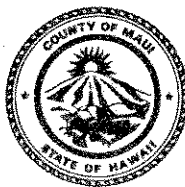


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Highways Division

Solid Waste Division

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
AND WASTE MANAGEMENT

200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

April 29, 1996

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DEPT. OF ENVIRONMENTAL QUALITY CONTROL

The Honorable Gary Gill, Director
Office of Environmental Quality Control
Central Pacific Plaza
220 South King Street, 4th Floor
Honolulu, Hawaii 96813

Dear Mr. Gill:

ACCEPTANCE NOTICE FOR THE
EXPANSION OF CENTRAL MAUI SANITARY LANDFILL PROJECT
FINAL ENVIRONMENTAL IMPACT STATEMENT

We are notifying you of our acceptance of the Final Environmental Impact Statement (EIS) for the Expansion of Central Maui Sanitary Landfill Project, as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes.

Pursuant to Section 11-200-23(e), Chapter 200, Title 11 ("Environmental Impact Statement Rules") of the Administrative Rules, this Acceptance Notice should be published in the May 23, 1996 OEQC Bulletin.

We have attached our Acceptance Report of the Final EIS for the Expansion of Central Maui Sanitary Landfill Project. Should you have any questions, please contact Elaine Baker of our staff at 243-7875.

Sincerely,

DAVID GOODE
Deputy Director of Public Works
and Waste Management

DG:mt
Attachment
cc: Masa Fujioka & Associates
Charles Jencks, Director of Public Works

5/9/96 - noted in file 5/23 TEN

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SANITARY LANDFILL PROJECT

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FINAL ENVIRONMENTAL IMPACT STATEMENT
FOR THE
EXPANSION OF CENTRAL MAUI SANITARY LANDFILL PROJECT

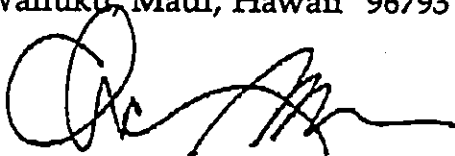
APRIL 1996

This Environmental Document is Submitted
Pursuant to Chapter 343, HRS

TAX MAP KEY: (2) 3-8-03:4

PROPOSING AGENCY:

Department of Public Works and Waste Management
Solid Waste Division
County of Maui
200 South High Street
Wailuku, Maui, Hawaii 96793



Charles Jencks
Director of Public Works and Waste Management

ACCEPTING AUTHORITY:

Department of Public Works and Waste Management
Solid Waste Division
County of Maui

PREPARED BY:

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TABLE OF CONTENTS

LIST OF TABLES, FIGURES AND APPENDICES.....	v
1.0 SUMMARY.....	1-1
2.0 DESCRIPTION OF THE PROPOSED ACTION.....	2-1
2.1 PROJECT OVERVIEW.....	2-1
2.2 PROJECT BACKGROUND.....	2-3
2.3 PROJECT DESCRIPTION.....	2-5
2.3.1 Landfill Site Characteristics.....	2-5
2.3.2 Landfill Life.....	2-6
2.3.3 Landfill Site Development Method.....	2-6
2.3.4 Proposed Landfill Facilities.....	2-9
2.3.5 Landfill Operation and Maintenance.....	2-19
2.3.6 Landfill Closure Plan.....	2-19
2.3.7 Landfill System Offsite Development.....	2-19
2.3.8 Utility Requirements.....	2-20
3.0 DESCRIPTION OF THE ENVIRONMENTAL SETTING.....	3-1
3.1 OVERVIEW.....	3-1
3.2 PHYSICAL ENVIRONMENT.....	3-1
3.2.1 General.....	3-1
3.2.2 Climate.....	3-1
3.2.3 Geology.....	3-3
3.2.4 Soils.....	3-6
3.2.5 Topography and Slopes.....	3-8
3.2.6 Flora and Fauna.....	3-10
3.2.7 Hydrology and Drainage.....	3-10
3.2.8 Groundwater Resources.....	3-11
3.2.9 Air Quality and Noise Levels.....	3-18
3.3 HUMAN ENVIRONMENT.....	3-19
3.3.1 Population and Economy.....	3-19
3.3.2 Existing Land Use.....	3-20
3.3.3 Recreation.....	3-21
3.3.4 Archaeological and Historic Sites.....	3-21
3.3.5 Infrastructure.....	3-22

TABLE OF CONTENTS (continued)

4.0	THE RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS, POLICIES AND CONTROLS FOR THE AFFECTED AREA.....	4-1
4.1	OVERVIEW	4-1
4.2	POLICY PLANS	4-1
4.2.1	Overview of Policy Plans	4-1
4.2.2	Hawaii State Plan.....	4-1
4.2.3	General Plan of the County of Maui.....	4-3
4.2.4	Wailuku-Kahului Community Plan.....	4-4
4.3	LAND USE REGULATIONS.....	4-6
4.3.1	Overview of Regulations.....	4-6
4.3.2	State Land Use District Regulations.....	4-6
4.4	OTHER PROGRAM CONTROLS.....	4-9
4.4.1	State Environmental Policy.....	4-9
4.4.2	Hawaii Administrative Rules.....	4-9
4.4.3	National Flood Insurance Program.....	4-11
4.4.4	State Underground Injection Control Program.....	4-11
4.4.5	Agricultural Lands of Importance to the State of Hawaii.....	4-12
4.4.6	Hawaii Coastal Zone Management Program and Special Management Area.....	4-12
4.4.7	National Pollutant Discharge Elimination System Permit.....	4-15
4.4.8	Solid Waste Management Control	4-15
5.0	SUMMARY OF PROBABLE IMPACTS OF THE PROPOSED ACTION...	5-1
5.1	OVERVIEW OF IMPACTS	5-1
5.2	PRIMARY IMPACTS	5-1
5.2.1	Primary Beneficial Impacts.....	5-1
5.2.2	Primary Adverse Impacts.....	5-2
5.3	SECONDARY IMPACTS.....	5-5
5.3.1	Secondary Beneficial Impacts.....	5-5
5.3.2	Secondary Adverse Impacts.....	5-6

TABLE OF CONTENTS (continued)

6.0	PROPOSED MITIGATION MEASURES TO PROBABLE AND UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS.....	6-1
6.1	OVERVIEW OF MITIGATION MEASURES.....	6-1
6.2	PRIMARY ADVERSE IMPACTS AND MITIGATION MEASURES.....	6-1
6.2.1	Leachate Production and Water Quality.....	6-1
6.2.2	Erosion.....	6-2
6.2.3	Flora and Fauna	6-2
6.2.4	Visual Impact.....	6-2
6.2.5	Air Quality and Noise.....	6-3
6.2.6	Litter.....	6-3
6.2.7	Economy	6-4
6.2.8	Archaeological and Historic Sites.....	6-4
6.3	SECONDARY ADVERSE IMPACTS AND MITIGATION MEASURES.....	6-5
6.3.1	Physical Environment.....	6-5
6.3.2	Scavenger Bird Migratory Patterns	6-5
6.3.3	Economy	6-5
6.3.4	Traffic.....	6-5
7.0	ALTERNATIVES TO THE PROPOSED ACTION.....	7-1
7.1	OVERVIEW OF ALTERNATIVES	7-1
7.2	NO-PROJECT ALTERNATIVE.....	7-1
7.3	ALTERNATE LOCATION FOR NEW LANDFILL	7-1
7.4	SOLID WASTE DISPOSAL BY INCINERATION.....	7-2
7.5	OTHER ALTERNATIVE DISPOSAL MEASURES.....	7-2
7.5.1	Overview of Alternative Disposal Measures	7-2
7.5.2	Shredding.....	7-2
7.5.3	Resource Recovery Methods.....	7-3
8.0	IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES.....	8-1
9.0	THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY.....	9-1

TABLE OF CONTENTS (continued)

10.0 OTHER INTERESTS AND CONSIDERATIONS OF GOVERNMENTAL POLICIES BELIEVED TO OFFSET THE ADVERSE ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION.....	10-1
11.0 SUMMARY OF UNRESOLVED ISSUES.....	11-1
12.0 LIST OF NECESSARY APPROVALS.....	12-1
12.1 STATE OF HAWAII.....	12-1
12.2 COUNTY OF MAUI.....	12-1
13.0 AGENCIES, ORGANIZATIONS AND INDIVIDUALS CONSULTED DURING PREPARATION OF THE ENVIRONMENTAL IMPACT STATEMENT.....	13-1
13.1 COUNTY OF MAUI AGENCIES.....	13-1
13.2 STATE OF HAWAII AGENCIES.....	13-1
13.3 FEDERAL AGENCIES.....	13-2
13.4 OTHER ORGANIZATIONS AND INDIVIDUALS.....	13-2
14.0 REFERENCES.....	14-1

LIST OF TABLES, FIGURES, AND APPENDICES

TABLES

TABLE 3-1 Land Study Bureau - Overall Productivity Ratings..... 3-9
TABLE 3-2 Wells Within Two (2) Miles of the Landfill..... 3-17

FIGURES

FIGURE 1-1 Site Location Map 1-3
FIGURE 2-1 Preliminary Site Map..... 2-2
FIGURE 2-2 Existing Sanitary Landfill Sites 2-4
FIGURE 2-3 Excavation Plan..... 2-7
FIGURE 2-4 Liner Construction Sequencing Plan..... 2-11
FIGURE 2-5 Final Fill Plan..... 2-13
FIGURE 2-6 Sections & Details 2-15

FIGURE 3-1 Mean Annual Rainfall 3-4
FIGURE 3-2 Wind Rose, Kahului Airport, Maui..... 3-5
FIGURE 3-3 Principal Groundwater Resource Areas 3-12
FIGURE 3-4 Aquifer Identification 3-13
FIGURE 3-5 Existing Wells & UIC Line Location..... 3-15

FIGURE 4-1 Maui General Plan Map 4-5
FIGURE 4-2 Wailuku-Kahului Community Plan..... 4-7
FIGURE 4-3 State Land Use Districts and Special Permit Designations..... 4-8
FIGURE 4-4 Agricultural Lands of Importance to the State of Hawaii..... 4-14

APPENDIX A

GROUNDWATER QUALITY DATA..... A-1

APPENDIX B

COMMENTS AND RESPONSES TO THE EIS PREPARATION NOTICE B-1

APPENDIX C

COMMENTS AND RESPONSES TO THE DRAFT EIS..... C-1

1.0 SUMMARY

The County of Maui has determined that the existing Central Maui Sanitary Landfill is reaching its capacity and, therefore, that an additional solid waste disposal site is needed. Instead of constructing a new landfill at a new location, the County has decided to expand the existing Central Maui Sanitary Landfill (see Figure 1-1). By implementing this expansion, a new landfill site will not have to be searched for and operation and maintenance of the Central Maui Landfill can simply continue onto the expansion following the closure of the original landfill.

The proposed project includes Phases IV, V and VI which are separated from the original landfill Phases I, II, and III by Kalialinui Gulch. Because the proposed new phases of the landfill are not a true lateral extension of the existing landfill boundaries, i.e., the existing landfill and proposed landfill are separated by the Gulch, the proposed landfill is not technically considered an expansion under 40 CFR §258. However, we have referred to it as an expansion in this document, since it is located adjacent to the existing landfill.

Phases IV and V are currently being used by a quarry operation and Phase VI is currently occupied by sugar cane but is scheduled for quarry operations in the future. This site is centrally located with respect to the major population centers of Maui, yet it is also in a rural, agricultural district. Expanding the landfill into areas where the quarry operation is completed eliminates the need for large-scale excavation, and stockpiled cover material may be available on site. This combination of a central yet rural location and compatible physical characteristics makes the site operationally and environmentally well-suited for the expansion of the existing Central Maui Landfill.

The proposed expansion is consistent with existing land-use plans, policies and controls for the affected area. It responds to the objectives and policies of the Hawaii State Plan, the General Plan of the County of Maui, and the Wailuku-Kahului Community Plan. A Special Use Permit will be completed to ensure that the landfill expansion is consistent with the State Land Use District regulations. The proposed expansion also complies with a variety of other program controls (see section 4 of this EIS for details). Permits and approvals will be obtained from the State of Hawaii Department of Health, the State Land Use Commission, and the County of Maui Department of Public Works & Waste Management (see sections 11 and 12).

The proposed project will have both beneficial and adverse environmental impacts. The primary beneficial impact will occur in the area of public services and facilities: a continuation of 1) a centrally located landfill site that will eliminate the difficulties of locating a new landfill site, and 2) the accommodation of the County's solid waste disposal needs, considering Phases IV, V and VI, through at least the year 2016 (Bryan A. Stirrat & Associates, 1994a).

The landfill will also protect the public health by providing a new, operating facility that will prevent the existing landfills from exceeding their design capacity.

The primary potential adverse impact is in the area of contamination of groundwater and surface water resources. Leachate is a product of the decomposition of solid waste and the percolation of rain and surface water through the layers of waste. Contaminated surface water or leachate from the landfill can have significant adverse effects on neighboring streams, irrigation ditches, and groundwater resources if allowed to escape offsite. The proposed expansion is located far from the nearest public water supply well and its design will include many mitigation measures to control leachate and surface water flows. These measures will minimize the possibility of groundwater contamination by providing control of the leachate produced by the landfill, both during the operation and after closure of the landfill. In addition, surface water flows will be routed around landfilled areas and into a sedimentation basin.

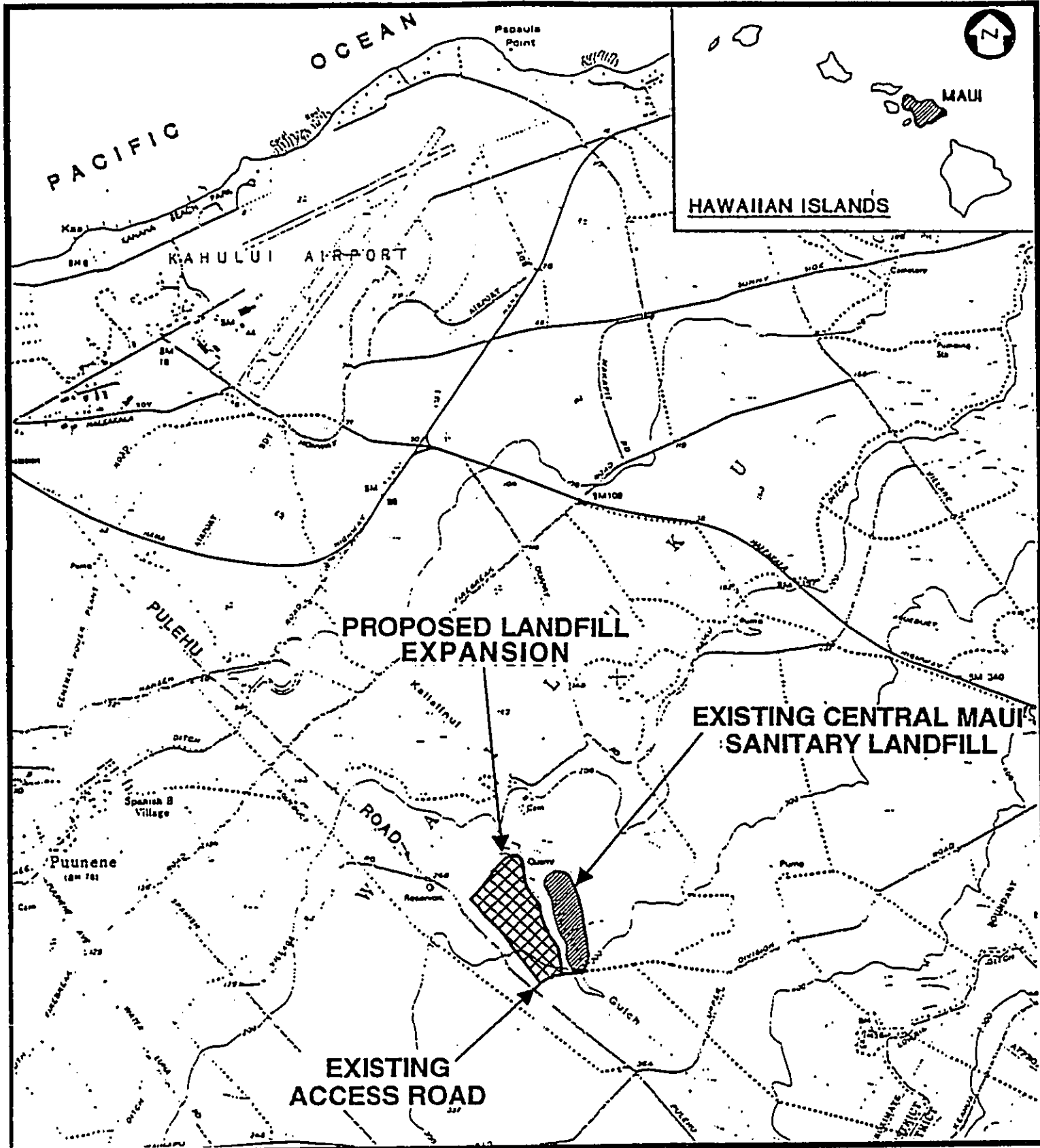
Windblown litter is another potential adverse impact which has been an issue at the existing landfill. Litter at the landfill expansion will be mitigated by a litter control program currently being developed. Additional information on the litter control program is included in this EIS.


Another concern is the impact of the proposed landfill expansion on the traffic in the vicinity. The access road into the current Central Maui Landfill will be used as the entrance into the proposed expansion. There will be a temporary increase in traffic due to the construction of the proposed expansion. However, since landfilling operations in the original Central Maui Landfill are planned to cease when the proposed expansion is ready to receive municipal waste, no additional traffic will be created by the operation of the proposed expansion.

Aesthetic impacts such as potential noise, odor, dust, and vector problems are being considered in the design of the expansion. Litter control and prevention programs and the incorporation of the proposed expansion into current recycling programs are discussed in greater detail in this EIS.

Alternatives to the proposed project include the no-project alternative, an alternate location for a new landfill, solid waste disposal by incineration, and other alternative disposal measures. Some forms of resource recovery will be carried out in conjunction with the proposed expansion. Section 7 of this EIS contains further detail about alternatives to the proposed project and resource recovery issues.

An overall assessment of the impacts indicates that the benefits significantly surpass the adverse impacts. The project will be both beneficial to the County and essential to Maui residents and businesses.



