.

Non-Cancer Health Risk

Non-cancer adverse health risks are measured against a Hazard Index (HI), which is the ratio of the predicted exposure concentration to a threshold level, as established by OEHHA, that could cause adverse health effects. The ratio (HI) of each non-carcinogenic substance is added to the calculated Hazard Indices of the other non-carcinogens to produce an overall HI. If the overall HI exceeds one (1), then the impact would be significant. The HI significance threshold of one is defined in the BAAQMD CEQA Guidelines and is consistent with the value requiring public notification in the AB2588 regulation and in Proposition 65.

IMPACTS AND MITIGATION MEASURES

Impact 3.2.1: Construction activities would generate substantial amounts of dust, which would result in potential health and nuisance impacts in the immediate project vicinity. (Significant)

Project construction (including relocation of the composting/co-composting area, placement of final cover on the 11.5-acre waste disposal area, and relocation of the administrative offices, maintenance facilities, and ancillary facilities) could generate substantial amounts of fugitive dust not evaluated in the 1994 FEIR. Dust emissions would vary from day to day, depending on the level and type of activity, silt content of the soil, and the prevailing weather. A large portion of the total construction dust emissions would result from equipment and motor vehicle traffic over unpaved roads and parking lots at the site. Other sources of fugitive dust during construction would include excavation, earth movement, grading, and wind erosion from exposed surfaces.

Fugitive dust from construction activities includes large-sized particulates that typically fall out of the air within several hundred feet of a construction site, as well as fine particulates. The larger-sized particulates would pose nuisance concerns such as reduced visibility and soiling of exposed surfaces. Fine particulates (PM-10) could be associated with adverse health effects. Background concentrations in the project vicinity, as well as the rest of the Bay Area, can exceed the state ambient PM-10 standard (see Table 3.2-3). Project construction activities would add to those concentrations, particularly in the immediate vicinity of the project site.

Peak construction activities would involve simultaneous grading and earth-moving activities over much of the site. The BAAQMD approach to assessing impacts from air pollutant emissions from construction activities is based upon whether identified feasible dust control measures are implemented. Without implementation of construction dust control measures, construction dust emissions would be considered significant.

Construction equipment, on-road heavy-duty trucks, and construction-worker commute vehicles would also generate ozone precursor emissions. Criteria pollutant emissions of ROG and NO_x from these emissions sources would incrementally add to regional atmospheric loading of ozone precursors during project construction. The *BAAQMD CEQA Guidelines* recognize that construction equipment emits ozone precursors, but indicate that such emissions are included in the emissions inventory that provides the basis for regional air quality plans, and that construction emissions are not expected to impede attainment or maintenance of ozone standards in the Bay Area (BAAQMD, 1999). Therefore, construction-related emissions, other than dust, would not be significant.

Mitigation Measures Proposed as Part of the Project

> **Mitigation Measure 3.2.1a:** As described under existing facilities in the Joint Technical Document (JTD) (GeoSyntec, 1998), the applicant controls dust by frequent application of water spray on soil-covered work areas and the use of a dust palliative on the access road and main haul roads, if necessary, to supplement watering. The JTD indicates that the same practices would be continued under the project.

Mitigation Measures Identified in This Report

Mitigation Measure 3.2.1b: The applicant shall implement good construction practices to minimize fugitive dust. Such practices shall include general watering of exposed areas, the use of palliatives or other dust suppressants on any unpaved haul roads, and periodic cleaning of paved roads.

Mitigation Measure 3.2.1c: The applicant shall implement a Construction Dust Abatement Program. Construction contractors and landfill staff involved in construction activities at the site shall implement a Construction Dust Abatement Program to reduce the contribution of project construction-related dust emissions to local respirable particulate matter concentrations. Some of these measures are similar to those identified under Measures 3.2.1a and 3.2.1b, but with additional specificity. This program shall include the following elements as needed to reduce fugitive dust to acceptable levels, using the BAAQMD Regulation 6 visible emissions standards as a guide:

- Water all active construction areas at least twice daily.
- Cover all trucks hauling soil, sand, and other loose materials, or require all trucks to maintain at least 2 feet of freeboard (i.e., the minimum required space between the load and the top of the trailer).
- Pave, apply water three times daily, or apply nontoxic soil stabilizers on all unpaved access roads, parking areas, and construction staging areas.
- Sweep daily with water sweepers all paved access roads, parking areas, and staging areas at construction sites.
- Sweep streets daily with water sweepers, if visible soil material is carried onto adjacent public streets.
- Hydroseed or apply nontoxic soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more).
- Enclose, cover, water twice daily, or apply nontoxic soil binders to exposed stockpiles (dirt, sand, etc.).
- Limit traffic speeds on unpaved roads to 15 miles per hour.
- Install silt fences or other erosion-control measures to prevent silt runoff to public roadways.
- Replant vegetation in disturbed areas as quickly as possible.
- Designate a person or persons to oversee the implementation of a comprehensive dust control program and to increase watering, as necessary.

Level of Significance After Mitigation

The above list of measures is recommended by the BAAQMD and constitutes a set of feasible control measures to reduce construction dust emissions at sites greater than four acres. With implementation of these measures, the residual effect would be less than significant.

Impact 3.2.2: Equipment and truck operations associated with an increase in incoming materials at the landfill would generate additional criteria air pollutant emissions. (Significant)

As described in Section 3.10, Transportation and Traffic the project would generate more traffic and associated emissions than are currently permitted under the 1995 SWFP and evaluated in the 1994 FEIR. As proposed, a maximum of 590 ~~900~~ vehicles per day would be permitted to enter the landfill on a regular basis. This represents ~~a more than doubling of traffic:~~ an increase of 175 ~~485~~ vehicles over the currently permitted traffic level of 415 vehicles per day. Because the landfill expects to serve as a regional landfill by accepting long-haul materials from more distant locations in addition to the wastes it receives from local areas, the average trip length of vehicles traveling to and from the landfill was assumed to increase from 10 to 15 miles. This analysis assumes that landfill operations could reach maximum operating levels as early as 2005. The increase in on-road vehicles traveling to and from the project would result in a net increase in emissions of about 207 ~~83~~ pounds per day of CO, 6 ~~11~~ pounds per day of ROG, 123 ~~351~~ pounds per day of NO_X, and 16 ~~34~~ pounds per day of PM-10. The net increase in on-road vehicle emissions of NO_X alone would exceed the BAAQMD thresholds of significance and would be considered significant. These emissions are shown in the On-Road Vehicles sources line in Table 3.2-6. (See Tables D-1 and D-3 in Appendix D for details.)

The project would also increase mobile off-road (on-site) equipment use over baseline conditions in order to accommodate the proposed increase in incoming wastes. To estimate the increase in off-road equipment emissions, it was assumed that daily equipment use would increase proportionally to the increase in peak daily material receipts. Off-road equipment estimates also include the additional emissions from the use of a diesel-powered waste tipper that was not previously evaluated in the 1994 FEIR. The increase in off-road equipment use would result in a net increase in emissions of about 20 ~~26~~ pounds per day of CO, 7 ~~9~~ pounds per day of ROG, 118 ~~156~~ pounds per day of NO_X, and 3 ~~4~~ pounds per day of PM-10. The net increase in off-road equipment emissions of NO_X alone would exceed the BAAQMD thresholds of significance and ~~, but in combination with on-road vehicle emissions these emissions and~~ would be considered significant. These emissions are shown in the Off-Road Equipment line in Table 3.2-6. (See Table D-4 in Appendix D for details on these emissions.)

New, more stringent federal and state standards for emissions from diesel-powered equipment apply only to new equipment. Therefore, project-related emissions of criteria pollutants can be expected to decrease over time; for example, new standards for diesel engines take effect in 2004 and 2008, and a requirement to use ultra-low sulfur fuel takes effect in 2006. However, continued use of older equipment that is not required under federal or state regulations to meet the lower emissions standards would result in higher project-related emissions than would be achieved by use of new equipment only (the calculation of emissions, shown in Table 3.2-6, and detailed in Table D-4 in Appendix D, assumes a “blended” emissions rate based on a mixture of older and newer equipment).

TABLE 3.2-6
INCREASES IN EMISSIONS OF CRITERIA AIR POLLUTANTS FROM THE PROJECT
(Without Mitigation Measures)

		Emissions (pounds per day)			
Emission Source	**Impact**	**CO**	**ROG**	**NO_x**	**PM-10**
Construction Activities	3.2.1				NQ
On-Road Vehicles	3.2.2	~~83~~ 207	~~11~~6	**~~351~~ 123**	~~34~~ 16
Off-Road Equipment	3.2.2	~~26~~ 20	~~9~~7	~~156~~ **118**	~~4~~3
Fugitive Dust from LF operations	3.2.4				~~623~~ **375**
Fugitive Landfill Gas	3.2.5		12		--
Flare Emissions[a]	3.2.5	NQ	1	NQ	NQ
Composting/Co-Composting	3.2.6	--	**~~329~~ 105**	--	--
Sludge as ADC and Disposed	3.2.7		~~27~~ -18		
Sludge Air Drying	3.2.10	--	**150**	--	
Designated waste disposal in Area G[a]	3.2.13	--	NQ	NQ	NQ
TOTAL QUANTIFIED EMISSIONS		~~109~~ 227	**~~539~~ 262**	**~~507~~ 242**	**~~661~~ 394**
BAAQMD Significance Criteria		550	80	80	80
Countywide Total[b]		246,400	44,420	37,400	15,740
Quantified Project Emissions as a % of Countywide Emissions		~~0.04%~~ 0.09%	~~1.21%~~ 0.59%	~~1.3%~~ 0.65%	~~4.20%~~ 2.50%

Key:
NQ = Not Quantified
Bolded values are in excess of applicable standard.

a Landfill gas flare and other combustion emissions, and ~~deignated~~designated waste emissions, could not be quantified due to insufficient information from the applicant.
b Countywide emissions totals were obtained from CARB’s 2001 Estimated Annual Average Emissions Inventory for Marin County, available on CARB’s website at www.arb.ca.gov.

SOURCE: Environmental Science Associates, California Air Resources Board

Since NO_X is a precursor of ozone, the net increase in NO_X emissions from the increased off-road equipment use and on-road vehicle travel c~~w~~ould contribute to existing, but infrequent, violations of the state ozone standard in the Bay Area. This would be a significant impact.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

Mitigation Measure 3.2.2a: The project applicant shall keep all off-road equipment well-tuned and regularly serviced to minimize exhaust emissions, and shall establish a regular and frequent check-up and service/maintenance program for all operating equipment at the landfill.

Mitigation Measure 3.2.2b: The project applicant shall use ultra-low sulfur fuel (with low sulfur and low aromatic content) in combination with a fuel additive (such as Puri-NO_X) in all diesel-powered off-road equipment to minimize NO_X emissions to the extent that these materials are commercially available to Redwood Landfill. Products such as this can reduce NO_X emissions by roughly 14 percent.

~~**Mitigation Measure 3.2.2c:** The project applicant shall retard the injection timing on all diesel-powered equipment to minimize NO_X emissions.~~

Mitigation Measure 3.2.2~~d~~c: As off-road equipment ages and requires replacement, the project applicant can be expected to purchase new equipment that incorporates technology that meets more stringent emission standards mandated by CARB. Alternatively, the project applicant may purchase electrically-powered equipment, or equipment fueled by an alternative, less-emitting fuel (e.g., liquefied natural gas [LNG] or compressed natural gas [CNG]). Use of alternative fuel engines can be expected to achieve a reduction in NO_X emissions of at least 37 percent.[7] The purchase of new equipment shall be limited to that which is available on the market at the time of replacement.

Mitigation Measure 3.2.2de: As collection vehicles are ~~equipment is~~ replaced, the project applicant, including other Waste Management affiliates that regularly haul materials to Redwood Landfill, shall comply with CARB's Solid Waste Collection Vehicle Fleet Rule (contained in Title 13, California Code of Regulations, Sections 2020, 2021, 2021.1, and 2021.2) adopted in September 2003 to address diesel particulate matter. The project applicant shall give preference to add-on technologies or control measures (such as fleet conversions) that also reduce NO_X emissions, while meeting necessary BACT requirements. The types of control measures that may be implemented include such measures as converting their collection fleets to vehicles that operate on alternative, low-emission fuels (such as CNG, LNG, or biodiesel) or ~~shall~~ modification or ~~y or~~ replacement of -diesel engines to reduce NO_X emissions, by such measures as incorporating exhaust gas recirculation (ERG) systems and/or stratified combustion chambers, and/or by using ultra-low sulfur fuel and fuel additives.

[7] Based on the difference in U.S. EPA emissions standards for heavy duty diesel and alternative fuel engines. See U.S. EPA, 1997.

Level of Significance After Mitigation

The combined net increase in NO_X emissions from the increased off-road equipment use and on-road vehicle travel would be about 241 ~~507~~ pounds per day (Table 3.2-6) over baseline conditions. Given current technologies, converting or modifying diesel equipment could achieve a maximum NO_X reduction of only about 50 percent. Furthermore, Mitigation Measure 3.2.2d~~e~~ would not apply to all vehicles hauling waste to the landfill. It is unlikely that the mitigation measures identified above could achieve a~~n~~ ~~84~~ two thirds ~~percent~~ reduction in NO_X emissions, the level necessary to reduce emissions from these sources to a level below the BAAQMD's 80 pounds per day significance threshold. Other mitigation measures were considered, including use of emission offset credits and requiring conversion of all fleet vehicles using the facility to alternative fuels. These were found not to be feasible, however; ~~:~~ the BAAQMD emissions banking program can be used only to offset stationary source emissions, and there is no means for requiring fleet vehicles other than those owned by the applicant to use alternative fuels or other emission reduction methods. Therefore, even with the implementation of all feasible mitigation measures, this impact will remain significant and should be considered an unavoidable consequence of project approval.

Impact 3.2.3: Mobile emissions generated by project traffic could increase CO concentrations at intersections in the project vicinity. (Less than significant)

As described in Section 3.10, Transportation and Traffic, an increase of about ~~130~~ 31 vehicle trips would be generated during the a.m. peak hour; the a.m. peak hour (8:00 to 9:00 a.m.) represents the hour in which roughly 12 percent of the daily trips would occur, the greatest number of project trips during a single daily period. The traffic analysis discusses how these ~~130~~ 31 trips would be distributed over the local roadway network and concludes that project-generated trips would not reduce or adversely affect the level of service of project roadways and would not cause the reduction of intersection Level of Service to D, E, or F at any intersection affected by project traffic. Further, the increase in traffic volumes on project roadways would be well below 10 percent. For these reasons, the project would not substantially contribute to violations of state CO concentration standards at local intersections. This would be a less-than-significant air quality impact.

Mitigation: None required.

Impact 3.2.4: Landfill operations, including vehicle and equipment travel on unpaved surfaces, would generate fugitive dust. (Significant)

Fugitive dust is the uncontrolled release of solid particulate matter as a direct result of the operation of a facility, other than from a stationary source. Sources of fugitive dust include equipment and vehicle travel over unpaved (gravel and dirt) and paved surfaces, earth movement, dumping and other off-loading operations, site and road maintenance, stockpiles, daily covering, sludge processing activities, composting operations, and exposed soil surfaces.

Existing dust control measures employed at Redwood Landfill include use of misting equipment or water sprays to wet materials during processing and watering of unpaved surfaces. As required under the PTO for the landfill, on dry days, water is applied to unpaved roads at least once every three hours, and to parking areas and infrequently used unpaved roads, the active landfill face, active stockpile areas, and composting areas at least twice daily. On rainy days, water is applied to unpaved roads and parking areas as necessary to reduce visible emissions.

The 1994 FEIR evaluated fugitive dust emissions and found that with good landfill management practices dust emissions would be reduced to a less-than-significant level. The proposed increase in peak day ~~waste~~ material receipts from 2,300 tons to 4,324 tons per day would be greater than ~~more than double~~ the quantity evaluated in the 1994 FEIR. The associated off-road equipment use, material movement on site, processing activities (including grinding of green waste and wood waste), and vehicle travel to and from the landfill and on unpaved (gravel and dirt) and paved surfaces at the landfill would increase proportionally ~~also more than double~~ under the project, thereby resulting in an increase in fugitive dust emissions beyond levels in the 1994 FEIR. A potential benefit of the project is that the proposed mix of materials to be used for alternative daily cover (green/wood waste, various sludge mixtures, and compost) could generate less particulate matter than cover soil.

Assuming continuation of existing dust control measures (e.g., watering practices), ~~Without dust control,~~ the project-generated increase would be about ~~623~~ 375 pounds per day, which would be well above the BAAQMD significance threshold for PM-10. These emissions are shown in Table 3.2-6. (See Table D-5 in Appendix D for detailed assumptions and calculations.) PM-10 created by project operations would remain airborne and could be dispersed a substantial distance from the point of emission. For these reasons, the increase in fugitive dust emissions associated with the increased level of operations at the site would be a significant impact.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

Mitigation Measure 3.2.4: The project applicant shall develop an Operational Dust Mitigation Plan/Program, in conjunction with the BAAQMD and the LEA ~~and BAAQMD~~, that would achieve at a minimum a dust control efficiency of about 75 percent. Upon completion, the Plan shall be subject to BAAQMD ~~LEA~~ review and approval. Components of the Plan should include:

- A watering program consistent with current practices. On dry days, apply water to unpaved surfaces at least once every three hours, and to parking areas and infrequently used unpaved surfaces, the active landfill face, active stockpile areas, or other dust prone areas at least twice daily. Apply water to composting operations areas once or twice daily, as needed. On rainy days, apply water to these areas as necessary to reduce visible emissions.

- Use of a chemical palliative or dust suppressant to reduce fugitive dust emissions from vehicle travel surfaces. Some chemical stabilizers can contain a considerable fraction of hydrocarbons, and should be selected judiciously. The choice of chemical palliative shall be made with the approval of the ~~LEA,~~ RWQCB, ~~and~~ BAAQMD and the LEA.
- Posting signs at the site that limit traffic speeds on unpaved roads to 15 miles per hour.
- Sweeping daily with water sweepers all paved access roads and parking areas.
- Appoint a designated person to oversee implementation of the Operational Dust Mitigation Plan, and make them responsible for ensuring that the Plan is fully implemented.

Level of Significance After Mitigation

With the implementation of an ~~LEA~~ approved Operational Dust Mitigation Plan/Program, the net increase in PM-10 emissions from the project would be below 375~~about 156~~ pounds per day, depending primarily on the frequency of water application. Although implementation of dust control measures would substantially help to reduce dust emissions, the impact would remain significant.

Impact 3.2.5: The project would increase the amount of landfill gas generated and could exceed the capacity of the landfill gas collection and treatment system. In addition, emissions of air pollutants from the landfill gas treatment system, as well as fugitive landfill gas emissions, would increase. (Significant)

The proposed increase in landfill capacity to ~~34.6~~ 34.744 million cubic yards is nearly double the currently permitted capacity of the landfill (19.1 million cubic yards). In addition, the applicant is proposing to increase the quantity of waste received at the landfill each day. The increase in landfill capacity could result in increased release to the atmosphere of untreated landfill gas, if the capacity of the control system were not adequate to handle the additional gas volume. Because untreated landfill gas consists partly of ROG, a criteria air pollutant, an increase in fugitive landfill gas emissions will result in an increase in ROG emissions. An increase in ROG emissions above the significance threshold of 80 pounds per day established by the BAAQMD would result in a significant impact. The landfill gas treatment system, currently consisting of a flare and leachate vaporator system~~, but soon to include gas-powered electrical generators,~~ destroys most of the ROG in landfill gas through combustion. Not all ROG is destroyed by these combustion systems, however, and the products of combustion of landfill gas contain other criteria air pollutants, including NO_x, SO_x, PM-10, and CO. An increase in any of these pollutants above baseline levels exceeding the significance threshold levels established by the BAAQMD would result in a significant impact.

Impact 3.2.8 discusses non-criteria air pollutant emissions and health risks associated with landfill gas and flare/leachate vaporator emissions.

Development of the landfill gas collection system at Redwood Landfill occurs as filling of the landfill progresses. The existing landfill gas collection system of wells and horizontal collectors leading to a flare is similar to the one evaluated in the 1994 FEIR and covered by the 1995 SWFP. It is expected to have a minimum collection efficiency of 75 percent, and the collection efficiency is expected to increase to up to 90 percent when the final cover is in place. Neither the landfill gas flare nor the leachate vaporator system that are now in place were addressed in the 1994 FEIR and they are not covered by the 1995 SWFP. In addition, RLI is proposing to install one or more electrical power generation engines to be fueled by landfill gas.[8]

The landfill gas flare evaluated in the 1994 FEIR was located within the landfill footprint and did not have sufficient capacity to process the anticipated flow rates of landfill gas. The larger, higher-capacity flare system now in operation is located outside the landfill footprint, in the southwestern corner of the site. (The smaller flare was shut down after the new flare commenced operation, as required in the facility's PTO.) A leachate vaporator that works in conjunction with the flare also has been installed. The vaporator uses landfill gas as an energy source to heat and vaporize leachate, and then injects the vapor (steam) into the gas flare for final incineration. The leachate vaporator operates only when there is sufficient leachate to support its operation. According to the applicant (GeoSyntec Consultants, 1998), in addition to receiving steam from the leachate vaporator, the new flare is capable of receiving combustion exhaust from the vaporator and/or from the power generation engines.

The new flare has a total capacity of 4,250 cubic feet per minute (cfm) (GeoSyntec Consultants, 1998). It currently is permitted (in the landfill's current PTO) to operate at a maximum flow rate of 4,000~~2,500~~ cfm; the permitted throughput of landfill gas to the leachate vaporator is 167 cfm.[9] ~~(Because RLI's projected landfill gas flow rate was well below the flare's capacity, RLI had requested the BAAQMD to permit the flare below its full capacity, at a level commensurate with anticipated gas flows [Woodward Clyde, 1997].)~~

As described earlier in this section, the current landfill gas flow rate is about 1,800 cfm with an average 50 percent methane content (Reco Project, 2001). Based on modeling conducted for this analysis, in ~~2016~~2024 (~~when~~ the earliest date that the landfill could ~~is expected to~~ reach capacity and close under the existing permitted level of waste intake – see Master Response 21 in Volume 2) ~~[see Appendix A])~~, under current permit conditions, total gas generation is expected to increase to about 6,325 cfm, of which 4,744 cfm would be collected by the landfill gas collection system (the remainder would escape untreated to the atmosphere) (Table D-7b in Appendix D)[10]. At the

8 The power generation system is characterized in the JTD (GeoSyntec, 1998) only as a potential future component of the landfill gas system; in 2002 RLI applied for and received from BAAQMD authority to construct three power generation engines. The authority to construct permit has now expired.

9 The per-minute flow rates are based on the permitted annual and daily flow rates specified in the current PTO: 1,490,000,000~~1,314,000,000~~ scf per year and 5,760,000~~3,600,000~~ scf per day for the flare, and 87,6000,000 scf per year and 240,000 scf per day for the vaporator.

10 This figure is based on calculations that assume a possible closure date of 2016, as used in the DSEIR. Since publication of the DSEIR, the landfill's life expectancy estimates have been revised, and current estimates are that

proposed rate of fill, by the time of landfill closure ~~2024~~ total landfill gas emissions could increase to up to 7,549 cfm, assuming the proposed maximum rate of fill that would be allowed[11] (Table D-7c in Appendix D). At the rate of fill proposed as part of the project, combined with the proposed increased in capacity, ~~2024~~ 2037 is the earliest date ~~year~~ the landfill is expected to close (see Table MR21-1 in Volume 2~~Appendix A~~), at which time the maximum landfill gas production rate would be realized[12]. Of the estimated 7,549 cfm produced at that time, 5,662 cfm would be collected by the LFG collection system and directed through the flare/vaporator system. This volume is substantially higher than the capacity of the flare/vaporator system of 4,417 cfm (assuming a flare LFG flow rate capacity of 4,250 cfm and a vaporator capacity of 167 cfm). Exceedance of the flare/vaporator system capacity, absent other abatement or mitigation measures, would be considered a significant impact.

The Joint Technical Document indicates that one or more power generation engines to be fueled by landfill gas are potential future components of the gas collection system that could utilize landfill gas beyond that handled by the flare/vaporator system. In 2002 RLI applied to the BAAQMD and was granted Authority to Construct three landfill-gas-fueled power generation engines. All three ~~are~~were internal combustion engines, each with a capacity to burn landfill gas at the rate of 482 cfm. Thus, together the three engines would have had the capacity to accommodate up to 1,446 cfm. Therefore, assuming the three engines or their equivalent are installed as currently planned, the combined LFG system, including flare, vaporator and power generation engines, would have the capacity to accommodate the LFG projected to be collected by the LFG system. The Authority to Construct authorizes operation of the engines during a start-up period of up to 90 days, until a Permit to Operate is issued. The Authority to Construct permits expired in July 2004. According to correspondence from the applicant (Meserve, 2005), the applicant now plans to construct one or more engines capable of producing a total of four to five megawatts of power.

Assuming installation of the ~~three~~ engine or engines, and their concurrent operation with the flare and leachate vaporator, the landfill gas collection and treatment system would have sufficient capacity to collect and treat the projected volume of landfill gas, and there would be no impact related to sufficiency of capacity of the landfill gas treatment system. As required by the current PTO, the existing landfill gas collection system and flare/vaporator system are required to achieve a minimum 98 percent destruction efficiency for non-methane organic compounds (NMOC), a category of gasses that includes ROG. Under the current permit, the maximum emission of ROG can be expected to occur ~~2016,~~ at the time of landfill closure, which could occur as early as the year 2024, when a total generation of approximately 743 pounds per day is anticipated (Table D-7b in Appendix D). Of this, 355 pounds per day would be captured and treated by the landfill gas collection system, and 118 pounds would escape to the atmosphere. Another 7 pounds per day of

the earliest closure date under the existing permit would be the year 2024 (see Table MR21-1 in Volume 2 of this FEIR). While this change would have an effect on the model used to derive the landfill gas emission rate, this effect would be slight and would not substantially alter the conclusions presented here.

11 The landfill gas emissions modeling conducted for this EIR accounted for the materials proposed for use as ADC (including petroleum contaminated soils, and sludge) as materials accepted in the landfill and capable of generating landfill gas emissions.

12 Please refer to the previous footnote. The DSEIR calculations were also retained for landfill gas production rates for the project.

ROG would be emitted by the flare system (assuming 98 percent destruction efficiency by all combustion equipment, including the power generation engines). The total baseline emission level for ROG from landfill gas produced by the landfill under current permit conditions is therefore 125 pounds per day (see Table 3.2-4). Under the project, the maximum production rate of landfill gas, and of ROG, would occur at the time of landfill closure, which could occur as early as the year 2037~~in 2024~~, when 522 pounds per day of ROG would be produced (Table D-7c in Appendix D). Of this, 391 pounds per day would be captured and treated, and 130 pounds per day would escape to the atmosphere. Assuming 98 percent destruction efficiency gas captured, emissions from the combustion equipment would be about 8 pounds per day. Therefore, the total amount of ROG emitted to the atmosphere under the project would be 138 pounds per day, an increase of 13 pounds per day above baseline (currently permitted) levels (Table 3.2-6). This falls well below the significance threshold of 80 pounds per day, so this impact would be less than significant.

The applicant has not provided sufficient background information to establish baseline or predicted emissions of other criteria air pollutants associated with combustion of landfill gas. Incomplete information provided by the applicant (Geosyntec Consultants, 1998, Table 6-3) suggests that the project may result in substantial increases in emissions of CO, NO_x, SO_x, and PM10. Increases in any of the emissions of any of these pollutants above the thresholds established by the BAAQMD would be a significant impact. There exists, therefore, the potential for a significant impact related to increase in emissions of CO, NO_x, SO_x, and PM-10 from operation of the landfill gas combustion system.

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.2.5a: The applicant has installed a landfill gas flare capable of accommodating a landfill gas flow rate of up to 4,250 cfm. The flare currently is permitted to operate at a maximum flow rate of 4,000~~2,500~~ cfm. The flare also is used to destroy leachate vapors from the leachate vaporator.

Mitigation Measure 3.2.5b: The applicant has installed a leachate vaporator that operates at a landfill gas flow rate of 167 cfm.

Mitigation Measure 3.2.5c: The project applicant shall apply to~~has received from~~ the BAAQMD for authority to construct ~~three~~ power generation engines to be fueled by landfill gas capable of producing 4 to 5 megawatts of power within two years of concurrence on its revised SWFP by the CIWMB. This will increase the overall capacity available to treat landfill gas, and will also result in the beneficial use of some portion of the landfill gas generated. Operation of the landfill-gas-powered generators will make the project consistent with Policy 4.2 of the Marin Countywide Plan Community Development element (refer to Applicable Plans and Policies in Section 3.9, Public Services, Utilities, and Energy), which calls for exploration and implementation, where possible, of opportunities for cost-effective energy savings that are compatible with other countywide and community goals.

Mitigation Measures Identified in This Report

Mitigation Measure 3.2.5d: The applicant shall apply to the BAAQMD to revise limits in the current Permit to Operate the flare, as needed to accommodate increased LFG generation. The flare/vaporator system will be operated/equipped as necessary to ensure BAAQMD emission limits specified in the PTO are maintained. The project applicant shall provide background test data and/or other supporting data as necessary to document to the BAAQMD and LEA that the system would accommodate worst case peak gas emissions.

Mitigation Measure 3.2.5e: The applicant shall apply for a Permit to Operate the power generation engines within the time frame specified in the Authority to Construct and shall operate the power generation engines in compliance with all BAAQMD regulations and conditions specified in the Permit to Operate. ~~As specified in the current Authority to Construct, t~~The applicant shall continue to maintain records of all compliance demonstration test results as specified in the Authority to Construct.

~~*Mitigation Measures Recommended in This Report*~~

~~In addition, implementation of Mitigation Measure 3.9.3b (Section 3.9, Public Services, Utilities, and Energy), to construct the power generators as soon as possible, would ensure maximum beneficial use of landfill gas.~~

Level of Significance After Mitigation

Implementation of Mitigation Measures 3.2.5a, 3.25b and 3.2.5c proposed by the applicant, in combination with Measures 3.2.5d and 3.5.e identified in this report, would ensure that the proposed landfill gas treatment system is permitted to handle the amount of landfill gas that is expected to be captured by the landfill gas collection system. Implementation of Mitigation Measure ~~3.9.3b~~ 3.2.5c would ensure that the landfill gas that is produced and collected is used in a beneficial manner. However, there is still the potential for the combustion system to increase emissions of CO, NO_x , SO_x, and PM-10 in excess of threshold limits set by the BAAQMD. The impact, therefore, remains significant.

Impact 3.2.6: The project would increase the amount of ROG emissions from composting/ co-composting activities. (Significant)

Proposed changes to composting/co-composting activities that were evaluated in the 1994 FEIR, allowed under the 1996 Registration Permit, and permitted under the current PTO that have potential air quality implications include: 1) increasing peak and average daily receipts of feedstock (green/wood waste, food waste, and biosolids); 2) adding food waste to the list of feedstock materials; and 3) increasing receipt of materials to mix with compost to produce soil amendments. ~~Although the applicant proposes to operate the composting facility under a higher-tier permit (known as a Standard Permit), t~~The primary change to the operation of the composting facility as a result of the proposed project would be its scale, although the applicant also would require a Compostable Materials Handling Facility Permit, pursuant to regulations promulgated by the CIWMB in April 2003, in order to utilize biosolids and food waste as composting feedstock. ~~Standard Permits are used for larger facilities and for facilities that handle a broader range of feedstock materials than is allowed under a Registration Permit~~.

Table 2-2 in Chapter 2, Project Description, shows the proposed increase in the average and peak daily receipt of feedstock materials. The proposed changes in the feedstock mix would result in a net reduction in biosolids being composted from current permit conditions. Green waste and wood waste materials would account for roughly 75 percent of the material being composted under the proposed project. By applying the SCAQMD ROG emission factor used in estimating baseline emissions for co-composting, and the CIWMB emission factor for greenwaste composting, the daily average emissions of ROG from composting/co-composting activities would increase from the current baseline of 171 ~~190~~ pounds per day (Table 3.2-4) to an estimated 275 ~~518~~ pounds per day (Table D-6 in Appendix D). The net increase over existing conditions would be 104 ~~328~~ pounds per day. Evaporative emissions from stockpiled feedstock materials are expected to amount to less than one pound per day of ROG (GeoSyntec Consultants, 1998). The total increase in ROG emissions from composting is therefore expected to be 105~~329~~ pounds per day. This figure is reflected in Table 3.2-6.

As described earlier in this section, the information available for quantifying ROG emissions from composting facilities is still new and subject to further scrutiny and debate.[13] However, available test studies and information suggest that the proposed increase in composting feedstock alone would lead to an exceedance of the BAAQMD thresholds of significance for ROG whether the SCAQMD or the CIWMB emissions factors are used. This would be a significant impact of the proposed project.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

Mitigation Measure 3.2.6a: The project applicant shall maintain records of all materials composted (in terms of volume or weight by material type) and shall comply with all applicable rules, regulations and permit conditions.

[13] Those scrutinizing these factors and the methods used in quantifying composting emissions argue that these emissions are not necessarily "new" and that they would occur even if these materials were landfilled, at a potentially higher rate given the anaerobic environment of a landfill. The rebuttal to these arguments is that if these materials were landfilled, at least a portion of the ROG emissions would be controlled by the landfill gas collection system.

By identifying composting facilities as potential sources of substantial ROG emissions, local air districts can better use the information in preparing emissions inventories that form the basis of plans developed to achieve attainment of state and national ozone standards. According to SCAQMD and CIWMB staff, ROG emission controls for green waste composting are cost prohibitive and may inhibit other environmental benefits (e.g., diverting materials from landfills) achieved by composting. As such, the control measures recommended by SCAQMD for green waste and wood waste facilities thus far are limited to administrative tracking procedures. The size of the co-composting facility falls well below the SCAQMD-recommended size that would require use of stringent control measures, such as enclosure of active composting or use of aerated static piles with venting of emissions through a bio-filtration system. The requirements proposed by SCAQMD include one-time registration (of composting facilities); annual reporting of materials composted; and compliance with all applicable air district rules, regulations and permit conditions (SCAQMD, 2002). It is not the intent of either agency to detract from the importance of composting activities.

Mitigation Measure 3.2.6b: The applicant shall prepare an Emissions Monitoring Plan that includes source testing of windrows used for composting and co-composting to obtain site-specific ROG emissions data. The Monitoring Plan shall require analysis of the effect of various feedstock materials on composting emissions, and a comparison of emissions during wet and dry season periods. The Monitoring Plan shall be subject to BAAQMD ~~and LEA~~ review and approval.

Mitigation Measure 3.2.6c: The applicant shall also conduct a feasibility study to determine the technologic and economic feasibility of using~~use~~ a composting method that allows for collection and treatment of gaseous emissions from active composting piles, such as an aerated static pile system with biofilters. The target ~~system shall be designed to reduce~~ ROG emissions reduction rate for purposes of the study shall be ~~by~~ a minimum of ~~90~~ 25 percent, such that the increase in emissions would be below the BAAQMD 80 pounds per day significance threshold. The results of the feasibility study shall be provided to the BAAQMD such that BAAQMD staff may consider incorporation of additional requirements to reduce ROG emissions into air permits for the site. The results of the study shall also be submitted to the LEA. If controls are determined to be infeasible or not economical, then the project applicant shall reduce the amount of compostable materials that are accepted at the site by 25 percent on a daily basis.

Mitigation Measure 3.2.6d: The applicant shall conduct monitoring in accordance with the approved Monitoring Plan and shall prepare a report summarizing the findings of the monitoring. Copies of the written report shall be provided to the BAAQMD and LEA for incorporation into permits for the site.

Level of Significance After Mitigation

The administrative and monitoring/reporting procedures and emissions control requirements identified as mitigation measures are consistent with the current requirements of the SCAQMD for composting/co-composting facilities. The increase in ROG emissions from the project is predicted to be 105 ~~329~~ pounds per day. A 25 ~~90~~ percent reduction in ROG emissions would result in total emissions of 78.8 ~~9.51~~pounds per day ~~(10 percent of the total predicted ROG emissions rate of 519 pounds per day)~~. These measures would reduce ROG emissions associated with composting operations to levels below BAAQMD significance thresholds, so the impact would be less than significant after mitigation.

Impact 3.2.7: Changes in sludge quantities received and sludge processing/handling activities (other than the proposed air-drying of sludge) could increase ROG emissions at the site. (Less than Significant)

As part of the project, the applicant proposes to accept a reduced quantity of sewage sludge from what is currently permitted under the 1995 SWFP (Table 3.2-7) and to modify sludge handling practices. The applicant now proposes to accept an average ~~of 200 tons per day (TPD)~~ and a peak of 232 ~~450~~tons per day (TPD) of sludge, and handle it by: a) direct disposal in the Class III disposal area (100 ~~71~~ TPD ~~average, 160 TPD peak~~); b) mixing it with soil, green waste, and/or wood waste for use as ADC (50 ~~47~~ TPD ~~average, 106 TPD peak~~); and, c) co-composting it with

TABLE 3.2-7
PERMITTED AND PROPOSED QUANTITIES OF SLUDGE (BIOSOLIDS)

		(Tons per Day)					
		Currently Permitted[1]		Proposed		Change	
		Average	Peak Day	Average	Peak Day	Average	Peak Day
~~Landfilled~~ Disposed	Non-hazardous sludge (Class B biosolids) for direct ~~disposal~~ disposal (proposed) or to main impoundment or N-Viro process	424 ~~550~~	455 ~~1,000~~	100 ~~71~~	100 ~~160~~	324 ~~479~~	355 ~~840~~
Composting	Biosolids (Class B) (for composting)	84	307	82	82 ~~185~~	-2	225 ~~123~~
ADC	Biosolids (Class B) (for ADC)	N/S	N/S	50 ~~47~~	50 ~~106~~	50 ~~47~~	50 ~~106~~
Total biosolids (Class B) for all purposes		508 ~~634~~	762 ~~1,307~~	232 ~~200~~	232 ~~450~~	276 ~~434~~	530 ~~857~~

NOTE:
Some totals may not sum due to rounding.
RLI is proposing to air dry up to 3,000 wet tons (600 dry tons) for two consecutive spring seasons following the permitting process, with no further air drying after that time. Emissions associated with air drying sludge are discussed under Impact 3.2.10.
[1] The current Solid Waste Facility Permit for Redwood Landfill states that maximum permitted sludge receipts are 550 tons per day average and 1,000 tons per day peak. However, with the issuance of the Registration Permit for composting, these quantities are reduced by the permitted volume of compostable materials, that is, 126 tons per day average and 545 tons per day peak.

SOURCE: See Project Description, Table 2-2.

other feedstock materials (82 TPD~~ average, 185 TPD peak~~). Sludge accepted at the site and not immediately processed by one of these mechanisms would be placed in the M~~m~~ain S~~s~~ludge I~~i~~mpoundment at the site for storage. The applicant proposes to air dry stockpiled sludge during dry months; air-dried materials would be used as ADC. Proposed air drying of sludge is considered in Impact 3.2.10. Use of sludge as a composting feedstock is considered in Impact 3.2.6. The 1994 FEIR did not evaluate direct disposal of treated sludge, did not evaluate use of wet sludge mixed with soil, greenwaste, or woodwaste as ADC, and did not evaluate evaporative emissions from storing sludge in the Main Sludge Impoundment. The baseline emissions estimates for sludge used as ADC and disposed of are shown in Table 3.2-4 and reflect daily receipts of up to 455 wet tons per day of sludge~~Therefore, all emissions related to these activities are considered new emissions (there is currently no baseline emission rate for these processes)~~.

Again, b~~B~~ecause specific emissions data are not available for the proposed direct disposal of sludge or use of sludge as ADC, project emissions for these processing mechanisms were estimated using the same emissions factor as for air drying (see Setting section and Impact 3.2.10). The applicant proposes to dispose of up to 100 ~~160~~ TPD of sludge, and to use up to 50 ~~106~~ tons per day of sludge as ADC, for a total of up to 150 ~~266~~ TPD to be handled by these two methods. Assuming a ROG emission rate of .29 pounds per dry ton treated, and that 150 ~~266~~ TPD of wet sludge is equivalent to 30 ~~53.2~~ TPD of dry sludge (equivalent to 20 percent solids), this component of the project would generate roughly 8.7 ~~15.4~~ pounds per day of ROG. In addition, evaporative emissions from stockpiled sludge are estimated to be about 12 pounds per day (GeoSyntec Consultants, 1998). The project's combined emissions from sludge processing and storage would therefore be about 20.7 ~~27.4~~ pounds per day (Table D-8 in Appendix D). Given the reduction in the amount of permitted sludge receipts for disposal and use as ADC, the project would result in a net decrease in ROG emissions of up to 18 pounds per day. ~~, which falls well below the criteria threshold of 80 pounds per day for ROG established by the BAAQMD~~. This figure is shown in Table 3.2-6. For this reason, the proposed stockpiling, direct disposal, and use of sludge for ADC would result in a less-than-significant rate of emission of ROG, and no mitigation measures are required.

Mitigation: None required.

Impact 3.2.8: Emissions of toxic air contaminants could pose a risk to human health. (Significant)

The project could potentially result in increased exposure of people to toxic air contaminants (TACs). Increased emissions of TACs from the project would be from several different sources. These include:

- TAC emissions from landfill gas generated by the decomposition of more waste than is currently permitted to be placed in the landfill;
- TAC emissions from increased scale of composting operations,
- TAC emissions from increased use of diesel trucks and equipment used to haul and process the proposed greater daily volume of waste that would be brought to the facility, and
- TAC emissions from increased receipt, handling, and disposal of "designated" wastes ~~in Area G, if it were to be reclassified as a Class II disposal unit~~.

TAC emissions from the greater volume of landfill gas treated by the landfill gas flare would be extremely small, since the combustion process destroys any toxic substances contained in the flared gas. TAC emissions from disposal of designated wastes ~~in Area G~~ are considered in Impacts 3.2.13 and 3.2.14.

The principal health risks from the project would be due to increased emissions of carcinogens from the project components described above. Health risks at offsite receptors were determined by conducting dispersion modeling of the TAC emission sources of the project, using the EPA model SCREEN3 (U.S. EPA, 1995d). The incremental health risks from each individual source of TAC emissions were added to determine the maximum total health risks at offsite receptors. The nearest sensitive receptor to the project site that could be affected by the project is the Buck Center, located about 1.5 miles to the southwest of the project site. The health risk assessment therefore is based on modeling of worst-case increases in project-related TAC concentrations at the Buck Center. The modeling is, however, applicable to any sensitive receptors at a distance of 1.5 miles from the project site.

Landfill Gas Emissions. Landfill gas may contain trace quantities of TACs, such as benzene, and possibly chlorinated hydrocarbons. The Air Solid Waste Assessment Test (SWAT test) performed for Redwood landfill in June, 1988 indicated that trace amounts of benzene were measured, and that the measured amount may actually be emissions from vehicles in the area (Marin County, 1994). No chlorinated hydrocarbons were found in the SWAT test. If benzene emissions are present, they would be part of the reactive organic gas (ROG) emissions from the landfill. Impact 3.2.5 indicates that the project could result in an increase of about 13 ~~16~~ pounds of ROG from the "fugitive" landfill gas not collected by the landfill gas collection system, and from the small amount of such gas that the flare system would not destroy. For the purposes of the Health Risk Assessment, it was assumed that, as a worst case, about 500 ppm of the ROG emissions would be benzene.

Using this assumed worst-case benzene concentration in the landfill gas, emissions were modeled using SCREEN3, assuming that emissions would occur over the entire permitted footprint of the landfill. The SCREEN3 model was run using an area source with unit emissions for the area source. The SCREEN3 model predicts that the maximum annual average benzene concentration at the nearest residential receptor (the Buck Center, about 1.5 miles away) to be 0.0004 ug/m^3. Assuming a unit risk value of $2.9 \times 10^{-5}/ug/m^3$ (OEHHA, 2002), the incremental cancer risk at that receptor is estimated to be 1.2×10^{-8}, or an increase of 1.2 cancer cases for every one hundred million people exposed (or 0.012 per million). This is well below the significance threshold of 10 in a million. The SCREEN3 model run for landfill gas is included in Appendix E.

Compost Emissions. Composting of biosolids, greenwaste, and other organic matter generates reactive organic gases (ROG), including some TACs, during the decomposition process. Impact 3.2.6 indicates that the project's proposed increase in the scale of the composting and co-composting operations would generate an increase of about 105 ~~329~~ pounds of ROG per day over a 15-acre area. TAC emissions have not been measured from composting at the Redwood Landfill, so TAC emissions from composting were estimated based on emissions measurements reported for a similar facility (i.e., a biosolids composting facility) (Hentz, et. al, 1996). In this study, TAC emissions are reported as fractions of total Volatile Organic Compounds (VOCs) measured from the process. [14] Several TACs, both carcinogens and non carcinogens, were reported in the study. The non-carcinogenic TACs of measurable quantities include methanol, toluene, 2-butanone, styrene, and carbon disulfide. Since the threshold acceptable exposure levels

[14] Reactive Organic Gasses (ROG) are a subset of Volatile Organic Compounds (VOCs), but the two terms can be used more or less synonymously in this context.

for these substances are very high (in the hundreds of micrograms per cubic meter), the offsite concentrations of these substances would be well below the acceptable thresholds.

Carcinogenic TAC emissions from composting would include benzene, tetrachloroethane, trichloroethene, and methylene chloride. The fractions of these TAC species were multiplied by the total VOC emissions to determine emissions of carcinogenic TAC species. Offsite concentrations of the specific TAC species were determined by fractionating the VOC concentrations, which were determined from the SCREEN3 modeling, by the measured fractions from the referenced report. These concentrations were then used to estimate incremental cancer risk at the offsite receptor from composting operations. The estimated incremental risks for the TAC species were determined by multiplying the predicted concentrations by the unit risk values as reported by California Office of Environmental Health Hazard Assessment (OEHHA, 2002). The total incremental risks from composting, which are given in Table 3.2-8, show that the increment is well below the significance threshold of 10 in a million.

TABLE 3.2-8
INCREMENTAL CANCER RISK AT OFFSITE RECEPTORS FROM COMPOSTING OPERATIONS

TAC	Concentration (ug/m^3)	Unit Risk/ug/m^3	Incremental Risk (New Cancer Cases per 1 Million People Exposed)
Benzene	0.0023	2.9 X 10^{-5}	0.067
Tetrachloroethane	0.0005	5.8 X 10^{-5}	0.001
Trichloroethene	0.0014	2.0 X 10^{-6}	0.003
Methylene Chloride	0.0001	1.0 X 10^{-6}	>0.001
		Total Risk	**0.072**

SOURCE: California EPA Office of Environmental Health Hazard Assessment (Unit Risk Values)

Diesel Particulate Matter Emissions. Diesel trucks that deliver waste to the site, and on-site, off-road diesel equipment are sources of diesel particulate matter (diesel PM), which is a TAC. Table D-3 in Appendix D indicates that diesel PM exhaust emissions in year 2005 from Medium-Heavy duty trucks are 0.014 grams per mile per truck and from Heavy-Heavy duty trucks they are ~~estimated at 0.22~~ 0.181 grams per mile per truck. The new Federal regulations will result in a decline in diesel PM exhaust emissions over time. Therefore, the long-term emission rate for Medium-Heavy duty and Heavy-Heavy duty trucks together is estimated to be approximately 0.1 grams per mile per truck. Using this diesel PM emission rate, daily emissions from trucks entering and leaving the site were modeled using SCREEN3, assuming an increase of 374 ~~615~~ Medium-Heavy and Heavy-Heavy duty truck trips per day under the project (see Tables D-2 and D-3 in Appendix D). The maximum annual average diesel PM concentration at residential receptors from project truck traffic was determined to be 0.008 ~~16~~ ug/m^3. The SCREEN3 model run for diesel trucks appears in Appendix E. Using the unit risk factor for DPM of 3 X 10^{-4}/ug/m^3

(OEHHA, 2002), the incremental risk at the offsite receptor is estimated to be 2.4 ~~4.8~~ X 10^{-6}, or 2.4 ~~4.8~~ in a million.

In addition to trucks visiting the site, diesel PM would be emitted from the heavy equipment working on the site. Table D-4 in Appendix D estimates that the increased diesel PM emissions from the project would be about 3 ~~3.85~~ pounds per day. A screening model run of these emissions predicts long-term average concentration of diesel PM at offsite receptors of 0.06 ~~0.08~~ ug/m^3. The incremental health risk at the offsite receptor from heavy equipment is estimated to be 18 ~~24~~ new cancer cases for every million people exposed. This exceeds the significance threshold of 10 new cancer cases for every million people exposed.

As stated earlier when discussing the screening model that was used in the analysis, the impacts can be considered as an upper limit because of the conservative nature of the methodology prescribed by agencies in a screening analysis. If historical meteorological data that are representative of the site are used, a more detailed modeling analysis can be carried out using EPA-approved models, such as ISC3 and AERMOD. If such an analysis were conducted, the estimated impacts would likely be lower. In addition, diesel PM emissions estimates for the offroad equipment do not take into consideration future reductions in these emissions because of the newly promulgated Federal Regulations (May 2004). These regulations require that, after 2010, new offroad equipment will have to reduce emissions of NOx and diesel PM by about 90%. However, equipment that is operating before 2010 would not be subject to the Regulation. Therefore future emissions of diesel PM are over-estimated, because this was not factored into the estimate. It is difficult to factor this in, because the longevity of existing equipment cannot be precisely defined.

Total Incremental Risk at Residential Receptor. The total incremental carcinogenic health risk at an offsite receptor was determined by summing the maximum incremental risk for each component of the project, which includes the landfill gas emissions, compost emissions, and diesel PM emissions. The incremental risk is estimated to be approximately 2~~3~~0 new cancer cases for every million people exposed. This combined risk, which is dominated by diesel PM emissions from the on-site equipment used for handling the waste material, can be considered an extreme worst-case, since the screening model methodology follows screening modeling guidelines, and tends to over-predict concentrations by a large margin. Also, worst-case exposure conditions are assumed, that is, that TAC emissions would occur constantly, and a person would be at the high receptor site 24 hours a day for 70 years. Nevertheless, the maximum incremental health risk from increased emissions of carcinogenic TACs exceeds the significance threshold of 10 in a million. Therefore, this is a significant impact of the project.

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.2.8a: The landfill gas collection and flare system will substantially reduce the rate of emission of TACs from the landfill.

Mitigation Measure 3.2.8b: Best management practices for the composting and co-composting operation, including scheduled pile turning and managing piles to avoid excessively high temperatures, will reduce the emissions of TACs from composting and co-composting operations.

Mitigation Measures Identified in This Report

Mitigation Measure 3.2.8c: New Federal ~~R~~regulations for offroad diesel equipment were promulgated in May 2004. These regulations require that, starting in 2010, new equipment will have to reduce emissions of NOx and diesel PM by about 90%. However, any equipment already in use at the time of the new regulation would be grandfathered and would not have to meet the new emissions limits. Since this equipment can operate for many years before needing replacement, future emissions would be at a higher rate. If ~~Implement~~ Mitigation Measures 3.2.2a-~~d~~e (as revised in this FEIR) are adopted on the existing equipment,~~.~~ d~~D~~iesel PM emissions from off-road equipment can be reduced to levels that are less than significant. ~~if these mitigation measures are adopted, since~~ Some of the measures specified to reduce NO_X emissions, such as the use of natural gas as an alternative fuel, would also reduce diesel PM emissions.~~;~~ U~~u~~se of alternative fuels can reduce~~s~~ fine PM emissions by as much as 90 percent**,** and electrically-powered equipment does not emit any diesel PM. Alternatively, all off-road diesel equipment at the site could be retrofitted with diesel particulate traps that are capable of removing over 85 percent of the diesel PM emissions, though this in itself would not reduce NO_X emissions.

Mitigation Measure 3.2.8d: Although d~~D~~iesel PM emissions from new on-road trucks~~vehicles~~ after 2007 will~~can~~ be reduced because the trucks will have to comply with the~~reduced~~ Federal ~~R~~regulations, trucks that were purchased before 2007 would not be subject to the new regulations. Diesel PM emissions from the older truck fleet shall be reduced by retrofitting the trucks with ~~through implementation of Mitigation Measure 3.2.2c, and/or the use of~~ particulate traps~~ on fleet vehicles~~.

Level of Significance After Mitigation

Mitigation Measure 3.2.8c will reduce this impact to a less-than significant level. Mitigation Measure 3.2-8d will further reduce the significance of this impact.

Impact 3.2.9: Project operations could result in nuisance odor emissions. (Significant)

The BAAQMD considers any landfill or composting facility located within one mile of sensitive receptors to have the potential to frequently expose members of the public to objectionable odors and to cause a significant odor impact (BAAQMD, 1999). As described in the setting section, the closest sensitive receptors are located over 1.5 miles from the site boundaries.

The BAAQMD's significance criteria are also based on the number of odor complaints generated by a project. Redwood Landfill has received only one confirmed complaint in the past three years, the applicant asserts that this was a confirmed complaint linked to a source not related to the landfill and is working with the BAAQMD to update the public record (Roycroft, 2002). When considering the past three years of data, the landfill has received an average of over seven unconfirmed complaints per year. Many of these complaints were attributed to sources other than the landfill.

Implementation of the proposed project would result in an increase in waste quantities received at the landfill, changes in the handling of sludge, and changes in the composting/co-composting activities. The project applicant does not propose to modify any of the odor control mechanisms that are currently in place (see setting section for a discussion of these practices). The use of potassium permanganate in sludge drying and the vapor phase odor counteractant system along the southern boundary of the site are current practices not allowed for under the current 1995 SWFP, but that appear to help minimize odor complaints. The increase in waste quantities and changes in activities at the landfill could have an adverse effect on odors and could generate additional odor complaints from nearby sensitive receptors. This would be a potentially significant impact of the project. It is uncertain whether the current odor management practices would sufficiently mitigate potential odor impacts.

~~The LEA has also identified odors as a potential concern given that Redwood Landfill is a "wetter" than the average landfill (based on its acceptance of sewage sludge, the high water table, and the lack of a synthetic liner system) and has recorded high hydrogen sulfide emission concentrations.~~

For the reasons described above, odors related to the proposed project are considered to be potentially significant.

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.2.9a: Continuation of current odor management practices. These include: covering landfilled waste at the end of each day with either soil or mixed ADC; applying potassium permanganate to air drying sludge and operation of a vapor phase odor counteractant system around the landfill's southern boundary; and, maintaining windrows in a manner that optimizes the composting process.

Mitigation Measures Identified in This Report

Mitigation Measure 3.2.9b: The project applicant shall formulate an Odor Impact Minimization Plan in accordance with the recently revised State composting regulations (Title 14 CCR § 17863.4.) This plan will be submitted to the LEA as part of the application for a solid waste facilities permit for the expanded composting facility. In accordance with the above-cited regulations, the plan shall contain, at a minimum:

- an odor monitoring protocol which describes the proximity of possible odor receptors and a method for assessing odor impacts at the locations of the possible odor receptors; and,

- a description of meteorological conditions effecting migration of odors and/or transport of odor-causing material off-site. Seasonal variations that effect wind velocity and direction shall also be described; and,

- a complaint response protocol that includes the immediate notification of BAAQMD Compliance & Enforcement Division and County LEA staff upon receipt of any odor complaints and the provision of the BAAQMD odor complaint hotline number (1-800-334-ODOR [6367]) to complainants upon receipt of their call; and,

- a description of design considerations and/or projected ranges of optimal operation to be employed in minimizing odor, including method and degree of aeration, moisture content of materials, feedstock characteristics, airborne emission production, process water distribution, pad and site drainage and permeability, equipment reliability, personnel training, weather event impacts, utility service interruptions, and site specific concerns; and,

- a description of operating procedures for minimizing odor, including aeration, moisture management, feedstock quality, drainage controls, pad maintenance, wastewater pond controls, storage practices (e.g., storage time and pile geometry), contingency plans (i.e., equipment, water, power, and personnel), biofiltration, and tarping.

Level of Significance After Mitigation

With implementation of these measures, the residual effect would be less than significant.

Impact 3.2.10: The proposal to air-dry stockpiled sewage sludge could result in increased emissions of volatile organic compounds and odors. (Significant)

The applicant proposes to air dry stockpiled sludge during dry months; air-dried materials would be used as ADC. Air drying of sludge would occur only until the time stockpiled wet sludge in the main sludge impoundment was depleted (approximately two years). The applicant has not stated the rate at which air drying would occur, but a study conducted for the applicant (J.M. Smith & Associates, 1997) indicates that at that time (1997) the applicant proposed to air dry 600 dry tons (3,000 wet tons) of sludge per day. Air drying would occur only during the months of April through July. To control odors during drying, the applicant proposes to apply potassium permanganate solution to the surface of the material and to apply an odor counteractant liquid as a vapor phase spray in the drying area.

The rate of emissions of VOCs from air drying of 600 dry tons (3,000 wet tons) per day of sludge calculated in J.M. Smith & Associates (1997) is 173.4 pounds per day. At this emission rate, and as shown in Table 3.2-6, the project would result in a net increase of about 150 pounds per day of VOCs from air drying of sludge, compared to the formerly proposed and permitted use of the N-Viro system with emission control for processing up to 177 dry tons (500 wet tons) per day of sludge.[15] This would exceed the BAAQMD threshold of 80 pounds per day of ROG, and would therefore be a significant impact.

The applicant commissioned an odor evaluation study in 1995 (J.M. Smith & Associates, 1996) to evaluate the effectiveness of application of potassium permanganate solution, use of counteractant liquid as a vapor phase spray in the drying area, and limiting the drying season to the months April through July. The study found that these measures substantially reduce the

[15] Note that the 1994 FEIR uses a different ratio of sludge measured on a wet basis to sludge measured on a dry basis: about 2:1, equivalent to about 35 percent solids, as opposed to the 4:1 figure, equivalent to about 20 percent solids used in the 1997 study and in the current JTD.

incidence of odors and the effects of odors on nearby sensitive receptors. Based on this study, the applicant's proposal to air dry stockpiled sludge, with the use of the odor control measures stated, appears to be capable of reducing odor impacts to a less-than-significant level.

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.2.10a: To control odors during drying, the applicant will apply potassium permanganate solution to the surface of the drying sludge and apply an odor counteractant liquid as a vapor phase spray in the drying area.

Mitigation Measures Identified in This Report

Mitigation Measure 3.2.10b: The applicant shall limit the amount of sewage sludge air dried each day to less than 1,800 wet tons (360 dry tons) per day. At an emission rate of .29 pounds per dry ton per day, this would result in emissions lower than 104 pounds of VOCs per day, which represents an increase of less than 80 pounds per day above the currently permitted limit of 24 pounds per day specified in the 1994 FEIR.

Mitigation Measure 3.2.10c: Alternatively, the applicant could purchase emissions credits from the BAAQMD, resulting in an off-set of VOC (ROG) emissions of any increment above 104 pounds per day. This would enable the applicant to process more than 1,800 wet tons (360 dry tons) per day of sewage sludge.

Level of Significance After Mitigation

Implementation of the mitigation measure proposed as part of the project together with either of the above measures identified in this report would reduce this impact to a less-than-significant level.

Impact 3.2.11: The combined emissions from project operations would exceed BAAQMD significance criteria for ROG, NO_X and PM-10. (Significant)

Table 3.2-6 shows the net increase in criteria air pollutant emissions from on-site and off-site sources related to operation of the project without mitigation. The following elements of the project were found to generate significant emissions of at least one criteria air pollutant for which the BAAQMD has established thresholds:

- Off-road equipment use and on-road vehicle travel to and from the landfill are major sources of NO_X emissions;
- Vehicle travel over unpaved surfaces would generate a substantial amount of fugitive dust (PM-10) emissions;
- Composting/co-composting operations ~~and sludge drying~~ are ~~the primary~~ a major source~~s~~ of significant ROG emissions;
- Air drying of stockpiled sewage sludge would result in significant ROG emissions; and,

- Emissions from the flare/vaporator/electric generator system for treatment of landfill gas ~~and from designated wastes that would be placed in Area G~~ could not be quantified because of inadequate information provided by the applicant, but it is likely that emissions from these sources would include significant levels of NO_X, PM-10, and perhaps CO.

As shown in Table 3.2-6, the total net increase in project emissions would exceed the BAAQMD thresholds for ROG, NO_X and PM-10. The combined emissions would be significant.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

Mitigation Measure 3.2.11: Implementation of Mitigation Measures 3.2.2 (a-d~~e~~), 3.2.4, 3.2.5(d-e~~f~~), 3.2.6(a-d), and 3.2.10(b or c) would help to mitigate the combined project operational emissions.

Level of Significance After Mitigation

Implementation of the above Mitigation Measures would substantially reduce operational emissions from individual elements of the project. However, it is unlikely that the mitigation measures identified above would reduce project ROG, NO_X and PM-10 emissions levels below the BAAQMD's 80 pounds per day significance threshold. Therefore, the combined emissions from project operation would be considered significant and unavoidable.

Impact 3.2.12: Leaving buried waste in place in the 11.5 acre unit in the southwest corner of the landfill property could result in fugitive emissions of landfill gas. (Less than Significant)

The 11.5 acre unit in the southwest corner of the landfill was apparently filled in the early history of the landfill. The applicant previously proposed to excavate the material in this area and place it in the permitted landfill area. The project includes a proposal by the applicant to leave this material in place, and to increase the depth of the existing soil cover to a minimum of 3-4 feet, but not to construct an engineered cap compliant with federal Subtitle D and state Title 27 requirements.

Limited subsurface investigations by the applicant have indicated that the materials placed in this area are primarily inert (Roycroft, 2001). A test of landfill gas concentrations in a shallow pit dug into the fill revealed methane concentrations of 100-280 ppm (.01 to .028 percent) (Roycroft, 2001). This may be compared to the gas extracted from the landfill's landfill gas collection system, which has a typical methane concentration of 50 percent. Quarterly monitoring by the applicant has revealed no concentration of methane at the property boundary in the vicinity of the 11.5 acre area (Roycroft, 2001). Therefore, the potential for generation of landfill gas from this area, and its release to the atmosphere in sufficient quantities to impact air quality, is insignificant. (Refer to the discussion under Impact 3.4.11 in Section 3.4, Geology, Soils, and Seismicity, regarding potential impacts on groundwater quality of the proposed management of this waste unit, and measures to reduce those impacts. Refer to the discussion under Impact 3.8.4 in Section 3.8, Public Health and Safety, regarding the site's ongoing landfill gas monitoring program and provisions for updating it under Mitigation Measure 3.8.4.)

Mitigation: None required.

Impact 3.2.13: Transport, handling, and disposal of the proposed increased volume of designated wastes ~~in Area G~~ could result in increased emissions of various air pollutants. (Significant)

The applicant proposes to increase the receipt of "designated" wastes from 20 tons per day to 200 tons per day. ~~to reclassify Area G as a Class II disposal unit that would accept a broad range of "designated" wastes~~. Designated wastes are wastes that fall below the definition of hazardous waste, or that have received a variance from hazardous waste handling and disposal requirements, but which can still pose a threat to water quality and human health if not handled and disposed properly. The applicant proposes to accept for disposal in ~~Area G~~ the Class III landfill the same types of designated wastes that are currently permitted for acceptance at the landfill (dewatered nonhazardous sludge (generally containing at least 20% solids), petroleum contaminated soil (PC soil meeting RWQCB acceptance criteria), incinerator ash, grit and grease, storm drain cleanings, nonhazardous holding tank pumpings from food processing facilities, treated wood (e.g., telephone and power poles, pier docks), dredge and fill material, and triple-rinsed chemical containers) ~~municipal solid wastes, sludges, petroleum or chemically contaminated soils, or other designated wastes that exceed the constituent concentrations identified in item B.5 of the existing Waste Discharge Requirements (see Appendix B) or that require, by regulations or private contract, the disposal of such waste into a composite lined waste management unit, but not including friable asbestos or petroleum-contaminated soils that exceed 50 parts per million of volatile compounds~~. The applicant proposes to accept ~~up to 1,000 tons per day peak and 500 tons per day average of petroleum contaminated soil, and~~ up to ~~500~~ 200 tons per day peak and ~~200 tons per day~~ average of ~~other~~ these designated wastes (see Table 2-2 in the Project Description). In addition, the applicant proposes to accept up to 800 tons per day peak and 640 tons per day average of petroleum contaminated soils meeting RWQCB acceptance criteria for use as alternative daily cover material (ADC); air quality impacts of this aspect of the proposal are analyzed in Impact- 3.2.14. Potential air quality impacts from handling and disposal of sewage sludge biosolids are considered in impact 3.2.7.

~~It can be expected that some of these materials would contain chemical constituents that fall below the concentration limits for hazardous materials set in Title 22 Division 4.5, Chapter 11, Article 3 (Characteristics of Hazardous Waste) of the California Code of Regulations, as well as materials that fall below the hazardous waste threshold limits for reactivity, corrosivity, ignitability, and toxicity, established in Title 22. It can further be expected that handling these materials, including transport, tipping, spreading, compacting, and covering, will result in emissions of dust, aerosols, and volatile compounds that may contain toxic air contaminants or criteria air pollutants. This could result in emissions of criteria pollutants above the significance~~

~~thresholds established by the BAAQMD, or could result in increased health risks due to exposure of carcinogenic and non-carcinogenic toxic air contaminants~~. ~~Because of the large volume of designated wastes that the applicant proposes to accept, and the uncertainty about the exact types of materials and their constituent concentrations that would be accepted, there is a potential for a significant air quality impact related to this project element.~~

Of the remaining materials, that is, incinerator ash, grit and grease, storm drain cleanings, nonhazardous holding tank pumpings from food processing facilities, treated, dredge and fill material, and triple-rinsed chemical containers, only incinerator ash has the potential to cause significant air quality impacts in the form of windblown particles. Currently, the landfill uses special handling procedures incinerator ash: incinerator ash meeting the RWQCB waste acceptance criteria is delivered to the working face for disposal in the landfill. Special handling (wetting or wrapping of the ash) is required by the generator of the waste to prevent the migration of airborne particles during transport and disposal. The landfill does not accept ash waste that it deems unmanageable.

Mitigation Measures Proposed as Part of the Project

> **Mitigation Measure 3.2.13~~a~~:** ~~The applicant proposes not to accept friable asbestos or petroleum-contaminated soils that exceed 50 parts per million of volatile compounds for disposal in Area G.~~The applicant has in place special handling requirements for generators of ash waste and procedures in place that ensure that acceptance and disposal of ash waste does not result in migration of airborne particles.

Mitigation Measures Identified in This Report

> ~~Mitigation Measure 3.2.13b~~: ~~The applicant shall be limited to accepting only designated wastes that do not pose a threat to air quality~~. ~~Prior to issuance of a revised Solid Waste Facilities Permit, the applicant shall submit to the LEA and the BAAQMD a detailed list of material types and constituent concentrations that they propose to accept for disposal in Area G, and will provide evidence of why handling and disposal of these material types and constituent concentrations will not result in emissions of criteria air pollutants or toxic air contaminants beyond threshold limits~~. ~~This list will be prepared by a specialist with expertise in calculating air emissions from handling and disposal of wastes~~. ~~The Solid Waste Facilities Permit will include as a condition of the permit that wastes acceptable for disposal in Area G will be limited to those included in the list only.~~

None required.

Level of Significance After Mitigation

Mitigation Measure 3.2.13~~b~~ would reduce this impact to a less-than-significant level. ~~would provide a firm basis for a conclusion that use of Area G as a Class II disposal unit, as conditioned, would not adversely affect air quality.~~

Impact 3.2.14: Acceptance of a greater quantity of petroleum contaminated soil (meeting Regional Water Quality Control Board acceptance criteria) and use of this material as

alternative daily cover could result in increased emissions of volatile organic compounds. (Significant)

RLI is currently permitted to accept up to 20 tons per day of petroleum contaminated soil (PC soil) meeting constituent concentration standards set by the Regional Water Quality Control Board (RWQCB) and to use this material as alternative daily cover (ADC). The applicant proposes to increase the amount of this material received for use as ADC to 640 tons per day average and 800 tons per day peak.

Volatile organic compounds in PC soils may volatilize under certain circumstances, and contribute to atmospheric VOC emissions. The RWQCB acceptance criteria for PC soils at Redwood Landfill allows~~are~~, however, relatively low concentrations of VOCs (see Appendix B). Furthermore, the typical usage of this material as ADC involves placement of the material over refuse at the end of the working day, and then placing and spreading fresh refuse on top of the material at the beginning of the next working day. The cover material is therefore exposed to the atmosphere during evening, night, and morning hours, when the combination of lower temperatures and little or no direct sunshine would reduce the rate of volatilization. If, however, a large area of this daily cover material is left exposed for a full day or a longer period of time, and exposed to high daytime temperatures and direct sunlight, the rate of volatilization could increase to the point that the BAAQMD significance threshold of 80 pounds per day is exceeded. This would be a significant impact.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

> **Mitigation Measure 3.2.14:** The applicant shall limit the acceptance of PC soils meeting RWQCB acceptance criteria for use as ADC only to those situations in which the PC soils will be exposed to the atmosphere for less than 24 hours. The applicant will ensure that, within 24 hours of receiving PC soils, the PC soils will either be covered with tarps, with waste material, or with other cover material.