<p>0 3000 6000</p> <p>Scale In Feet</p>	<p>North</p> 	<p>Project No. 94128-001</p>	<p>Figure 1-1 Site Location Map Proposed Expansion of the Central Maui Landfill Puunene, Maui, Hawai'i</p>
		<p>Drawn By: LTI</p> <p>Approved By: JJK</p>	
<p>Base Maps: Final Environmental Impact Statement Central Maui Sanitary Landfill Project, March 1986 Prepared by: R.M. Towill Corporation Figures 2-1 & 2-2</p>		<p>Date: 6-27-95</p> <p>Scale: 1" = 3000'</p>	<p>MASA FUJIOKA & ASSOCIATES ENVIRONMENTAL • GEOTECHNICAL • HYDROGEOLOGICAL CONSULTANTS</p>

2.0 DESCRIPTION OF THE PROPOSED ACTION

2.1 PROJECT OVERVIEW

The proposed project is an expansion of the Central Maui Landfill in the County of Maui. This Environmental Impact Statement (EIS) addresses the design of Phase IV as a Subtitle "D" Landfill and the planning of Phases V and VI.

A Subtitle "D" landfill is defined according to the following criteria:

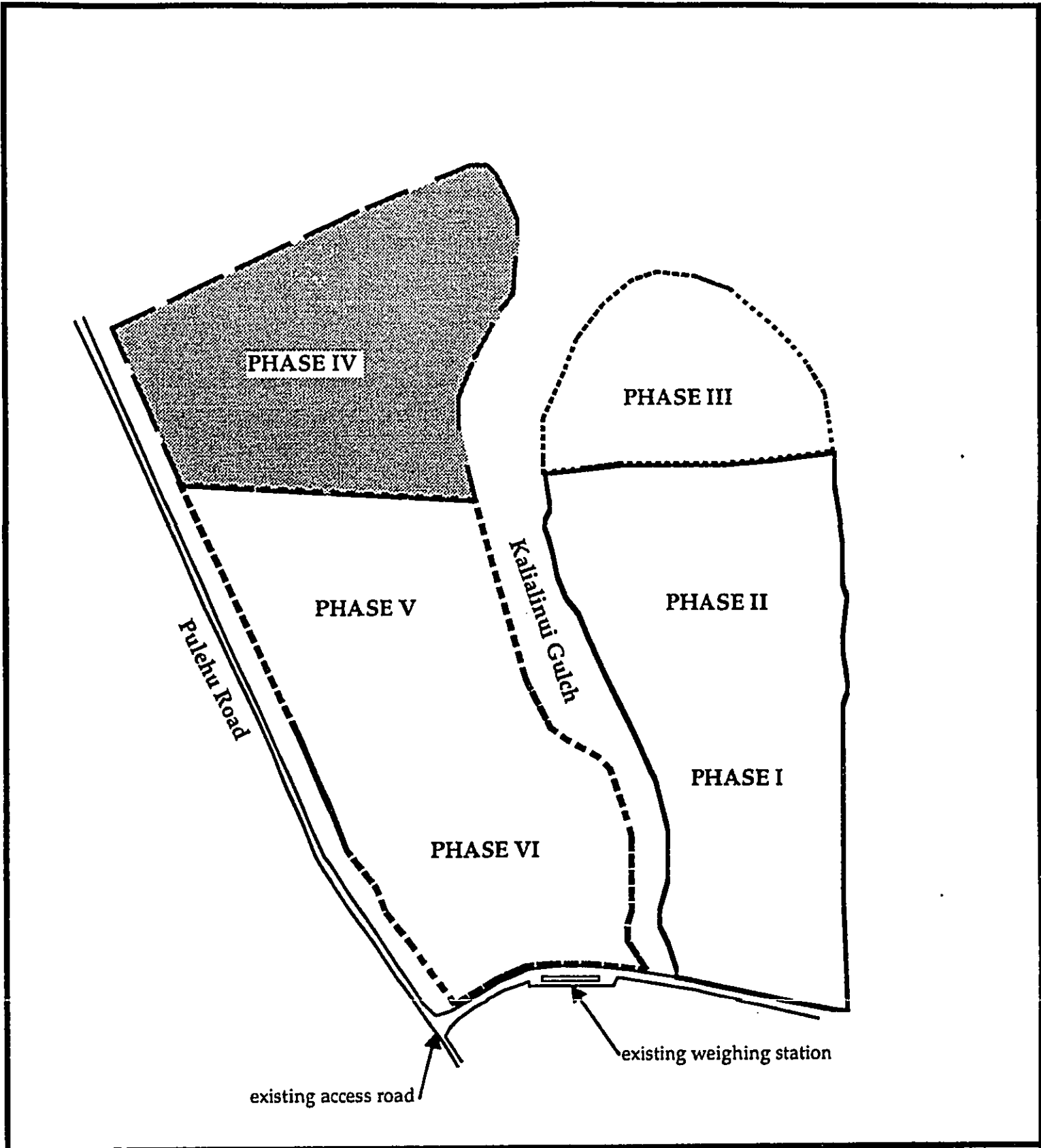
1. The design must ensure that the concentration values of EPA-designated chemical constituents will not be exceeded in the uppermost aquifer at the relevant point of compliance.
2. A composite liner, consisting of an upper component (a minimum 30-mil flexible membrane liner) and a lower component (at least a two-foot layer of compacted soil with the hydraulic conductivity of no more than 1×10^{-7} cm/sec) must be included in the landfill design.
3. A leachate collection system that is designed and constructed to maintain less than a 30-cm depth of leachate over the liner must be included in the landfill design (EPA, 1994).

A more detailed description can be found in 40 CFR §258.40 (EPA, 1994). The proposed new landfill will be designed to meet these criteria.

The project site is located on the northeastern slope of Haleakala on the Island of Maui. It is located approximately 12,000 to 14,000 feet southeast of Kahului Airport and is bordered by a quarry and rock crushing operation to the north, by the existing Central Maui Sanitary Landfill to the east beyond Kalialinui Gulch, and by sugar cane fields on the west and south sides. The sugar cane fields are owned by Alexander and Baldwin and cultivated by HC&S.

The proposed expansion is separated from the existing Phases I, II and III of the Central Maui Sanitary Landfill on the east by Kalialinui Gulch (see Figure 2-1). Because the proposed new phases of the landfill are not a true lateral extension of the existing landfill boundaries, i.e., the existing landfill and proposed landfill are separated by the Gulch, the proposed landfill is not technically considered an expansion under 40 CFR §258. However, we have referred to it as an expansion in this document, since it is located adjacent to the existing landfill.

The proposed project will utilize the present and future disturbed quarry sites as additions to the Central Maui Landfill. The long-range plan for the site is to leave the area as an open field following the closure of the landfill. The proposed Phase IV and V areas are currently being utilized for quarry and rock crushing operations and the proposed Phase VI area is currently being used for



<p>LEGEND</p> <p>———— existing operating phase</p> <p>..... existing composting area</p> <p>——— proposed landfill expansion</p> <p>- - - - - additional planned expansions</p> <p>Base Map: Bryan A. Stirrat & Associates, Inc. April 31, 1994</p>	<p>North</p>	<p>Project No. 94128-001</p>	<p>Figure 2-1 Preliminary Site Map Proposed Expansion of the Central Maui Landfill Puunene, Maui, Hawai'i</p>
		<p>Drawn By: LTI</p>	
		<p>Approved By: JJK</p>	
		<p>Date: 6-27-95</p>	
<p>Scale: 1" = 400'</p>		<p>M_FA MASA FUJIOKA & ASSOCIATES ENVIRONMENTAL • GEOTECHNICAL • HYDROGEOLOGICAL CONSULTANTS</p>	

sugar cane cultivation but will be used for quarry operations in the future. The proposed landfill will utilize the 40- to 50-foot cuts into the soil and rock resulting from the quarry operations at the site.

The Central Maui Landfill is centrally located with respect to the major urban areas of Maui. The site is also located in a rural district removed from major cities and towns. This combination of central yet rural location provides an ideal location to continue the operation of a major landfill facility.

2.2 PROJECT BACKGROUND

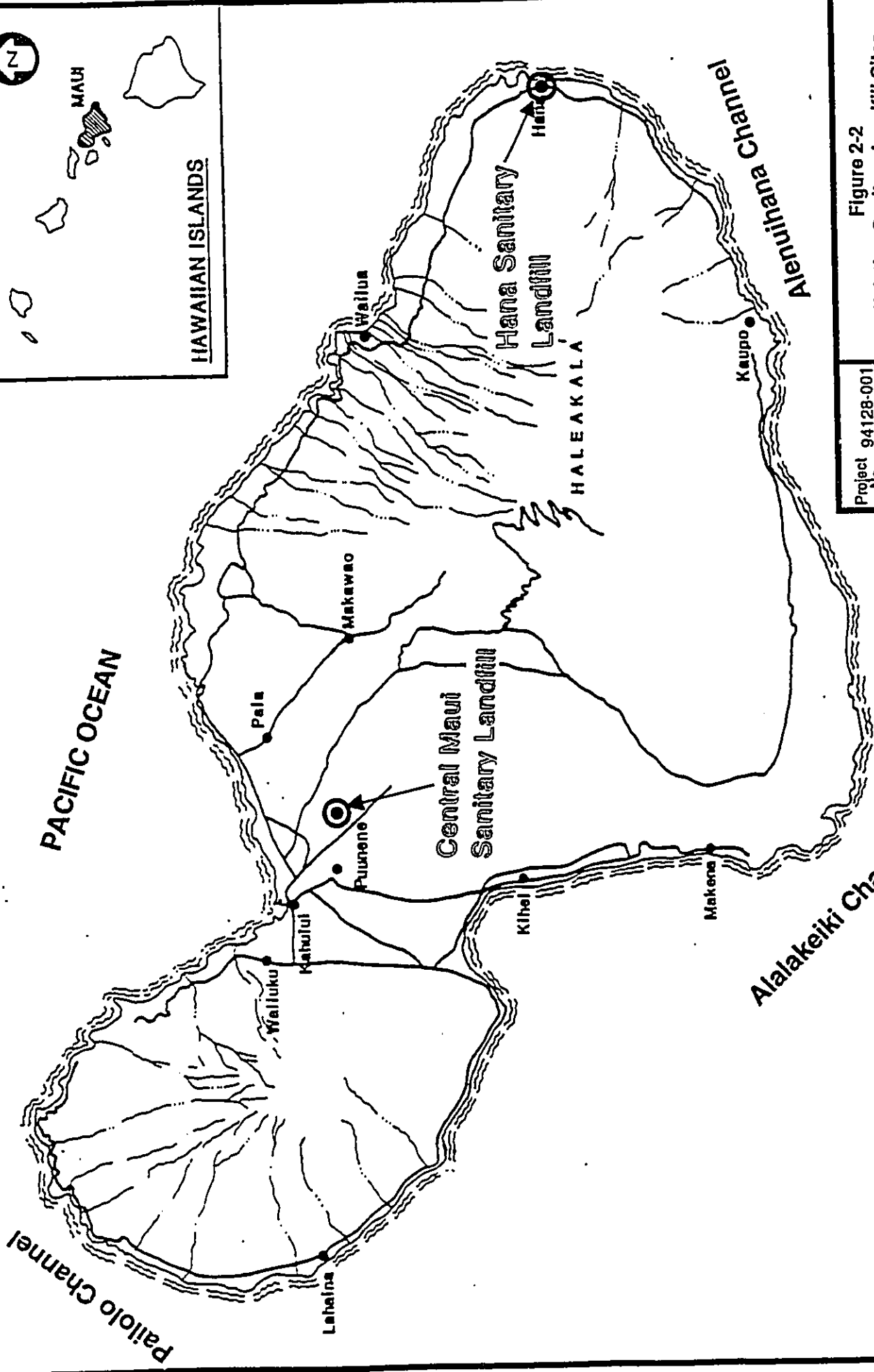
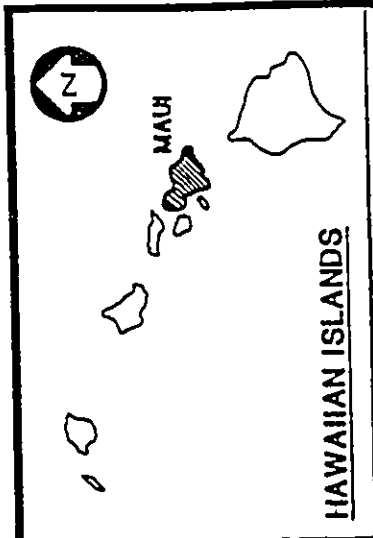
The County of Maui presently operates two sanitary landfill facilities on the island of Maui (Figure 2-2):

- Hana Landfill - Approximately 34 acres, established in 1969; and
- Central Maui Landfill - Approximately 55 acres, established in 1987.

The Hana Landfill has a very small service area compared to the Central Maui Landfill, which is currently handling 98% of the island's total refuse. The Hana Landfill is planned to still be in service when the proposed expansion of the Central Maui Landfill becomes operational.

Phases I and II of the Central Maui Landfill are projected to reach their design capacity as early as 1999 (Bryan A. Stirrat & Associates, 1994b). Since this landfill is handling most of the island's solid refuse, plans need to be made to either extend the life of the landfill or to build another landfill. The proposed expansion, Phases IV, V, and VI, is planned to extend the life of the landfill until at least 2016 (Bryan A. Stirrat & Associates, 1994b). Phase III is currently used for co-composting (bio-solids and greenwaste) activities. No landfilling activities in Phase III have begun and co-composting activities are planned to be continued in this phase.

The proposed project plan is similar to that utilized for the existing Central Maui Landfill. The proposed expansion will be constructed in the excavated areas of a current quarry operation to make use of the deeply excavated land. The expansion will eliminate the need to search for a new landfill site. Additionally, the Central Maui Landfill is in a central location yet is sufficiently isolated so as not to disrupt the residential and urban communities.



Base Map: Final Environmental Impact Statement
 Central Maui Sanitary Landfill Project, March 1986
 Prepared by: R.M. Towill Corporation
 Figure 2-2

Project No. 94128-001	Figure 2-2
Drawn By: LTI	Existing Sanitary Landfill Sites
Approved By: JJK	Proposed Expansion of the Central Maui Landfill
Date: 6-28-95	Puunene, Maui, Hawaii
Scale: As Noted	

MT MASA FUJIOKA & ASSOCIATES
 ENVIRONMENTAL • GEOTECHNICAL • HYDROLOGICAL CONSULTANTS

2.3 PROJECT DESCRIPTION

2.3.1 Landfill Site Characteristics

The proposed landfill expansion site consists of Phases IV and V, which is an active quarry operation producing rock material for use in local construction work, and Phase VI, which is currently sugar cane fields. Phase VI is planned to be used as quarry land in the future.

The quarry was originally established by the Navy Seabees in 1939. The landfill was subsequently acquired for private use, first by the Kahului Railroad Company, and then by HC&D, Ltd. in 1966. Ameron currently operates the quarry. The current landfill and quarry are completely surrounded by sugarcane fields. The quarry land as well as the surrounding fields are owned by Alexander and Baldwin, Inc.

Rock is currently being removed from Phases IV and V, located across Kalialinui Gulch northwest of the existing landfill. Quarry operations, including rock crushing, are located north and northeast of the existing landfill. A conveyer belt is currently used to carry rock from Phase IV to the rock crusher located northeast of Phase III. Much of the rock material is used as concrete aggregate or base course material for road construction.

Approximately 55 acres of the former quarry site is occupied by Phases I, II and III of the existing landfill. Phase III is currently used for co-composting (bio-solids and greenwaste) activities. No landfilling activities in Phase III have begun and co-composting activities are planned to be continued in this phase. Another 60 acres of quarry land will be occupied by the proposed landfill expansion, Phases IV, V and VI. The characteristics of the quarry, a large, excavated open area, make this site an ideal location for expansion of the existing landfill.

Additionally, stockpiled material from quarry operations may be available for purchase by the County as cover material for landfill operations. This onsite availability of cover material would minimize added costs and other potential impacts of transporting cover material to the landfill expansion site.

The proposed project is divided into three phases. Phase IV is currently under design and Phases V and VI are in the planning stage.

The proposed landfill expansion into Phase IV will operate as a Municipal Solid Waste Landfill (MSWLF) as defined by federal regulations 40 CFR §257 and §258 known as subtitle D and State of Hawaii Administrative Rules (HAR) Title 11 Department of Health Chapter 58.1 Section 11-58.1-03.

As a MSWLF it will begin operation immediately after required permits have been obtained and begin to receive refuse after the existing landfill Phases I and II reach their design capacities.

2.3.2 Landfill Life

The life of the proposed expansion was determined using the assumption that the entire volume of refuse generated on Maui will be delivered to the Central Maui Landfill (Bryan A. Stirrat & Associates, 1994a).

No change to existing operation characteristics in the Phase IV expansion area will occur nor will any new buildings be constructed or existing buildings be expanded at this time. The maximum anticipated quantity of waste to be received at the proposed landfill expansion will be 670 tons per day or 3,350 tons per week (Bryan A. Stirrat & Associates, 1994a). Six hundred seventy (670) tons per day was also the rate used in calculating the maximum capacity for the existing landfill Phases I and II (Bryan A. Stirrat & Associates, 1993).

The maximum finished grade of the proposed Phase IV will be 340 feet above mean sea level (MSL) roughly conforming to the proposed final grades of Phases I and II. Phases V and VI will be designed at a later date. Phase IV will have a capacity of approximately 2.2 million cubic yards and a life expectancy of approximately six years of life.

At the base of the quarry there is approximately 10 feet of soil and saprolite (basaltic rock which has nearly weathered to soil) overlying basaltic rock (Masa Fujioka & Associates, 1995a). Because of the shallow depth of this soil overburden, it is considered too expensive to excavate lower than 10 feet below existing grades into the basalt rock. However, following a more detailed geotechnical investigation, the exact depth depicted in the final designs may vary from the conceptual designs presented in this EIS.

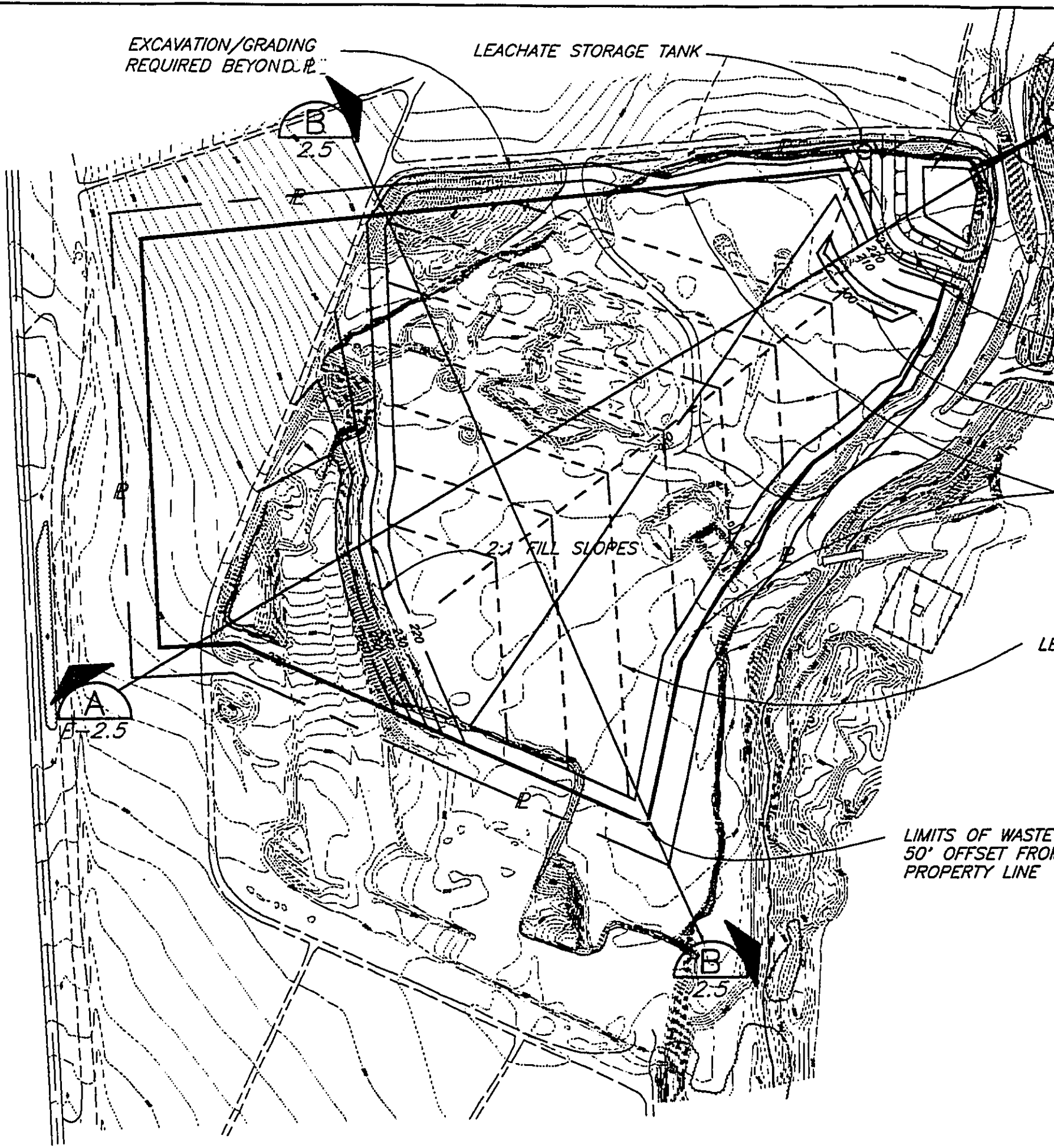
2.3.3 Landfill Site Development Method

In the past there were three sanitary landfill methods commonly used in the United States: (1) the trench method, (2) the area method, and (3) the ramp method. Since the adoption of 40 CFR, every landfill constructed in the United States after October 9, 1993, must have a bottom liner consisting of a layer of clay overlain by a layer of plastic. Therefore for this landfill, the area method will be the only filling method suitable for this type of liner.

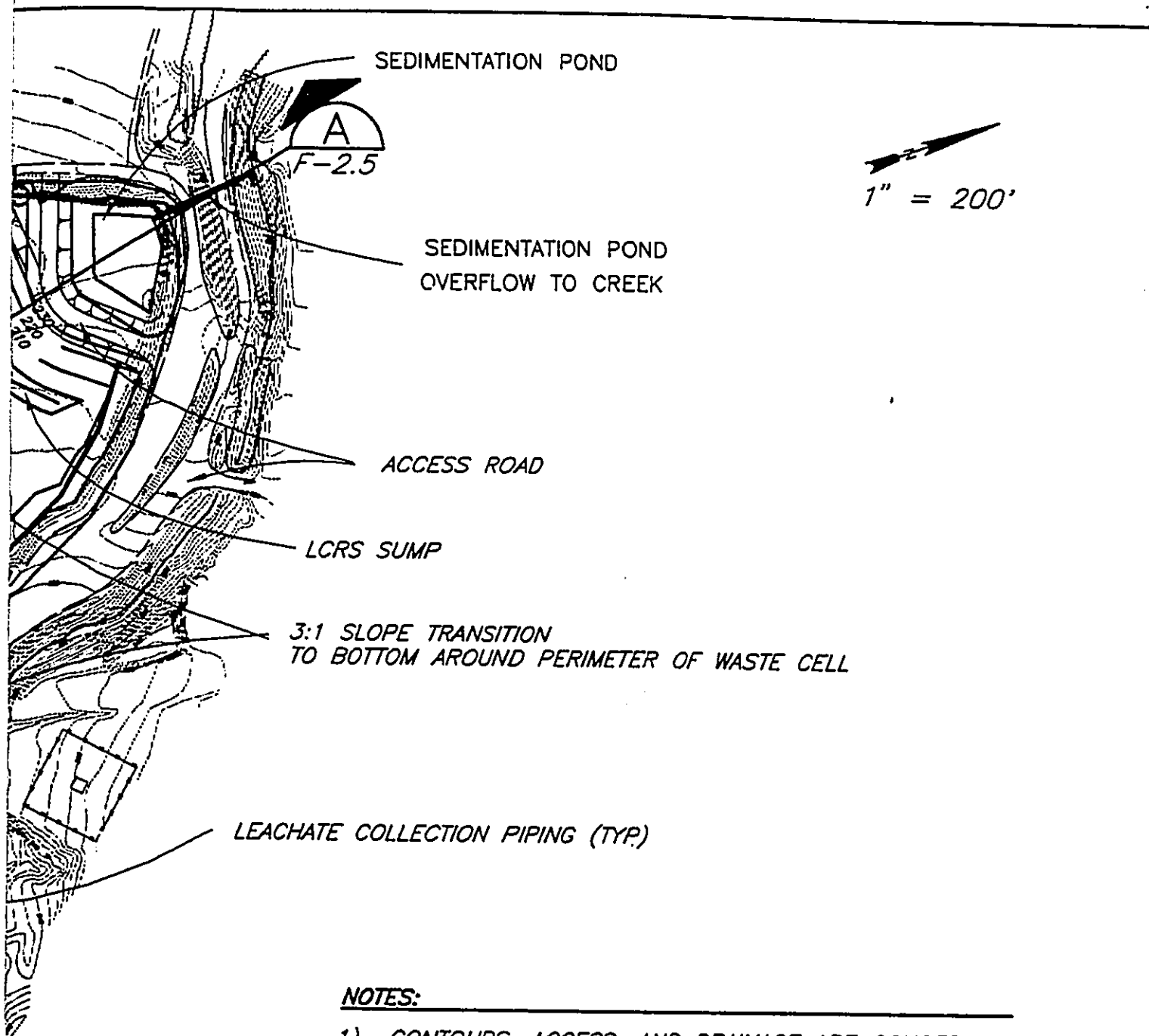
The conceptual design excavation contours for the project to be constructed prior to the addition of refuse material are shown in Figure 2-3. Figure 2-3 also depicts

EXCAVATION/GRADING
REQUIRED BEYOND P

LEACHATE STORAGE TANK



095150/MAUI-1.DWG (NEWS: P3.M1)



SEDIMENTATION POND

A
F-2.5

1" = 200'

SEDIMENTATION POND
OVERFLOW TO CREEK

ACCESS ROAD

LCRS SUMP

3:1 SLOPE TRANSITION
TO BOTTOM AROUND PERIMETER OF WASTE CELL

LEACHATE COLLECTION PIPING (TYP)

LIMITS OF WASTE
50' OFFSET FROM
PROPERTY LINE

NOTES:

- 1) CONTOURS, ACCESS, AND DRAINAGE ARE CONCEPTUAL. MODIFICATIONS AND DETAILS WILL BE ADDRESSED AFTER APPROVAL OF CONCEPTUAL DESIGN.
- 2) DATE OF PHOTOGRAPHY: 8-6-95
- 3) AERIAL PHOTOGRAPHY AND PHOTOGRAMMETRY BY: AIR SURVEY HAWAII, INC.
- 4) GROUND CONTROL SURVEY AND PROPERTY BOUNDARY BY: NEWCOMER - LEE LAND SURVEYORS, INC. 5-8-95

<p>VERIFY SCALES</p> <p>BAR IS ONE INCH ON ORIGINAL DRAWING</p> <p>FOR ALL OTHER SCALES ACCURACIES</p>	
<p>SHN</p> <p>CONSULTING ENGINEERS & GEOLOGISTS</p> <p>2630 Harrison Ave. Eureka, CA 95601 FAX (707)444-0193</p>	
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<p>CENTRAL MAUI SANITARY LANDFILL PHASE IV - CONCEPTUAL DESIGN EXCAVATION PLAN</p>	
<p>FIGURE: 2-3</p>	
<p>DATE 12/95</p>	
<p>PROJ. NO. 095156.001</p>	

the conceptual leachate collection and recovery system (LCRS). The LCRS consists of a gravel layer with perforated piping which drains to a leachate sump.

Leachate will be pumped from the sump to a leachate storage tank located at the northwest portion of the proposed expansion area. The LCRS is described in more detail in Section 2.3.4 of this EIS.

The construction phasing of the bottom liner will occur in at least two steps of approximately 15 acres each. Figure 2-4 shows each conceptual phasing step. Landfill operation will begin in the northeastern portion of the site near the proposed sedimentation pond and will progress towards the south in subsequent phases. Figure 2-5 depicts the final fill portion of Phase IV. Phase IV final grades are shown without consideration of anticipated future Phases V and VI because the County does not yet own the property.

All cuts and surface soil fill preparation areas for the placement of the geocomposite liner are designed conceptually as 2:1 slopes for the liner. All refuse fill slopes will be constructed at a 3:1 ratio, with a 20 foot wide bench for every 50 feet of elevation gain. A minimum set back of 50 feet between the property line and the edge of the Limit of Refuse or "Toe" of the landfill is shown in the final elevation grade drawings.

Construction of the landfill will require excavation of onsite overburden soil prior to placement of the liner system and burial of refuse material. The excavated soil will be stockpiled and may be used as daily cover material or as fill material for onsite construction. During the first phase of the liner installation (first 15-acre step), sufficient area on the landfill site will be available for temporary stockpiling of overburden soil. However, when it becomes necessary to install the second step of the liner installation, the excavated material will be removed outside the landfill expansion area and temporarily stored elsewhere on the applicant's property. This offsite storage will be temporary in nature and will be used prior to closure of the proposed landfill expansion.

2.3.4 Proposed Landfill Facilities

Additional features installed as part of the design for the landfill expansion will include drainage control, a composite liner, a LCRS, a groundwater monitoring system, and possibly a landfill gas collection system. These systems are described below.

A. Drainage Control

As shown on Figure 2-5 a perimeter drainage channel will be provided for the landfill expansion to collect runoff from the adjacent watershed and landfill fill slopes. The drainage channel will begin at

the southeast perimeter of the landfill expansion and traverse parallel to the property boundary and the limit of refuse, approximately 2,200 feet, and enter a sedimentation pond. At the southwest end of the landfill expansion the drainage channel will flow north approximately 1,200 feet and make a 90 degree turn and flow east approximately 2,400 feet to enter the same sedimentation pond. The drainage channels and sedimentation pond capacity have been sized to include future flows from proposed Phases V and VI of the Central Maui Landfill not yet owned by the County of Maui. The drainage channels will prevent uncontrolled runoff to adjacent properties. The sedimentation pond will be constructed to control sediment runoff into waters of the United States.

Drainage improvements have been designed in accordance with HAR §11-58.1-15(g) which states that drainage control facilities for a MSWLF must have capacity to handle the peak discharge from a 25-year, 24-hour storm. According to the Flood Insurance Rate Maps (maps showing flood hazard boundaries) prepared by the Federal Emergency Management Agency (FEMA), the site is located in Zone C. Zone C designates areas of minimal flooding outside the 500 year-flood plain, Zone B. The site is not located in a flood plain.

B. Landfill Liner

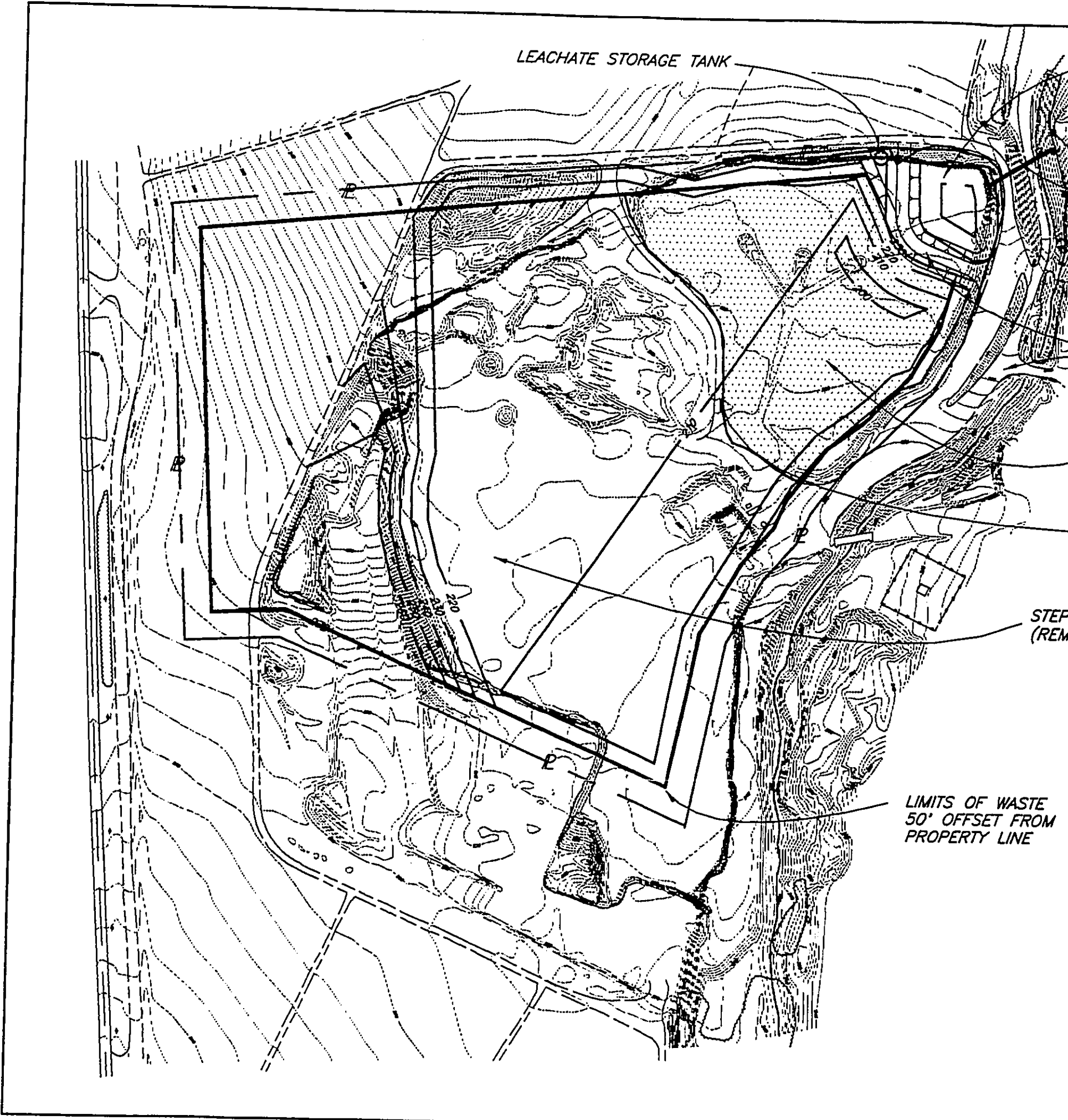
The proposed expansion area will be lined with a composite liner having two components. The first (upper) component will be a flexible membrane liner (FML) made of High Density Polyethylene (HDPE) at least 60-mil in thickness. The second (lower) component will consist of at least a two-foot layer of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} cm/sec.

However, if there is no suitable clay on site and off-site clay is far away and therefore expensive, a geocomposite liner may be proposed as a substitute to the two-foot clay requirement. See Figure 2-6 for proposed liner details.