Level of Significance After Mitigation

Less than significant.

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3.3 BIOLOGICAL RESOURCES

This section discusses potential impacts of the project on existing biological resources at the project site and areas adjacent to the landfill. Discussion of biological resources and analysis of potential environmental impacts are based on a review of the California Natural Diversity Data Base (CNDDB) records (California Department of Fish and Game, 2001) for the Novato and Petaluma River 7.5 minute quadrangles, which cover the site and the surrounding areas, the California Native Plant Society (CNPS) electronic inventory (Skinner and Pavlik, 1999), a U.S. Fish and Wildlife Service (USFWS) list of legally sensitive species in the project area (USFWS, 2001a), a previous environmental impact report for the project site (Marin County, 1994), and other biological literature (Sawyer and Keeler-Woolf, 1995; Hickman, 1993; Holland, 1986).

Site visits were conducted on February 5 and February 22, 2001, and April 8, 2003 to characterize wildlife habitat and vegetative communities, survey for special status plants and animals, and list incidental species of animals observed. Animal surveys were not intended to establish the presence or absence of particular species, or to provide an exhaustive species list; instead, the habitats found on site were characterized and the likelihood that special status species would occur on site was evaluated. Similarly, not all plant species were in bloom at the time of the surveys; plant habitats were surveyed to determine the likelihood that special status plant species would occur on the site. In general, descriptions of vegetative habitats follow Holland (1986); wildlife habitats are given as characterized by the California Wildlife Habitat Relationships (CWHR) system (California Department of Fish and Game, 1999).

3.3.1 SETTING

REGULATORY FRAMEWORK

Federal Endangered Species Act

Under the Federal Endangered Species Act (FESA), the Secretary of the Interior and the Secretary of Commerce jointly have the authority to list a species as threatened or endangered (16 USC 1533(c)). Pursuant to the requirements of FESA, an agency reviewing a proposed project within its jurisdiction must determine whether any federally listed threatened or endangered species may be present in the project area and determine whether the proposed project will have a potentially significant impact on such species. In addition, the agency is required to determine whether the project is likely to jeopardize the continued existence of any species proposed to be listed under FESA or result in the destruction or adverse modification of critical habitat proposed to be designated for such species (16 USC 1536(3), (4)). Therefore, project-related impacts to these species or their habitats would be considered “significant” in this EIR.

The USFWS also publishes a list of candidate species for listing and “Species of Concern.”[1] Species on this list receive special attention from federal agencies during environmental review, although they are not protected otherwise under the FESA. The candidate species are taxa for which the USFWS has sufficient biological information to support a proposal to list as Endangered or Threatened.

California Endangered Species Act

Under the California Endangered Species Act (CESA), the California Department of Fish and Game (CDFG) has the responsibility for maintaining a list of threatened species and endangered species (Cal. Fish and Game Code 2070). The CDFG also maintains a list of “candidate species,” which are species that the CDFG has formally noticed as being under review for addition to either the list of endangered species or the list of threatened species. The CDFG also maintains lists of “Species of Special Concern” which are roughly analogous to the federal Species of Concern described above. Pursuant to the requirements of CESA, an agency reviewing a proposed project within its jurisdiction must determine whether any State-listed endangered or threatened species may be present in the project area and determine whether the proposed project will have a potentially significant impact on such species. In addition, the CDFG encourages informal consultation on any proposed project that may impact a candidate species. Project-related impacts to species on the CESA endangered list and threatened list would be considered significant in this EIR. Impacts to Species of Special Concern would be considered significant under certain circumstances, discussed below.

CEQA Guidelines Section 15380

Although threatened and endangered species are protected by specific federal and State statutes, CEQA Guidelines section 15380(b) provides that a species not listed on the federal or State list of protected species may be considered rare or endangered if the species can be shown to meet certain specified criteria. These criteria have been modeled after the definition in FESA and the section of the California Fish and Game Code dealing with rare or endangered plants or animals. This section was included in the Guidelines primarily to deal with situations in which a public agency is reviewing a project that may have a significant effect on, for example, a “candidate species” that has not yet been listed by either the USFWS or CDFG. Thus, CEQA provides an agency with the ability to protect a species from a project’s potential impacts until the respective government agencies have an opportunity to designate the species as protected, if warranted.

Other Statues, Codes, and Policies Affording Limited Species Protection

The federal Migratory Bird Treaty Act (16 U.S.C., Sec. 703, Supp. I, 1989) prohibits killing, possessing, or trading in migratory birds except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, and bird nests and

[1] “Species of Concern,” “Species of Special Concern” and “Special Status” species are terms-of-art to describe the entire realm of taxa whose conservation status may be of concern for the USFWS or other resource agencies, but the terms have no official status. Project impacts on such species could, on a case-by-case basis, be considered “significant” in this EIR.

eggs. Birds of Prey are protected in California under the State Fish and Game Code (Section 3503.5, 1992). Section 3503.5 states that it is “unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto.” Construction disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered “taking” by the CDFG. Any loss of fertile eggs, nesting raptors, or any activities resulting in nest abandonment would constitute a significant impact. This approach would apply to red-tailed hawks, American kestrels, burrowing owls, and other birds of prey. Project impacts to these species would not be considered “significant” in this EIR unless they are known or have a high potential to nest on the site or rely on it for primary foraging.

The federal Bald Eagle Protection Act prohibits persons within the United States (or places subject to U.S. jurisdiction) from “possessing, selling, purchasing, offering to sell, transporting, exporting or importing any bald eagle or any golden eagle, alive or dead, or any part, nest, or egg thereof.”

The legal framework and authority for the State’s program to conserve plants are woven from various legislative sources, including CESA, the California Native Plant Protection Act (Fish and Game Code Section 1900 – 1913), the CEQA Guidelines, and the Natural Communities Conservation Planning Act.

Vascular plants listed as rare or endangered by the CNPS (Skinner and Pavlik, 1995), but which may have no designated status or protection under federal or State endangered species legislation, are defined as follows:

- List 1A: Plants Presumed Extinct.
- List 1B: Plants Rare, Threatened, or Endangered in California and elsewhere.
- List 2: Plants Rare, Threatened, or Endangered in California, but more numerous elsewhere.
- List 3: Plants About Which More Information is Needed – A Review List.
- List 4: Plants of Limited Distribution – A Watch List.

In general, plants appearing on CNPS List 1A, 1B, or 2 are considered to meet the criteria of Section 15380 of the CEQA Guidelines and effects to these species are considered “significant” in this EIR. Additionally, plants listed on CNPS List 1A, 1B or List 2 meet the definition of Section 1901, Chapter 10 (Native Plant Protection Act) and Sections 2062 and 2067 (California Endangered Species Act) of the California Department of Fish and Game Code.

REGIONAL SETTING

Redwood Landfill is located north of the west shore of San Pablo Bay, which receives most of its water from the Sacramento River and is contiguous with San Francisco Bay to the south. The Bay is subject to tidal influence, and before development was largely bordered by a mixture of saline and freshwater marsh.

The landfill itself is located near the Petaluma River, which flows into San Pablo Bay east of the city of Novato. San Antonio Creek forms the eastern border of the landfill. Between the creek and the river is a large expanse of tidal marsh. This area is part of the Petaluma Marsh Wildlife Area, and is traversed by a number of sloughs. These include Mud Hen Slough, which joins San Antonio Creek east of the landfill, as well as Mira Monte Slough, which joins the Creek opposite the southeast corner of the landfill.

On the west, the project site is bordered by a narrow slough that runs roughly northward alongside the Northwestern Pacific railroad tracks, where it is channelized, then turns eastward to form the northern boundary of the landfill before joining San Antonio Creek. This slough is subject to tidal influence. The southern boundary of the project site is formed by another channel, also tidally influenced; thus, the project site is largely surrounded by water.

Further to the west, across the railroad tracks, is an area of grasslands, which cross Highway 101 and continue uphill into an area of oak woodland. There is also a small amount of oak woodland on a knoll to the north of the landfill.

PROJECT SETTING

The area of landfill operations is almost entirely enclosed by a perimeter levee. The outer edge of this levee is adjacent to the surrounding open water, except in the area of the Oxbow along San Antonio Creek, and along the north side of the landfill, where there are areas of brackish marsh between the levee and the creek. Excluding the landfill footprint itself, the area within the levees is largely ruderal grassland and compacted soil in the area of current operations. East of the fill area, in the Oxbow area, is an area of grassland that is regularly disturbed by sludge drying operations.

The proposed changes in operation of the landfill will not expand the area of operations outside the levees, or move the footprint of the fill area closer to them.

Plant Communities and Wildlife Habitats

The vegetation/habitat classification system used for this analysis is based on Sawyer and Keeler-Woolf (1995) and the classification system of Holland (1986). These classification systems are hierarchical treatments of vegetation communities/wildlife habitats that describe natural communities, naturalized communities, invasive plant associations, and human-influenced and urban landscapes. Equivalent wildlife habitats are as given by the CWHR.

Strictly speaking, much of the site does not support a plant community, since it is either recently disturbed and barren, or contains only scattered weedy plants. Most of the remainder of the site can best be described as highly disturbed California annual grassland. A eucalyptus grove occurs along the site’s western edge and a small area of freshwater marsh habitat occurs along an edge of the southern storm water impoundment. Coastal brackish marsh is found just beyond the project area to the east of the levee, bordering San Antonio Creek. Degraded patches of brackish marsh habitat also are found along the channel bordering the northern end of the site, outside the levee.

California Annual Grassland (Highly Disturbed)

This habitat type comprises a dense to sparse cover of introduced, naturalized grasses associated with numerous species of annual and perennial forbs. The presence of this assemblage of non-native grasses (of Mediterranean and South African origin) is, for the most part, a consequence of permanent alterations to the once widely distributed, pristine perennial grasslands of California. In the case of the project site, the pre-1940 habitat type was probably northern salt marsh and/or brackish marsh before being filled for agricultural purposes. Throughout the period of agricultural use in the 1940s and 1950s, and the subsequent use of the site for landfill/dump purposes since 1958, disturbance at the site has probably been frequent and ongoing, leaving little chance for plant community development.

Presently, since it is a working landfill and waste processing facility, most of the site remains subject to high levels of frequent disturbance. Thus most of the plant species that occur are annual ruderal species. Most of this vegetation can be classified as disturbed California annual grassland, although a continuum of vegetation can be observed – from bare, newly disturbed ground to disturbed ground with a sparse cover of weedy species such as black mustard (*Brassica nigra*), bristly ox-tongue (*Picris echiodes*), wild radish (*Raphanus sativa*), and fennel (*Foeniculum vulgare*), to a relatively developed annual grassland consisting of the above species, plus annual grasses such as Italian ryegrass (*Lolium multiflorum*), wild oats (*Avena fatua*), ripgut brome (*Bromus diandrus*), and other non-native grass and forb species.

Temporary small ponds occur in some grassland areas, particularly in the Oxbow area. Most show signs of being recently formed with no or little development of hydric soil conditions. At the time of the survey, most ponds were inhabited by single plant species, usually either Italian ryegrass or brass buttons (*Cotula coronopifolia*). In addition to the seasonal nature of these ponds, the depressions that contain the ponds are probably transient features due to frequent grading and other manipulations of the landscape associated with spreading and drying of biosolids.

In contrast, raised berms at the grassland edges provide a more upland habitat. These berms include the levees that surround much of the site, as well as parts of the lower existing landfill contours and the berms that surround the two storm water impoundments and the leachate impoundment. The berm surrounding the southern-most (18-acre) storm water impoundment has remained stable long enough for shrub species to establish, particularly the native coyote brush (*Baccharis pilularis*).

Wildlife species found in disturbed grasslands areas vary with the amount of vegetative structure (McBride and Reid, 1988). Very little mammalian wildlife was observed (mule deer [*Odocoileus hemionus*] and jackrabbit [*Lepus* sp.]); however, within the Oxbow area, there were skulls of a bobcat (*Lynx rufus*) and a skunk (*Mephitis mephitis*), as well as remains of a domestic cat (*Felis sylvestris* sp.), and tracks of raccoon (*Procyon lotor*).

Birds observed in the grassland area included Canada goose (*Branta canadensis*), western meadowlark (*Sturnella neglecta*), crows (*Corvus brachyrhynchos*), and killdeer (*Charadrius vociferus*).

Avocets (*Recurvirostra americana*), great egrets (*Casmeridius albus*), snowy egrets (*Egretta thule*), tundra swans (*Cygnus columbianus*), shovelers (*Anas clypteata*), and black-necked stilts (*Himantopus mexicanus*) were observed in temporary shallow ponds in the grasslands of the Oxbow area. Temporary ponds also occur just outside the site on the grasslands to the west.

Raptors observed in the grassland area included American kestrels (*Falco sparverius*), white-tailed kites (*Elanus leucurus*), northern harriers (*Circus cyaneus*), red-tailed hawks (*Buteo jamaicensis*), and turkey vultures (*Cathartes aura*).

The presence of predators, including both cats and raptors, indicates the presence of prey, which for all these predator species is very likely to be small mammals. EIR surveys recorded one northern harrier with prey, a mammal the size of a gopher. Small mammal burrows, although not numerous, are present in the Oxbow area and also are found throughout the site.

A variety of gull species, including California gulls (*Larus californicus*) and ring-billed gulls (*Larus delawarensis*), were noted at the site.

Coastal Brackish Marsh

The relatively narrow area between the levee bordering the east side of the project area and San Antonio Creek supports mostly brackish marsh vegetation. This is most developed along the perimeter of the Oxbow area. Although there is freshwater input from the upstream portions of San Antonio Creek, salinity levels by the site must be relatively high, as shown by the predominance of halophytic plants. The vegetation in this area follows the typical salt marsh zonation pattern: mostly cordgrass (*Spartina* sp.) furthest into the channel, pickleweed (*Salicornia virginica*) in periodically flooded areas just above the cordgrass zone, and saltgrass (*Distichlis spicata*) above the pickleweed zone. As is generally the case, these zones at the site become more diverse going from the channel to the upland interface, with species such as alkali heath (*Frankenia salina*), jaumea (*Jaumea carnosa*), and sea-lavender (*Limonium californicum*) occurring. Small patches of degraded coastal brackish marsh habitat occur along the slough bordering the northern edge of the project site.

Although the active area of the landfill is effectively separated from marsh habitat by the levee, scattered pickleweed and saltgrass occur on the landfill side of the levee. These occurrences are probably a result of saline deposits remaining after evaporation rather than to any connection with the tidal influence of San Antonio Creek.

Brackish marsh corresponds with the wildlife habitat type of saline emergent wetland (California Department of Fish and Game, 1999). The Oxbow area is relatively constricted grassland area with brackish marsh on three sides. As noted above, however, some pickleweed grows on the inside of the levee in the Oxbow area, so that the boundary between wildlife habitats inside and outside the levee is not completely distinct.

Saline emergent wetlands potentially support a considerable variety of wildlife. Around San Francisco Bay, species associated with areas where this habitat is in good condition and extent include endemic subspecies of birds, such as the endangered California and light-footed clapper rails, California black rail, salt marsh yellowthroat, Belding's savannah sparrow and three subspecies of song sparrow. Other likely bird species include herons, egrets, various waterfowl and raptor species (including northern harrier), as well as shorebirds, swallows, and the marsh wren (*Cistothorus palustris*). Mammals potentially using these wetlands include various rodents such as shrews and mice, along with the endangered salt marsh harvest mouse (California Department of Fish and Game, 1999). Raccoon and river otter (*Lutra canadensis*) may also be found, as may a number of reptiles and amphibians.

The wildlife actually observed in the brackish marshes included great egrets, snowy egrets, northern harriers, white-tailed kites, and canvasback ducks (*Aythya valisineria*). These species seem to be a representative subset of the wildlife listed by the CWHR system as potentially occurring.

Eucalyptus Grove

A band of eucalyptus trees (*Eucalyptus globulus*) is found on the levee along the slough that parallels the railroad tracks on the west of the landfill. Introduced from Australia, eucalyptus has become naturalized throughout much of California. Although usually not designated as forest or woodland in California, the "Eucalyptus series" (Sawyer and Keeler-Woolf, 1995) is often characterized by a continuous canopy and sparse understory.

Eucalyptus groves may be important as roosts, perches, or nest sites for a number of birds, and this may be particularly true at the site, which contains good raptor foraging areas just to the west. Species potentially using the trees include American crows (*Corvus brachyrhynchos*), ravens (*Corvus corax*), barn owls (*Tyto alba*), and red-tailed and red-shouldered (*Buteo lineatus*) hawks (California Department of Fish and Game, 1999). Great horned owls (*Bubo virginianus*) may also nest in isolated strings of eucalyptus. Below the canopy, the bark that falls to the ground forms a microhabitat that may be used by smaller vertebrates (California Department of Fish and Game, 1999).

Various ornamental trees and shrubs also have been planted along this levee. Nearer to the water of the slough occur a number of stands of giant reed (*Arundo donax*), a pernicious invasive plant species of California waterways.

Open Water/Freshwater Marsh

The approximately 18-acre storm water impoundment at the southern end of the project area was landscaped to provide wildlife habitat. This has resulted in the formation of a few areas of basic freshwater marsh habitat, principally represented by the presence of cattails (*Typha* sp.) and a few willows (*Salix* sp.) on the lower part of the adjacent berm. Tundra swans, Canada geese, mallards (*Anas platyrhynchos*), bufflehead (*Bucephala albeola*), scaup (*Aytha* sp.), and red-winged blackbirds (*Agelaius phoeniceus*) were observed on the pond.

The two other ponds on the landfill are the 1.5-acre interim storm water pond in Area G, which is clay-lined, and the 11-acre leachate pond located in the Oxbow area of the site. Neither is as vegetated as the formerly landscaped southern impoundment, although the leachate pond does support some emergent vegetation. At the time of the EIR surveys, the water in the Area G pond was shallow, and black-necked stilts were seen there. A few song sparrows (*Melospiza melodia*) were seen in the vegetation near the northern pond, but could not be identified to subspecies.

A drainage ditch, approximately five feet wide at water level, borders the eastern side and part of the southern side of Area D. Wildlife noted in this area were mallards, snowy egrets, and a great blue heron (*Ardea herodias*).

Wetlands

Wetlands are defined by the U.S. Army Corps of Engineers (Corps) and the U.S. Environmental Protection Agency (U.S. EPA) as those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. The Corps' Wetlands Delineation Manual (Corps of Engineers, 1987) establishes three criteria – presence of wetland vegetation (hydrophytes), wetland (hydric) soils, and wetland hydrology – for determining if an area may qualify as a wetland under the jurisdiction of the Corps. All three must be present for an area to qualify as a wetland.

While the coastal brackish marsh between the levee and San Antonio Creek, along the eastern edge of the project site, and the patches of degraded brackish marsh along the slough on the northern perimeter of the project site are both on the landfill property, neither is within the area where work will occur for the proposed project, with the possible exception of levee reconstruction.

As noted in the Project Setting discussion, above, the site was converted from marsh wetland to agricultural land in the 1940s or 1950s, and has been used as a landfill since 1958. The project area contains no undeveloped, diked historic baylands (Marin County, 1994). A wetland delineation conducted in the mid-1980s by Harding Lawson Associates, which identified two small wetlands (totaling 0.45 acres) on the project site, was verified by the Corps on two separate occasions (1988 and 1992). These wetland areas have since been filled and the filling mitigated following the Corps' Section 404 permitting process. The 18-acre storm water impoundment, 11-acre leachate impoundment, and the drainage ditch existed at the time of the delineation, although the drainage ditch apparently is repositioned periodically dependent on landfill operations. It is assumed that these were determined not to be "waters of the United States" based on 33 CFR 328.3(c)and 33 CFR 328.3(a).[2] It is assumed that the small water-filled depressions resulting from ongoing activities at the landfill were determined not to be "waters of the United States" based on 33 CFR 328.3(e).[3]

Characteristics of the 18-acre and 11-acre impoundments and the drainage ditch have not changed significantly since at least 1991, and they have remained in constant use by the landfill. These impoundments would continue to be excluded from classification as "waters of the United States" based on 33 CFR 328.3(a) and (c). In any event, these features are not proposed to be filled, nor is fill material proposed to be discharged into them, as part of the proposed project. The interim, 1.5-acre storm water impoundment in Area G, built since the 1992 determination, is used for temporary storage of excessive storm water runoff and is dry for most of the year. As with the other two impoundments, this impoundment would not be considered to be "waters of the United States" based on 33 CFR 328.3(c). This impoundment will be filled as a result of the development of Area G as a landfill, which is already a permitted activity.

The temporary ponds that form mainly in the Oxbow area are on terrain that is in constant use for the processing of biosolids and/or for storage. These would not be considered "waters of the United States" based on 33 CFR 328.3(e).

Potential Wildlife Movements Between On-site and Off-site Habitat

Since the project site is largely grassland, it can be considered as an isolated extension of the grassland to the west. The levee on its eastern border thus forms a boundary between grassland habitat and the marsh areas of the Petaluma River and the Petaluma Marsh Wildlife Area. As noted above, however, the habitat boundary is not completely distinct, since pickleweed is found on both sides of the levee.

Levees are not major barriers to the movement of most terrestrial vertebrates, since they are narrow and their banks are not vertical. Thus, although the levee forms a fairly sharp barrier between the disturbed vegetative habitats of the project site and the marsh habitat outside, it is permeable to animals, and movement of wildlife species into and out of the project area could logically be expected, and observations during EIR surveys support this expectation. Animal species observed within the Oxbow area that are likely to move back and forth into the marsh included mule deer, bobcat, skunk, raccoon, and domestic cat. Bird species in the area, particularly foraging raptors, were observed to move between the marsh and the project site.

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2 33 CFR 328.3 (a) provides that the Corps generally does not consider "[n]on-tidal drainage and irrigation ditches excavated on dry land" to be waters of the United States," and 33CFR 328.3(c) provides that the Corps generally does not consider "[a]rtificial lakes or ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing" to be waters of the United States.

3 33 CFR 328.3(e) provides that the Corps generally does not consider to be waters of the United States those "[w]aterfilled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States."

Black-necked stilts were seen both within the site and in temporary ponds that formed in the grasslands just to the west; presumably these birds also move in and out of the landfill site.

Wildlife observed in the slough outside (east of) the levee included four bird species likely to move in and out of the site, since appropriate vegetative habitat is found in both areas: western meadowlark (*Sturnella neglecta*), red-winged blackbird, avocets (*Recurvirostra americana*), and killdeer (*Charadrius vociferous*). The slough also supported pied-billed grebes (*Podilymbus podiceps*) and large numbers of canvasbacks. Both these species dive beneath the water surface for their food, and thus are not likely to be found in the shallow water areas of the site. However, they might well be found on the 18-acre storm water pond. Other duck species, including the mallard, can use water of different depths for feeding and for loafing, and are likely to move in and out of the site. Potential movements of special status species are described below.

Special Status Species

Special Status Animals

A list of special status animals potentially occurring on the site is presented in Table 3.3-1, based on lists developed by the CNDDB (California Department of Fish and Game, 2001) for the Novato and Petaluma River 7.5 minute USGS quadrangles and by the U.S. Fish and Wildlife Service (2001a) for the Petaluma River Quadrangle. Also included are species not on these lists but considered likely to occur on or near the site on the basis of professional experience. CNDDB records show only those species actually reported for the area; a species might be present in the area but unreported. The list provided by the USFWS is more comprehensive, including animals that occur within, or that may be affected by projects within, the appropriate quadrangles. Some of these species were not considered in this document, since no appropriate habitat exists on or near the site. These species are listed in Table 3.3-2.

Threatened or Endangered Animals. Five threatened or endangered species were cataloged by the CNDDB as reported from the Novato and Petaluma River quadrangles. Of these five, only two birds (the California clapper rail [*Rallus longirostris obsoletus*]and the California black rail [*Laterallus jamaicensis coturniculus*]) and one mammal (the salt marsh harvest mouse [*Reithrodontomys raviventris*]) potentially occur either on or near the site. The other two are fish (the tidewater goby [*Eucycloglobius newberryi*] and the steelhead [*Onchorhynchus mykiss irideus*]), which would not be affected by the project.

In addition to these five listed species, the USFWS list includes the California red-legged frog (*Rana aurora draytonii*), as well as four salmonids (*Onchorhynchos* spp.). The site is close to previously designated Critical Habitat for the red-legged frog, which is discussed below. Both the California clapper rail and the California black rail are found in the brackish marsh areas of the San Francisco Bay area. The California clapper rail is a subspecies of the clapper rail (*Rallus longirostris*), and is listed as endangered by both the State and federal governments. It is found in Morro, Monterey, and San Francisco bays, where it occurs year-round. Its habitat is wetlands and brackish areas, preferably dominated by pickleweed and cordgrass, along with bulrush in brackish areas. Habitat must include shallow water or mudflats for foraging, with adjacent vegetation for

TABLE 3.3-1
SPECIAL STATUS ANIMAL SPECIES POTENTIALLY OCCURRING AT REDWOOD LANDFILL, MARIN COUNTY

Common Name ***Scientific Name***	**Status** **USFWS/CDFG**	**Habitat Requirements**	**Occurrence Potential**
BIRDS			
Burrowing owl *Athene cunicularia*	--/CSC	Open grasslands or similar vegetation; rodent burrows (usually ground squirrel) required for burrows.	**Considered extirpated from Marin County.**
California black rail *Laterallus jamaicensis coturniculus*	--/CT	Salt marshes along larger bays; also tidal fresh, brackish, and salt marsh.	**Absent from the landfill**. The brackish marsh habitat on the outside of the levee might provide habitat.
California clapper rail *Rallus longirostris obsoletus*	FE/CE	Saltwater and brackish marshes traversed by tidal sloughs. Pickleweed areas; forages in mud-bottom sloughs. San Francisco Bay area.	**Absent from the landfill.** The brackish marsh habitat on the outside of the levee might provide habitat, esp. since it includes pickleweed.
Salt marsh common yellowthroat *Geothlypis trichas sinuosa*	--/CSC	Fresh and saltwater marshes with cover down to water's edge for foraging; tall grasses, tule patches, willows for nesting. San Francisco Bay area.	**Absent from the landfill.** The brackish marsh habitat on the outside of the levee might provide habitat.
San Pablo song sparrow *Melospiza melodia samuelis*	--/CSC	Salt marshes in San Francisco and San Pablo bays; tidal sloughs in *salaconia* marshes, nests in *Grindelia* bordering slough channels.	**Absent from the landfill.** Could occur in the brackish marsh areas outside the levee.
Tri-colored blackbird *Agelaius tricolor*	--/CSC	Colonial nester in wetland areas of emergent vegetation; requires associated open water; most numerous in Central Valley.	**Low.** Could occur in the emergent vegetation of the storm water ponds.
White-tailed kite *Elanus leucurus* (nesting)	3503.5	Open grassland, meadows, marshes for foraging; isolated dense-topped trees for nesting.	**Low.** There is no nesting habitat within the site itself; however, have been observed foraging nearby and potential nest areas are nearby.
MAMMALS			
Pallid bat *Antrozous pallidus*	--/CSC	Open, dry habitats in grassland, woodland, forest, with rocky areas for roosting, occasionally roosts in trees or buildings.	**Low/Moderate.** Might roost in the open outbuildings on the site
Salt marsh harvest mouse *Reithrodontomys raviventris*	FE/CE	Saline emergent wetlands of San Francisco Bay and its tributaries. Primary habitat is pickleweed.	**Possible but unlikely.** Pickleweed is found both in the brackish marsh habitat outside the levee and inside the levee in the Oxbow area. None found in 1992.
Townsend's western big-eared bat *Corynorhinus townsendii townsendii*	--/CSC	Mesic habitats; roosts in mines, buildings in open areas, hanging from walls and ceilings.	**Low/Moderate.** The open outbuildings on the site provide potential roost habitat; the seasonally wet grassland areas and the nearby slough areas provide foraging habitat.

TABLE 3.3-1 (Continued)
SPECIAL STATUS ANIMAL SPECIES POTENTIALLY OCCURRING AT REDWOOD LANDFILL, MARIN COUNTY

Common Name *Scientific Name*	**Status USFWS/CDFG**	**Habitat Requirements**	**Occurrence Potential**
AMPHIBIANS AND REPTILES			
California red-legged frog *Rana aurora draytonii*	FT/CSC	Can use virtually any aquatic system; requires surface water of 20 inches minimum depth from March – July; associated uplands, dispersal, and estivation habitat also critical.	**Low/Moderate.** 18-acre storm water pond is suitable but no frogs have been observed.
California tiger salamander *Ambystoma californiense*	--/CSC	Grasslands; requires vernal pools or other seasonal water sources for breeding; also requires underground refuges, especially ground squirrel holes.	**Considered absent.** The seasonal ponds provide potential breeding habitat, but the grasslands areas on site lack burrows for refuge.
Foothill yellow-legged frog *Rana boylii*	--/CSC	Shallow streams and riffles with rocky substrate; cobble-sized substrate for egg-laying.	**Absent.** No suitable habitat on the project site.
Northwestern pond turtle *Clemmys marmorata marmorata*	--/CSC	Permanent or nearly permanent water; marshes, rivers, streams, and irrigation ditches with aquatic vegetation. Requires basking sites (open mud banks, partly submerged logs, etc.).	**Low/Moderate.** 18-acre storm water pond is suitable but no turtles have been observed.
Western spadefoot toad *Scaphiopus hammondii*	--/CSC	Primarily grasslands but also valley-foothill hardwood woodland; requires vernal pools for breeding and egg-laying.	**Moderate.** The seasonal ponds on site could provide breeding habitat.
FISH			
Steelhead (Central California coast ESU) *Onchorhynchus mykiss irideus*	FT/--	San Francisco and San Pablo Bay basins.	**Low.** No suitable habitat on the project site, although steelhead present in the Petaluma River.
Tidewater goby *Eucycloglobius newberryi*	FE/CSC	Brackish water habitats; shallow lagoons and lower stream reaches; still but not stagnant water with high oxygen levels.	**Low.** No suitable habitat on the project site or in the adjacent areas due to fluctuating water levels.

Federal categories (U.S. Fish and Wildlife Service):
FE = Federally listed as Endangered;
FT = Federally listed as Threatened;
FSC = Federal Species of Concern (former Category 2 species).

State categories (California Department of Fish and Game):
CE = State listed as Endangered;
CT = State listed as Threatened;
CSC = State Species of Special Concern;
3503.5 = Protected under Cal. Fish and Game Code Section 3503.5.

High Potential = Species expected to occur and meets all habitats defined in list.
Moderate Potential = Habitat only marginally suitable or suitable but not within species range.
Low Potential = Habitat does not meet species requirements as currently understood in the scientific community.

SOURCE: California Department of Fish and Game 2001, U.S. Fish and Wildlife Service 2001a.

TABLE 3.3-2
ANIMAL SPECIES LISTED BY USFWS FOR THE PROJECT AREA BUT NOT CONSIDERED IN THIS DOCUMENT DUE TO LACK OF HABITAT

Common Name	Scientific Name
Birds	
American peregrine falcon	*Falco peregrinus anatum*
Bald eagle	*Haliaeetus leucocephalus*
Bell's sage sparrow	*Amphispiza belli belli*
Ferruginous hawk	*Buteo regalis*
Little willow flycatcher	*Empidonax traillii brewsteri*
Northern spotted owl	*Strix occidentalis caurina*
Western snowy plover	*Charadrius alexandrinus nivosus*
Mammals	
Greater western mastiff-bat	*Eumops perotis californicus*
Fringed myotis bat	*Myotis thysanodes*
Long-eared myotis bat	*Myotis evotis*
Long-legged myotis bat	*Myotis volans*
Point Reyes jumping mouse	*Zapus trinotatus orarius*
Point Reyes mountain beaver	*Aplodontia rufa phaea*
Suisun ornate shrew	*Sorex ornatus sinuosus*
Yuma myotis bat	*Myotis yumanensis*
Amphibians and Reptiles	
Northern red-legged frog	*Rana aurora aurora*
Fish	
Central valley spring-run chinook salmon	*Onchorhynchus tshawytscha*
Coho salmon	*Onchorhuynchus kisutch*
Delta smelt	*Hypomesus transpacificus*
Winter-run chinook salmon	*Onchorhynchus tshawytscha*
Invertebrates	
California freshwater shrimp	*Syncaris pacifica*
Ricksecker's water scavenger beetle	*Hydrochara rickseckeri*

cover when water is high. Nesting occurs in saline emergent wetlands with abundant cordgrass and nearby tidal sloughs; the breeding season is from mid-March through July (California Department of Fish and Game, 1999). The presence of nearby tidal sloughs satisfies a habitat requirement for clapper rails.

The California black rail, listed as threatened by the State of California, is found in various areas of southern California, as well as in the San Francisco Bay area and the Sacramento-San Joaquin Delta, where it is resident year-round. It is found in the vicinity of tidal sloughs, in saline emergent wetlands, particularly where pickleweed grows, and in freshwater marshes with bulrushes, cattails, and saltgrass. It usually inhabits wetland areas near the upper limit of tidal flooding rather than areas with large annual or daily water level fluctuations. Nesting has been reported from mid-March to early June (California Department of Fish and Game, 1999).

The salt marsh harvest mouse, listed as endangered by both the State and federal governments, is found only in saline emergent wetlands of San Francisco Bay and its tributaries (California Department of Fish and Game, 1999 and 2001). The northern subspecies (*Reithrodontomys raviventris halicoetes*) is found on the Marin Peninsula, "through the Petaluma, Napa, and Suisun Bay marshes, and is also found in Contra Costa County" (California Department of Fish and Game, 1999). The southern subspecies, *Reithrodontomys raviventris raviventris* is also found in isolated populations in Marin and Contra Costa counties (California Department of Fish and Game, 1999).

The primary habitat of this mouse is pickleweed marsh, but this must be associated with non-submerged vegetation to allow movement away from water at high tide or during floods (California Department of Fish and Game, 1999 and 2001). In the spring and summer, some individuals make daily movements from the pickleweed marsh to higher grassland. Individuals do not appear to move between marshes. The northern subspecies breeds from May to November, the southern from March to November (California Department of Fish and Game, 1999).

The presence of pickleweed in the brackish marsh outside the landfill levee provides habitat for the salt marsh harvest mouse, and the fact that the pickleweed extends across the levee may improve the habitat value by providing a refuge from high tides and a connecting habitat to grasslands inside the levee. The 1994 FEIR reported a small amount of potential habitat present inside the levee, but an intensive trapping survey by Harding Lawson Associates [conducted in 1992] for the species was negative.

The CNDDB catalogs two listed fish species that have essentially no likelihood of occurring on the site. The tidewater goby is found in brackish water habitats, but only in lower stream reaches and shallow lagoons, which do not occur in the area of the landfill. Steelhead are present in the Petaluma River, but are not likely to be found in the marshy areas adjacent to the site. This is also true of the other salmon species listed by the USFWS and included in Table 3.3-2. The California red-legged frog can be found in a variety of habitats, and when dispersing, can travel as much as one to two miles away from its aquatic breeding areas, moving across upland habitats including annual grasslands (Smith, 2000; USFWS, 2001b). Consequently, it potentially can be found throughout much of California.

"Critical Habitat" for the red-legged frog was proposed in September, 2000 and made final in May, 2001; Unit 10 of designated Critical Habitat includes part of Sonoma County east of the Petaluma River (USFWS, 2001b), and the landfill is separated from the designated Critical Habitat by the river itself and the intervening brackish marsh area. The proposed project site is therefore not included in the Critical Habitat designation for the species. Moreover, Critical Habitat for the California red-legged frog was withdrawn on July 2, 2002, reinstated on July 24, and again withdrawn on November 9. The most recent ruling left intact only 124,000 acres around a Merced River tributary in Tuolumne and Mariposa counties, and 75,000 acres in the Angeles National Forest near Los Angeles. The official timetable for redrawing critical Habitat boundaries requires the Fish and Wildlife Service to act by 2005. In any event, Critical Habitat designation will not be an issue at the landfill.

The leachate and storm water impoundments were evaluated as potential habitat for red-legged frog breeding on the site, and the grasslands areas, particularly in the Oxbow area, as potential upland habitat. Results of tests of salinity in the ponds and ditches suggest a low probability and much more restricted area where frogs could successfully breed. The species is considered to have a tolerance for salinities only up to about 4 parts per thousand (ppt) (Jennings and Hayes, 1994). Salinity readings for the leachate pond and one of the drainage channels were 7.6 and 8.3 ppt, respectively. Only the 18-acre storm water pond could be considered suitable, at 3.3 ppt. The actual landfill site and the traffic involved in its operation somewhat isolate the potential upland habitat from other grassland habitat in the area, particularly the grasslands to the west, which in turn are isolated by Highway 101.

Other Special Status Animal Species. Six other legally sensitive species are listed as reported from the area by the CNDDB: three birds (the burrowing owl [*Athene cunicularia*], the salt marsh common yellowthroat [*Geothylypis trichas sinuosa*], and the white-tailed kite [*Elanus leucurus*]); two bats (the pallid bat [*Antrozous pallidus*] and the Townsend’s western big-eared bat [*Corynorhinus townsendii townsendii*]); and one amphibian, the foothill yellow-legged frog (*Rana boylii*).

Burrowing owls are found throughout California in deserts and in grasslands (California Department of Fish and Game, 1999). Habitat requirements are open, shortgrass, treeless areas, generally in association with burrowing mammals, with the presence of mammalian nest burrows a requirement for breeding (Haug et al., 1993). Burrowing owls can be found in small open areas such as golf courses, vacant lots in residential areas, airports, and fairgrounds (Haug et al., 1993). The presence of low perches for foraging is advantageous. Burrowing owls, as their name implies, are subterranean nesters. In California, they are dependent on burrowing mammals, especially the California ground squirrel, for nest burrows (California Department of Fish and Game, 2001). The grasslands to the west of the landfill might well provide habitat for this species. However, habitat on the landfill does not appear suitable, since ground squirrel or similar-sized burrows are not available, and the subsurface of the soil may be too damp for burrowing. The only habitat for these owls would be in the drier portions of the site, where, lacking suitable rodent burrows, they might be found in openings under human structures. Burrowing owls are considered largely extirpated from Marin County (DeSante and Ruhlen, 1995).

The salt marsh common yellowthroat is a subspecies of the common yellowthroat (*Geothlypis trichas*), and is both a resident and a summer visitor in the San Francisco Bay area (California Department of Fish and Game, 1999). Its breeding and wintering habitat includes wet meadows and both fresh and saline emergent wetlands; breeding may also occur in other habitats including annual and perennial grasslands with tall grasses, tule patches, and willows (California Department of Fish and Game, 1999 and 2001). Breeding takes place between early April and mid-July, peaking in May and June (California Department of Fish and Game, 1999). Foraging areas have continuous, thick, cover extending down to the water surface (California Department of Fish and Game, 2001). Consequently, the brackish marsh areas outside the levee, and to some extent the pickleweed and grassland areas inside, provide habitat for this species.

The white-tailed kite is protected at its nest sites by Section 3503.5 of the California Fish and Game Code. It nests over a large portion of California, although it is relatively uncommon. It nests in trees with dense canopies, including scattered oaks, close to appropriate foraging areas, which include open grasslands, meadows, marshes, and emergent wetlands (California Department of Fish and Game, 1999 and 2001). Prey consists largely of small mammals such as voles, although some small birds are taken, along with some insects, reptiles and amphibians (California Department of Fish and Game, 1999). Breeding is from February to October, with the peak from May to August (California Department of Fish and Game, 1999). Since white-tailed kites were observed at the landfill during the winter, the site presumably provides appropriate foraging habitat. The eucalyptus trees on the western edge of the landfill might provide suitable nesting habitat, but the amount of disturbance in the area makes nesting there unlikely. However, the site is close to the potential nesting habitat of the oak trees on the knoll to the north. Consequently, even if kites do not nest on the site itself, the landfill might still provide foraging habitat for nesting kites.

The Townsend's western big-eared bat is found in the humid coastal regions of northern and central California, where it roosts in the open portions of caves, lava tubes, tunnels, mines, buildings, and other human-made structures, hanging from walls and ceilings (California Department of Fish and Game, 1999 and 2001). Maternity roosts, which are located at warm sites, may be found in caves, tunnels, mines, and buildings (California Department of Fish and Game, 1999). Mating occurs from November to February, often prior to hibernation, and births occur in May and June, with the peak in late May (California Department of Fish and Game, 1999). These bats show a high site fidelity if undisturbed, but are extremely sensitive to disturbance at their roosting sites. A single disturbance may cause abandonment of the site, and roosting sites are considered to be the resource that limits population size (California Department of Fish and Game, 1999 and 2001). Since these bats roosts in human-made structures, they potentially could be found on the site.[4] Insect prey is captured in flight or gleaned from brush or trees (California Department of Fish and Game, 1999); the nearby slough areas and grasslands could provide foraging habitat.

The pallid bat is common in the lower elevations of the State, inhabiting a variety of habitats including grasslands, shrublands, woodlands, and forests. Habitat preference is for areas with rocky outcrops, cliffs, and crevices with access to open areas for foraging (California Department of Fish and Game, 1999 and 2001). Day-roosting sites are found in caves, crevices, mines, and occasionally in hollow trees and buildings; these roosts must protect the bats from high temperatures (California Department of Fish and Game, 1999 and 2001). Mating is from October to February. Young are born from April to July, with the peak in May and June. These bats are

[4] Bats may roost in attics, soffits, louvers, chimneys, under siding, eaves, roof tiles or shingles. They can enter through openings as small as one half inch in diameter.

very sensitive to disturbance on their roosting sites (California Department of Fish and Game, 1999 and 2001). Pallid bats might roost in the open outbuildings of the site, but their preferred habitat is not found on the landfill.

Foothill yellow-legged frogs are found in a variety of habitats, but always in or near rocky streams (California Department of Fish and Game, 1999). Their specific habitat is the shallow portions of streams with rocky substrate; cobble-sized substrate is suitable for laying (California Department of Fish and Game, 2001). No suitable habitat is found on the site.

In addition to the special status species listed by the CNDDB as actually occurring in the area, above, the USFWS lists five more as possibly affected by the project: The tri-colored blackbird (*Agelaius tricolor*) breeds near fresh water with emergent vegetation (California Department of Fish and Game, 1999); consequently available habitat on site is limited to the areas of the runoff ponds. The amount of available habitat appears marginal for breeding. The San Pablo song sparrow (*Melospiza melodia samuelis*) is found in the salt marshes of San Francisco and San Pablo bays (California Department of Fish and Game, 2001), and thus could occur in the brackish marsh areas outside the levee. During the EIR surveys, song sparrows (of undetermined subspecies) were noted along the ditch connecting the storm water and leachate ponds. The northwestern pond turtle (*Clemmys marmorata marmorata*) can be found in irrigation ditches with aquatic vegetation and in other areas of permanent or nearly permanent water (California Department of Fish and Game, 2001); consequently, the storm water pond provides potential habitat. The western spadefoot toad (*Scaphiophus hammondii*) is found in grassland habitats, and breeds almost exclusively in shallow, temporary pools formed by rainwater (California Department of Fish and Game, 1999). The temporary pools that form in the Oxbow area could provide breeding habitat. Finally, the California tiger salamander (*Ambystoma californiense*) is another grassland resident that breeds in seasonal ponds, and the temporary ponds on the site potentially provide breeding habitat. However, this species, which remains below ground for most of the year, requires subterranean refugia. Ground squirrel holes are particularly favored for shelter, although tiger salamanders may occasionally take shelter under man-made structures (California Department of Fish and Game 1999). The lack of ground squirrel or other, similar, burrows on the site lowers the likelihood that this salamander would be found there.

Special Status Plant Species and Communities

Table 3.3-3 lists the three special status plant species considered in this analysis and the current federal and State listing status and the California Native Plant Society (CNPS) status for each.

The three plant species with federal status known to occur within the general region of the project site are the soft bird's-beak (*Cordylanthus mollis* ssp. *mollis*), the Point Reyes bird's beak (*Cordylanthus maritimus* ssp. *palustris*), and the Marin knotweed (*Polygonum marinense*). The first species is federally listed as endangered (in danger of extinction) and the latter two are both federal species of concern. All three occur in coastal salt marsh habitat and have been recorded historically from near the project area. Habitat no longer exists for these species in the landfill area within the levees, although habitat does occur in the coastal brackish marsh on the San Antonio Creek side of the levee along the eastern site boundary, as well as in the degraded

TABLE 3.3-3
SPECIAL STATUS PLANT SPECIES
POTENTIALLY OCCURRING AT REDWOOD LANDFILL

Common Name ***Scientific Name***	**Listing Status USFWS/ CDFG/CNPS**	**General Habitat**	**Potential for Species Occurrence Within the Project Area**	**Period of Identification**
		SPECIAL STATUS SPECIES		
PLANTS				
Point Reyes bird's-beak *Cordylanthus maritimus* spp. *palustris*	FSC/--/1B	Coastal salt marsh	**Absent from the landfill.** Habitat does not occur in the project area but does occur just beyond the eastern levee, on the border of San Antonio Creek. Potential for occurrence there is moderate.	June-October
Soft bird's-beak *Cordylanthus mollis* ssp. *mollis*	FE/CR/1B	Coastal salt marsh	**Absent from the landfill.** Habitat does not occur in the project area but does occur just beyond the eastern levee, on the border of San Antonio Creek. Potential for occurrence there is moderate.	July-November
Marin knotweed *Polygonum marinense*	FSC/--/3	Coastal salt marsh and brackish marsh	**Absent from the landfill.** Habitat does not occur in the project area but does occur just beyond the eastern levee, on the border of San Antonio Creek. Potential for occurrence there is moderate.	April-October

STATUS CODES:

FEDERAL: (U.S. Fish and Wildlife Service)
FE = Listed as Endangered (in danger of extinction) by the Federal Government.
FT = Listed as Threatened (likely to become Endangered within the foreseeable future) by the Federal Government.
FP = Proposed for Listing as Endangered or Threatened.
FC = Candidate to become a *proposed* species.
FSC = Federal Species of Concern. May be Endangered or Threatened, but not enough biological information has been gathered to support listing at this time.

STATE: (California Department of Fish and Game)
CE = Listed as Endangered by the State of California
CT = Listed as Threatened by the State of California
CR = Listed as Rare by the State of California (plants only)
CSC = California Species of Special Concern
* = Special Animals
3503.5=Protection for nesting species of Falconiformes (hawks) and Strigiformes (owls)

California Native Plant Society
List 1A=Plants presumed extinct in California
List 1B=Plants rare, Threatened, or Endangered in California and elsewhere
List 2= Plants rare, Threatened, or Endangered in California but more common elsewhere
List 3= Plants about which more information is needed
List 4= Plants of limited distribution

SOURCE: California Department of Fish and Game 2001.

patches of coastal brackish marsh along the slough bordering the northern edge of the project site. While these areas are classified as brackish marsh, the halophytic plants found there (e.g. cordgrass and pickleweed) indicate suitable conditions for salt marsh plants.

Soft bird’s-beak. A soft-hairy annual, not exceeding 40 cm in height, this species is found associated with salt marsh plants such as pickleweed, saltgrass, jaumea, and cordgrass. A population of this species was discovered in 1945 on the west side of the channel that borders the west side of the project site, on the Northwestern Pacific Railroad property (California Department of Fish and Game, 2001). The population was monitored periodically after its discovery and extant individuals were last observed in 1978. The species was not seen during monitoring visits in 1986 and 1993 (California Department of Fish and Game, 2001). Examination of the channel during the EIR surveys revealed none of the species indicative of functioning salt or brackish marsh habitat (e.g saltgrass, pickleweed, or alkali heath). The potential for soft bird’s beak to occur along this channel is presently very low due to this lack of habitat. However, the species has a moderate potential to occur in the brackish marsh habitat just outside the project area, as described above.

Point Reyes bird’s-beak. This waxy annual is in the same size range as soft bird’s-beak and is found along with the same associates in coastal salt marsh. An extant population occurs just north of the site, between Woloki and Mud Hen Sloughs. As with soft bird’s-beak, potential habitat in the project area includes both salt and brackish marsh areas.

Marin Knotweed. This often sprawling annual may be found in coastal salt marsh and in brackish marsh. The last record of it in the vicinity of the project site was in 1945. As with the two species described above, potential habitat in the project area includes both salt and brackish marsh areas.

During the February 22, 2001 survey of the site, no habitat for these species was found within the project area as defined by the levees. As previously noted, surveys for these species were not conducted during their period of identification.

Special Status Communities. Coastal brackish marsh is listed by the CDFG as a plant community of concern (Holland, 1986); this community has a State Sensitivity Ranking of S2.1.[5] The CNDDB maps the marsh area between San Antonio Creek and the Petaluma River as coastal brackish marsh.

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5 Sensitivity Ranking is part of a system devised by CDFG to provide information on the rarity of a species or community. S2= 6-20 viable element occurrences or 2,000-10,000 acres. S2.1 signifies that the entity is very threatened.

3.3.2 IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

Based on policy and guidance provided by CEQA (Public Resources Code §21001 and CEQA Guidelines), an effect of the proposed project would be considered significant if it causes one or more of the following impacts:

- Adverse substantial effect to any species identified as a threatened, endangered, candidate, sensitive, or special-status species in local or regional plans, policies, regulations or by lists of species of concern from the CDFG, the USFWS, or as defined by CEQA Guidelines §15380;
- Adverse substantial effect to habitat (including habitats for rare and endangered species as defined by California Fish and Game Code 903) or other sensitive natural community identified in local or regional plans, policies, regulations, or by lists compiled by CDFG or USFWS;
- Substantial interference with movement of any native resident or migratory fish or wildlife species or with established migration or dispersal corridors;
- Adverse substantial effect to federally protected wetlands (including but not limited to marshes and riparian areas) as defined by Section 404 of the Clean Water Act, or riparian and marsh areas under the jurisdiction of CDFG as defined by California Fish and Game Codes 1601–1603;
- Damage to a resource that is subject to Corps permit requirements under Section 404 of the federal Clean Water Act and that may provide valuable wildlife habitat, such as habitat for special status plant or animal species; or
- Removal or damage to any tree meeting the significant resource criteria set forth under local plan or ordinance.

In addition, the following CEQA Guidelines sections provide further significance criteria:

- §15065 provides for mandatory findings of significance if projects "…substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare or threatened species.…"
- §15206 (b) (5) defines projects as being of statewide, regional, or areawide significance if they "would substantially affect sensitive wildlife habitats including but not limited to riparian lands, wetlands, bays, estuaries, marshes, and habitats for endangered, rare, and threatened species as defined by §15380...."
- §15382 states that a project has a significant effect on the environment if there would be "…a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance."

Impact 3.3.1: Implementation of the proposed project would result in the loss of degraded California annual (non-native) grassland within the project boundaries, which is used by special-status raptors as foraging habitat. (Less than Significant)

The loss of this community does not constitute a significant impact to biotic resources due to its relative abundance locally and regionally, and to the degraded nature of much of this community on the project site and the extensive presence of non-native species.

Mitigation: None required.

Impact 3.3.2: Project activities may disturb habitat for special status plant species. (Significant)

Although no project activities will occur in habitat where special status plant species have the potential to occur, project activities may occur in the vicinity of such habitat. Specifically, this habitat is the brackish marsh located between the levee on the east side of the project area and San Antonio Creek, and the degraded brackish marsh habitat on the north side of the levee. Although no special status plant species have been observed in this area, nearby extant populations and historical records indicate a moderate potential for occurrence. Incidental disturbance associated with perimeter levee reconstruction could be a significant impact.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

Mitigation Measure 3.3.2*:* No project actions shall be permitted which result in removal of vegetation above the toe of the slope on the marsh side of landfill levees unless preceded by a survey to establish that no sensitive plant species are present.

Level of Significance After Mitigation

Less than significant.

Impact 3.3.3: Project activities may disturb jurisdictional wetlands. (Significant)

Although no project activities would occur in jurisdictional wetlands, project activities may occur in the vicinity of the brackish marsh habitat located at the east and north borders of the project area (the same habitat noted for potential special status plants noted in Impact 3.3.2). Accidental disturbance or fill associated with construction activities is possible. This would be a significant impact.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

> **Mitigation Measure 3.3.3*:*** When working near brackish marsh areas, the edge of the marsh shall be clearly marked with orange mesh fencing or equivalent to indicate limits of disturbance.

Level of Significance After Mitigation

Implementation of Mitigation Measure 3.3.3 would reduce this impact to a less-than-significant level.

Impact 3.3.4: Project activities may have a deleterious effect on special status bird and mammal species. (Significant)

Project activities may occur in the vicinity of the brackish marsh located between the levee on the east side of the project area and San Antonio Creek, and on the north side of the levee. Incidental disturbance associated with perimeter levee reconstruction could be a significant impact. The California clapper rail, salt marsh harvest mouse, and California black rail are considered to occur in the brackish marsh. Because of the endangered status of these species, any loss of individuals or disruption of breeding activities is considered a significant impact.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

> **Mitigation Measure 3.3.4:** Levee reconstruction work during the California clapper rail nesting season (February 1 – August 31) shall be avoided, unless surveys by a qualified biologist indicate that black or clapper rails are not nesting within 500 feet of the work area. Proper precautions shall be taken to confine the necessary disturbances to the smallest area possible. Although salt marsh harvest mice were absent from the landfill in 1992, they should be considered potentially present during high tides, when mice may use the outer levee slope as a refuge. Care should be taken to avoid construction that disturbs the outer levee bank during spring tides.

Level of Significance After Mitigation

Less than significant.

Impact 3.3.5: High noise levels from composting operations in the Oxbow area and in Field 1, and from landfill activities in Areas A and B may disturb California clapper rail nesting. (Significant)

Part of the project is to allow composting operations in the Oxbow area and in “Field 1.” Portions of these areas are within 200 feet of San Antonio Creek. Brackish marsh habitat associated with San Antonio Creek is found adjacent to and east of the levee bordering the east side of the Oxbow area and Field 1. Machinery associated with composting operations (tubgrinders, compost windrow turners and trommel screens) may produce noise levels close to 76 dBA at the marsh boundary (see Impact 3.7.3 in Section 3.7, Noise). Portions of Areas A and B are within about 200 feet of San Antonio Creek and associated marsh habitat (Figure 2-3 in Chapter 2). Landfill operations under the project are expected to be louder than under current permit conditions: sound levels could exceed 80 dBA at the marsh boundary (see Impact 3.7.2 in Section 3.7, Noise). Actual effects of noise on California clapper rail nesting are a matter of some conjecture. The Port of Oakland (1998) considered that impacts on rails might occur as a result of machinery operating at more than 65 dBA at a distance of 50 feet. For this EIR, the USFWS standard used by Caltrans (Morton, 2003) is more appropriate, i.e. that short-term noise levels above 76 dBA[6] at the nest may disturb California clapper rail nesting, for which potential habitat occurs in the brackish marsh east of the levee. Because noise levels from landfill and composting operations could exceed 76 dBA in the marsh, this would be a significant impact.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

> **Mitigation Measure 3.3.5a:** Compost machinery, including tubgrinders, trommel screens, and windrow turners, and other composting equipment capable of generating high noise levels shall be positioned to assure that noise levels do not exceed 76 dBA at the marsh boundary east of the levee during clapper rail nesting season (February 1 – August 31). See also Mitigation Measure 3.7-3.

> **Mitigation Measure 3.3.5b:** If landfill activities are to take place in Areas A or B during clapper rail nesting season (February 1- August 31), they must be preceded by either a biological survey to determine presence or absence of clapper rail nests in the marsh area adjacent to the landfill, or a noise study to determine noise levels from landfill operations at the marsh boundary. Landfill activities may proceed in these areas during nesting season only if it is determined that nests are not present, or that sound levels at the marsh boundary are below 76 dBA.

Level of Significance After Mitigation

Mitigation Measures 3.3.5a and 3.3.5b would reduce this impact to a less-than-significant level.

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6 Long term exposure to levels in excess of 76 dBA is considered harmful to human health by the EPA.

Impact 3.3.6: Project activities in the vicinity of the 18-acre storm water impoundment could affect California red-legged frogs or western pond turtle. (Significant)

Project activities could take place in the vicinity of the 18-acre storm water pond in the southern portion of the landfill. Disturbance from these activities could potentially affect California red-legged frogs, a listed species, or western pond turtle, a State species of special concern, as the pond may provide habitat for both species; this would be a significant impact.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

Mitigation Measure 3.3.6: It is understood that the project involves changes in landfill capacity, design, operations, environmental controls, and infrastructure, and that these changes constitute a system of continuous operational actions as opposed to a discrete project timeframe. To avoid the possibility of "taking" (harming or harassing) red-legged frogs or pond turtles, surveys for their presence will be performed following approved protocols for season and intensity of surveys. For red-legged frogs these are four discrete surveys within a one-week period between May and November; pond turtle surveys could be done concurrently. If no frogs or pond turtles were found, the landfill would be considered operating adjacent to unoccupied habitat and no additional mitigation would be necessary. If frogs or pond turtles are found, the provisions described below will be followed.

As an alternative to conducting the above surveys, the following measures will be followed without the surveys.

- A 50 ft construction buffer zone will be established between work sites and the storm water pond. The storm water impoundment will be separated from the work areas with "frog-proof" staked fabric silt fencing at the border of the 50 ft buffer zone. The fencing will essentially extend along all areas bordering this impoundment from other landfill areas. The purpose of the fence is to limit site access by construction equipment and limit accidental wildlife movement onto the work sites. The fence shall be buried to a depth of at least 4 inches and be a minimum of 3 feet tall.

- An employee education program shall be conducted to explain red-legged frog concerns to landfill employees and contractors. The program shall consist of a brief presentation by persons knowledgeable in species biology and legislative protection and shall include the following: a description of the species and its habitat needs; the occurrence of the species in the project area; status of the species and its protection under the Federal Endangered Species Act, including fines and penalties; and measures being taken to reduce impacts to the species during active landfill or construction operations near sensitive areas.

- If a California red-legged frog is identified in the project operational zone, all work in the immediate area shall immediately cease and the USFWS shall be contacted immediately.

Level of Significance After Mitigation

Mitigation Measure 3.3.6 would reduce this impact to a less-than-significant level.

Impact 3.3.7: Removal or remodeling of structures could result in the loss of individuals of special status bat species. (Significant)

Implementation of the project will require the removal of open sheds and other currently existing storage areas in the vicinity of Area G. This could potentially result in the loss of individuals of special status bat species. This would be a significant impact.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

> **Mitigation Measure 3.3.7:** Prior to removal of the buildings, they will be inspected for the presence of bats during the spring or summer of the year preceding construction by a qualified wildlife biologist.[7] Should any bats be found, a qualified wildlife biologist holding the appropriate permits will remove and relocate the bats.

Level of Significance After Mitigation

Less than significant.

Impact 3.3.8: The project could result in the loss of raptor foraging habitat. (Less than Significant)

Implementation of the proposed project would result in some loss of annual grassland within the project boundaries, and consequently a potential loss of raptor foraging habitat. The loss of this habitat does not constitute a significant impact to biotic resources because of the abundance of local grassland foraging habitat, including the grassland areas immediately adjacent to the landfill to the west. Therefore, this would be a less than significant impact.

> **Mitigation:** None required.

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[7] The term "qualified wildlife biologist" indicates a person with at least an undergraduate degree in wildlife biology or a related field, and either professionally certified as a Wildlife Biologist (C.W.B.) by The Wildlife Society, or working under the direct supervision of a C.W.B.

Impact 3.3.9: The project could produce litter which may have deleterious effects on wildlife. (Less than Significant)

This category of impact is somewhat speculative as per CEQA Guideline 15145, in that degree and intensity of impact cannot be determined based on the anticipated effects and the sensitivity of animals. Wildlife using the landfill at present appear to have normal foraging patterns, and Mitigation Measure 3.1.6 is deemed adequate to reduce impacts below the level of significance.

Mitigation: None required.

Impact 3.3.10: The proposed expanded composting operation could become a means for transmission of the pathogen that causes Sudden Oak Death. (Less than Significant)

Sudden Oak Death is a forest disease caused by the plant pathogen *Phytophthora ramorum*. This pathogen has caused widespread dieback of tanoak and several oak species (coast live oak, California black oak, Shreve's oak, and canyon live oak) in California's central and northern coastal counties. It has also been found to infect the leaves and twigs of numerous other plants species. While many of these foliar hosts, such as California bay laurel and *Rhododendron* species, do not die from the disease, they do play a key role in the spread of *P. ramorum*, acting as a breeding ground for innoculum, which may then be spread through wind-driven rain, water, plant material, or human activity.

A quarantine has been established to prevent the spread of the disease. The quarantine area consists of the counties with confirmed cases of the disease, as shown in Figure 3.3.1. State (State Miscellaneous Ruling 3700) and federal (7 CFR Part 301) regulations prohibit the transport of plant material from within an infected county to an area outside of the quarantine area. An exception to this prohibition is possible, if a party wishing to ship materials outside the quarantine area enters into a Compliance Agreement with the County Agricultural Commissioner.

Composting facilities can act as dispersal centers for Sudden Oak Death and other plant diseases, if infected plant material is shipped from the facility to an area where the disease has not yet occurred. However, the composting process itself, which must meet state regulatory standards (CCR Title 14, Section 17868.3) for pathogen reduction by subjecting all parts of the composting pile to a minimum temperature for a minimum period of time, has been shown to kill *Phytophthora ramorum* (Garbelotto and Paswater, 2003). Therefore, properly composted and handled material leaving the site in an uncontaminated vehicle would not be a source of the disease.

The Marin County Agricultural Commissioner’s office has in the recent past entered into discussions with Redwood Landfill, but at the current time the existing composting facility does not ship materials outside of the quarantine area; the majority of compostable material is currently used as alternative daily cover and for other purposes at the landfill, such as erosion control, so does not leave the site. The Agricultural Commissioner has therefore determined that at this time a Compliance Agreement is not needed (Ventura, 2004). The project, however, would greatly expand the permitted volume of material composted. The applicant could begin shipping

SOURCE: UCB CAMFER

Redwood Landfill Solid Waste Facilities Permit Revision EIR / 200238 ■

Figure 3.3-1
Sudden Oak Death in California

more compost or other plant materials greater distances, which could increase the possibility of spreading Sudden Oak Death.

If the project is approved, the Marin County Agricultural Commissioner has stated that they would enter into a Compliance Agreement with the Landfill to ensure that the composting operation does not become a spreading center for Sudden Oak Death. The compliance agreement would require restrictions on the area to which compost and other plant material is shipped, as well as operations and practices, such as sterilizing or washing equipment, vehicles, and clothing and preventing finished compost coming into contact with uncomposted material, to prevent cross-contamination of material.

Because of the existing regulatory structure for preventing the spread of Sudden Oak Death, including the ability and intent of the County Agricultural Commissioner to enter into and enforce a Compliance Agreement with Redwood Landfill, this impact is considered less than significant.

Mitigation: None required.

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3.4 GEOLOGY, SOILS, AND SEISMICITY

This section describes the topographic, geologic, and hydrogeologic settings relevant to the project. The soils, groundwater, seismicity, and geologic and seismic hazards also are described, as are the relevant regulatory background topics and their applicability to the project. Applicable project impacts and mitigation measures are presented and discussed. The analysis and conclusions presented in this section are based in part on geotechnical reports prepared for the proposed project by GeoSyntec Consultants, independently reviewed for this EIR by Treadwell & Rollo, and supplemented as appropriate.

3.4.1 SETTING

TOPOGRAPHY

Redwood Landfill is located along the western margin of flat tidal lands of the San Pablo Bay. Both natural and manmade sloughs encircle the project site, including San Antonio Creek, Mud Slough, West Slough, and South Slough. These waterways are tributaries of the Petaluma River, which ultimately drains into San Pablo Bay. The project site consists of approximately ~~600 acres, of which~~ 420 acres ~~are~~ used for waste disposal and related operations. The permitted landfill footprint ~~within the 420-acre area~~ is approximately 223 acres. San Antonio Creek forms the eastern property boundary, while the Northwest Pacific railroad lines delineate the western boundary of the site. Located on flat-lying, drained and diked marshland, site elevations in areas not overlain by refuse range from -3 to +5 feet relative to mean sea level.

GEOLOGY

The Redwood Landfill is located in northern Marin County along the border of Marin and Sonoma Counties. The project site lies within the geological region of California referred to as the Coast Range Geomorphic Province, which is characterized by a series of discontinuous northwest trending mountain ranges, ridges, and intervening valleys controlled by folding and faulting. Examples of these geomorphological features include the Petaluma Valley, where the site is located, the Sonoma Mountains to the east, and Burdell Mountain to the west.

Franciscan Bedrock

Much of the Coast Range province is composed of marine sedimentary and volcanic rocks that constitute the Franciscan Assemblage. The Franciscan Assemblage in this region of California dates from the Jurassic to Cretaceous periods (approximately 65 to 150 million years old), and consists primarily of basalt (volcanic rocks), greenstone (altered volcanic rocks), chert (ancient silica-rich ocean deposits), and sandstone that originated as ancient sea floor sediments. These rocks occur in northwest-trending ridges and valleys and extend along the Pacific Coast from Oregon 400 miles south into Southern California (Oakeshott, 1978).

The project site is underlain by the Franciscan Assemblage, with bedrock outcrops occurring in spur ridges and knolls immediately west of the site, and in the former four-acre pond area in the northern portion of the 420-acre landfill property. Exploration drilling of the Franciscan bedrock encountered very dark gray-brown mudstone/claystone. This mudstone/claystone is likely sheared shale and intensely fractured and deeply weathered sandstone, graywacke, and greenstone.

Throughout most of the landfill, younger alluvial deposits (eroded material deposited by water) overlie the Franciscan bedrock. These materials can consist of silt, sand and gravel. Overlying the alluvium is the still younger deposit consisting of clay (referred to as Bay Mud) that is commonly found at the margins of the San Francisco Bay and San Pablo Bay. The alluvium and younger Bay Mud are discussed in additional detail below.

Alluvium

In most areas, the Franciscan bedrock is overlain by Pleistocene-age alluvial deposits that vary from 0 to 200 feet thick; the top of this stratigraphic unit is encountered between approximately -53 and -8 mean sea level (msl) (i.e., from approximately 5 to 53 feet below ground surface). Pleistocene alluvium overlies and in-fills most of the irregular topography developed on top of the Franciscan Complex. The alluvium locally consists of very stiff to hard sandy clay/clayey sand that contains laterally discontinuous lenses of coarse-grained sand and gravel. The top and base of the alluvium locally consists of very stiff sandy clay or clayey sand (Treadwell & Rollo, 2002).

Bay Mud

Bay Mud occurs as the youngest deposit along the margin of the San Pablo Bay. This fine-grained sedimentary deposit consisting of highly plastic clays and silt contains varying amounts of organic material, sand, and shells and can present a variety of engineering challenges due to its inherent low strength, compressibility, and saturated condition. In general, the Bay Mud deposits on the subject site thicken eastward, from a 5-foot thickness along the western perimeter to a 56-foot thickness in the Oxbow area. Bay Mud has been determined to have a thickness of 7 feet to 48 feet within the active landfill footprint (Treadwell & Rollo, 2002). Bay Mud also is found along the San Antonio Creek and Petaluma River and overlies bedrock ridges in areas such as the northern portion of the landfill where alluvium is relatively absent. Bay Mud also is exposed in the Oxbow area and north of the site. In other areas it is concealed beneath the refuse and levee fill deposits. Previous investigations did not encounter Bay Mud in the former four-acre pond area in the northern portion of the site.

SOILS

Two major soil associations characterized at the subject site, as defined by the United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS),[1] are Xerorthens-Fill and Reyes Clay. The Xerorthens-Fill is highly variable due to the presence of artificial fill, and therefore, difficult to characterize. The main limitations associated with this soil type are subsidence and erosion hazards (USDA NRCS, 1985). Typically, the Reyes Clay surface layer is a light brownish-gray clay and the underlying material is generally a gray clay and silty

1 The NRCS was formerly known as the Soil Conservation Service.

clay. The main limitations associated with this soil type are the seasonal high water table, the potential for shrinking and swelling, and subsidence. Xerorthens-fill and Reyes Clay soils are not classified as prime or unique farmland by the USDA NRCS.

MINERAL RESOURCES

The California Geological Survey (CGS) has classified lands within the San Francisco-Monterey Bay Region into Mineral Resource Zones (MRZs) based on guidelines adopted by the California State Mining and Geology Board, as mandated by the Surface Mining and Reclamation Act (SMARA) of 1974 (Stinson et al., 1983). The project site has not been zoned for mineral resources, although quarrying of Franciscan bedrock outcrops historically occurred in the vicinity of the project site, and the landfill currently holds a quarry permit for the adjacent property, which is quarried for cover soil. The proposed project would not change the existing landfill property boundary and would not affect the ability to mine in areas outside the project boundary.