C. Leachate Collection and Removal System

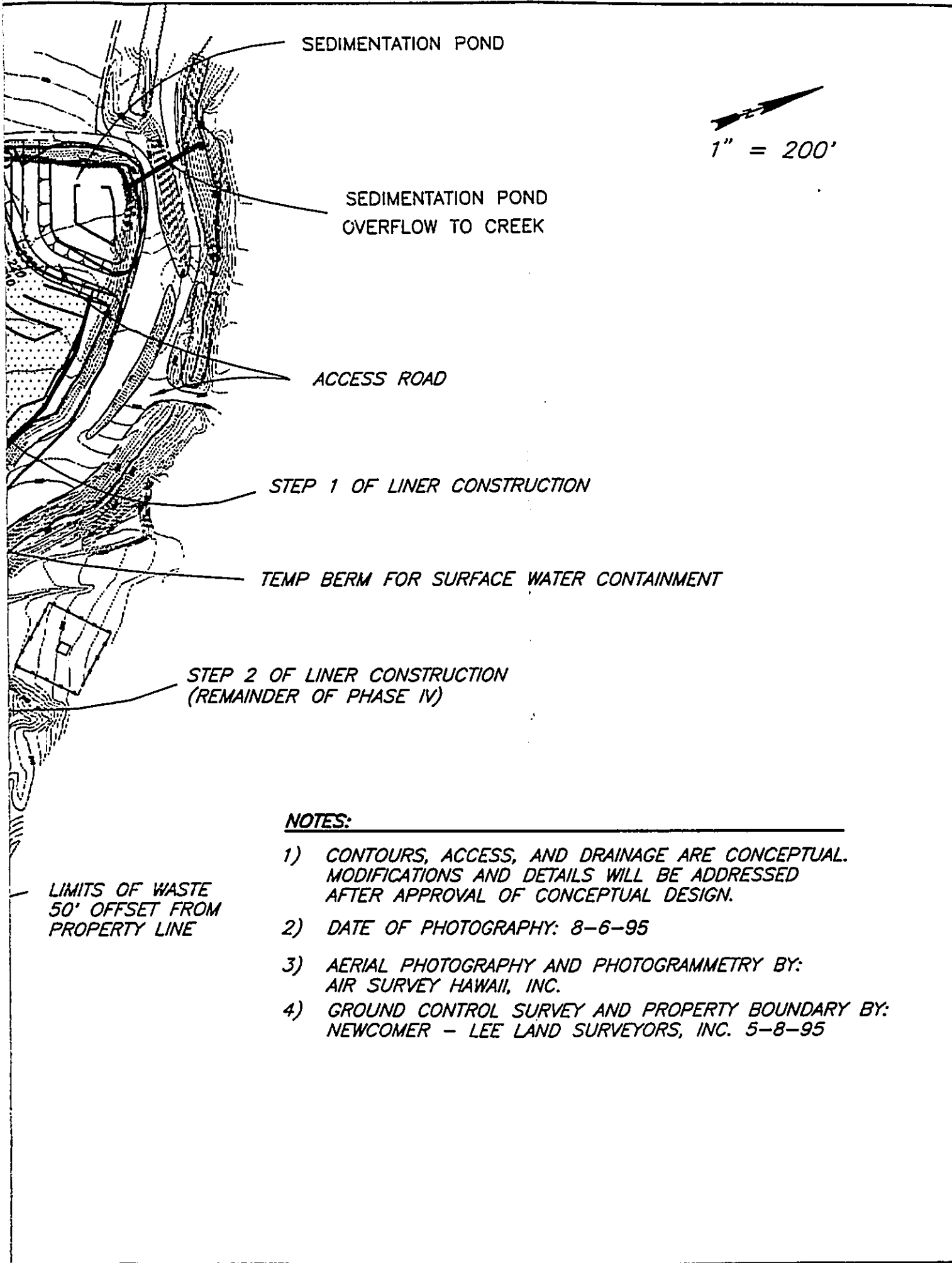
The proposed expansion area will contain a LCRS. The LCRS is illustrated in Figure 2-3. The LCRS will be installed in accordance with HAR §11-58.1-14(b)(2). These rules state that LCRS's are to be designed and constructed to maintain less than a thirty-centimeter (11.8-inch) depth of leachate over the liner. The initial phase of the system will be sized and laid out in a manner that will facilitate its extension as the landfill develops.

LEACHATE STORAGE TANK



STEP
(REMAINDER)

LIMITS OF WASTE
50' OFFSET FROM
PROPERTY LINE



NOTES:

- 1) CONTOURS, ACCESS, AND DRAINAGE ARE CONCEPTUAL. MODIFICATIONS AND DETAILS WILL BE ADDRESSED AFTER APPROVAL OF CONCEPTUAL DESIGN.
- 2) DATE OF PHOTOGRAPHY: 8-6-95
- 3) AERIAL PHOTOGRAPHY AND PHOTOGRAMMETRY BY: AIR SURVEY HAWAII, INC.
- 4) GROUND CONTROL SURVEY AND PROPERTY BOUNDARY BY: NEWCOMER - LEE LAND SURVEYORS, INC. 5-8-95

LIMITS OF WASTE
50' OFFSET FROM
PROPERTY LINE

1" = 200'

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FOR ALL DIMENSIONS
ON ORIGINAL DRAWING
DATE: 12/85
SCALE: AS SHOWN

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& GEOLOGISTS
2630 Harrison Ave.
Eureka, CA 95501 FAX (707)444-0193

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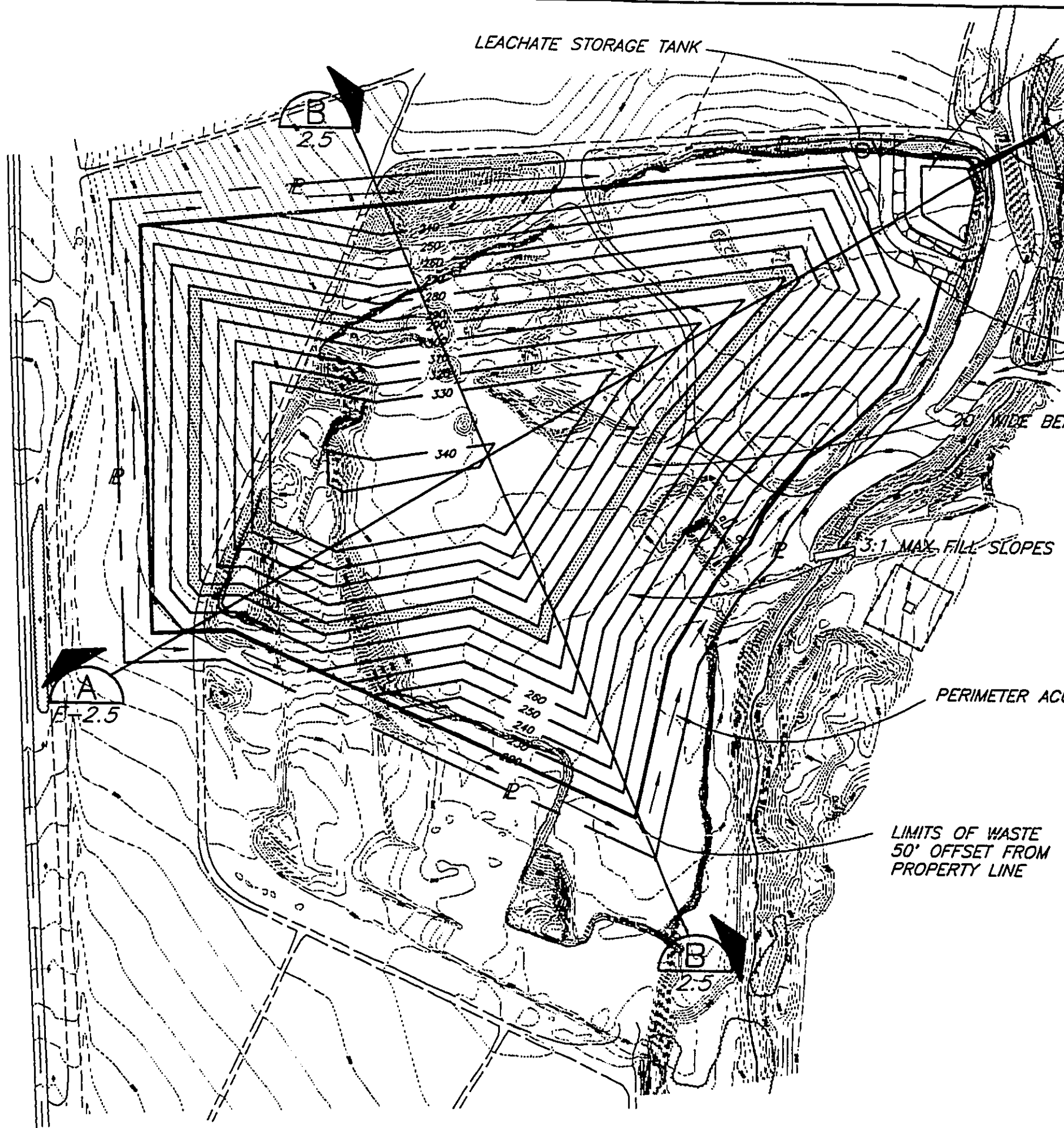
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CENTRAL MAUI SANITARY LANDFILL
PHASE IV - CONCEPTUAL DESIGN
LINER CONSTRUCTION
SEQUENCING PLAN

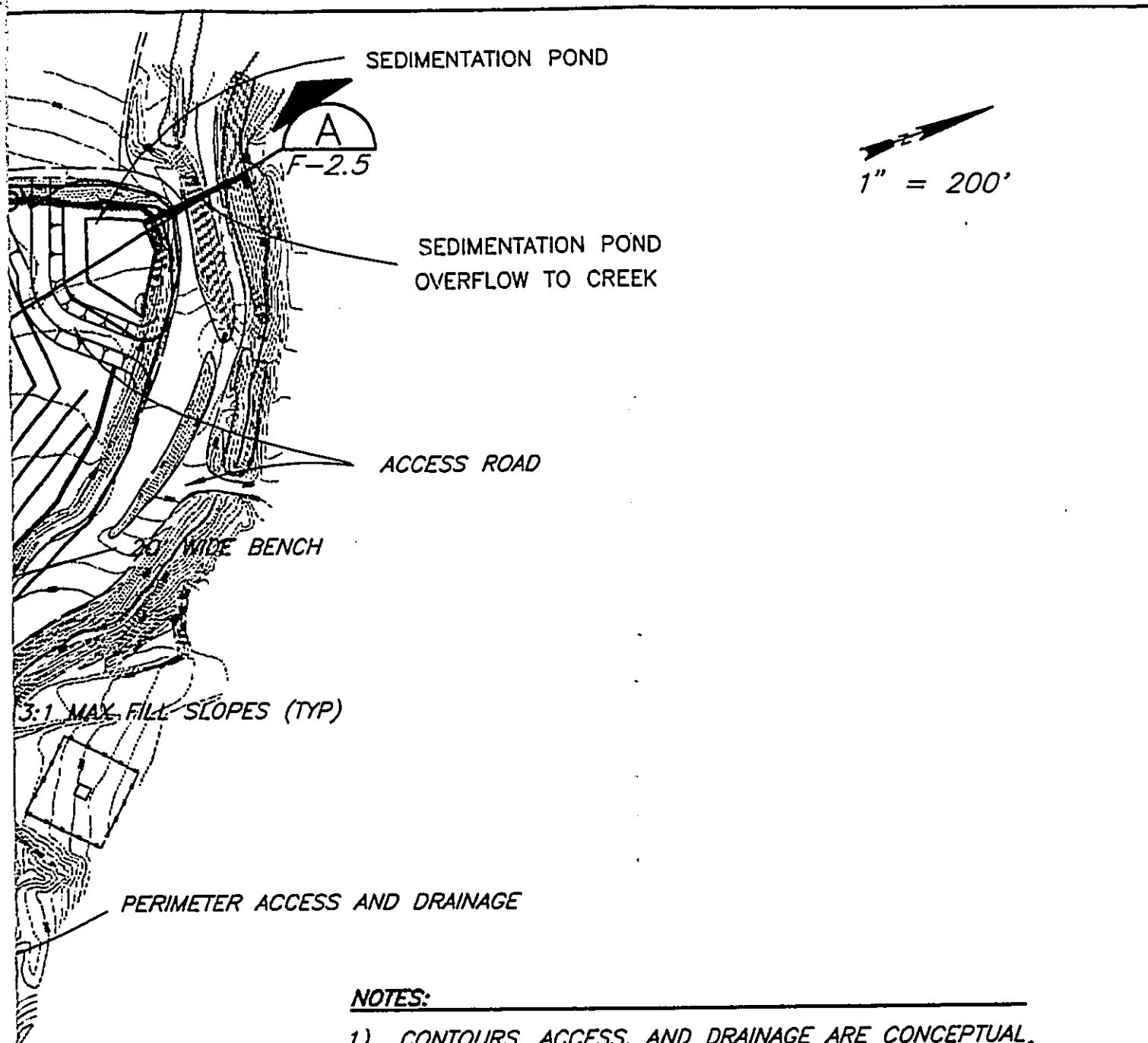
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DATE 12/85
PROJ. NO. 095150.001

LEACHATE STORAGE TANK



095150/MAJ-1.DWG (VIEWS: P3,M1)



NOTES:

- 1) CONTOURS, ACCESS, AND DRAINAGE ARE CONCEPTUAL. MODIFICATIONS AND DETAILS WILL BE ADDRESSED AFTER APPROVAL OF CONCEPTUAL DESIGN.
- 2) DATE OF PHOTOGRAPHY: 8-6-95
- 3) AERIAL PHOTOGRAPHY AND PHOTOGRAMMETRY BY: AIR SURVEY HAWAII, INC.
- 4) GROUND CONTROL SURVEY AND PROPERTY BOUNDARY BY: NEWCOMER - LEE LAND SURVEYORS, INC. 5-8-95

LIMITS OF WASTE
50' OFFSET FROM
PROPERTY LINE

VERIFY SCALES
SCALE: AS SHOWN ON ORIGINAL DRAWING
1" = 200'

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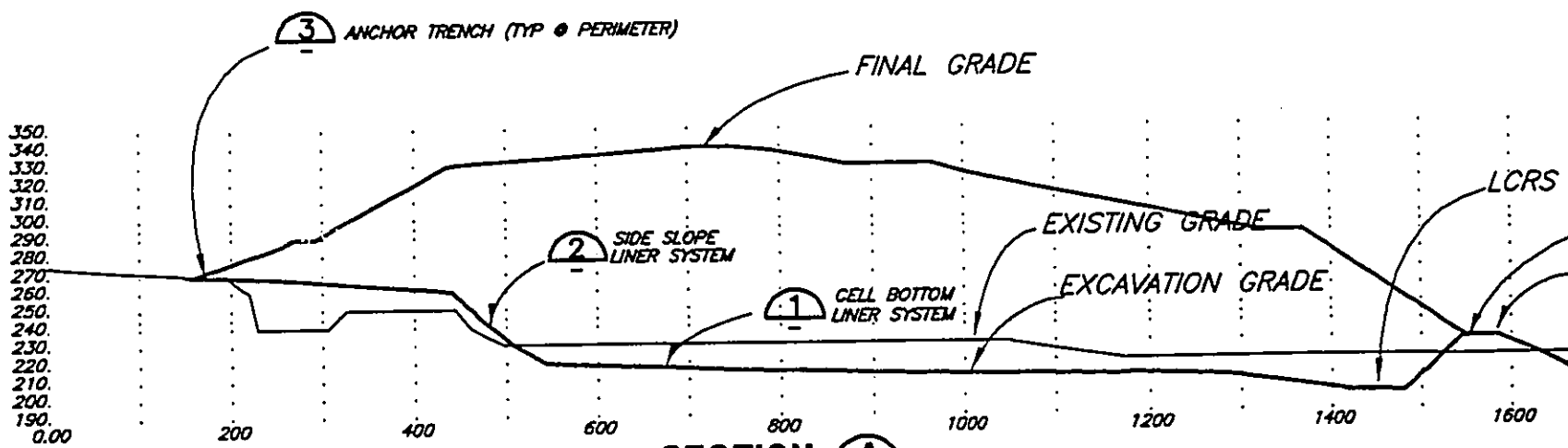


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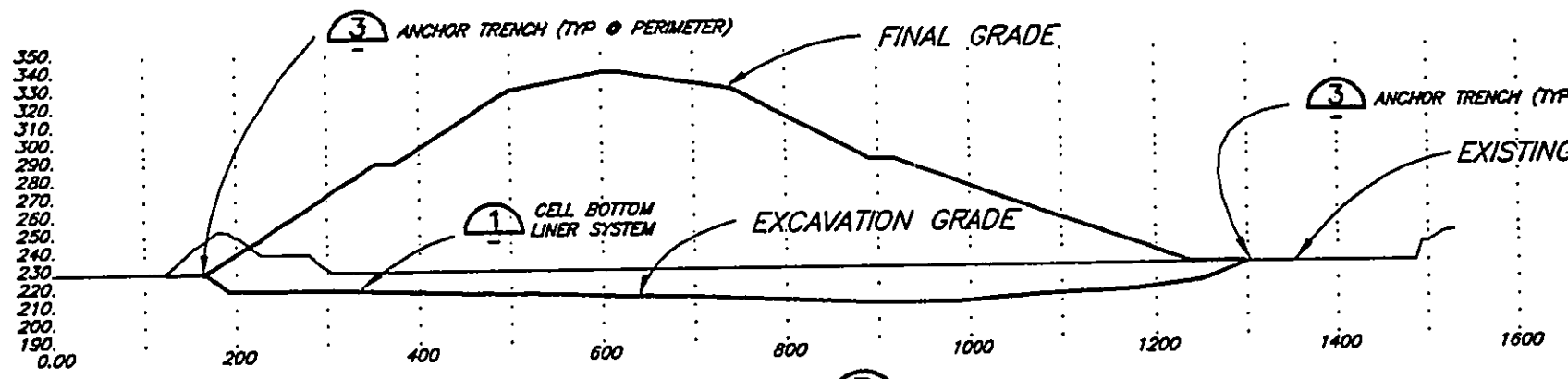
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CENTRAL MAUI SANITARY LANDFILL
PHASE IV - CONCEPTUAL DESIGN
FINAL FILL PLAN

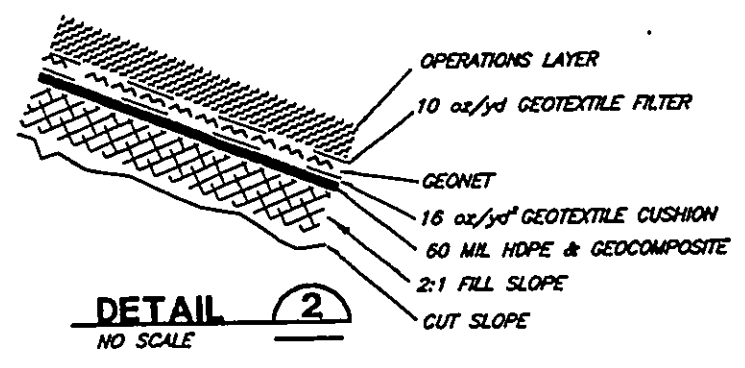
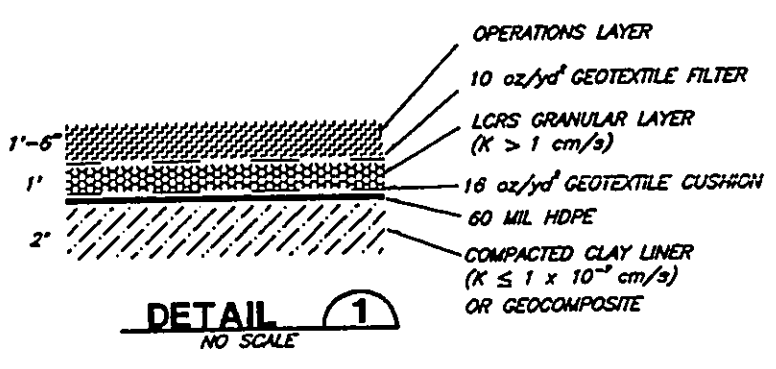
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DATE 12/95
PROJ. NO. 095150.001

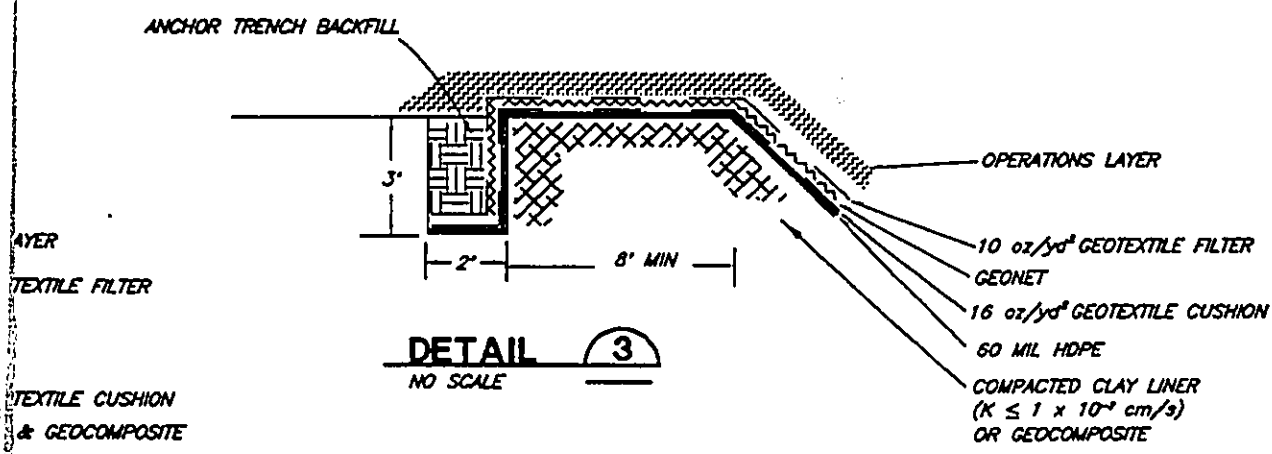
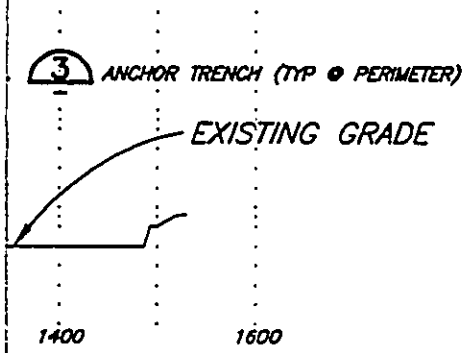
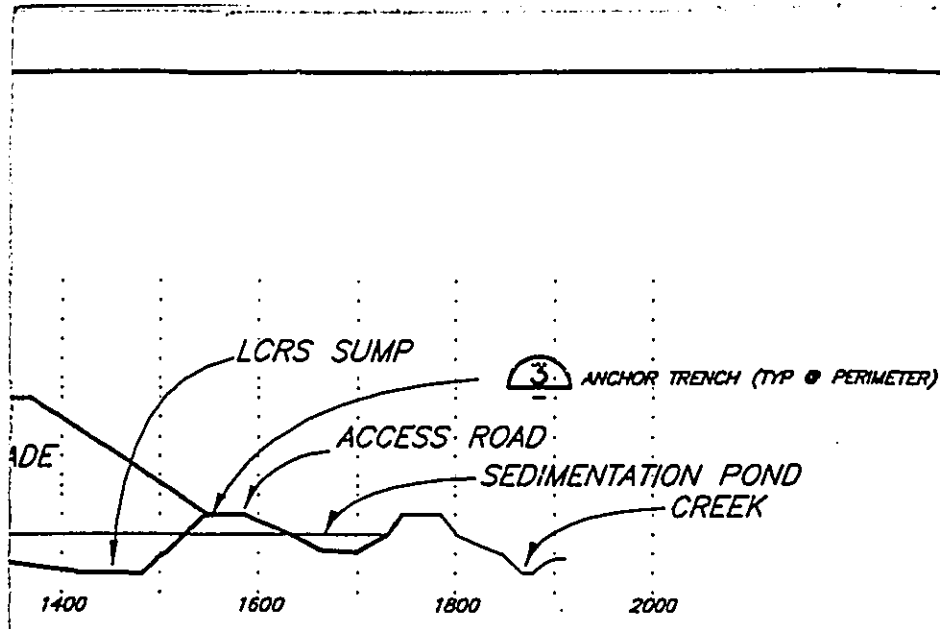


SECTION A
 HORIZ: 1" = 200'
 VERT: 1" = 100'



SECTION B
 HORIZ: 1" = 200'
 VERT: 1" = 100'





VERIFY SCALES
 1" = 10'-0" HORIZONTAL
 1" = 1'-0" VERTICAL
 ALL DIMENSIONS TO CENTERLINE UNLESS OTHERWISE NOTED

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 & GEOLOGISTS
 2830 Harrison Ave.
 Eureka, CA 95501 FAX (707)444-0163



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CENTRAL MAUI SANITARY LANDFILL
 PHASE IV - CONCEPTUAL DESIGN
SECTIONS & DETAILS

2-6
 DATE 12/95
 PROJ. NO. 035150.001

The leachate collection and removal system will consist of 6-inch diameter polyvinyl chloride (PVC), or equivalent, pipes spaced so the leachate will not exceed 30 centimeters of head on the HDPE liner. The pipes will connect to a main header line that will transport the leachate to a down gradient sump located at an elevation below that of the sedimentation pond. This is done to prevent any possible cross contamination with clean surface water in the sedimentation pond. All leachate pipes will have an approximate slope of 1% and will be placed in a gravel layer to induce direct flow to the sump. Leachate will be pumped from the sump to an above-ground storage tank for eventual final disposal at a Publicly Owned Treatment Works (POTW). On-site disposal of leachate may be employed for Phases V and VI, but currently there are no plans for on-site disposal of leachate for Phase IV due to a lack of available space.

Piping for the leachate collection and removal system will be both solid and perforated. Solid piping will be used for outfall systems. Perforated pipe and filter fabric material will be used for the interior collection system.

The capacity of this system will exceed twice the anticipated leachate production.

D. Groundwater Monitoring

In accordance with State and Federal regulations, a groundwater protection standard will be developed for the landfill. The groundwater protection standard will require periodic groundwater monitoring including sampling and testing of groundwater, statistical analysis of the data, periodic reporting to the Department of Health (DOH), and contingency plans for responding to a potential release. A minimum of three groundwater monitoring wells will be installed around Phase IV and additional wells will be installed when Phases V and VI are developed. The locations and exact number of wells have not yet been determined but will be included in the groundwater protection standard.

In addition to the monitoring wells, a lysimeter will likely be installed underneath the liner below the sump. The sump basin is the only location, due to the slope and impermeability of the landfill liner, where leachate could collect to form a standing pool. The lysimeter will be able to detect the presence of a leak near the sump long before the groundwater monitoring wells can detect a leak.

The groundwater protection standard will need to be approved by DOH as part of the permit requirements for the landfill. The County is

currently developing a groundwater protection standard for Phases I, II and III. Monitoring at subsequent landfill phases will be incorporated into the groundwater protection standard for the Central Maui Landfill.

E. Gas Extraction System

The proposed expansion may include a gas extraction system. The purpose of the gas system is to relieve internal gas pressure within the landfill under closure. Since the regulations require that the cover cap have at least the same permeability as the bottom liner, the impermeable cap would then prevent landfill gases from venting to the atmosphere. Without a venting system designed into the landfill, the lined cap can detach from the ground surface causing damage to the liner.

The gas collection system can assist in preventing gas and odors emanating uncontrolled from the landfill. A combination of vertical and horizontal well systems would be installed on the finished landfill benches. They would provide a barrier for gas movement at the surface and perimeter of the landfill.

As the landfill is developed and new benches are completed, horizontal gas collection systems would be installed. The horizontal systems would be interspaced throughout the landfill on each bench. Typically, the systems would be located on 100- to 300-foot intervals. Each horizontal trench would be connected at its ends to above-ground collection headers which would deliver the collection gas to the flare station. As the landfill continues to rise in elevation, additional levels of horizontal trenches would be provided at 50-foot elevation increments corresponding to the graded landfill benches.

The horizontal gas collection system would typically consist of a network of PVC or Polyethylene (PE) pipes in a slip joint configuration, embedded in the trenches in the refuse approximately 3 feet wide and 4 feet deep. The bottom of the trench would be backfilled with 1.5 to 2 feet of 1.5-inch rock. The collection pipe would be placed on top of the rock and the trench would be backfilled with additional rock.

To prevent dirt and debris from filtering into the rock bed, a geotextile filter fabric would be placed over the trenched area. The system is designed with consideration for anticipated gas flow, vacuum requirements and cover materials subsequently placed in the area. The rock fill which surrounds the horizontal pipe also serves as a gas conduit.

Condensate generated by the landfill gas would be collected by drain lines connected to bench headers and piped to double-walled sumps strategically placed at low points around the landfill. The collected condensate would then be pumped and trucked to a POTW for disposal.

2.3.5 Landfill Operation and Maintenance

The landfill operation and maintenance will ensure that the landfill is run as efficiently as possible through careful design and inspection. An operations plan will be developed in accordance with DOH permit requirements. The operations plan will be developed later as part of the permitting process and will include, at a minimum, details on operation hours, methods of disposal, recycling operations, site maintenance, hazardous waste exclusion program, liquids monitoring plan, emergency operating procedures, personnel training program, leachate monitoring, groundwater monitoring, surface water monitoring, cover material, special waste acceptance and disposal procedures, landfill gas control and monitoring, site nuisance control measures, and control measures for fire, dust, vector, birds, litter, noise and odor. The operations plan for the existing landfill includes these items; this plan will be modified to address the expansion area. The County is also currently working with the quarry to coordinate quarry and landfill operations.

2.3.6 Landfill Closure Plan

The landfill closure plan will be prepared when landfill operations are near completion. The final closure plan will include a final cover plan, a final grading plan, and a permanent leachate and gas collection and disposal plan. The conceptual final grading plan is illustrated in Figure 2-5. The final closure plan will depend on whether Phases V and VI will be connected with Phase IV into one continuous cell. At this time, the final grading plan for Phase IV does not include the possible future use of Phases V and VI because the County does not yet own the property. Therefore, a final closure plan needs to be developed sometime in the future.

2.3.7 Landfill System Offsite Development

Following the closure of three other landfills in Maui, namely Olowalu (in 1993), Makani (in 1993), and Waikapu (in 1987), a transfer station was constructed at the Olowalu site (Hirose, 1995). The Olowalu station has met the required need for a transfer station in partnership with the existing Central Maui Landfill, and it is not anticipated that additional transfer stations will need to be constructed.

However, the County currently is planning to construct a temporary transfer station at the existing Central Maui Landfill to accommodate home owners and small commercial haulers. The purpose of this transfer station is to keep home owners and small haulers away from the landfill equipment operating on the working face. The transfer station planned for the existing landfill will be utilized for the proposed expansion.

2.3.8 Utility Requirements

There will be no water hook-up or sewer hook-up requirements for the proposed landfill expansion. The existing scale house and operator facilities are planned for use with the new landfill expansion. A water tank, electric pump, and septic tank with drain field are currently used for operation of the existing scale house and will continue to be used. Electrical power is currently used for the operation of the existing truck scale and in the existing scale operation facilities located in Phase I.

Water requirements for fire and dust control are currently being provided by water trucks. A portable water tank is located on Phase III. This portable storage facility has a total capacity of 53,700 gallons, with 25,000 gallons reserved for fire control, required for the pre-engineered building located on the existing landfill site.

3.0 DESCRIPTION OF THE ENVIRONMENTAL SETTING

3.1 OVERVIEW

This section of the EIS contains a description of the existing physical and socio-economic environment. These conditions were considered during the analysis of project components, alternatives and potential impacts. Some of the following information was taken from the Final EIS prepared for the existing Central Maui Sanitary Landfill (R.M. Towill Corporation, 1986).

3.2 PHYSICAL ENVIRONMENT

3.2.1 General

The Hawaiian Archipelago comprises a chain of more than 100 islands spanning a distance of more than 1,500 miles (UH Dept. Geography, 1983). The islands are the emerged summits of volcanoes on a great submarine ridge that strikes northwest-southeast. The islands were formed by the passage of the Pacific lithospheric plate over a hot spot fixed in the earth's mantle (Macdonald et al., 1983). The sequential formation of the archipelago is indicated by the occurrence of submerged older islands in the northwest portion of the chain and by the relative youth and current volcanic activity of the islands of the State of Hawaii at the southeast end.

Six major islands comprise the State of Hawaii. From west to east they are Kauai, Oahu, Molokai, Lanai, Maui and Hawaii. The project site is located on the Island of Maui, the second largest island in the state with an area of 728 square miles. Maui is located approximately 58 miles southeast of Oahu.

Maui was formed through the merging of two volcanoes, the West Maui and East Maui (Haleakala) volcanoes. The lavas of Haleakala banked against the older slopes of the West Maui volcano to form the broad, gently sloping plain of the Maui Isthmus. The West Maui mountains currently rise to a maximum elevation of 5,788 feet above mean sea level (msl). Haleakala rises to 10,025 feet msl and constitutes the greater bulk of Maui's land mass.

3.2.2 Climate

The outstanding features of the Hawaiian Islands' climate include mild and equable temperatures year round, moderate humidities, persistence of northeasterly trade winds, remarkable differences in rainfall within short distances, and infrequency of severe storms (UH Dept. Geography, 1983). In most of Hawaii there are only two seasons. The "summer" season occurs between about May and October, when the sun is more nearly overhead, the weather

warmer and drier, and the trade winds most persistent. The "winter" season occurs between about October and April, when the sun is in the south, the weather cooler, and the trade winds more often interrupted by other winds and by intervals of widespread clouds and rain.

Mean annual temperature in the islands varies between 72° and 75°F near sea level and decreases by about 3°F for each 1,000 feet of elevation (UH Dept. Geography, 1983). Some sunny, dry areas tend to have a slightly higher mean annual temperature. Since temperature decreases with elevation by about 3° per thousand feet, Hawaii's mountains, which extend from sea level to nearly 14,000 feet, encompass a climate range from the tropic to the sub-Arctic. August and September are the warmest months and January through March are the coolest. The seasonal mean temperature range is only 4° to 8°F, which is much below the daily range. Almost everywhere at low elevations the highest temperatures of the year are in the low 90's and the lowest near 50°F.

Hawaii's mountains profoundly influence every aspect of its climate, giving Hawaii as a whole a climate different from that of the surrounding ocean, and also creating within the small compass of the islands a climatic variety that would not exist if these were flat islands of the same size. Where the warm, moist winds are forced to rise over windward coasts and slopes, cloudiness and rainfall are much greater than over the nearby open sea. Conversely, leeward areas, where the air descends, tend to be sunny and dry. Local winds and temperatures can vary substantially. On the higher mountains the belt of maximum rainfall lies at only 2,000 to 3,000 feet, and amounts drop off rapidly with further elevation, reflecting the tendency of air to flow around rather than over these obstacles, so that the highest slopes are relatively dry. Brief, but intense, localized convective showers also occur as a result of towering cumulus clouds that build up over mountains and interiors.

The islands' heaviest rains are brought by winter storms during the October-to-April season (UH Dept. Geography, 1983). The orographic effects on storm rainfall are not as pronounced as on tradewind showers. Frequently, the heaviest storm rains do not occur in localities having the greatest average rainfall; nor is it uncommon during such storms for relatively dry areas to receive within a day, or even a few hours, totals exceeding half their mean annual rainfall. Since the lowland lees and other dry areas obtain their rainfall chiefly from a few winter storms, and only negligibly from tradewind showers, their rainfall is strongly seasonal, their summers being arid. In the wetter regions, on the other hand, where rainfall comes from both winter storms and year-round tradewind showers, seasonal differences are much smaller.

Maui is also subject to these general climate patterns, with its climate varying significantly according to altitude and leeward/windward locations. Rainfall is generally heavy on the windward slopes of East and West Maui (UH Dept. Geography, 1983). On the windward side of East Maui (Haleakala), the mean

annual rainfall reaches 300 inches per year at an elevation of about 3,000 feet. Average annual rainfall at the 10,025-foot summit of Haleakala and along the leeward coast of east Maui is less than 30 inches. The summit of West Maui averages 400 inches of rainfall per year, while its windward coastal areas average 40 inches, and leeward coastal areas average less than 15 inches of rainfall (UH Dept. Geography, 1983).

The proposed site for the expansion of the Central Maui Sanitary Landfill is located in the Central Maui lowlands, where temperatures usually range from the low 60's during the winter to the high 80's in the summer. This area is relatively dry, with an average annual rainfall of approximately 20 inches (see Figure 3-1). Most of the rain is produced by the higher intensity Kona rains during the winter months. Kona rains can cause serious runoff and flooding problems in low-lying areas. Fortunately, these conditions usually occur only a few days of the year.