GROUNDWATER

Groundwater beneath the Redwood Landfill occurs in water-bearing zones located in the refuse, Bay Mud, Pleistocene alluvium, and Franciscan bedrock. Groundwater conditions at the site are complex because of the number of water-bearing geologic units and nearby surface water bodies. Groundwater flow directions beneath the landfill are controlled by topography, hydraulic conductivity, and surface water bodies. The general direction of groundwater flow in the alluvium appears to be to the northwest (Treadwell & Rollo, 2002).

Subsurface water in contact with the refuse is regarded as leachate[2] and occurs as isolated perched zones. The maximum anticipated rates of leachate generation during the life of Redwood Landfill were computed by Multimedia Environmental Technology, Inc. and Sanifill, Inc. (MET and Sanifill, 1995a) to range from 3 to 6 gallons per minute during landfill operations and eventually to zero following landfill closure (Treadwell & Rollo 2002). In general, the rate of leachate generation at a landfill is highest early in the operating life of the facility, approaches a steady-state condition during the latter stages of operation, and after placement of the final cover system often decreases to nearly zero. The long-term reduction in the leachate generation rate due to final cover placement depends on the permeability of the cover. If the cover essentially prevents infiltration, leachate resulting from infiltration will eventually cease to be generated.

Groundwater flow directions can be controlled by and become variable due to local recharge of precipitation and discharge areas at tidally-influenced creeks, sloughs, and mud flats that border the site. Ponds and drainage ditches act as local sources of water for recharge, and therefore, alter the natural groundwater flow patterns. The ponds and ditches also induce a downward component of flow as groundwater moves away from the source areas towards drainage facilities that lie below the natural water table (Treadwell & Rollo, 2002). In areas adjacent to surface water

[2] Leachate is liquid that has come in contact with waste, and is produced primarily as a result of water infiltration through the waste mass, waste settlement, and to a lesser extent, as a result of waste decomposition. As noted in the text, groundwater in contact with refuse also is considered leachate. Leachate from municipal solid waste landfills is a complex mixture of soluble organic and inorganic constituents, suspended solids, and bacteriological constituents, all in an aqueous medium. (Treadwell & Rollo 2002).

features, downward migration of groundwater is impeded by the Bay Mud and flows from the Bay Mud to the sloughs at low tide, and from the sloughs to the Bay Mud at high tide. However, as suggested by the tidal response data, this hydraulic communication is limited to areas near surface water (HLA, 1995).

The ability of the Bay Mud to transmit groundwater is low due to its fine-grained nature. Units with low permeability such as the Bay Mud are generally referred to as aquitards (a geologic unit that retards the flow of groundwater to units above or below it), rather than aquifers (a geologic unit that yields a usable quantity of water to wells). Groundwater within the Bay Mud flows radially outward from the center of the landfill, flows upward toward the refuse in the center of the landfill, and flows outward toward the leachate collection and removal system (LCRS) trench system along the perimeter of the site. Measured water levels within the Bay Mud indicate a higher potentiometric water elevation in areas where refuse thickness is greatest and leachate elevations are highest.[3] The elevated potentiometric surface can be attributed to consolidation of the Bay Mud caused by loading with refuse (Treadwell & Rollo, 2002). Within the refuse, it appears that the areas with higher measured water levels are isolated zones of perched water with limited hydraulic connection between elevated areas. Several sand and silty sand zones, ranging in thickness from less than one foot to several feet, occur locally across the site. In addition, thin stringers of decomposed organic material occur as local, discontinuous lenses. These thin lenses within the Bay Mud are considered to be the first aquifer beneath the site (HLA, 1995). RLI has conducted field investigations to identify and delineate the extent of the sand lenses.

Groundwater within the alluvium that underlies the Bay Mud exhibits a vertical component of flow and, therefore, appears to be confined by the overlying Bay Mud.[4] The Franciscan bedrock that underlies the alluvium consists primarily of sheared shale and fractured sandstone, graywacke, and greenstone, and is generally considered a non-water-bearing unit relative to the overlying alluvium (Treadwell & Rollo, 2002).

No beneficial domestic use of groundwater is identified in the 1995 Waste Discharge Requirements Order 95-110 (“WDRs”). Since total dissolved solids in both the Bay Mud and Pleistocene alluvium groundwater underlying the Redwood Landfill exceed 3,000 mg/L, it is unlikely this water would be used as a domestic water supply. The WDRs identify industrial process supply as the future beneficial use of groundwater in the alluvial deposits surrounding the Redwood Landfill.

SEISMICITY

The San Francisco Bay Area region contains both active and potentially active faults and is considered a region of high seismic activity.[5] The 1997 Uniform Building Code (UBC) locates

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3 The potentiometric groundwater surface is the surface representative of the level to which water will rise in a well cased to the aquifer. “Piezometric” was the term formerly used for this surface.

4 Confined groundwater zones are typically under pressure with a surface (water table) that would be at a higher elevation were it not for an overlying confining layer or aquitard. Aquitards are geologic units composed of low permeability fine-grained alluvium that retard the flow of groundwater to units above or below them.

5 An active fault is defined by the State of California as a fault that has had surface displacement within Holocene time (approximately the last 10,000 years). A potentially active fault is defined as a fault that has shown evidence of surface displacement during the Quaternary (last 1.6 million years), unless direct geologic evidence demonstrates

the entire Bay Area within Seismic Risk Zone 4. Areas within Zone 4 are expected to experience maximum magnitudes and damage in the event of an earthquake (Lindenburg, 1998). The U.S. Geological Survey (USGS) Working Group on California Earthquake Probabilities has evaluated the probability of one or more earthquakes of Richter magnitude 6.7 or higher occurring in the San Francisco Bay Area within the next 30 years. The result of the evaluation indicated a ~~70~~62 percent likelihood that such an earthquake event will occur in the Bay Area between ~~2000~~2003 and ~~2030~~2033 (USGS, ~~1999~~2003).

Regional Faults

The project site is located approximately 1.2 miles northeast of the Burdell Mountain Fault, 3.5 miles southeast of the Tolay Fault, 5 miles southwest of the Rodgers Creek Fault, 12.5 miles northwest of the Hayward Fault Zone, and 17 miles east of the San Andreas Fault Zone (Figure 3.4-1). The Hayward and San Andreas faults are strike-slip faults that have experienced movement within the last 150 years.[6] Other principal faults capable of producing significant ground shaking at the project site are listed in Table 3.4-1, and include the Calaveras, Concord-Green Valley, and West Napa faults. A major seismic event on any of these active faults could cause significant ground shaking at the site.

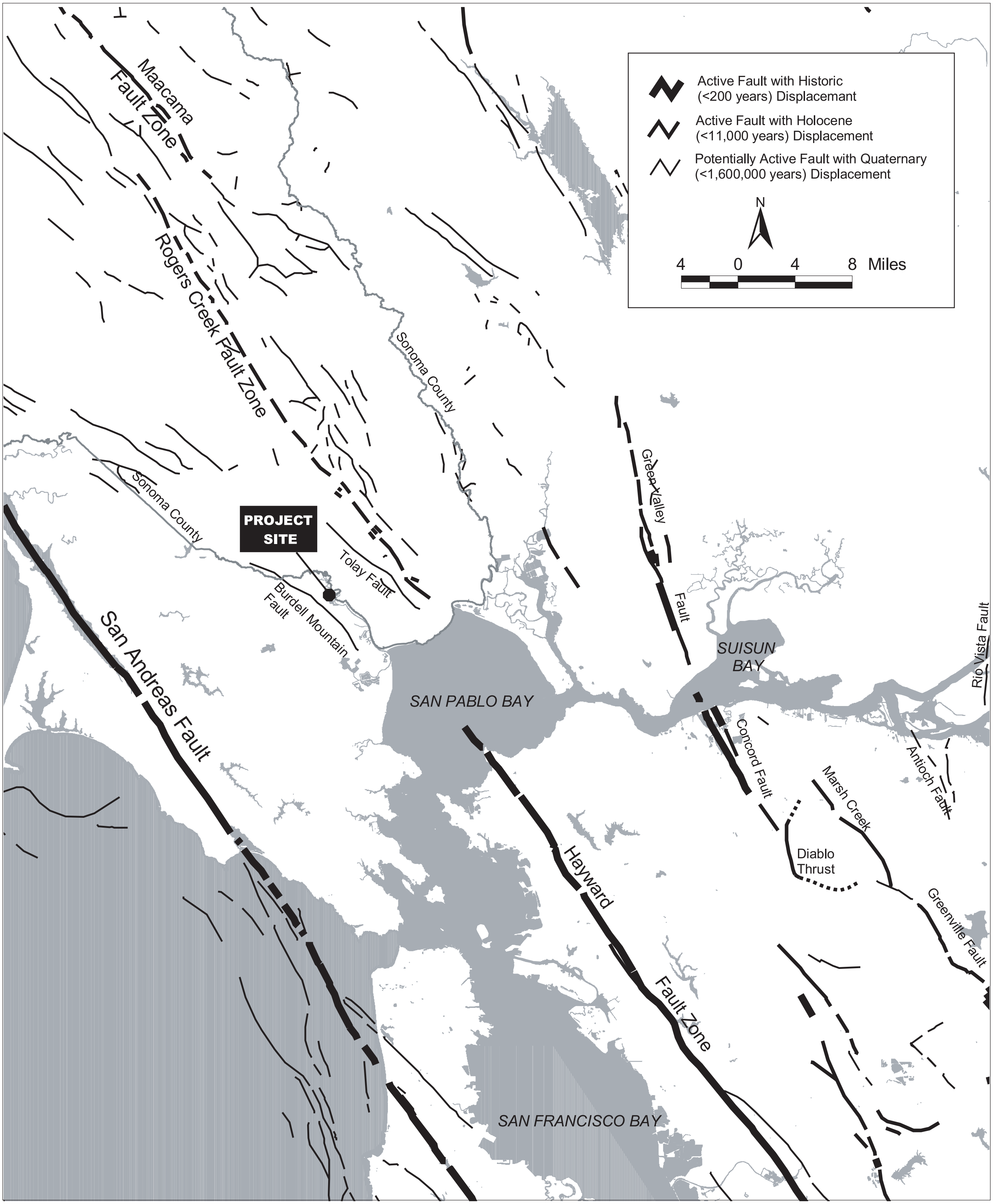
Earthquake Intensity

Strong ground movement from a major earthquake could affect the project site during the next 30 years. Ground shaking may affect areas hundreds of miles distant from the earthquake's epicenter. Historic earthquakes have caused strong ground shaking and damage in the San Francisco Bay Area, the most recent being the 6.9 (moment magnitude) Loma Prieta earthquake in October 1989. The epicenter for this event was approximately 95 miles southeast of the project area; the earthquake caused strong ground shaking for about 20 seconds and resulted in varying degrees of structural damage throughout the Bay Area. Earthquakes on the regional active faults are expected to produce a range of ground shaking intensities at the project site. The estimated (moment) magnitudes identified in Table 3.4-1 represent *characteristic* earthquakes on particular faults.[7]

inactivity for all of the Holocene or longer. This definition does not, of course, mean that faults lacking evidence of surface displacement are necessarily inactive. Sufficiently active is also used to describe a fault if there is some evidence that Holocene displacement occurred on one or more of its segments or branches (Hart, 1997).

6 A strike-slip fault is a fault on which movement is parallel to the fault's strike (Bates and Jackson, 1980).

7 Moment magnitude is related to the physical size of a fault rupture and movement across a fault, while the Richter magnitude scale reflects the maximum amplitude of a particular type of seismic wave. Moment magnitude provides a physically meaningful measure of the size of a faulting event (CDMG, 1997b). The concept of "characteristic" earthquake means that we can anticipate, with reasonable certainty, the actual damaging earthquake that can occur on a fault.



SOURCE: California Department of Conservation,
Division of Mines and Geology (After Jennings, 1994)

Figure 3.4-1
Active and Potentially Active
Bay Area Earthquake Faults

TABLE 3.4-1
ACTIVE AND POTENTIALLY ACTIVE FAULTS
IN THE PROJECT SITE VICINITY

Fault	Distance and Direction	Recency of Movement	Fault Classification[a]	Historical Seismicity[b]	Maximum Moment Magnitude Earthquake (Mw)[c]
Burdell Mountain	1.2 miles southwest	Quaternary	Potentially Active	Not Available	Not Available
Tolay	3.5 mile northeast	Quaternary	Potentially Active	Not Available	Not Available
Rodgers Creek	5 miles northeast	Historic	Active	M6.7, 1898 M5.6, 5.7, 1969	7.0
Hayward	12 miles Southeast	Historic (1836; 1868)	Active	M6.8, 1868 Many <M4.5	6.9
San Andreas	15 miles west	Historic (1906; 1989 ruptures)	Active	M7.1, 1989 M8.25, 1906 M7.0, 1838	7.9
West Napa	16 miles east	Holocene	Active	M5.2, 2000	6.5
Concord-Green Valley	22 miles east	Historic (1955)	Active	Historic active creep	6.9
Maacama (Southern)	24 miles north	Holocene	Active	Historic, active creep	6.9
Marsh Creek-Greenville	38 miles west	Historic 1980	Active	M5.6 1980	6.9
Calaveras (northern)	42 miles southwest	Historic 1861 rupture	Active	M5.6-M6.4, 1861; swarms 1970, 1990	6.8

[a] An active fault is defined by the State of California as a fault that has had surface displacement within Holocene time (approximately the last 10,000 years). A potentially active fault is defined as a fault that has shown evidence of surface displacement during the Quaternary (last 1.6 million years), unless direct geologic evidence demonstrates inactivity for all of the Holocene or longer. This definition does not, of course, mean that faults lacking evidence of surface displacement are necessarily inactive. Sufficiently active is also used to describe a fault if there is some evidence that Holocene displacement occurred on one or more of its segments or branches (Hart, 1997).

[b] Richter magnitude (M) and year for recent and/or large events. Richter magnitude scale reflects the maximum amplitude of a particular type of seismic wave.

[c] Moment magnitude is related to the physical size of a fault rupture and movement across a fault. Moment magnitude provides a physically meaningful measure of the size of a faulting event (CDMG, 1997b). The Maximum Moment Magnitude Earthquake (Mw), derived from the joint CDMG/USGS Probabilistic Seismic Hazard Assessment for the State of California, 1996 (Peterson, 1996).

SOURCES: Hart, 1997, Jennings, 1994, Peterson, 1996.

While the magnitude is a measure of the energy released in an earthquake, intensity is a measure of the ground shaking effects at a particular location. Ground movement intensity during an earthquake can vary depending on the overall magnitude of the earthquake, distance to the fault, focus of earthquake energy, and type of geologic material. Ground shaking can be described in terms of peak acceleration, peak velocity, and displacement of the ground.[8] Areas that are underlain by bedrock tend to experience less ground shaking than those underlain by unconsolidated sediments such as artificial fill. The composition of underlying soils in areas located relatively distant from faults can intensify ground shaking. Portions of the Bay Area that experienced the worst structural damage due to the Loma Prieta earthquake were not those closest to the fault, but rather those with soils that magnified the effects of ground shaking. The Modified Mercalli (MM) intensity scale (see Table 3.4-2) is a common measure of earthquake effects due to ground shaking intensity. The MM values for intensity range from I (earthquake not felt) to XII (damage nearly total), and intensities ranging from IV to X could cause moderate to significant structural damage.[9] At the project site, areas underlain by thick deposits of unconsolidated alluvial deposits are more likely to experience amplified ground shaking than areas with relatively shallow bedrock.

GEOLOGIC HAZARDS

Expansive Soils

Expansive soils possess a “shrink-swell” characteristic. Shrink-swell is the cyclic change in volume (expansion and contraction) that occurs in fine-grained clay sediments from the process of wetting and drying. The native Bay Mud at the project site is composed of clays and silts, and is highly expansive.

Landslide Hazards

A landslide is a mass of rock, soil, and debris displaced down-slope by sliding, flowing, or falling. The susceptibility of land (slope) failure is dependent on the slope and geology as well as the amount of rainfall, excavation or seismic activities. Steep slopes and down-slope creep of surface materials characterize areas most susceptible to landsliding, although landslides can occur in low gradient slopes that have been saturated, altered by removing the base, or contain low-strength soil material. Landslides are least likely in topographically low alluvial fans and at the margin of the San Francisco Bay. The artificial slopes created by landfill activities could be susceptible to landslides unless properly designed and engineered. The potential risk of a slope to

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8 Peak acceleration, peak velocity, and peak displacement values were measured by strong-motion detectors during the Loma Prieta earthquake in several ground and structure strong-motion stations in the Bay Area. For comparison purposes, the maximum peak acceleration value recorded was in the vicinity of the epicenter, near Santa Cruz, at 0.64 g. The highest value measured on the San Francisco Peninsula was 0.33 g, recorded in artificial fill soils at the San Francisco International Airport (CDMG, 1990). Peak Ground Acceleration is the maximum horizontal ground movement expressed as acceleration due to gravity or approximately 980 centimeters per second.

9 The damage level represents the estimated overall level of damage that will occur for various MM intensity levels. The damage, however, will not be uniform. Some buildings will experience substantially more damage than this overall level, and others will experience substantially less damage. Not all buildings perform identically in an earthquake. The age, material, type, method of construction, size, and shape of a building all affect its performance (ABAG, 1998).

TABLE 3.4-2
MODIFIED MERCALLI INTENSITY SCALE

Intensity Value	Intensity Description	Average Peak Acceleration
I	Not felt except by a very few persons under especially favorable circumstances.	< 0.0017 g[a]
II	Felt only by a few persons at rest, especially on upper floors on buildings. Delicately suspended objects may swing.	< 0.014 g
III	Felt noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly, vibration similar to a passing truck. Duration estimated.	< 0.014 g
IV	During the day felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.	0.014–0.04 g
V	Felt by nearly everyone, many awakened. Some dishes and windows broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles may be noticed. Pendulum clocks may stop.	0.04–0.09 g
VI	Felt by all, many frightened and run outdoors. Some heavy furniture moved; and fallen plaster or damaged chimneys. Damage slight.	0.09–0.18 g
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.	0.18–0.34 g
VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.	0.34–0.65 g
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.	0.65–1.24 g
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.	> 1.24 g
XI	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.	> 1.24 g
XII	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown upward into the air.	> 1.24 g

[a] g (gravity) = 980 centimeters per second squared. 1.0 g of acceleration is a rate of increase in speed equivalent to a car traveling 328 feet from rest in 4.5 seconds.

SOURCE: Bolt, Bruce A., *Earthquakes*, W.H. Freeman and Company, New York, 1988 and the California Geological Survey.

fail is often expressed as a Factor of Safety (FS), which is determined by dividing the forces that resist slope failure (i.e. shear strength) by those that drive the slope to fail (i.e. weight). If the resisting forces are greater, the FS is greater than 1 and the slope is considered stable. If driving forces are greater, the FS is less than 1 and the slope is considered unstable.

The currently permitted fill sequencing plan at Redwood landfill requires 4:1 slopes (maximum of one foot elevation gain every four horizontal feet) with 25- to 100-foot wide benches located every 15 feet of vertical gain in elevation. The proposed fill-sequencing plan would have steeper (3:1) slopes, with 25-foot wide benches located every 50 vertical feet. The permitted leachate collection and removal system (LCRS) is an integrated LCRS-levee design that was evaluated in the 1994 FEIR. The design includes reconstruction of the perimeter levee. RLI constructed the LCRS as permitted at Area A, but constructed the LCRS without reconstructing the perimeter levee along Areas B, C, and D. RLI proposes to construct the remaining LCRS sections without reconstructing the perimeter levee, as well. (For flood control RLI still proposes to increase the height of the existing levee, but not as part of an integrated LCRS system.)

Soil Erosion

Soil erosion is the process whereby soil materials are worn away and transported to another area either by wind or water. Rates of erosion can vary depending on the soil material and structure, placement and human activity. The erosion potential for soils is variable throughout the project area. Soil containing high amounts of clay can be easily erodable while sandy soils are less susceptible. Excessive soil erosion can eventually lead to damage of building foundations, roadways and dam embankments. Erosion is most likely on sloped areas with exposed soil, especially where unnatural slopes are created by cut and fill activities. Soil erosion rates can therefore be higher during the construction phase of a project. Typically, the soil erosion potential is reduced once the soil is graded and covered with concrete, structures or asphalt. However, creation of impermeable surfaces such as concrete can increase runoff and produce erosion hazards in down-gradient areas. The Xenorthens-fill and Reyes Clay land soils overlying the site are highly susceptible to erosion, especially when graded and temporarily exposed to wind and water.

Settlement

Settlement is the depression of the bearing soil when a load, such as that of a building or new fill material, is placed upon it. Soils tend to settle at different rates and by varying amounts, referred to as differential settlement, depending on the load weight. Areas underlain by compressible sediments, such as poorly engineered artificial fill or the Bay Mud present in the marshland on the San Francisco Bay margin, are susceptible to differential settlement. The project site is highly susceptible to settlement as the refuse is placed on the native Bay Mud soils, causing compaction of Bay Mud and consequential settlement. Total settlement of the Bay Mud over the life of the landfill has been estimated to vary from 6 to 9 feet around the perimeter of the landfill and 10 to 15 feet in the central portion (HLA, 1992).

SEISMIC HAZARDS

Surface Fault Rupture

Seismically induced ground rupture is defined as the physical displacement of surface deposits in response to an earthquake's seismic waves. The magnitude, sense, and nature of fault rupture can vary for different faults or even along different strands of the same fault. Future faulting is generally expected along different strands of the same fault (CDMG, 1997a). Ground rupture is considered more likely along active faults (refer to Table 3.4-1). The site is not within an Alquist-Priolo Special Study Zone (discussed under Regulatory Background, below) for fault rupture hazards, as designated by the state. Since no mapped active or potentially active faults are known to pass through the project site, the potential risk from fault rupture is considered relative low.

Ground Shaking

A characteristic earthquake on the Rodgers Creek Fault or Hayward Fault with estimated moment magnitude of 7.0 and 7.1, respectively, could produce violent shaking intensities (IX on the Modified Mercalli Scale) in the project site vicinity (ABAG, 2001a). According to the Modified Mercalli Scale, earthquake ground movement of this intensity would cause cracks in the ground to appear, and underground pipes to break. Considerable structural damage would likely occur. This level of shaking is similar to that which occurred during the 1906 San Francisco earthquake, which had a moment magnitude of 7.9. The 1989 Loma Prieta earthquake, with a moment magnitude of 6.9, produced only moderate (VI) shaking intensities in the area of the project site (ABAG, 2001b). A characteristic earthquake on the Calaveras, Concord-Green Valley, West Napa, or Maacama would produce strong (VII) shaking intensities at the project site (ABAG, 2001a). An earthquake with this MM intensity would be felt by most people, and cause slight to moderate damage to ordinary structures.

The CGS probabilistic seismic hazard map indicates that peak ground accelerations in the Novato region could range from 0.5g to 0.6g (Peterson, et al., 1999).[10] Peak ground acceleration on bedrock for a short-term design was determined by previous study to be 0.25g (50 percent probability of exceedance in 35 years), while a long-term design event was determined to have a peak ground acceleration on bedrock of 0.58g (10 percent probability of exceedance in 50 years) (HLA, 1992).

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10 A probabilistic seismic hazard map is a map that shows the hazard from earthquakes that geologists and seismologists agree could occur in California. It is probabilistic in the sense that the analysis takes into consideration the uncertainties in the size and location of earthquakes and the resulting ground motions that can affect a particular site. The maps are typically expressed in terms of probability of exceeding a certain ground motion. For example, the 10 percent probability of exceedance in 50 years maps depict an annual probability of 1 in 475 of being exceeded each year. This level of ground shaking has been used for designing buildings in high seismic areas. The maps for 10 percent probability of exceedance in 50 years show ground motions that geologists and seismologists do not think will be exceeded in the next 50 years. In fact, there is a 90 percent chance that these ground motions will NOT be exceeded. This probability level allows engineers to design buildings for larger ground motions than what geologists and seismologists think will occur during a 50-year interval, which will make buildings safer than if they were only designed for the ground motions that are expected to occur in the next 50 years. Seismic shaking maps are prepared using consensus information on historical earthquakes and faults. These levels of ground shaking are used primarily for formulating building codes and for designing buildings. The maps can also be used for estimating potential economic losses and preparing for emergency response (Peterson, 1999).

Liquefaction

Liquefaction is a phenomenon whereby unconsolidated and/or nearly saturated soils lose cohesion and are converted to a fluid state as a result of severe vibratory motion. The relatively rapid loss of soil shear strength during strong earthquake shaking results in the temporary fluid-like behavior of the soil. Soil liquefaction causes ground failure that can damage roads, pipelines, underground cables, and buildings with shallow foundations. Liquefaction can occur in areas characterized by water-saturated, cohesionless, granular materials at depths less than 40 feet. In addition, liquefaction can occur in unconsolidated or artificial fill sediments such as those located in reclaimed areas along the margin of San Francisco Bay. The depth of groundwater influences the potential for liquefaction in this area, the shallower the groundwater, the higher potential for liquefaction. Liquefaction potential is highest in areas underlain by artificial bay fills, and unconsolidated alluvium. The high groundwater table and presence of unconsolidated alluvial deposits indicates portions of the landfill may be susceptible to liquefaction hazards.

Earthquake-Induced Settlement

Settlement of the ground surface can be accelerated and accentuated by earthquakes. During an earthquake, settlement can occur as a result of the relatively rapid compaction and settling of subsurface materials (particularly loose, non-compacted, and variable sandy sediments) due to the rearrangement of soil particles during prolonged ground shaking. Settlement can occur both uniformly and differentially (i.e. where adjoining areas settle at different rates). Areas are susceptible to differential settlement if underlain by compressible sediments, such as poorly engineered artificial fill or Bay Mud.

The existing settlement caused by compaction of the Bay Mud by overlying refuse deposits may be amplified by seismic ground shaking, potentially resulting in differential settlement of refuse. GeoSyntec conducted a site seismic response analysis for the subject site as part of a revised fill sequencing plan (GeoSyntec, 1997a and 1997b). Results indicated that the permanent seismic deformation for long-term conditions is to be on the order of 2.5 inches for non-circular failure surfaces in Bay Mud (GeoSyntec, 1997a and 1997b).

REGULATORY BACKGROUND

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (formerly the Alquist-Priolo Special Studies Zone Act), signed into law December 1972, requires the delineation of zones along active faults in California. The purpose of the Alquist-Priolo Act is to regulate development on or near fault traces to reduce the hazard of fault rupture and to prohibit the location of most structures for human occupancy across these traces. Cities and counties must regulate certain development projects within the zones, which includes withholding permits until geologic investigations demonstrate that development sites are not threatened by future surface displacement (Hart, 1997). Surface fault rupture is not necessarily restricted to the area within an Alquist-Priolo Zone.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was developed to protect the public from the effects of strong ground shaking, liquefaction, landslides, or other ground failure, and from other hazards caused by earthquakes. This act requires the State Geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones. Before a development permit is granted for a site within a seismic hazard zone, a geotechnical investigation of the site must be conducted and appropriate mitigation measures incorporated into the project design. The CGS has not yet completed a preliminary Seismic Hazards Map for the Novato or Petaluma area, which includes the project location.

California Building Code

The California Building Code is another name for the body of regulations known as the California Code of Regulations (CCR) Title 24, Part 2, which is a portion of the California Building Standards Code (CBSC, 1995). Title 24 is assigned to the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under state law, all building standards must be centralized in Title 24 or they are not enforceable (Bolt, 1988).

Published by the International Conference of Building Officials, the Uniform Building Code is a widely adopted model building code in the United States. The California Building Code incorporates by reference the Uniform Building Code (UBC), with necessary California amendments. About one-third of the text within the California Building Code has been tailored for California earthquake conditions (ICBO, 1997).

California Code of Regulations Title 27, Environmental Protection

CCR Title 27 Division 2, Solid Waste, contains the regulations of the California Integrated Waste Management Board (CIWMB) and State Water Resources Control Board (SWRCB) pertaining to waste disposal on land. The regulations promulgated by the SWRCB pertain to water quality aspects of discharges of solid waste to land for treatment, storage, or disposal, establish waste and site classifications, and include waste management requirements for solid waste disposal in landfills and surface impoundments. Chapter 3, Criteria for All Waste Management Units, includes the provisions summarized below:

Waste Classification and Management

§20210 Designated Waste. Designated waste, as defined in California Water Code Section 13173, shall be discharged only at Class I waste management units … or at Class II waste management units which comply with the applicable SWRCB-promulgated provisions of this subdivision and have been approved by the RWQCB for containment of the particular kind of waste to be discharged. Decomposable wastes in this category can be discharged to Class I or II land treatment units.

§20240 Classification and Siting Criteria

§20240(a) Units and Facilities. Waste management units (Units) shall be classified according to their ability to contain wastes. Containment is determined by geology, hydrology, topography, climatology, and other factors relating to the ability of the unit to protect water quality. A waste management facility may consist of several Units, each with a different classification. Classification of Units shall be based on [Title 27 siting and design criteria], on field inspections by RWQCB and SWRCB staffs, and other pertinent information. Information used to classify Units is to be submitted according to [the Title 27 provisions regarding reports of waste discharge (ROWDs) and other reporting requirements (§21710, et seq.)]. Owners and operators of classified Units shall comply with waste discharge requirements (WDRs) adopted by the RWQCB.

<u>§20240(b) Reclassification</u>. Existing Units shall be reclassified according to applicable [specified] criteria provided that such Units comply with [specified siting criteria] and are operating in compliance with [specified Title 27 general requirements for existing and new units].

<u>§20240(c) Five-Foot Separation</u>. All new landfills… shall 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. Existing landfills… shall be operated to ensure that wastes will be a minimum of five feet (5 ft.) above the highest anticipated elevation of underlying ground water. [Section 20080(b) provides an exemption to this requirement (summarized below)].

> *§20080(b) Engineered Alternatives Allowed*. Unless otherwise specified, alternatives to construction or prescriptive standards contained in the SWRCB-promulgated regulations of this subdivision may be considered. Alternatives shall only be approved where the discharger demonstrates that: (1) that the construction or prescriptive standard is not feasible [as provided in this section] and (2) there is a specific engineered alternative that: (A) is consistent with the performance goal addressed by the particular construction or prescriptive standard and (B) affords equivalent protection against water quality impairment.

<u>§20240(d) Unit Foundation</u>. All engineered structures [including containment structures] constituting any portion of a Unit shall have a foundation or base capable of providing support for the structures, and capable of withstanding hydraulic pressure gradients to prevent failure due to settlement, compression, or uplift and all effects of ground motions resulting from at least the maximum probable earthquake (for Class III Units [as provided]) or the maximum credible earthquake (for Class II Units [as provided]), as certified by a registered civil engineer or certified engineering geologist.

§20250 Class II: Waste Management Units for Designated Waste

<u>§20250(a) General</u>. Class II Units shall be located where site characteristics and containment structures isolate waste from waters of the state.

<u>§20250(b) Geologic Setting</u>. (1) New and existing Class II landfills or waste piles shall be immediately underlain by natural geologic materials which have a hydraulic conductivity of not more than $1x10^{-6}$ cm/sec (i.e., 1 foot/year) and which are of sufficient thickness to prevent vertical movement of fluid, including waste and leachate, from Units to waters of the state for as long as wastes in such units pose a threat to water quality. Class II units shall not be located where areas of primary (porous) or secondary (rock opening) hydraulic conductivity greater than $1x10^{-6}$ cm/sec (i.e., 1 foot/year) could impair the competence of natural geologic materials to act as a barrier to vertical fluid movement. (2) Natural or artificial barriers shall be used to prevent lateral movement of fluid, including waste and leachate. (3) A liner system which conforms to the requirements of [Title 27 waste

management unit construction standards in §20310, below] with a hydraulic conductivity of not more than $1x10^{-6}$ cm/sec (i.e., 1 foot/year) shall be used for landfills … when natural geologic materials do not satisfy the requirements in (b)(1). [Additional specifications are provided for Class II surface impoundments and for land treatment units.]

Waste Management Unit Construction Standards

§20310(a) General Construction Criteria. Class II Units shall be designed and constructed to prevent migration of wastes from the Units to adjacent geologic materials, ground water, or surface water, during disposal operations, closure, and the post closure maintenance period. Class II and Class III MSW landfills are also subject to any applicable waste containment system design requirements of SWRCB Resolution No. 93-62 to the extent that such requirements are more stringent than those applicable to a non-MSW Class II or Class III landfill under this subdivision.

§20310(b) General Construction Criteria. Each Class II Unit shall be designed and constructed for the containment of the specific wastes which will be discharged.

§21710 Report Of Waste Discharge (ROWD) and Other Reporting Requirements

Any person discharging or proposing to discharge solid waste to land where water quality could be affected as a result of such discharge shall submit to the RWQCB a report of waste discharge (ROWD)…. After July 18, 1997 [if the waste management unit is subject to regulation by both the CIWMB/EA and the RWQCB ROWD submittals shall be made] in the form of a Joint Technical Document (JTD) [as provided]…. Dischargers shall submit any applicable information required by this article to the RWQCB upon request. Dischargers shall provide information on waste characteristics, geologic and climatologic characteristics of the Unit and the surrounding region, installed features, operation plans for waste containment, precipitation and drainage controls, and closure and post closure maintenance plans as set forth in [specified sections pertaining to waste characteristics, waste management unit characteristics, design report and operations plan, and closure and post-closure maintenance plan requirements].

§21740(a) Waste Characteristics/ROWD to Include. Dischargers shall provide in the ROWD, including any such report that is integrated into a Joint Technical Document [as provided] the following information about the characteristics of wastes to be discharged at each waste management unit (Unit) addressed by the ROWD:

(1) *Constituents & Reference Numbers*. A list of the types, quantities, and concentrations of wastes proposed to be discharged at each Unit. Wastes and known waste constituents shall be specifically identified according to the most descriptive nomenclature. A listing of all anticipated hazardous constituents that could be discharged to the Unit (e.g., household hazardous waste discharged to an MSW landfill might include constituents listed in Appendix II to 40CFR258); where available, this listing shall include constituent (or waste) reference numbers from listings established by the DTSC [state Department of Toxic Substance Control] or U.S. EPA (e.g., Appendix IX to §66264 of [CCR] Title 22).

(2) *TSD Methods*. A description of proposed treatment, storage, and disposal methods.

(3) *Expected Decomposition Products/Rate*. An analysis of projected waste decomposition processes for each Unit indicating intermediate and final decomposition products and the period during which decomposition will continue following discharge.

Marin County

The Environmental Hazards Element of the *Marin Countywide Plan* provides policies to ensure acceptable protection of people and structures associated with geology, seismicity, fire, and flood hazards. Marin County applies these policies in their planning process and would seek consistency with these policies in approving a project within the county. Policies that may be applicable to the proposed project are listed below.

> Policy EH-5.1 Mitigation of Risk. Construction of all new habitable structures, including those for residential, commercial, and industrial use, shall employ engineering measures which mitigate against life safety risks from ground shaking. At minimum, new structures shall meet standards specified in Title 19, Marin County Code.
>
> Policy EH-5.2 Geotechnical Investigation Requirements. Applications for proposed developments sited on landslide deposits, non-engineered fill, or bay mud shall be accompanied by a geotechnical engineering investigation which focuses on the problem of ground shaking and ground failure.
>
> Policy EH-5.3 Potential Earthquake Hazard in Existing Buildings. The county should minimize potential earthquake damage from existing publicly owned buildings through strengthening building structure, eliminating hazardous features, or relocating buildings.
>
> Policy EH-6.1 Evaluate Projects in Stability Zones 3 and 4. Prior to consideration of site design or use, the Department of Public Works shall evaluate projects where there is landslide potential according to the California Division of Mines and Geology Classification 9. Project proposals shall be accompanied by a report prepared by a civil engineer with soils engineering expertise or a soils certified engineering geologist. The soils evaluation should address the structural foundation engineering of the actual site, the impact of the project on adjacent land, and impacts of offsite conditions on the site.
>
> Policy EH-6.2 Construction Observation and Certification. For work undertaken to correct slope instability, the County should require that the work is supervised and certified by a geotechnical engineer and, when necessary, an engineering geologist.
>
> Policy EH-6.3 Projects on Known Landslides and Landslide-Prone Deposits. New development should not occur on known landslide-prone deposits on steep slopes, except where an engineering geologic site investigation indicates that such sites are stable, or can be made stable through appropriate mitigation measures. In such cases, it must be shown that the risk to persons, property, or public liability can be minimized to a degree acceptable to the County.
>
> Policy EH-7.1 Filled Land Underlain by Compressible Materials. Soils investigations for projects on filled land underlain by compressible materials (bay mud, marsh, slough) should delineate those areas where settlement will be greatest and subsidence may occur. Soils investigation should include: recommended site preparation techniques employed to preclude hazard; borings; identification of former sloughs; and a list of other factors which would accentuate differential settlement.
>
> Policy EH-7.2 Minimize Differential Settlement. In the areas with great potential for differential settlement, uses should be planned which would not be damaged by settlement

and which would provide minimum inducement to settlement that is detrimental to persons, property and public investment.

Policy EH-7.3 Structural Design of Foundations and Utilities. The structural design of foundations and utilities shall recognize the potential for differential settlement and subsidence.

3.4.2 IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

The significance criteria for this project are derived from information provided by Treadwell & Rollo during their review of the project geotechnical documents and from the checklist items outlined in CEQA *Guidelines*, Appendix G. An impact related to geologic conditions, seismic setting or underlying soils type would be considered significant if it would result in any of the following:

- Exposure of people, structures, or the environment to hazards related to failure of the landfill foundation or structures during a major seismic event. CCR Title 27, §20370 requirements specify that Class II landfills must be capable of withstanding the maximum credible earthquake (MCE) and associated ground motions. Class III landfills must be capable of withstanding the maximum probable earthquake (MPE) and associated ground motions. Significant impacts will occur if the landfill is not designed to perform acceptably without significant damage to critical landfill foundations or structures during the design earthquakes. This includes construction on substrate that consists of material subject to liquefaction in the event of ground shaking.

- Exposure of people, structures, or the environment to hazards related to displacement of unstable slopes that could jeopardize the integrity of the landfill foundation and the structures that control leachate, surface drainage, erosion, or landfill gas. CCR Title 27, §21750(f) requirements specify a factor of safety for critical slopes of at least 1.5 under dynamic conditions or utilization of a more rigorous analytical method to quantify the magnitude of movement.

- Critical displacement of levee and landfill slopes due to settlement or gravity. Acceptable minimum factors of safety used recently by the engineering industry for landfill design have been 1.5. This factor of safety was used as a minimum in the analysis of static slope stability for the final grading configuration. A factor of safety of 1.3 was used as a minimum in the analysis of static slope stability for interim grading configuration.

- Production of leachate that could contaminate on-site and off-site groundwater.

- Increased erosion to the point of causing damage to foundation substrate, slopes, berms, landfill cover, or access roads, and sedimentation in surface water surfaces.

- Mass movement of contaminated water (leachate or contact storm water runoff) that could breach perimeter barriers and contaminate off-site water.

- A change in conditions that could otherwise lead to significant adverse changes to groundwater quality or potentially impair the downstream groundwater-surface water system.

Impact 3.4.1: A seismic event on one of the active or potentially active Bay Area faults could generate seismic ground motion capable of causing failure of landfill slopes, displacement of perimeter levee slopes, damage to the LCRS, and/or damage to the proposed Area G liner. (Significant)

Modifications of the landfill geometry and construction of a LCRS without reconstructing the perimeter levee could increase the potential for landfill or levee slope failure, damage to the LCRS, and/or damage to the Area G liner, as a result of an earthquake on one of the faults in the project vicinity. RLI proposes to increase the landfill's slopes from the currently permitted maximum of 4:1 (four feet horizontal for each foot of vertical rise) to 3:1. Benches will decrease from the currently permitted widths of between 25 and 100 feet to widths of 25 feet, and the bench intervals (vertical distance between benches) will increase from 15 feet to 50 feet. Depending on the material and its placement on engineered slopes, increasing steepness can reduce the overall equilibrium of a slope and result in localized, shallow debris slumps or slides. In some cases the factor of safety in a slope decreases upon increasing the steepness of the slope. In addition, RLI has constructed the LCRS along landfill Areas B, C, and D without reconstructing the perimeter levee, and proposes to construct the remaining sections of the LCRS without reconstructing the levee. Reconstruction of the perimeter levee was part of an integrated LCRS-perimeter levee design evaluated in the 1994 FEIR, and had been considered an important factor in ensuring landfill stability. The landfill slopes have been designed to comply with applicable state regulations governing waste disposal facilities (CCR Title 27, §20370 and §21750[f]) (GeoSyntec, 1998; Treadwell & Rollo, 2002). These regulations establish minimum performance standards to prevent displacements due to earthquake ground motion. GeoSyntec (1997a and 1997b) reevaluated seismic slope stability as part of the revised fill sequencing plan and Area G expansion (Treadwell & Rollo, 2002). Site response and deformation analyses were performed using measured and estimated geotechnical properties of the waste, foundation soils, and perimeter levee in computer models. Four design earthquakes were used for the seismic deformation analysis and are summarized below in Table 3.4-3 (Treadwell & Rollo, 2002).

TABLE 3.4-3
DESIGN EARTHQUAKES FOR SEISMIC DEFORMATION ANALYSIS

Design Event	Analysis Case	PHGA[a]
Near-Field	Short-term	0.25 g
	Long-term	0.58 g
Far-Field	Short-term	0.20 g
	Long-term	0.33 g

[a] Peak Horizontal Ground Acceleration

SOURCE: Treadwell & Rollo, 2002

The near-field design earthquake events, or those seismic events generated from nearby earthquake sources, were adopted from a seismic exposure evaluation for the site performed by HLA (1992). The design earthquake for the site is the maximum probable earthquake (MPE) of moment magnitude 7.0 on the Healdsburg-Rogers Creek Fault. The short-term design event has a peak horizontal ground acceleration (PHGA) on bedrock of 0.25g with 50-year mean recurrence interval (50 percent in 35 years). The long-term design event has a PHGA on bedrock of 0.58g with a 475-year mean recurrence interval (10 percent in 50 years) (Treadwell & Rollo, 2002).

As required by the California Building Code (Title 24), GeoSyntec performed a supplemental seismic hazard analysis to evaluate the potentially more damaging far-field event with lower PHGA, but larger magnitude (Treadwell & Rollo, 2002). For the short-term event, GeoSyntec used the MPE on the San Andreas Fault with a moment magnitude 7.5 and a PHGA of 0.20g. For the long-term event, GeoSyntec adopted the MCE on the San Andreas Fault with a moment magnitude 8.0 and a PHGA of 0.33g. The mean recurrence intervals for the short-term and long-term events are 50-year and 475-year, respectively. Seismic analyses were performed for both the Area G Class II liner and unlined area of the revised site development plan (Treadwell & Rollo, 2002). These analyses are discussed below.

GeoSyntec completed analyses of potential seismic deformation, using the Newmark Analysis. The analyses focused on failure surfaces in the Bay Mud and along the Area G liner. The results of the permanent seismic displacement analyses indicate that the short-term stability of the landfill is governed by non-circular failure surface passing through the Bay Mud, whereas the long-term stability is governed by a non-circular failure surface passing along the liner. Computed maximum seismically induced displacements for short-term conditions are on the order of 12 inches, and for long-term conditions are on the order of 2.5 inches (Treadwell & Rollo, 2002).

The results of the permanent seismic deformation analysis for Area G were also used by GeoSyntec to estimate the level of permanent seismic deformation for the unlined area of the landfill. For the unlined area of the landfill, the short-term yield acceleration calculated for each phase of the sequencing plan is on the order of 0.064g, in agreement with the yield acceleration of 0.066g calculated for non-circular failures in the Bay Mud in Area G. Consequently, the permanent seismic deformations for short-term condition are on the order of 12 inches for non-circular failure surfaces in Bay Mud. The long-term yield acceleration calculated for each phase of the sequencing plan is on the order of 0.080g, or less than the yield acceleration of 0.25g calculated for non-circular failure in Bay Mud at Area G. Therefore, the permanent seismic deformation for long-term conditions is on the order of 2.5 inches, as calculated by GeoSyntec (1997a) for non-circular failure surfaces in Bay Mud (Treadwell & Rollo, 2002).

In accordance with CCR Title 27, §20370, (refer to Significance Criteria, above), the landfill slopes have been designed to withstand the design seismic events (Treadwell & Rollo, 2002). However, slope displacements from dynamic forces such as earthquakes would occur as a single event and cannot be monitored. Landfill slopes, perimeter levees, and the LCRS could be damaged in such an event. Additional mitigation is required to reduce potential adverse impacts from seismically-induced slope displacement to a less-than-significant level (Treadwell & Rollo, 2002).

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.4.1a: A detailed Post Earthquake Inspection and Corrective Action Plan was prepared by RLI and approved by RWQCB in October 1995 (RLI, 1995a). The plan focuses on damage caused to groundwater monitoring wells, perimeter levees, and the LCRS following a major earthquake event. This plan includes, but is not limited to, the following:

- visual inspection for damage, soil settlement, slope failure, tension cracks, ponding of water, and leachate seeps;
- evaluation of water level fluctuations and slope inclinometer measurements of soils displacement; and
- replacement of damaged wells and repair or reconstruction of the LCRS and perimeter levees.

If groundwater monitoring performed as part of the Post Earthquake Inspection and Corrective Action Plan detects leachate outside the perimeter levee, the facility's collection and containment plan shall be implemented (refer to Mitigation Measure 3.4.7d, below).

Mitigation Measure 3.4.1b: Costs to remediate degradation of groundwater or surface water due to earthquake-related landfill and perimeter levee slope displacement, and/or breaching of the leachate collection and removal system will be financially assured by the applicant's Pollution Legal Liability Insurance or an applicant-sponsored trust fund for closure/post-closure activities.

Mitigation Measures Identified in This Report

Mitigation Measure 3.4.1c: The applicant shall update the existing Post Earthquake Inspection and Corrective Action Plan to reflect current understanding of ground motion and seismicity in the Bay Area, to address changes to the landfill site resulting from the proposed project, and to reflect geotechnical analyses conducted for the proposed project. The understanding of earthquake probabilities, predicted ground motion, the attenuation of seismic waves, and other aspects of seismology has advanced since the facility's current plan was written in 1995, and the plan shall be revised to reflect this new understanding. Consistent with the current plan, the revised plan shall require immediate inspection and repair of earthquake damage to the landfill slopes, perimeter levees, groundwater wells, and the LCRS. The measures to repair earthquake damage as developed in the revised Post Earthquake Inspection and Corrective Action Plan shall be submitted to the RWQCB for approval and become part of the project. The updated plan also will discuss contingency measures in the event that Redwood Landfill is unusable or inaccessible as a result of a major earthquake in the vicinity.

Level of Significance After Mitigation

Implementation of the revised Post Earthquake Inspection and Corrective Action Plan, assuring the applicant's financial responsibilities, and the implementation of the collection and containment plan specified in Measure 3.4.7d would reduce impacts related to seismic damage to a less than significant level.

Impact 3.4.2: Static forces acting on native materials underlying the landfill or on the refuse and cover materials could cause displacement of landfill slopes and the perimeter levee, damage to the LCRS, or differential settlement. (Significant)

Displacement of soil cover materials along the slopes of the landfill and displacement of the perimeter levees could occur as a landslide or slope failure due to gravity and settlement (static forces). Proposed changes to the landfill geometry (increasing the steepness of side slopes, decreasing bench widths, and increasing the length of intervals between benches) and construction of the LCRS trench without reconstruction of the perimeter levee could increase the potential for landfill or levee slope displacement as a result of static forces. Slope displacement in conjunction with a breach of the perimeter levee could allow refuse and/or leachate to reach and potentially contaminate surrounding surface waters, block an adjacent drainage, or disturb surrounding wetlands (Treadwell & Rollo, 2002).

Material strengths of the fill and soils at the site are critical factors in determining landfill stability and evaluating potential settlement issues. Subsurface materials at the landfill include old levees, new levees, refuse/cover soil, and Bay Mud. GeoSyntec (1997b) evaluated the strength properties of these materials using field data, laboratory testing data, and published data. The undrained[11] shear strength of the Bay Mud is the most significant parameter with respect to stability analyses of the waste fill (Treadwell & Rollo, 2002).

Design for Static Forces

The main geotechnical issue regarding the proposed vertical expansion is the stability of the landfill, which is controlled by the strength of the underlying soft Bay Mud (Treadwell & Rollo, 2002). Currently, the Bay Mud is not strong enough to support the proposed final landfill grades. When a load is applied to the Bay Mud, the pressure of the water trapped in pores increases; as this pore pressure dissipates, the Bay Mud consolidates and its shear strength increases. As consolidation continues and the strength of the Bay Mud increases, additional refuse can be supported. The benefits of time-dependent strength gain of soft foundation soils are used to build high fills over soft soils in a construction method referred to as staged construction (Treadwell & Rollo, 2002).

The landfill slopes have been designed to comply with applicable state regulations governing waste disposal facilities (CCR Title 27, §20370 and §~~17~~21750[f]). These regulations were promulgated to establish minimum performance standards to prevent displacements due to static and dynamic forces. GeoSyntec (1997b) determined, through the use of computer modeling that incorporated site-specific geotechnical data (e.g., analyses of site soil and refuse samples) in

11 *Undrained* refers to a soil that contains water; stress applied to the soil is partly carried by the pore water and partly by the skeletal structure of the soil.

conjunction with geotechnical assumptions and methodology, that the primary design factors influencing static landfill slope stability during and after landfill development are the rate of refuse placement, the Bay Mud strength, and the strength of the refuse. These three primary factors were incorporated into the landfill expansion design and development of the fill sequencing plan. The analyses were performed assuming existing perimeter levee conditions and associated engineering properties of the levee materials (Treadwell & Rollo, 2002).[12]

Revised Fill-Sequencing Plan

Since 1992 landfill operation and fill sequencing have generally adhered to a fill sequencing plan developed by Harding Lawson Associates (HLA, 1992). As part of this project, RLI proposes a revised fill sequencing plan (GeoSyntec, 1997b). The revised fill sequencing plan is based on new geotechnical data gathered by continued monitoring and new analysis, and through study of sequencing based on adjusted operational planning (Treadwell & Rollo, 2002). GeoSyntec (1997b) analyzed the behavior of the underlying Bay Mud by evaluating pore pressure, deformation, and stress generation, conducted equilibrium analysis on the waste mass stability, and modeled pore pressure dissipation. GeoSyntec (1997b) also analyzed static slope stability of the refuse fill and the final cover design and used these analyses in the development of the revised fill sequencing and final grading plan (Treadwell & Rollo, 2002).

The revised fill sequencing plan was developed using an analysis that determined the maximum allowable refuse placement considering static and seismic displacement criteria, and consists of a nine-stage program intended to reach the maximum final height of 160 feet above mean sea level. To maintain geotechnical stability, 25-foot-wide benches (setbacks) are incorporated every 50 vertical feet interval. Each fill stage is designed to accommodate stability requirements. The design of the landfill slopes incorporates a factor of safety of at least 1.3 for interim grading configurations and 1.5 for final grading configurations (GeoSyntec, 1998). Refuse would be placed continuously at the site, but the time interval between refuse placement at a particular location could range between 200 and 1,200 days. These factors of safety are greater than 1.0 and therefore, as discussed in the Setting section under Landslide Hazard, above, indicate stable slopes under static conditions.

The engineered design of landfill slopes is in conformance with applicable regulations. However, peer review of project design features indicates that, although unlikely, potentially significant impacts could still occur as a result of static or dynamic forces (Treadwell & Rollo, 2002).

Mitigation Measures Proposed as Part of the Project

> **Mitigation Measure 3.4.2a:** The applicant has developed and will utilize criteria for monitoring the lateral and vertical deformation of Bay Mud during fill placement to provide advance warning of potential instability. If the geotechnical monitoring program indicates an increasing rate of deformation in the monitored slopes, filling activity will stop

[12] The top of the existing perimeter levee ranges in elevation from approximately 6 to 9 feet and is approximately four feet wide at the crest. The height of the perimeter levee will be increased to at least an elevation of 9 feet around the entire landfill and the crest will be widened to 10 feet (GeoSyntec, 1998). The levee is designed to prevent inundation or washout due to floods.

at impacted areas. The applicant also has developed and will utilize criterion for monitoring pore pressures following fill placement to confirm that sufficient consolidation is achieved prior to placement of the next fill lift (GeoSyntec, 1997b).

GeoSyntec recommends staged placement of refuse due to the low strength of the underlying Bay Mud. Based upon results of analyses, GeoSyntec developed an observational approach to monitor the stability of the waste fill at the site (GeoSyntec, 1997b). Geotechnical monitoring consists of installing, monitoring, and collecting data from inclinometers and piezometers. Currently there are 10 inclinometers (numbered I-6 through I-15) and 14 piezometers (numbered P-7 through P-10, P-13 through P-17, P-20, P-21, P-23, and P-24) at the site. Based on the results of collected field data, modification to the fill-sequencing plan may be needed. The modification may consist of limiting refuse placement in certain areas to restrict slope deformations, or taking advantage of stronger foundation conditions by increasing landfill capacity.

GeoSyntec provides quantitative criteria to evaluate when the results of the inclinometers and piezometers indicate a slope failure may occur and filling should stop. These criteria, shown in Table 3.4-4, are based on the ratio of vertical and lateral deformations as provided by inclinometer readings and the rate of excess pore pressure generation for refuse placed as provided by piezometers. The ~~frequency of~~ monitoring and reporting that is included in the geotechnical monitoring program shall occur quarterly, unless the RWQCB or the LEA determines that more frequent monitoring is needed, and will follow ~~that~~ the frequency indicated in the WDRs and/or the SWFP.

TABLE 3.4-4
SLOPE MONITORING CRITERIA

Bay Mud Thickness	**Filling Should Stop When:**	
	Δ lateral deformation[a] / **Δ vertical deformation**	**Δ embankment height**[b] / **Δ pore pressure**
less than 20 feet	>6.6:1	>0.25 feet of fill per psf
greater than 20 feet	>3:1	>0.1 feet of fill per psf

[a] Monitor change in lateral and vertical deformation at the top of the Bay Mud layer.
[b] Monitor pore pressure at the middle of the Bay Mud layer. Pore pressure to be measured in pounds per square feet (psf).

SOURCE: Treadwell & Rollo, 2002

Mitigation Measures Identified In This Report

Mitigation Measure 3.4.2b: The geotechnical monitoring program developed by GeoSyntec to monitor fill placement shall be conducted under supervision of a geotechnical engineer familiar with landfill operations and the behavior of the underlying Bay Mud. Recommendations of the supervising engineer and activities conducted as part of the monitoring plan shall be documented and included in periodic reports submitted to the County of Marin and, if appropriate, the RWQCB.

Mitigation Measure 3.4.2c: If refuse placement activities have stopped, due to indications of an increasing rate of deformation in the monitored slopes, as provided under Mitigation Measure 3.4.2a, and geotechnical monitoring continues to indicate exceedance of the threshold values, the supervising engineer shall implement one or more of the following measures to increase the factor of safety of the slope and be within the geotechnical monitoring criteria described above:

- remove refuse in critical areas to reduce the driving force of the slope;
- construct a berm or install piles at the toe of the slope to provide resistance to slope movement; and/or
- implement other engineering measure(s) to reduce the rate of deformation and prevent slope instability.

The appropriate measure or measures to be undertaken shall be assessed by the geotechnical engineer supervising the geotechnical monitoring program, as specified under 3.4.2b.

Mitigation Measure 3.4.2d: Depending on findings of the geotechnical monitoring program, the fill sequencing plan shall be modified, as needed, to slow the rate of fill if Bay Mud strength is less than anticipated. The change in rate of fill shall be determined by quantitative threshold values that shall be incorporated into the geotechnical monitoring program. Any modifications to the fill sequencing plan shall be reported to the LEA and the RWQCB.

Level of Significance After Mitigation

Mitigation Measure 3.4.2a will be implemented as part of the project and the combination of Mitigation Measures 3.4.2b, 3.4.2c, and 3.4.2d will be implemented to supplement the proposed geotechnical monitoring program. Together these measures are sufficient to protect against slope displacements related to static stability and reduce impacts to a less-than-significant level.

Impact 3.4.3: Differential settlement of the refuse and the underlying Bay Mud, causing cracks in the levee or final cover and damage to the LCRS, could occur as additional refuse is placed on the landfill. (Significant)

As additional refuse is placed on the landfill, and as time goes by, the refuse and the Bay Mud underlying the landfill is expected to settle. The refuse will likely settle differentially due to its heterogeneous nature. The Bay Mud also is expected to experience differential settlement due to localized variations in strength, consistency, texture, and thickness of the Bay Mud, the height of refuse placement over it, and the time when various stages of refuse are placed. Refuse settlement can range from 5 to 30 percent of original height. Because the Bay Mud beneath the landfill occurs as an eastward thickening wedge, the settlement is expected to vary gradually across the site. The total settlement of Bay Mud has been estimated to vary from 6 to 9 feet around the perimeter of the landfill and 10 to 15 feet beneath the central portion of the landfill where the refuse thickness is the greatest (Treadwell & Rollo, 2002). Differential settlement could cause cracks in the levee and/or final cover and damage the landfill gas or leachate collection systems. Damage to underground collection pipes would probably be limited because pipes are relatively flexible and some deformation would not appreciably reduce the effectiveness of perforated pipe. Although unlikely, damage resulting from differential settlement would be a significant impact (Treadwell & Rollo, 2002).

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

> **Mitigation Measure 3.4.3:** As part of the geotechnical monitoring program, the applicant will inspect quarterly for cracks in cover material and monitor pressure and volume changes in the landfill gas collection system. If measured settlement or deformation rates begin to increase, the inspection frequency will be increased to weekly. If monitoring reveals evidence of differential settlement, the following measures will be implemented, as needed:
>
> - if settlement cracks are observed in the levee or final cover, the cracks shall be re-graded to seal them; and
> - if the LCRS or landfill gas collection system is damaged, pipes shall be repaired and/or replaced.

Level of Significance After Mitigation

Implementation of Mitigation Measure 3.4.3 will reduce potential impacts related to differential settlement to less than significant.

Impact 3.4.4: Precipitation contacting the landfill cover and other unpaved areas of the landfill could generate storm water runoff with sufficient velocity to dislodge and transport soil and sediment, resulting in the formation of erosion features that could damage portions of the landfill. (Significant)

Soil erosional hazards could result if storm water runoff from the landfill occurs at erosive velocities, volumes, or distances. Increased sediment in the drainage network could impact water quality in off-site surface water bodies. Erosion of cover material overlying the refuse could increase infiltration into the refuse mass and increase leachate quantities. Erosion of landfill or perimeter levee slopes could damage slopes or lead to slope displacement. Excessive erosion can lead to incised features such as levees and gullies in the landfill slopes, access roads or berms.

Title 27 (§20365) specifies the following storm water management practices to minimize erosion, infiltration, and uptake of pollutants:

> Diversion and drainage facilities shall be designed, constructed, and maintained:

- to effectively divert sheet flow runoff laterally, or via the shortest distance, into the drainage and collection facilities;
- to prevent surface erosion through the judicious use of energy dissipators where required to decrease the velocity of runoff; and slope protection and other erosion control measures;
- to control and intercept run-on, in order to isolate uncontaminated surface waters from water that might have come into contact with waste; and
- to take into account, for closed portions of waste management units, the expected final contours of the closed unit, including its planned drainage pattern; for operating portions of the units other than surface impoundments, the unit's drainage pattern at any given time; the possible effects of the unit's drainage pattern on and by the regional watershed; the design capacity of drainage systems of downstream and adjacent properties by providing for the gradual release of retained water downstream in a manner which does not exceed the expected peak flow rate at the point of discharge if there were no waste management facility; and to preserve the system's function by periodically removing accumulated sediment from the sedimentation or detention basins as needed to preserve the design capacity of the system.

RLI has performed an assessment of the design slope length and inclination to check that erosion would be within the maximum allowable annual rate of erosion. This analysis is referred to as their "Soil Erosion Control Program" (included as part of Appendix J of the Joint Technical Document [GeoSyntec, 1998]).

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.4.4a: RLI will maintain a Storm Water Pollution Prevention Plan (SWPPP) as required under their storm water discharge permit. The SWPPP will provide necessary Best Management Practices to control storm water runoff and reduce erosion.

RLI prepared a SWPPP (RLI, ~~2000~~2003) for compliance with Provision C.2 of the General Industrial Storm Water Discharge Permit issued by the State Water Resources Control Board (SWRCB) and enforced by the Regional Water Quality Control Board (RWQCB), San Francisco Bay Region. In addition, the landfill was designed in accordance with CCR Title 27, §20365, which (as outlined above) specifies requirements and performance standards for precipitation and drainage control for active Class III landfills (GeoSyntec, 1998).

Mitigation Measure 3.4.4b: According to the applicant's SWPPP (RLI, ~~2000~~2003), sediment and erosion control features implemented include:

- placement of yard waste and grass seeds on slopes to promote vegetation of slopes;
- top deck berms;
- collection inlets;
- downdrain pipes;
- hay bales;

- silt fences; and
- directing storm water flows to the main storm water impoundment in the southern part of the site or a 1/2 acre pond in the western-central portion of the site for settlement of suspended sediments prior to discharging offsite. ~~(The 2000 SWPPP states that storm water flows also may be directed to an approximately one acre impoundment [shown as 1.5 acres in Exhibit 2 of the SWPPP]; however, since the 2000 SWPPP was produced, this impoundment has been incorporated into the Area G waste management unit and is no longer available to accept storm water flows.)~~

RLI has stated that the SWPPP will be amended whenever a change in design, construction, operation, or maintenance occurs that has a significant potential for pollutants to discharge to the adjacent waterways.

Mitigation Measure 3.4.4c: A final landfill closure and post-closure maintenance and monitoring plan, as per federal and state regulations, will need to be implemented (GeoSyntec, 1998). Preliminary closure and post-closure plans were provided in the JTD (GeoSyntec, 1998). Preliminary closure and post-closure maintenance activities proposed to reduce the effects of surface water runoff and erosion were detailed in the JTD's Sections 8 and 9 and included:

- Applicable final cover design to reduce infiltration and reduce surface water runoff velocity
- Minimum grading requirements for the final cover
- Environmental monitoring and control systems including final cover, surface water, and leachate management.

According to GeoSyntec (1998), reporting requirements and schedule will be further defined in Final Closure and Post-Closure Maintenance Plans.

Mitigation Measures Identified in This Report

Mitigation Measure 3.4.4d: Prior to project implementation the applicant shall update the facility's SWPPP as needed to accurately reflect existing conditions and features. Because Area G is to be developed as a disposal cell, the remaining 1/2 acre stormwater pond in this area, referenced in the 2003 revision of the SWPPP, will eventually be eliminated; such change shall be addressed in a timely revision of the SWPPP. ~~The revision shall include the removal of references to the pond at Area G as an area to which storm water flows could be directed, since the pond is now part of the Area G waste management unit~~. As required by NPDES provisions, the revised SWPPP shall be kept on site and made available to RWQCB staff upon request.

Level of Significance After Mitigation

Implementation of Mitigation Measures 3.4.4a, 4b, and 4c combined, in addition to the BMPs contained in Redwood Landfill's existing SWPPP, will reduce erosion-related impacts to a less-than-significant level.

Impact 3.4.5: The existing surface drainage system s may be inadequate for a Class III landfill. (Significant)

According to the applicant's description of the existing surface drainage system in Section 5.2.7 of the Joint Technical Document (GeoSyntec, 1998), the permanent and major temporary diversion and drainage facilities are designed and constructed to accommodate peak flow from surface runoff associated with precipitation of the 100-year, 24-hour duration storm (design event). The applicant has withdrawn the application to reclassify Area G as a Class II waste unit, which CCR Title 27~~, however, requires that the capacity of~~ would have required to have precipitation and drainage control facilities~~ (design storm) for Class II MSW Landfills be sufficient~~ with the capacity to accommodate the 1,000-year 24-hour precipitation event (Title 27, §20365, Table 4.1, Construction Standards for Units). The 100-year 24-hour duration storm is the appropriate storm event for which Class III landfill drainage and precipitation facilities must be designed and constructed as required under Title 27~~Inadequate drainage facilities can contribute to soil erosion and increased sedimentation in surface waters~~. ~~Refer to the discussion under 3.5.9 in Section 3.5 Hydrology and Water Quality~~. Measure 3.4.5 (to implement Measure 3.5.9) would ensure that the drainage facilities meet the applicable Title 27 standards.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

> **Mitigation Measure 3.4.5:** Implement Mitigation Measure 3.5.9 (i.e., ~~prior to reclassification of Area G as a Class II unit,~~ the applicant shall produce~~,~~ and present to the ~~LEA and~~ RWQCB for approval~~,~~ a report demonstrating that precipitation and drainage control facilities ~~affecting Area G~~ meet Title 27 requirements, and provide a copy of the report to the LEA~~ for Class II units~~).

Level of Significance with Mitigation

Implementation of Mitigation Measure 3.5.9 would reduce the potential impact of inadequate drainage facilities for a Class III landfill to a less-than-significant level.

Impact 3.4.6: A five-foot separation does not exist between the base of the landfill and the underlying groundwater. (Significant)

Title 27, §20240 requires landfills to have a minimum separation of five feet between the underlying groundwater and the base of the landfill, unless an engineered alternative is proposed. Redwood Landfill was constructed and is operating without a liner, resulting in the placement of refuse on top of the Bay Mud, with the lower refuse levels within groundwater. Therefore, the landfill does not meet the five foot separation criterion. The groundwater present within the Bay Mud is in hydraulic communication with the landfill leachate. The applicant has proposed a perimeter leachate cutoff/collection system to protect against the migration of leachate and contaminated groundwater off-site as an alternative to the five-foot separation requirement. According to information presented in a letter from RWQCB (Friedman, 1999), the proposed LCRS was granted approval as a corrective action, not as an engineered alternative. (The applicant has proposed a separate LCRS for Area G in conjunction with the proposal to use Area G as a Class II unit, which is discussed under Impact 3.4.10.)

Mitigation Measures Proposed by the Project

Mitigation Measure 3.4.6: The applicant has proposed a leachate collection and removal system (LCRS) as an engineered alternative to the Title 27 requirement of a minimum separation of five feet between waste and groundwater (GeoSyntec, 1998). According to the applicant, the cost to modify the landfill to meet the five-foot separation requirement would be too great; thus the applicant has filed an exemption request with the RWQCB (GeoSyntec, 1998). Title 27 provides for consideration of engineering alternatives if the minimum five-foot separation between the landfill and underlying groundwater is not possible or would be prohibitively expensive to provide. As described in the Joint Technical Document (GeoSyntec, 1998), the underlying Bay Mud has relatively low permeability (less than 10^{-6} cm/s) and the thickness of the Bay Mud deposit ranges from 7 to 45 feet within the landfill's footprint. Given the thickness of the Bay Mud, its low permeability, and the preferential flow direction of the leachate along the refuse-Bay Mud interface, significant migration of leachate below the site would not occur. The landfill's LCRS (described in greater detail below, under Impact 3.4.7) would intercept leachate flowing along the refuse-Bay Mud interface, and the leachate would be pumped to the onsite leachate pond.

The results of a study on a perimeter LCRS and its effect on leachate migration (MET and Sanifill, 1995a) indicate the preferential flow of the leachate for the entire site would be towards the perimeter LCRS. Therefore, because the LCRS prevents the contamination of the underlying groundwater by directing the leachate flow away from the underlying groundwater, the design can be considered an adequate engineered alternative to the five feet separation requirement (Treadwell & Rollo, 2002). Final determination of the adequacy of the applicant's design as an engineered alternative will be made by the RWQCB after the applicant submits a complete design packet.

Mitigation Measures Identified in This Report

None required.

Level of Significance with Mitigation

Although implementation of Mitigation Measures 3.4.6 will not increase the physical separation between the landfill and the underlying groundwater, Mitigation Measure 3.4.6 provides an adequate engineering alternative that should prevent the migration of leachate below the landfill and reduce groundwater contamination-related impacts to a less-than-significant level. Implementation of Mitigation Measures 3.4.7(e) (below), which entails pumping leachate from the interior of the landfill, provides an additional safeguard to prevent leachate from migrating off-site or affecting underlying groundwater.

Impact 3.4.7: If not properly designed, the proposed Leachate Collection and Recovery System (LCRS) could allow leachate to migrate off-site and potentially contaminate off-site groundwater and surface water. (Significant)

Groundwater present within the Bay Mud is in hydraulic communication with the landfill leachate. Chemicals from the leachate could dissolve into the groundwater beneath the landfill and, by groundwater flow, contaminate off-site groundwater and surface water that is in hydraulic communication with the shallow groundwater. Migration of leachate in the Bay Mud would most likely occur in the sand lenses within the Bay Mud. Sand lenses present beneath the landfill and extending off site beneath the perimeter drainage system could transport leachate chemicals and impact off-site groundwater and surface water. Additionally, potential adverse effects to downstream water quality could occur through groundwater seepage into surface waterways such as the surrounding sloughs, creeks, and other waterways.