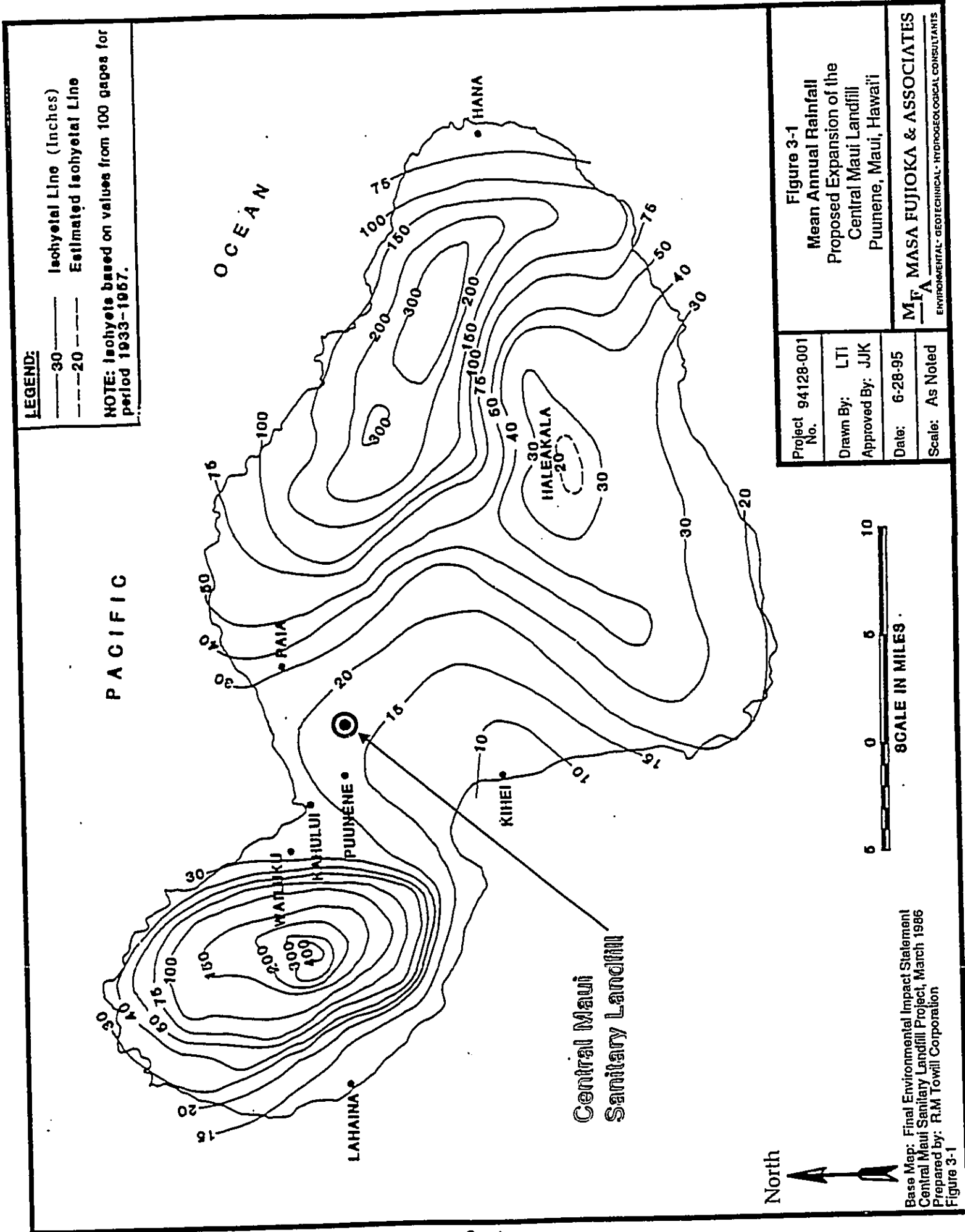
Figure 3-2 shows a wind rose for surface wind direction, speed, and frequency data collected at Kahului Airport, 3 miles northeast of the proposed landfill site. The wind rose was developed from data obtained from the National Weather Service. It reflects surface wind information collected over the period of 1985-1994. The data illustrates that the predominant wind directions are from the north to east-northeast about 69 percent of the time. Wind speeds in the vicinity of the airport are relatively low, exceeding 25 miles per hour only about 3 percent of the time from all directions. The average surface wind speed from all directions is 14 miles per hour.

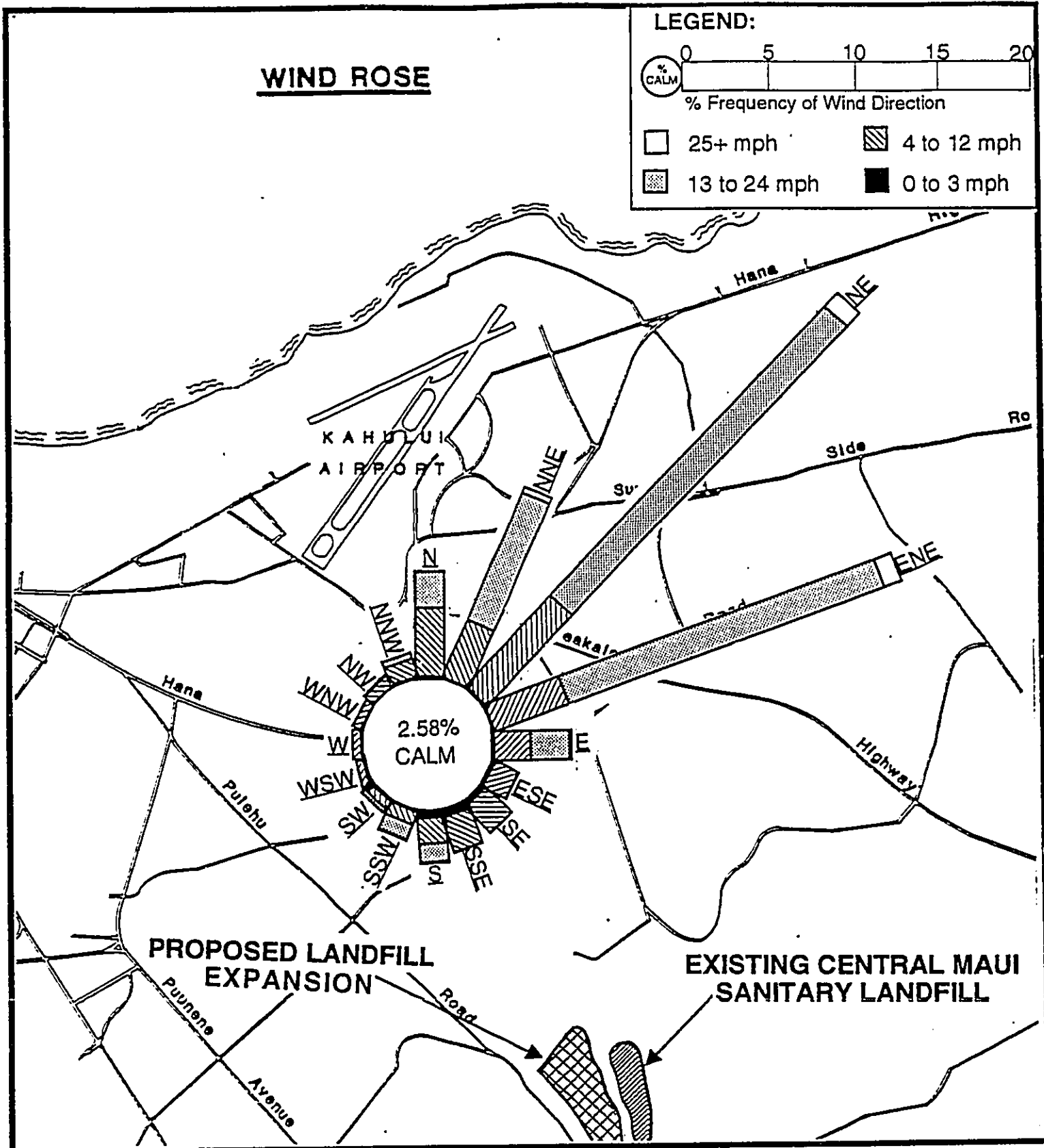
The tradewinds in the vicinity of the proposed landfill site are affected by local topographic conditions. Coming from the northeast, they become northerly as they are funneled between the mountains of east and west Maui (R.M. Towill Corporation, 1986).

Wind conditions at the site may impact windblown litter distribution and severity at the landfill. Windblown litter has been an issue at the existing landfill. Mitigation of windblown litter is discussed in Section 6.2.6 of this EIS.

3.2.3 Geology

The Hawaiian Islands are comprised of an undersea mountain range almost wholly built up by volcanic activity. The islands have all followed the same pattern of development - basaltic shield building, caldera collapse, eruption of intracaldera or post-caldera hawaiites, mugearites, and trachytes, a long erosional period, and, in most cases, renewed post-erosional eruptions. Initial eruptions are alkalic basalts; however, the bulk of the shield consists of tholeiitic basalt,





<p>0 3000 6000</p> <p>Scale In Feet</p>	<p>North</p>	<p>Figure 3-2 Wind Rose, Kahului Airport, Maui Proposed Expansion of the Central Maui Landfill Puunene, Maui, Hawaii'i</p>
<p>Base Map: Final Environmental Impact Statement Central Maui Sanitary Landfill Project, March 1986 Prepared by: R.M. Towill Corporation Figure 3-2</p>		<p>Project No. 94128-001</p> <p>Drawn By: LTI</p> <p>Approved By: JJK</p> <p>Date: 1-3-96</p> <p>Scale: 1" = 3000'</p>
		<p>M_FA MASA FUJIOKA & ASSOCIATES ENVIRONMENTAL • GEOTECHNICAL • HYDROGEOLOGICAL CONSULTANTS</p>

olivine basalt, and oceanite (Macdonald et al., 1983). In the later stages, alkalic olivine basalts reappear.

At many locations in Hawaii, particularly the younger islands (Hawaii and Maui), the near surface "soil" conditions consist of shallow basaltic rock. Rocky terrain is generally highly resistant to erosion. The basalts in Hawaii, with the exception of basalts found within former calderas (fire pits), were ejected, came into contact with air, and underwent the process of downslope flow in a molten state. These conditions were conducive to the formation of cooling fractures, lava tubes, blisters, other cavities, and to the interlayering of the flowing lava with highly permeable clinker zones (Macdonald et al., 1983).

West Maui is the older of the two volcanoes that make up the island of Maui (Macdonald et al., 1983). Lavas of Haleakala (East Maui) have banked against the slope of West Maui to form the broad, gently sloping plain of the Maui isthmus. West Maui has passed through the principal stages of Hawaiian volcanism, and has produced four small post-erosional eruptions. The oldest flows of West Maui are the tholeiite, olivine tholeiite, and oceanite basalt flows with associated pyroclastics and intrusives that build the main shield. These are covered by a thin, discontinuous layer of andesitic and trachytic flows, domes, and pyroclastics. After a long period of erosion, four small eruptions took place on the western slope of the mountain. The rift zones of West Maui are less well defined than those of most Hawaiian volcanoes. There is a tendency for dikes to radiate in all directions from the summit.

Haleakala erupted less than two centuries ago, and cannot be regarded as extinct; the potential for future eruptions exists (Macdonald et al., 1983). The primitive shield of Haleakala is composed of pahoehoe and a'a flows of tholeiite, olivine tholeiite and oceanite, with very minor amounts of pyroclastics. Later-stage hawaiiite, and smaller amounts of alkalic olivine basalt and ankaramite overlie the primitive shield over most of the southwestern and southeastern portions of the mountain. Late eruptions were more explosive, forming many large cinder cones and large ash beds. These eruptions took place from three well-defined rift zones.

The bedrock geology in the vicinity of the landfill site is characterized by late-stage basaltic lava flows from Haleakala volcano. The Kula volcanic series, of Pleistocene age (Macdonald et al., 1983), is the upper series, overlying Honomanu basalts. Haleakala basalts overlap the Honolulu volcanic series of West Maui at approximately -500 feet msl.

3.2.4 Soils

Volcanic soils include residual, alluvial, colluvial, and "special" soils. The large majority of volcanic soils in the Hawaiian Islands are residual soils, which form

from in-situ chemical weathering of basaltic rock. These soils normally comprise the top of a weathering profile in which the residual soils are underlain by saprolite (basaltic rock which has nearly weathered to soil). The saprolite is underlain by weathered rock which is, in turn, underlain by unweathered basaltic rock. The thickness of the weathering profile can range from a few feet to hundreds of feet, depending upon age, weathering environment (high vs. low rainfall), and the area's geologic history. Although time is, in general, an important soil-forming factor, the relative age of the underlying geologic formation may not be a good indicator of soil maturity. Residual soils normally retain some of the structure of the parent rock and the combination of the relict texture of the soil and thick vegetation in undisturbed areas can make these soils highly resistant to erosion.

Alluvial soils form due to the downstream deposition of eroded volcanic soils. Alluvial soils are normally deposited in low-gradient areas and have less tendency to erode because of the lack of steep slopes. Colluvial soils form due to the downslope movement of volcanic soils. These soils are usually loose and incoherent deposits, usually at the foot of a slope or cliff and brought there chiefly by gravity, and include talus and cliff debris.

"Special" soils are the result of chemical decomposition of volcanic materials other than basaltic rock. These "special" soils include those formed by decomposition of volcanic ash or types of volcanic ejecta other than lava. Most of these soils do not have the relict texture of residual soils and are more susceptible to erosion. At many locations in the Hawaiian Islands, particularly the younger islands (Maui and Hawaii), the near surface "soil" conditions consist of shallow basaltic rock. This rocky terrain is generally highly resistant to erosion.

Deep, well-drained, moderately fine-textured residual soils are typical of the low uplands of Central Maui (Foote et al., 1972), with slopes ranging from nearly level to moderately steep. The site is characterized by Foote et al. (1972) to contain two major soil types, referred to as Rock Land (rRK) and Waiakoa silty clay loam, 3 to 7 percent slopes (WeB). Rock Land is made up of areas where exposed rock covers 25 to 90 percent of the surface. In the site vicinity, Rock Land occurs in the vicinity of Kalialinui Gulch.

The Waiakoa soil series consists of well-drained soils developed in material weathered from basic igneous rock. The upper part of the profile is influenced by volcanic ash. In a representative profile, the surface layer is dark reddish-brown silty clay loam about 2 inches thick. The subsoil, about 23 inches thick, is dark reddish-brown and very dark grayish-brown silty clay loam that has prismatic structure or is massive. The substratum is very dark brown silty clay loam and hard, basic igneous rock. Depth to bedrock in a typical profile ranges from 20 to 40 inches. Waiakoa silty clay loam exhibits moderate permeability and slow

runoff, and the erosion hazard is slight (Foote et al., 1972). The clay loam is considered excellent landfill cover material (R.M. Towill Corp., 1986).

Quarry operations in the existing landfill area have revealed soil strata consisting of a topsoil layer of 5 to 6 feet, followed by a rock layer of about 40 feet, likely consisting of basalt of the Kula volcanic series. An approximately 10-foot thick clay layer forms the contact between the Kula and the underlying Honomanu cinder deposits. Similar subsurface conditions appear to have been uncovered by quarry activities in Phase IV. Future planned soil investigations in Phase IV and future quarry operations in Phases V and VI will produce a more detailed knowledge of the soil strata in these areas.

According to the Land Study Bureau (LSB) Detailed Land Classification for Maui, the LSB Overall Productivity Rating (OPR) is E72 within Kalialinui Gulch and A5li for the land encompassing Phase I, VI, V, VI and the southern half of Phase II. The northern half of Phase II and all of Phase III have an OPR of C55i (see Table 3-1 for definitions) (LSB, 1967). According to these designations, the gulch and entire quarry site have poor productivity potential, whereas the adjacent sugarcane land has very good productivity potential for agricultural uses.

3.2.5 Topography and Slopes

The lavas of Haleakala banked against the older slopes of the West Maui volcano to form the broad, gently sloping plain of the Maui Isthmus. The west slopes of Haleakala, extending to the Maui Isthmus, are characterized by slightly dissected uplands, with slopes cut by widely spaced erosional gullies (UH Dept. Geography, 1983). Much of the west and north coasts of the Kula uplands, together with the south and north coasts of the isthmus, are occupied by sand beaches.

The Central Maui Isthmus is generally characterized by level to gently sloping terrain. The site is located within the 200- to 300-foot elevation levels. The regional slope in the vicinity of Phases I, II and III is approximately 2.5 percent, sloping downward toward the northwest. The natural topography has been highly disturbed in the immediate area of Phases I, II, and III during quarrying operations and current landfill operations. The regional slope in the vicinity of Phases IV, V, and VI is approximately 3.5 percent, sloping downward toward the northwest. As with the existing landfill, the natural topography in the immediate vicinity of Phases IV and V has been highly disturbed, and the natural topography of Phase VI will be highly disturbed, as a result of quarry and landfill operations. The final topography in both the existing landfill and the proposed landfill will be determined once quarry and landfill operations are completed.

Table 3-1 Land Study Bureau - Overall Productivity Ratings

Soil Code	Machine Tillability	Stoniness	Depth (inches)	Slope (%)	Texture	Drainage	Mean Annual Rainfall (inches)	Elevation (feet)	Color	Soil Series	Major Existing Uses in 1967	Current Uses in 1995
A51i	Well-suited	Nonstony	Deep, over 30	0 to 10 predominantly 8	Fine	Well drained	15 to 25	0 to 400	Dark reddish brown	Molokai, Lanai	Sugar cane	Landfill & quarry operations
C55i	Moderately suited	Nonstony to stony	Moderately deep, less than 20	0 to 10 predominantly 8	Fine	Well drained	15 to 25	0 to 400	Dark reddish brown	Molokai, Lanai	Sugar cane (Landfill)	Landfill & quarry operations
E72	Moderately suited	Stony	Deep, over 30	0 to 10, average between 2-5	Moderately Fine	Well drained	10 to 30	0 to 400	Dark brown to dark reddish brown	Pulehu, Alae Puumene	Sugar cane, grazing	Protected Kaliainui Gulch

Source: Detailed Land Classification - Island of Maui

3.2.6 Flora and Fauna

The existing vegetation in the vicinity of the landfill site consists almost entirely of cultivated sugarcane fields. Immediately east of the site is an intermittent stream channel, the Kalialinui Gulch, with an associated strip of natural vegetation about 100 feet wide. The vegetation in the gulch consists mainly of common species such as kiawe, klu, pili grass and haole koa. There are no endangered or rare plant species on or near the site (R.M. Towill Corp., 1986).

Animal and bird species found in the vicinity are those typical of the Central Maui cane fields, including a variety of rodent species such as mongoose, and birds such as mynahs, sparrows, doves, and cattle egrets. No animals are known to inhabit the relatively barren quarry areas. R. M. Towill Corp. (1986) reported the presence of barn owls (*Tyto alba*) roosting in crevices in the quarry walls, and barn owls were reported to have been seen earlier this year in the area (Cameron, 1995). There are no endangered or rare animal or bird species on or near the site (R.M. Towill Corp., 1986).

3.2.7 Hydrology and Drainage

The torrential streams of East and West Maui flow on steep gradients. Streams descending the western slopes of Haleakala deposit alluvial fans where they issue onto the gentler slopes of the isthmus, burying older alluvium (Macdonald et al., 1983). Much of the water is lost in the permeable rocks of the Kula and Honolua series (Stearns & MacDonald, 1942).

The proposed landfill expansion site is part of the drainage area of Kalialinui Gulch, an intermittent natural water course that originates high on the northwestern slopes of Haleakala. Kalialinui Gulch is one of several major gulch features in Central Maui. It drains a total of 11,460 acres (17.9 square miles) and runs in a northwesterly direction towards Kahului Airport (R.M. Towill Corp., 1986). The discharge point for the Kalialinui Gulch is in the vicinity of Kanaha Beach Park. A portion of the gulch runs between the existing landfill and the proposed expansion site.

A crest-stage gauge station was established in Kalialinui Gulch near Kahului in 1966, and annual maximum discharge flows have been recorded by the United States Geological Survey (USGS) and published in its annual reports of 1967-1994 (USGS, 1994). According to these reports, the gulch received zero flow during six water years (1973, 1977, 1981, 1983, 1984 and 1985). The largest annual maximum discharge recorded was 1,330 cubic feet per second and occurred in 1971. The average annual maximum discharge for the 28-year period is 250 cubic feet per second.

Generally, the section of Kalialinui Gulch in the vicinity of the project site does not experience any serious flooding problems. In the EIS prepared for the existing Central Maui Landfill, R.M. Towill Corp. (1986) stated that the gulch had overflowed and flooded a portion of the northern section of the quarry on at least one previous occasion, but that the area affected by the flooding was downstream and outside of the boundary of the proposed landfill expansion site. R.M. Towill Corp. (1986) further reported that the section of the berm that was overtopped was built higher and that until 1986, no subsequent overtopping had occurred. According to Ameron and the Central Maui Landfill personnel, no overtopping has occurred since 1986.

The site ranges in elevation from approximately 210 to 310 feet msl and is located approximately 3 miles from the nearest shoreline, far inland from the coastal high hazard and 100-year flood boundary areas. Therefore, the site is not subject to the restrictions of 40 CFR §258.11 regarding landfills located in the 100-year flood plain.





3.2.8 Groundwater Resources

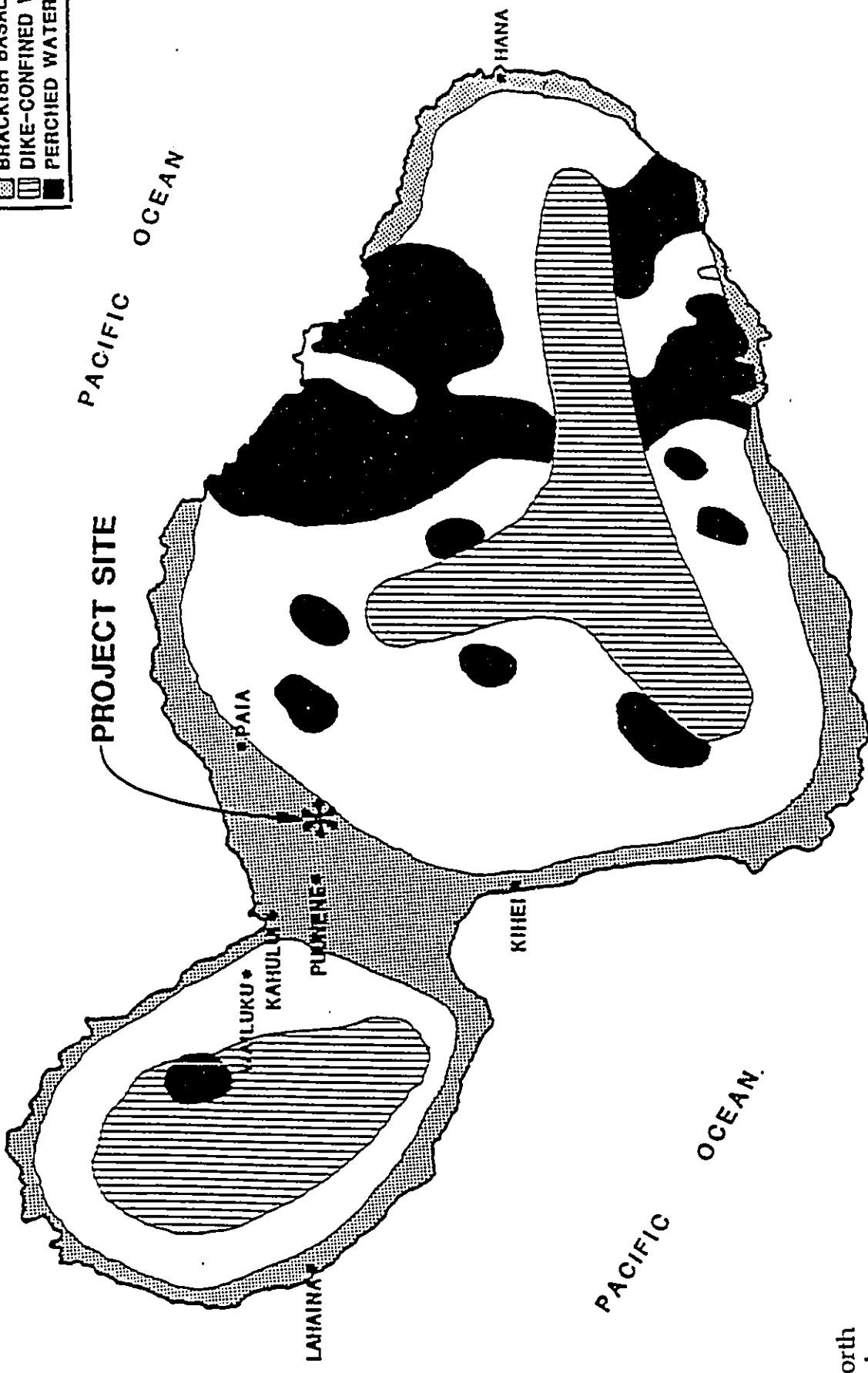
Fresh basal water, brackish basal water, dike-confined water and perched water make up the four types of principal groundwater resources on Maui (R.M. Towill Corp., 1986). The areas where these resources occur are illustrated in Figure 3-3.

As previously discussed (§3.2.3), bedrock beneath the landfill site is classified as Kula volcanic series basalt overlying Honomanu basalt. Stearns and MacDonald (1942) report that the Honomanu basalts are very permeable and yield large supplies of water to wells. The andesites of the Kula series are less permeable and in wet places commonly contain water perched on interstratified soils, conglomerate, or ash. These Kula ashy soil beds cause many perched bodies of water, some of which are broad and thick, when combined with extensive layers of fairly impermeable lava in areas of high rainfall.

East Maui has been divided by Mink and Lau (1990) into four groundwater sectors, the most westerly of which is the Central (03) Sector, which starts with the isthmus and extends to the northwest and southwest rift zones of Haleakala. The aquifer beneath the proposed project site is part of the Paia System of the Central Sector (Figure 3-4). Mink and Lau report that basal groundwater occurs in both the Kula and Honomanu formations, and that an effective sedimentary caprock is absent in this area.

The Paia System is characterized by two aquifers (Mink and Lau, 1990). The upper aquifer is high level (not in contact with seawater), unconfined (the water table is the upper surface of the saturated aquifer), and perched (on an impermeable layer). Mink and Lau (1990) use a status code to describe the development stage, utility, salinity, uniqueness, and vulnerability to

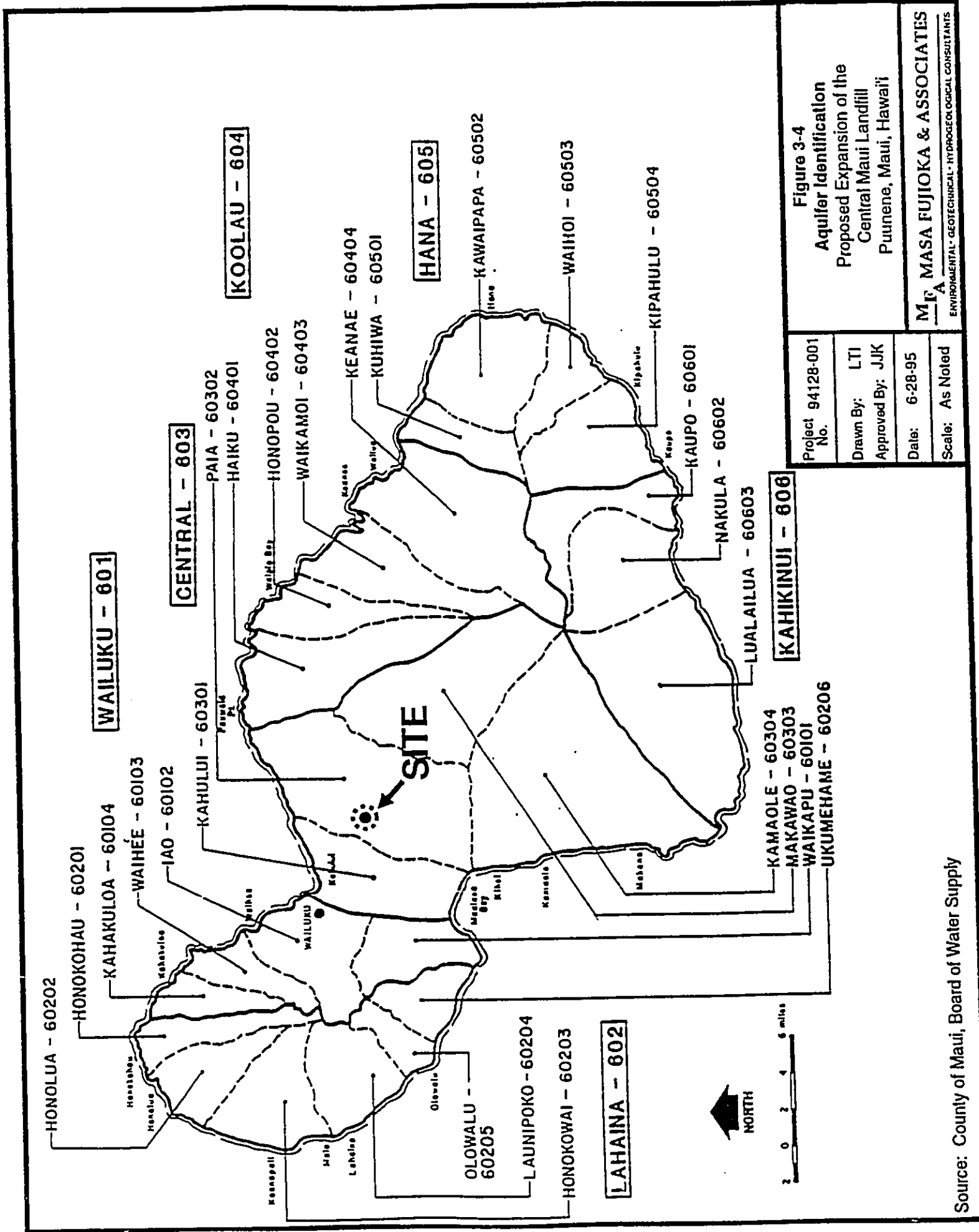
LEGEND	
	FRESH BASAL WATER
	BRACKISH BASAL WATER
	DIKE-CONFINED WATER
	PERCHED WATER



Project No. 94128-001	
Drawn By: LTI	Approved By: JJK
Date: 6-28-95	Scale: As Noted
Figure 3-3 Principal Groundwater Resource Areas Proposed Expansion of the Central Maui Landfill Puunene, Maui, Hawaii	
MASA FUJIOKA & ASSOCIATES <small>ENVIRONMENTAL • GEOTECHNICAL • HYDROGEOLOGICAL CONSULTANTS</small>	



Source: Final Environmental Impact Statement
 Central Maui Sanitary Landfill Project, March 1986
 Prepared by: R.M. Towill Corporation
 Figure 3-3



Source: County of Maui, Board of Water Supply

contamination of the aquifer. They classify the upper Paia aquifer as having no potential use for either drinking or other ecologically important uses, as low salinity (250 - 1000 mg/l Cl⁻), and as highly vulnerable to contamination but replaceable (Mink and Lau, 1990). These perched groundwater bodies, which were identified by Stearns and MacDonald (1942) to occur in ashy soil beds of the Kula series, may be limited in the vicinity of the site due to the low rainfall in the area. Quarry operations at the site have not encountered perched groundwater strata, and recently installed groundwater monitoring wells at the site did not encounter perched groundwater.

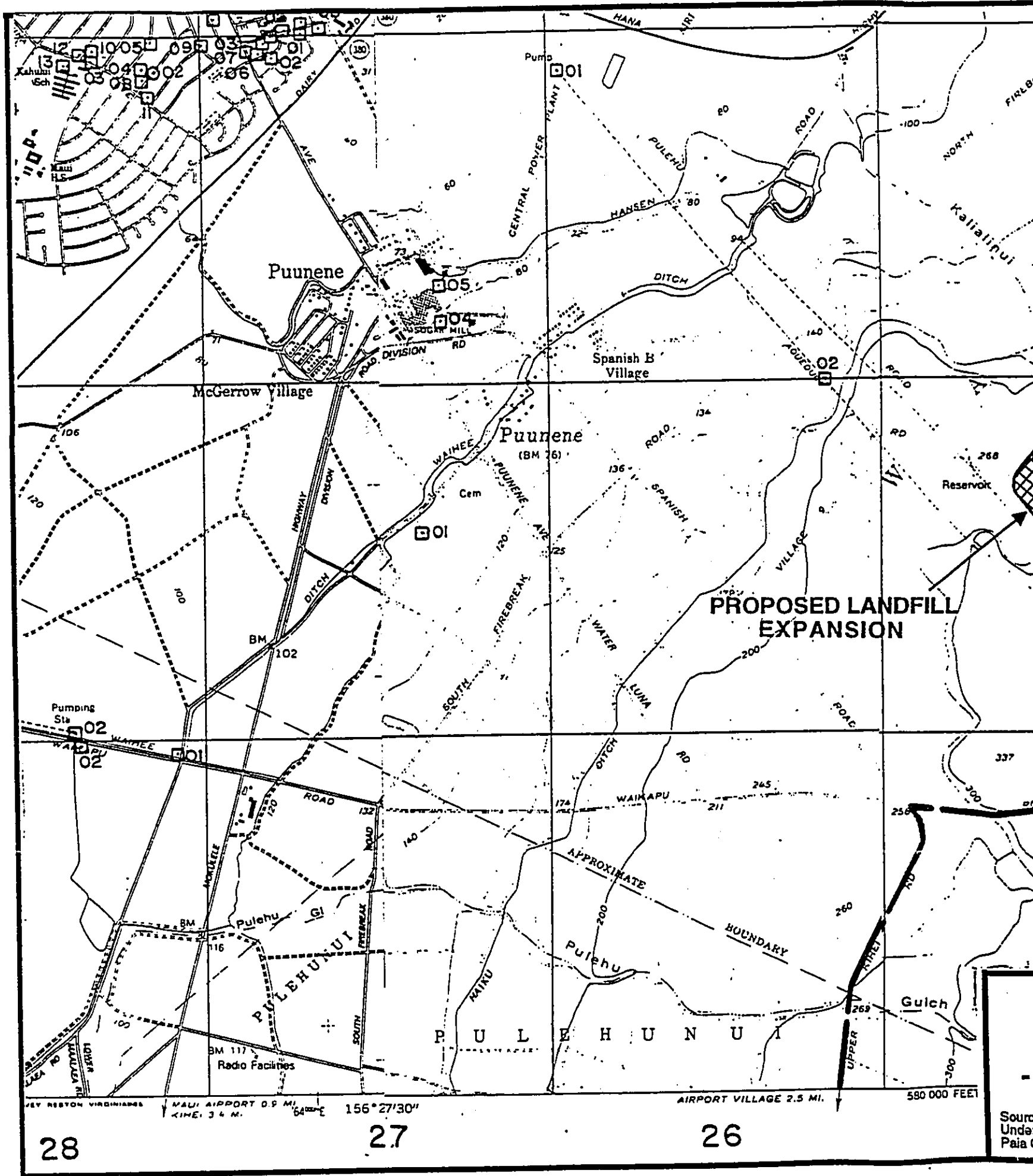
The lower aquifer is characterized by Mink and Lau (1990) as basal (fresh water in contact with seawater), unconfined (the water table is the upper surface of the saturated aquifer), and occurring in flank (horizontally extensive) lavas. Mink and Lau (1990) classify this aquifer as currently used for drinking water, as fresh (salinity < 250 mg/l Cl⁻), and as irreplaceable with a moderate vulnerability to contamination.