Leachate generated from the Class III landfill is collected by a perimeter LCRS. The existing 1995 SWFP specifies a LCRS that is incorporated into the design of a reconstructed perimeter levee. Such an integrated LCRS-levee design was constructed along Area A in 1991, to repair an unstable portion of the existing levee. The integrated design consists of a pipe with drain rock against a new levee/cutoff wall. The LCRS and levee were keyed into the underlying Bay Mud deposit. The LCRS was constructed against the landside edge of the levee/cutoff wall as the new levee was constructed.

Subsequent to issuance of the 1995 SWFP, a LCRS trench (independent of the perimeter levee system) was constructed along Areas B and C in 1995 and Area D in 1996. A LCRS is still needed at Areas E, F, and G. For the remaining areas RLI also proposes to construct a LCRS trench, independent of levee construction or reconstruction. The final sections of Areas E and F were completed in 2003 and 2004; these also were constructed independent of levee construction or reconstruction. According to GeoSyntec (1998), new perimeter levee/cutoff wall construction is not required to maintain stability. (The potential impacts of the proposed project, including with the revised LCRS design, on landfill stability are evaluated under Impacts 3.4.1 and 3.4.2, above.)

To provide a barrier to offsite leachate migration, the LCRS is typically keyed approximately 1 to 3 feet (to Elevation –5.5 feet) into the low permeability Bay Mud. The LCRS includes a gravel-filled trench that is lined with a collection pipe and graded to sumps (depressions or pits in the bottom of the trench) that are spaced along the trench alignment. Leachate flowing towards the edge of the landfill through the refuse or along the Bay Mud/refuse interface would be intercepted by and collected in the perimeter drainage trench. As leachate is collected and removed through the LCRS, the preferential flow of the leachate for the entire site would be towards the perimeter trench. Previous analysis (MET and Sanifill, 1995a) has shown that near-surface water on the outboard side of the LCRS also would have a preferential flow towards the LCRS, rather than towards the adjacent waterway. Intercepted leachate would flow by gravity within the trench to the sumps. The sumps are fitted with automatic level control pumping systems that pump the leachate to the on-site leachate impoundment. Cleanouts are provided every 500 feet for pipe maintenance (GeoSyntec, 1998). The sump pumps are set to maintain an elevation of -1 feet MSL within the system, to promote the flow of leachate and outboard groundwater toward the LCRS trench (GeoSyntec, 1998).

The capacity of the LCRS system is evaluated under Impact 3.4.8.

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.4.7a: According to the applicant, leachate is managed at the existing facility in accordance with the RWQCB-approved Leachate Management Plan prepared by CH2MHill (1992) (GeoSyntec, 1998). The Joint Technical Document (GeoSyntec, 1998) description of existing leachate management includes the following activities to minimize the production of leachate and promote the reuse of collected leachate. Although not explicitly stated in Chapter 6 (Proposed Facility Modifications) of the Joint Technical document, this analysis assumes these practices will be continued with the proposed project.

- placement of well-compacted, vegetation-free intermediate cover (defined in 27 CCR §20164 as cover material placed on all fill surfaces where additional cells are not to be constructed for 180 days or more, to control vectors, fires, odors, blowing litter, scavenging, and drainage) over the refuse;
- grading of daily, intermediate, and final cover to minimum 3 percent slopes to promote surface-water runoff from the landfill;
- installation and continuous operation of a perimeter LCRS around the landfill;
- placement of final cover in phases throughout the life of the landfill as final grades are reached; and
- use of collected leachate for dust control on access roads and intermediate covers as approved by regulatory agencies.

Mitigation Measure 3.4.7b: To address the issue of leachate leakage from the leachate pond, RLI prepared a Leachate Facilities Leak or Spill Contingency Plan (RLI, 1995b). RLI site operations personnel routinely monitor the leachate pond in association with daily activities and the site operations supervisor performs weekly formal monitoring/inspection.

Mitigation Measure 3.4.7c: Following a significant seismic or rare rainfall event, RLI will initiate an immediate inspection of the leachate pond containment facilities as part of their contingency measures. If any noticeable damage is observed during these inspections, landfill or contracted equipment will be used to repair and control all minor leaks. If a major leak is evident, Redwood will take the following immediate measures to ensure control of the leachate release (RLI, 1995b):

- construction of a dike using available soil;
- construction of temporary berms;
- excavation of additional channels;
- construction of a temporary leachate storage pond in the Oxbow area (the Leachate Facilities Leak or Spill Contingency Plan identifies Fields 2 and 3 and the narrow strip between the eastern edge of the existing leachate pond and Field 5 as the location of the contingent leachate pond); and

- pump water into onsite ponds as emergency disposal of "clean" leachate in heavy rainfall. (The Leachate Facilities Leak and Spill Contingency Plan, produced in 1995 [RLI, 1995b], does not identify specific "onsite ponds" to which it refers. The plan states that additional pond storage capacity was planned at the time, through the construction of an additional leachate storage/evaporation pond in the summer of 1996.)

Mitigation Measure 3.4.7d: If groundwater monitoring performed as part of the self-monitoring program detects leachate outside the perimeter levee, RLI shall follow Title 27 CCR regulations (e.g., Section 20385 et seq.) and work with the RWQCB in the development of an Evaluation Monitoring Plan and/or an Engineering Feasibility Study to determine the appropriate site specific methods for evaluating the scope of a release, its mitigation, and subsequent monitoring program or corrective action program pursuant to 27 CCR Section 20385 and Section 20430. The~~the~~ following contingency ~~plan will~~ measures may be appropriate and would be implemented if needed and in coordination with RWQCB requirements:

- ~~Containment will involve i~~Installation of a geosynthetic membrane across the length of a trench constructed in the targeted zone along the site perimeter to contain the release. The geosynthetic barrier would reduce the rate of off-site migration of the release while also reducing groundwater inflow to the collection system.

- ~~The release will be collected~~ Collection of the leachate by installing a French drain in the trench. A sump in the trench would be pumped to prevent hydraulic head buildup up-gradient of the containment barrier.

Mitigation monitoring locations in Bay Mud, refuse, and surface water will determine the necessity for implementing the mitigation measures outlined for this impact (i.e., increase in leachate extraction rate, contingency measures for capture of leachate migration). Financial assurance for the system to capture and/or contain leachate release beyond the perimeter levee would be provided for by applicant insurance.

Mitigation Measures Identified In This Report

Mitigation Measure 3.4.7e: ~~Prior to the placement of wastes at Areas E and F, t~~The applicant ~~shall~~ has completed installation of the ~~at these areas a~~ LCRS at Areas E and F~~as was installed at Areas B, C, and D~~.

~~Although "installation and continuous operation of a perimeter LCRS around the landfill" is listed as one of the activities performed to manage leachate in Chapter 5, Existing Facility, of the Joint Technical Document (GeoSyntec, 1998), no LCRS is currently in place in Areas E, F, or G. The applicant has proposed a separate LCRS for Area G in conjunction with the proposal to use Area G as a Class II unit (discussed under Impact 3.4.10). If waste were placed in Areas E or F without a LCRS, leachate generation would be a significant impact. Ensuring that the LCRS is in place prior to waste placement at Areas E or F would ensure that this impact at these areas would be less than significant.~~

To further limit the potential for significant leachate accumulation in the landfill, RLI shall undertake a leachate pumping program in coordination with the RWQCB whereby leachate is initially extracted from up to 13 existing landfill gas wells in the interior of the landfill. The pumping shall be selectively monitored for pumping times, rates and recovery to determine well productivity and effectiveness for use in future additions to the pumping program. Chemistry tests on pumped liquids will be selectively conducted to determine the source of gas well liquid in order to differentiate between leachate and groundwater.

Additional dual leachate/gas collection wells shall be installed to the base of the landfill or to sea level, whichever is higher, and shall be equipped with leachate extraction pumps. The number and spacing of leachate extraction wells shall be augmented each year until a consistent decrease in leachate volume can be empirically verified and is sufficient to achieve the long-term objective of removing the leachate mound.

Empirical verification of initial leachate volume reduction and verification that an appropriate number of wells and pumps have been installed shall be provided to the RWQCB and shall include the satisfaction of the following performance criteria:

1) Demonstrate, using a refined water balance model approved by the RWQCB, that the leachate extraction rate exceeds the leachate generation rate; and

2) Demonstrate a measurable and quantifiable decrease in leachate volume within the landfill using leachate elevation measurements from either monitoring wells or landfill gas extraction wells located in the interior of the landfill.

Once it has been established that the leachate collection and removal system size and pumping rate is sufficient to reduce the leachate volume, the system shall be maintained and operated such that leachate volume is steadily reduced. Leachate levels shall be reduced to a sustainable level over a period of 5- years. The achievement of the sustainable level shall be empirically verified by the achievement of at least one of the following three performance criteria:

1) Demonstrate that the piezometric head in the basal (laterally continuous)- leachate is no greater than 1 ft MSL;

2) Demonstrate that the extracted leachate is chemically indistinguishable from the groundwater in the vicinity of the landfill; or

3) Demonstrate that an inward gradient has been achieved such that leachate flows from the perimeter of the landfill towards the center of the landfill.

The performance criteria evaluations shall account for seasonal fluctuations and be capable of demonstrating performance achievement on a year-to-year basis

Mitigation Measure 3.4.7f: RLI shall update its Leachate Facilities Leak or Spill Contingency Plan to accommodate proposed project changes. At a minimum, the revised plan shall address the following issues:

(1) Areas in the Oxbow shown in the existing plan (RLI, 1995b) as the location of the contingent leachate pond (Fields 2 and 3 and the narrow strip between the eastern edge of the existing leachate pond and Field 5) are proposed under the project to be used for composting and co-composting, and Fields 3, 4, and 5 are proposed under the project to be used for composting, co-composting, and are "also available for Class II leachate impoundments." The revised leachate contingency plan shall identify which area or areas will be used for contingent leachate storage or, alternatively, explain/clarify how composting operations and emergency leachate

storage will be accommodated in the same area. (Refer to Mitigation Measures 3.5.3a, 3.5.3b, and 3.5.3d regarding leachate potentially generated at these new composting areas.)

(2) Because an additional leachate storage/evaporation pond that, according to the 1995 Leachate Facilities Leak and Spill Contingency Plan (RLI, 1995b), was to have been constructed in the summer of 1996 to provide additional pond storage capacity, has not been constructed, the revised plan shall also include the reason(s) that the additional leachate storage/evaporation pond is no longer planned or needed, especially in the event of a leak at the existing 11-acre leachate pond or malfunction of the leachate vaporator.

(3) With regard to potential overtopping of the leachate pond during rare rainfall events, the 1995 plan indicated that pumping directly into San Antonio Creek, if leachate water was confirmed to be clean, was the most effective contingency measure to quickly evacuate the leachate pond. The updated leachate contingency plans shall not rely solely on such a measure for leak or spill contingencies, but shall include other contingency measures as discussed under item (1), above (i.e., identification of the location of on-site contingent impoundments), that prevent the off-site release of leachate.

The updated Leachate Facilities Leak or Spill Contingency Plan shall be submitted to the LEA and the RWQCB prior to project approval. Approval of use of Oxbow areas for composting, where the applicant has recently constructed a compost pad, shall be conditioned upon approval of the updated leachate contingency plan, in addition to other relevant approvals required as mitigations in this report.

Level of Significance with Mitigation

Implementation of Mitigation Measures 3.4.7a, 3.4.7b, 3.4.7c, and 3.4.7d, proposed as part of the project and Mitigation Measures 3.4.7e and 3.4.7f, specified in this EIR, in combination with Mitigation Measures 3.4.8 and 3.5.4, would reduce this impact to a less-than-significant level.

Impact 3.4.8: The increased generation of leachate that would result from the project could surpass the capacity of the LCRS, resulting in the off-site release of leachate and the contamination of off-site groundwater. (Significant)

~~Proposed changes to the landfill geometry (i.e., the proposed increase in the steepness of the landfill slopes, increase in the length of the intervals between slope benches, and decrease in the width of slope benches) would increase total landfill capacity from 19.1 million cubic yards to 34.6 million cubic yards.[13] The proposed increase in landfill capacity would increase the quantity of leachate generated. It~~ The proposed increase in daily tonnage is ~~also~~ likely ~~that~~ to increase the size of the working face ~~would be increased as a result of the project, to accommodate the~~

[13] The proposed volume represents total landfill volume between the landfill base and the proposed final landfill grade, and would accommodate the liner and cover materials as well as waste.

~~proposed increase in daily tonnage~~. This ~~also could~~ is expected to increase leachate generation, as a larger area that is subject to infiltration would be exposed to rainfall. Leachate can contain substantial concentrations of chemical contaminants, nutrients, and bacteria. In addition, the revised LCRS will result in some additional flow of water outside the landfill to the perimeter LCRS. If the additional leachate generated as a result of the project surpassed the capacity of the LCRS, leachate could be released off site and contact and degrade groundwater or surface water.

Leachate Generation

A design analysis for the LCRS conducted in 1995 by MET and Sanifill calculated that average leachate generation rates during the life of the landfill would range from 3 to 6 gallons per minute (gpm), equivalent to approximately 1.6 to 3.2 million gallons per year. The study noted that seasonal flow rates could be four or five times these average rates for one or two months per year. (The reason for such a sharp seasonal increase is not articulated.) Based on this estimate of seasonal increase, it is assumed that for up to two months per year during the rainy season, flows to the LCRS could range from 15 to 30 gallons per minute (or from .6 to 1.3 million gallons in a 30-day month). Leachate generation would eventually drop to zero following landfill closure (MET and Sanifill, 1995a).

The purpose of the 1995 MET/Sanifill design analysis (1995a) was to verify total leachate generation over the life and post-closure period of the landfill, as well as to demonstrate the effectiveness of the perimeter trench as a barrier to offsite migration of leachate. The analysis examined refined alternatives of the perimeter trench concept previously recommended in the CH2MHill Leachate Management Plan for the landfill (CH2MHill, 1992) and addressed in the landfill's 1994 Report of Waste Discharge (ROWD) by Harding Lawson Associates (HLA, 1994). The MET/Sanifill analysis was conducted subsequent to certification of the 1994 FEIR and included site condition assumptions pertaining to cell geometry and refuse placement based on the facility's 1992 Revised Site Development Plan (HLA, 1992) (MET and Sanifill, 1995a), rather than on the currently proposed landfill capacity and acceptance rates evaluated in this SEIR. A stated goal of the 1995 analysis was to define more accurately flow rates to the LCRS than did the CH2MHill (1992) study, for the design and construction of appropriate leachate management facilities.

The CH2MHill study (1992) had determined that the generation rate would range from 25 to 70 gpm (equivalent to 13.1 to 36.8 million gallons per year) during landfill operation. After closure, generation would be between 15 and 30 gpm; assuming the most impermeable cover of the three evaluated in this study, infiltration after closure would be negligible and leachate generation would result from upwelling of groundwater through the parcel. After closure leachate was expected to closely resemble the groundwater (CH2MHill, 1992).

Because the MET/Sanifill analysis (1995a) is more recent and was specifically conducted to refine the perimeter trench concept evaluated in the CH2MHill Leachate Management Plan and to more accurately determine flow rates, for the purpose of designing and constructing appropriate leachate management facilities, it is assumed that the flow rates determined in the MET/Sanifill study (1995a) supersede those of the CH2MHill study. However, because reported rates of leachate usage (i.e., for dust control) exceed the average rates estimated by the MET/Sanifill analysis and the 1992 CH2MHill Plan continues to factor prominently in the facility's management of leachate (e.g., it is cited regarding the landfill's current leachate management practices [GeoSyntec, 1998], and the LCRS design for the proposed project), the flow rates calculated in the CH2MHill study continue to be relevant~~are considered of interest as background information~~.

Pursuant to state and federal regulations, the project would incorporate design elements and management practices established to limit infiltration and thereby reduce the potential for leachate generation. These include grading slopes to a minimum of 3 percent slopes to promote surface-water runoff and use of compacted soil covers (daily, intermediate, and final) or approved alternative daily cover materials.[14] In addition, the LCRS is designed to collect and remove twice the maximum anticipated daily volume of leachate from the unit, as required by 27CCR §20340(b) (GeoSyntec, 1998).

Leachate Capacity

As noted, the 1995 MET/Sanifill design analysis for the LCRS (1995a) calculated that leachate generation rates during the life of the landfill would range from 3 to 6 gpm,[15] equivalent to approximately 1.6 to 3.2 million gallons per year. Leachate from the landfill is collected by the perimeter LCRS and conveyed to the 11-acre leachate pond. From the leachate pond, some of the leachate is conveyed to the newly constructed leachate vaporator (a component of the project evaluated in this SEIR), where it is destroyed, some is used for dust control (if it tests "clean"), and some evaporates. In addition, as part of the project, the applicant also is proposing to use leachate as quench water for the composting operation (if it tests clean, as required for the current use of leachate for dust control).

The newly constructed leachate vaporator facility has the capacity to mechanically evaporate up to 2.6 million gallons of leachate per year (GeoSyntec, 1998). Therefore, assuming the MET/Sanifill generation rates, all ~~to~~or most of the leachate projected to be generated per year could be destroyed by the vaporator. At the high end of the range of expected generation rates (6 gpm), generation would exceed vaporator capacity by approximately 0.6 million gallons of leachate per year.

The capacity of the leachate pond is more than ~~15 to~~ 18 million gallons (RLI, ~~1996~~2003). According to the current SWPPP (RLI, ~~2000~~2003), the capacity of the pond was exceeded during the severe winter of 1998. Overtopping was prevented by pumping out the pond to the onsite drainage system for flow off site out of the storm water pond.[16] According to the SWPPP, since that time, operations have been modified to generate less leachate (contact water), to use a vaporator to burn leachate, and to provide more capacity ~~in~~ other than impoundments (RLI,

[14] The alternative daily cover materials, which were evaluated in a demonstration project, are used pursuant to an interim approval granted by the LEA and are proposed to be permitted for use as ADC as part of the Project.

[15] As previously noted, this flow rate was calculated based on previously proposed and evaluated acceptance rates and total landfill capacity.

[16] According to the SWPPP, no significant impact to surface waters was noted during this event, which was reported to the RWQCB.

2003~~2000~~). As noted, the vaporator has been constructed and currently is in use.~~; however no information has been provided to indicate that other leachate impoundments have been constructed~~. Based on the generation rates calculated in the MET/Sanifill analysis (1995a) the ~~and considering the capacity of the~~ leachate pond alone ~~in conjunction with use of the vaporator, apart from other uses of the leachate, the pond~~ would have well more than twice the ~~average~~ annual leachate capacity needed ~~to contain the leachate not vaporized each year~~. However, as noted above, the reported use of leachate for dust control suggests leachate is generated at a higher rate than the MET/Sanifill analysis calculated.

In addition to being vaporized, leachate currently is used for dust control. In the year from July 2000 through June 2001, 8.12 million gallons of leachate water and 6 million gallons of potable water were used for dust control. No leachate was used from November through the following March, although some potable water was used for dust control in November, February, and March (18,000, 22,000 and 210,000 gallons respectively) (Kahny, 2001).

One component of the project is the proposed use of leachate for composting quench water (as long as it meets the same standards currently required for the use of leachate for dust control). Currently, no water is added as quench or process water for the existing composting operations because the greenwaste and biosolids feedstock have been found to contain sufficient moisture to sustain reactions through the active composting phase (Roycroft, 2002). However, the use of quench water is anticipated by the applicant in the request to use leachate for this purpose, and in the facility's 1996 application for Registration Permits for composting and co-composting (RLI, 1996). In the 1996 application RLI estimated that active composting of material requires approximately 730 gallons of water per ton of product during the dry weather season. The application stated that during the wet weather season (November through March), rainfall, higher levels of humidity, and lower ambient temperatures all contribute to providing and maintain adequate moisture content in the composting piles (RLI, 1996). With the project, RLI is proposing to compost an average of 514 TPD of incoming greenwaste, biosolids and food waste (see Table 2-2). For the sake of calculating possible quench water needs for the proposed operation, which the applicant has declined to estimate, it is assumed that a ratio of 50,000 tons of biosolids and foodwaste to 35,625 tons of greenwaste[17] would be used as the co-composting mix, and that additional moisture would not be required for the co-composted material (since both biosolids and food contain substantial moisture). This mix would utilize an average of approximately 81 TPD of greenwaste for co-composting, leaving approximately 319 TPD of composted greenwaste potentially requiring the addition of quench water. Thus, in the seven-month dry-weather period each year (April through October) 68,000 tons of greenwaste would be composted, and 49.6 million gallons of quench water could be used in the process. Based on this estimate and the current practice of not using any quench water, therefore, a range of 0 to 49.6 million gallons of leachate per year could be used as composting quench water, assuming its use is approved and it tests "clean" according to RWQCB standards for this purpose.

[17] This is the ratio of biosolids to greenwaste shown in the project's mass flow diagram for composing and co-composting, Figure 7-2 of the Joint Technical Document (GeoSyntec, 1998); food waste is not shown in this diagram.

In addition to the above uses, which serve to enhance the facility's leachate capacity, the applicant has indicated that Fields 3, 4 and 5 in the Oxbow area may be "available for" a Class II leachate impoundment (refer to Figure 2.7 in Chapter 2, Project Description) (GeoSyntec, 1998). Uncertainty exists as to the applicant's intentions for this area because these fields also are proposed for composting or co-composting. These fields may be put to one of these uses, or its current use, "pending final design and CRWQCB approval" (GeoSyntec, 1998). The three fields comprise approximately 27 acres. Use of this area for a leachate impoundment would provide additional storage capacity during periods of high rainfall or for emergency storage in the event of a leak requiring evacuation of the 11-acre leachate impoundment. Fields 3, 4 and 5 are composed of native soils and would require, at a minimum, a lining appropriate for a Class II impoundment, and RWQCB approval, before they could be used as a Class II impoundment.

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.4.8a: The applicant proposes to use leachate that tests "clean," according to standards established by the RWQCB, for composting quench water, if approved.

Mitigation Measure 3.4.8b: The applicant has installed a leachate vaporator to destroy collected leachate, as part of the facility's LCRS. The vaporator has not previously been evaluated and is a component of the project evaluated in this EIR.

In addition, actions undertaken as part of Mitigation Measures 3.4.7a, including the grading of slopes to promote runoff, the timely placement of intermediate and final cover, and the use of leachate for dust control, would help enhance LCRS capacity by limiting leachate generation and making use of the leachate that is generated.

Mitigation Measures Identified in this Report

Although, with the various elements described above, leachate capacity appears to be adequate, because of conflicting, inconsistent, missing or outdated information in source documents, this is difficult to assess with an acceptable level of certainty. Generation rates and management strategies need to be consistent with all aspects of the applicant's proposed project and with mitigation measures identified in this EIR.

Mitigation Measure 3.4.8c: RLI shall update their Leachate Management Plan so that, at a minimum, a single Leachate Management Plan serves as the current plan for the landfill. The plan shall be consistent with all aspects of the applicant's proposed project and with mitigation measures identified in this SEIR, including the currently-proposed LCRS design;~~,~~ management practices to limit leachate production and manage the leachate that is generated;~~,~~ and the most current leachate flow rates based on the proposed LCRS design, the most recent and comprehensive leachate generation studies, ~~and the much larger capacity provided by the proposed landfill geometry,~~ and empirical data of actual leachate flow rates since installation of the LCRS. The Plan shall demonstrate that the LCRS components and leachate impoundment(s) provide adequate capacity as required under 27 CCR §20340 (i.e., twice the maximum daily volume anticipated), including adequate conveyance and storage capacity during the wettest months of the year. (The MET/Sanifill analysis [1995a] indicated that seasonal flow rates may be as much as 4 to 5 times the calculated values for long-term and short-term flows, for one or two months each year.)

The updated plan shall address and remedy the current situation in which a 1992 study and plan is cited for leachate management practices and the LCRS design (but not for the leachate flow rates it presents), a 1995 study is cited for leachate flow rates, although these ~~cited leachate flow~~ rates are inconsistent with reported actual use ~~based on the currently permitted landfill geometry and fill sequencing, rather than the proposed landfill geometry and fill sequencing (as well as on refined alternatives to the 1992 LCRS design)~~, and estimates of the quantity of leachate expected to be utilized or consumed by various landfill facilities and activities are not provided in a discussion of system capacity, if at all. In demonstrating that adequate leachate capacity exists to prevent the off-site discharge of leachate, the updated plan shall include a complete water balance model that shows ~~diagram and/or a clearly written text presentation showing~~ quantitatively (using both actual flow rates from operation of the LCRS to date, as well as estimated projections) the amount of leachate that is expected to be generated and how it is managed to prevent any off-site discharges. The water balance model ~~demonstration of capacity~~ shall include any elements that are expected by the applicant to be considered by permitting agencies in their assessment of the leacahte system's capacity (e.g., the anticipated quantities of leachate to be used for dust control and quench water [if approved], and the basis for such estimates, if these are to be considered in the assessment of system capacity).

The Leachate Management Plan shall incorporate elements of the report required by Mitigation Measure 3.5.4 (concerning composting contact water) to ensure that the plan also addresses leachate generated by the expanded composting operations.

The updated Leachate Management Plan shall be submitted to the LEA and RWQCB prior to project approval.

RLI shall review annually and if necessary revise the updated Leachate Management Plan, including the water balance model, taking into consideration monitoring results that RLI collects and presents quarterly to the RWQCB and the LEA. These monitoring data shall include the amount of leachate extracted from the landfill, the elevation of leachate within monitoring and extraction wells, and the disposition of collected leachate. RLI shall present the results of the annual review and any revisions to the RWQCB for approval, with a copy sent to the LEA.

In addition, the implementation of Mitigation Measure 3.4.7f, updating the landfill's Leachate Facilities Leak and Spill Contingency Plan, will help ensure that adequate capacity exists in the event of a leak in the existing pond.

Level of Significance with Mitigation

Implementation of the combination of measures proposed as part of the project and identified in this EIR under this impact and Impact 3.4.7 would reduce this impact to a less-than-significant level.

Impact 3.4.9: Proposed modifications to the final cover design could adversely impact landfill stability or result in the degradation of groundwater or surface water quality. (Significant)

As described in Chapter 2, Project Description, the proposed final cover design would modify the final cover from a four-foot thick cover (evaluated in the 1994 FEIR) to a three-foot thick cover. The proposed final cover is designed to have the performance characteristics of the previous design. The principal change is the replacement of the one-foot barrier layer of compacted, low-permeability soil with a barrier/drainage layer consisting of a 40-mil (40 thousandths of an inch) geomembrane barrier layer overlain by a synthetic geotextile net or sand drainage layer, for the top deck, and by a geotextile or geocomposite drainage net, for the side slopes.

If the new cover design were not sufficiently impermeable, increased infiltration of rain water would result in the increased generation of leachate, resulting in the increased chance of off-site migration of leachate and adverse impacts to groundwater or nearby surface waters. The Title 27 (§21090[a]) requirement for a barrier layer is a one-foot-thick layer of soil with a maximum hydraulic conductivity of 1×10^{-6} cm/s (or equal to the hydraulic conductivity of any bottom liner system or underlying natural geologic materials, whichever is less permeable) or some other barrier material that "provides a correspondingly low through-flow rate throughout the post-closure maintenance period."

Based on typical manufacture specifications of the proposed geomembrane, the membrane would meet the permeability criteria (Treadwell & Rollo, 2001). In addition, the proposed drainage layer between the barrier layer and vegetative layer would minimize potential infiltration through the final cover by conveying water to surface-water downdrains. Therefore, the revised final cover design would meet the minimum requirement for permeability set forth by Subtitle D and Title 27 (Treadwell & Rollo, 2001).

The stability of the final cover has been evaluated to establish the required cover material shear strengths to maintain both static and seismic stability. The evaluation employed the infinite slope approach described by Matasovic (1991) and seismic site response analyses conducted by GeoSyntec (1997b). The final cover system is designed for a static factor of safety of 1.5. The results indicated that the final cover system will experience less than one foot of permanent displacement during a design seismic event. The results of the analyses are summarized in Table 3.4-5 (GeoSyntec, 1998).

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.4.9a: To ensure the adequacy of cover materials to resist sliding (failure) under static or dynamic conditions, RLI's geotechnical consultants established the degree of shear strength (resistance to shear, or deformation in a direction parallel to planes of contact) any material used for the cover would need to possess (GeoSyntec, 1998). The required shear strength of a cover material (expressed as the angle of friction, where the lower the angle of friction the weaker is the material and vice versa) varies depending on whether or not seepage would be present, the cohesion of the materials within each layer, and the degree of adhesion between layers in contact. Materials used for the final cover would require the following specified degrees of shear strength.

To maintain a static factor of safety against sliding, assuming no seepage, each of the cover materials must have shear strengths of friction angle ϕ greater than 34°, if no cohesion is present, or friction angle ϕ greater than 9°, if 50 lb/ft^2 of cohesion is present. Intermediate

TABLE 3.4-5
COVER SLOPE STABILITY RESULTS: REDWOOD LANDFILL

Condition		Required Shear Strength Parameters[a]			
		Internal Shear Strength		Interface Shear Strength	
		Cohesion[b] c (psf)	Friction Angle ϕ (degrees)	Adhesion[b] c_a (psf)	Friction Angle δ (degrees)
Long-term static	No cohesion / adhesion present	0	34	0	34
	50 lb/ft^2 cohesion / adhesion present	50	9	50	9
Long-term with full seepage[c]	No cohesion / adhesion present	0	49	0	49
	50 lb/ ft^2 cohesion / adhesion present	50	3	50	3
Long-term seismic[d]	No cohesion / adhesion present	0	34	0	34
	50 lb/ ft^2 cohesion / adhesion present	50	9	50	9

a Required shear strengths for each over component based on maintaining a minimum factor of safety of 1.5 for static conditions and 1.0 foot or less permanent seismic displacement during a design earthquake event.
b For cohesion/adhesion values other than 0 and 50 psf, the required frictional strength would vary accordingly.
c Seepage assumed to occur through the entire depth of the vegetative layer. A well designed drainage layer will reduce seepage effects.
d Assume that the seismic event and seepage conditions do not occur simultaneously.

SOURCE: GeoSyntec, 1998

values of friction angle ϕ are required for cohesion between 0 and 50 lb/ft^2. Each material interface must have similar shear strength requirements for friction angle δ and adhesion. If seepage is encountered through the entire thickness of the vegetative cover, the required shear strengths become more restrictive. Without cohesion/adhesion, friction angles in excess of 49° would be required, while 50 lb/ft^2 of cohesion/adhesion reduces the requirement to 3°.

Because it is unlikely that a 49° friction angle could be achieved with conventional cover materials, only materials that have sufficient cohesion and interfaces with sufficient adhesion will be used. The drainage layer will be properly designed to prevent seepage forces through the entire depth of the vegetative layer and will reduce the shear strength requirement for the long term seepage condition.

To prevent permanent seismic displacement in excess of 12 inches, the cover shear strength friction angles must exceed 34° in the absence of cohesion/adhesion and must exceed 9° when coupled with 50 lb/ft^2 cohesion/adhesion (GeoSyntec, 1998).

Mitigation Measure 3.4.9b: Preconstruction testing will be conducted to ensure that the minimum material strength is achieved.

Mitigation Measures Identified in This Report

None required.

Level of Significance After Mitigation

Implementation of Mitigation Measures 3.4.9a and 3.4.9b will ensure that this impact is reduced to a less-than-significant level.

Impact 3.4.10: The proposed increase in the acceptance rate for designated waste ~~use of Area G as a Class II landfill~~ could result in groundwater contamination from escaping ~~Class II~~ leachate and waste. (Significant)

~~In general, Class II landfills accept certain waste materials that are not acceptable in Class III landfills. Class II landfills have more stringent environmental controls necessary for safe disposal of certain designated wastes for which Class III facilities are inadequate. These controls include more stringent criteria and higher-standard liner systems. As a part of the project, RLI proposes to use Area G, which is currently permitted as part of the Class III landfill, as a Class II landfill. The applicant proposes to accept for disposal in Area G municipal solid wastes, sludges, petroleum or chemically contaminated soils, or other designated wastes that exceed the constituent concentrations identified in item B.5 of the existing Waste Discharge Requirements (see Appendix B) or that require, by regulations or private contract, the disposal of such waste into a composite lined waste management unit, but not including friable asbestos or petroleum-contaminated soils that exceed 50 parts per million of volatile compounds. The applicant proposes to accept up to 1,000 tons per day peak and 500 tons per day average of petroleum contaminated soil, and up to 500 tons per day peak and 200 tons per day average of other designated wastes (see Table 2-2 in the Project Description).~~

~~Compared with leachate typically produced in a Class III landfill, use of Area G as a Class II cell could generate leachate containing more diverse and more highly concentrated inorganic and organic chemicals, potentially including industrial solvents, heavy metals, aromatic hydrocarbons and polychlorinated biphenyls (PCBs). If not managed and controlled, leachate from this area could migrate laterally away from the cell to adversely impact surface and groundwater sources to an extent requiring active remediation, especially if it was to enter a surface water body such as San Antonio Creek. As noted in Chapter 2, Project Description, this change of use would require a revision of the Waste Discharge Requirements, as well as the Solid Waste Facilities Permit, to re-classify Area G as a Class II waste management unit. Redwood Landfill has prepared and submitted to the RWQCB a design for using Area G as a Class II waste management unit (GeoSyntec, 1997). The Area G design was developed to isolate waste from the surrounding environment, including the existing disposal area, and provides for the containment,~~

~~collection, and removal of leachate. The design of the landfill containment system for Area G includes the following elements:~~

~~In floor areas, a composite liner and leachate collection and removal system (LCRS) consisting of the following components, from subgrade up:~~

- ~~6-inch minimum thickness capillary break/underdrain system. The capillary break/underdrain system would consist of a blanket layer of crushed and processed concrete, quarried granular material or equivalent, encapsulated by a an 8-ounce-per-square-yard geotextile filter layer, and 6-inch diameter high density polyethylene (HDPE) perforated collection piping and granular bedding material;~~

- ~~24-inch minimum thickness compacted clay liner(CCL) with a hydraulic conductivity of 1x10-7 centimeters per second or less, which would act as the secondary liner in the composite liner system;~~

- ~~80-mil (80 thousandths of an inch) thick double-sided textured HDPE geomembrane (GeoSyntec, 2001);~~

- ~~8-ounces-per-square-yard geotextile cushion layer to protect the HDPE geomembrane;~~

- ~~12-inch minimum thickness LCRS consisting of a blanket layer of granular material and 6-inch diameter HDPE perforated collection piping;~~

- ~~8-ounces-per-square-yard geotextile filter layer overlying the LCRS to prevent clogging of the drainage material by migration of fines from above; and~~

- ~~12-inch minimum thickness operations layer to protect the containment system during future waste placement.~~

~~In side slopes, the composite liner and LCRS are similar to that of the floor area, with the exception that the 6-inch minimum thickness capillary break/underdrain system is replaced with a geocomposite capillary break/underdrain system.~~

~~The underdrain system would act as the perimeter LCRS in Area G and provide a mechanism for relieving pore pressures and consolidation water developed due to the loading of the waste mass as landfill development progresses. Since the Area G underdrain will be constructed to depths similar to those used in the perimeter LCRS design (i.e., Elevation -4 feet), and the sub-drain will be "keyed" into native Bay Mud or clean fill soils below the Area G liner, a complete barrier to outward migration of leachate from the existing disposal areas will be created (Treadwell & Rollo, 2002). This sub-drain system will also serve as an engineered alternative to the regulatory requirement to maintain a minimum separation of five feet between the underlying groundwater and the base of the landfill, as allowed by Title 27, §20240. Interior cell sumps are designed to collect the leachate within the lined Class II Area G cell. Two interior sumps will drain the LCRS and pump the leachate via HDPE force mains to the proposed leachate vaporator system to be located at the landfill flare facility.~~

~~Interior cell sumps are designed to collect the leachate within the lined Class II Area G cell. Two interior sumps will drain the LCRS and pump the leachate via HDPE force mains to a leachate vaporator system located at the landfill flare facility (Treadwell & Rollo, 2002).~~

~~In conclusion, the applicant's design for Area G appears to meet the regulatory requirements for a liner system, LCRS, and separation of groundwater for a Class II waste disposal unit. In general, Class II waste disposal units may receive any materials that fall below the hazardous waste threshold limits for reactivity, corrosivity, ignitability, and toxicity, as well as chemical concentration limits (both Total Threshold Limit Concentration (TTLC) and Soluble Threshold Limit Concentration (STLC) values) established in Title 22, Division 4.5, Chapter 11, Article 3 (Characteristics of Hazardous Waste) of the California Code of Regulations. However, the applicant has not specifically proposed specific waste types nor chemical concentration limits for materials placed in Area G. Furthermore, the Regional Water Quality Control Board must make the final determination on the suitability of the applicant's proposed design for Area G, including the acceptability of the subdrain system as an engineered alternative to the requirement to maintain a five-foot separation between groundwater and the base of the landfill, and the ability of the design to protect groundwater quality. Until these determinations are made, the proposed reclassification of Area G as a Class II waste unit poses the potential for contamination of groundwater under the site, and so has the potential to cause a significant environmental impact~~.

Redwood Landfill currently is permitted to accept up to 20 tons per day of designated waste other than sludge, including incinerator ash, grit and grease, storm drain cleanings, nonhazardous holding tank pumpings from food processing facilities, treated wood (e.g., telephone and power poles, pier docks), dredge and fill material, triple-rinsed chemical containers, and petroleum-contaminated soils that meet waste acceptance criteria for maximum chemical constituent concentrations as permitted by the RWQCB. Designated waste is defined as including hazardous waste that is not required to be disposed at a Class I landfill and non-hazardous waste that poses a greater threat to water quality than ordinary non-hazardous solid waste. Designated waste primarily is disposed at Class II landfills, which have more stringent siting and unit construction criteria under CCR Title 27 than do Class III units; however, as is the case at Redwood Landfill, Class III landfills may accept a limited or incidental amount of designated waste if permitted to do so by the relevant regulatory agencies (i.e., the LEA, RWQCB and/or BAAQMD). Given that Redwood landfill is an unlined landfill (albeit one underlain by low permeability Bay Mud) that does not currently meet state prescriptive standards for a Class II or Class III landfill in terms of liner design and separation of waste from groundwater, and that the applicant has provided no new information on the containment attributes of the landfill that would justify the acceptance of a ten-fold increase in designated waste, the proposed acceptance of 200 TPD of designated waste at Redwood landfill could pose a substantial risk to groundwater quality, or in the event of a leak or spill of leachate, to surface water quality. This would be a significant impact.

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.4.10a: The applicant has ~~committed to~~ constructed ~~a liner and~~ a perimeter trench LCRS and has agreed to augment the leachate collection system by pumping from wells located in the interior of the landfill (see Mitigation Measure 3.4.7g).

~~in Area G that complies with applicable state and federal regulations governing Class II waste disposal facilities, including an engineered alternative to the requirement to maintain five feet of separation between groundwater and the base of the landfill~~.

Mitigation Measures Identified in This Report

Mitigation Measure 3.4.10b: Maintain receipt of designated waste at currently permitted levels. ~~and Prior to issuance of a revised Solid Waste Facilities Permit revised Waste Discharge Requirements, the applicant shall submit a detailed list of material types and chemical concentration limits of wastes proposed for placement in Area G to Marin County Environmental Health Services and the Regional Water Quality Control Board~~.

Mitigation Measure 3.4.10c: ~~If the Regional Water Quality Control Board finds that the applicant's proposed design for Area G is not adequate for protecting groundwater quality from the material types and chemical concentrations proposed for placement therein (as per Mitigation Measure 3.4.10b), Regional Board staff may suggest to the applicant modifications to their proposal, including modifications to the design of Area G, and lower constituent concentration limits or elimination of certain material types for placement in Area G. The Regional Water Quality Control Board may then re-consider a revised proposal.~~ The applicant could construct a cell that meets Title 27 prescriptive standards for a Class II cell and seek to permit it as such, and, if the cell was so permitted, seek to change the quantity of designated waste received.

~~**Mitigation Measure 3.4.10d:** If the Regional Water Quality Control Board finds that the applicant's proposed design for Area G is adequate for protecting groundwater quality from the material types and chemical concentrations proposed for placement therein (as per Mitigation Measure 3.4.10b), the Regional Board shall provide evidence of this finding, along with any necessary conditions, to the Marin County Local Enforcement Agency (LEA). The LEA will then prepare revisions to the Solid Waste Facilities Permit that incorporate these conditions.~~

~~**Mitigation Measure 3.4.10e:** If the Regional Water Quality Control Board is unable to conclude, based on information provided by the applicant, that the proposed design for Area G is suitable for use of this unit as a Class II waste disposal unit, then further consideration of use of Area G as a Class II waste disposal unit will require further environmental review under CEQA after submission of a sufficiently complete proposal by the applicant.~~

Level of Significance with Mitigation

~~Implementation of~~ Mitigation Measure 3.4.10a, in conjunction with either Mitigation Measures 3.4.10b~~,~~ or 3.4.10c~~, and 3.4.10d~~ would ~~result in a reduction in this impact to a less-than significant level, if the Regional Water Quality Control Board finds that the applicant's design is adequate to protect groundwater quality from the waste material types and chemical concentrations proposed by the applicant for disposal in Area G. However, if the Regional Water Quality Control Board is unable to make such a finding, then further environmental review may be required, as per Mitigation Measure 3.4.10e. In either case, the~~ reduce this impact ~~would be reduced~~ to a less-than-significant level.

Impact 3.4.11: The proposed management of the buried waste in the southwest corner could result in soil or groundwater contamination. (Significant)

The 11.5-acre area of buried refuse in the extreme southwest corner of the landfill dates back to the landfill's early history. This area is outside the permitted landfill footprint, is not served with a leachate collection system or a landfill gas management system, and the material that is presently covering it is not an approved final cover. Results of subsurface data by Harza (1996) indicate that the refuse in the subject waste unit is three to four feet deep and consists primarily of soil and inert waste such as crushed concrete and glass (Treadwell & Rollo, 2002). The volume of the waste unit is estimated to be approximately 65,000 cubic yards (Roycroft, 2001). Bay Mud underlying the site ranges in thickness from 0 to 15 feet (Roycroft, 2001; Harza, 1996). As noted in the setting section, above, except where bedrock occurs, Pleistocene-age alluvium underlies Bay Mud at the project site. The material underlying this waste unit has not been approved as an alternative liner.

Rather than excavating this waste, as previously planned (Marin County, 1999), in 1998, RLI proposed as part of a revised Preliminary Closure Plan to leave this refuse unit in place (GeoSyntec, 1998). RLI proposed to continue to monitor the waste unit for landfill gas and potential groundwater impacts, and, if monitoring indicated the wastes were impacting groundwater, the wastes would be removed when the perimeter levee was constructed in the area, and placed within the landfill footprint; if monitoring indicated the wastes were not impacting groundwater, the waste would be left in place and a final cover placed over them (GeoSyntec, 1998). Subsequent to this proposal, groundwater monitoring results from two wells located down-gradient and just outside the subject waste unit to the south and southwest (wells MWH-18 and MWH-19) have indicated that the subject waste unit has not impacted groundwater quality in the areas of the two wells (Harding ESE, 2001, and WM, 2001). Because the wells do not indicate water quality impacts from the 11.5-acre site, the RLI now proposes "to seal this area" with 3 to 4 feet of soil (Roycroft, 2001) as an alternate final cover. The unit currently is covered by soil ranging in depth from 2 to 6 feet and part of it underlies a landfill roadway that is to be paved (Roycroft, 2001).

Precipitation infiltrating into this waste unit as well as groundwater and liquid generated from the waste could produce leachate within this 11.5-acre area. Leachate generated in the waste unit could potentially migrate and degrade off-site groundwater. Although monitoring data to date indicate that the refuse unit has not degraded groundwater, RLI has not presented data demonstrating that the proposed alternative final cover meets Title 27 requirements for a final cover or than the proposed alternative liner (i.e., the native materials underlying the waste unit) will meet Title 27 requirements for waste containment.

Regarding the effectiveness of the native materials underlying the refuse to protect against potential leachate migration, RLI cites the MET/Sanifill study (1995b), "Subtitle D Alternative Liner Performance Demonstration." According to the MET/Sanifill study (1995b), the thickness of Bay Mud throughout the landfill property ranges from 5 to 56 feet (except for an area identified as the "four-acre pond area" [which was in the vicinity landfill Area C]). However, the Harza (1996) investigation found that, while much of the 11.5-acre refuse unit is underlain by

Bay Mud ranging in thickness from 5 to 15 feet, the thickness of Bay Mud is zero immediately north of the northwestern corner of this waste unit. Considering that the impermeability of Bay Mud is an important factor in considering the potential for leachate migration from the permitted landfill footprint and that the Harza report suggests that the Bay Mud unit may occur as only a very thin layer (or not at all) under part of the 11.5-acre refuse unit, the discrepancy between the MET/Sanifill and Harza reports regarding thickness of the Bay Mud in this area needs to be addressed. In addition, information is needed on the nature of, and potential movement of leachate through, the subsurface material that underlies the northwestern portion of this waste unit, if it is confirmed that Bay Mud in this area is thin to non-existent. Refer to Impact 3.8.4 in Section 3.8, Public Health and Safety, regarding potential impacts of methane generated at this waste unit.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

> **Mitigation Measure 3.4.11a:** Prior to landfill closure, the applicant shall prepare and submit for approval to the RWQCB and the LEA a final Closure and Post-Closure Maintenance plan for this waste unit as required under Title 27, Chapter 3, Subchapter 5, Closure and Post Closure Maintenance. The Closure and Post-Closure Maintenance ~~p~~Plan shall demonstrate that the proposed alternative final cover design and existing base underlying the waste unit, in conjunction with post-closure monitoring, will continue to isolate the waste in the 11.5-acre unit and prevent the degradation of groundwater.
>
> The closure and post-closure plan shall demonstrate that the proposed alternative final cover will continue to isolate the waste in this unit from precipitation and irrigation waters at least as well as would a final cover built in accordance with applicable prescriptive standards. This measure is consistent with Title 27 §21090, which provides that the RWQCB can allow any alternative final cover design that it finds will continue to isolate the waste in the unit from precipitation and irrigation waters at least as well as would a final cover built in accordance with applicable prescriptive standards.
>
> The closure and post-closure plan also shall demonstrate that the proposed alterative liner (i.e., the materials underlying the waste unit) will meet the performance criteria for containing waste and preventing the degradation of waters of the state required under Title 27 Section 20310. The description of the proposed alternative liner will include information on the geologic unit(s) (including thicknesses thereof) underlying the refuse across the 11.5-acre unit. Technical data from extensive groundwater monitoring and Hydrologic Evaluation of Landfill Performance (HELP) model results may be necessary to demonstrate to the RWQCB that no significant groundwater impact will result from the proposed alternative final cover and liner.
>
> Pursuant to CEQA Guidelines, the revised Closure and Post-Closure Maintenance Plan will be subject to additional review under CEQA prior to approval.

In the meantime, prior to submittal and agency approval of the final Closure, Post-Closure Maintenance Plan for this area, the following measures shall be implemented:

Mitigation Measure 3.4.11b: The applicant shall continue to implement the existing groundwater monitoring program for this area. If leachate is detected by the monitoring program, the applicant will implement appropriate measures to prevent the off-site release of such leachate. Such measures may include installation of an extraction well, pumping the detected leachate plume at a rate sufficient to prevent its release off-site, and disposing of the collected leachate at the 11-acre leachate pond. (Because this 11.5-acre waste unit does not have an LCRS trench system, remedial actions here would necessarily be different from those identified for the permitted landfill footprint under 3.4.7d, above.)

Mitigation Measure 3.4.11c: If the RWQCB or LEA ~~finds~~ determine that the applicant's ~~proposed~~ revised Closure and Post-Closure Maintenance Plan for this waste unit is inadequate to protect groundwater quality, then the applicant shall excavate the refuse as previously proposed and dispose of it within the permitted landfill footprint. The estimated 65,000 cubic yards of refuse is equivalent to approximately 5 percent of the air space consumed annually, assuming the waste acceptance rate proposed under the project, or about 15 days' worth of landfill space (refer to Appendix A, Site Life Calculations).

Mitigation Measure 3.4.11d: Without mitigation, excavation of 65,000 cubic yards of refuse would have adverse impacts on air quality due to dust and equipment emissions. If Mitigation Measure 3.4.11c is required, it shall be implemented in conjunction with Mitigation Measures 3.2.1a-c, identified in this EIR, to reduce impacts of construction activities on air quality, and in conjunction with Mitigation Measures 3.2.2a-e, to reduce impacts associated with equipment and truck emissions of criteria air pollutants.

Level of Significance After Mitigation

Implementation of Mitigation Measure 3.4.11a in conjunction with Mitigation Measure 3.4.11b would reduce the impact of leaving the 11.5-acre waste unit in place to a less-than-significant level if the Closure and Post-Closure Plan for this unit is determined by the RWQCB and LEA to adequately protect groundwater quality. If the RWQCB or LEA find that the applicant's proposed final Closure and Post-Closure Maintenance Plan for this area is inadequate, implementation of Mitigation Measure 3.4.11c in conjunction with Mitigation Measure 3.4.11d would reduce this impact to a less-than significant level.

Impact 3.4.12: Due to the increase of load pressure by waste placement and the decrease of pore water velocity during Bay Mud consolidation, a leachate mound could be created that will create sufficient uplift pressure on the landfill to trigger slope failure. (Significant)

Under loading from waste displacement, excess pore pressure will be generated in the Bay Mud underlying the landfill. Dissipation of this excess pore pressure will result in consolidation of the Bay Mud, and could cause the leachate mound beneath the waste to rise. The perimeter leachate collection system (LCRS) is designed to collect all lateral seepage from the leachate mound, which would counteract the mounding. However, the net effect of the consolidation of the Bay Mud and the drainage provided by the LCRS has not been established. It is possible that without further mitigation, the leachate mound could rise to the extent that it creates uplift pressure on the landfill and contribute to the destabilization of landfill slopes.

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.4.12a: As described under Impacts 3.4.6 and 3.4.7, the applicant has proposed to install a LCRS around the perimeter of the landfill footprint and will continue to manage leachate in accordance with the facility's RWQCB-approved Leachate Management Plan. The LCRS will include a gravel-filled trench that is lined with a collection pipe and graded to sumps that are spaced along the trench alignment. The sumps are fitted with automatic level control pumping systems that are set to maintain an elevation of -1 feet MSL within the system, to promote the flow of leachate and outboard groundwater toward the LCRS trench (GeoSyntec, 1998). The LCRS will help to prevent leachate mounding within the landfill.

Mitigation Measures Identified in This Report

Mitigation Measure 3.4.12b: If quarterly measurements of leachate elevations in leachate wells indicate that buildup is occurring, the results of geotechnical monitoring required under Impact 3.4.2 shall be evaluated to assess the effect of the leachate mound on slope stability. The assessment shall be conducted under the supervision of the geotechnical engineer familiar with landfill operations and the behavior of the underlying Bay Mud, as specified in Mitigation Measure 3.4.2b. If the geotechnical assessment determines that the leachate elevation ~~uplift pressure~~ needs to be reduced to maintain landfill stability, RLI will immediately undertake steps to reduce the height of the leachate mound ~~shall be reduced~~. Measures that could be taken to reduce the height of the mound include (1) increasing the rate of leachate removal by adjusting the settings on the automatic pumps in the perimeter sumps and in the landfill gas/leachate extraction wells to commence operation at lower leachate levels, and (2) ~~utilizing temporary pumps placed either within the LCRS sump or installed within the landfill where the leachate mound is observed to increase leachate volume removal~~ implementation of Mitigation Measure 3.4.7e.

Level of Significance with Mitigation

Implementation of the identified measures would reduce potential impacts to less-than-significant levels.

Impact 3.4.13: Excess pore pressure resulting from infiltration of quench water for composting operations conducted on the permitted landfill area could cause slope instability. (Significant)

The applicant proposes to increase the scale of greenwaste composting by approximately ten times. The existing composting operation is already permitted to operate on portions of the permitted landfill footprint. However, increased intensity of composting operations conducted on the permitted landfill footprint could result in the application of substantial quantities of quench water to the composting material. It is unclear from background documents provided by the applicant whether all composting within the permitted landfill footprint will take place on lined pads that will control infiltration. Increased quantities of quench water infiltrating into the landfill mass directly through the surface where composting takes place, or as runoff from the composting area onto other portions of the landfill surface, could lead to a build-up of pore pressure within the landfill mass, which could lead to slope instability problems. This would be a significant impact.

Federal Subtitle D (40 CFR 258.28a) prohibits application of bulk or noncontainerized liquid waste into a municipal solid waste landfill unit unless: (1) the waste is household waste other than septic waste; or (2) leachate or gas condensate are derived from the landfill unit and the unit is designed with a specific composite liner meeting the requirements of 40 CFR 258.40(b). Use of leachate or other liquid as quench water for composting piles located within the permitted landfill footprint could result in infiltration of this liquid into the landfill mass, which would be a violation of 40 CFR 258.41. This, too, would be a significant impact.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

Mitigation Measure 3.4.13a: All composting within the permitted landfill footprint shall be conducted on a low permeability pad that meets permeability specifications established by the RWQCB.

Mitigation Measure 3.4.13b: Runoff from composting areas within the permitted landfill footprint shall be controlled and transmitted to the leachate collection pond or other leachate storage or treatment area.

Mitigation Measure 3.4.13c: The applicant shall comply with all provisions of CCR Title 14, §17865 and Subtitle D, 40 CFR 258.28a.

Level of Significance After Mitigation

Implementation of the above mitigation measures would reduce the significance of this impact to less-than-significant.

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3.5 HYDROLOGY AND WATER QUALITY

This section describes the hydrologic and water quality setting of the Redwood Landfill site, analyzes potential impacts of the proposed project on surface waters, and identifies mitigation measures to reduce or eliminate those impacts. (Please refer to Section 3.4, Geology, Soils, and Seismicity regarding potential project impacts to groundwater.)

3.5.1 SETTING

CLIMATE

The region of the project site is characterized by a temperate coastal climate. Winters are generally cool and wet and summers warm and dry; extreme temperatures are moderated by the Pacific Ocean and the San Pablo Bay. Mean monthly temperatures in the site vicinity range from 37 to 56 degrees in January and 52 to 82 degrees in August. Average annual precipitation in the area is approximately 24 inches. Based on average monthly precipitation data, the average monthly precipitation in the winter (December through February) is 4.6 inches and in summer (June through August) is 0.1 inches. The 100-year, 24-hour precipitation event is 6.23 inches, and the 1,000-year, 24-hour precipitation event is approximately 10 inches.[1] Mean annual evaporation is approximately 71 inches, with a minimum mean monthly evaporation (based on five years of data) of 2.0 inches calculated for January and a maximum mean monthly evaporation of 10.4 inches calculated for June[2] (GeoSyntec, 1998).

SURFACE WATER

Redwood Landfill is located in flat, low-lying, drained marshlands along the western margin of the Petaluma Valley and adjacent to hills of the Coast Ranges west of the site. The site contains and is surrounded by a complex network of natural and manmade surface water bodies including ditches, ponds, creeks, and sloughs. The tidally influenced San Antonio Creek, Mud Slough, West Slough, and South Slough[3] surround the site. These sloughs are tributaries of San Antonio Creek which flows to the Petaluma River (see Figure 3.5-1) and eventually into San Pablo Bay. A perimeter levee ranging in elevation from approximately 6.5 to 9 feet above mean sea level (msl) separates the site from the surrounding waterways and adjacent mud flats.

San Antonio Creek, which forms the northern and eastern boundary of the landfill, drains an area of approximately 33 square miles northwest of the landfill (HLA, 1994). The creek is approximately 120 to 230 feet wide near the landfill levees. The bottom elevation of the creek varies from 5 to 12 feet below mean sea level. The elevation of the tidal mud flats through which

1 Temperature and normal precipitation are based on data collected at Petaluma Fire Station 2 and the 100- and 1000-year storm event data are from the Novato Weather Station (GeoSyntec, 1998).

2 Evaporation data for the project site is based on measurements taken over a five year period between 1955 and 1959 at Hamilton Air Force Base, using a U.S. Weather Bureau Class A pan.

3 As used in this document, South Slough refers to an unnamed slough that runs along the southern boundary of the site that is commonly referred to as South Slough.

SOURCE: USGS; Environmental Science Associates

Figure 3.5-1
Surface Waterways in the Project Vicinity

the creek flows east of the site ranges from approximately 2 to 3 feet above msl. The estimated 100-year flow[4] for San Antonio Creek is 5,900 cubic feet per second (cfs). Due to the breadth of the floodplain in this area, the correspondingly low flow velocities, and density of vegetation, no scouring action is evident or anticipated (HLA, 1994). The West Slough, on the site's western border, is approximately 10 to 15 feet wide and has a bottom elevation of 2 to 15 feet below mean sea level. The South Slough, on the site's southern border, is approximately 10 feet wide; its bottom elevation has not been surveyed (HLA, 1994). Surface water runoff intercepted from surrounding hills can amount to 1,250 cfs during a 100-year precipitation event (HLA, 1994).

Storm Water and Tidal Influence and Flooding

The Petaluma River, San Antonio Creek, and the sloughs and mudflats east of the project site are subject to tidal influence. Occasionally, the sloughs overflow due to heavy rains or tidal peaks resulting in widespread, shallow flooding of the marshlands located east of the landfill (Marin County, 1994a). The Oxbow area and southern third of the site, where sludge processing takes place and the administrative facilities are planned, are within the 100-year floodplain of the Petaluma River and San Antonio Creek (see Figure 3.5-2). As shown on Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FEMA, 1982 and 1991), the base flood elevation associated with the 100-year event is 6 to 7 feet ngvd.[5,6] According to the facility's Report of Waste Discharge (HLA, 1994), the highest tide recorded at the confluence of the Petaluma River and San Antonio Creek was 6.25 feet above msl; however, this elevation was likely exceeded during a February 1998 storm event (GeoSyntec, 1998).

Tsunamis

Previous studies have been conducted on the effects of movement on the San Andreas Fault during the 1906 earthquake with respect to the generation of a tsunami in the vicinity of San Francisco. That earthquake caused 27 feet of vertical displacement and substantial submarine landsliding along the fault margins outside the Golden Gate. Displacement of ocean water caused by vertical movement along a fault or submarine landslides is a primary cause of tsunamis, making the 1906 event particularly instructive as to the potential magnitude of tsunamis from future earthquakes on the San Andreas. Modeling to assess the effects within San Francisco Bay of a major earthquake on the San Andreas indicated that the 1906 earthquake generated a tsunami with a maximum wave height approximately 2 feet above normal levels occurring in the vicinity of Redwood City. The modeling indicated that the attenuation of wave energy east of the fault through the Golden Gate into San Francisco Bay, and north and south within San Francisco Bay, is substantial. Therefore, it is assumed that the existing and proposed perimeter levee at the project site would be sufficient to protect the site from a tsunami.

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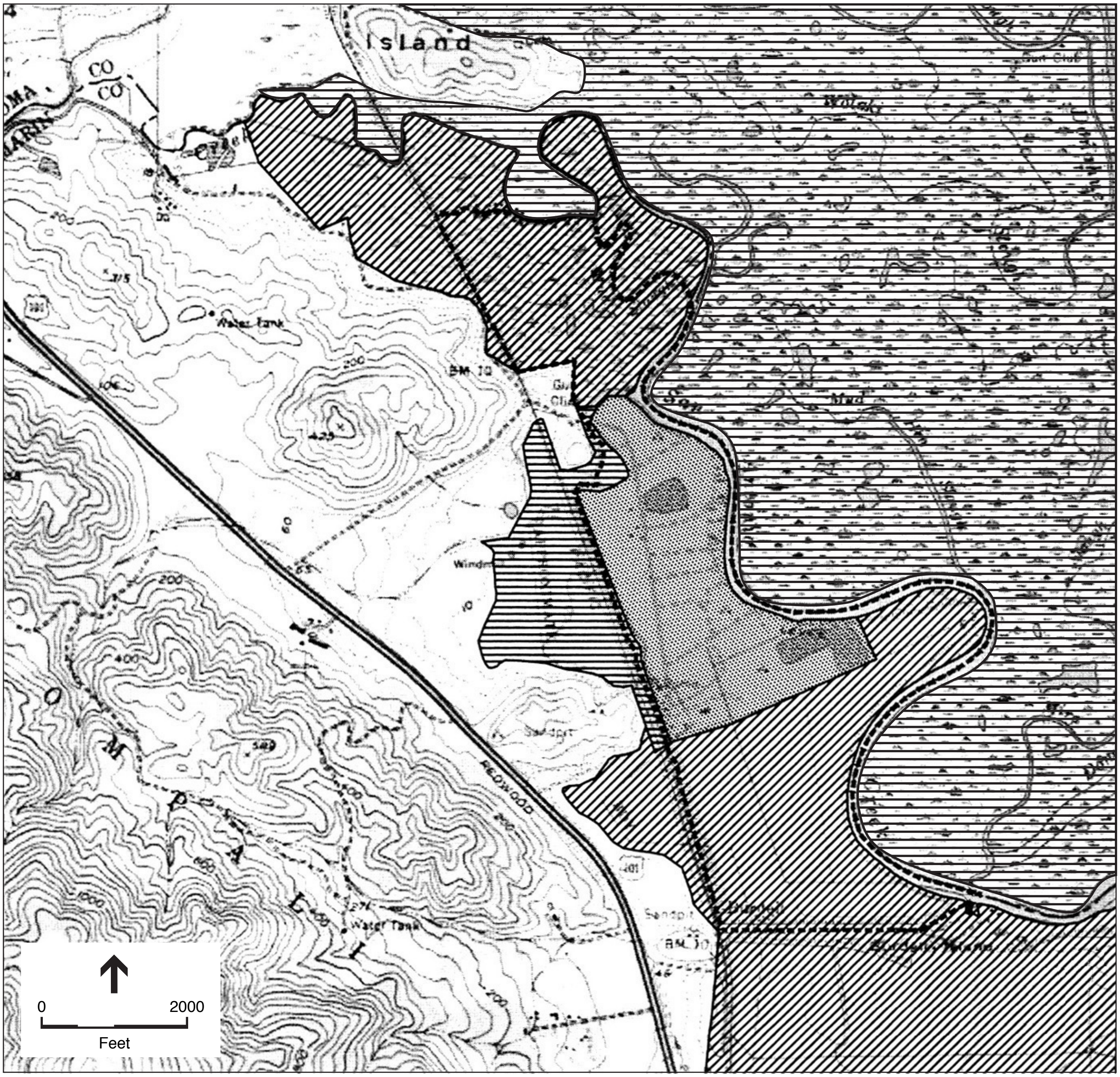
4 The 100-year flood event is the flow that would have a 1 percent chance of occurring in any given year.

5 The Marin County Flood Insurance Rate (FIRM) maps of the site (1982) show a base flood elevation of 6 feet ngvd and the Sonoma County FIRM maps (1991) for the mud flats directly adjacent to the site (to the centerline of San Antonio Creek, the county boundary) show an elevation of 7 feet ngvd.

6 National Geodetic Vertical Datum of 1929.



REFERENCE:
FEMA, National Flood Insurance Program, Flood Insurance Rate Maps
Marin County, CA:
Community Panel Numbers 060173-0140A and 060173-0145A (3/1/82)
Sonoma County, CA:
Community Panel Numbers 0603750995B.01 and 0603750990B (4/02/91)

BASE MAP:
USGS 7.5 Minute Series (Topographic)
California - Petaluma River Quadrangle, 1954

NOTE:
Adjacent areas shown as areas of 100-year flood and 100-year coastal flood with velocity are a result of separate mapping efforts for Marin and Sonoma Counties.

LEGEND

- Areas of 100-year coastal flooding with velocity (wave action); base flood elevations and flood hazard factors determined
- Areas of 100-year flood; base flood elevations and flood hazard factors determined
- Areas of minimal flooding
- Property Line

SOURCE: GeoSyntec Consultants (1998); FEMA; Environmental Science Associates

Figure 3.5-2
100-Year Floodplain Map

On-Site Drainage

The on-site drainage system consists of a network of drainage ditches, berms, and culverts leading to surface impoundments or discharging off site. Three ponds currently exist within the landfill perimeter to help control and manage surface water runoff. These ponds consist of an 11-acre leachate/contact runoff impoundment, an 18-acre storm water impoundment in the southern part of the site, and a temporary~~ 1.5~~ 0.5-acre storm water collection pond in Area G, in the west-central part of the facility. (This area will eventually be developed as part of ~~Because this 1.5-acre pond is now part of Area G, it will not be available for storm water storage once Area G is developed as~~ a waste management unit.)[7] The landfill's permanent and major temporary diversion and drainage control facilities are designed and constructed to carry the peak discharge resulting from the 100-year, 24-hour storm event (GeoSyntec, 1998). The drainage network of diversion berms, drainage ditches, and corrugated HDPE pipe is designed to carry storm water at non-erosive velocities to minimize ditch erosion. Energy dissipaters are utilized where necessary to limit flow velocities.

The drainage system has two discrete components, one for handling contact water and one for handling non-contact water. Contact surface water, i.e., runoff that has been in contact with refuse, compost, or sludge in the active landfill and sludge-processing areas, is managed by various means at different locations on site (Redwood Landfill, 2003~~0~~). At the disposal working face, earthen berms and diversionary ditches and piping are used to collect contact water, which is later collected (by pumping to a tanker truck) and delivered to the 11-acre leachate pond located in the Oxbow. Alternatively, collected contact water may be indirectly discharged to the leachate pond by discharging it to sumps or manholes leading to the pond. Contact water from the impermeable pad where sludge processing for mixing alternative daily cover (ADC) and co-composting takes place also is pumped to the leachate collection pond. When operations occur in close proximity to the leachate pond, contact water is conveyed by gravity flow through temporary pipes to the pond (Redwood Landfill, 2003~~0~~). When rain is forecast, all ADC that is applied as cover for the day is covered with impermeable tarps to prevent rainfall contacting the ADC. Portions of the main sludge impoundment also are available for storage of contact water from the sludge processing area. ~~According to the site's existing Storm Water Pollution Prevention Plan (SWPPP) (Redwood Landfill, 2000), Area G, which formerly was used for sludge storage, has more recently been available as back-up for contact water storage~~. ~~However, Area G currently is permitted as a disposal area, as part of the Class III landfill, and is proposed as part of the project to be used as a Class II landfill.~~ Most of the ~~The adjacent, temporary 1.5-acre storm water pond will become part of Area G; a 0.5-acre storm water pond will remain~~.

Water in the leachate collection pond is left to evaporate or, if it tests "clean" (i.e., has non-detectable concentrations of volatile organics, per U.S. EPA Method 8260, and lower than

7 The facility's SWPPP (RLI, 2003~~0~~) also states that ~~identifies two sludge storage areas, one 11 acres and the other a~~ part of the main sludge impoundment~~, as being~~ is available as back-up for contact water storage. ~~Based on acreage, it is assumed that that the 11-acre area refers to Area G, which formerly was used as a sludge impoundment, but is now permitted as a Class III waste unit and therefore would not be available in the future for contact water storage~~. The main sludge impoundment is proposed under the project to be used for year-round composting or co-composting in addition to continued use for biosolids processing and/or storage. It is not clear what part of the main sludge impoundment, if any, may be available for use in the future for contact water storage.

background inorganics, in accordance with the facility's Reuse of Leachate for Dust Control Plan [McMurty, 1994]), is used for dust control. Recently a leachate vaporator system has been installed (and is considered part of this project) to provide another means of expending leachate collected in the impoundment.

Non-contact water, i.e., storm water runoff that has not been in contact with refuse, compost, or sludge, is conveyed to the ~~1.5~~ 0.5-acre temporary storm water impoundment in Area G or the 18-acre storm water impoundment in the southeast corner of the site, from which it is discharged into adjacent offsite surface waters, or is conveyed directly offsite into San Antonio Creek and the surrounding sloughs via 32 discharge outlets (GeoSyntec, 1998; Redwood Landfill, 2003)) . As noted, conveyance structures have been designed to limit flows to nonerosive velocities. Two of the discharge outlets are less than 2 feet above msl and therefore subject to tidal influence. These outlets, which are located near Area A and the leachate pond, are equipped with flap gates to prevent flood tides from entering the outlets (GeoSyntec, 1998).[8] The other discharge outlets are located at elevations above the 100-year tide elevations in San Antonio Creek, and therefore are not subjected to tidal flows.

Surface Water Quality

Section 303(d) of the Clean Water Act requires states, territories and authorized tribes to develop lists of impaired waters – waters that do not meet water quality standards even after point sources of pollution have been outfitted with the minimum required levels of pollution control technology. The law requires jurisdictions to establish priority rankings for water on the lists and develop action plans, known as Total Maximum Daily Loads (TMDLs), to improve water quality. San Antonio Creek is included on the 1998 California 303(d) list of impaired water bodies, for diazinon coming from urban runoff and storm sewers. The Petaluma River also is included on the 1998 California 303(d) list, for nutrients, pathogens and sedimentation/siltation. Sources for these pollutants are agriculture, construction/land development, and urban runoff and storm sewers.

Beneficial uses

WDR Order No. 95-100 of the RWQCB (1995) identifies estuarine habitat and wildlife habitat as the local beneficial uses of San Antonio Creek and Mud Slough.

REGULATORY SETTING

The existing Redwood Landfill and the proposed project are subject to numerous regulations regarding landfill siting, design, operation, ground- and surface-water quality monitoring, corrective action, and closure and post-closure requirements. Regulations specifically related to water resources include California Water Code Section 13273; California Code of Regulations (CCR) Title 27, Division 2, Chapter 3, Criteria for All Waste Management Units, Facilities, and Disposal Sites; 40 Code of Federal Regulations (CFR) parts 257 and 258 (also known as Subtitle D of the Resource Conservation and Recovery Act [RCRA]); and the National Pollutant

8 Section 5.2.7.3 of the Joint Technical Document states that the purpose of the flap gates is to prevent ebb tides from entering; it is assumed that flood tides is what is meant.

Discharge Elimination System (NPDES), authorized by the Clean Water Act and federally administered by the U.S. EPA. Class II and Class III landfills also are subject to state and federal regulations contained in SWRCB Resolution No. 93-62. Finally, the Marin Countywide Plan Community Development Element (Marin County, 1994b) has established Policy CD-4.6, Water Conservation, which states that water should be conserved, both to decrease use of a scarce resource and to reduce consumption of energy for water distribution.

The Redwood Landfill operates under the following permits intended to protect water quality:

- Waste Discharge Requirements (WDRs), Order No 95-110, issued by the California Regional Water Quality Control Board (RWQCB), San Francisco Bay Region, in May 1995;
- Hazardous Waste and Hazardous Materials Management Regulatory Program Permit, issued by the Marin County Department of Public Works in January 1998;
- NPDES General Industrial Activities Storm Water Discharge Permit, adopted by the State RWQCB on April 17, 1997; and
- Solid Waste Assessment Test Approval for Water Quality, issued by the RWQCB in March 1993.

3.5.2 IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

Consistent with CEQA Guidelines Appendix G, a project would normally have a significant impact on hydrology or water quality if it would:

- violate any water quality standards, waste discharge requirements, or otherwise substantially degrade water quality;
- substantially alter the existing drainage pattern of the site or area in a manner that would result in substantial erosion, siltation, or flooding on- or off-site;
- create or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff; or
- place within a 100-year flood hazard area structures that would impede or redirect flood flows.

State and federal standards have been established for the siting, design, construction, operation, closure, and postclosure of Class II and Class III landfills. These standards incorporate state-of-the-art engineering requirements that are intended to reduce the risks associated with waste disposal facilities to an acceptable level. Any inconsistency between the proposed project and regulations related to surface or groundwater hydrology and water quality would have the potential to result in significant impacts.

Impact 3.5.1: Displacement of landfill slopes, the perimeter levee, or damage to the LCRS due to static or dynamic forces could allow leachate or refuse to reach and potentially contaminate surrounding surface water bodies, block adjacent drainages, or allow surrounding floodwaters to flood the landfill. (Significant)

As discussed under Impacts 3.4.1, 3.4.2, and 3.4.3 of Section 3.4, Geology, Soils, and Seismicity, damage to the landfill slopes, perimeter levee, or LCRS due to dynamic or static forces (e.g., an earthquake [dynamic] or gravity and settlement [static], respectively) and differential settlement could result in the off-site migration of leachate and/or refuse. Such a release of refuse or leachate could in turn reach and contaminate nearby waterways. Landfill slope or levee failure along San Antonio Creek could block the creek's flow and/or that of adjacent sloughs. As discussed in Section 3.4, elements of the project design, mitigation measures proposed as part of the project, and measures identified in this EIR would reduce to a level of insignificance the impacts resulting from potential for slope or levee failure or damage to the LCRS as a result of static or dynamic forces

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.5.1a: Implement Mitigation Measures 3.4.1a and 3.4.1b (regarding RLI's Post Earthquake Inspection and Corrective Action Plan and ensuring that costs to remediate groundwater or surface water degradation resulting from earthquake-caused damage to landfill or levee slopes or the LCRS are financially assured), and Mitigation Measure 3.4.2a (regarding utilization of criteria developed by GeoSyntec for monitoring the lateral and vertical deformation of Bay Mud to provide advance warning or potential landfill instability).

Mitigation Measures Identified in This Report

Mitigation Measure 3.5.1b: Implement Mitigation Measure 3.4.1c (i.e., update the facility's Post Earthquake Inspection and Corrective Action Plan to address changes resulting from the project), and Mitigation Measures 3.4.2b (regarding the conduct and reporting of the geotechnical monitoring program), 3.4.2c (regarding actions to take in response to indications of an increasing rate of deformation in the monitored slopes), 3.4.2d (regarding the modification of the fill sequencing plan, as needed, if the strength of the Bay Mud is less than anticipated), and Mitigation Measure 3.4.3 (regarding regular inspection for cracks in cover material and regular monitoring of pressure and volume changes in the landfill gas collection system).

Level of Significance After Mitigation

Less than significant.

Impact 3.5.2: The off-site migration of landfill leachate could contaminate nearby surface waters. (Significant)

The landfill was constructed and is operating without a liner, resulting in the placement of refuse on top of the Bay Mud. Leachate generated by the landfill expansion could migrate along the Bay

Mud/refuse interface resulting in the discharge of leachate into the surrounding sloughs, creeks, and other waterways. An increased generation of leachate resulting from the proposed increase in refuse throughput and landfill capacity could exceed the capacity of the LCRS, resulting in the off-site migration of leachate and contamination of surface water. As discussed in Section 3.4, implementation of measures proposed as part of the project and identified in this EIR would reduce the potential for off-site leachate migration to less-than-significant levels.

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.5.2a: Implement Mitigation Measures 3.4.7a (regarding the continued management of leachate in accordance with the landfill's RWQCB-approved leachate management plan), 3.4.7b (regarding RLI's preparation of a leachate facilities leak and spill contingency plan and regular monitoring of the leachate pond), 3.4.7c (regarding the immediate inspection of leachate pond containment facilities after any significant seismic or rainfall event, and actions to take if a major leak is evident), and 3.4.7d (regarding evaluation and development of a monitoring and corrective action program ~~the implementation of a collection and containment plan~~ if the groundwater monitoring program detects leachate outside the perimeter levee), and Mitigation Measure 3.4.10a (regarding RLI's ~~commitment to~~ construction of a perimeter trench ~~a liner and~~ LCRS and augmentation of the LCRS by the pumping of leachate from wells in the interior of the landfill~~in Area G that complies with applicable state and federal regulations governing Class II waste disposal facilities~~).

Mitigation Measures Identified in This Report

Mitigation Measure 3.5.2b: Implement Mitigation Measure 3.4.7e (regarding the installation of a LCRS at Areas E and F and implementation of a pumping program in the interior of the landfill~~prior to the placement of wastes in those areas~~), Mitigation Measure 3.5.3b (to ensure that composting occurs on appropriate pads that are sufficiently impermeable), Mitigation Measure 3.5.3d (to ensure that contact water [leachate] from the proposed composting, co-composting, and sludge processing areas continues to be managed separately from non-contact runoff), and Mitigation Measure 3.4.7f (regarding the landfill's Leachate Facilities Leak or Spill Contingency Plan).

Level of Significance After Mitigation

Implementation of the measure proposed as part of the project in combination with the measures identified in this report would reduce this impact to a less-than-significant level.

Impact 3.5.3: The proposal to no longer manage water that has contacted compost, co-compost, sludge, and materials proposed to be used as ADC, separately from non-contact water could degrade the water quality of the storm water impoundment and ultimately transport contaminants to off-site surface waters. (Significant)

Water that has contacted refuse, compost, co-compost, sludge, or some materials proposed to be used as ADC ("contact water") has the potential to transport dissolved or suspended contaminants initially to on-site impoundments and ultimately to off-site receiving waters. To minimize the potential contamination of water resources, Redwood Landfill currently manages contact water and non-contact water as separate, discrete systems: contact water is directed to the 11-acre leachate pond and non-contact water is discharged directly off-site or is directed to the interim 1.5-acre storm water pond or the 18-acre storm water pond, from which it ultimately is discharged off-site. Water in the leachate pond is not discharged off-site; it is evaporated, used for dust control (assuming it tests "clean"), or directed to the recently-constructed leachate vaporator, where it is destroyed. The facility's current SWPPP (Redwood Landfill, 2003~~0~~) describes "leachate, or contact water from waste disposal operations or from other processes onsite" as "the key control issue" in limiting the off-site discharge of contaminated runoff.

As part of the current project, however, RLI proposes to direct water that has contacted compost, co-compost, or sludge to the 18-acre storm water impoundment rather than to the leachate impoundment. As part of this proposal, two times per year RLI would test water that has been in contact with these materials (compost, co-compost, or sludge). If the tests show the water's pollutant levels are below surface water background levels, this contact runoff would be directed to the storm water impoundment. As noted above, water in the storm water impoundment ultimately is discharged off-site.

Incoming composting feedstock, sludge, and ADC materials would be received from a variety of sources. The contaminant levels in different incoming loads could vary widely. The composting process is regulated by state and federal agencies and monitored to ensure that possible pathogens within the feedstock are destroyed, in order to protect public health and the environment. Protection of public health and the environment is also the purpose of segregating contact and non-contact water at solid waste, sludge processing, and composting facilities. Testing the contact water runoff two times per year would not provide a reliable measure of the quality of runoff that could be generated by rainfall falling on the materials being processed at any particular time. Therefore, the periodic testing of the contact water as proposed under the project is not sufficient to guarantee that contact water discharged from the storm water pond would be sufficiently free of contaminants to warrant its release off-site. Testing of the water in the impoundment prior to *each* release could theoretically ensure that only water meeting the established standards was released; however, in practice such frequent testing would be infeasible. Storms can arrive in rapid succession during the rainy winter months, requiring regular and frequent discharges from the storm water pond. The continued segregation of contact water and non-contact water is an accepted and feasible approach to preventing off-site discharges of contaminated contact water.

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.5.3a: Outside of areas with a LCRS, future composting/co-composting activities will be conducted on appropriate composting pads to limit infiltration and to control run-off (GeoSyntec, 1998). Based on the applicant's "Comments and Project Clarification Discussion [on the project]" (RLI/WM, 2000), wet-weather composting will not take place in unlined areas. Thus, year-round composting will take place only on lined pads (i.e., lined with 2 feet of clay, as in Fields 1 and 2). Pads will be designed and constructed to promote surface drainage and prevent ponding. Portions of the composting pads may be surfaced with 6 to 12 inches of gravel, asphalt, or other suitable material to provide for all weather access (GeoSyntec, 1998). Dry-weather composting will be conducted on pads comprised of a minimum of either 1 foot of native soils or recompacted imported soils possessing a maximum saturated hydraulic conductivity of 1 x 10^{-6} centimeters per second.

Mitigation Measures Identified in This Report

Mitigation Measure 3.5.3b: For composting operations outside the landfill footprint, including any operations in the area currently known as the main sludge impoundment, pads used for both wet weather and dry weather operations must meet permeability specifications established by the RWQCB. Although Bay Mud is generally a low-permeability soil, lenses of more permeable sand or organic material are known to occur within it. The applicant shall provide documentation to the RWQCB of site-specific studies documenting that areas proposed to be used for composting meet RWQCB specifications throughout the proposed area.

Mitigation Measure 3.5.3c: For composting or co-composting operations conducted on any portion of the landfill that already has a LCRS (i.e., within the permitted 223-acre landfill footprint), implement Mitigation Measure 3.4.13c (regarding Title 14 Section 17865 requirements for the siting of composting facilities on landfills). See also Impact 3.4.13 (regarding potential excess pore pressure resulting from the infiltration of quench water) in Section 3.4, Geology, Soils, and Seismicity.

Mitigation Measure 3.5.3d: To ensure storm water discharges do not contaminate off-site receiving waters, all contact water shall continue to be managed separately from non-contact water and retained on site. Storm water management shall include the following measures:

1. Composting operations areas outside of the landfill footprint, including areas used for active composting, stockpiling of feedstock and curing or finished compost, maturing piles, and other processing, shall be fitted with leachate collection systems, such as site grading and perimeter drain systems, that prevent pooling of liquids, that collect any free liquid, including leachate, excess quench water, and other liquids, and that convey the collected liquid to the leachate collection pond or other leachate treatment facility.

2. Areas used for wet season handling, storage, or stockpiling of dried sludge, materials to be used for ADC, or other materials capable of producing contaminated runoff shall be fitted with impermeable pads and leachate collections systems, or the materials themselves shall be protected from contact with rainwater.

Level of Significance After Mitigation

The combination of Mitigation Measures 3.5.3a, 3.5.3b, 3.5.3c, and 3.5.3d will ensure that this impact is reduced to a less-than-significant level.

Impact 3.5.4: Insufficient capacity to contain contact-water runoff from new areas proposed to be used for composting and co-composting would result in the off-site release of contact water and the potential degradation of nearby surface waters. (Significant)

Capacity may not be sufficient to contain contact-water runoff from the fields in the Oxbow area proposed for composting. Fields 1-5 comprise approximately 46 acres, of which approximately

20 acres (Fields 1 and 2) are lined and would be used for year-round composting. (As noted in the Project Description, since publication of the Joint Technical Document [1998] the applicant has indicated that composting would not be conducted on unlined areas during wet weather. Therefore this analysis assumes that the fields shown as “native materials” in Figure 2-3 [i.e., Fields 3, 4, and 5] would not be used during the rainy season [November through April]).

According to RLI the purpose for constructing the new leachate vaporator system is to ensure that sufficient capacity is maintained in the leachate pond, considering the increase in leachate generation that is expected. However, based on the proposal to divert compost and sludge contact water to the storm water pond (discussed under Impact 3.5.3, above), the project as proposed does not provide for the capacity to retain on-site, separate from non-contact water, contact-water run-off from this new area.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

Mitigation Measure 3.5.4: The applicant shall produce and present to the LEA and RWQCB for approval a report demonstrating that sufficient capacity exists to contain contact water from areas outside the landfill footprint, proposed to be used for composting, co-composting and sludge processing, that would result from a 100-year storm event. Approval of use of these areas for composting, co-composting, and sludge processing shall be conditioned upon submittal and approval that this standard has been met.

Because the amount of contact water generated at Redwood Landfill would increase as a result of the expanded composting area~~, and Area G, which currently is available as back-up for contact water storage, will no longer be available for back-up storage when it is developed as either a Class III or Class II waste management unit~~, RLI will have to demonstrate to the satisfaction of the LEA and the RWQCB where, within the landfill boundaries, contact water from this area would be directed, and that such contact-water impoundment will have sufficient capacity to accommodate run-off from a 100-year storm event. Storage capacity shall be adequate to contain contact water generated from a storm occurring mid- or late-season, when the impoundment could have water in it from previous storms.

Level of Significance After Mitigation

RLI’s demonstration to the LEA and RWQCB that sufficient capacity exists at the site to contain contact water from the composting, co-composting, and sludge processing areas outside the landfill footprint would reduce this impact to a less-than-significant level.

Impact 3.5.5: The use of leachate as quench water could contaminate groundwater and surface water. (Significant)

Quench water is applied periodically in composting operations to maintain the appropriate moisture balance within the composting windrows. RLI proposes to use leachate (from the

11-acre leachate pond) as quench water in the composting operation. As proposed, the leachate would be tested quarterly, as it is now, and would be used for quench water as long as it met RWQCB-approved standards currently applied to the use of leachate for dust control at the site.

Composting is proposed to occur in a range of locations both within and outside the permitted landfill footprint. Areas outside the 223-acre permitted landfill footprint (i.e., Fields 1, 2, 3, 4, and 5 and the main sludge impoundment) are also outside the LCRS. Fields 1 and 2 are lined with a 2-foot clay liner and Fields 3, 4, and 5 have a base of native material (GeoSyntec, 1998). Composting during the dry-weather seasons (when quench water is more likely to be applied) could occur in any of these areas. If not carefully applied, excess quench water could generate surface runoff, which could reach the on-site drainage system and ultimately be discharged off site.

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.5.5a: The applicant will test leachate to be used as quench water quarterly, consistent with current testing and use protocols applied to the use of leachate for dust control. The leachate will be used for quench water as long as, and only if, it meets RWQCB-approved standards established for the use of leachate for dust control at the site. This measure will be reflected as a requirement in the Solid Waste Facilities Permit as well as the landfill's Waste Discharge Requirements.

The current program to reuse leachate for dust control, upon which the program to reuse leachate for quench water will be based, requires RLI to sample the leachate pond on a quarterly basis prior to use for dust control to insure that levels of chemical constituents are at "clean" standards. Reporting of the leachate sampling is included with the Self Monitoring Program associated with Redwood Landfill's Waste Discharge Requirements. Written detection monitoring reports, which include compliance evaluation summaries, are filed by the 15th day of the month following the report period; an annual report also is required, by January 31 for the previous calendar year.

Mitigation Measure 3.5.5b: Implement Mitigation Measure 3.5.3a.

Mitigation Measures Identified in This Report

Mitigation Measure 3.5.5c: Implement Mitigation Measures 3.5.3b, 3.5.3c, and 3.5.3d.

Level of Significance After Mitigation

Implementation of these measures would reduce impacts to less-than-significant levels.

Impact 3.5.6: Areas outside the 223-acre landfill footprint, including areas proposed for composting and co-composting operations and the relocated administration facilities, are within the 100-year flood plain. (Significant)

As discussed in the setting section and shown in Figure 3.5-2, FEMA flood insurance rate maps for this part of Marin County show that the portion of the landfill that is outside the permitted landfill footprint is within the 100-year flood plain of the Petaluma River/San Antonio Creek.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

Mitigation Measure 3.5.6: To ensure the site and project elements are protected from potential impacts of flooding, the applicant shall complete their planned increase in the height of the perimeter levee that encompasses the entire landfill site (i.e., the approximately 380 acres of the 420-acre Southern Area currently located within levees) to 9 feet above msl and their planned increase in the width of the perimeter levee to 10 feet prior to implementation of project elements in the Oxbow or other areas outside the permitted 223-acre landfill footprint.

The applicant's Joint Technical Document (JTD) (GeoSyntec, 1998) states on page 4-21 that the perimeter levee is approximately four miles long and separates the site from adjacent sloughs. As part of the description of the existing facility (pages 5-1 and 5-2) the JTD states that the perimeter levee encompasses approximately 380 acres of the 420-acre Southern Area of the landfill property, and that the height of the perimeter levee will be increased to 9 feet above mean sea level around the entire landfill, and that the crest will be widened to 10 feet. These changes to the perimeter levee are not specified as project elements, and elsewhere in the JTD some ambiguity exists as to whether references to a perimeter levee refer to a levee around only the permitted landfill footprint (approximately 223 acres) or around the entire landfill site (approximately 380 acres of which are within existing levees). This analysis assumes that as part of the facility's existing operation, as stated on the aforementioned pages, RLI intends to increase the perimeter levee that encompasses the entire 380 acres of the 420-acre Southern Area to 9 feet above msl and to widen its crest to 10 feet.

Because the base flood elevation for the 100-year storm is 6 to 7 feet ngvd (approximately equivalent to mean sea level), increasing the levee to 9 feet would protect the landfill property from the 100-year flood. Increasing the width should contribute support to the levee's stability and ability to withstand the dynamic forces of the river at flood stage. The 223-acre landfill footprint already is located outside the 100-year flood plain due to existing levees. The portion of the site outside the landfill footprint remains vulnerable to flooding until these planned changes to the perimeter levee are completed.

Level of Significance After Mitigation

Implementing the planned increases in the height and width of the perimeter levee would reduce this impact to a less-than-significant level.

Impact 3.5.7: If surface water drainage systems are not properly managed, storm water contacting the landfill surface could erode landfill cover materials and cause the sedimentation of onsite drainage systems, and potentially, the sedimentation and/or contamination of off-site receiving surface waters. (Significant)

Storm water runoff from the landfill occurring at erosive velocities, volumes, or distances could erode landfill cover materials and lead to sedimentation of the landfill's drainage system. This would further impair the system's capacity to accommodate storm flows and could result in offsite impacts to surface waters.

Mitigation Measures Proposed as Part of the Project

> **Mitigation Measure 3.5.7:** Implement Mitigation Measures 3.4.4a, 4b, 4c, and 4d (to implement an updated SWPPP and prepare and eventually implement a final closure and post-closure maintenance plan). As discussed under Impact 3.4.4 in Section 3.4, Geology, Soils, and Seismicity, implementation of these measures would reduce the potential impacts of storm-generated erosion and help ensure the proper management of the site's drainage system. Implementation of these measure, combined with requirements specified in Title 27 for precipitation and drainage controls as well as the existing drainage facilities and management practices at the landfill would reduce this impact to a less-than-significant level.

Mitigation Measures Identified in This Report

No additional measures required.

Level of Significance After Mitigation

Less than significant.

Impact 3.5.8: Construction activities, including grading and related activities at the proposed composting areas could increase soil erosion and result in the transport of sediments and other contaminants to off-site surface waters. (Significant)

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

> **Mitigation Measure 3.5.8:** Prior to construction, the applicant will prepare a construction Storm Water Pollution Prevention Plan (SWPPP) to minimize impacts to storm water runoff quality from construction activities. The construction SWPPP will be kept on site and available to RWQCB and LEA staff upon request.

Level of Significance After Mitigation

Implementation of this measure would reduce this impact to a less-than-significant level.

Impact 3.5.9: The existing drainage system may be insufficient to accommodate the 1~~,~~00~~0~~-year, 24-hour precipitation event required of Class III landfills~~, as Area G is proposed to be classified~~. (Significant)

According to the applicant's description of the existing surface drainage system in the Joint Technical Document (Section 5.2.7.1) (GeoSyntec, 1998) the permanent and major temporary diversion and drainage facilities are designed and constructed to accommodate~~d~~ a volume of precipitation and peak flow from surface runoff associated with precipitation of the 100-year, 24-hour duration storm (design event). Section 5.6.4 of the JTD, Surface-Water Management, describes existing drainage and erosion control and storm-water management and sediment control without specifying a design storm. Sections 6.6.4 and 6.6.4.1 in Chapter 6 of the JTD, on the proposed project, state that no changes in surface water management or drainage and erosion control, from that currently permitted and described for existing facilities in Sections 5.6.4 and 5.6.4.1, respectively, are proposed. (As discussed under Impact 3.5.3, above, in Section 6.6.4.2 the applicant does propose to change the management of contact water.)

The applicant's Report of Waste Discharge for Area G Expansion (GeoSyntec, 1997), Section 5.7, Precipitation and Drainage Controls (Surface Drainage), states that this [element] is unchanged from that reported in the facility's Report of Waste Discharge (ROWD) (HLA, 1994). The ROWD states that the permanent and major temporary diversion and drainage facilities will be designed to accommodate flows from the 100-year, 24-hour duration storm. Since publication of the DSEIR RLI has withdrawn the proposal to reclassify Area G as a Class II waste management unit. Therefore the entire landfill would be operated as a Class III landfill, and the 100-year storm event is the appropriate "design storm" for drainage facilities.

~~CCR Title 27, however, requires that the capacity of precipitation and drainage control facilities (design storm) for Class II MSW Landfills be sufficient to accommodate the 1,000-year 24-hour precipitation event (Title 27, Table 4.1, Construction Standards for Units, Sections 20320-20377). RLI has applied to have Area G reclassified from a Class III to a Class II waste management unit. Since Area G is integrated into the overall landfill design (as shown in the existing site plan and permitted and proposed final contours), any part of the landfill's surface drainage system that serves or is affected by surface drainage at Area G would need to be upgraded to meet Title 27 standards for Class II units.~~ Mitigation Measure 3.5.9 would ensure that the facility meets Title 27 precipitation and drainage control standards.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

Mitigation Measure 3.5.9: The applicant shall produce and present to the ~~LEA and~~ RWQCB for approval a report demonstrating that sufficient capacity exists in the precipitation and drainage control facilities ~~affecting or affected by Area G~~ to accommodate the 1,00~~0~~-year 24-hour precipitation event as required by Title 27. A copy of the report shall also be provided to the LEA. The report shall include information about the anticipated elevation of flows in San Antonio Creek during the 100-year flood; if existing and any new discharge outlets to San Antonio Creek are below this elevation, such drains shall be equipped with flap gates to prevent flood waters from entering the outlets, as two existing drains are equipped to prevent flood tides from entering. ~~Approval of use of this area as a Class II unit shall be conditioned, in part, upon submittal and approval that this standard has been met.~~ The final engineering design specifications for the permanent and major temporary drainage facilities capable of meeting the requirements specified in Title 27, Table 4.1 shall be developed by a registered engineer and shall include drainage facilities for all areas of the landfill property. These specifications shall become part of the project.

Level of Significance After Mitigation

Less than significant.

Impact 3.5.10: The proposed use of various alternative daily cover (ADC) materials could have an adverse impact on water quality. (Significant)

RLI has proposed to use shredded green waste/wood waste, dried sludge, wet sludge mixed with soil, wet sludge mixed with green waste, and compost as alternatives to soil for daily cover. Precipitation contacting these cover materials could transport dissolved or suspended contaminants from the cover materials to receiving waters. Demonstration projects were conducted in 1995 and 1996 for most of the proposed ADC materials (all except compost) to determine their suitability for use as ADC. The demonstration projects indicated that the materials met Title 14 and Title 27 performance standards for ADC, and the LEA granted interim approval of their use until the SWFP was revised. ADC materials involving sludge would continue to be mixed, as they are now, on an impermeable pad with leachate and storm water containment in place.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

Although Mitigation Measures 3.5.10a and 3.5.10b, below, are included as best management practices in the current SWPPP (Redwood Landfill, 2003~~2000~~), they are not described as part of the facility's drainage or operational controls in the Joint Technical Document (GeoSyntec, 1998) and therefore do not appear to be proposed as part of the project.

Mitigation Measure 3.5.10a: As described under "working face operations in wet weather" in Redwood Landfill's current Storm Water Pollution Prevention Plan (Redwood Landfill, 2003~~2000~~), when rain occurs or is forecast or imminent, RLI shall cover the ADC applied that day with impermeable tarps to prevent rainwater contact with the ADC.

Mitigation Measure 3.5.10b: The operator shall not use ADC, or shall cover it with a geosynthetic blanket after application at the working face ~~Dirt shall continue to be used as the cover material~~ on any day preceding closed days (e.g., Saturdays); ADC may continue to be used as the daily cover the rest of the week (i.e., Monday through Friday; the landfill is closed on Sunday).

Mitigation Measure 3.5.10c: In conjunction with implementing Mitigation Measure 3.5.3, above, water contacting ADC shall be considered, and managed as, contact water. Thus water contacting ADC shall be managed separately from non-contact water and retained on site.

Level of Significance After Mitigation

Less than significant.

REFERENCES – Hydrology and Water Quality

GeoSyntec Consultants, 1997. *Report of Waste Discharge for Area G Expansion*, 25 March 1997.

GeoSyntec Consultants 1998, *Joint Technical Document: Redwood Landfill, Marin County, California*, 27 March 1998.

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Marin County, *Redwood Landfill Solid Waste Facilities Permit Expansion Project Environmental Impact Report*, SCH # 91033042, prepared by Woodward Clyde, 1994a.

Marin County, *The Marin Countywide Plan Community Development Element*, Adopted January 1994b.

McMurty, Richard K., Chief of Groundwater Protection/Waste Containment Division, San Francisco Bay Regional Water Quality Control Board, letter to Jordan Smith, Redwood Sanitary Landfill, Approval of Reuse of Leachate for Dust Control – Redwood Landfill, Novato, Marin County, July 29, 1994.

Redwood Landfill, Inc. 2003~~2000~~. Storm Water Prevention Pollution (sic) ~~Prevention~~ Plan: NPDES Permit No. 2 2S00012, prepared for Redwood Landfill, Inc., July 16, 2003~~March 2000~~.

Redwood Landfill, Inc., A Waste Management Company (RLI/WM), *Comments and Project Clarification Discussion based on Final Initial Study Type Review (December 7, 1999)*, January 31, 2000.

Regional Water Quality Control Board, San Francisco Bay Region, Order No. 95-110, Updated Waste Discharge Requirements, Redwood Landfill, Inc. Class III Waste Management Unit, adopted May 24, 1995.

3.6 LAND USE AND PLANNING

3.6.1 SETTING

EXISTING LAND USES

Agricultural land uses, primarily ranching, predominate in the project vicinity; other nearby land uses include recreation, open space, and the Marin County Airport. Olompali State Historic Park, the former site of a Coast Miwok settlement, is located on the east-facing slopes of Burdell Mountain west of U.S. 101 near the landfill site. A hill quarried to provide soil for landfill daily cover is located west of the site between U.S. 101 and the Northwestern Pacific Railroad right-of-way, which runs along the site's western boundary. Kayaking and other water-oriented recreational uses occur on San Antonio Creek, the Petaluma River, and the sloughs and tidelands east and south of the project site. A privately operated marina is located on Mira Monte Slough on the site's southern border, although as of October 2002 the marina is apparently closed, and is being used to store motor homes. The runway of Marin County Airport, Gnoss Field, is located approximately 3,000 feet south of the site's southern boundary, and approximately 4,500 feet from the southernmost active landfill area (Area G). Gnoss Field is a general aviation airport that is used both by piston-type aircraft and turbojet aircraft. The County has plans to extend the Gnoss Field runway 1,100 feet to the northwest, which would result in its reaching closer to the landfill (Rawles, 2003). The Redwood Landfill site itself previously had several tenants with other land uses; however, the lease of the last remaining tenant, an auto wrecking yard, expired in May 2002 and the tenant moved offsite. The site is now used by RLI entirely for activities and operations related to landfilling and composting.

The nearest existing residential developments are the Buck Center (a medical research center that also includes on-site residential units), residential developments on Bahia Lagoon and south of the Rush Creek Open Space Preserve, and single family houses and limited agricultural/residential land uses along Atherton Avenue, south of the landfill in an unincorporated section of the County near Novato. The Buck Center is located west of U.S. 101 and south of Olompali State Park, approximately 1.5 miles southwest of the Redwood Landfill boundary. The residential development on Bahia Lagoon and the Rush Creek Estates development are both approximately 2.5 miles from the southern border of the landfill property.

APPLICABLE PLANS AND POLICIES

The Marin Countywide Plan

Because the site is located in an unincorporated area outside the sphere of influence of the City of Novato, it is governed by the policies of the Marin Countywide Plan (1994), the County's general plan. The Environmental Quality, Community Development, and Agriculture Elements of the Countywide Plan contain policies and programs relevant to the project site and its vicinity.

A draft of a new Marin Countywide Plan was released to the public in February, 2004. As part of the development of the new Plan, The Sustainability Working Group in 2001 produced interim Sustainability Principles (Marin County Sustainability Working Group, 2001) to help guide the development of the plan. The draft Plan does not yet have the force of adopted County policy; however the Sustainability Principles are being used to guide plan development. Several of the 10 Sustainability Principles are relevant to the project and to management of wastes in general:

2. Use finite and renewable resources efficiently and effectively.
We will reduce consumption and reuse and recycle resources. We will reduce waste by optimizing the full life cycle of products and processes.
Examples of Community Indicators: Per capita waste produced and recycled; per capita use of energy, natural gas, and water; ecological footprint (measures per capita consumption of natural resources).

3. Reduce the release of hazardous materials.
We will make continual progress toward eliminating the release of substances that cause damage to living systems. We will strive to prevent environmentally-caused diseases.
Examples of Community Indicators: Water and air quality; measurements of toxic levels; childhood cancer rates.

7. Foster businesses that provide a balance of economic, environmental and social benefits.
We will retain, expand and attract a diversity of businesses that meet the needs of our residents and strengthen our economic base. We will partner with local employers to address transportation and housing needs.
Examples of Community Indicators: Taxable sales; retention and attraction of targeted businesses; job growth; unemployment rate; number of businesses with environmental management systems; hospitality revenues.

10. Support public health, safety, and social justice.
We will live in healthy, safe communities and provide equal access to amenities and services. We will particularly protect and nurture our children, our elders, and the more vulnerable members of our community.
Examples of Community Indicators: Income statistics; health statistics; Percent of uninsured (medical population; longevity after retirement; volunteerism; crime rate; percent of philanthropic contributions.

Environmental Quality Element

The Environmental Quality Element of the current Marin Countywide Plan establishes policies to protect the County's natural resources and ensure that design of the built environment is compatible with its natural setting. This element establishes three major planning corridors in the County, based on the County's ecosystem, as a broad land management framework. The project site is located within the "Inland Rural Corridor," within which agricultural uses are to be emphasized, along with other uses that are compatible with agriculture.

This element also establishes resource conservation areas as overlay zones to identify and conserve specific resources in unincorporated portions of the County through general plan policies. The project site is located in the Bayfront Conservation Zone. Bayfront Conservation Zone policies include protection and restoration of habitat, protection of environmental quality, support and guidance for agricultural uses, guidance on public access to bayfront lands, and protection of scenic quality.

Community Development Element

The Community Development Element of the Marin Countywide Plan covers policies and issues related to countywide character, development patterns, and land use. As noted above, the project site is located within the "Inland Rural Corridor," in which agricultural uses are to be emphasized. It is also in the Novato Planning Area (PA 1), one of seven planning areas in the County established to further define specific area and parcel policies. Figure 3.6-1 shows land use designations in the project vicinity established in the Community Development Element. As shown, the project site is designated "AG1" (agriculture, with 1 housing unit per 31-60 acres) and nearby areas are designated for agricultural, commercial recreational, and open space uses.

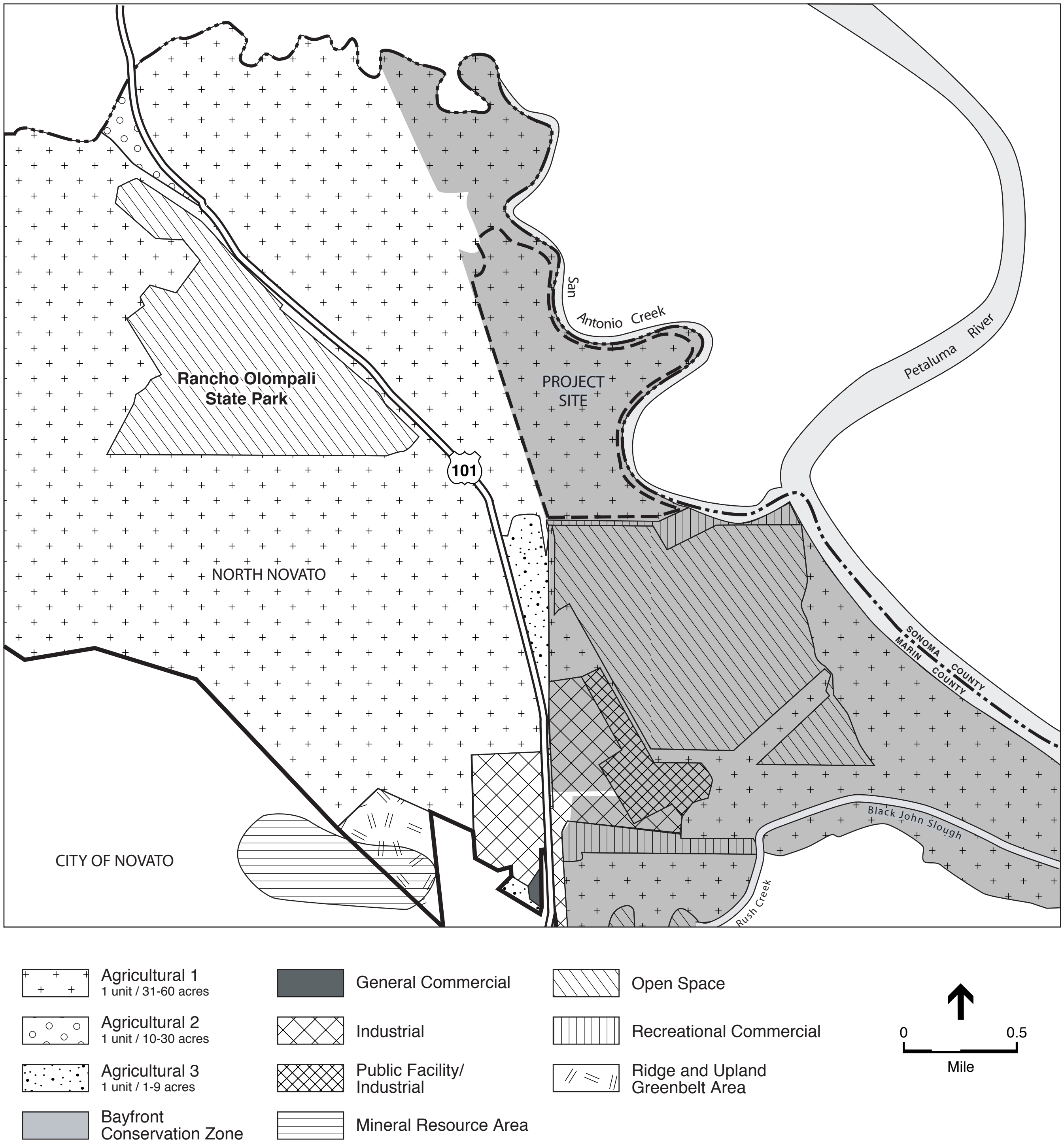
Agriculture Element

The Agriculture Element provides background information on agriculture in Marin and establishes County policies and programs to protect and preserve agricultural practices. This element includes a map of "Important Farmlands in Marin County," which shows that much of the land in the site vicinity is designated as either "Farmlands of Local Importance" or "Grazing Lands." The project site is shown as "urban and other land uses." The site is within the A-60 agricultural zoning district, which allows one housing unit for every 60 acres. The "A" (Agriculture) zoning district is the least restrictive of three established agricultural zones (the others are ARP [Agricultural Residential Planned] and APZ [Agricultural Production Zone]), and allows several non-agricultural uses. The site is also located within the County's Agricultural Preserve Zone, a district established to define the areas within which the County would enter into Williamson Act contracts with owners of qualifying agricultural property.[1]

The following Countywide Plan policies are relevant to the proposed project. Table 3.6-1 summarizes project consistency with these land use policies.

> <u>Policy EQ-2.43. Development and Access Limitations in Bayfront Conservation Areas</u>. Development shall not encroach into sensitive wildlife habitats, limit normal range areas, create barriers which cut off access to food, water, or shelter, or cause damage to fisheries or fish habitats. Buffer zones between development and identified or potential wetland areas shall be provided. On residential and industrial parcels which are already filled and at least 50 percent developed, minor redevelopment involving less that 25 percent of the structure may be excluded from policies which apply to the Bayfront Conservation Zone. No additional fill will be allowed. Access to environmentally sensitive marshland and adjacent habitat shall be restricted, especially during spawning and nesting seasons.

[1] The contractual agreement restricts the property owner's use of his or her land to agricultural use for a period of 10 years in exchange for a County tax assessment based on the property value in agricultural use rather than at market value. The contract is automatically renewed every year; landowners may withdraw from a Williamson Act contract, if they so chose, nine years after giving notice.



SOURCE: Community Development Element
Marin Countywide Plan (1994)

Figure 3.6-1
Designated Land Uses
in Project Vicinity

TABLE 3.6-1
PROJECT CONSISTENCY WITH COUNTYWIDE PLAN LAND USE POLICIES

Countywide Plan Policies	Consistent With Countywide Plan?	Analysis
EQ-2.43	Refer to Section 3.3, Biological Resources	The project does not exceed existing landfill footprint and therefore would not encroach upon the tidal flats, sloughs, or other waterways immediately east of the project site. See also Section 3.3, Biological Resources.
EQ-2.45	Yes	The project is located within the diked historic marshlands subzone. Although the project does not specifically “foster enhancement of wildlife and aquatic habitat value,” it does not entail or require any additional diking, filling, or dredging.
EQ-2.53	Refer to Sections 3.3 and 3.5	Mitigation measures identified in Sections 3.3 and 3.5 of this EIR, as well as measures incorporated into the facility’s waste discharge requirements, would eliminate potential adverse impacts on the water quality of the bay and nearby marshes. Refer to Sections 3.3, Biological Resources, and 3.5, Hydrology and Water Quality.
EQ-2.56	Yes	Redwood Landfill operates pursuant to waste discharge requirements (WDRs) issued by the San Francisco Bay Regional Water Quality Control Board (RWQCB). Prior to project implementation the RWQCB would revise the WDRs to ensure the protection of groundwater and adjacent surface waters from potential accidental waste discharges. See also Section 3.5, Hydrology and Water Quality.
EQ-2.58.	Yes	The proposed project would occur within the existing Redwood Landfill property boundary and would not encroach upon or interfere with adjacent agricultural land uses.
EQ-2.66 and EQ-2.67	Yes	Although the project site is located in a shoreline area adjacent to San Antonio Creek, safety considerations related to the site’s existing and proposed use as a solid waste landfill make the concurrent use of the site for public access to shoreline areas inappropriate.
CD-1.2	Yes	While the site would not be used for agriculture under the proposed project, the existing landfill has been shown to be compatible with adjacent and nearby agricultural uses, and should continue to be so under the proposed project. According to the County’s Zoning Code, subject to issuance of a use permit, dumps (landfills) are considered conditionally acceptable uses in the County’s agricultural districts.
CD-8.2	Yes	According to the County Zoning Code, the existing and proposed use of the site as a landfill is allowed in agricultural districts, subject to issuance of a use permit.
A-1.10	Yes	According to the County Zoning Code, subject to issuance of a use permit, the existing and proposed use of the site as a solid waste landfill is considered compatible with agricultural land uses.

Policy EQ-2.45. Diked Historic Marshlands Subzone. The county shall, through its land use and development regulations, foster the enhancement of wildlife and aquatic habitat value of the diked historic marshlands subzone. Land uses which provide or protect wetland or wildlife habitat, and which do not require diking, filling, or dredging, shall be encouraged.

Policy EQ-2.53. Siting of Industrial Facilities. The development and siting of industrial (and any other) facilities adjacent to bayfront areas should be planned to eliminate significant adverse environmental impacts on the water quality of the bay and marshes.

Policy EQ-2.56. Waste Discharge. The County shall not permit waste discharge which would contaminate water resources or adversely affect any inter-tidal environment. Municipal discharges should move toward partial consolidation and relocation of discharge points.

Policy EQ-2.58. Protection of Existing Agricultural Lands. The County shall protect existing agricultural lands in the Bayfront Conversation Zone.

Policy EQ-2.66. Use of Shoreline Areas. Public use of the shoreline areas is desirable and should be encouraged consistent with ecological and safety considerations.

Policy EQ-2.67. Ensuring Public Access to Shoreline Areas. The County shall ensure that public access is provided and protected along the bayfront and significant waterways.

Policy CD-1.2. Land Use in the Inland Rural Corridor. Agricultural land uses will be emphasized in the Inland Rural Corridor along with other uses that are compatible with agriculture and enhance agriculture preservation in a significant way, such as resource and habitat preservation. Existing communities shall be preserved.

Policy CD-8.2. Land Use Categories. Land use categories are generalized groupings of land uses and titles that define a predominant land use type. Some listed uses will be conditional uses under zoning, will require a use permit, and may be allowed only in limited areas or under limited circumstances.

Policy A-1.10. Non-Agricultural Land Uses. Non-agricultural land uses on agricultural lands should be compatible with agricultural land uses and with the rural character of the Inland Rural and Coastal Recreation corridors and enhance the economic viability of agricultural operations. Marin County Code Title 22. Zoning

Chapter 22.10. A Districts – Agricultural and Conservation Districts

The project site is zoned A-60. Dumps are identified as one of the uses allowed in A-Districts, subject to the securing of a use permit. Minimum parcel size in A-60 districts is 60 acres. The County issued a use permit for establishment of a “sanitary land fill garbage and rubbish dump” at the site in 1958.

Chapter 22.50. Bayfront Conservation Districts

The site is also part of the diked bay marshland and agricultural subzone of the bayfront conservation district. This subzone includes all historic bay marshlands that have been diked off from tidal action and in some cases filled or partially filled and/or converted to other uses.

Marin County Waste Management Plans

Marin County's waste management plan consists of the following elements:

- 1997 Regional Agency Summary Plan (April 1998), which aggregates the following elements:
- 1995 Siting Element for Marin County and its Cities (April 1996);
- Multi-Jurisdictional Source Reduction and Recycling Element (SRRE) for Marin County and its Cities (July 1996);
- Multi-Jurisdictional Household Hazardous Waste Element for Marin County and its Cities (March 1992); and
- Multi-Jurisdictional Nondisposal Facility Element for Marin County and its Cities (July 1995)

Together these plans establish region-wide goals and objectives for integrated waste management planning, describe the current system of solid waste management in the county; and summarize the programs and facilities selected in the multi-jurisdictional planning documents prepared for Marin County and its cities.

The following waste management plan goals and policies are relevant to the project.

From the Multi-Jurisdictional Source Reduction and Recycling Element (SRRE) for Marin County and its Cities (July 1996)

<u>SRRE Goal 1: Maximize Diversion from All Source Reduction and Recycling Element Program Areas</u>. To meet source reduction, recycling, and composting diversion requirements of Section 40051 of the Public Resources Code.

<u>SRRE Goal 2: Maintain Public/Private Partnership</u>. To maintain a strong public/private partnership throughout the implementation of the SRR Element.

(Includes the following Medium-Term Planning Period objective: Work with haulers, landfills, and recovery centers to promote the continuation and development of local activities and industries that contribute to the attainment of the diversion targets for Marin County and its Cities.)

<u>SRRE Goal 3: Build on Existing Programs</u>. To build on existing, cost-effective source reduction, recycling, composting, incineration, disposal, and education programs and services provided by the public and private sectors.

(Includes the following Medium-Term Planning Period objective: Promote the continuation and development of local activities and industries that contribute to the attainment of the diversion targets for Marin County and its Cities.)

<u>SRRE Goal 4: Maximize Cost-Effectiveness</u>. To achieve the diversion mandates in a manner that is most cost-effective for rate payers.

SRRE Goal 6: Maximize Source Reduction. To recognize that source reduction is the preferred management tool for implementing AB 939 regulations since, if waste is not generated, downstream management efforts can be reduced.

(Includes the following Medium-Term Planning Period objective: Reduce waste generation by two percent through source reduction activities.)

SRRE Goal 9: Maximize the Use of Incentives that will Promote Diversion Programs. To assist the implementation of source reduction, recycling, and composting programs through financial or other incentives that will encourage participation.

(Includes the following objective: Develop tip fee differential rates based on materials or jurisdiction of origin.)

From the Marin County Regional Summary Plan

The SRRE goals are repeated in the Marin County Regional Summary Plan. In addition, the Regional Summary Plan includes the following goals, policies, and objectives, which are also relevant to the project:

Summary Plan Goal 12. To insure that all residents of Marin County have access to a program that safely and effectively manages household hazardous wastes. To the greatest extent possible, Marin County and its Cities shall facilitate a decrease in the production, consumption, use, and disposal of hazardous household products. For those materials that are used and disposed, the goal shall be to reuse or recycle as much of the material as possible, and to dispose of the remainder in an environmentally safe manner.

Summary Plan Goal 13. To allow Marin County to maintain adequate landfill disposal capacity for those wastes which will need to be landfilled after maximizing source reduction, recycling, and composting through the year 2010. Adequate disposal capacity will be maintained by utilizing existing permitted solid waste landfill disposal facilities.

Summary Plan Policy 13. To target yard waste in the commercial and self-haul waste streams, facility operators are to develop separate drop-off locations at all Marin County waste recovery and disposal facilities.

Summary Plan Policy 14. Marin County, its cities, and/or the Regional Agency will develop an effective program for managing household hazardous waste generated in the county.

Summary Plan Objective 4. Marin regionwide composting of yard wastes will be diverted at 8 percent in the short term, and 11 percent in medium term.

Summary Plan Objective 5. To encourage the source reduction and recycling of special wastes, where appropriate, develop alternative management methods for non-hazardous sewage and industrial sludge, and to continue safe handling and disposal practices for ash, asbestos, auto bodies, auto shredder waste, white goods, bulky wastes, used tires, and agricultural waste.

Summary Plan Objective 10. Maintain and monitor existing load checking activities which promote proper handling of household hazardous waste and to update, if necessary

> Summary Plan Objective 13. To ensure there are opportunities for residents to recycle waste oil, latex paint, and lead-acid batteries

From the 1995 Siting Element

Goal 1 of the 1995 Siting Element for Marin County and its Cities essentially repeats Summary Plan Goal 13:

> Siting Element Goal 1: Assure 15 Years Disposal Capacity for Marin County. The county will maintain adequate landfill disposal capacity for those wastes which will need to be landfilled after maximizing source reduction, recycling, and composting through the year 2010. Adequate disposal capacity will be maintained by utilizing existing permitted solid waste landfill disposal facilities.
>
> Siting Element Goal 2: Ensure Regulatory Compliance. The County, through its Local Enforcement Agency, will ensure that the operation and maintenance of existing and/or proposed solid waste landfill disposal facilities located in Marin County are in full compliance with established laws, regulations, permits, and plans; and in such a manner as to ensure public health, safety, and protection of the environment.
>
> The Siting Element also contains ten exclusionary or “fatal flaw” criteria that are to be used in the initial stages of new or expanded facility siting, and an additional nine ranking criteria to differentiate potential sites. Since the project involves only modification of the existing Redwood Landfill, only the exclusionary criteria are considered relevant to this analysis. They are listed below:

E1. New or expanded landfill shall not be located on a known Holocene fault.

E2. New or expanded landfills shall not be located in a 100-year flood plain.

E3. New or expanded landfills shall be located in a manner which will ensure that wastes will be a minimum of 5 feet above the highest anticipated elevation of underlying ground water.

E4. New or expanded disposal facilities shall be located only in areas designated or authorized for solid waste facilities in an applicable city or county general plan.

E5. New or expanded disposal facilities shall be compatible with adjacent general plan land uses.

E6. New or expanded landfills shall be located further than 10,000 feet from airport runways used by turbojet aircraft and further than 5,000 feet from airport runways used solely by piston-type aircraft.

E7. New or expanded disposal facilities shall be required at all times to be in compliance with applicable federal, state, and local statues, permits, minimum operating standards and monitoring requirements. This includes, but is not limited to, the requirements of the California Integrated Waste Management Board, Regional Water Quality Control Boards, local air pollution control districts, local jurisdictions, and all utilities, service districts, or agencies which have jurisdiction over the installation of improvements or which provide services to disposal facilities.

E8. New or expanded landfills shall not be located in such a way as to cause a net loss of wetland acreage, functions, and values.

E9. To protect water quality, new or expanded landfills shall be sited where soil characteristics, distance from waste to ground water, and other factors will ensure no impairment of beneficial uses of surface water or of ground water beneath or adjacent to the landfill.

E10. New or expanded landfills shall not be located in stream conservation areas, so as to alter major drainages. Such areas are defined in the Marin Countywide Plan.

Table 3.6-2 summarizes project consistency with the County's solid waste management policies.

Airport Land Use Plan: Marin County Airport Gnoss Field

The site is located within designated safety zones of the Marin County Airport, Gnoss Field, which is located south of the site. The safety zones, established in the Airport Land Use Plan (ALUP) (1991) pursuant to federal aviation regulations, are areas in the vicinity of the airport in which land use and/or zoning restrictions are established to protect public safety on the ground by limiting exposure to aircraft crash hazards (ALUP, 1991). Five zones are established, with Zone 1 (Clear Zone) the closest to the airport and Zone 5 (Referral) the farthest.

The southern half (roughly) of the landfill site is located in safety zone 3, Traffic Pattern Zone, and the northern half is within safety zone 4, Overflight Zone. Zone 3, Traffic Pattern Zone, includes the area under the flight paths of aircraft as they prepare for landing or initially depart from the airport; this zone is designed to protect this area from obstructions. Zone 4, Overflight Zone, is the area immediately outside the Traffic Pattern Zone where aircraft are still climbing or descending, but where the risks appear to be minimal. Zone 5, Referral Area, extends 2 miles from the future boundary of Gnoss Field and therefore Redwood Landfill also falls within this zone. Within the Referral Zone, all significant development projects, including the proposed landfill project, must be submitted to the Airport Land Use Commission for review and comment before approval (Haddad, 2001). Marin County plans to extend the Gnoss Field runway 1,100 feet to the Northwest (Rawles, 2003). This would bring the runway into closer proximity with Redwood Landfill, and would result in a shift of the safety zones closer to the landfill.

A-60 districts are considered "conditionally compatible" with safety zones 1, 2, and 3, on the condition that no residential uses be located in zones 1 and 2, and compatible with safety zone 4. Industrial districts are considered compatible with zones 3, 4, and 5. In safety zone 2 (which does not overlie the landfill but is immediately adjacent to the southwestern corner of the landfill site), industrial uses that produce light, glare, and/or smoke or any other substance/emission that could interfere with aviation activities at Gnoss Field are prohibited.

Airport Master Plan: Marin County Airport (Gnoss Field)

This 20-year master plan, adopted by the County Board of Supervisors in June 1989, provided the basis for the above-referenced ALUP; relevant policies of the master plan are included in the ALUP discussion.

TABLE 3.6-2
PROJECT CONSISTENCY WITH INTEGRATED WASTE MANAGEMENT PLAN GOALS, POLICIES, AND OBJECTIVES

Marin County Integrated Waste Management Plan Goals, Policies, and Objectives	Consistent With Integrated Waste Management Plan?	Analysis
SRRE Goal 1	No	To the extent that the project would involve development of new recycling and composting capacity in the County, it is compatible with this goal. In addition, PRC Section 40051 specifies that environmentally safe land disposal may be used for wastes that cannot feasibly be reduced at their source, recycled, or composted. However, increasing landfill capacity could result in lower landfill tipping fees, which could have a deleterious effect on diversion programs. The project does not propose measures that would maximize diversion, and so is inconsistent with this goal.
SRRE Goal 2	Yes	The project would involve development of new composting capacity in the County.
SRRE Goal 3	Yes	The project would involve an expansion of existing composting and disposal facilities.
SRRE Goal 4	Unknown	The overall impact of the project on diversion rates, and the cost effectiveness of the project in maximizing diversion in the County, are unknown and beyond the scope of this EIR.
SRRE Goal 6	No	The project involves considerable investment of resources to increase disposal capacity, to enable an increased rate of disposal, and to increase the capacity to compost materials centrally. The project therefore conflicts with the goal of maximizing source reduction.
SRRE Goal 9	No	The existing tip fee structure (effective March 1, 2000) does not provide reduced rates for recoverable materials, other than clean dirt, concrete, asphalt, and mud. For example, clean yard waste loads are charged the same ($20 per cubic yard) as general debris. The applicant does not propose to change the existing fee structure as part of the project, so the project is inconsistent with this goal.
Summary Plan Goal 12	No	Redwood Landfill currently accepts used motor oil and auto batteries, two of the most common types of recyclable household hazardous waste. In addition, the landfill accepts white goods (refrigerators, stoves, etc.), from which Freon is recovered. The landfill does not, and does not propose, however, to accept two other common household hazardous wastes: latex paint and antifreeze.
Summary Plan Goal 13	Yes	The project would ensure that Marin County has adequate landfill capacity at least until the year ~~2024.~~ 2037.
Summary Plan Policy 13	Yes	A separate drop-off area exists at the landfill for clean yard waste loads, and will be continued under the project.

TABLE 3.6-2 (Continued)
PROJECT CONSISTENCY WITH INTEGRATED WASTE MANAGEMENT PLAN GOALS, POLICIES, AND OBJECTIVES

Marin County Integrated Waste Management Plan Goals, Policies, and Objectives	Consistent With Integrated Waste Management Plan?	Analysis
Summary Plan Policy 14	No	Two household hazardous (HHW) waste facilities exist in Marin County, one in San Rafael, which accepts the full range of HHW materials; and one in Novato, which accepts only used motor oil and filters, automotive batteries, fluorescent bulbs, and anti-freeze. The landfill itself accepts automotive batteries and used motor oil. The landfill may therefore be considered part of the overall County HHW management program. The landfill, however, does not accept several other common, recyclable HHW material types.
Summary Plan Objective 4	Yes	The 1990 Multi-Jurisdictional Waste Generation Study for Marin County and its Cities predicts that the quantity of yard waste produced in the entire county would be 50,418 tons in 2001, increasing to 51,857 tons in 2005. This document indicates that about 13 percent of the County's generated waste consists of yard waste, so the 11 percent figure in the Objective is about 85 percent of generated yard waste. 85 percent of the predicted 51,587 tons is just over 44,000 tons per year. The existing co-composting facility at Redwood Landfill is permitted to process 52,000 cubic yards of greenwaste and wood waste per year, equivalent to about 13,000 tons of material. In addition, Marin Sanitary Service's Recycling and Resource Recovery Center in San Rafael recovered approximately 12,000 tons of yard debris and wood waste from Marin County jurisdictions (Marin County Office of Waste Management, 1995). In order to achieve this objective, additional capacity is required.
Summary Plan Objective 5	Yes	The project includes two alternative uses for sludge: co-composting (increasing the capacity of the existing co-composting facility) and use of sludge as alternative daily cover material.
Summary Plan Objective 10	Yes	The existing load checking program would be continued under the project.
Summary Plan Objective 13	Yes	This objective includes the milestone "to have at least one permanent recyclable HHW "BOP" (batteries, oil, paint) drop-off operating in Marin. There are currently at least two such facilities, one in San Rafael and another in Novato. In addition, the landfill accepts automotive batteries and motor oil.
Siting Element Goal 1	Yes	The project, if approved, would provide adequate landfill capacity for Marin County and its cities through at least ~~2024~~ 2037.
Siting Element Goal 2	Yes	The project, if approved, would bring certain operations at the landfill in compliance with the facility's permits.
Siting Criteria E1	Yes	The landfill is not located on a known Holocene fault (see Geology section).

TABLE 3.6-2 (Continued)
PROJECT CONSISTENCY WITH INTEGRATED WASTE MANAGEMENT PLAN GOALS, POLICIES, AND OBJECTIVES

Marin County Integrated Waste Management Plan Goals, Policies, and Objectives	Consistent With Integrated Waste Management Plan?	Analysis
Siting Criteria E2	Yes	Areas outside the landfill footprint, including areas proposed for composting and co-composting operations, are within the 100-year floodplain. However, the landfill footprint itself is outside the 100-year floodplain (see Impact 3.5.6 and Figure 3.5-2).
Siting Criteria E3	Refer to Section 3.4	The Leachate Collection and Removal System is designed as an engineered alternative to the requirement that a 5-foot separation be maintained between waste and groundwater. Refer to Section 3.4, Geology, Soils, and Seismicity.
Siting Criteria E4	Yes	See previous discussion of consistency with Countywide Plan land use policies.
Siting Criteria E5	Yes	See previous discussion of consistency with Countywide Plan land use policies.
Siting Criteria E6	Yes	The project does not involve a height extension nor a lateral expansion of the existing permitted landfill, and will therefore not result in the landfill being in closer proximity to the end of the Gnoss Field runway than it already is.
Siting Criteria E7	Yes	The project, if approved, would bring certain operations at the landfill into compliance with the facility's permits.
Siting Criteria E8	Yes	The landfill, while located within historic diked wetlands, is separated from remaining wetlands, and the project is not expected to impact wetlands (see Biology section).
Siting Criteria E9	Refer to Sections 3.4 and 3.5	Refer to Section 3.4, Geology, Soils, and Seismicity, regarding site soils and groundwater and Section 3.5, Hydrology and Water Quality, regarding surface water.
Siting Criteria E10	Yes	The project will not be located in a stream conservation area, and will not alter major drainages.

Federal Aviation Administration, Environmental Protection Agency and California Integrated Waste Management Board Policies Pertaining to the Proximity of Airports and Waste Disposal Facilities

To reduce the potential for bird/aircraft strike hazard, Federal Aviation Administration (FAA) Order 5200.5 (10/16/74) established distance criteria of 5,000 feet from runways serving reciprocating engine-powered aircraft and 10,000 feet from runways serving turbine-powered aircraft, within which land use for disposal sites would be considered incompatible with airport operations (FAA, 1992). In 1990, Order 5200.5A expanded the area of consideration to include a 5-mile radius of concern (FAA, 1992).

The Environmental Protection Agency (U.S. EPA) adopted amendments to the Resource Conservation and Recovery Act, adding 40 CFR Part 258, §258.10 effective October 1993, to require FAA notification for proposed new or expanded municipal solid waste landfill units (MSWLF) (U.S. EPA, 1991). §258.10 requires:

(a) owners or operators of new MSWLF units, existing MSWLF units, and lateral expansions that are located within 10,000 feet (3,048 meters) of any airport runway end used by turbojet aircraft or within 5,000 feet (1,524 meters) of any airport runway end used by only piston-type aircraft to demonstrate that the units are designed and operated so that the MSWLF unit does not pose a bird hazard to aircraft;

(b) owners or operators proposing to site new MSWLF units and lateral expansions within a five-mile radius of any airport runway end used by turbojet or piston-type aircraft to notify the affected airport and the Federal Aviation Administration (FAA); and

(c) the owner or operator to place the demonstration in paragraph (a) in the operating record and notify the State Director that it has been placed in the operating record.

The combined State Water Resources Control Board/California Integrated Waste Management Board (CIWMB) regulations concerning facility siting and classification (Division 2, Title 27, §20270) include language nearly identical to items (a) through (c) above. In addition, existing MSWLF units that were unable to make the demonstration specified in (c) above were to be closed by October 9, 1996, or for certain exceptions, 1998 at the latest.

3.6.2 IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

The project would have a significant impact if it were to:

- conflict with an applicable land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect;
- conflict with any applicable habitat conservation plan or natural community conservation plan; or
- result in a substantial change to land use patterns.

Impact 3.6.1: Implementation of the proposed project would intensify landfill operations in the project area, which could result in land use conflicts with adjacent land uses. (Less than Significant)

Landfill expansion would increase activities at the project site which could result in potential nuisance impacts on nearby land uses related to truck traffic, fugitive dust generation, odors, noise, aesthetics, and the off-site accumulation of litter. Refer to Sections 3.1, 3.2, 3.7 and 3.10

for the analysis of impacts related to aesthetics and litter, air quality, noise, and traffic, respectively. Potential impacts with the neighboring County Airport are discussed under Impact 3.6.2, below. The project would be implemented within the existing landfill footprint and therefore would not encroach on adjacent land uses. Under the project Redwood Landfill would continue as a conditionally permitted land use at a site it has occupied since 1958. Therefore, other than the potential impacts analyzed in the above-referenced sections and under Impact 3.6.2 below, the land use impacts resulting from the project would be less than significant.

Mitigation: None required.

Impact 3.6.2: Development of the proposed project could result in conflicts with operations at Gnoss Field. (Significant)

Because Redwood Landfill is located in Gnoss Field safety zones 3, 4, and 5, changes to the existing operations could potentially conflict with airport operations. Because the proposed project would not involve expansion beyond the existing landfill footprint nor increase the height of the landfill, the project would not result in any conflicts related to the encroachment by the landfill into restricted airspace of the safety zones. This analysis assumes, however, that the area of the working face of the landfill would be larger as a result of the project, to accommodate the increase in daily tonnage proposed to be received. Such an increase in the working face could result in increased bird activity at the site and thus increase the risk of bird/aircraft strikes. The proposed increase in composting operations, especially the addition of food as a composting feedstock, also could increase bird activity at the site and contribute to increased risk of bird/aircraft strikes. This would be a significant impact.

In addition, while the applicant has not proposed any change in the number or type of lights currently permitted to be used during nighttime operations, the size of working face and the frequency and extent of nighttime activities would presumably increase if the project were approved, and more light than is currently used for nighttime operations would be required. It is assumed that the applicant currently does not use all six portable light plants at the working face of the landfill or elsewhere at the site. Increased light and glare could potentially interfere with nighttime operations at the airport. This would be a significant impact.

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.6.2a: The applicant proposes to continue their existing bird control program. Redwood Landfill’s bird control program focuses on gulls, the predominant avian scavengers at the site, and consists of using pyrotechnic devices to discourage gulls from landing or circling overhead during refuse placement and compaction. The devices provide noise (bang or whistle), a flash of light, smoke, and the sound of the propellant. RLI focuses its deterrent efforts when the birds first begin to arrive in the morning (shortly after dawn) and the morning hours, having found that this results in fewer gulls approaching the site during the rest of the day. RLI also may use a gas-fired cannon, which emits a loud blast, in conjunction with the pyrotechnic devices. Redwood Landfill periodically re-evaluates and revises bird control techniques as necessary.

Mitigation Measure 3.6.2b: The applicant proposes no change in the number or type of lights used for nighttime operations. There are no records that indicate that the existing use of lights at the landfill poses a hazard to operations at Gnoss Field.

Mitigation Measures Identified in This Report

Mitigation Measure 3.6.2c: To ensure that nighttime activities do not interfere with operations at Gnoss Field, lights used during nighttime landfill operations will not be colored, will be shielded and directed downward to reduce glare, and will be placed in an irregular pattern in order not to appear to be a runway. The applicant shall notify the Gnoss Field Airport prior to any change in the way lighting is used for nighttime operations.

Mitigation Measure 3.6.2d: If bird activity at the landfill, including the areas outside the permitted landfill footprint proposed for composting, increases as a result of the project, as determined by the LEA during regular site inspections, RLI shall adjust its existing bird control program as necessary to ensure that the facility does not pose a bird hazard to aircraft. RLI shall modify as necessary the demonstration required in 40 CFR Part 258, §258.10 (a) and 27 CCR, §20270(a) (that the landfill does not pose a bird hazard to aircraft).

Level of Significance After Mitigation

The combination of Mitigation Measures 3.6.2a, 3.6.2b, 3.6.2c, and 3.6.2d will ensure that this impact is reduced to a less-than-significant level.

Impact 3.6.3: Implementation of the proposed project could result in conflicts with agricultural uses. (Less than Significant)

Redwood Landfill is located adjacent to areas identified as “Locally Important Farmland” or “Grazing land” on the County’s Important Farmlands map (Marin Countywide Plan, Agriculture Element) and is designated and zoned for “agricultural” land uses in the Countywide Plan and Zoning Code, respectively. However the site itself is not considered important farmland on the Important Farmlands map (where it is shown as an “other” land use) and landfills are conditionally acceptable land uses (upon issuance of a use permit) in “A” zones, according to the County Zoning Code. The project would not involve expansion beyond the existing ~~footprint~~landfill property boundary and therefore would not encroach on neighboring agricultural lands. The proposed changes in landfill and composting operations are compatible with the site’s rural character and agricultural setting. Therefore, the project is not expected to have significant adverse impacts on or conflicts with agricultural land uses in the project vicinity.

Mitigation: None required.

Impact 3.6.4: The project would conflict with Goals 1, 6, and 9 of the Source Reduction and Recycling Element of the Integrated Waste Management Plan for Marin County and its Cities. (Significant)

The proposed increases in daily tonnages and in overall landfill capacity could result (through effects of economies of scale) in a lowering of the unit price for landfilling material. This could have an adverse impact on the adopted waste management plans and policies of Marin County and its cities regarding maximizing source reduction, recycling, and composting as the preferred methods for managing wastes. Specifically, this could conflict with SRRE Goals 1 and 6. In addition, the current tip fee structure for Redwood Landfill is incompatible with SRRE Goal 9, to maximize the use of incentives that will promote diversion programs, including developing tip fee differential rates based on materials or jurisdiction of origin.

The project would not be consistent with Source Reduction Goals 1, 6, and 9, because it does not propose reasonable and feasible diversion measures, and therefore does not maximize diversion, does not maximize source reduction, and does not maximize incentives that would promote diversion in accordance with these goals.

The project would transform Redwood Landfill into a regional solid waste disposal facility, enabling the importation from outside the County of large quantities of waste materials. This would result in more rapid consumption of landfill capacity and would leave less capacity available for disposal of wastes generated within Marin County.

Because the project would provide a disincentive to diversion, would fail to implement reasonable and feasible new diversion measures, and would result in less landfill capacity being available for Marin County wastes, this is considered a significant impact.

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.6.4a: The applicant is proposing to increase the capacity of the existing composting/co-composting facility.

Mitigation Measures Identified in This Report

Mitigation Measure 3.6.4b: The following measures will be required as conditions of a revised Solid Waste Facilities Permit, or through other actions, as noted:

- RLI will be required to implement additional diversion programs at the landfill, such as construction and demolition debris recovery, recovery of materials from self-haul and debris box loads, salvage of building materials and other reusable items, increased opportunity for drop-off of source-separated materials, and other measures as detailed in the Mitigated Alternative (see Chapter 5);

- The County will consider the enactment of an ordinance that would impose a mitigation fee on waste imported to Redwood Landfill from areas of California outside Marin County. The mitigation fee will be used to develop additional landfill capacity, to develop diversion programs, and to offset other project impacts, including significant, unavoidable air quality impacts (see section 3.2, Air Quality and Chapter 4, Cumulative Impacts).

Significance after Mitigation

These measures would reduce the project's inconsistency with County Integrated Waste Management Plan goals. In addition, these measures could reduce some of the project's impacts, and could provide justification for Overriding Considerations that may be needed for project approval. Together, these mitigation measures will reduce this impact to a less-than-significant level.

Impact 3.6.5: The project would conflict with Summary Plan Goal 12, which is to insure that all residents of Marin County have access to a program that safely and effectively manages household hazardous waste, and Summary Plan Policy 14, to develop an effective program for managing household hazardous waste generated in the county. (Significant)

Redwood Landfill accepts two common, recyclable types of household hazardous waste: used motor oil and automotive batteries. The landfill does not currently, and does not propose as part of the project, to accept other common recyclable types of household hazardous waste, including antifreeze, automotive oil filters, fluorescent light bulbs, and cathode ray tubes (television and computer monitor picture tubes). Two other facilities in Marin County accept all of these household hazardous waste types: one in San Rafael, operated by Marin Recycling, which also accepts a broad range of other, non-recyclable HHW materials; and Novato Disposal in Novato, which accepts used motor oil, oil filters, antifreeze, automotive batteries, fluorescent bulbs, as well as other household hazardous wastes. However, the Novato Disposal facility is available only to Novato residents who are customers of Novato Disposal Company, and the Marin Recycling facility may not be conveniently located, especially for residents in the northern and western parts of the County, who may tend also to self-haul wastes to Redwood Landfill; the Marin Recycling facility is available to all residents of Marin County, except Novato residents. The absence in the project of a proposal to provide facilities for the safe disposal and recycling of the full range of common, recyclable household hazardous wastes at the Redwood Landfill is considered a significant impact.

Mitigation Measures Proposed as Part of the Project

> **Mitigation Measure 3.6.5a:** RLI currently accepts used motor oil and automotive batteries at the landfill, and does not plan to discontinue this service.

Mitigation Measures Identified in This Report

> **Mitigation Measure 3.6.5b:** Redwood Landfill shall provide facilities for residents to drop-off oil filters, antifreeze, fluorescent light tubes, latex paint, and cathode ray tubes, in addition to used motor oil and automotive batteries, which are currently accepted.

Level of Significance after Mitigation

Implementation of this measure would reduce this impact to a less-than-significant level.

Impact 3.6.6: The project could conflict with Siting Element Exclusionary Criterion E6. (Less than Significant)

Exclusionary Criterion 6 from the Siting Element for Marin County and its Cities states that "new or expanded landfills shall be located further than 10,000 feet from airport runways used by turbojet aircraft and further than 5,000 feet from airport runways used solely by piston-type aircraft." The existing landfill is located within 4,200 feet of the end of the Gnoss Field runway. Gnoss Field is used by both turbojet aircraft and piston-type aircraft. Marin County plans to extend the Gnoss Field runway 1,100 feet to the northwest, which would bring it within about 3,100 feet of the permitted landfill area. The project, however, does not include a lateral expansion outside the landfill's existing footprint, nor a height increase of the existing landfill. Furthermore, potential impacts of the project that could affect the safety of Gnoss Field operations, including bird attraction and nighttime lighting, would be fully mitigated (Mitigation Measures 3.6.2a, b, c, and d). Therefore, there will be no new conflict with Siting Element Exclusionary Criterion E6 as a result of the proposed project, and this is a less-than-significant impact.

Mitigation: None required.

Impact 3.6.7: The project would increase the rate of fill of the landfill, which could result in a conflict with Summary Plan Goal 13 and Siting Element Goal 1, which require the County to assure 15 years of disposal capacity. (Less than Significant)

The Siting Element and Summary Plan for Marin County and its Cities require that Marin County assure 15 years of disposal capacity. As these documents were adopted in 1995, they explicitly require that the County assure disposal capacity through the year 2010. Maintenance of 15 years of landfill capacity (a planning requirement which is also reflected in state statutes – PRC §41700 et seq) may however be taken as a general goal and policy. The Landfill Site Life Calculations table included in ~~Appendix A~~ Master Response 21 (Table MR21-1) indicates that, under current permit conditions, Redwood Landfill could reach capacity as early as the year 2024. ~~2016 (Scenario 1 in the Table). This is considerably sooner than site life calculations presented in the 1995 Siting Element (also shown in the Appendix A table, Scenario 4), which predicted that the landfill would reach capacity in 2025. The main difference in the calculations is the anticipated rate of fill, which has increased substantially since publication of the Siting Element. The Appendix A table~~ Table MR21-1 also includes site life calculations for the landfill under project conditions~~. Two projections are shown: that produced by the applicant (Scenario 3), and another that was produced as a part of this EIR analysis (Scenario 2). The applicant's site life projections for the landfill, if the project were to be approved, predict that the landfill would reach capacity in the year 2051. Calculations conducted for this EIR, however, predict a much earlier closure date of 2024,~~ which indicate that the earliest closure date under the project would be the year 2037. ~~if~~

~~the landfill accepts waste materials for disposal at the maximum proposed rate.[2] The applicant uses an erroneous density factor in their calculations of 3,760 pounds per cubic yard for landfilled waste, which is much higher than can be achieved in a sanitary landfill, and which explains much of the difference.~~ Since the project would extend the life of the landfill by at least ~~8~~ 13 years, and would result in greater than 15 years of capacity for Marin County and its cities, this impact is less than significant, and requires no mitigation.

Mitigation: None required.

REFERENCES – Land Use and Planning

Federal Aviation Administration (FAA). U.S. Department of Transportation, Federal Aviation Administration, Great Lakes Region: Policy and Procedures Memorandum – Airports Division, Number 5210.2; Subject: "Bird Hazard Reduction – Waste Disposal Facilities," July 27, 1992.

Haddad, Tim, Environmental Coordinator, Marin County Community Development Agency, telephone communication (with Chris Mueller), ESA July 12, 2001.

Marin County, *The Marin Countywide Plan:* Agricultural Element, Community Development Element, and Environmental Quality Element, adopted January 1994.

Marin County Department of Public Works, 1997 Regional Agency Summary Plan for Marin County and its Cities, April, 1998.

Marin County Office of Waste Management, Multi-Jurisdictional Nondisposal Facility Element for Marin County and its Cities, July, 1995.

Marin County Office of Waste Management, 1995 Siting Element for Marin County and its Cities, April 1996.

Marin County Office of Waste Management, Multi-Jurisdictional Source Reduction and Recycling Element (SRRE) for Marin County and its Cities, July, 1996.

Marin County Planning Department, Multi-Jurisdictional Household Hazardous Waste Element for Marin County and its Cities, March 1992

Marin County Planning Department, Airport Land Use Plan, Marin County Airport, Gnoss Field, June 1991.

Marin County Sustainability Working Group. 2001. *Interim Sustainability Principles*. Available at http://www.co.marin.ca.us/depts/cd/main/fm/cwpdocs/InterimGuidingPrinciples.pdf

Rawles, Jeffrey, Marin County Public Works Program Manager, Personal Communication – telephone – (with Dan Sicular, ESA), March 26, 2003.

2 ESA's calculations assume that Area G would be available for disposal of both designated waste and ordinary municipal solid waste.

United States Environmental Protection Agency (U.S. EPA). Amendment to Resource Conservation and Recovery Act 40 CFR Part 258, *Federal Register* Volume 56, Number. 196, page 51018. Oct. 9, 1991.

3.7 NOISE

This section evaluates the potential for the project to cause new or more severe noise impacts. The 1994 FEIR for the previous Redwood Landfill expansion project found that that project did not have the potential to cause significant noise impacts on the environment. This was due to the remote nature of the landfill and the presence of existing noise sources in the vicinity of the landfill, including U.S. 101, Gnoss Field, and the then-existing landfill operations. These same conditions of remoteness and existing noise sources prevail today at the Redwood Landfill.

This section provides an update to the physical and regulatory setting discussions presented in the Noise Section of the 1994 FEIR, and examines the potential for the proposed project to increase noise levels at the Redwood Landfill to the extent that a new, significant environmental impact could occur.

3.7.1 SETTING

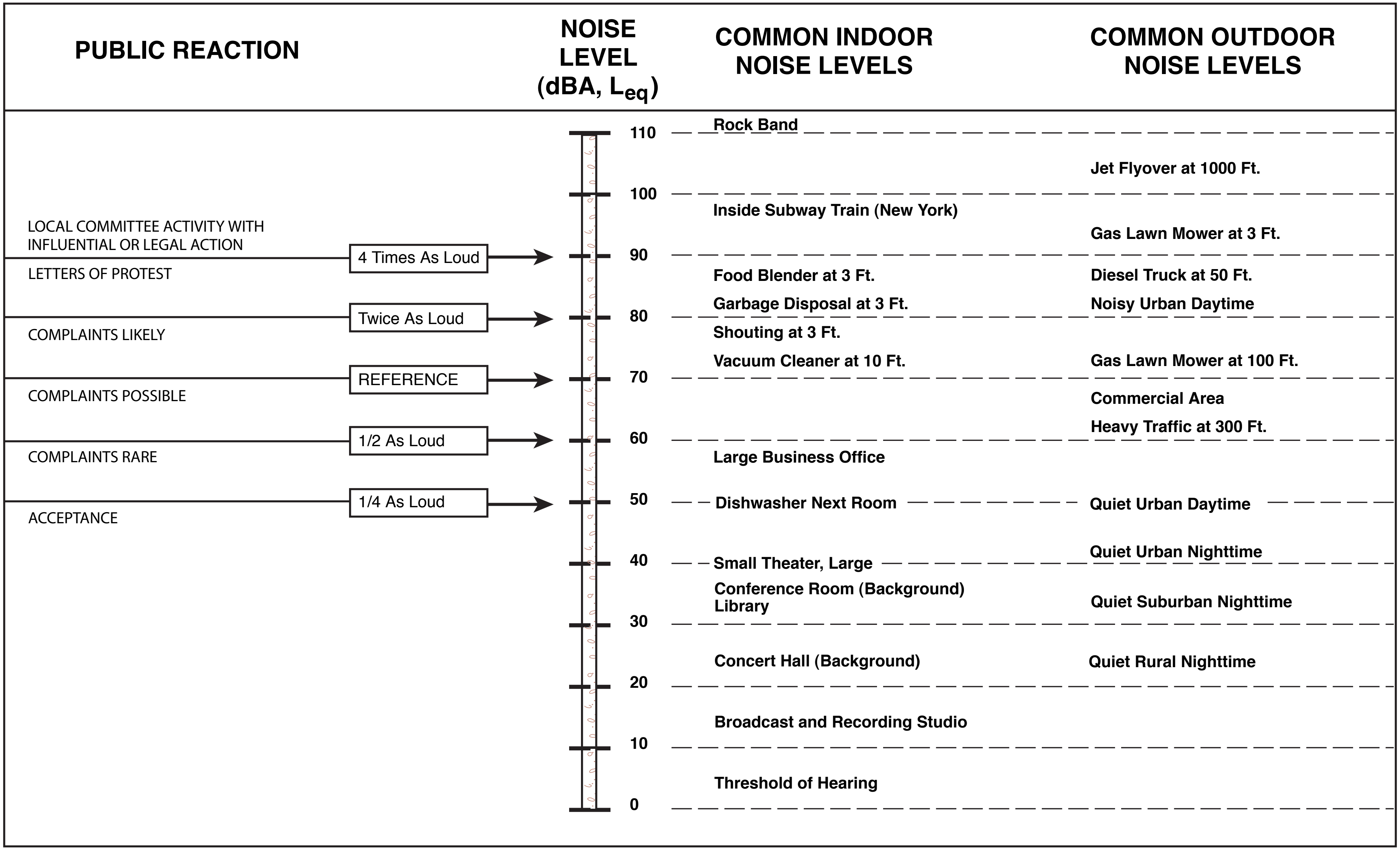
INTRODUCTION TO NOISE PRINCIPLES AND DESCRIPTORS

Environmental noise is usually measured in A-weighted decibels (dBA).[1] Some representative noise sources and their corresponding noise levels in dBA are shown in Figure 3.7-1. Environmental noise typically fluctuates over time, and different types of noise descriptors are used to account for this variability. Typical noise descriptors include the energy-equivalent noise level (L_{eq}),[2] the day-night average noise level (L_{dn}), and the Community Noise Equivalent Level (CNEL). The L_{dn} and CNEL are commonly used in establishing noise exposure guidelines for specific land uses. In general, a change of three dBA is a noticeable change and a change of 10 dBA is perceived as a doubling of noise.

Noise levels are measured on a logarithmic scale, instead of a linear scale. On a logarithmic scale, the sum of two noise sources of equal loudness is 3 dBA greater than the noise generated by just one of the noise sources (e.g., a noise source of 60 dBA plus another noise source of 60 dBA generate a composite noise level of 63 dBA). To apply this formula to a specific noise source, in areas where existing levels are dominated by traffic, a doubling in the volume of the traffic will increase ambient noise levels by 3 dBA. Similarly, a doubling in the use of heavy equipment, such as use of two landfill dozer/compactors where formerly one was used, would

1 A decibel (dB) is a logarithmic unit of sound energy intensity. Sound waves exert a sound pressure (commonly called "sound level"), measured in decibels. An A-weighted decibel (dBA) is a decibel corrected for the variation in frequency response of the typical human ear at commonly-encountered noise levels. The highest dBA recorded in a given period of time is known as the maximum noise level (L_{max}). All of the noise levels reported herein are "A-weighted."

2 L_{eq}, the energy equivalent noise level (or "average" noise level), is the equivalent steady-state continuous noise level which, in a stated period of time, contains the same acoustical energy as the time-varying sound level actually measured during the same period. L_{dn}, the day-night average noise level, is a weighted 24-hour average noise level measured in decibels. With the L_{dn} descriptor, noise levels between 10:00 p.m. and 7:00 a.m. are adjusted upward by ten dBA to take into account the greater annoyance of nighttime noise as compared to daytime noise. The CNEL is calculated in a similar way, but an additional 5 dBA are added to the noise levels in the evening hours between 7:00 p.m. and 10:00 p.m.



SOURCE: Caltrans Transportation Laboratory Noise Manual, 1982; and Modification by Environmental Science Associates

Figure 3.7-1
Effects of Noise on People

also increase ambient noise levels by 3 dBA. A 3 dBA increase is the smallest change in noise level detectable to the average person. A change in ambient sound of 5 dBA can start to create concern among neighbors. A change in sound of 7 to 10 dBA typically brings calls to government officials and letters to the newspaper.

The noise experienced at a receptor depends on the distance between the source and the receptor, the presence or absence of noise barriers and other shielding features, and the amount of noise attenuation (lessening) provided by the intervening terrain. For line sources, such as motor or vehicular traffic, noise decreases by about 3.0 to 4.5 dBA for every doubling of the distance from the roadway. For point or stationary sources, such as electric motors, a noise reduction of 6.0 to 7.5 dBA is experienced for each doubling of the distance from the source. Sensitivity to noise also varies according to the individual, the time of day (noise at night is weighted to reflect greater sensitivity), and type of noise (the backfire from an engine [a loud, short duration noise] is often more intrusive than the constant low hum of an engine).

FINDINGS OF THE 1994 FEIR

This section summarizes the Noise section from the 1994 FEIR for the previous Redwood Landfill expansion project. The summary includes a review of the environmental setting described in the 1994 FEIR, significance criteria established for determining significant noise effects of the previous project, and noise impacts and mitigation measures identified in that document.

The 1994 FEIR notes in the description of the environmental setting for noise that, apart from several commercial uses on the landfill property, the nearest commercial land uses were several miles from the landfill; the nearest residence was approximately two and one half miles south of the facility.

The FEIR states that ambient noise levels in the vicinity of the landfill were reflective of the area’s undeveloped nature. At that time, the principal noise sources were from traffic on U.S. 101 and on the landfill’s access roads; from aircraft associated with Gnoss Field; from landfill activities, and from natural sources such as wind and wildlife. The FEIR cites a 1991 EIR for Gnoss Field that states that U.S. 101 is the predominant noise source in the area, and also cites the Draft EIR for the Buck Center that included a noise study that indicated a CNEL level of 65 dBA at approximately 725 feet from U.S. 101, and 60 dBA at about 2,000 feet from U.S. 101 in the vicinity of the landfill.

The 1994 FEIR uses the Community Noise Level standards from the August 30, 1991 draft of the *Marin Countywide Plan, Noise Element* to set the criteria for determining the significance of an impact from the project. The draft of the *Noise Element* contains the same Community Noise Level Standards as in the adopted 1994 version, which are shown in Table 3.7-1. The 1994 FEIR states that the project would have a significant noise effect if it caused noise levels above 65 dBA CNEL at commercial receptors or above 60 dBA CNEL at residential receptors.

TABLE 3.7-1
LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS

Land Use Category	Levels of Acceptability, L_{dn} or CNEL[a] Normally Acceptable	Conditionally Acceptable	Normally Unacceptable
Residential – low density single family, duplex, mobile homes	less than 60	60 to 70	more than 70
Residential – multi family	less than 60	60 to 70	more than 70
Transient lodging, motels, hotels	less than 60	60 to 70	more than 70
Schools, libraries, churches, hospitals, nursing homes	less than 60	60 to 70	more than 70
Auditoriums, concert halls, amphitheaters	NA	less than 70	more than 70
Sports arenas, outdoor spectator sports	NA	less than 70	more than 70
Playgrounds, neighborhood parks	less than 60	60 to 70	more than 70
Golf courses, riding stables, water recreation, cemeteries	less than 65	65 to 70	more than 70
Office buildings, business commercial and professional	less than 65	65 to 75	more than 75
Industrial, manufacturing, utilities, agriculture	less than 70	70 to 75	more than 75

[a] Levels of Acceptability:

Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable: New construction should be under taken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply will normally suffice.

Normally Unacceptable: New construction of development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

SOURCE: Marin County, *Marin Countywide Plan, Noise Element*, January 1994.

The 1994 FEIR identifies two noise impacts of the project then being evaluated: Impact 1, from landfill construction and operational activities; and Impact 2, from increased traffic generated by the project. For both impacts, the FEIR determines that, primarily due to the distance between new noise sources and sensitive receptors, neither impact would be significant, and no mitigation measures were required.

NOISE REGULATIONS, PLANS, AND POLICIES

Noise is regulated in the project area through implementation of the Noise Element of the *Marin Countywide Plan*, which was adopted in January, 1994, and through Section 6.70 of the Marin County Code.

Marin County Loud and Unnecessary Noises Ordinance

Section 6.70 of the Marin County Code (Loud and Unnecessary Noises), restricts the creation and continuation of loud, unnecessary, or unusual noise. This ordinance, enforced by the County Sheriff's Department, prohibits excessive noise levels from various sources including motor vehicles, amplification systems, and persons yelling. None of the specific provisions of the Ordinance pertains to normal landfill operations or traffic noise, other than a prohibition on the unnecessary sounding of vehicle horns and signaling devices.

Marin Countywide Plan Noise Element

The Marin Countywide Plan (General Plan) Noise Element identifies traffic noise as the major source of noise in Unincorporated Marin County. Other major sources of noise include aircraft in the vicinity of Gnoss Field, railroad traffic along the Northwestern Pacific right-of-way, and stationary noise sources such as construction sites and industrial equipment (Marin County, 1994). All of these noise sources affect the noise environment of the Redwood Landfill. Appendix N-1 of the Noise Element shows that along the U.S. 101 segment from the Sonoma County line south to Atherton Avenue, the 65 dBA noise contour was calculated at about 541 feet from the centerline of the highway; and the 60 dBA contour was about 1,167 feet from the centerline. These distances were expected to decrease slightly (to 533 feet and 1,148 feet) at buildout.

The Noise Element identifies exterior noise environments which are appropriate for various types of land uses. These are shown in Table 3.7-1. The land uses around Redwood Landfill include agricultural, open space and recreation, and Gnoss Field. Table 3.7-1 shows that for agricultural land uses, the normally acceptable noise level is less than 70 dB CNEL or L_{dn}; conditionally acceptable levels are 70-75 dB CNEL or L_{dn}, and normally unacceptable levels are above 75 dB CNEL or L_{dn}; for certain open space uses, including water recreation, the normally acceptable noise level is less than 65 dB CNEL or L_{dn}; conditionally acceptable levels are 65-70 dB CNEL or L_{dn}, and normally unacceptable levels are above 70 dB CNEL or L_{dn}.

The County has also adopted separate standards for stationary noise sources such as mechanical equipment and industrial facilities (Marin County, 1994). These standards, which are shown in Table 3.7-2, do not constitute an enforceable noise ordinance, but rather provide benchmarks to be used in planning and siting land uses. The noise levels listed in Table 3.7-2 are standards for noise levels at the property line of the potentially affected land use; nighttime standards apply only when the potentially affected land use operates or is occupied during nighttime hours.

The Marin Countywide Plan Noise Element (Marin County, 1994) includes several objectives, policies, and programs that pertain to the project:[3]

[3] There are several references in the objectives, policies and programs to Table N-2 and Table N-3. Table N-2 is reproduced in this document as Table 3.7-1, and Table N-3 is reproduced as Table 3.7-2.

TABLE 3.7-2
BENCHMARKS FOR ALLOWABLE NOISE EXPOSURE FROM STATIONARY NOISE SOURCES

	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Hourly Leq, dB	50	45
Maximum Level, dB	70	65
Maximum Level, dB (Impulsive Noise)	65	60

SOURCE: Marin County, *Marin Countywide Plan, Noise Element*, January 1994.

Objective N-2: Prevent Significant Noise Impacts From New Development in Existing Developed Areas. To ensure that new development does not significantly increase noise levels within existing residential, commercial, industrial and agricultural areas, and to ensure that noise from new development does not exceed County guidelines.

Policy N-2.1: Use Noise Level Guidelines-Existing Development. The County shall use noise level guidelines contained in this element to protect existing land uses from noise generated by new development.

Program N-2.la: Use the CEQA Process and Discretionary Review to Protect Existing Land Uses From Significant Noise Impacts Due to New Development. Both CEQA and discretionary review of new development shall determine the noise impacts of new development. Potential noise impacts and mitigation measures shall be evaluated through environmental review, master plans, design review, use permits and other discretionary permits in cases of significant increases in noise levels.

Program N-2.lb: Noise Guidelines to Protect Existing Land Uses from Transportation-Generated Noise Due to New Development. Table N-2 shall be used as a guide to establish allowable noise levels. Where the existing noise level is rated “Normally Acceptable,” if new development raises the L_{dn} by more than 5 dBA but the noise level still remains in the “Normally Acceptable” category, it is considered a significant impact. In areas where the existing noise level is “Normally Acceptable,” if new development raises the L_{dn} by more than 3 dBA and the noise level exceeds the “Normally Acceptable” standard, it is considered a significant impact. In areas that already exceed the “Normally Acceptable” noise level, if new development raises the L_{dn} by more than 3 dBA, it is considered a significant impact. When a significant impact occurs, mitigation measures shall be required.

Program N-2.1c: Noise Guidelines to Protect Existing Land Uses from Stationary Source Noise Generated by New Development. Table N-3 shall be used as a guide to establish allowable noise levels. New noise-generating development proposed near existing residential or other noise-sensitive land uses shall have an acoustical analysis performed to determine the appropriate mitigation necessary to conform to the standards in Table N-3.

Effective mitigation measures shall be incorporated into the new development to reduce exposure to noise levels at or below the standards shown in Table N-3.

Table N-2 shall be used to determine allowable noise levels for commercial, industrial, agricultural or other less noise-sensitive land uses exposed to stationary source noise generated by new development.

Policy N-2.4: Minimize Impacts From Excessive Noise Levels Due to Construction Activity. During all phases of construction, measures should be taken to minimize the exposure of neighboring properties to excessive noise levels from construction-related activity.

Program N-2.4a: Limit Construction Hours. The Community Development Agency reserves the right to set hours for construction-related activities involving the use of machinery, power tools or hammering. The type of construction, site location and noise-sensitivity of nearby land uses will determine the hours of construction. The conditions of approval will specify hours for staging and type of construction activities. Special consideration shall be given to homeowners who perform their own work.

CHANGES IN THE ENVIRONMENTAL SETTING SINCE THE 1994 FEIR

There have been few changes to the environmental setting for noise since publication of the 1994 FEIR. Redwood Landfill is still several miles distant from most commercial or residential developments, and the same noise sources, i.e., U.S. 101, air traffic from Gnoss Field, and landfill operations and landfill traffic, are the greatest contributors to ambient noise levels. One change that has taken place is that there are no longer non-landfill related uses at the landfill site. Another is the development of the Buck Center, approximately 1.5 miles south of the facility, and across U.S. 101.

The 1994 FEIR did not identify the parcel immediately to the south of the landfill property as a sensitive noise receptor, despite the presence of a commercial operation (the Mira Monte Marina) and the general plan land use designation and zoning for these parcels (RC – Recreational Commercial). Neither did the 1994 FEIR identify San Antonio Creek as a sensitive noise receptor, even though San Antonio Creek is used for water recreation, one of the land uses for which a community noise standard exists (see Table 3.7-1).

3.7.2 IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

To assess long-term changes in the ambient noise environment at nearby noise-sensitive receptor locations, the policies, objectives, and programs from the Countywide Plan Noise Element shall constitute significance criteria for the project. These include the guidelines set in Program N-2.1b and Program N-2.1c. Program N-2.1b contains the most specific guidance for determining significance, and while this program pertains primarily to transportation-related noise sources, the criteria contained in the text of the program shall serve here as significance thresholds for all potential new noise sources generated by the project. Program N-2.1b uses the community noise standards shown in Table 3.7-1 as the basis of the guidelines:

> "Where the existing noise level is rated 'Normally Acceptable,' if new development raises the L_{dn} by more than 5 dBA but the noise level still remains in the 'Normally Acceptable' category, it is considered a significant impact. In areas where the existing noise level is 'Normally Acceptable,' if new development raises the L_{dn} by more than 3 dBA and the noise level exceeds the 'Normally Acceptable' standard, it is considered a significant impact. In areas that already exceed the 'Normally Acceptable' noise level, if new development raises the L_{dn} by more than 3 dBA, it is considered a significant impact."

L_{dn} calculations for impacts are included in Appendix C of this document.

Impact 3.7.1: Noise from increased levels of landfill operational activities and for construction at the landfill could increase ambient noise levels for the closest sensitive land uses. (Less than Significant)

The loudest noises associated with landfill operations and construction at the site are caused by the use of heavy equipment, including compactor-dozers, scraper-spreaders, truck tippers, water trucks, and excavators. Other major noise sources include heavy duty trucks crossing the landfill to and from the working face, and the vaporator and flare. Typical noise levels associated with use of heavy equipment of this kind range from 79-91 dBA at 50 feet distance (Bolt, Berenek, and Newman, 1971). Operation of two pieces of equipment that each generate 91 dBA (such as heavy duty trucks) would result in a combined noise level of approximately 94 dBA. Increased noise generated by the project can be expected to result from the additional use of equipment to transport and process the increased amount of material handled at the landfill. Since the proposed peak amount of material that the landfill might handle on a daily basis would be approximately twice the current amount, it is reasonable to assume that noise-generating functions, especially operation of heavy equipment, could also approximately double to handle the increased amount of incoming material. While the applicant does not propose to increase the number of pieces of heavy equipment at the landfill, there would certainly be an increase in the use of existing equipment under the project, including increased number of hours of operation and running two pieces of equipment where currently one is typically used. Based on the rule-of-thumb formula presented in the introductory discussion in this section, the sum of two noise sources of equal loudness is 3 dBA greater than the noise generated by just one of the noise sources. An approximate doubling in the use of heavy equipment can therefore be expected to increase ambient noise levels around the landfill by about 3 dBA.

The closest noise-sensitive land use is the Mira Monte Marina, located immediately south of the landfill. The property line is about 1,800 feet from the closest part of the landfill property permitted for landfilling operations (the southern edge of areas D and G), the Marina is about 3,000 feet away. Since noise from stationary sources decreases by at least 6-7.5 dBA with each doubling of distance, the loudest assumed noises from landfill operations and construction would decrease as follows:

Distance from Source (feet)	91 dBA Noise Source	94 dBA Noise Source
50	91	94
100	85	88
200	79	82
400	73	76
800	67	70
1,600	61	64
3,200	55	58
6,400	49	52

At 2,400 feet, noise from the landfill operations under the project can be expected to attenuate to a conservative estimate of 58-64 dBA; because of vegetation, structures, and topography, the actual attenuation would probably be somewhat higher. The project can be expected to increase noise levels at the Marina by about 3 dBA, from about 55 dBA to 58 dBA. Given the landfill's hours of operations, from 8 p.m. to 4:30 p.m. the following day (the landfill is not permitted to operate between 4:30 p.m. and 8:00 p.m. each day), the L_{dn} noise level caused by landfill operations can be expected to increase from about 61 dBA L_{dn} to about 64 dBA L_{dn}. This is within the "Normally Acceptable" range for commercial uses, and does not constitute an increase of more than 5 dBA L_{dn}. Therefore, the impact is less than significant and does not require mitigation.

Mitigation: None required.

Impact 3.7.2: Noise from increased levels of landfill operational activities and for construction at the landfill could increase ambient noise levels for less sensitive land uses. (Less than significant)

As discussed in Impact 3.7.1, the increase in landfill operations that will be necessary to process the proposed near-doubling of material entering the site can be expected to increase the ambient noise level around the landfill by about 3 dBA. The designated land use for the parcels to the west and north of the landfill is agricultural (AG-1). San Antonio Creek, which is used for water recreation, is located immediately to the east of the landfill property.

Table 3.7-1 indicates that the community noise standards for industrial, manufacturing, utilities, and agricultural land uses are as follows: acceptable, less than 70 L_{dn}; conditionally acceptable, 70 to 75 L_{dn}; and normally unacceptable, more than 75 L_{dn}. Table 3.7-1 also indicates that for uses including golf courses, riding stables, water recreation, and cemeteries, the normally acceptable noise level is less than 65 L_{dn}; conditionally acceptable is 65 to 70 L_{dn}, and normally unacceptable is more than 70 L_{dn}.

This analysis assumes that, because of the proximity to the existing landfill operations (areas permitted for landfill are within about 100 feet of the western property boundary), the parcels to the west of the landfill already experience noise levels in excess of the 75 L_{dn} "normally unacceptable" standard for agricultural lands, at least during times when the active face of the landfill is in areas C, E, F, and G, near the western property boundary. The northern property boundary may experience similar noise levels when the working face is in Area B of the landfill. As with the previous impact, the noise levels generated by the landfill operations are expected to increase under the project from about 91 dBA to about 94 dBA at 50 feet. At 100 feet, 94 dBA would attenuate to about 88 dBA. Assuming, as in the previous impact, that the landfill could currently generate noise levels of 91 dBA during all hours of permitted operation, and that this noise level can be expected to increase to about 94 dBA under the project (with the expected near-doubling of equipment use), the L_{dn} at the western property boundary can also be expected to increase from about 91 dBA to 94 dBA during times when operations are occurring in areas C, E, F, and G and at the northern property boundary when operations are occurring in area B (the attenuation caused by distance is made up for by the "penalty" given nighttime noise). Because the project would not be expected to increase the L_{dn} by more than 3 dBA in an area that already experiences "normally unacceptable" noise levels, the impact would be less than significant.

San Antonio Creek, which is used for water recreation, is within about 200 feet of portions of Area A and Area B of the landfill. When the working face of the landfill is within areas A and B, noise levels of 91 dBA at 50 feet from the source would be expected to attenuate to about 79 dBA 200 feet away at San Antonio Creek. Under the project, with the assumed 3 dBA increase in noise generation, the noise level 200 feet from the source can be expected to be about 82 dBA. The corresponding L_{dn} noise levels, assuming constant generation of these noise levels during all permitted hours of operation, would be about 85 dBA L_{dn} under existing conditions, and 88 dBA L_{dn} under the project. 85 dBA L_{dn} is already above the "normally acceptable" standard for water recreation. However, the predicted increase for the L_{dn} from the project is not greater than 3 dBA; therefore, the impact is less than significant, and requires no mitigation.

Mitigation: None required.

Impact 3.7.3: Use of equipment for composting operations in the Oxbow area and other areas proposed for composting operations could cause an increase in the ambient noise level for adjacent land uses. (Significant)

Tubgrinders, which are used to grind green waste and other materials to make them suitable for composting, may produce noise levels in the range of 96 dBA at 50 feet, while compost windrow turners generate lower levels of noise, in the range of 77 dBA at 50 feet (Contra Costa County, 2001). Trommel screens also produce high noise levels. Currently, the tubgrinder for the composting operation is operated in the existing permitted composting area, on the west side of the landfill, within the landfill footprint (shown as the "interim composting/co-composting facility in Figure 2-3). Noise from the tubgrinder operated under the existing permit probably cannot be heard at the eastern and southern boundaries of the landfill property, where the adjoining parcels are more noise-sensitive, since the noise would be attenuated by distance and by the landfill mass itself.

Part of the project is to allow composting and co-composting operations in the Oxbow area, in what is now the main sludge impoundment, and in “Field 1”, which is immediately east of the main sludge impoundment. These areas are much closer to San Antonio Creek and to the Mira Monte Marina than the existing composting site, and they are not shielded from the southern and eastern property lines by the landfill mass. Portions of the Oxbow area and Field 1 are within about 200 feet of San Antonio Creek, and within about 600 feet of the southern boundary of the landfill property. A noise level of 96 dBA at 50 feet would attenuate to about 84 dBA at 200 feet, and to about 76 dBA at 600 feet. The perimeter levee would further attenuate noise levels, by at least 10 dBA where the levee would block the line of site between the noise source and the receptor. The resulting noise levels at San Antonio Creek could still be about 74 dBA, and at the southern property line about 66 dBA.

In addition to the proposal to conduct composting operations in these areas of the landfill property, the project also includes the proposal to increase the amount of material that would be composted. The currently permitted average amount of greenwaste that the facility can receive is approximately 42 tons per day. The proposed project includes an increase in average daily receipt of greenwaste to 400 tons per day. This is an approximately 10 fold increase. The landfill’s existing tub grinder is rated to process 50 tons per hour, so the project would result in an increase in the use of the tub grinder by about 10 times, from an average of just under one hour per day to about 8 hours per day. Since the current hours of operation for the composting facility are from 6:00 a.m. until 9:00 p.m. Monday through Friday, there could be more frequent operation of the tubgrinder during the more sensitive early morning hour between 6:00 a.m. and 7:00 a.m. Eight hours of operation of the tubgrinder, including the hour of 6:00 a.m. to 7:00 a.m. is predicted to produce an L_{dn} of 73 dBA at San Antonio Creek, and 66 dBA at the southern property line. While 66 dBA is within the “conditionally acceptable” range for commercial land uses, 73 dBA L_{dn} is within the “normally unacceptable” noise level standard for water recreation land uses. Therefore, this would be a significant impact.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

Mitigation Measure 3.7.3a: Operating hours for the tubgrinder shall be restricted to 7 a.m. to 7 p.m.

Mitigation Measure 3.7.3b: The tubgrinder shall be operated at least 600 feet from the outer edge (creek side) of the road along the perimeter levee.

Mitigation Measure 3.7.3c: Alternatively, the landfill operator could construct an earthen berm between the tubgrinder operations area and all parts of the eastern landfill boundary within 600 feet of the tubgrinder location. The earthen berm must be at least as high as the highest part of the tubgrinder itself. Compost windrows could be substituted for the earthen berm, as long as they are as high as the highest part of the tubgrinder, and located between the tubgrinder operations area and the eastern landfill boundary.

Level of Significance After Mitigation

Mitigation Measure 3.7.3a, in conjunction with either Mitigation Measure 3.7.3b *or* 3.7.3c can be expected to reduce the noise level at San Antonio Creek from composting operations to less than 65 dBA L_{dn}, which would reduce the impact to a less-than-significant level.

Impact 3.7.4: Noise from increased levels of landfill traffic could increase ambient noise levels for nearby land uses. (Less than Significant)

Table 3.10-4 in the Traffic Section shows that the applicant is proposing to increase the permitted number of vehicles entering the facility each day. The revised proposal (revised since publication of the DEIR; see Master Response 17 in Volume 2) is to increase permitted traffic from the currently permitted level of 415 vehicles per day to ~~1,000~~ 690 vehicles per day, an increase of ~~more than 100~~ about 66 percent. While this represents a minor incremental increase in traffic on U.S. 101, Sanitary Landfill Road, the access road to the landfill, carries only landfill traffic. Therefore, traffic on Sanitary Landfill Road would ~~more than double~~ increase substantially, and ambient noise levels from traffic along Sanitary Landfill Road can be expected to increase by about ~~more than~~ 3 dBA (based on an approximate 3 dBA increase for each doubling of traffic volume).

The land adjacent to Sanitary Landfill Road is designated AG-1 (agricultural) in the Marin Countywide Plan, but the land is not currently used for agriculture or agricultural processing, other than occasional use as grazing land. The noise environment in this area is already affected by traffic on Sanitary Landfill Road and by traffic on U.S. 101 (the 70 dBA L_{dn} noise contour for this part of U.S. 101 is about 250 feet from the centerline of the roadway; the 60 dBA L_{dn} noise contour is about 1,150 feet from the centerline of the roadway, or about the distance to the landfill property boundary – see Marin County, 1994, Appendix N-1). In addition, the Northwestern Pacific Railroad tracks pass just west of the landfill's western property boundary in this area, and the Gnoss Field runway is oriented toward this area. Therefore, despite the increase in ambient noise from increased traffic on Sanitary Landfill Road, the lack of sensitive receptors and the already high noise levels in the areas adjacent to Sanitary Landfill Road render this impact less than significant, and no mitigation is required.

Mitigation: None required.

REFERENCES – Noise

Bolt, Berenek, and Newman, Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances. U.S. Environmental Protection Agency, 1971.

Contra Costa County Community Development Department, Acme Fill Composting Facility Land Use Permit (LUP982082), Initial Study and Draft Mitigated Negative Declaration, SCH # 2001052011. Contra Costa County, May, 2001.

Marin County, *Marin Countywide Plan: Noise Element*. Marin County, January, 1994.

3.8 PUBLIC HEALTH AND SAFETY

This section describes the regulatory setting that pertains to public health and safety issues at Redwood Landfill, analyzes potential impacts of the proposed project on public health and safety, and identifies mitigation measures to reduce or eliminate those impacts. Issues having to do with public health and safety aspects of specific impact areas (e.g., water quality, air quality, and traffic hazards) are presented in the sections on those impact areas (Sections 3.5, 3.2, and 3.10, respectively).

3.8.1 SETTING

REGULATORY SETTING

Various requirements for the permitting and development of sanitary landfills are imposed by governmental agencies at the federal, state, regional, and local levels. The requirements come in the form of statutes, regulations, and policies adopted by the agencies, and are enforced by permitting and approval processes that have been established to prevent landfills from being designed poorly or operated improperly. Relevant responsibilities of the regulatory agencies and agency policies are summarized in this section and elsewhere in this EIR. A common goal of all regulatory oversight is to assure that adequate controls are in place to prevent the landfill from having adverse impacts on public health, safety, or the environment.

Regulatory Agencies

Federal

The U.S. Environmental Protection Agency (U.S. EPA) is responsible at the federal level for enforcing regulations pertaining to solid waste management and hazardous substances and wastes. Principal federal statutes that affect solid waste management and the handling of hazardous waste include the Solid Waste Disposal Act of 1967, the Resource Recovery Act of 1970, the Resource Conservation and Recovery Act (RCRA) of 1976, the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Superfund Amendment and Reauthorization Act of 1986.

The federal Occupational Safety and Health Administration (Fed/OSHA) regulates occupational workplaces to protect worker safety pursuant to the Occupational Safety and Health Act. In California, Fed/OSHA has delegated most of its regulatory authority to the corresponding state agency, Cal/OSHA. Regulations regarding worker health and safety are discussed below.

State and Regional

The U.S. EPA has delegated much of its regulatory authority to individual states where adequate state regulatory programs exist. In California, four state agencies are involved to a large degree in solid waste management: the CIWMB; the Department of Toxic Substances Control (DTSC); the California Air Resources Board (CARB); and the SWRCB.

The California Integrated Waste Management Board (CIWMB) regulates landfills, transfer stations, and other major solid waste facilities in the state. DTSC is responsible for protecting public health and the environment from harmful exposure to hazardous substances. CARB is responsible for preserving and enhancing air quality within the state. The Bay Area Air Quality Management District (BAAQMD) implements CARB policies in the Bay Area region. (See Section 3.2, Air Quality, for a more detailed discussion of BAAQMD responsibilities and project effects on air quality). The SWRCB is responsible for protecting California's surface water and groundwater, and administers and enforces Title 27 of the California Code of Regulations (CCR). Regionally, the SWRCB is represented by the San Francisco Bay Regional Water Quality Control Board (RWQCB). Pursuant to CCR, Title 27, any person discharging, having discharged, or proposing to discharge any waste that might affect the quality of surface water or groundwater in the region must submit a Report of Waste Discharge (ROWD) to the RWQCB and develop a groundwater monitoring program. Groundwater sampling is required quarterly and is used to determine if the water quality protection standards established by the RWQCB are being maintained. (See Section 3.5, Hydrology and Water Quality, for a more detailed discussion of project effects on water quality.)

Local

California law places responsibility for the provision of solid waste collection, processing, transfer, and disposal with local jurisdictions. State standards are enforced by local officials through the Local Enforcement Agency (LEA) appointed by the CIWMB. Marin County Environmental Health Services is the appointed LEA in Marin County. The LEA has the primary responsibility for ensuring that a solid waste management facility complies with all applicable federal, state and local regulations. The LEA is responsible for issuing solid waste facilities permits (SWFPs) for solid waste disposal facilities and enforces the Title 14 operating controls and standards described below. Enforcement responsibilities include field inspections of composting facilities and disposal sites for compliance with state standards. The LEA also has the responsibility to protect public health and safety, prevent environmental damage, and enforce long-term environmental protection.

Worker Health and Safety

The California Occupational Safety and Health Administration (Cal/OSHA) and the Federal Occupational Safety and Health Administration (Fed/OSHA) are the agencies responsible for assuring worker safety. Pursuant to the Occupational Safety and Health Act of 1970, Fed/OSHA has adopted numerous regulations pertaining to worker safety, contained in the Code of Federal Regulations Title 29 (29 CFR). These regulations set standards for safe workplaces and work practices, including standards relating to hazardous material handling. Cal/OSHA assumes primary responsibility for developing and enforcing state workplace safety regulations. Because California has a federally approved OSHA program, it is required to adopt regulations that are at least as stringent as those found in 29 CFR. Cal/OSHA standards are generally more stringent than federal regulations.

Cal/OSHA regulations concerning the use of hazardous materials in the workplace, as detailed in Title 8 of the CCR, include requirements for safety training, availability of safety equipment, implementation and maintenance of accident and illness prevention programs, hazardous substance exposure warnings, and emergency action and fire prevention plan preparation. Title 8 regulations (§3203) include requirements for worker safety training and injury/illness prevention programs contained in Senate Bill 198, which was adopted in 1990. Cal/OSHA enforces hazard communication program regulations that contain training and information requirements, including procedures for identifying and labeling hazardous substances, communicating hazard information related to hazardous substances and their handling, and preparation of health and safety plans to protect workers and employees at hazardous waste sites.

Regulations covering waste disposal site operations specifically are given in CCR Title 27, Division 2, Chapter 3, §20550-§20750. Several sections deal specifically with worker health and safety. §20590 requires that operating and maintenance personnel wear and use approved safety equipment for personal health and safety, as determined necessary by the LEA. §20610 requires that personnel assigned to operate the site must be adequately trained in subjects pertinent to site operation and maintenance, with emphasis on safety, health, environmental controls, and emergency procedures. It is the responsibility of the site operator to provide adequate numbers of qualified personnel to staff the site and deal effectively and promptly with matters of environmental controls, emergencies, and health and safety. The site operator is required to provide adequate supervision to insure proper compliance with all applicable laws, regulations, permit conditions, and other requirements.

Landfill Controls and Standards

Title 27 of the California Code of Regulations (CCR) contains regulations of the State Water Resources Control Board (SWRCB) and the California Integrated Waste Management Board (CIWMB) pertaining to the disposal of waste on land. Title 27, Division 2, Chapter 3, establishes minimum standards for solid waste handling and disposal. Articles 4 and 6 contain specific landfill disposal site controls that relate to public health and safety:

- §20760. Nuisance Control. Each disposal site shall be operated and maintained so as to not create a public nuisance.
- §20770. Animal Feeding. Feeding of refuse to animals which will be used for human consumption is expressly prohibited on disposal sites. Grazing of livestock away from operating areas is permitted.
- §20790. Leachate Control. The operator shall ensure that leachate is controlled to prevent contact with the public.
- §20800. Dust Control. The operator shall take adequate measures to minimize the creation of dust and prevent safety hazards due to obscured visibility.
- §20810. Vector and Bird Control. The operator shall take adequate steps to control or prevent the propagation, harborage or attraction of flies, rodents or other vectors and to minimize bird problems.

- §20820. Drainage and Erosion Control. The drainage system shall be designed and maintained to:

  (a) ensure integrity of roads, structures, and gas monitoring and control systems;
  (b) prevent safety hazards; and
  (c) prevent exposure of waste.

- §20830. Litter Control. Litter shall be controlled, routinely collected and disposed of properly. Windblown materials shall be controlled to prevent injury to the public and personnel. Controls shall prevent the accumulation, or off-site migration, of litter in quantities that create nuisance or cause other problems.

- §20840. Noise Control. Noise shall be controlled to prevent health and safety hazards to persons using the site and to nearby residents.

- §20860. Traffic Control. Traffic flow into, on, and out of the disposal site shall be controlled to minimize the following:

  (a) interference and safety problems with traffic on adjacent public streets or roads.
  (b) on-site safety hazards, and
  (c) interference with site operations.

- §20870. Hazardous Wastes. Owners or operators of all MSWLF units must implement a program at the facility for detecting and preventing the disposal of regulated hazardous wastes as defined in 40 CFR Part 261 and polychlorinated biphenyls (PCB) wastes as defined in 40 CFR Part 761. This program must include, at a minimum:

  (a) Random inspections of incoming loads unless the owner or operator takes other steps to ensure that incoming loads do not contain regulated hazardous wastes or PCB wastes;

  (b) Records of any inspections;

  (c) Training of facility personnel to recognize regulated hazardous wastes and PCB wastes; and

  (d) Notification of the EA, the Director of the California Department of Toxic Substances Control (DTSC) or its delegated agent, and the Regional Water Quality Control Board (RWQCB), if a regulated hazardous waste or PCB waste is discovered at the facility.

  The site shall not accept hazardous waste unless the site has been approved for the particular waste involved.

  At sites where hazardous materials are processed, precautions must be taken to eliminate or control dusts, fumes, mists, vapors or gases that may be produced in quantities and under conditions which may have harmful effects on site personnel, the general public or animals.

- §20919. Gas Control. Where the enforcement agency, the local fire control authority, or the CIWMB has cause to believe a hazard or nuisance may be created by landfill decomposition gases, they shall so notify the owner. Thereafter, the site owner shall cause the site to be monitored for presence and movement of gases, and shall take necessary action to control such gases. The site owner shall inform the operator of any actions ordered by the EA, the local fire control authority or the CIWMB concerning gas control methods. The monitoring program shall be developed pursuant to the specifications of the above agencies. The monitoring program shall not be discontinued until authorized to do so in writing by the requiring agency. Results of the monitoring shall be submitted to the appropriate agencies. If monitoring indicates methane gas movement away from the site, the owner shall, within a period of time specified by the requiring agency, construct a gas control system approved by that agency. The agency may waive this requirement if satisfactory evidence is presented indicating that adjacent properties are safe from hazard or nuisance caused by methane gas movement. The operator shall duly inform the disposal site owner of possible landfill gas problems.

CCR Title 14, Division 7, establishes minimum regulatory standards for solid waste management, handling and disposal (Chapter 3) and establishes guidelines for enforcement of solid waste standards and administration of solid waste facilities permits (Chapter 5). Article 6.2 of Chapter 3 establishes solid waste facility operating standards pertaining to health and safety, including the following:

- <u>§17407.1. Burning Wastes and Open Burning</u>. Burning wastes received at a facility shall be separated from other wastes and deposited in a safe area, spread, and extinguished.

- <u>§17407.5. Hazardous, Liquid, and Special Wastes</u>. A facility shall not intentionally accept or store hazardous wastes unless it has been approved to handle the particular waste by the appropriate regulatory agencies. At facilities where unauthorized hazardous wastes are discovered, control measures as are necessary to protect public health, safety and the environment shall be taken prior to isolation or removal from the operation or facility. Liquid wastes and sludges shall not be accepted or stored at an operation or facility unless the operator has written approval to accept such wastes from the appropriate agencies and the enforcement agency.

- <u>§17409.5. Loadchecking</u>. The operator of an attended operation or facility shall implement a loadchecking program to prevent the acceptance of waste prohibited by this Article. This program must include at a minimum:

  (1) the number of random loadchecks to be performed;

  (2) a location for the storage of prohibited wastes removed during the loadchecking process that is separately secured or isolated;

  (3) records of loadchecks and the training of personnel in the recognition, proper handling, and disposition of prohibited waste.

  A copy of the loadchecking program and copies of the loadchecking records for the last year shall be maintained in the operating record and be available for review by the appropriate regulatory agencies.

- <u>§17410.4. Vector, Bird and Animal Control</u>. The operator shall take adequate steps to control or prevent the propagation, harborage and attraction of flies, rodents, or other vectors, and animals, and to minimize bird attraction.

Hazardous Waste Regulation

Definitions

Certain chemical and physical properties of substances cause them to be considered hazardous. The terms hazardous material and hazardous waste are legal terms defined in State regulations. Under Title 22 of the CCR, a hazardous material is defined as a substance or combination of substances, which because of quantity, concentration, or physical, chemical or infectious characteristics, may either: (1) cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating, illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported or disposed of, or otherwise managed (CCR, Title 22, Chapter 10, Article 2, §66260.10).

Hazardous wastes are defined in the same manner (CCR, Title 22, Chapter 11, Article 2, §66261.10). Hazardous wastes are hazardous residues or discards that no longer have practical use, such as substances that have been discarded, spilled, contaminated, or disposed.

According to Title 22, hazardous substances are classified according to four properties: toxicity, ignitability, corrosivity, and reactivity. Carcinogens (substances known to cause cancer) are a special class of toxic substances. Explosives, volatile fuels, and natural landfill gas are examples of reactive materials.

Contaminated soil is not necessarily hazardous waste. Soils are considered contaminated when they contain elevated levels of a chemical substance and have the potential to cause human health effects or adversely affect the natural environment. Contaminated soil that is excavated would be considered a hazardous waste if it exceeded any of a number of specific CCR Title 22 criteria. Redwood Landfill’s current SWFP and WDRs permit it to accept petroleum contaminated soils (classified as a “designated waste”) provided that concentrations of constituents do not exceed specified limits.

Hazards vs. Risk

Workers and public health are potentially at risk whenever hazardous wastes are encountered. It is necessary to differentiate between the “hazard” of the materials and the “risk” they pose to human health or the environment (e.g., through exposure to the material as a consequence of accidental upset or release). Risk is determined by a combination of (1) the probability of exposure to the hazardous material and (2) the severity of consequences should exposure occur (California Office of Emergency Services, 1989). In other words, the likelihood of exposure to the hazardous material coupled with its inherent hazardous properties determine the degree of risk to health or the environment. To be of high risk, exposure to a hazardous material must be both likely and consequential.

Hazard Exposure

Exposure to hazardous compounds or disease organisms could arise through transport by air of potentially toxic materials released in gaseous form or as smoke emitted by a fire; transport by animal vectors, such as scavenging birds, rodents, or insects; and transport by surface water or groundwater where hazardous materials leave the landfill site due to leaks, spills, or uncontrolled runoff.

Pathways of exposure to a hazardous material or waste depend on the chemical and physical properties of the waste and the type of occurrence or accident that released it. The four common exposure pathways are inhalation, ingestion, direct contact (with skin or eyes), and injection (skin puncture or cut).

Factors that influence the health effects of exposure to hazardous material include the dose to which the person is exposed, the frequency of exposure, the exposure pathway, and individual susceptibility. A material may be hazardous by one exposure pathway but not another; for example, a chemical might be toxic if ingested but not if touched.

Effects of Exposure

Health effects of exposure to hazardous chemicals can vary greatly and are specific to each chemical. Possible health effects of exposure may be acute (immediate, or of short-term severity) or chronic (long-term, recurring, or resulting from repeated exposure). Acute effects, usually resulting from a single exposure, might include burns or injury to body organs or systems such as from exposure to corrosive, reactive, or ignitable materials. Chronic effects, usually resulting from repeated or long-term exposure to a toxic material (as in a poorly ventilated work place, for example), could also include systemic or organ damage. Chronic toxic effects of particular concern are birth defects and cancer.

Disposal of Designated Waste

In general, Class II landfills accept the class of wastes known as “designated waste,” which is defined and regulated by the RWQCB. Designated waste is defined as either: (1) nonhazardous waste that consists of or contains pollutants that, under ambient environmental conditions at the landfill, could be released at concentrations in excess of applicable water quality objectives, or that could cause degradation of waters of the state; or (2) hazardous waste that has been granted a variance from hazardous waste management requirements pursuant to the CCR Title 22, §66310.

Designated wastes that fall within the second definition are similar to “Special Wastes,” which are defined in Title 22 (§66260.10) as wastes that are hazardous only because they pose a chronic toxicity hazard if managed improperly. While designated wastes are classified by the RWQCB, special wastes are classified by DTSC. Designated and special wastes can be disposed at Class II landfills only with the prior approval of the RWQCB for containment of the particular kind of waste to be discharged.

SENSITIVE RECEPTORS

With regard to public health and safety, a sensitive receptor is an individual or population that resides near or encounters a potential health hazard. For example, an individual living near the landfill site would be subject to the greatest risk from a grass fire or landfill gas explosion occurring at the site, vectors, or a release that could contaminate air or water. No sensitive receptors live in close proximity to the project site. Land uses surrounding the landfill include agriculture, open space, recreation, and the County airport. The nearest residences are located approximately 1.5 miles to the southwest (west of Highway 101) at the Buck Center.

EXISTING SITE CONDITIONS

Existing Hazards

Public health and safety concerns associated with current, ongoing landfill and composting operations include the potential for hazardous compounds or disease organisms to be present in sewage sludge (biosolids) and other designated wastes; the probable presence in incoming loads of household hazardous waste; potential emissions of toxic air contaminants from landfill operations and the release of bioaerosols from composting operation; potential releases of leachate to groundwater and nearby surface waters; potential explosions from the buildup of landfill gas; and the presence of vectors potentially capable of spreading pathogens in the refuse of composting feedstock. Birds attracted to the landfill can pose a bird-strike hazard for aircraft approaching or departing from the nearby County airport, Gnoss Field.

Redwood Landfill has an ongoing loadcheck program (discussed in greater detail below) to detect and manage prohibited wastes, including household hazardous waste, that may enter the site commingled with refuse loads. The facility's existing and proposed leachate collection and removal system is discussed and evaluated in Section 3.4, Geology, Soils, and Seismicity. Fire incidences and potential fire hazard at the site are discussed in Section 3.9, Public Services, Utilities and Energy.

Sewage Sludge (Biosolids)

Federal regulations applicable to domestic septage (40 CFR Part 503) define sewage sludge (also called biosolids) as a solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. The Part 503 rules create incentives for the beneficial use of sewage sludge (U.S. EPA, 1994). The presence of human pathogens distinguishes sewage sludge from other types of manure, and makes its handling and processing potentially more problematic. Other constituents sometimes present in sewage sludge such as heavy metals, solvents, and other potentially harmful substances, also warrant particular concern.

Redwood currently is permitted to accept Class B biosolids for disposal and as co-composting feedstock. As described in the Project Description, biosolids are classified under 40 CFR, Part 503 as "Class B" if pathogens are detectable, but have been reduced to levels that do not pose a threat to public health and the environment as long as actions are taken to prevent exposure to the biosolids after their use or disposal. Properly managed aerobic composting further reduces the pathogens in biosolids to non-detectable levels; aerobic composting is one of the processes listed in 40 CFR Part 503 to further reduce pathogens in biosolids. Application of one of these processes to further reduce pathogens is one of the standards necessary to upgrade biosolids to Class A.

Toxic Air Emissions

Toxic air contaminants (TACs) are airborne substances that are capable of causing short-term (acute) and/or long-term (chronic or carcinogenic, i.e., cancer-causing) adverse human health effects (i.e., injury or illness). TACs include both organic and inorganic chemical substances. Wastes accepted at the landfill generate TACs. Landfills typically are sources of TACs such as benzene, carbon tetrachloride, chloroform, ethylene dichloride, and methylene chloride. When the quantities and types of air pollutants allowed under an existing permit change, an application must be filed with the AQMD for a permit modification. See Section 3.2, Air Quality, for a more detailed discussion and impact analysis pertaining to TACs.

Landfill Gas

Natural processes in landfills (i.e., the decomposition of organic waste) generate carbon dioxide, a nontoxic gas, and methane, a non-toxic but flammable and explosive gas. Under the anaerobic phase of decomposition (i.e., without oxygen), methane continues to be generated until all organic matter in the landfill has decomposed. The presence of moisture in a landfill can speed waste decomposition and increases the rate of gas generation.

Landfill gas typically consists of about 50 percent methane (CH_4), the primary component of natural gas, and about 50 percent carbon dioxide (CO_2) and a small amount of non-methane organic compounds (U.S. EPA, 2002). Because of relatively impermeable liners, landfill gases tend to accumulate in landfills and gradually seep out along paths of least resistance, such as cracks or fissures. If methane gas enters confined spaces, such as buildings, it can become explosive and present a significant threat to health and safety. The lower explosive concentration limit for methane is 5 percent and the upper explosive limit is 15 percent (ATSDR, 2001).

CCR Title 27, §21600 requires landfills to have and describe their systems for monitoring, venting, controlling, and possibly using, landfill gas. The current landfill gas management system at Redwood Landfill consists of landfill gas monitoring and a collection and treatment system. Monitoring includes quarterly monitoring by an outside consultant using portable gas detection equipment, weekly monitoring by RLI using a GasTech combustible gas indicator in accordance with the terms of the landfill's Permit to Operate from BAAQMD, and continuous monitoring by RLI of landfill gas levels in the administration building using a GasTech gas sensing device and alarm system. The use of probes is not considered an effective means of detecting lateral migration due to the low permeability of the Bay Mud underlying the landfill, which acts as a barrier to migration, and the high groundwater table, which leaves no subsurface monitoring zone (GeoSyntec, 1998).

The landfill gas collection and control system was installed and is operated pursuant to BAAQMD Regulation 8, Rule 34. This system is expected to lower landfill gas pressure within the refuse unit, thereby reducing the potential of gas within the unit to migrate, but is not designed to control lateral subsurface migration. The system controls landfill gas by collecting it and conveying it to the newly constructed flare located near the southwest corner of the landfill footprint, where it is burned. The collection system currently includes 37 horizontal collectors and 4 vertical wells. RLI plans to expand the system to meet applicable regulations and other requirements as the landfill is further developed (GeoSyntec, 1998).

The 11.5-acre waste unit in the southwest corner of the property, which RLI proposes as part of the current project to leave in place, is not served by a landfill gas system (Treadwell & Rollo, 2002). Very low concentrations of methane gas have been detected in shallow soil and at the surface of this waste unit by surface and subsurface scans in shallow tests excavated to 2.0 to 2.5 feet below ground (WM, 1997).

Designated Wastes

While Redwood Landfill currently is permitted and operated as a Class III landfill, its 11-acre leachate impoundment is permitted as a Class II waste management unit. The leachate impoundment receives runoff that has been in contact with refuse, compost, or sludge ("contact water") as well as leachate from the a landfill's leachate collection and removal system (LCRS). Other designated wastes Redwood Landfill currently is permitted to receive include the following: dewatered sewage sludge, incinerator ash, grit and grease, storm drain cleanings, nonhazardous holding tank pumpings from food processing facilities, petroleum-contaminated soils meeting waste acceptance criteria specified in the current WDRs, treated wood, dredge and fill material, triple-rinsed chemical containers.

Vectors

As defined by CCR Title 14 (§17225.73), a "'vector' includes any insect or other arthropod, rodent, or other animal capable of transmitting the causative agents of human disease, or disrupting the normal enjoyment of life by adversely affecting the public health and well being." Pathogenic microorganisms (disease) potentially carried by vectors can originate from a number of sources in municipal solid waste, such as animal feces, human feces in diapers, sewage sludge, and even from contaminated materials such as glass, metal, plastic, paper, and yard wastes. The vectors of greatest concern are flies and rats because of their ability to reproduce rapidly and disperse from the site. Other vectors of concern include birds and other insects and arthropods. Birds such as seagulls are frequently found at landfills. Although birds generally are only a nuisance (especially when they defecate on property or people), they can be a serious concern for low-flying aircraft.

As outlined above, CCR Title 27, §20810, and Title 14, §17410.4, direct landfill operators to take adequate steps to control or prevent the propagation, harborage or attraction of flies, rodents or other vectors and to minimize bird populations. Title 27 §20680 requires landfill operators to compact and cover waste with a layer of soil or new waste to minimize the occurrence of vectors. This practice lessens the potential for the landfill to provide food, shelter, and breeding grounds for vectors.

The applicant has identified minimizing the working area over which the refuse is spread and compacted, and covering the area daily with approved cover materials as the most effective means of controlling vectors (GeoSyntec, 1998). In addition, site personnel inspect the landfill for evidence of vector activity and retain a pest control specialist if such activity is observed.

Currently the site is serviced monthly by an independent pest control contractor. According to the applicant, an evaluation of the effectiveness of daily cover practices conducted between May 2001 and July 1992, determined that Redwood Landfill's use of both soil and of alkaline-stabilized sludge (a process that is no longer used at the site) were effective in deterring vectors (GeoSyntec, 1998).

Gulls are regularly present at or near the landfill throughout the year, with largest numbers present between October and March. Redwood Landfill's bird control program consists of using pyrotechnic devices to discourage them during refuse placement and compaction. The devices provide noise (bang or whistle), a flash of light, smoke, and the sound of the propellant. RLI focuses its deterrent efforts when the birds first begin to arrive in the morning (shortly after dawn) having found that this results in fewer gulls approaching the site during the rest of the day. RLI also may use a gas-fired cannon, which emits a loud blast, in conjunction with the pyrotechnic devices (GeoSyntec, 1998).

Accidents

Accidents can occur at any industrial facility, regardless of how well it is managed. Very few accidents have occurred at Redwood Landfill, and the landfill has never been cited for health and safety violations. A "Special Occurrences" summary prepared by the landfill manager for the five years between August 1997 and August 2002 indicates that one accident occurred on site during that period: two employees were injured in November 1998 when a conveyor slipped off the loader teeth. A traffic accident involving a Cascades Forest Product vehicle crossing the highway occurred in front of the landfill during this period (in May 1998), as well (Roycroft, 2002). (Refer to Section 3.10 regarding traffic-related safety issues.)

Redwood Landfill's employee training and safety program includes monthly safety meetings and weekly tailgate meetings. The monthly training sessions cover emergency response, material safety data sheets, leachate and methane gas safety, prohibited waste, safety rules, safety equipment, heavy equipment operation, spill containment, fire response, SB-198 injury and illness prevention, composting and co-composting operations, greenwaste and woodwaste processing, processing ADC materials, NPDES requirements, and on-the-job safety inquiries (GeoSyntec, 1998). The landfill maintains on-site an inventory of necessary safety equipment. This equipment currently is kept in a storage container near the maintenance shop.

Bioaerosols

Bioaerosols, which are associated with composting activities, are suspensions of particles in the air consisting partially or wholly of microorganisms. These microorganisms can remain suspended in the air for long periods of time retaining viability or infectivity (U.S. EPA, 1994). The most common bioaerosol of concern in composting activity is *Aspergillus fumigatus*. This fungus is not considered a health hazard to healthy individuals; however, in susceptible individuals it can inhibit lung function and produce fungal infections. *Aspergillus fumigatus* is ubiquitous in the environment, and is especially common in agricultural settings. Activities that result in routine exposure to the fungus include lawn mowing, gardening, potting of household plants, and raking leaves (CIWMB, 1993). It often colonizes incoming material at yard trimming and municipal solid waste composting facilities and is readily dispersed from dusty composting piles during and after mechanical agitation (U.S. EPA, 1994). The levels of the fungus decrease rapidly only a short distance from the source to background levels.[1] Endotoxins are another health concern at composting facilities. Endotoxins are toxins produced within microorganisms that are released upon destruction of the cell in which they are produced. The distance from the landfill to the nearest residences (more than a mile) reduces the potential for adverse impacts on nearby sensitive receptors from these health risks.

Prohibited Waste Control Program

As noted above, both Title 27 and Title 14 require landfill operators to implement a loadchecking program to prevent the acceptance of prohibited waste. Redwood Landfill's program to prevent prohibited wastes from entering the site includes employee training, signage at the landfill entrance, initial screening by the attendant at gate house, and a loadcheck program. Designated employees are sent to a training program that includes definitions and examples of prohibited wastes; methods of identifying such wastes; load checking procedures; recommended actions to take if such wastes are identified; and proper waste handling and safety procedures (GeoSyntec, 1998). Training records are maintained for each employee. Signs are posted at the entrance stating that hazardous wastes are not accepted. The landfill's load checking program follows California Department of Health Services guidelines (California Department of Health Services, 1990 *in* GeoSyntec, 1998). Household hazardous waste items removed from the waste stream are affixed with warning labels, dated, and stored in secure, portable containers until being removed from the site by qualified haulers.

3.8.2 IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

According to CEQA guidelines, a project would be considered to have a significant adverse impact on the environment if it would:

- create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
- interfere with safe operations of a nearby airport or result in a safety hazard for people residing or working in the project area, due to its proximity to an airport;
- interfere with emergency response plans or emergency evacuation plans; or

[1] For example, a study of a bio-solids composting facility cited by EPA (1994) found the highest concentration of colony-forming units (CFU) of *Aspergillus fumigatus* at the mix area (110 to 120 CFU) and relatively high concentrations associated with front-end loader activities (11 to 79 CFU), while concentrations dropped to background levels (2 CFU) at the site periphery (EPA, 1994).

- expose people or structures to risk of loss, injury, or death involving wildland fires.

Impact 3.8.1: Receipt of designated wastes, in particular, spill or upset conditions resulting from the receipt and handling of designated wastes, could expose site workers or the general public to unacceptable contaminant levels. (Significant)

RLI proposes to increase the acceptance rate of designated wastes currently permitted to be accepted at the landfill from 20 TPD to 200 TPD. ~~revise the SWFP and the WDRs to re-classify Area G as a Class II waste management unit and to accept as-yet-unspecified wastes, sludges, and/or contaminated soils with higher (but unspecified) concentrations of pollutants or chemical contaminants than wastes currently accepted at Redwood Landfill (or considered acceptable at Class III landfills).~~ ~~In general, Class II waste disposal units may receive any materials that fall below the hazardous waste threshold limits for reactivity, corrosivity, ignitability, and toxicity, as well as chemical concentration limits (both Total Threshold Limit Concentration [TTLC] and Soluble Threshold Limit Concentration [STLC] values) established in Title 22, Division 4.5, Chapter 11, Article 3 (Characteristics of Hazardous Waste) of the California Code of Regulations~~. Designated wastes are distinguished from general, non-hazardous municipal solid waste because, although they fall below hazardous waste threshold limits for the above parameters, they pose a risk to human health or the environment if not handled properly.

As discussed in the setting section, above, common routes of contaminant exposure for both the public and the landfill workers include inhalation, ingestion, direct contact, and injection through a cut or puncture. The handling of wastes with higher levels of hazardous constituents (i.e., designated wastes) would increase the potential risk of exposure to the harmful constituents in these wastes, in the event of improper handling or an accidental spill or upset. This would be a significant impact.

As noted above, RLI has an employee training and safety program and an injury and illness prevention program for its current operation. Appendix L of the Joint Technical Document (GeoSyntec, 1998) includes safety equipment designed to protect workers from exposure to various types and concentrations of hazardous materials. Since publication of the DSEIR ~~However, because~~ RLI has ~~not~~ indicated ~~the~~that no change is proposed in the specific waste types or chemical concentration limits from that currently specified for designated wastes in the facilities SWFP and WDRs ~~they intend to accept for disposal in Area G, the appropriateness or effectiveness of the listed equipment for use in handling such wastes cannot be assessed~~.

It is also noted that the increased rate of acceptance of designated waste ~~for disposal at Area G~~ would result in an incremental increase in vehicles transporting these more problematic materials on local and regional roadways in the project vicinity and, therefore, an incremental increase in the risk of accidental spill on roadways in the project vicinity. However, the project would not be generating additional hazardous materials; designated wastes generated in the County and region currently are transported on public roads to other appropriate ~~Class II~~ facilities (e.g., Class II landfills) in the region. The incremental risk to public health associated with vehicles transporting these materials to Redwood Landfill as a result of the project, as opposed to another regional facility is considered less than significant.

(Refer to the discussion under Impact 3.4.10 in Section 3.4, Geology, Soils, and Seismicity, regarding the effectiveness of the existing landfill ~~proposed Area G~~ liner to protect groundwater quality.)

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.8.1a: The project applicant has prepared and implements a worker health and safety program.

Mitigation Measures Identified in This Report

Mitigation Measure 3.8.1b: Implement Mitigation Measure 3.2.~~13~~10b (limit acceptance of designated wastes currently accepted at the landfill to the currently permitted level of 20 TPD) which ~~ose that are determined not to pose a threat to air quality and provide to the LEA and BAAQMD detailed information including material types and handling procedures), Mitigation Measure 3.4.10b (submit a detailed list of material types and chemical concentration limits of wastes proposed for placement in Area G to the LEA and the RWQCB, and an engineering study demonstrating the effectiveness of the liner and LCRS proposed for Area G in protecting groundwater and the surrounding environment from constituents in the waste and leachate generated by it), and Mitigation Measure 3.4.10c (if the RWQCB finds the proposed design is not adequate, modify the proposal as appropriate, potentially modifying the design of Area G, lowering the constituent concentrations in waste to be accepted, or eliminating certain material types proposed to be placed in the unit)~~. ~~Implementation of these measures~~ would reduce to a less-than-significant level the potential for ~~help to limit exposure of~~ workers or members of the public using the facility to be exposed to unacceptable contaminant levels associated with the landfill's receipt of designated wastes.

~~**Mitigation Measure 3.8.1c:** The applicant shall modify the facility's injury and illness prevention program to address the receipt and appropriate handling of the wastes proposed to be accepted at Area G (as specified under Mitigation Measures 3.2.13b and 3.4.10b), and submit the modified program to the LEA for approval prior to approval of Area G as a Class II unit.~~

Level of Significance After Mitigation

Implementation of Mitigation Measures 3.8.1a~~,~~ and 3.8.1b~~, and 3.8.1c~~ will reduce this impact to a less-than-significant level.

Impact 3.8.2: Expanding the composting operations could increase the health threat to workers from exposure to *Aspergillus fumigatus* and endotoxins. (Significant)

As noted above *Aspergillus fumigatus* is a bioaerosol commonly associated with composting operations. It is a ubiquitous fungus that is both a normal and integral part of the composting process and a potential health risk to certain high-risk individuals. Although the fungus is present in ambient air both indoors and outdoors, a study of compost facilities in the United States found airborne concentration of *Aspergillus fumigatus* at the active site of operations to be, on the average, 10-fold higher than background levels (CIWMB, 1993). Due to the distance of the landfill to the nearest residences, *Aspergillus fumigatus* does not pose a significant threat to off-site sensitive receptors. However, without dust control measures, there is an elevated risk of exposure to spores for workers at compost facilities, and the proposed increased throughput of composting feedstock would increase this potential exposure. This has the potential to significantly impact worker health at the site.

Mitigation Measures Proposed as Part of the Project

Mitigation Measure 3.8.2a: Redwood Landfill's existing composting operation includes dust control measures, such as the addition of water (using a water truck or portable sprinkler system) to composting windrows as needed to control dust and to maintain the appropriate moisture content for the composting process (GeoSyntec, 1998). Because bioaerosols and endotoxins are both carried on dust particles (particulate matter), measures to control dust at Redwood Landfill also will help limit the dispersal of *Aspergillus fumigatus* and endotoxins.

Mitigation Measures Identified in This Report

Mitigation Measure 3.8.2b: Implement Mitigation Measure 3.2-4 (development and implementation of a Dust Mitigation Plan/Program).

Mitigation Measure 3.8.2c: The project applicant shall follow sound composting management practices, including maintaining moisture, temperature and pH levels, and properly aerating, turning and mixing the composting materials. Specifically, the following practices will help minimize the generation and dispersal of dust and fungus spores during composting operations and thus limit exposure:

- Refrain from turning, screening, or loading activities on windy days;
- Use water sprays or mists during grinding, screening, and pile turning activities;
- Maintain proper moisture levels in active composting piles;
- Maintain good housekeeping practices, including site cleanliness; and
- Provide employee training and the use of personal protective equipment.

Level of Significance After Mitigation

Implementation of Mitigation Measures 3.8.2a, 3.8.2b, and 3.8.2c to control dust and limit the generation and dispersal of dust and spores would reduce potential impacts of exposure to *Aspergillus fumigatus* and endotoxins to a less-than-significant level.

Impact 3.8.3: The proposed changes to the management of water that has contacted sludge and composting and co-composting materials could degrade water quality and impact public health. (Significant)

As discussed under Impact 3.5.3 in Section 3.5, Hydrology and Water Quality, RLI currently manages contact water and non-contact water as separate, discrete systems, in which contact water is directed to the 11-acre leachate pond and non-contact water is directed to the 1.5-acre or 18-acre storm water ponds, from which it is ultimately discharged off-site, or is discharged directly off-site. RLI's proposal to direct contact water from the composting and sludge processing operations to the storm water pond could result in significant adverse impacts to water quality. Implementation of Mitigation Measures 3.5.3a, 3.5.3b, 3.5.3c, and 3.5.3d would reduce this impact to a less than significant level. Refer to Section 3.5, Hydrology and Water Quality.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

> **Mitigation Measure 3.8.3:** Implement Mitigation Measures 3.5.3a, 3.5.3b, 3.5.3c, and 3.5.3d regarding the conduct of composting outside and within the permitted landfill footprint and the management of contact water and storm water.

Level of Significance After Mitigation

Less than significant.

Impact 3.8.4: Landfill gas migrating from the 11.5-acre waste unit in the southwest corner of the site could become trapped beneath the nearby relocated administration building and accumulate to explosive levels. (Significant)

Very low concentrations of methane have been detected in shallow soil and at the surface of the 11.5-acre waste unit in the southwest corner of the site (Treadwell & Rollo, 2002), which the applicant proposes to cover in place. This waste unit is not served by a landfill gas management system. As discussed in the setting section, above, within a landfill methane typically occurs at a concentration outside its explosive limits. However, methane has been known to migrate away from the waste unit in which it was generated, become trapped in a confined space (such as a basement) and accumulate to a concentration within its explosive limits.

The Bay Mud in the project vicinity is relatively impermeable and thus would help impede the migration of methane to other areas. However, as discussed in Section 3.4, Geology, Soils and Seismicity, sand lenses are known to occur within the Bay Mud. Below the water table the sand lenses act as a shallow, discontinuous aquifer within the Bay Mud. Above the water table they could serve as potential conduits allowing methane to migrate to other areas. Although the opportunities for methane to migrate through Bay Mud to the relocated administration building are limited, the potential consequences of such an occurrence could be tragic. Therefore this is considered a significant impact.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

> **Mitigation Measure 3.8.4:** The project applicant shall continue to implement the continuous monitoring of landfill gas levels in the relocated administration building, as is currently the practice at the existing administration building. Continuous monitoring is conducted using a GasTech gas sensing device and alarm system. In addition, the other existing gas monitoring programs at the landfill site shall be reviewed and modified if necessary to include monitoring of the 11.5-acre waste unit. The other monitoring includes quarterly monitoring by an outside consultant using portable gas detection equipment and weekly monitoring by RLI using a GasTech combustible gas indicator, in accordance with the terms of the landfill's Permit to Operate from BAAQMD.

Level of Significance After Mitigation

Mitigation Measure 3.8.4 will reduce the severity of this impact to a less-than-significant level.

Impact 3.8.5: Increased refuse and composting throughput could result in increases in gulls and other scavenging birds at the site, thus increasing the risk of bird strikes for aircraft approaching or departing from the nearby County airport, Gnoss Field. (Significant)

Redwood Landfill is located in Gnoss Field safety zones 3, 4, and 5. As discussed under Impact 3.6.2 in Section 3.6, Land Use, the applicant proposes to continue implementation of the existing bird control program at the site. Implementation of Measure 3.6.2d, which requires RLI to modify its current bird hazard control program should bird activity at the landfill increase, would ensure that the potential bird hazard posed by the project changes at the landfill would be less than significant. Refer to Section 3.6, Land Use.

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

> **Mitigation Measure 3.8.5:** Implement Mitigation Measure 3.6.2d (i.e., modification of RLI's bird control program if needed to address increased bird activity at the site).

Level of Significance After Mitigation

Less than significant.

Impact 3.8.6: The proposed increase in landfilled material will result in an increase in the size of the working face, potentially causing an increase in the occurrence of vectors at the landfill. (Less than significant)

RLI has identified limiting the size of the working face as one of the two most effective means of controlling vectors at the landfill (the other being covering the refuse daily with approved cover materials) (GeoSyntec, 1998). RLI proposes to increase the peak daily throughput of landfilled waste by approximately ~~50~~67 percent (from ~~2,290~~1,290 TPD to ~~3,560~~2,150 TPD). Such an increase would require an increase in the size of the working face, which could increase the incidence of vectors at the face. However, vector control standards required by Title 14 and Title 27 and the continued implementation of measures currently in practice at the landfill would reduce this impact to a less-than-significant level.

Mitigation: None required.

REFERENCES – Public Health and Safety

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3.9 PUBLIC SERVICES, UTILITIES, AND ENERGY

This section evaluates potential impacts on public services and utilities – including fire protection and police services and water, wastewater, and power suppliers – and energy that could result from the project. Because of the nature of the project and because no increase in staffing levels is proposed, the project is assumed not to have an impact on schools or parks and these elements are not discussed further. Storm drainage at the site is addressed in Section 3.5, Hydrology and Water Quality.

3.9.1 SETTING

PUBLIC SERVICE PROVIDERS

Fire Protection

The Novato Fire Protection District (NFPD) provides fire protection for the entire Novato Planning Area, including Redwood Landfill (Marin County, 1994a). Fire Station 2, located approximately 5.1 miles away at 450 Atherton Avenue, covers the landfill for "first in" response to reported incidents. Fire Station 1, located at 7025 Redwood Boulevard, provides "second in" response coverage for the landfill. The entrance facilities, maintenance buildings, and landfilling equipment at the landfill are equipped with portable fire extinguishers, and the administrative office and former Cascades Forest Products building (to which the administrative office will be relocating) are equipped with sprinkler systems for fire protection (GeoSyntec, 1998). Equipment, stockpiled soil cover, and the two water trucks used for dust control (with capacities of 8,000 and 4,000 gallons) also are available on site if necessary for use for fire control. The creeks and sloughs surrounding the site also serve as perimeter fire breaks. The Novato Fire Protection District inspected the facility in October 1994 for compliance with Public Resources Code flammable clearance provisions (PRC §44151) and found that all areas met or exceeded minimum requirements of clearance from exposed flammable solid waste and or flammable material, and that the facility was in compliance with applicable sections of the California Public Resources Code (Elliott, 1994).

According to the applicant, any fire that occurs is extinguished by Redwood Landfill staff or the Novato Fire Protection District (GeoSyntec, 1998). The Special Occurrence Log Book maintained at the landfill (Khany, 2002a) indicates that three small fires have occurred in the last five years, as follows: (1) in 2000, the car of an employee of one of the landfill's tenants caught fire in the parking lot; (2) in 2001, a small grass fire was started on a side slope behind the landfill's working face, when a "whistler" (a noise-making device used for bird control) landed on the slope rather than detonating in the air as intended; and (3) in 2002, a smoldering fire occurred in a pile of freshly ground greenwaste. In the case of the car fire, the Novato Fire District responded with a fire truck and extinguished the fire. The fire started by the whistler was extinguished by landfill employees with a fire extinguisher. Smoke from the smoldering green waste pile was noticed by a passing Novato Fire District fireman, who notified Redwood Landfill personnel. Landfill personnel spread out the pile and added dirt until the fire was extinguished.

The landfill maintains a 20-foot separation between green waste piles so that if a fire should occur in one of the piles it does not spread to others (Khany, 2002b). The landfill also has a policy and practice (not adhered to in this instance) of breaking down any piles of freshly ground green waste before the end of the day, to a size (two to three feet high) that would prevent the pile from overheating and catching fire (Khany, 2002b).

Police Protection

The Marin County Sheriff's Department provides police services in the unincorporated areas of Marin County (Marin County, 1994a). There are four Sheriff's Office stations in the County (Marin County, 2002a); the one nearest Redwood Landfill is the main office located at the Marin Civic Center in San Rafael.

The California Highway Patrol (CHP) has jurisdiction and law enforcement powers on all County roads and state highways outside the incorporated cities. The CHP's Marin County office is located in Corte Madera. The CHP's Golden Gate Communications Center in Benicia is the dispatch center for the Marin office (California Highway Patrol, 2002).

UTILITIES

Water Supply

The North Marin Water District (NMWD) provides potable water to the project site via a 12-inch-diameter water main located along the landfill entrance road. The water main was extended to the southwest corner of the landfill to serve the Cascade Forest Products (CFP) facility and will serve the landfill administration offices, which are proposed to be located to the CFP building. Sanitary facilities at the site (including both the currently vacant CFP facility and existing landfill administration facility) consist of 9 toilets, 11 hand-wash facilities, and 2 portable toilets (GeoSyntec, 1998; Roycroft, 2002). The landfill uses approximately 208,000 gallons of NMWD water per month (Roycroft, 2002).

In addition to drinking water, water is used onsite for dust control, construction, equipment maintenance, sanitary facilities, and fire protection (GeoSyntec 1998). Two water storage tanks are located on the site. One tank is located across from the former Turini's Auto Wrecking Yard and has a capacity of 38,000 gallons; it is reserved for fire fighting purposes. The other tank is located north of the scalehouse and has a capacity of 24,000 gallons; it is used for fire fighting and utility purposes (GeoSyntec, 1998). The NMWD supplies the water for the tanks. RLI estimates that the landfill uses approximately 3,000,000 gallons per month of water from the two storm water impoundments and the leachate impoundment for dust control, primarily throughout the dry weather period (May to November). This estimate is based on the routine use of one 8,000 gallon tanker and one 4,000 gallon tanker, which refill approximately 10 times per day during a 6 day week (GeoSyntec, 1998).

Typically in composting operations, water for composting, which is referred to as "quench" water, is applied periodically to composting windrows to maintain the proper moisture balance.

According to RLI's Report of Composting Site Information (1998) water from Redwood Landfill's storm water impoundment or potable water is added to the windrowed material as necessary to maintain optimum moisture conditions. In practice, however, to date RLI has found that the greenwaste feedstock and greenwaste-biosolids feedstock contain enough water after processing at the site (i.e., greenwaste is ground and the sludge is dried back) to sustain reactions through the active composting phase. Therefore RLI's experience and practice has been not to add any water to the composting process for the current composting operations (Roycroft, 2002).

Wastewater

Wastewater is directed to five holding tanks that have replaced all septic tanks previously used at the site. The holding tanks are used pursuant to holding tank permit No. 95-70 from Marin County Environmental Health Services. The permit specifies that a pumping contract is required and that the holding tanks are to be pumped regularly on an as-needed basis and monitored by RLI. The landfill's pumping contract is with Redwood Sanitary Service (Redwood Sanitary Service, 1996). In conjunction with Permit 95-70, permission to abandon the leachfield and convert the five septic tanks to holding tanks was granted in October 1995 by the County Environmental Health Services.

The holding tanks are periodically pumped by a sewage service company and the septage is transported to a wastewater treatment plant for disposal (GeoSyntec, 1998). As no increase in staffing levels is proposed under the project, the project is not anticipated to result in increased use of the facility's existing wastewater system.

Storm Water

Redwood Landfill is not served by a public storm water collection system; refer to Section 3.5 Hydrology and Water Quality for a discussion of the facility's storm water and surface water drainage system.

Electricity and Natural Gas

Pacific Gas and Electric (PG&E) provides electricity to the site to power electric gates, automated scales and scale house**,** the equipment maintenance area, offices, landfill gas-fired flare and onsite pumping facilities (GeoSyntec, 1998). Lighting is provided by 38 pole-mounted, mercury vapor lights located throughout the property, primarily in the scale area and the sludge unloading areas. The lights are mounted on 25- to 30-foot tall poles with illumination directed at individual work areas. Six portable light plants are available for use in either the sludge processing areas or at the working face (GeoSyntec, 1998). Typically, three portable light plants are positioned to illuminate the working face. Each light plant contains four 1,000-watt bulbs mounted at the end of a 20-30 foot high mast; the light plants are powered by a 6 kW generator (Roycroft, 2001).

The electric power poles on site are periodically relocated to accommodate facility operations. Ultimately, all electric supply lines will be located off of the landfill footprint around the perimeter of the landfill, and will be buried (GeoSyntec, 1998).

Communications Systems

GTE of California, Inc., provides telephone service to the site. Telephones for general and emergency use are located in the administrative building and the scale house. A pay phone is located north of the outbound scale. Redwood Landfill offices and vehicles are equipped with two way radio units, and all personnel have access to mobile or portable radio communications equipment (GeoSyntec, 1998).

Landfill capacity

The project's consistency with solid waste plans, policies, and regulations and its effect on the County's landfill disposal capacity are discussed in Section 3.6, Land Use.

ENERGY

As described above, PG&E supplies the electricity used to power electric gates, automated scales and the scale house, the equipment maintenance area, offices, the landfill gas-fired flare, and onsite pumping facilities (GeoSyntec, 1998). Landfill equipment and vehicles, including compactors, tractors, loaders, water trucks, truck tipper, grader, windrow turner, tub grinder, and the generators used to power portable light plants at the working face, consume energy in the form of diesel fuel.

APPLICABLE PLANS AND POLICIES

CCR Title 14 Chapter 3.1, Compostable Materials Handling Operations and Facilities Regulatory Requirements, establishes the following requirements pertaining to fire control:

> §17867(a)(8). The [composting facility] operator shall provide fire prevention, protection and control measures, including, but not limited to, temperature monitoring of windrows and piles, adequate water supply for fire suppression, and the isolation of potential ignition sources from combustible materials. Firelanes shall be provided to allow fire control equipment access to all operation areas.

The Community Development Element of the Marin Countywide Plan (Marin County, 1994b) includes the following policies pertaining to water conservation and energy:

> Policy CD-4.1. Energy Conservation and Commercial Development. Commercial development should be located, sized, and designed to minimize energy consumption on site and to reduce energy used in traveling to and from other destinations.
>
> Policy CD-4.2. Opportunities for Energy Savings. Opportunities for cost effective energy savings that are compatible with other countywide and community goals should be explored and, where possible, savings measures should be implemented.
>
> Implementation programs for this policy include:
>
>> *Program CD-4.2b. Incorporate Energy Efficiency into Project Review*. Incorporate cost effective energy efficiency and renewable energy use as criteria for design

review, growth management, review of grant applications, and other local programs that affect energy use.

Policy CD-4.3. Upgrade Energy Efficiency of Existing Structures. The energy efficiency of existing structures should be voluntarily upgraded in every area possible if it is cost effective to the point that energy use costs are reduced.

Policy CD-4.4. Increase the Energy Efficiency of New Structures. The energy efficiency of new structures should be encouraged and increased in every way possible including possible tax incentives.

Policy CD-4.5. Use of Renewable Energy. Solar energy and other renewable energy sources should be used in all structures to the extent feasible.

Policy CD-4.6. Water Conservation. Water should be conserved, both to decrease use of a scarce resource and to reduce the consumption of energy for water distribution.

3.9.2 IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

A project would normally have a significant adverse impact on public services, utilities, or energy resources if it:

- substantially increased demand for fire protection services;
- exceeded available water supplies, resulting in the need for new or expanded entitlements;
- required or resulted in the construction of new or expanded water facilities, electrical generation facilities, gas supply, or communications infrastructure; or
- encouraged activities that would result in the unnecessary use of energy or used fuel or energy in an inefficient or wasteful manner. CEQA Guidelines Appendix F underscores the importance of energy conservation. For a large landfill project, the absence of energy generation from landfill gas could be construed as incompatible with energy conservation objectives.

Impact 3.9.1: The proposed increase in composting throughput could increase the risk of fire occurring at the composting facility. (Significant)

Under the project, RLI proposes to increase the average daily throughput of composting feedstock by approximately 400 percent (from approximately 126 tons to approximately 514 tons), including a 10-fold increase in green waste, and nearly double the peak daily throughput of green waste (from approximately ~~545~~238 tons to ~~945~~400 [peak and average] tons) (refer to the revised Table 2-2 in Chapter 2, Project Description of this FEIR). (Due primarily to a reduction in biosolids, overall the peak daily throughput of compostable material is slightly reduced from the currently permitted peak of 545 TPD to 514 TPD.) Because compost feedstock comprises combustible material, and the composting process itself elevates temperatures within the windrows and potentially produces combustible gases, the increased level of green waste composting ~~activities~~ increases the risk of fire occurring at the site, within the incoming and ground piles of feedstock and the windrowed or curing materials.

As noted above, composting facilities are required under CCR Title 14 to provide fire prevention, protection, and control measures. Redwood Landfill's existing Registration Permit for the composting facility (Marin County, 1996) includes the following terms and conditions:

- A fire lane of a minimum of 12 feet in width shall be provided to allow access to all operation areas;
- The operator shall notify the Novato Fire Department immediately of any fire occurrence; and
- All active compost shall remain within the design parameters submitted with the permit application (RLI, 1996). Relevant design parameters included in RLI's permit application include the following:
  - windrows will be 7-12 feet high and 10-14 feet wide at the base, and the length of each windrow will vary according to site constraints;
  - 12-feet wide equipment lanes will be maintained adjacent to each windrow;
  - the site supervisor will monitor the piles for temperature and moisture content throughout the composting process;
  - piles will be turned to keep them aerated, based on monitoring; and
  - moisture will be added as necessary to maintain optimum moisture conditions; the average water content for the compost piles is expected to range from 40 to 65 percent, and the optimum water content of the piles should range from 50 to 60 percent.

In addition, the Marin County Environmental Health Services Department established the following terms and conditions of approval pertaining to fire prevention and control for RLI's proposed mixed food waste and green waste composting pilot program (Marin County, 2002b):

- Should a fire occur at the site, the operator shall notify the Novato Fire Department immediately;
- The operator shall have access to an adequate water supply at all times to control spontaneous combustion; and
- Compost windrows shall have a thirty (30) foot fire break from grassland and eucalyptus trees.

Title 14 also requires solid waste and composting facilities to maintain records of unusual occurrences at the facility, including any fires that occur. As noted in the setting section, above, the record of unusual occurrences at Redwood Landfill indicates that ~~over~~ there have been three small fires in the past five years, one of which was associated with the composting facility. This was a low-intensity, smoldering fire that was contained by site personnel. Given the few fire-related incidences that have occurred at the site in the past five years and existing state regulations to minimize fire hazards at composting facilities, the measures identified below would be sufficient to mitigate potential impacts related to fire from the proposed increase in green waste composting operations.

Mitigation Measures Proposed as Part of Project

None.

Mitigation Measures Identified in This Report

> **Mitigation Measure 3.9.1:** For composting operations in new areas of the project site, RLI shall adhere to management practices established in the Registration Permit for the current composting operation and the terms and conditions established for the green waste and food waste pilot program.

Level of Significance After Mitigation

Less than significant.

Impact 3.9.2: The proposed increase in composting operations could place burdensome demands on public water supplies, exceeding available capacity, especially during periods of drought. (Significant)

As shown in Table 2-2 of the Chapter 2, Project Description, RLI proposes to increase the average daily throughput of composting feedstock by approximately 400 percent (from approximately 126 tons to approximately 514 tons, and roughly double the peak daily throughput (from 545 tons to 945 tons). RLI does not currently use quench water in its composting operation. However, the facility's Report of Composting Site Information (RLI, 1998) indicates that the use of quench water is considered part of routine composting operations, and RLI has further demonstrated interest in the future use of quench water by proposing, as part of the project, to use leachate for this purpose. In general, substantial quantities of water could be required for the expanded composting operation – for dust control during grinding and windrow turning as well as the potential future need for quench water to maintain the appropriate moisture levels to sustain optimal levels of microbial activity within the composting materials.

RLI utilizes leachate and potable water for dust control in accordance with approval from the RWQCB (RLI, 1998) and, as noted in the setting section, uses water from the storm water impoundment or potable water for quench water as necessary to maintain optimum moisture conditions (RLI, 1998). (As also noted, to date RLI has found it has not been necessary to use quench water in the current composting operations.) RLI proposes as part of the current project to utilize contact water and leachate from the leachate impoundment for quench water, as long as it does not exceed established contaminant level standards. If approved, use of water from the leachate impoundment would provide an additional source of non-potable water to use for the composting operation. On the other hand, a previously existing minor source of storm water that might have been used for either dust control of quench water, the former 1.5 acre storm water pond at Area G, which has been reduced to 0.5 acre and will eventually be incorporated as part of the landfill, will not be available for storm water collection once this occurs~~landfilling at Area G, which is already permitted and scheduled, commences~~.

The current composting facility has not been in operation during a period of prolonged drought, such as occurred in the mid-1970s and more recently in the late 1980s to roughly 1993, and which occur periodically in northern California. Previous periods of drought have placed substantial constraints on Marin County's water supply. During a drought period, feedstock materials received at the composting facility would likely be drier, requiring more water to be added to windrows to maintain satisfactory composting conditions. At the same time, fire hazard would be exacerbated during a drought, due to drier incoming materials, and water with which to combat possible fires would be relatively scarce. If RLI were required to use potable water to supplement dwindling or non-existent supplies from on-site impoundments, this could strain NMWD resources at a time when other demands are placed on the system. This would be a significant impact. Implementation of the following measure would ensure that the impacts of the composting operation on public water supplies during drought conditions would be less than significant:

Mitigation Measures Proposed as Part of the Project

None.

Mitigation Measures Identified in This Report

> **Mitigation Measure 3.9.2:** During periods of drought RLI shall use only water from non-potable sources for dust control and/or quench water for the expanded composting operation.

Level of Significance After Mitigation

Less than significant.

Impact 3.9.3: On-site activities, primarily the increased use of landfill equipment and vehicles, would increase energy consumption. (Significant)

Some increased use of electricity is likely under the project for such equipment as pumping facilities and scales, as these will receive greater use. However, no change is proposed in hours of operation, staffing levels, or the degree of outdoor lighting, and administration offices are proposed to be relocated to an existing building previously used by Cascades Forest Products, a former tenant that has left the site. Therefore, it is expected that the consumption of electricity would not change substantially under the project.

Project implementation would entail a substantial increase in the use of on-site, off-road, diesel-fueled equipment and vehicles to handle the increased volume incoming solid waste and composting feedstock. Assuming that use of this on-site equipment would increase roughly in proportion to the increase in incoming material, diesel consumption would ~~more than double~~increasing by almost 90 percent. Use of the tub grinder is expected to increase approximately 10-fold to handle the 10-fold increase in incoming green waste. RLI currently uses approximately 15,000 gallons of diesel fuel per month (Roycroft, 2001). Under the project, the monthly total would increase to ~~32,850~~28,200 gallons per month, assuming an increase in on-site fuel use commensurate with the ~~219~~88 percent increase (above existing levels) in incoming materials, a monthly increase of ~~17,850~~13,200 gallons (equivalent to about ~~425~~314 barrels of oil).

This estimated increase assumes the use of existing equipment. As noted in Section 3.2, Air Quality, new standards for new, diesel-powered engines ~~take~~took effect in 2004 and will in 2008. Therefore, project-related fuel consumption for on-site, diesel-fueled equipment can be expected to decrease over time, as equipment is replaced.

Although it is not assumed that equipment use at the site would be inherently inefficient, the absence of recovery of landfill gas energy to offset the increased energy consumed under project conditions could be construed as wasteful, given the substantial increase in solid waste throughput and landfill capacity that are proposed, the substantial amount of landfill gas that is already being produced, and the availability of technologies to recover landfill gas energy.

The Joint Technical Document (JTD) for the project (GeoSyntec, 1998) states that the landfill does not generate enough gas to power both the leachate vaporator (used to destroy landfill leachate) and a power generator, although installation of a power generator is anticipated in the future. Since publication of the JTD, RLI ~~has~~ applied for and received from BAAQMD an Authority to Construct three landfill-gas-powered, internal combustion generators (BAAQMD, 2002). However, ~~The~~the Authority to Construct expired~~s~~ in July 2004~~two years from the date of issuance unless substantial use of the authority has begun~~. According to the applicant (Meserve, 2005), RLI now plans to construct one or more landfill gas-powered enginescapacgel fo producing four to five megawatts of power.

Because the project does not propose to minimize energy consumption, reduce energy use, or incorporate energy conservation measures to the extent feasible, the project is inconsistent with County energy policies CD-4.1, CD-4.2, CD-4.4, and CD-4.5, and this would be a significant impact.

Mitigation Measures Proposed as Part of the Project

> **Mitigation Measure 3.9.3a:** RLI shall apply to the ~~has applied for and received from~~ BAAQMD for Authority to Construct power generation engines capable of producing four to five megawatts of power within two years of concurrence on the revised SWFP by the CIWMB.~~three landfill-gas-powered, internal combustion generators (BAAQMD, 2002)~~. ~~The Authority to Construct expires two years from the date of issuance unless substantial use of the authority has begun~~.

Mitigation Measures Identified in This Report

Mitigation Measure 3.9.3b: Implement Mitigation Measures 3.2.5c and 3.2.5e (apply for an authority to construct power generation engines with a capacity to produce four to five megawatts of power within two years of concurrence on the revised SWFP by the CIWMB, and apply for a Permit to Operate the engines.) Consistent with County policies regarding best energy management practices, RLI shall ~~install the proposed power generation engines, pursuant to the Authority to Construct issued by the BAAQMD, and~~ commence operation of these engines as soon as possible. The experience of other landfills indicates that electricity generated by the landfill gas could replace (partly or entirely) electricity currently provided by PG&E, and eventually (if not immediately) provide sufficient power to be sold to offsite users. The use of landfill gas to provide for the facility's electricity needs would serve to offset partly the increased consumption of diesel fuel for project operations.

The applicant also shall install additional power generation engines in order to offset some use of the LFG flare. ~~According to the Authority to Construct, the three proposed power generation engines have a combined capacity to accommodate landfill gas flows of 1,446 cubic feet per minute (cfm), while the total capacity of the gas flare is 4,250 cfm, and total LFG generation is projected to reach 7,549 cfm by 2024~~. ~~Of this projected total generation, 5,662 cfm would be collected by the LFG collection system (assuming collection efficiency of 75 percent) and directed to the flare, vaporator and generators (as discussed under Impact 3.2.5)~~. Currently, use of the flare is required to abate the emission of all collected LFG except the relatively small amount used by the leachate vaporator, as well as to destroy the vapor produced by the vaporator. The flare also could potentially be used to destroy exhaust emissions from the vaporator and the future power generation engines. However, rather than using the flare at full capacity as the generation of LFG increases, an increasing share of LFG could be diverted to generate additional electrical power if additional generation engines were installed. Even with the additional power generation engines installed, some use of the flare will continue to be required, for final destruction of leachate vapor as well as for destruction of combustion exhaust emissions from the vaporator and, potentially, from the power generation engines. However, operation of additional power generation engines potentially would provide a more productive use of much of the collected LFG than simply flaring it.

Level of Significance After Mitigation

Less than significant.

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Roycroft, Glen A., P.E., Area Engineer, Waste Management, letter to Christine Mueller, Environmental Science Associates, July 21, 2001.

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3.10 TRANSPORTATION AND TRAFFIC

In accordance with the Court's decision in *Fairview Neighbors v. County of Ventura* ([2d Dist. 1999] 70 Cal. App. 4th 238 [82 Cal. Rptr.2d 436]), the design, operations, and environmental controls described in the 1995 Solid Waste Facilities Permit and other current permits, based on the 1994 FEIR, as well as other applicable permits that have undergone separate environmental review, will constitute the baseline against which potential impacts of the project will be measured in this EIR.[1]

3.10.1 SETTING

INTRODUCTION

The Redwood Landfill currently operates under the 1995 Solid Waste Facilities Permit (SWFP), which specifies the following traffic characteristics for the landfill:

- Total permitted traffic volume is 830 vehicle trips per day (415 vehicles in and 415 vehicles out), excluding construction traffic.
    - Waste hauling-related traffic is limited to 820 vehicle trips per day (410 vehicles in and 410 vehicles out; vehicle type or size not specified).
    - Traffic for removal of recovered materials is limited to 10 vehicle trips per day (5 vehicles in and 5 vehicles out).
- Construction traffic is not specified, though it is explicitly excluded from total permitted traffic volume.
- Traffic related to employees driving to and from work, public users, and visitors is not specified.

The 1996 Registration Permit for the composting facility allows up to 5 incoming waste material vehicles (bringing compost feedstock) and 15 outgoing waste material vehicles (carrying finished compost).

In 1999, the Local Enforcement Agency (LEA) issued a Stipulated Notice and Order that allows Redwood Landfill to exceed the number of vehicle trips permitted in the 1995 SWFP, until such time as a new SWFP is issued. The Stipulated Notice and Order allows an additional 64 vehicle trips per day (32 vehicles in and 32 vehicles out) above the permitted 830 vehicle trips per day, provided they are limited to private and small commercial self-haulers.

1 For an existing permitted facility that is seeking a permit for a new or revised aspect of its operation, where the facility's previously permitted operations had previously undergone environmental review, the appropriate baseline should be the existing permitted operations, rather than the level of operations actually occurring at the time of the notice of preparation.

ACCESS ROADWAYS

Regional Access

U.S. Highway 101 is a north-south regional roadway that provides the only vehicle access route to/from the Redwood Landfill. Highway 101 is intersected by Sanitary Landfill Road, the private road that connects to the landfill itself. Under existing conditions, the stop-sign-controlled T-intersection of Highway 101 / Sanitary Landfill Road (with an opening in the median on Highway 101) accommodates all turning movements to and from the project access road (i.e., inbound right turns [from the south], inbound left turns [from the north], outbound right turns [to the north], and outbound left turns [to the south]; outbound left turns are prohibited at all times for loaded trucks, and for all vehicles from 3:00 to 6:00 p.m. (except on Sundays and holidays). To the south of the project site, Highway 101 passes through the City of Novato (about four miles away from the site), and other areas of Marin County. To the north, Highway 101 passes through the City of Petaluma (about seven miles away), and other areas of Sonoma County.

In general, Highway 101 is a multi-lane freeway, with access restricted to on- and off-ramps at interchanges. The intersection with the private landfill road falls within an approximate seven-mile-long four-lane-wide expressway segment with paved shoulders, divided by a median. The freeway ends north of the Atherton Avenue interchange (about 1.5 miles south of the site access road), and begins again south of the South Petaluma Boulevard interchange. There are three at-grade intersections (with openings in the median) in the expressway segment, at the project site, at San Antonio Road and at Kastania Road. The latest data from Caltrans indicates that the average annual daily traffic on this section of Highway 101 is about 90,000 vehicles (Caltrans, 2002). Trucks represent about 7.5 percent of total traffic (Caltrans, 2001).

Local (Site) Access

The only local access to and from Redwood Landfill is provided by the two-lane (private) Sanitary Landfill Road, which currently connects to Highway 101; see text above for a description of the existing configuration of the intersection. Traffic warning signs are provided on Highway 101 in advance of the intersection. For southbound traffic, signs of “Truck Crossing – 1,600 Feet” and “Slow Trucks Entering – 800 Feet” (with flashing light) are provided. For northbound traffic, signs of “Truck Crossing Ahead” and “Truck Crossing” (with flashing light) are provided. Weekday traffic volumes on Sanitary Landfill Road average about 720 vehicles per day (i.e., about 360 vehicles turning from Highway 101, and the same number of vehicles turning onto Highway 101).[2]

Sight distance (a measure of the ability of drivers to see, and react to, objects that will conflict with their vehicle’s travel path) to the Highway 101 / Sanitary Landfill Road intersection from the north is affected by the 6 to 6.5 percent grade of Highway 101, which screens the intersection for

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2 The 1994 FEIR reported an average daily volume of 720 vehicles, 640 vehicles to/from the landfill, and 80 vehicles to/from other businesses that used Sanitary Landfill Road for access. Those businesses have left the area, but landfill traffic counted in July 2001 (about 700 vehicles) is higher than the 640 vehicles cited in the 1994 FEIR.

drivers of southbound vehicles. The restricted sight distance, southbound downward slope and non-standard deceleration lane for the southbound left turn lane combine to pose a traffic safety problem at the intersection.

For purposes of this EIR, the baseline setting for project site access reflects the ~~proposed~~ construction of a grade-separated access connection between the landfill's access road and southbound U.S. 101, and the project sponsor's commitment to the grade-separated access being in-place prior to approval of the proposed Solid Waste Facilities Permit (SWFP).~~[3]~~ As of the date of publication of this FEIR, Redwood Landfill, Inc. (RLI) has obtained all necessary permits for construction of the new overpass structure, and construction formally began in June, 2005. -A Supplemental EIR for the new access connection ~~has been~~ was certified in 2002 (Marin County, 2002) . ~~, and construction of the access connection was approved by the Marin County Board of Supervisors in 2002; the road project currently is in the design phase~~. Under project conditions, the new two-lane / two-way access connector road will replace the existing southbound left turn median pocket (for inbound traffic from the north) and the median "slip" lane (for outbound traffic to the south).[4] A right-in and right-out driveway, with deceleration and acceleration tapers on Highway 101, will be provided for the new access road. Access for northbound traffic would be as it currently is, i.e., right-in and right-out from Highway 101 (with deceleration and acceleration lanes improved to meet Caltrans standards).

The 1994 FEIR identified significant and unavoidable traffic safety impacts at the existing Highway 101 / Sanitary Landfill Road intersection. Measures were implemented to reduce, though not eliminate, significant impacts (i.e., restricted turning movements and landfill access at certain times of the day). In February 2000, RLI proposed to Caltrans and Marin County to design and construct the grade-separated access assumed for the baseline setting in this analysis. The 2002 Supplemental EIR found that the unavoidable safety impacts identified in the 1994 FEIR would be reduced to a less than significant level by the proposed new access connection. If for any reason the access road project were not completed, the significant and unavoidable traffic safety impacts identified in the 1994 FEIR would remain, and additional traffic safety analysis would be required to provide adequate access before the revised SWFP could be approved.

EXISTING LANDFILL TRAFFIC VOLUMES

Traffic to the landfill consists of vehicles of varying sizes carrying municipal solid waste, recyclable and compostable wastes, non-hazardous sludge, and other designated wastes from throughout Marin County and other Bay Area jurisdictions, and vehicles used by employees and visitors, and for deliveries. As stated above, weekday trip generation averages about 720 trips per

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~~3 Doug Diemer, Vice President, Redwood Landfill, Inc., Letter to Daniel T. Sicular, Project Manager, ESA, April 9, 2002. The letter states that Redwood Landfill, Inc. (RLI) is the project sponsor for the Redwood Landfill Access Road and Bridge Project, and that RLI is fully funding all requisite permitting, design and construction. Marin County, in cooperative agreement with the California Department of Transportation (Caltrans), is serving as Lead Agency for the environmental review of the interim access road project.~~

4 A median slip lane is a refuge area, at T-intersections, within the width of a median, which allows drivers turning left from a side street to select a gap in one traffic stream at a time. For example, in this case, Part 1 of the left turn consists of the vehicle crossing a gap in the northbound lanes into the median refuge area, and Part 2 consists of the vehicle accelerating and merging into a gap in the southbound traffic stream.

day (360 vehicles arriving at, and departing from, the landfill). The highest hourly volume occurs during the morning hours, with traffic generally evenly spread across the hours from 6:00 a.m. to 2:00 p.m.; there is minimal traffic during other hours, with little if any during the p.m. peak-period commute. The great majority (about 85 to 90 percent) of the traffic originates south of the site.[5]

EXISTING TRAFFIC CONDITIONS

Level of Service Analysis Methodologies

The operation of a local roadway network is commonly measured and described using a grading system called Level of Service (LOS). The LOS grading system qualitatively characterizes traffic conditions associated with varying levels of vehicle traffic, ranging from LOS A (indicating free-flow traffic conditions with little or no delay experienced by motorists) to LOS F (indicating congested conditions where traffic flows exceed design capacity and result in long delays). This LOS grading system applies to both roadway segments and intersections. Marin County has established LOS D as the minimum acceptable service level at most intersections throughout the County. For Highway 101, LOS E has been established by the Congestion Management Plan (CMP) as the minimum standard, although the segment between Atherton Avenue and the Marin/Sonoma County line (i.e., the expressway segment serving the project site) is identified in the CMP as operating at LOS F and therefore is exempt from meeting the LOS E standard.

Expressways

The procedure to evaluate LOS on expressways is presented in the *Highway Capacity Manual* (Transportation Research Board, 2000). The analysis methodology is based on comparing the density of traffic volumes to the capacity of the roadway. The relationship of LOS criteria with density, speed, volume-to-capacity ratio and service flow rate for multilane divided highways is shown in Table 3.10-1.

Unsignalized Intersections

The procedure to evaluate unsignalized intersections with stop sign control on the side street approach is likewise presented in the *Highway Capacity Manual* (HCM). With this methodology, the LOS is related to the total delay per vehicle for each stop-controlled movement. Total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line. This time includes the time required for a vehicle to travel from the last-in-queue position to the first-in-queue position. The relationship of LOS criteria with total delay for unsignalized intersections is shown in Table 3.10-2.

Ramp Junction Areas

The procedure to evaluate LOS at ramp junction areas (merges on on-ramps, and diverges on off-ramps) is also presented in the HCM. The analysis methodology is based on comparing the

5 Distribution of site-generated traffic is based on the Traffic Report: Source Origination from July 2001 provided by Redwood Landfill, Inc.

TABLE 3.10-1
LEVEL OF SERVICE CRITERIA FOR MULTILANE HIGHWAYS
(Free Flow Speed = 60 MPH)

Level of Service	Density (pc/mile/lane) [a]	Speed (MPH)	Volume-to-Capacity Ratio	Maximum Service Flow Rate (pc/hour/lane) [b]
A	11	60.0	0.30	660
B	18	60.0	0.49	1,080
C	26	59.4	0.70	1,550
D	35	56.7	0.90	1,980
E	40	55.0	1.00	2,200
F	Unstable	Unstable	>1.00	>2,200

[a] pc/mile/lane = passenger car equivalents per mile per lane.
[b] pc/hour/lane = passenger car equivalents per hour per lane.

SOURCE: Transportation Research Board, Special Report 209, *Highway Capacity Manual*, updated 2000

TABLE 3.10-2
LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

Level of Service	Average Total Vehicle Delay (Seconds)	Description
A	≤10	No delay for stop-controlled approaches.
B	>10 and ≤15	Operations with minor delay.
C	>15 and ≤25	Operations with moderate delays.
D	>25 and ≤35	Operations with increasingly unacceptable delays.
E	>35 and ≤50	Operations with high delays and long queues.
F	>50	Operation with extreme congestion, with very high delays and long queues unacceptable to most drivers.

SOURCE: Transportation Research Board, Special Report 209, *Highway Capacity Manual*, updated 1997

density of traffic volumes to the capacity of the merge or diverge area. The relationship of LOS criteria with density and speed for ramp junction areas is shown in Table 3.10-3.

TABLE 3.10-3
LEVEL OF SERVICE CRITERIA FOR RAMP JUNCTION AREAS

Level of Service	Maximum Density (Primary Measure) (pc/mile/lane) [a]	Minimum Speed (Secondary Measure) (MPH)
A	10	58
B	20	56
C	28	52
D	35	46
E	>35	42
F	[b]	[b]

[a] pc/mile/lane = passenger car equivalents per mile per lane.
[b] Demand flows exceed capacity limit.

SOURCE: Transportation Research Board, Special Report 209, *Highway Capacity Manual*, updated 2000

Highway 101 Roadway Level of Service

The segment of Highway 101 at Sanitary Landfill Road has a morning peak-hour volume of about 3,870 vehicles (southbound) and 1,440 vehicles (northbound). Accounting for the peak 15-minute flow within the peak hourly flow (i.e., the Peak Hour Factor), and the percentage of trucks in the traffic stream, the a.m. peak-hour levels of service are LOS E (for peak-direction southbound traffic) and LOS B (for lower-volume northbound traffic).[6]

Highway 101 / Sanitary Landfill Road Intersection Level of Service

As described above, for purposes of this EIR, the baseline setting for project site access reflects the proposed construction of a grade-separated access connection between the landfill's access road and southbound U.S. 101. Under project conditions, the only at-grade movements would be inbound right turns from northbound Highway 101 to Sanitary Landfill Road, and stop-sign-controlled outbound right turns from Sanitary Landfill Road to northbound Highway 101. Under that configuration, drivers of the seven vehicles that currently make outbound right turns onto Highway 101 during a.m. peak hour experience minor delays (LOS B).

SAFETY AND ACCIDENTS

The accident rates (expressed in terms of accidents per million vehicle miles) for the section of Highway 101 near the Sanitary Landfill Road are about 0.627 (total accidents), 0.014 (fatal accidents) and 0.278 (fatal plus injury), as compiled and reported by Caltrans (Marin County,

6 Note that the p.m. peak-hour peak-direction (northbound) service level on this segment of Highway 101 is LOS F.

2002). As described above, the 1994 FEIR identified significant and unavoidable traffic safety impacts at the existing Highway 101 / Sanitary Landfill Road intersection, and measures (i.e., restricted turning movements and landfill access at certain times of the day) to reduce, though not eliminate, significant impacts were implemented. The 2002 Supplemental EIR found that the significant and unavoidable safety impacts would be reduced to a less-than-significant level by the proposed new access connection.

3.10.2 IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

Appendix G of the CEQA Guidelines states that a project will normally have a significant effect upon the environment if it will “cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system.” Specific criteria based on the policies of Marin County, the Marin County Congestion Management Agency (CMA), and on standard practice are described below.

- Because the Highway 101 expressway segment that includes the project site access is currently operating at LOS F, and the policy of the Marin CMA is to accept LOS F as the standard for this section of highway, the project impact would be considered to be significant if the project-generated increase in traffic would cause an increase of two percent or greater in the vehicle service flow rate.

- The impact of the project would be considered to be significant if the project-generated increase in traffic would cause the operation of stop-controlled movements at an unsignalized intersection to degrade from LOS D or better to LOS E or F; or from LOS E to LOS F; or if the affected movement is operating at LOS F without the project, would cause an increase of two percent or greater in vehicle delay.

- The impact of the project would be considered to be significant if the project-generated increase in traffic would cause the operation of a ramp junction area to degrade from LOS D or better to LOS E or F; or from LOS E to LOS F; or if the ramp junction is operating at LOS F without the project, would cause an increase of two percent or greater in vehicle density.

- The impact of the project would be considered to be significant if the project-generated increase in traffic would cause the accident rate to be higher than the existing accident rate.

PROJECT TRIP GENERATION

The Redwood Landfill would generate more traffic under the proposed revisions to the 1995 Solid Waste Facilities Permit (SWFP) than is currently permitted (as shown in Table 3.10-4 and as described below). As now proposed by the project applicant (the proposal has changes since publication of the DEIR; see Master Response 17 in Volume 2 of this FSEIR), a maximum of ~~900~~ 590 vehicles per day would be permitted to enter the landfill (i.e., ~~840~~ 540 waste-carrying vehicles and ~~60~~ 50 vehicles for employees, visitors and deliveries) on a regular basis, and in addition up to 100 construction vehicles per day on a seasonal or occasional basis. That level of permitted traffic would ~~more than double~~ increase the current permitted traffic of 415 vehicles

~~TABLE 3.10-4~~
~~PROJECT VEHICLE TRIP GENERATION~~

	~~Daily Totals~~		~~AM Peak-Hour Trips (8:00-9:00)~~		
~~Vehicle Type~~	**~~Vehicles~~**	**~~Vehicle Trips~~**	**~~Vehicle Trips~~**	**~~Inbound Trips~~**	**~~Outbound Trips~~**
~~PROPOSED~~					
~~Vehicles Carrying Waste~~	~~840~~	~~1,680~~	~~178~~	~~92~~	~~86~~
~~Other Vehicles (*Employees, Visitors and Deliveries*)~~	~~60~~	~~120~~	~~41~~	~~19~~	~~22~~
~~Subtotal~~	~~900~~	~~1,800~~	~~219~~	~~111~~	~~108~~
~~Construction Traffic (*seasonal*)~~					
~~Total Proposed Traffic~~	**~~1,000~~**	**~~2,000~~**	**~~240~~**	**~~122~~**	**~~118~~**
~~EXISTING~~					
~~All Vehicles (*Carrying Waste, Employees, Visitors and Deliveries*)~~	~~415~~	~~830~~	~~111~~	~~56~~	~~55~~
~~Construction Traffic (*expires 2002*)~~					
~~Total Existing Traffic~~	**~~415~~**	**~~830~~**	**~~111~~**	**~~56~~**	**~~55~~**
~~NET NEW~~					
~~Landfill Operations~~	~~485~~	~~970~~	~~108~~	~~55~~	~~53~~
~~Construction Traffic (*seasonal*)~~					
~~TOTAL~~	**~~585~~**	**~~1,170~~**	**~~129~~**	**~~66~~**	**~~63~~**

~~SOURCES: Environmental Science Associates, using data provided by Waste Management (G. Roycroft and R. Khany) and a.m. peak-period traffic count data at Highway 101 / Project Access.~~

per day by about two-thirds. The additional vehicles day-in and day-out would generate ~~970~~ 350 vehicle trips (i.e., ~~485~~ 175 vehicles in and ~~485~~ 175 vehicles out); the seasonal construction traffic would generate an additional 200 vehicle trips (half in and half out). To ensure that potential impacts are not underestimated, impact determination will be made on the basis of the maximum increase in traffic (i.e., inclusive of seasonal construction traffic).

Under project conditions, an increase of about ~~130~~ 58 vehicle trips would be generated during the a.m. peak hour (see Table 3.10-4). The peak-hour (8:00 to 9:00 a.m.) traffic generation for vehicles carrying waste was derived using temporal distribution of daily traffic in the hourly traffic report for the Redwood Landfill for the month of July 2001; data for midweek (Tuesday hrough Thursday, excluding the 4th of July) was used. The inbound versus outbound split of a.m. peak-hour traffic was derived on the basis of the a.m. peak-period (7:00 to 10:00 a.m.) traffic count conducted at the intersection of the Landfill Access Road and Highway 101 on May 14, 2002. In the absence of other data, the number of a.m. peak-hour trips generated by on-site

TABLE 3.10-4 (Revised)
PROJECT VEHICLE TRIP GENERATION

	Daily Totals		AM Peak-Hour Trips (8:00-9:00)		
Vehicle Type	**Vehicles**	**Vehicle Trips**	**Vehicle Trips**	**Inbound Trips**	**Outbound Trips**
PROPOSED					
Vehicles Carrying Waste	540	1,080	114	59	55
Other Vehicles (*Employees, Visitors and Deliveries*)	50	100	34	16	18
Subtotal	590	1,180	148	75	73
Construction Traffic (*seasonal*)	100	200	21	11	10
Total Proposed Traffic	**690**	**1,380**	**170**	**86**	**84**
EXISTING					
All Vehicles (*Carrying Waste, Employees, Visitors and Deliveries*)	415	830	111	56	55
Construction Traffic (*expires 2002*)	0	0	0	0	0
Total Existing Traffic	**415**	**830**	**111**	**56**	**55**
NET NEW					
Landfill Operations	175	350	37	19	18
Construction Traffic (*seasonal*)	100	200	21	11	10
TOTAL	**275**	**550**	**58**	**30**	**28**

SOURCES: Environmental Science Associates, using data provided by Waste Management (G. Roycroft and R. Khany) and a.m. peak-period traffic count data at Highway 101 / Project Access.

construction activity was assumed to represent a similar percentage of daily construction trips as for traffic generated by landfill operations. Also, the existing base condition for construction traffic was set at zero on the basis that construction activity covered by the 1994 FEIR was described in that document as occurring from 1994-2002, and was specifically for traffic related to reconstruction of the perimeter levee, which is no longer proposed by the project applicant.

PROJECT TRIP DISTRIBUTION

As described in the Setting, about 85 to 90 percent of traffic generated by the landfill originates south of the site. It is reasonably expected that that directional split would continue under project conditions, and the net new a.m. peak-hour trips would be distributed as shown in Table 3.10-5.

TABLE 3.10-5
PROJECT VEHICLE TRIP DISTRIBUTION – AM PEAK HOUR

Roadway / Turning Movement	Direction	Percent	Number of Vehicles
Northbound Highway 101 (south of Access Road) - Right Turn from Highway 101	Inbound	88%	26 ~~58~~
Southbound Highway 101 (north of Access Road) - Diverge from Highway 101 to Access Road Overcrossing	Inbound	12%	4 ~~8~~
Southbound Highway 101 (south of Access Road) - Merge from Access Road Overcrossing to Highway 101	Outbound	88%	25 ~~55~~
Northbound Highway (north of Access Road) - Right Turn onto Highway 101	Outbound	12%	3 ~~8~~

SOURCE: Environmental Science Associates, using data provided by Waste Management (G. Roycroft)

Impact 3.10.1: Traffic generated by the project would affect traffic levels of service on the Highway 101 mainline in the project area. (Less than Significant)

As shown in Table 3.10-5, the proposed project would add ~~55~~ 25 vehicles to the peak-direction (southbound) Highway 101 traffic flow during the a.m. peak hour, which would represent an increase of about ~~1.5~~ 0.6 percent in peak-hour peak-direction traffic volumes. As shown in Table 3.10-6, the level of service for southbound Highway 101 would not be adversely affected, remaining at LOS E, and the project impact would be less than significant.

Mitigation: None required.

Impact 3.10.2: Traffic generated by the project would affect traffic levels of service at the Highway 101 / Sanitary Landfill Road intersection. (Less than Significant)

As shown in Table 3.10-5, the proposed project would add ~~8~~ 3 vehicles to the stop-controlled right-turn movement from Sanitary Landfill Road onto Highway 101 during the a.m. peak hour. As shown in Table 3.10-6, the level of service for that movement would not be adversely affected, remaining at LOS B, and the project impact would be less than significant.

Mitigation: None required.

TABLE 3.10-6
LEVELS OF SERVICE (LOS) AT ANALYSIS LOCATIONS

Analysis Facility	Baseline Condition Volume	Baseline Condition Density or Delay [a]	Baseline Condition LOS	Project Condition Volume	Project Condition Density or Delay [a]	Project Condition LOS
Mainline Highway 101						
- Southbound	3,868	38	E	3,893 ~~3,923~~	**39**	E
- Northbound	1,441	13	B	1,467 ~~1,499~~	**14**	B
Intersection of Highway 101 and Sanitary Landfill Road						
- Westbound Right Turn	7	6.3	B	10 ~~15~~	6.3	B
Ramp Junction on Highway 101 at Interim Access Roadway						
- Southbound Off-ramp (diverge)	14	34	D	18 ~~22~~	34	D
- Southbound On-ramp (merge)	30	32	D	55 ~~85~~	32	D

[a] Density (for mainline and ramp junction analyses) is defined as passenger car equivalents per mile per lane; Delay (for intersection analysis) is defined as average total vehicle delay (in seconds).

SOURCE: Environmental Science Associates

Impact 3.10.3: Traffic generated by the project would affect traffic levels of service at the Highway 101 ramp junction areas of the interim access road. (Less than Significant)

As described in the Setting, under project conditions, movements for southbound traffic to and from the landfill would consist of diverge and merge movements from and to Highway 101, respectively. Levels of service at ramp junctions are usually calculated for ramps on freeways. However, because deceleration and acceleration lanes with an expressway mainline operate similar to freeway junction areas, the *Highway Capacity Manual* procedures for freeway ramp junctions can be applied to analyses of ramp junctions on non-freeway facilities such as expressways and multilane highways as long as the ramp junctions are not controlled by traffic signals or stop/yield signs. The junctions of the deceleration and acceleration lanes with Highway 101 that would exist under project conditions would meet the ramp junction analysis criteria set forth in the HCM.

The a.m. peak-hour level of service for the 14 vehicles that would exit (diverge from) southbound Highway 101, and the 30 vehicles that would enter (merge to) southbound Highway 101, under the existing Solid Waste Facilities Permit (SWFP) both would be LOS D (see Table 3.10-6). As shown in Table 3.10-5, the proposed project would add ~~8~~ 4 vehicles to the diverge movement, and ~~55~~ 25 vehicles to the merge movement, during the a.m. peak hour. As shown in Table 3.10-6, the levels of service for those movements would not be adversely affected, remaining at LOS D, and the project impact would be less than significant.

Mitigation: None required.

Impact 3.10.4: Traffic generated by the project would affect traffic safety on Highway 101 in the project area. (Less than Significant)

As described above, the 1994 FEIR identified significant and unavoidable traffic safety impacts at the existing Highway 101 / Sanitary Landfill Road intersection, and measures (i.e., restricted turning movements and landfill access at certain times of the day) intended to reduce, though not eliminate, significant impacts were implemented. In February 2000, RLI proposed to Caltrans and Marin County to design and construct the grade-separated access assumed for the baseline setting in this analysis. The 2002 Supplemental EIR found that the unavoidable safety impacts identified in the 1994 FEIR would be reduced to a less than significant level by the proposed new access connection. Construction of the access connection was approved by the Marin County Board of Supervisors in 2002, and the road project currently is in the design phase. On the basis of the project sponsor's commitment to the grade-separated access connection between the landfill's access road and southbound U.S. 101 being in-place prior to approval of the proposed SWFP, as stipulated in footnote 3, page 3.10-3, the baseline setting for project site access in this EIR reflects the grade-separated access. If for any reason the access road project were not completed, the significant and unavoidable traffic safety impacts identified in the 1994 FEIR would remain, and additional traffic safety analysis would be required to provide adequate access before the revised SWFP could be approved.

The proposed project would neither change the physical characteristics of the street network surrounding the site nor generate traffic (e.g., vehicle type) that is incompatible with existing traffic patterns. On that basis, the rate of accidents (i.e., accidents per million vehicle miles) would not increase as a result of the project, and the project impact would be less than significant.

The above-cited new access connection (not part of the proposed revisions to the SWFP) will eliminate the existing traffic conflicts between left turns across Highway 101 and mainline traffic on Highway 101. The number of accidents, and more importantly the severity of accidents, will be reduced by the change in landfill access.

Mitigation: None required.

REFERENCES – Transportation and Traffic

Caltrans (California Department of Transportation), http://www.dot.ca.gov/hq/traffops, 2002.

Caltrans, *2000 Annual Average Daily Truck Traffic on the California State Highway System*, December 2001.

Marin County, Community Development Agency, *Redwood Landfill Inc. Interim Access Road Improvements Final Supplemental EIR*, June 2002.

Transportation Research Board, *Highway Capacity Manual*, Special Report 209, Updated 2000.

CHAPTER 4
GROWTH-INDUCING AND CUMULATIVE EFFECTS

4.1 GROWTH-INDUCING EFFECTS OF THE PROPOSED SOLID WASTE FACILITIES PERMIT REVISION

4.1.1 INTRODUCTION

The CEQA *Guidelines* (Section 15126.2[d]) require that an EIR evaluate the growth inducing impacts of a proposed action. A growth-inducing impact is defined by the CEQA *Guidelines* as:

> The way in which a proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth…. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.

A project can have direct and/or indirect growth inducement potential. Direct growth inducement would result if a project, for example, involved construction of new housing. A project would have indirect growth inducement potential if it established substantial new permanent employment opportunities (e.g., commercial, industrial or governmental enterprises) or if it would involve a construction effort with substantial short-term employment opportunities that would indirectly stimulate the need for additional housing and services to support the new employment demand. Similarly, a project would indirectly induce growth if it would remove an obstacle to additional growth and development, such as removing a constraint on a public service that otherwise limits growth.

The CEQA *Guidelines* further explain that the environmental effects of induced growth may be indirect impacts of the proposed action. These indirect impacts or secondary effects of growth may result in significant, adverse environmental impacts. Potential secondary effects of growth include increased demand on other community and public services and infrastructure, increased traffic and noise, and adverse environmental impacts such as degradation of air and water quality, degradation or loss of plant and animal habitat, and conversion of agricultural and open space land to developed uses.

Growth inducement may constitute an adverse impact if the growth is not consistent with or accommodated by the land use plans and growth management plans and policies for the area affected, would exceed available services, or otherwise result in an identifiable secondary impact as discussed above. Local land use plans provide for land use development patterns and growth policies that allow for the orderly expansion of urban development supported by adequate urban public services, such as water supply, roadway infrastructure, sewer service and solid waste service. A project that would induce "disorderly" growth (conflict with the local land use plans) could indirectly cause additional adverse environmental impacts and other public services impacts. Thus, to assess whether a growth-inducing project will result in adverse secondary effects, it is important to assess the degree to which the growth accommodated by a project would or would not be consistent with applicable land use plans.

COMPONENTS OF GROWTH

The timing, magnitude, and location of land development and population growth in a community or region is based on various interrelated land use and economic variables. Key variables include regional economic trends, market demand for residential and non-residential uses, land availability and cost, the availability and quality of transportation facilities and public services, proximity to employment centers, the supply and cost of housing, and regulatory policies or conditions. Since the general plan of a community defines the location, type and intensity of growth, it is the primary means of regulating development and growth in California.

GROWTH-INDUCEMENT POTENTIAL

As described in Chapter 2 (Project Description), Redwood Landfill provides solid waste service for much of Marin County and for waste originating elsewhere in the region. The landfill currently has capacity at least until the year 2024. ~~for the next 13–37 years, depending on the rate of fill.~~ Other landfill facilities in Marin County have ceased operations.

Redwood Landfill is identified in the Marin Countywide Integrated Waste Management Plan as the primary disposal facility for the County. The project would provide for sufficient solid waste disposal capacity for the County as well as the disposal needs for other communities in Northern and Central California, and still maintain a site life of at least ~~20~~ 32 years (through 2037), depending on the rate of fill (see ~~appendix A~~ Master Response 21 in Volume 2). Because the existing permitted capacity of Redwood Landfill is sufficient for all of Marin County's wastes for at least the next ~~13~~ 19 years, expanding the landfill's overall capacity and allowable rate of waste acceptance would not, at least in the next few years, induce growth by removing a barrier to development.

GROWTH EFFECTS OF THE PROJECT

The proposed Solid Waste Facilities permit revision would have the effect of increasing the ultimate size of Redwood Landfill, the rate at which it can be filled, and the acceptance rate for materials for composting. The project applicant, Redwood Landfill, Inc., does not plan to increase staffing of the landfill if the project is approved; nor would the project attract housing or commercial development to the vicinity of the site; on the contrary, the applicant has recently terminated or opted not to renew the leases of several tenants at the site; and few people choose to work or live in close proximity to an active sanitary landfill. Since there is sufficient landfill capacity throughout the Bay Area region, and since the availability of landfill capacity is not frequently cited as a constraint to the development of new housing or commercial areas, the increase in total capacity and rate of waste acceptance cannot be seen as removing a significant constraint to regional development. Thus, the increase in total capacity and rate of waste acceptance are not anticipated to induce additional growth in the region.

The proposed project would not involve additional expansion or extension of infrastructure facilities or roadways that could induce unplanned growth adjacent to the landfill. The North Marin Water District (NMWD) recently extended a larger (12-inch-diameter) water main to the site. The ~~planned~~ access bridge at the intersection of U.S. 101 and Landfill Road, which is currently under construction and which is not a part of this project, would serve only the landfill, so it is not expected to induce growth in the area of the highway exit.

4.2 CUMULATIVE IMPACTS

4.2.1 INTRODUCTION

"Cumulative impacts" refers to two or more individual effects that, when considered together, are considerable or compound other environmental impacts.[1] CEQA Guidelines require that EIRs discuss the cumulative impacts of a project when the project's incremental effects are "cumulatively considerable," meaning that the project's incremental effects are considerable when viewed in connection with the effects of past, current, and probable future projects. The discussion of cumulative impacts must reflect the severity of the impacts and their likelihood of occurrence, but need not provide as much detail as the discussion provided for impacts of the project alone, and should be guided by the standards of practicality and reasonableness.[2]

In addition, the CEQA *Guidelines* identifies that the following three elements are necessary for an adequate cumulative analysis:[3]

- A list of past, present, and reasonably anticipated future projects producing related or cumulative impacts, including those projects outside the control of the agency (list approach), or a summary of projections contained in an adopted general plan or related planning document which is designed to evaluate regional or area-wide conditions. Any such planning document is to be referenced and made available to the public at a location specified by the Lead Agency (plan approach);[4]

- A summary of expected environmental effects to be produced by those projects with specific reference to additional information stating where that information is available; and

1 CEQA Guidelines §15355
2 CEQA Guidelines §15130(b)
3 Ibid.
4 A recent appeals court decision (*Communities For A Better Environment v. California Resources Agency*, Case No. C038844 [10/28/02]) held that in determining probable future projects, lead agencies should not limit consideration to only one category of projects enumerated in CEQA Guidelines Section 15130(b)(1)(B)2 (such as those projects requiring agency approval for which an application has been received; projects included in an adopted capital improvements program, general plan, regional transportation plan, or other similar plan; projects anticipated as a later phase of a previously approved project; or those public agency projects for which money has been budgeted).

- A reasonable analysis of the cumulative impacts of the relevant projects. An EIR shall examine reasonable options for mitigating or avoiding any significant cumulative effects of a proposed project.

The cumulative analysis in this EIR uses both Marin County General Plan projections and specific recent and proposed future developments in the County and City of Novato.

MARIN COUNTYWIDE PLAN

The Marin Countywide Plan (the General Plan; adopted 1994) provides for the long-range direction and development of land within the County. The Land Use Policy Maps for the North Novato Area (Maps 1.3 and 1.3a), in the Community Development Element of the Countywide Plan, identify and plan for future development densities and intensities in the project vicinity. Most of the land in the immediate vicinity is designated to continue in agricultural use (primarily AG-1, 1 unit per 31-60 acres, although a small area north of Olompali State Park is designated AG-2, 1 unit per 10-30 acres, and another small area southwest of the landfill is designated AG-3, 1 unit per 1-9 acres) or as open space (refer to Figure 3.6-1 in Chapter 3). Farther south, approximately 3/4 miles from the landfill, an area west of the Gnoss Field Airport is zoned for low-density industrial development (floor-area ratio of 0.04 to 0.035), suggesting that some additional development could occur in this area in the future. The nearest designated residential area is an area designated SF3 (single family, 1 unit per 1-5 acres) east of the Rush Creek Open Space Preserve just north of Atherton Avenue.

PROJECTS POTENTIALLY HAVING RELATED OR CUMULATIVE EFFECTS

Table 4-1 lists the projects that were considered in the evaluation of cumulative impacts. The sources for this list include information provided by the Marin County Community Development Department (Haddad, 2002; Marin County, 2002) and the City of Novato Community Development Department (City of Novato, 2002), both of which provided lists of current and recent planning projects. None of the projects on either list were considered to have the potential to combine with the project to create cumulative effects, other than general regional effects such as increased traffic and related air quality impacts, due to the location, size, or nature of the projects listed. None of the projects from the Marin County list are in the vicinity of Redwood Landfill. Those projects from the City of Novato list that are located in the northern part of the City are included in Table 4-1.

In addition to projects from the two lists, Marin County Community Development Department identified several other recent, current, and planned future projects in the vicinity of Redwood Landfill that are expected to have the potential to combine with the project to create cumulative effects. These are listed at the beginning of Table 4-1, and include the planned improvements to Redwood Landfill's access road (the access bridge – now under construction); planned improvements at Marin County Airport (Gnoss Field); development of the Buck Center; and CalTrans' planned widening of U.S. 101.

TABLE 4-1
DEVELOPMENT PROJECTS IN THE VICINITY OF REDWOOD LANDFILL

Project Name	Planning Jurisdiction	Location/Project Characteristics	Status
Projects Expected to Have the Potential to Combine with the Project to Create Cumulative Effects			
Redwood Landfill Interim Access Road Improvements	County of Marin Community Development Agency / and Caltrans	Highway 101 at the landfill entrance road; overcrossing structure to provide landfill access to southbound traffic eliminating the existing at-grade left turn lane and crossing.	Project has been approved; construction has begun ~~pending~~
Gnoss Field Improvements	County of Marin Department of Public Works	Runway Extension	Planned
Buck Center	City of Novato	Medical Center and residences; phase of residential development currently in progress	Main part of med center completed
Widening of U.S. 101	CalTrans	Widen U.S. 101, eliminate level crossings, and divide roadway between Novato and Petaluma	Planned
Other Projects			
Projects in northern Novato, from List Provided by City of Novato Community Development Department			
Campus Management	City of Novato	541,000 square foot commercial (office) development at 7701 Redwood Blvd.	Application incomplete
Marion Ave. VTM	City of Novato	10-unit single-family residential development on Marion Ave.	Project approved
Oak View	City of Novato	57,900 square foot commercial (office) development on Meadow Crest Court	Project approved
San Marin Cottages	City of Novato	3 unit single-family residential development at 200 San Marin Drive	Pending approval
Tranquility Lot Line Adjustment	City of Novato	Lot line adjustment for parcel with single-family residential use designation	Pending approval
Virginia Oaks	City of Novato	Subdivision for 5-unit single-family residential development at 1827 Virginia Ave.	Application incomplete
Woodside Office Amendment	City of Novato	Commercial development at 800 Grant Ave.	Pending approval

ON-SITE PROJECTS POTENTIALLY HAVING CUMULATIVE EFFECTS

In addition to off-site projects, previously permitted projects at Redwood Landfill that could contribute to cumulative impacts include the landfill expansion and administrative facilities evaluated in 1994 FEIR.

4.2.2 IMPACT DISCUSSION: CUMULATIVE IMPACTS

Possible cumulative impacts that may result from approval of the project, combined with the development of other approved or reasonably foreseeable projects in the area include the following:

AESTHETICS

Impact CU-1: The project would contribute to the cumulative degradation of the visual character of the surrounding area, particularly the U.S. 101 corridor between Novato and Petaluma. (Less than Significant)

As discussed in Section 3.1 of Chapter 3, the impacts of the various physical elements of the project, including the recently constructed, 40-foot high landfill gas flare, the leachate vaporator, the proposed power generators, and the increased slope and mass of the landfill itself, compared with the currently permitted landfill, would have less-than-significant impacts on the visual character of the area. The project would, however, add to a cumulative effect that is in process caused by several projects in this rural agrarian area. These include the ~~future~~ construction of the access bridge at the junction of U.S. 101 and Sanitary Landfill Road, the planned widening of U.S. 101, the construction of the Buck Center southwest of the site, and the implementation of the previous Redwood Landfill expansion project (the subject of the 1994 FEIR). Together, these projects are altering the character of this area by introducing commercial, industrial, and new transportation features that are out of character with the adjacent agricultural and open space land uses. However, it is noted that this particular area along U.S. 101 has not been maintained exclusively for agricultural and open space uses for many decades, considering, for example, the existence of the landfill at its current site since 1958 and the location of the Marin County Airport, Gnoss Field, south of the project site. While the combined effects of the identified cumulative projects would alter the character of this area to a degree, the area would remain essentially rural, and agricultural and open space land uses would continue to predominate. The project's contribution to the cumulative effect on visual resources would not be considerable because neither the landfill footprint nor its height are increasing, and the change to landfill contours would be minor; existing equipment from the Cascade Forest Products operation currently in view at the site would be removed, and relocated facilities and new equipment would be screened by vegetation to be planted pursuant to mitigation measures identified in the 1994 EIR. Therefore, the project would not contribute considerably to the cumulative effect on visual resources.

Mitigation: None required.

AIR QUALITY

Impact CU-2: The project would incrementally add to cumulative air pollutant emissions. (Significant)

The project would result in the generation of air pollutants in the immediate vicinity of the site and along access roads, and would incrementally add to cumulative emissions. The project would significantly add to ozone precursor emissions on a regional basis, and on a local basis would add to PM-10 and toxic air contaminant emissions. The project also has the potential to contribute to cumulative odor impacts. Overall, the project's contribution to cumulative air quality conditions is considered significant, because the proposed project would likely contribute to continued violations of ozone and PM-10 air quality standards, those pollutants for which the Bay Area is designated nonattainment.

As indicated in Table 3.2-6 in Section 3.2, the proposed project would result in emissions well in excess of BAAQMD thresholds for ROG, NO_x, and PM-10 and would account for ~~more than one~~a discernible percentage of the total estimated emissions of these pollutants in Marin County. Projects exceeding the BAAQMD significance thresholds are generally considered to be inconsistent with the *Bay Area 2000 Clean Air Plan.* Thus, the project would contribute to a significant cumulative effect based on its cumulatively considerable increase in ROG, NO_x, and PM-10 emissions.

Mitigation Measures Proposed as Part of the Project

Mitigation Measure CU-2a: Implement Mitigation Measure 3.2.1a.

Mitigation Measures Identified in This Report

Mitigation Measure CU-2b: Implementation of the following mitigation measures, identified in Section 3.2, Air Quality, to mitigate project impacts concerning air pollutant emissions, also would help to mitigate the project's contribution to the cumulative impact: Mitigation Measure 3.2.2 (a-d~~e~~) to reduce impacts from the increased equipment and truck operations associated with the proposed increase in incoming materials, Mitigation Measure 3.2.4 to reduce levels of project-generated fugitive dust, Mitigation Measure 3.2.5 (a-e~~d-f~~) to address landfill gas emissions, Mitigation Measure 3.2.6 (a-d) to address ROG emissions from the proposed composting operation, and Mitigation Measure 3.2.10 (b or c) to address VOCs and odor from the air drying of sludge.

Level of Significance After Mitigation

The identified mitigation measure would not fully mitigate the project's operational impacts to air quality to a less-than-significant level. Consequently, when project operational impacts are added to impacts from cumulative development, the total emissions will remain well above the BAAQMD recommended significance thresholds and inhibit regional attempts to achieve attainment of air quality standards. The impact would remain significant and should be considered an unavoidable consequence of project approval.

BIOLOGICAL RESOURCES

The project is not expected to have any significant impacts on biological resources that cannot be mitigated and therefore avoided. The mitigation measures identified in Section 3.3, in Chapter 3, will ensure that the project does not have a considerable contribution to regional impacts on biological resources.

GEOLOGY, SOILS AND SEISMICITY

Potential project impacts related to geology, soils, seismicity, and groundwater are site-specific and would not combine with related impacts of other projects to create cumulatively considerable impacts.

HYDROLOGY AND WATER QUALITY

~~With implementation of the measures identified to mitigate project impacts (refer to Chapter 3 of this report), the potential project impacts related to surface water hydrology and water quality would be site-specific and would not combine with related impacts of other projects to create cumulatively considerable impacts.~~

The cumulative impact analysis for hydrology and water quality considers the contribution of the proposed project to water quality degradation and stormwater runoff to San Antonio Creek, the Petaluma River, and San Francisco Bay, in the context of existing and proposed development projects outlined in Table 4-1. Other projects in the table, including the Buck Center complex, the construction of the new access bridge to the landfill, the widening of U.S. 101, and new commercial and residential developments in Novato will contribute incrementally to the pollutant and sediment load of the aforementioned waterways, although these developments will be subject to existing regulations to protect water quality.

The landfill's current WDRs (Order No. 95-11, Item no. 32) state that the WDRs implement the water quality objectives stated in the San Francisco Bay Basin Plan adopted by the Regional Board in December 1986. Similarly, the specifications of the next revised WDRs also will be designed to implement water quality objectives in the current Basin Plan. Other projects also will be subject to RWQCB requirements that implement the water quality objectives of the Basin Plan.

As required under CCR Title 27 and in RLI's WDRs, a detection monitoring program is in place at the landfill, and would continue under the project. Detection of any statistically significant change from background levels of the specified monitoring parameters must be reported to the RWQCB, and triggers additional scrutiny and, potentially, as determined by the RWQCB, corrective action. As specified in Mitigation Measure 3.5.3d, water that has contacted refuse at the working face or compost at the composting facility ("contact water") will continue to be treated as leachate and retained on site. Under the project, all activities within the landfill property would continue to be governed by terms of the NPDES General Industrial Activities Storm Water Discharge Permit and revised WDRs. Activities within the landfill footprint would not change substantially from those currently permitted in terms of changes to impervious surface area and disposal activities. (Subsequent to publication of the DSEIR, the applicant withdrew the proposal to reclassify Area G as a Class II disposal unit.) Outside the landfill footprint the use of fields in the Oxbow area for composting could increase the amount of impervious surface for the areas serving as composting pads (as required under Mitigation Measure 3.5.3b). However, the composting pads are required to have leachate collection systems and as noted any water contacting compost is required to be treated as leachate (pursuant to Mitigation Measure 3.5.3d); therefore much of the stormwater contacting this area would not be discharged from the site, but instead would be directed to the existing or a newly constructed leachate impoundment.

Therefore, with implementation of the measures identified to mitigate project impacts, the project's contribution to cumulative impacts on hydrology and water quality would be less than cumulatively considerable.

LAND USE AND PLANNING

Section 3.6 in Chapter 3 identifies several potentially significant effects of the project on land use and planning. This section also identifies mitigation measures that will reduce these impacts to less-than-significant levels. These mitigation measures will also reduce the contribution of these impacts to less-than-cumulatively-considerable, and no cumulative impacts will result. The less-than-significant effects of the project related to compatibility with surrounding land uses identified in Section 3.6 would not combine with similar effects of other projects to produce a significant cumulative impact. Therefore, the project will not result in a cumulative impact on Land Use and Planning.

NOISE

As discussed in the Noise analysis, the area in the vicinity of the project site is already impacted by noise from U.S. 101, Gnoss Field, and other sources. The project can be expected to contribute incrementally to ambient noise in the area. However, due to the lack of sensitive receptors in the area, and the low sensitivity of land uses in this area to noise, the project's contribution to cumulative ambient noise levels is not cumulatively considerable. Therefore, the project will not result in nor contribute to a cumulative noise impact.

PUBLIC HEALTH AND SAFETY

The project would result in several public health and safety impacts, but with the mitigation measures identified in Section 3.8, these would all be reduced to less-than significant levels. Most of these impacts would be site-specific and would not have the potential to combine with off-site projects to produce a cumulative impact. Increased transport of the proposed increased volume of designated wastes to the site ~~for disposal in Area G~~ would contribute slightly to the risk of upset or spill of potentially dangerous materials on regional roadways. However, the designated wastes that would be accepted are not hazardous materials. Neither ~~The project~~ would ~~not, however,~~ the project result in increased generation or transport of these materials, but would only provide an additional site in the region at which they might be disposed. Therefore, the contribution of this impact to the existing regional risk of upset or spill of dangerous materials on regional roadways is considered de minimis.

PUBLIC SERVICES, UTILITIES, AND ENERGY

Although the project could incrementally increase demand for water, implementation of the mitigation measure identified in the analysis of project impacts would reduce the project's contribution to cumulative demand on water supplies to a less than cumulatively considerable level.

Implementation of Mitigation Measure 3.9.3b, which would result in installation of landfill gas to energy generators, would ensure that the project does not result in wasteful use of energy, and would avoid a cumulative impact on energy consumption.

TRANSPORTATION AND TRAFFIC

Impact CU-3: The project would contribute to cumulative increases in traffic on roadway facilities in the project area in 2020. (Less than Significant)

Recent studies of cumulative (2020) traffic conditions in the project area indicate that both ~~and~~ the Novato Planning Area and Sonoma County are expected to experience substantial growth by 2020, which means that traffic volumes on Highway 101 in the project area will also grow substantially from existing conditions (Marin County, 2002). Traffic volumes on Highway 101 during the a.m. peak-hour are projected to increase about 53 percent from existing levels. The a.m. peak-hour level of service on the four-lane mainline and at the ramp junction areas in the peak-direction (southbound) will degrade to LOS F under cumulative conditions. The project-generated increase in traffic on southbound Highway 101 would represent about 0.9 percent of the cumulative volume. As specified in the Significance Criteria, the policy of the Marin Congestion Management Agency (CMA) is to accept LOS F as the standard for this section of highway, the impact would be considered to be less than significant because the project-generated increase in traffic would cause an increase of less than two percent in the vehicle service flow rate.

The stop-controlled right-turn movement from Sanitary Landfill Road onto Highway 101 during the a.m. peak hour would operate at LOS C, and the impact would be less than significant.

Mitigation: None required.

REFERENCES – Impact Overview

City of Novato, Community Development Department, *Current Planning Division Projects* (database report), December 2, 2002. 11 pp.

Haddad, Tim, Environmental Coordinator, Marin County Community Development Department, personal communication (telephone) with Dan Sicular, ESA, July 2, 2002.

Marin County, Community Development Agency, Redwood Landfill Inc. *Interim Access Road Improvements Final Supplemental EIR*, June 2002.

Marin County Community Development Agency Planning Division and Environmental Health Services, *Phase II: Final Initial Study Type Review: Redwood Landfill Solid Waste Facility Permit Technical Review/Project Description and Initial Study*, prepared by John Roberto Associates and Michael Clayton & Associates, December 7 1999.

Marin County, *Marin Countywide Plan.* Marin County, 1994.

Marin County Community Development Agency Planning Division and Environmental Health Services, *Phase II: Final Initial Study Type Review: Redwood Landfill Solid Waste Facility Permit Technical Review/Project Description and Initial Study*, prepared by John Roberto Associates and Michael Clayton & Associates, December 7 1999.

Marin County, *PROPDEV 35, Semi-Annual Proposed Development Survey: An Inventory of Proposed Development Projects in Marin County as of July, 2002.* Marin County Community Development Agency in cooperation with the Planning Departments of the Cities and Towns of Marin. August, 2002

CHAPTER 5
ALTERNATIVES TO THE PROJECT

The California Environmental Quality Act (CEQA) requires an evaluation of the comparative effects of a range of reasonable alternatives to a project that would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project (CEQA *Guidelines* Section 15126.6[a]). The EIR is to consider a reasonable range of potentially feasible alternatives that will foster informed decisionmaking and public participation. The nature and scope of the alternatives to be discussed is governed by the "rule of reason." The discussion of alternatives is to focus on alternatives to the project or its location that are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede, to some degree, the attainment of the project objectives, or would be more costly (*Guidelines* Section 15126.6[b]).

The range of potential alternatives shall include those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the project effects. The EIR should also identify any alternatives that were considered by the lead agency but were rejected as infeasible during the scoping process and briefly explain the reasons underlying the lead agency's determination (*Guidelines* Section 15126.6[c]). The EIR shall include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed project. (*Guidelines* Section 15126.6[d]). Evaluation of a No Project Alternative is required, to allow decisionmakers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project. The "No Project" analysis shall discuss existing conditions at the time the environmental analysis is commenced, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved (*Guidelines* Section 15126.6[e]).

This EIR considers five alternatives, which were selected because of their feasibility, their ability to meet most of the basic objectives of the project, and because they provide a reasonable range of alternatives to the project. The five alternatives are:

1. No Project Alternative
2. Status Quo Alternative
3. Reduced Scale Alternative
4. Mitigated Alternative
5. Off-Site Alternative

Below, each of these five alternatives is described and its potential environmental impacts and ability to meet basic project objectives are compared with the proposed project.

5.1 ALTERNATIVES CONSIDERED BUT REJECTED

In addition to the five alternatives selected for this analysis, the Lead Agency considered several other possible alternatives. Upon consideration, however, these alternatives were rejected because of one of three reasons: the alternative failed to meet most of the basic project objectives; the alternative was found to be infeasible; or the alternative did not have the ability to avoid the significant environmental impacts identified for the project. These rejected alternatives are discussed briefly, along with the specific reason that they were rejected.

5.1.1 REJECTED ALTERNATIVE 1: OFF-SITE ALTERNATIVES FROM THE 1988 LANDFILL SITING STUDY

The 1994 FEIR revisited a 1988 study by Marin County that identified five possible sites for a new landfill. The 1994 FEIR compared development of each of these five sites to the project then being proposed. The 1994 FEIR concluded that,

> "In summary, the continued. use of the existing Redwood Landfill would result in less environmental damage compared to the development of any of the identified alternative sites. In addition, the continued landfill operation in this area can be accomplished for the least cost, and is the only "practicable alternative" based on access, adjacent land use, technology, logistics, and Marin County planning an zoning requirements." (FEIR, p. 4-25)

Because these off-site alternatives do not appear to have the ability to substantially lessen or avoid the project's impact, this alternative has been rejected from further analysis.

5.1.2 REJECTED ALTERNATIVE 2: MODIFICATION OF ANOTHER WASTE MANAGEMENT INC. LANDFILL

This alternative, which would have involved modification of a different Waste Management, Inc. landfill in the Bay Area (such as Guadalupe Hills Landfill in Santa Clara County or Altamont Landfill in Alameda County) was rejected because it was deemed that the alternative would have failed to meet most of the basic project objectives, or because such an undertaking would be infeasible; for example, Waste Management Inc. recently won approval for a modest expansion (compared with their original proposal) of Altamont Landfill.

5.1.3 REJECTED ALTERNATIVE 3: PARTIAL OFF-SITE ALTERNATIVE

This alternative would have involved the location of some project elements, such as the expanded composting facility, in a location other than the Redwood Landfill. The alternative was rejected from further consideration because it was deemed likely to be economically infeasible, and because it is likely that, while avoiding some site-specific impacts, it would have caused other equally or more severe impacts.

5.2 ALTERNATIVES CONSIDERED IN THE EIR

Each alternative is described below. The impacts associated with each alternative are compared to the project's impacts in Table 5-1.

5.2.1 NO PROJECT ALTERNATIVE

ALTERNATIVE DESCRIPTION

The No Project Alternative analysis is based on the assumption that the Redwood Landfill would continue to operate under the terms of its existing permits. There would be no increase in daily receipt of wastes, no increase in the permitted capacity of the landfill (or change in the landfill's final grades), there would be no change to the design of the landfill's final cover, and there would be no expansion of the compost facility. There would be no change to the permit conditions regarding alternative daily cover (ADC); only N-Viro processed sewage sludge biosolids, processed within a building equipped with an adequate filtration system to limit odors and emissions, could be used as ADC. To address permit conditions that specify the end of sludge storage and air drying in 1996, RLI would limit sludge intake as needed to empty the 34-acre sludge impoundment within a limited timeframe, using permitted sludge processing methods and quantities. Area G would eventually be developed as a Class III cell ~~(not Class II as proposed)~~ consistent with ~~after~~ the RWQCB's recent approval~~es~~ of the final liner design~~, which must be consistent with current regulatory requirements~~. Redwood Landfill ~~would~~has completed construction of the leachate collection and recovery system (LCRS) according to the revised design (the perimeter trench design) and would complete the elevation and widening of the perimeter levee. The Stipulated Notice and Order, which allows the landfill to receive more vehicles than the SWFP allows, would be rescinded, and the maximum daily traffic to the facility would be 415 vehicles (830 vehicle trips). The buried waste in the 11.5-acre outside the landfill footprint would be excavated and deposited within the permitted landfill as planned prior to the 1994 EIR. The access bridge at the intersection of U.S. 101 and the landfill access road would be built.

ENVIRONMENTAL IMPACTS

Aesthetics

There are no significant aesthetic impacts of the project. The No Project Alternative would have less of an aesthetic impact than the project.

Air Quality

The No Project Alternative would have lesser air quality impacts than the project, due to the lower traffic volume, less intensive site operations, and more restricted range of materials accepted. Although the excavation of the 11.5-acre waste area would have dust and emissions impacts, these effects would be temporary and would be offset by the overall reduction in Air Quality impacts under this alternative.

TABLE 5-1 [New to this EIR]
IMPACTS AND SIGNIFICANCE LEVELS OF THE PROJECT AND ALTERNATIVES[a,b]

Impact	Proposed Project	No Project	Status Quo	Reduced Scale	Mitigated	Off-Site
Aesthetics						
3.1.1: View from U.S. 101, approximately 1/4 miles from Redwood Landfill, looking northeast. (Less than Significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	N/A
3.1.2: View from U.S. 101, south of the landfill entrance road, looking east/northeast. (Less than Significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	N/A
3.1.3: View from U.S. 101 approximately 2/3 mile from Redwood Landfill, looking east. (Less than Significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	N/A
3.1.4: View from Olompali State Park, approximately 2/3 mile from Redwood Landfill, looking northeast. (Less than Significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	N/A
3.1.5: Increased levels of nighttime activities could occur, resulting in adverse impacts on the rural character of the project vicinity due to increased light and glare. (Less than Significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	S/UN (G)

a Significance levels for the project and the alternatives reflect the levels of significance after all applicable mitigation measures are applied. (Measures identified for the project apply to the Reduced Scale, Mitigated, and Off-Site Alternatives, but not to the No Project and Status Quo Alternatives.)

S/UN = Impact is significant and unavoidable.
NS = Impact is less than significant; no mitigation is warranted.
NS(M) = Impact is less than significant; supplemental mitigation is identified.
S/M = Potentially significant impact; impact would be reduced to less than significant by mitigation measures required in this report.
G = Greater (or less favorable) impact than under the proposed project.
L = Less (or more favorable) impact than under the proposed project.
E = Equal (or similar) impact as under the proposed project.
UKN = Unknown level of impact.
N/A = Not applicable.

b This table presents a comparison of environmental impacts that were identified under the proposed project with each of the alternatives. Additional environmental impacts that would potentially occur under each of the alternatives are presented in the text discussion.

TABLE 5-1 (continued) [New to this EIR]
IMPACTS AND SIGNIFICANCE LEVELS OF THE PROJECT AND ALTERNATIVES[a,b]

Impact	Proposed Project	No Project	Status Quo	Reduced Scale	Mitigated	Off-Site
3.1.6: The increase in waste receipts and compost throughput and the use of a waste tipper could result in increased litter on and near the project site, causing adverse aesthetic impacts in the site vicinity. (Significant)	S/M	NS (L)	NS (L)	NS (L)	NS (L)	S/M (G)
3.1.7: Prior to landfill closure, the proposed changes in landfill contours (in conjunction with the revised fill sequencing plan) could increase the visibility of landfill activities as seen from Highway 101. (Less than Significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	S/UN (G)
CU-1: The project would contribute to the cumulative degradation of the visual character of the surrounding area, particularly the U.S. 101 corridor between Novato and Petaluma. (Less than Significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	S/M (G) or S/UN (G)
Air Quality						
3.2.1: Construction activities would generate substantial amounts of dust, which would result in potential health and nuisance impacts in the immediate project vicinity. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	S/M (L)	S/M(G)

a Significance levels for the project and the alternatives reflect the levels of significance after all applicable mitigation measures are applied. (Measures identified for the project apply to the Reduced Scale, Mitigated, and Off-Site Alternatives, but not to the No Project and Status Quo Alternatives.)

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TABLE 5-1 (continued) [New to this EIR]
IMPACTS AND SIGNIFICANCE LEVELS OF THE PROJECT AND ALTERNATIVES[a,b]

Impact	Proposed Project	No Project	Status Quo	Reduced Scale	Mitigated	Off-Site
3.2.2: Equipment and truck operations associated with an increase in incoming materials at the landfill would generate additional criteria air pollutant emissions. (Significant)	S/UN	NS (L)	NS (L)	S/UN (L)	S/UN (L)	S/UN(E)
3.2.3: Mobile emissions generated by project traffic could increase CO concentrations at intersections in the project vicinity. (Less than significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	S/M (G) or S/UN (G)
3.2.4: Landfill operations, including vehicle and equipment travel on unpaved surfaces, would generate fugitive dust. (Significant)	S/UN	NS (L)	NS (L)	S/UN (L)	S/UN (L)	S/UN(G)
3.2.5: The project would increase the amount of landfill gas generated and could exceed the capacity of the landfill gas collection and treatment system. In addition, emissions of air pollutants from the landfill gas treatment system, as well as fugitive landfill gas emissions, would increase. (Significant)	S/UN	NS (L)	NS (L)	S/UN (L)	S/M (L)	S/UN(E)
3.2.6: The project would increase the amount of ROG emissions from composting/ co-composting activities. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	S/M (L)	S/M(G) or S/UN (G)

a Significance levels for the project and the alternatives reflect the levels of significance after all applicable mitigation measures are applied. (Measures identified for the project apply to the Reduced Scale, Mitigated, and Off-Site Alternatives, but not to the No Project and Status Quo Alternatives.)

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TABLE 5-1 (continued) [New to this EIR]
IMPACTS AND SIGNIFICANCE LEVELS OF THE PROJECT AND ALTERNATIVES[a,b]

Impact	Proposed Project	No Project	Status Quo	Reduced Scale	Mitigated	Off-Site
3.2.7: Changes in sludge quantities received and sludge processing/handling activities (other than the proposed air-drying of sludge) could increase ROG emissions at the site. (Less than Significant)	NS	NS (L)	NS (E)	NS (L)	NS (L)	NS(G)
3.2.8: Emissions of toxic air contaminants could pose a risk to human health. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	S/M (L)	S/M (E or G) or S/UN (G)
3.2.9: Project operations could result in nuisance odor emissions. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	S/M (L)	S/M (G) or S/UN (G)
3.2.10: The proposal to air-dry stockpiled sewage sludge could result in increased emissions of volatile organic compounds and odors. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	S/M (L)	S/M (G) or S/UN (G)
3.2.11: The combined emissions from project operations would exceed BAAQMD significance criteria for ROG, NOx and PM-10. (Significant)	S/UN	NS (L)	NS (L)	S/UN (L)	S/UN (L)	S/UN (G)
3.2.12: Leaving buried waste in place in the 11.5 acre unit in the southwest corner of the landfill property could result in fugitive emissions of landfill gas. (Less than Significant)	NS	NS (L)	NS (L)	NS (E)	NS (E)	NS (E)

a Significance levels for the project and the alternatives reflect the levels of significance after all applicable mitigation measures are applied. (Measures identified for the project apply to the Reduced Scale, Mitigated, and Off-Site Alternatives, but not to the No Project and Status Quo Alternatives.)

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TABLE 5-1 (continued) [New to this EIR]
IMPACTS AND SIGNIFICANCE LEVELS OF THE PROJECT AND ALTERNATIVES[a,b]

Impact	Proposed Project	No Project	Status Quo	Reduced Scale	Mitigated	Off-Site
3.2.13: Transport, handling, and disposal of the proposed increased volume of designated wastes could result in increased emissions of various air pollutants.	S/M	NS (E)	NS (E)	NS (E)	NS (E)	NS (E)
3.2.14: Acceptance of a greater quantity of petroleum contaminated soil (meeting Regional Water Quality Control Board acceptance criteria) and use of this material as alternative daily cover could result in increased emissions of volatile organic compounds. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	S/M (L)	S/M (E)
CU-2: The project would incrementally add to cumulative air pollutant emissions. (Significant)	S/UN	NS (L0	NS (L)	S/UN (L)	S/UN (L)	S/UN(E)
Biological Resources						
3.3.1: Implementation of the proposed project would result in the loss of degraded California annual (non-native) grassland within the project boundaries, which is used by special-status raptors as foraging habitat. (Less than Significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	S/M (G) or S/UN (G)
3.3.2: Project activities may disturb habitat for special status plant species. (Significant)	S/M	NS (G)	NS (G)	S/M (L)	S/M (L)	S/M(G) or S/UN(G)

a Significance levels for the project and the alternatives reflect the levels of significance after all applicable mitigation measures are applied. (Measures identified for the project apply to the Reduced Scale, Mitigated, and Off-Site Alternatives, but not to the No Project and Status Quo Alternatives.)

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b This table presents a comparison of environmental impacts that were identified under the proposed project with each of the alternatives. Additional environmental impacts that would potentially occur under each of the alternatives are presented in the text discussion.

TABLE 5-1 (continued) [New to this EIR]
IMPACTS AND SIGNIFICANCE LEVELS OF THE PROJECT AND ALTERNATIVES[a,b]

Impact	Proposed Project	No Project	Status Quo	Reduced Scale	Mitigated	Off-Site
3.3.3: Project activities may disturb jurisdictional wetlands. (Significant)	S/M	NS (G)	NS (G)	S/M (L)	S/M (L)	UKN
3.3.4: Project activities may have a deleterious effect on special status bird and mammal species. (Significant)	S/M	NS (G)	NS (G)	S/M (L)	S/M (L)	S/M (G) or S/UN(G)
3.3.5: High noise levels from composting operations in the Oxbow area and in Field 1, and from landfill activities in Areas A and B may disturb California clapper rail nesting. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	S/M (L)	N/A
3.3.6: Project activities in the vicinity of the 18-acre storm water impoundment could affect California red-legged frogs or western pond turtle. (Significant)	S/M	NS (G)	NS (G)	S/M (E)	S/M (E)	N/A
3.3.7: Removal or remodeling of structures could result in the loss of individuals of special status bat species. (Significant)	S/M	NS (G)	NS (G)	S/M (E)	S/M (E)	N/A
3.3.8: The project could result in the loss of raptor foraging habitat. (Less than Significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	S/M (G) or S/UN (G)
3.3.9: The project could produce litter which may have deleterious effects on wildlife. (Less than Significant)	NS	NS (E)	NS (E)	NS (E)	NS (L)	UKN

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Impact	Proposed Project	No Project	Status Quo	Reduced Scale	Mitigated	Off-Site
3.3.10: The proposed expanded composting operation could become a means for transmission of the pathogen that causes Sudden Oak Death. (Less than Significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	NS (E)
Geology, Soils and Seismicity						
3.4.1: A seismic event on one of the active or potentially active Bay Area faults could generate seismic ground motion capable of causing failure of landfill slopes, displacement of perimeter levee slopes, damage to the LCRS, and/or damage to the proposed Area G liner. (Significant)	S/M	NS (L)	NS (L)	S/M (E)	S/M (L)	S/M (E or L)
3.4.2: Static forces acting on native materials underlying the landfill or on the refuse and cover materials could cause displacement of landfill slopes and the perimeter levee, damage to the LCRS, or differential settlement. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	S/M (L)	S/M (E or L)
3.4.3: Differential settlement of the refuse and the underlying Bay Mud, causing cracks in the levee or final cover and damage to the LCRS, could occur as additional refuse is placed on the landfill. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	S/M (L)	S/M (L)

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Impact	Proposed Project	No Project	Status Quo	Reduced Scale	Mitigated	Off-Site
3.4.4: Precipitation contacting the landfill cover and other unpaved areas of the landfill could generate storm water runoff with sufficient velocity to dislodge and transport soil and sediment, resulting in the formation of erosion features that could damage portions of the landfill. (Significant)	S/M	NS (E)	NS (E)	SM (E)	SM (E)	S/M (E)
3.4.5: The existing surface drainage system is ~~in~~adequate for a Class ~~II~~III landfill. (Less than Significant)	~~S/M~~NS	NS (E)	NS (E)	NS (E)	NS (E)	NS (E)
3.4.6: A five-foot separation does not exist between the base of the landfill and the underlying groundwater. (Significant)	S/M	NS (E)	NS (E)	S/M (E)	S/M (E)	NS (L)
3.4.7: If not properly designed, the proposed Leachate Collection and Recovery System (LCRS) could allow leachate to migrate off-site and potentially contaminate off-site groundwater and surface water. (Significant)	S/M	NS (L)	NS (L)	S/M (E)	S/M (E)	S/M (L)
3.4.8: The increased generation of leachate that would result from the project could surpass the capacity of the LCRS, resulting in the off-site release of leachate and the contamination of off-site groundwater. (Significant)	S/M	NS (L)	NS (L)	SM (L)	SM (L)	S/M (L)

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Impact	Proposed Project	No Project	Status Quo	Reduced Scale	Mitigated	Off-Site
3.4.9: Proposed modifications to the final cover design could adversely impact landfill stability or result in the degradation of groundwater or surface water quality. (Significant)	S/M	NS (E)	NS (E)	S/M (E)	S/M (E)	S/M (E)
3.4.10: The proposed increase in the acceptance rate for designated waste ~~use of Area G as a Class II landfill~~ could result in groundwater contamination from escaping ~~Class II~~ leachate and waste. (Significant)	S/M	NS (E)	NS (E)	S/M (E)	NS (E)	S/M (E)
3.4.11: The proposed management of the buried waste in the southwest corner could result in soil or groundwater contamination. (Significant)	S/M	NS (L)	NS (L)	S/M (E)	S/M (E)	S/M (E)
3.4.12: Due to the increase of load pressure by waste placement and the decrease of pore water velocity during Bay Mud consolidation, a leachate mound could be created that will create sufficient uplift pressure on the landfill to trigger slope failure. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	S/M (L)	N/A

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Impact	Proposed Project	No Project	Status Quo	Reduced Scale	Mitigated	Off-Site
3.4.13: Excess pore pressure resulting from infiltration of quench water for composting operations conducted on the permitted landfill area could cause slope instability. (Significant)	S/M	NS (L)	NS (L)	SM (L)	S/M (L)	SM (E)
Hydrology and Water Quality						
3.5.1: Displacement of landfill slopes, the perimeter levee, or damage to the LCRS due to static or dynamic forces could allow leachate or refuse to reach and potentially contaminate surrounding surface water bodies, block adjacent drainages, or allow surrounding floodwaters to flood the landfill. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	S/M (L)	S/M (E)
3.5.2: The off-site migration of landfill leachate could contaminate nearby surface waters. (Significant)	S/M	NS (L)	NS (L)	SM (E)	S/M (E)	S/M (L)
3.5.3: The proposal to no longer manage water that has contacted compost, co-compost, sludge, and materials proposed to be used as ADC, separately from non-contact water could degrade the water quality of the storm water impoundment and ultimately transport contaminants to off-site surface waters. (Significant)	S/M	NS (L)	NS (L)	S/M (E)	S/M (E)	S/M (E)

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Impact	Proposed Project	No Project	Status Quo	Reduced Scale	Mitigated	Off-Site
3.5.4: Insufficient capacity to contain contact-water runoff from new areas proposed to be used for composting and co-composting would result in the off-site release of contact water and the potential degradation of nearby surface waters. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	S/M (L)	S/M (E)
3.5.5: The use of leachate as quench water could contaminate groundwater and surface water. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	S/M (L)	S/M (E)
3.5.6: Areas outside the 223-acre landfill footprint, including areas proposed for composting and co-composting operations and the relocated administration facilities, are within the 100-year flood plain. (Significant)	S/M	NS (L)	NS (L)	S/M (E)	S/M (E)	NS
3.5.7: If surface water drainage systems are not properly managed, storm water contacting the landfill surface could erode landfill cover materials and cause the sedimentation of onsite drainage systems, and potentially, the sedimentation and/or contamination of off-site receiving surface waters. (Significant)	S/M	NS (L)	NS (L)	S/M (E)	S/M (E)	S/M(E)

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Impact	Proposed Project	No Project	Status Quo	Reduced Scale	Mitigated	Off-Site
3.5.8: Construction activities, including grading and related activities at the proposed composting areas could increase soil erosion and result in the transport of sediments and other contaminants to off-site surface waters. (Significant)	S/M	NS (L)	NS/SM (L)	S/M (L)	S/M (L)	S/M (E)
3.5.9: The existing drainage system ~~may~~would be ~~in~~sufficient to accommodate the 1~~,~~00~~0~~-year, 24-hour precipitation event required of Class III landfills~~, as Area G is proposed to be classified~~. (Less than Significant)	NS	NS (E)	NS (E)	NS (E)	NS (E)	NS (E)
3.5.10: The proposed use of various alternative daily cover (ADC) materials could have an adverse impact on water quality. (Significant)	S/M	NS (L)	NS(E)	S/M (E)	S/M (E)	S/M (E)
Land Use						
3.6.1: Implementation of the proposed project would intensify landfill operations in the project area, which could result in land use conflicts with adjacent land uses. (Less than Significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	S/M (G) or S/UN (G)

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Impact	Proposed Project	No Project	Status Quo	Reduced Scale	Mitigated	Off-Site
3.6.2: Development of the proposed project could result in conflicts with operations at Gnoss Field. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	S/M (L)	NS (L)
3.6.3: Implementation of the proposed project could result in conflicts with agricultural uses. (Less than Significant)	NS	NS (E)	NS (E)	NS (E)	NS (E)	S/M (G) or S/UN (G)
3.6.4: The project would conflict with Goals 1, 6, and 9 of the Source Reduction and Recycling Element of the Integrated Waste Management Plan for Marin County and its Cities. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	NS (L)	S/M (E)
3.6.5: The project would conflict with Summary Plan Goal 12, which is to insure that all residents of Marin County have access to a program that safely and effectively manages household hazardous waste, and Summary Plan Policy 14, to develop an effective program for managing household hazardous waste generated in the county. (Significant)	S/M	NS (E)	NS (E)	S/M (E)	S/M (E)	S/M (E)
3.6.6: The project could conflict with Siting Element Exclusionary Criterion E6. (Less than Significant)	NS	NS (E)	NS (E)	NS (E)	NS (L)	NS (L)

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3.6.7: The project would increase the rate of fill of the landfill, which could result in a conflict with Summary Plan Goal 13 and Siting Element Goal 1, which require the County to assure 15 years of disposal capacity. (Less than Significant)	NS	NS (G)	NS (G)	NS (L)	NS (L)	NS (E)
Noise						
3.7.1: Noise from increased levels of landfill operational activities and for construction at the landfill could increase ambient noise levels for the closest sensitive land uses. (Less than Significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	S/M (G) or S/UN (G)
3.7.2: Noise from increased levels of landfill operational activities and for construction at the landfill could increase ambient noise levels for less sensitive land uses. (Less than significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	S/M (G) or S/UN (G)
3.7.3: Use of equipment for composting operations in the Oxbow area and other areas proposed for composting operations could cause an increase in the ambient noise level for adjacent land uses. (Significant)	NS	NS (L)	NS (L)	S/M (L)	S/M (L)	N/A

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Impact	Proposed Project	No Project	Status Quo	Reduced Scale	Mitigated	Off-Site
3.7.4: Noise from increased levels of landfill traffic could increase ambient noise levels for nearby land uses. (Less than Significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	S/M (G) or S/UN (G)
Public Health and Safety						
3.8.1: Receipt of designated wastes, in particular, spill or upset conditions resulting from the receipt and handling of designated wastes, could expose site workers or the general public to unacceptable contaminant levels. (Significant)	S/M	NS (E)	NS (E)	S/M (E)	NS (E)	S/M (E)
3.8.2: Expanding the composting operations could increase the health threat to workers from exposure to Aspergillus fumigatus and endotoxins. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	S/M (E)	S/M (E)
3.8.3: The proposed changes to the management of water that has contacted sludge and composting and co-composting materials could degrade water quality and impact public health. (Significant)	S/M	NS (L)	NS (L)	S/M (E)	S/M (E)	S/M (E)

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Impact	Proposed Project	No Project	Status Quo	Reduced Scale	Mitigated	Off-Site
3.8.4: Landfill gas migrating from the 11.5-acre waste unit in the southwest corner of the site could become trapped beneath the nearby relocated administration building and accumulate to explosive levels. (Significant)	S/M	NS (L)	NS (L)	S/M (E)	S/M (E)	S/M (E)
3.8.5: Increased refuse and composting throughput could result in increases in gulls and other scavenging birds at the site, thus increasing the risk of bird strikes for aircraft approaching or departing from the nearby County airport, Gnoss Field. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	S/M (L)	NS (L) or S/M (L)
3.8.6: The proposed increase in landfilled material will result in an increase in the size of the working face, potentially causing an increase in the occurrence of vectors at the landfill. (Less than significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	NS (E)
Public Services, Utilities, and Energy						
3.9.1: The proposed increase in composting throughput could increase the risk of fire occurring at the composting facility. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	S/M (L)	S/M(G)

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Impact	Proposed Project	No Project	Status Quo	Reduced Scale	Mitigated	Off-Site
3.9.2: The proposed increase in composting operations could place burdensome demands on public water supplies, exceeding available capacity, especially during periods of drought. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	S/M (L)	S/M (G) or S/UN (G)
3.9.3: On-site activities, primarily the increased use of landfill equipment and vehicles, would increase energy consumption. (Significant)	S/M	NS (L)	NS (L)	S/M (L)	S/M (L)	S/M (E)
Transportation and Traffic						
3.10.1: Traffic generated by the project would affect traffic levels of service on the Highway 101 mainline in the project area. (Less than Significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	NS (E)
3.10.2: Traffic generated by the project would affect traffic levels of service at the Highway 101 / Sanitary Landfill Road intersection. (Less than Significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	N/A
3.10.3: Traffic generated by the project would affect traffic levels of service at the Highway 101 ramp junction areas of the interim access road. (Less than Significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	N/A

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Impact	Proposed Project	No Project	Status Quo	Reduced Scale	Mitigated	Off-Site
CU-3: The project would contribute to cumulative increases in traffic on roadway facilities in the project area in 2020. (Less than Significant)	NS	NS (L)	NS (L)	NS (L)	NS (L)	NS

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b This table presents a comparison of environmental impacts that were identified under the proposed project with each of the alternatives. Additional environmental impacts that would potentially occur under each of the alternatives are presented in the text discussion.

Biological Resources

~~The project has the potential for several significant impacts to biological resources beyond those of t~~The No Project Alternative. would not increase site activities that could disturb nearby animal species and no new areas would be developed that could disturb plant or animal species or habitat. ~~These include~~Project impacts associated with increased activities in the Oxbow area would not occur. However, the mitigation measures specified in the impact analysis would mitigate not only project-related impacts, but also (incidentally) those associated with on-going landfill activities. Since the effects of these activities would not be mitigated under the No Project Alternative, this alternative has a greater potential for impacts to biological resources than the project, as long as the mitigation measures identified in the analysis are implemented.

Geology, Soils, and Seismicity

Potential geologic and groundwater impacts of the project are greater than those of this alternative, including proposed steeper slopes, greater landfill mass, revised fill sequencing and increased filling rate, and stability impacts related to Bay Mud strength; however, all geology and groundwater impacts of the project can be mitigated to a less-than-significant level. Therefore, the severity of geologic and groundwater impacts for the project and this alternative are about the same.

Hydrology and Water Quality

Potential hydrology and water quality impacts of the project are greater than those of this alternative, including use of leachate as compost quench water and conveyance of contact water to the storm water pond; however, all hydrology and water quality impacts of the project can be mitigated to a less-than-significant level. Therefore, the severity of hydrology and water quality impacts for the project and this alternative are about the same.

Land Use and Planning

As suggested in the FEIR Land Use and Planning section~~,~~ and demonstrated in FEIR Master Response 21~~Appendix A~~, the landfill under the no project scenario could reach capacity ~~as early as~~in the year ~~2016~~2024. This is ~~less~~more than Marin County's 15-year capacity standard and thus is consistent with the County planning goal of providing for at least 15 years of landfill capacity. Because this alternative provides fewer years of landfill capacity than does the project, the impact is ~~This would result in an impact~~ less favorable (greater) than the project. This alternative does not advance the County Summary Plan Goal 12 or Policy 14 of developing adequate household hazardous waste programs for county residents. However, battery and motor oil drop off is provided, and because this alternative does not involve the development of *any* new waste management programs, options, or disposal capacity while excluding HHW programs, the impact with respect to these goals and policies is considered insignificant.

Noise

Certain aspects of the project, including composting operations in the Oxbow area, have the potential to create significant noise impacts that would not be associated with the No Project Alternative. However, all noise impacts of the project can be mitigated to a less-than-significant level. Therefore, the severity of noise impacts for the project (after mitigation) and this alternative are about the same.

Public Health and Safety

Hazardous waste and worker safety impacts would be about the same as with the proposed project. The health risks associated with fugitive emissions would be less than those for the project.

Public Services, Utilities, and Energy

Increased risk of fire and increased use of water associated with an expansion of composting operations under the project pose greater potential for impacts than would be associated with the No Project Alternative. However, these project impacts can be mitigated to a less-than-significant level, and are therefore, ultimately, neither more nor less severe than for the No Project Alternative.

Transportation and Traffic

Because the No Project Alternative assumes that the access bridge will be built at the junction of the landfill access road and U.S. 101, the traffic and circulation impacts of this alternative would be about the same as with the Project. However, this alternative would result in incrementally less traffic on regional roadways.

Cultural Resources

Neither this alternative nor the project is expected to have an impact on cultural resources.

Mineral Resources

Neither the project nor the No Project Alternative is expected to have significant impacts on mineral resources.

Population and Housing

There are no population and housing impacts of the project, or of this alternative.

Recreation

Neither this alternative nor the project is expected to have an impact on recreation.

ABILITY OF THE ALTERNATIVE TO MEET PROJECT OBJECTIVES

The No Project Alternative has the ability to meet partly some of the applicant's objectives for the project, based on the operational flexibility extant under the facility's existing permits. See Table 5-2.

5.2.2 STATUS QUO ALTERNATIVE

ALTERNATIVE DESCRIPTION

The Status Quo Alternative assumes that the Marin County Local Enforcement Agency would issue a new Solid Waste Facilities Permit to Redwood Landfill that would explicitly allow several operational changes that Redwood Landfill has implemented that vary from the existing permit. No other aspects of the proposed project would be approved. The differences between the Status Quo Alternative and the No Project Alternative include the following:

- The terms of the Stipulated Notice and Order would be incorporated into the new permit, allowing an additional 32 vehicles (64 vehicle trips) per day.
- Additional materials that have received interim approval for use as ADC would be designated in the permit for this use.~~;~~
- The revised design of the LCRS would be included in the new permit.
- Daily sludge receipts would be limited to the rate received in recent years of 150 TPD (per RLI's October 13, 2003 DSEIR comment letter [Letter K, page 7]). Sludge would be processed as co-compost consistent with the existing registration permit or mixed with green waste for use as ADC consistent with current approval. The LEA could specify in the permit a timeline by which the 34-acre sludge impoundment would be emptied.

As with the No Project Alternative, the Status Quo Alternative would involve no increase in daily receipt of wastes, no increase in the permitted capacity of the landfill (or change in the landfill's final grades), there would be no change to the design of the landfill's final cover, and there would be no expansion of the compost facility. Area G would ~~eventually~~ be developed as a Class III cell ~~(not Class II as proposed)~~ consistent with the ~~after~~ RWQCB's recent approval~~es~~ of the final liner design~~, which must be consistent with current regulatory requirements~~. The buried waste in the 11.5-acre outside the landfill footprint would be excavated and deposited within the permitted landfill as planned prior to the 1994 EIR. This alternative further assumes that the access bridge at the intersection of U.S. 101 and the landfill access road would be built.

ENVIRONMENTAL IMPACTS

Aesthetics

There are no significant aesthetic impacts of the project. The Status Quo Alternative would have less of an aesthetic impact than the project.

TABLE 5-2
ABILITY OF ALRTERNATIVES TO SATISFY PROJECT OBJECTIVES

Project Objective	No Project Alternative	Status Quo Alternative	Reduced Scale Alternative	Mitigated Alternative	Off-Site Alternative	Project
1. To respond to changing physical conditions, changes in regulations, increases in recycling efforts, and necessary responsiveness to changes in waste markets.	Partly; existing landfill has some operational flexibility	Partly; existing landfill has some operational flexibility	Yes	Yes	Yes	Yes
2. To allow for processing and reuse of sludge by existing approved or conditionally approved alternative methods, and reducing the amount of sludge received.	Partly	Yes	Yes	Yes	Maybe	Yes
3. To stabilize overall site revenue, in turn helping to stabilize in-county waste disposal fees, by phasing in increased permitted receipts of non-hazardous solid waste to offset revenue reductions from planned reductions in sludge receipts.	No	No	Partly		No (expense of developing new site)	Yes
4. To allow for acceptance of types and quantities of waste (produced within the County and the region) not currently acceptable at the Class III landfill, by constructing Area G as a Class II waste management unit.	No	No	Yes	No	Maybe	Yes
5. To respond to new geotechnical information that has been gathered since 1992 and used to refine and develop new site slope stability analyses and a new fill sequencing plan.	No	No	Partly	Partly	No	Yes

SOURCE: Environmental Science Associates

Air Quality

The Status Quo Alternative would have lesser air quality impacts than the project, due to the lower traffic volume, less intensive site operations, and more restricted range of materials accepted.

Biological Resources

The project has the potential for several significant impacts to biological resources beyond those of the Status Quo Alternative. These include impacts associated with increased activities in the Oxbow area. However, the mitigation measures specified in the impact analysis would mitigate not only project-related impacts, but also (incidentally) those associated with on-going landfill activities. Since the effects of these activities would not be mitigated under the Status Quo Alternative, this alternative has a greater potential for impacts to biological resources than the project, as long as the mitigation measures identified in the analysis are implemented.

Geology, Soils, and Seismicity

Potential impacts of the project associated with the revised fill sequencing plan would be avoided with this alternative. However, the impact analysis indicates that all geological impacts of the project can be mitigated to a less-than-significant level.

Hydrology and Water Quality

Potential hydrology and water quality impacts of the project are greater than those of this alternative, including use of leachate as compost quench water and conveyance of contact water to the storm water pond; however, all hydrology and water quality impacts of the project can be mitigated to a less-than-significant level. Therefore, the severity of hydrology and water quality impacts for the project and this alternative are about the same.

Land Use and Planning

As suggested in the Land Use and Planning section, and demonstrated in Appendix A, the landfill under the no project scenario could reach capacity as early as the year 2016. This would hold true for the Status Quo Alternative as well. This is less than Marin County’s 15-year capacity standard. This would result in an impact greater than the project.

Noise

Certain aspects of the project, including composting operations in the Oxbow area, have the potential to create significant noise impacts that would not be associated with the Status Quo Alternative. However, all noise impacts of the project can be mitigated to a less-than-significant level. Therefore, the severity of noise impacts for the project (after mitigation) and this alternative are about the same.

Public Health and Safety

Hazardous waste and worker safety impacts would be about the same as with the proposed project. The health risks associated with fugitive emissions would be less than those for the project.

Public Services, Utilities, and Energy

Increased risk of fire and increased use of water associated with an expansion of composting operations under the project pose greater potential for impacts than would be associated with the Status Quo Alternative. However, these project impacts can be mitigated to a less-than-significant level, and are therefore, ultimately, neither more nor less severe than for the Status Quo Alternative.

Transportation and Traffic

Because the Status Quo Alternative assumes that the access bridge will be built at the junction of the landfill access road and U.S. 101, the traffic and circulation impacts of this alternative would be about the same as with the project. However, this alternative would result in incrementally less traffic on regional roadways than would the project.

Cultural Resources

Neither this alternative nor the project is expected to have an impact on cultural resources.

Mineral Resources

Neither the project nor the Status Quo Alternative is expected to have significant impacts on mineral resources.

Population and Housing

There are no population and housing impacts of the project, nor of this alternative.

Recreation

Neither this alternative nor the project is expected to have an impact on recreation.

ABILITY OF THE ALTERNATIVE TO MEET PROJECT OBJECTIVES

The Status Quo Alternative has the ability to partly meet some of the applicant's objectives for the project, based on the operational flexibility extant under the facility's existing permits, and the incorporation of certain provisionally approved operations into a new permit. See Table 5-2.

5.2.3 REDUCED SCALE ALTERNATIVE

ALTERNATIVE DESCRIPTION

The Reduced Scale Alternative differs from both the existing permit conditions and the proposed project in several ways:

- The total maximum daily receipt of waste would be less than the proposed project, but greater than currently permitted;
- The maximum daily number of vehicles entering the site would also be less than the proposed project, but greater than the currently permitted traffic volume;
- The capacity of the landfill would be increased from the currently permitted volume of approximately 19.1 million cubic yards, but the increase would be less than the proposed project (about half of what is proposed – about 25 million cubic yards, versus the project's 34.1 million cubic yards). Consequently the side slopes of the finished landfill need not be as steep as the proposed project, but steeper than currently permitted;
- The increase in the capacity of the composting facility would be less than proposed, but greater than the current capacity.
- The proposed increase in designated waste would be less than the proposed project but greater than currently permitted. As with the proposed project (as revised) the types of designated waste proposed to be received at the landfill would be the same as currently permitted by the facility's SWFP and WDRs and would meet waste acceptance criteria specified in the current WDRs. The disposal of designated waste would not be limited to Area G –which would be developed as a Class III~~II~~ waste unit –but would be accepted for disposal at any cell within the landfill that was accepting waste. ~~as proposed for the project, with all mitigations proposed by the applicant and identified in the EIR~~.

ENVIRONMENTAL IMPACTS

Aesthetics

There are no significant aesthetic impacts of the project. The Reduced Scale Alternative would have a slightly lesser aesthetic impact than the project.

Air Quality

The Reduced Scale Alternative would have lesser air quality impacts than the project, due to the lower traffic volume and less intensive site operations.

Biological Resources

The Reduced Scale Alternative has less potential for impacts to biological resources than the proposed project, due to lower levels of composting and landfilling activities. The mitigation measures specified in the impact analysis would also be required for this alternative to ensure that impacts are not significant.

Geology, Soils, and Seismicity

This alternative, because of the reduced mass and rate of loading of the landfill, would have less severe impacts on geology than the proposed project. The reduced waste acceptance rate would allow for a smaller working face and incrementally lower potential for leachate production resulting from infiltration at the working face. However, all project impacts on geology and groundwater can be adequately mitigated. Therefore, the severity of geology and groundwater impacts of this alternative compared with the mitigated project ~~and this alternative~~ are ~~about the same~~similar, though incrementally less than those of the project.

Hydrology and Water Quality

Because of the reduced scale of composting and landfilling operations associated with this alternative, it would have less severe hydrology and water quality impacts than would the proposed project. However, all project impacts on hydrology and water quality can be mitigated to a less-than-significant level. Therefore, the severity of hydrology and water quality impacts of the mitigated project and this alternative are about the same.

Land Use and Planning

The Reduced Scale Alternative would have slightly less severe effects on Land Use and Planning than the project. Neither this alternative nor the project would result in a significant unavoidable Land Use and Planning impact.

Noise

The Reduced Scale Alternative, because of the lower level composting and landfilling operations, and the lesser traffic volumes, would have less potential for significant noise impacts than the proposed project. However, the mitigation measures specified in the impact analysis would also be required for this alternative to ensure that impacts are not significant.

Public Health and Safety

Hazardous waste and worker safety impacts would be about the same as with the proposed project. The health risks associated with fugitive emissions would be less than those for the project.

Public Services, Utilities, and Energy

The Reduced Scale Alternative would involve a modest expansion of the composting facility. There would be a slight increase in the risk of fire and a small increase in use of water. These impacts would likely be less than significant, and would be less severe than those associated with the proposed project.

Transportation and Traffic

Because the Reduced Scale Alternative assumes that the access bridge will be built at the junction of the landfill access road and U.S. 101, the traffic and circulation impacts of this alternative would be about the same as with the project. However, because of the lower level of waste acceptance than the proposed project, this alternative would result in incrementally less traffic on regional roadways.

Cultural Resources

Neither this alternative nor the project is expected to have an impact on cultural resources.

Mineral Resources

Neither the project nor the Reduced Scale Alternative is expected to have significant impacts on mineral resources.

Population and Housing

There are no population and housing impacts of the project, or of this alternative.

Recreation

Neither this alternative nor the project is expected to have an impact on recreation.

ABILITY OF THE ALTERNATIVE TO MEET PROJECT OBJECTIVES

The Reduced Scale Alternative would have the ability to meet or partly meet most of the applicant's objectives. See Table 5-2.

5.2.4 MITIGATED ALTERNATIVE

ALTERNATIVE DESCRIPTION

The Mitigated Alternative would include all mitigation measures included as part of the project by the applicant, all of the mitigation measures identified in the EIR, and in addition changes to the project that would reduce or eliminate those aspects of the project that have the greatest potential to harm the environment. These include the following:

- Area G would be developed as a Class III landfill cell, not Class II as proposed and the type of designated wastes and rate of acceptance of designated waste would be the same as currently permitted (20 TPD);

- The increase in the rate of waste acceptance, and acceptance of material for composting, would be reduced to a level that substantially reduces the ~~where~~ increase~~s~~ in vehicle, equipment, flare, vaporator, and composting emissions ~~would be below significance thresholds~~. The Mitigated Alternative would allow a modest increase in landfilled waste and composting material and a substantial increase in separated or commingled recyclable, resusable and compostable material (not including green waste or yard waste or clean or petroleum-contaminated soils). Landfilled MSW would increase from a peak of 1,290 to a peak and average acceptance rate of 1,390 TPD; average daily receipts of compostable yard waste, biosolids, and food waste would increase from an average of 126 TPD to 170 TPD (while the peak permitted quantities would decrease from 545 to 170 TPD); and the quantity of cover material would increase from an average of 424 TPD and peak of 455 TPD to 550 TPD, peak and average. The permitted level of recyclables other than green/yard/wood waste and soils would increase from 10 TPD to 400 TPD, peak and average ~~This level would be approximately 15 percent above the currently permitted rate~~.

- The capacity of the landfill would be increased from the currently permitted volume of approximately 19.1 million cubic yards, but the increase would be less than the proposed project (about half of what is proposed – about 25 million cubic yards, versus the project's 34.1 million cubic yards). Consequently the side slopes of the finished landfill need not be as steep as the proposed project, but steeper than currently permitted;

Redwood Landfill would shift its emphasis from waste disposal to material and energy recovery. Instead of placing emphasis on increasing waste disposal capacity, Redwood Landfill would develop processes and methods aimed at increasing diversion of materials from landfill, and increasing energy production at the site. This would result in several benefits, including preservation of landfill capacity for Marin County wastes; increasing diversion and reducing landfilling of wastes in this environmentally sensitive location; reducing the need for certain project mitigation measures described in the analysis; providing justification for Overriding Considerations for significant unavoidable impacts of the project; helping to counterbalance or avoid altogether the significant unavoidable effects of the proposed project; maximizing consistency with County Integrated Waste Management Plan policies and County energy policies; and providing long-term protection of the environment in accordance with California Public Resources Code (PRC) § 44012[1]. These measures would include the following:

- Instituting a County ordinance to impose a mitigation fee on wastes from other areas of California outside Marin County, and to encourage recycling or composting of materials, rather than landfilling. Mitigation fees would be used to offset the environmental effects of the project, including more rapid consumption of landfill capacity, by funding programs to divert more waste from landfill; and to develop new landfill capacity. The mitigation fees could also be used to mitigate other project impacts, including the project's significant, unavoidable air quality impacts;

- Instituting a construction and demolition debris recycling system;

- Instituting a self-haul waste sorting and recovery operation;

- Establishing a salvage and re-use area for diversion of usable building materials, appliances, and miscellaneous effects;

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1 PRC § 44012 states that "When issuing or revising any solid waste facilities permit, the enforcement agency shall ensure that primary consideration is given to protecting public health and safety and preventing environmental damage, and that the long-term protection of the environment is the guiding criterion…."

- Placing recycling bins in an accessible location so that self-haul customers can drop-off their recyclable and reusable items prior to approaching the scale house. This would provide an economic incentive for people to source separate and recycle their wastes instead of landfilling them;

- Establishing additional power generation facilities at the site, including wind and solar.

ENVIRONMENTAL IMPACTS

Aesthetics

Because of the smaller finished size of the landfill and the slower rate of fill, the Mitigated Alternative would have less of an aesthetic impact than the project. Additional elements of this alternative, including new recycling and energy generation installations, could have an aesthetic impact or could contribute to a cumulative aesthetic impact.

Air Quality

The primary design criterion for this alternative is avoidance of air quality impacts by scaling operations to a level where vehicle, equipment, composting pile, and landfill gas emissions would be less than significant. Therefore, this impact would have no or much less severe air quality impacts than the proposed project. Some recycling operations, such as construction and demolition debris recycling, could result in additional dust emissions requiring mitigation measures.

Biological Resources

Incorporation of all mitigation measures identified in the impact analysis, and lower levels of composting and landfilling operations, would result in less severe or avoided impacts to biological resources than those associated with the project. If windmills were installed at the site for electrical generation, there could be an impact on raptors and other birds who might be struck by the windmill blades.

Geology, Soils, and Seismicity

Incorporation of the mitigation measures identified in the impact analysis, and lower rates of fill and less total mass, would result in less severe or avoided impacts to geology, soils, and groundwater resources.

Hydrology and Water Quality

Incorporation of all mitigation measures identified in the impact analysis, and lower levels of composting and landfilling operations, would result in less severe or avoided impacts to hydrology and water quality.

Land Use and Planning

The Mitigated Alternative would be more consistent with County policies regarding diversion and energy conservation than the project.

Noise

The Mitigated Alternative, because of the lower level composting and landfilling operations, and the lesser traffic volumes; and the incorporation of the mitigation measures specified in the impact analysis, would have less potential for significant noise impacts than the proposed project. Some recycling activities, such as construction and demolition debris recycling, might have noise impacts that would require mitigation.

Public Health and Safety

Hazardous waste and worker safety impacts would be about the same as with the proposed project. The health risks associated with fugitive emissions would be less than those for the project.

Public Services, Utilities, and Energy

The Mitigated Alternative would involve a more modest expansion of the composting facility. There would be a slight increase in the risk of fire and a small increase in use of water. These impacts would likely be less than significant, and would be less severe than those associated with the proposed project. Use of the site for increased power generation from alternative energy sources would be a beneficial impact.

Transportation and Traffic

This alternative would result in less traffic on local roadways than the proposed project. In addition, this alternative assumes that the access bridge will be built at the junction of the landfill access road and U.S. 101. Therefore, the traffic and circulation impacts of this alternative would be less than with the project.

Cultural Resources

Neither this alternative nor the project is expected to have an impact on cultural resources.

Mineral Resources

Neither the project nor the Mitigated Alternative is expected to have significant impacts on mineral resources.

Population and Housing

There are no population and housing impacts of the project, or of this alternative.

Recreation

Neither this alternative nor the project is expected to have an impact on recreation.

ABILITY OF THE ALTERNATIVE TO MEET PROJECT OBJECTIVES

The Mitigated Reduced Scale Alternative would have the ability to meet or partly meet most of the applicant's objectives. See Table 5-2.

5.2.5 OFF-SITE ALTERNATIVE

ALTERNATIVE DESCRIPTION

The Off-Site Alternative generally evaluates the environmental impacts of another, unidentified landfill site meeting minimum siting criteria from the *1995 Siting Element for Marin County and its Cities* (see Section 3.6, Land Use and Planning). The analysis assumes that such a site would be located in a remote upland area zoned for agriculture, with close proximity to the U.S. 101 corridor, and without incompatible adjacent land uses. The analysis generally describes the types of environmental impacts that could be expected from developing and operating a landfill at such a site, and compares them to the project's impacts.

ENVIRONMENTAL IMPACTS

Aesthetics

It is likely that development of a new landfill in an area currently zoned for agriculture would result in significant and unavoidable impacts to views and the visual character of the land. The impacts related to specific views and vantage points in the vicinity of Redwood Landfill evaluated in the EIR (i.e., Impacts 3.1.1 - 3.1.4) would probably not specifically apply to a new landfill. However the new landfill could have adverse impacts on views from U.S. 101 and other major roads, and on other public views in its vicinity. Because this would be a new landfill the impact would be major rather than incremental and very likely would be significant and unmitigable. Nighttime operations would introduce a new source of light and glare and have an adverse impact on the rural character of the site. Landfill and compost facility operations would be a new source of litter in the area, resulting in significant adverse aesthetic impacts; although litter management mitigations identified for the project would be implemented for this alternative as well, the visual impact would likely be greater due to the relatively undeveloped character of any site that would be suitable for a new landfill. The landfill also would probably contribute to significant cumulative degradation of visual character in the site vicinity.

Air Quality

New cell development would likely have greater construction-related impacts than would the project. Because a new landfill would be sited in proximity to the U.S. 101 corridor, and because the new site would be required to comply with landfill gas emissions controls, fugitive dust control measures and other air quality mitigation measures, it is likely that the regional air quality impacts of the Off-Site Alternative would be about the same as with the proposed project for most pollutants. However, the Off-Site Alternative could result in localized air quality impacts, for example along local roads leading to the landfill and nuisance odors. In addition, any nearby sensitive receptors could be impacted by fugitive emissions of toxic air contaminants. The severity of such an impact would have to be evaluated based on site-specific conditions using a health risk assessment.

Biological Resources

It is likely that development of a new landfill in an area zoned for agriculture would result in significant impacts to biological resources, and that these impacts would be more severe than those associated with the proposed project. While the specific site has not been identified, because no existing landfill (with its associated activities) is located at the site, it is likely that this alternative would have greater impacts – which may or may not be mitigable depending on specific conditions at the site – on raptor foraging habitat, special status plant and animal species, and wildlife generally. Due to current siting critieria that would apply, a new landfill would not be located on baylands and therefore impacts on clapper rail probably would not apply; however the impacts of landfill activities and noise on other special status animal species could be equal to or greater than those of the project. Project-specific impacts on the RLI stormwater pond obviously would not apply to this alternative. However, comparably significant impacts would be likely to species (such as red legged frogs) that may be attracted to the stormwater and leachate impoundments that would be developed at the new site.

Geology, Soils, and Seismicity

The site for a new landfill would have to comply with the siting criteria for new landfills (see Section 3.4~~6~~), including location away from a known Holocene fault, outside of a 100-year flood plain, and with a minimum 5-foot separation from underlying groundwater. Project impacts that require mitigation due to the existing landfill's location on Bay Mud would be avoided. In addition, the new site would have to be fully lined, in accordance with current regulations for development of landfills. It is likely, therefore, that a new landfill would be sited and engineered to avoid geologic impacts, and would have less severe impacts of this kind than would the proposed project.

Hydrology and Water Quality

A new landfill would be required to comply with all applicable state and federal regulations regarding control, collection, and treatment of leachate, contact-water, and non-contact water. As noted above, under current siting criteria the landfill would not be located in the 100-year flood plain and would have a liner that met state and federal standards. It would be required, as a Class III landfill, to have drainage and precipitation control facilities designed to accommodate the 100-year 24-hour design storm as required by state regulations. However, development of a new landfill would likely alter the hydrology of the site, and could result in a significant impact.

Land Use and Planning

The Off-Site Alternative would involve development of a new landfill on land currently zoned for agriculture. While landfills are an acceptable use in areas zoned agricultural, development of a landfill in an area currently used for agriculture, or adjacent to such lands, would likely cause land use incompatibilities, and would likely conflict with several policies in the Agriculture Element of the Countywide Plan (see Section 3.6). This would likely result in significant and unavoidable impacts. The landfill would be sited consistent with FAA, EPA and County policies and regulations, and therefore would located in an area that is more than 10,000 feet of a Gnoss Field runway and is otherwise consistent with airport proximity policies and regulations.

Noise

Any nearby sensitive receptors to the new landfill site or along the haul road to the landfill would likely be significantly and adversely impacted by the development of this alternative.

Public Health and Safety

Hazardous materials and worker safety issues would be about the same at a new, off-site landfill as with the proposed project. ~~However, nearby sensitive receptors could be impacted, especially by fugitive emissions of toxic air contaminants.~~ ~~The severity of such an impact would have to be evaluated based on site-specific conditions using a health risk assessment.~~

Public Services, Utilities, and Energy

The development of a new landfill at an off-site location could require provision of public services and utilities to an area not currently served with such, and could result in a significant increase in demand on such services locally. This could result in a significant impact.

Transportation and Traffic

Because a new landfill would be sited in proximity to the U.S. 101 corridor, it is likely that the regional traffic impacts of the Off-Site Alternative would be about the same as with the proposed project. However, the Off-Site Alternative could result in localized traffic impacts, for example along local roads and intersections leading to the landfill.

Cultural Resources

Development of a new landfill on relatively undisturbed ground or in an area formerly used for agriculture could result in disturbance or destruction of cultural or historic resources.

Mineral Resources

If mineral resources existed at the site of the new landfill, these could be impacted by development of the landfill.

Population and Housing

Development of a new landfill in a sparsely populated, agricultural part of the County would not be likely to have impacts on population and housing.

Recreation

Development of a new landfill in a relatively undeveloped rural area would change the character of the area, and could negatively impact nearby recreational uses.

ABILITY OF THE ALTERNATIVE TO MEET PROJECT OBJECTIVES

The Off-Site Alternative could meet or partially meet some of the applicant's objectives for the project. Please refer to Table 5-2.

5.3 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

Table 5-3 is based on the foregoing analysis. The table indicates that the No Project Alternative, the Status Quo Alternative, and the Mitigated Alternative all have the ability to avoid or reduce most or all significant unavoidable impacts associated with the project. As discussed in the analysis above, however, the No Project Alternative and the Status Quo Alternative would conflict with County policy to maintain a minimum of 15 years of landfill disposal capacity, and so would cause a new significant impact.

The Mitigated Alternative has been crafted not only to avoid the significant impacts associated with the project, but to better meet Marin County's integrated waste management and energy goals, objectives, and needs. The Mitigated Alternative would yield many positive environmental effects that the project would not. Because of the Mitigated Alternative's ability to avoid significant impacts of the project, to meet or at least partly meet the applicant's objectives (as shown in Table 5-2), and to produce several beneficial environmental effects, the Mitigated Alternative is considered the Environmentally Superior Alternative.

TABLE 5-3
ABILITY OF ALTERNATIVES TO REDUCE OR AVOID SIGNIFICANT UNAVOIDABLE IMPACTS OF THE PROJECT

IMPACT	Project	No Project Alternative	Status Quo Alternative	Reduced Scale Alternative	Mitigated Alternative	Off-Site Alternative
Impact 3.2-2: Equipment and truck operations associated with an increase in incoming materials at the landfill would generate additional criteria air pollutant emissions.	No	Yes	Yes	Partly	Yes	No
Impact 3.2.4: Landfill operations, including vehicle and equipment travel on unpaved surfaces, would generate fugitive dust.	No	Yes	Yes	Partly	Yes	No
Impact 3.2.5: The project would increase the amount of landfill gas generated and could exceed the capacity of the landfill gas collection and treatment system. In addition, emissions of air pollutants from the landfill gas treatment system, as well as fugitive landfill gas emissions, would increase.	No	Yes	Yes	Partly	Yes	No
Impact 3.2-11: The combined emissions from project operations would exceed BAAQMD significance criteria for ROG, NOx and PM-10.	No	Yes	Yes	Partly	Yes	No
Impact CU-2: The project would incrementally add to cumulative air pollutant emissions	No	Yes	Yes	Partly	Yes	No

KEY: No: Alternative does not have the ability to avoid this impact.
Yes: Alternative does have the ability to avoid this impact.
Partly: Alternative has the ability to reduce the severity of this impact, but not to less-than-significant level.

SOURCE: Environmental Science Associates