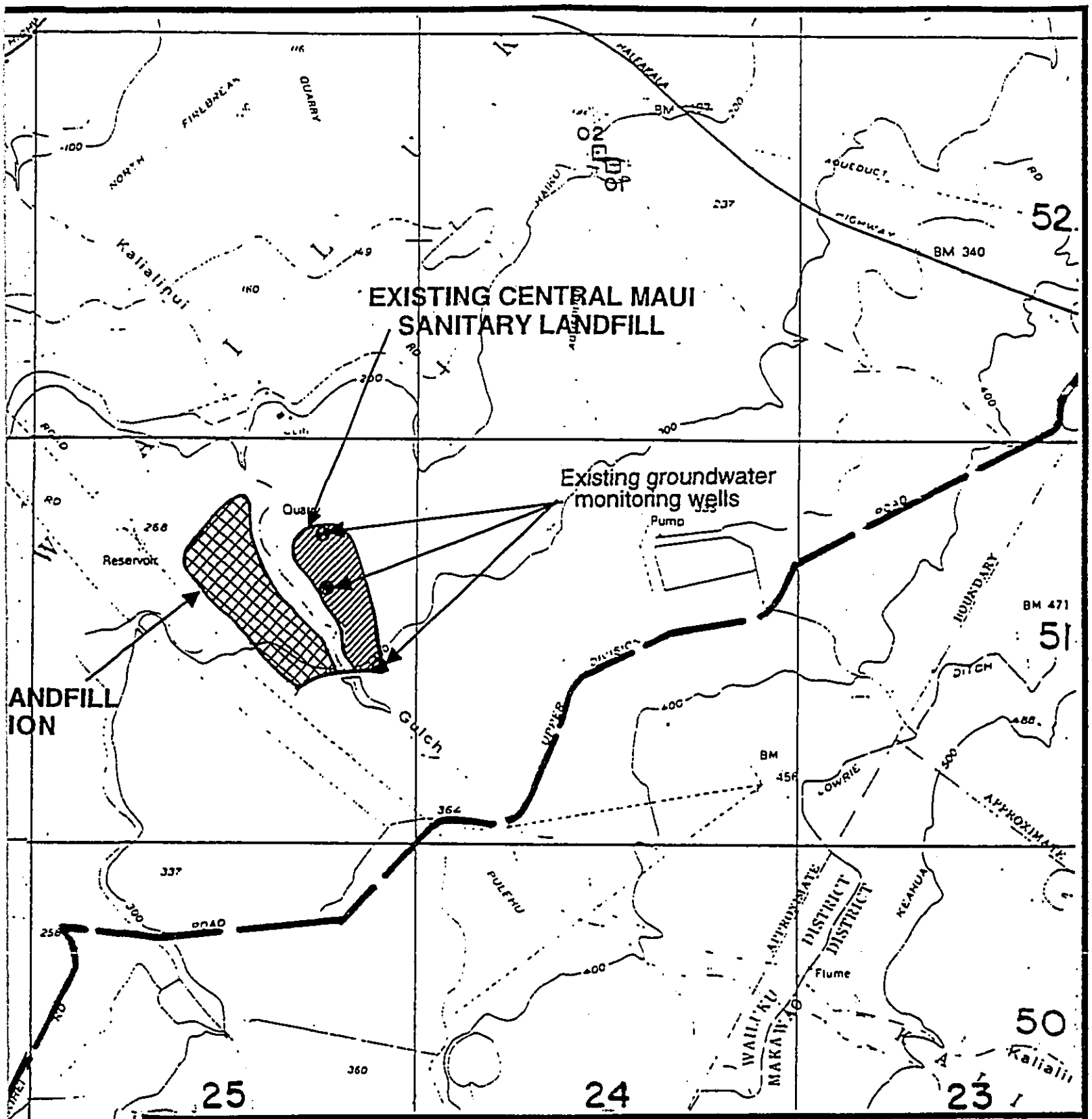
The drinking water well nearest the landfill site is a single well (# 6-5420-1) approximately 5.8 miles northeast of the site (DOH, 1983). This well is listed (DLNR, 1991) as located at the Maui High School, and owned by the State of Hawaii. The well was drilled in 1964 and has a total depth of 371 feet. Although this well is located within the same aquifer system as the Central Maui Landfill, the landfill is located hydrogeologically downgradient of the well and, therefore, will have no impact on the well. The Department of Water Supply does not have future plans to withdraw groundwater in the vicinity of the landfill (BWS, 1995).

Other wells in the area of the proposed project site are shown on Figure 3-5 and listed in Table 3-2. Wells are identified on Figure 3-5 and in Table 3-2 by the quad number and the well number; e.g., well 6-5226-2 represents island 6 (Maui), the quad's latitudinal identification (52), the quad's longitudinal identification (26), and the well number in that quad (2).

The nearest known well, well 6-5226-2 (Puunene Well 6) is used by Hawaiian Commercial and Sugar Company (HC&S) for irrigation of sugarcane fields. It is located about 3,000 feet northwest of the landfill site (Figure 3-5). This well was last reported in June 1994 to be used by two pumps (DLNR, 1995). The groundwater at this location is brackish, with a chloride content historically ranging from 350 to 450 mg/l (R. M. Towill Corp., 1986). This water is not potable since the chloride concentration exceeds the maximum permissible level of 250 mg/l as recommended by the National Secondary Drinking Water Regulations.

Two other HC&S groundwater wells (#6-5224-1 and #6-5224-2) are located approximately 1.5 miles northeast of the landfill and another well (#6-5226-1) is located approximately 2 miles northwest of the landfill. According to the Water Resource Management Division of the State Department of Land and Natural





LANDFILL EXPANSION

EXISTING CENTRAL MAUI SANITARY LANDFILL

Existing groundwater monitoring wells

Legend:

- ⊙ injection well
- ⊠ other well
- - - UIC Line

North
↑

Project No. 94128-001
 Drawn By: ALS
 Approved By: JJK
 Date: 12-12-95
 Scale: As Noted

Figure 3-5
Existing Wells and UIC Line Location
 Proposed Expansion of the
 Central Maui Landfill
 Puunene, Maui, Hawai'i

MFA MASA FUJIOKA & ASSOCIATES
 ENVIRONMENTAL • GEOTECHNICAL • HYDROGEOLOGICAL CONSULTANTS

Source: State of Hawaii, Department of Health
 Underground Injection Control Program
 Paia Quadrangle, 1983

580 000 FEET

TABLE 3-2 Wells Within Two (2) Miles of the Landfill

Well Number	Name	Owner	Total Depth (ft)	Year Drilled	Major Use	Draft (mgd)
6-5125-01*	MW-1	Maui County	318	1995	monitoring	NA
6-5125-02*	MW-2	Maui County	238	1995	monitoring	NA
6-5125-03*	MW-3	Maui County	258	1995	monitoring	NA
6-5127-01	Puunene	Maui County	165	not listed	other	not reported
6-5224-01	Haiku ditch	HC&S	204	1936	unused	not reported
6-5224-02	Puunene Pump 9	HC&S	202	1938	irrigation	11.2
6-5226-01	Puunene Pump 5	HC&S	48	1899	irrigation	7.0
6-5226-02	Puunene Pump 6	HC&S	176	1934	irrigation	18.2
6-5227-04	Puunene Pump 8	HC&S	not listed	1939	industrial	11.2
6-5227-05	Puunene Pump 19	HC&S	not listed	1952	industrial	9.9
6-5326-01	Old Pump 3	HC&S	not listed	1898	sealed	9.0

Source: DLNR, 1993.

* = Source: Masa Fujioka & Associates, 1995a.

NA = Not Applicable

Resources (DLNR), the chemical composition of the well water was not recently recorded (DLNR, 1995). Water from these three wells flows into the Haiku Ditch to provide irrigation water to many users, with usage depending on the rainfall and time of year. These sources also yield water with high chloride concentrations, generally ranging from 425 to 700 mg/l as last reported in 1974.

Three groundwater monitoring wells were recently installed around the perimeter of the existing Central Maui Landfill (Figure 3-5). These wells will be used to monitor groundwater quality; samples will be taken periodically to meet the requirements of HAR §11-58.1 and 40 CFR §258. Groundwater samples were collected from these wells in October 1995, November 1995 and February 1996. Appendix A summarizes the laboratory results and compares the data to available water quality standards. Additional groundwater monitoring wells will be installed to provide monitoring for the Phase IV landfill expansion.

3.2.9 Air Quality and Noise Levels

The air quality in this rural area of Central Maui is generally quite good, and noise levels are low (R. M. Towill Corp., 1986). The only significant generator of air pollutants and noise in the area is the existing quarry. Dust from quarry operations causes a localized degradation of air quality, and noise from quarry machinery and blasting can be substantial. However, prevailing winds normally direct dust and noise towards sugarcane fields. Transient and seasonal noise and air pollutants are also generated by sugarcane harvesting operations in the fields surrounding the landfill. Current landfill activities contribute very little to noise pollution in the area.

Co-composting activities (bio-solids and greenwaste) at the landfill have previously caused odor and potentially hazardous microorganism problems (Tanji, 1994a; Tanji, 1994b). The co-composting at the site was a pilot program operated in Phase III by a subcontractor. The County of Maui conducted an investigation, including air sampling, into the co-composting project set-up in 1993, following complaints about the operation.

As a direct result of this investigation, several steps were taken to eliminate the problems caused by the 1993 co-composting activities. The volume of green waste was increased to reduce the saturation of the waste by the sludge. The present co-composting project is run at a better C:N (Carbon to Nitrogen) ratio. An aerated static pile is used to reduce the amount of fugitive dust and air borne bacteria from escaping. A biofilter, wood chips, is placed over the static pile to act as a barrier to odor. The moisture level of the pile is maintained at 50% to promote the degradation of waste and to reduce fugitive dust emissions.

The current composting project is being operated by a new, qualified subcontractor. Co-composting is planned to be continued in Phase III during the construction of the proposed expansion. Existing air quality data for the proposed expansion area are not available.

3.3 HUMAN ENVIRONMENT

3.3.1 Population and Economy

Hawaii's gross State product topped \$29,324 billion in 1992. Tourism is the State's biggest industry. Spending by the federal government (mostly military) is next in importance. Agriculture is the next most important industry, with sugar, pineapple, and flowers the primary crops. Efforts are being made by the State to diversify its economic base by attracting regional corporate headquarters, organizing special sports, cultural, and entertainment events, promoting health and fitness activities, encouraging filming for TV and motion pictures, expanding trans-Pacific financial services, and processing and marketing seafood. Diversification has included a high-technology center in Maui which houses a super-computer. Hawaii's high land, labor, and materials costs contribute to a cost of living about 40 percent higher than the continental U.S. average (Office of State Planning, 1992).

Prior to the mid-1950s, agriculture was the mainstay of the economy on Maui. Sugar, pineapple, cattle and diversified truck farming were the chief agricultural activities. The population on Maui during the 1950s numbered approximately 38,000 people, with three sugar and six pineapple companies employing forty-seven percent of the work force. Between 1940 and 1960, approximately 11,000 people left Maui because the agricultural sector was static, affecting the rest of the business community (R. M. Towill Corp., 1986).

Tourism is now the main industry on the island and was responsible for a shift in the work force. From 1952 to 1977, the percent of Maui's work force in the agricultural industry dropped from 49 to 40 percent. During this same time period, the total number of jobs increased by 87 percent, primarily due to the tourist industry. The resident population also showed a dramatic expansion with a 45 percent increase between 1953 and 1975. Resident population growth was greatest in Kula, Kihei and Lahaina (including Kaanapali and Honolua). Most of the visitor-oriented condominiums and hotels are concentrated in West Maui and in the Kihei area (south coast) of East Maui. From 1970 to 1975, the resident population grew from 5,524 to 9,278 in the Lahaina area and grew from 3,670 to 9,347 in the Kula and Kihei areas (R. M. Towill Corp., 1986).

The town of Puunene, located approximately 2 miles west-northwest of the landfill, is the nearest development to the landfill. This town consists of an HC&S sugar mill, several dozen homes, two churches, a school, a park, a post

office, and a HC&S Company Museum (Masa Fujioka & Associates, 1995c). Puunene's population declined from 1,132 in 1970 to 572 people by 1980. More efficient operations at the HC&S sugar mill and the relocation of most of the residents from the HC&S-owned mill camp houses in Puunene to homes purchased in Kahului are cited as the causes of the population decline (R. M. Towill Corp., 1986). There are currently approximately 400 persons employed at the mill, including factory, maintenance, and administrative workers (HC&S, 1995).

3.3.2 Existing Land Use

Approximately 60% of the land in Hawaii is zoned as conservation land, partly because of the steep slopes and the need to preserve watersheds (UH Dept. Geography, 1983). National parks and recreational preserves are included in this percentage. Agricultural uses, plantation agriculture and cattle ranching utilize approximately 35% of Hawaii's land. Urban uses, including residential, commercial, and industrial uses, comprise approximately 4%, and non-residential military use comprises the remaining 1% of land use in the State. Urban uses in Maui generally consist of small towns and villages, many evolved from plantation homestead areas.

The federal, state, and county governments together control about 47 percent of the total land area. About four-fifths of these public lands (including Hawaiian Home Lands) belong to the State of Hawaii, and are controlled by the Department of Land and Natural Resources, the state's land management agency (UH Dept. Geography, 1983). These state lands constitute the bulk of the forest reserves or the conservation districts set aside by statewide zoning law. About one fifth of state land is leased, principally for farming. The reserve system protects unique natural resources, such as volcanic and other geological features and distinctive marine and terrestrial life forms. Private ownership of land is also highly concentrated: about 77 percent of the private land (53 percent of total land area) is in the hands of fewer than 40 landowners or landholding trusts.

Hawaii has strong land use controls at state and county levels. Hawaii was the first state to adopt a general plan for land use and to enact a statewide land-use zoning law (UH Dept. Geography, 1983). This law, passed in 1961, established the State Land Use Commission, whose task it is to classify and regulate the use of all lands in the State. Land uses within urban districts are administered solely by the counties. For agriculture and rural districts, the commission establishes regulations and the counties are responsible for their administration.

Many battles have been fought over the development of land (Fairbairn et al., 1991). On the one hand there is pressure to conserve agricultural land, and on the other, to develop land for tourism and to house a rapidly expanding population. Political leaders have responded to public fears of overdevelopment

by enacting numerous planning laws and forming various commissions. Environmental and citizen groups have opposed specific projects by testifying at hearings, filing lawsuits, and launching initiative campaigns.

The area around the Central Maui Landfill is zoned as agricultural. The landfill and quarry are operated under Special Use Permits. The landfill currently consists of three phases. Phase I and II are currently active landfill areas undergoing waste fill operations. These two active portions of the landfill are located in abandoned areas of an ongoing quarry operation. Phase III is located at the north end of Phase II but has not yet been used for landfill operations. It is currently being utilized by a co-composting (bio-solids and greenwaste) operation, and this use is planned to continue in Phase III. In addition, the quarry processing plant is operating in and around portions of Phase III.

The active quarry excavation is currently located in Phases IV and V. Quarry operations are planned to continue progressing southward between the gulch and Pulehu Road, progressing from Phases IV and V to Phase VI. The proposed landfill expansion will follow the completion of quarry operations in Phases IV, V and VI. A Special Use Permit for the proposed landfill expansion will be sought following approval of the EIS for the project.

3.3.3 Recreation

The area surrounding the Central Maui Landfill site, within at least a one-mile radius, is occupied by agricultural fields devoted to sugarcane cultivation. The closest public recreational facilities at Puunene School are located two miles away to the east-northeast.

The State Recreational Function Plan is updated by the State Department of Land and Natural Resources every five years. It reflects the needs of different communities for public recreational facilities regardless of state or county land ownership. According to the State Recreational Function Plan (State DPR, 1995), no public recreational facilities are planned for the vicinity of the Central Maui Landfill.

3.3.4 Archaeological and Historic Sites

There are no known significant archaeological or historic sites within or in the vicinity of the project site. This absence of significant archaeological or historic resources has been confirmed with State Department of Land and Natural Resources, Historic Sites Section (R.M. Towill Corp., 1986). The nearest registered historic site, the Maui Jinsha Mission, is located in Wailuku.

There is a small Japanese cemetery located approximately 1,125 feet from the northern border of the proposed expansion. The cemetery appears on many maps dated back to the 1940s, but is not listed as a historical site. It is located within the quarry operation on the northern side of the existing Central Maui Landfill. The cemetery is situated in the same area as the rock crushing operation, pre-stressed concrete operation, and the maintenance shed of the quarry. Tall grass surrounds the area of the cemetery and stones with Japanese writing mark the grave sites. We observed no evidence of recent maintenance of the cemetery (Masa Fujioka & Associates, 1995c).

3.3.5 Infrastructure

The main County road in the area is Pulehu Road, a paved two-lane road of generally good quality. Pulehu Road originates near the outskirts of Kahului and runs generally southeast to the village of Pulehu, which sits at about elevation 3,000 feet on the slopes of Haleakala. Vehicular access to the landfill is currently provided by a road southwest of the existing and proposed landfill phases (see Figure 2-1). This access road travels northeast from Pulehu Road to the weighing station and then into Phase I of the existing landfill. The road travels through Phase II to Phase III of the existing landfill. Access to the proposed Phase IV will be from Phase III via a ford across Kalialinui Gulch. A ford is currently utilized in this area by the quarry operation. An emergency access to Phase IV will be established as a separate road from Pulehu Road north of the proposed Phase IV.

There is no potable water supply available in the landfill or quarry area. Water is currently being provided to the landfill by water trucks. The site is not served by a public wastewater collection and disposal system; however, there is a lavatory located in the weighing station which is connected to a cesspool and water tank. The landfill expansion plans provide for the weighing station to remain in the same location and, therefore, the existing related infrastructure will remain in place.

Electric power and telephone service are provided to the quarry and the landfill via separate overhead utility lines that enter the site from the northwest.

4.0 THE RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE
PLANS, POLICIES AND CONTROLS FOR THE AFFECTED AREA

4.1 OVERVIEW

This section discusses the various land use plans and policies pertaining to the proposed sanitary landfill expansion. Other plans and regulations related to the proposed project are also discussed.

4.2 POLICY PLANS

4.2.1 Overview of Policy Plans

The State of Hawaii, the County of Maui, and the Community of Wailuku-Kahului have adopted general plans to guide the physical, social and economic development of the islands in general and Maui in particular. These general plans outline the objectives and policies that encourage the controlled development of Maui's resources (energy, economics, water, etc.). These policies provide a general framework for the proposed sanitary landfill expansion project, as described below.

4.2.2 Hawaii State Plan

On May 22, 1978, the Hawaii State Plan was signed into law. The Hawaii State Plan serves "as a guide for the future long-range development of the State; identifies goals, objectives, policies, and priorities for the State. The Plan provides a basis for determining priorities and allocating limited resources, such as public funds, services, human resources. It improves coordination of federal, state, and county plans, policies, programs, projects, and regulatory activities. And the plan establishes a system for plan formulation and program coordination to provide for an integration of all major state and county activities" (OSP, 1991).

The Hawaii State Plan objectives and policies that pertain most directly to the proposed Central Maui Sanitary Landfill are contained in Section 14 of the Plan:

Section 14: Objective and Policies for Facility Systems - In General

- (a) *Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, waste disposal, energy and telecommunication systems that support statewide social, economic, and physical objectives.*

(b) To achieve the general facility systems' objective, it shall be the policy of the State to:

- (1) Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.
- (2) Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.
- (3) Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user.
- (4) Pursue alternative methods of financing programs and projects and cost-saving techniques in the planning, construction, and maintenance of facility systems.

The proposed project responds to this general objective and its related policies. Design and implementation of the proposed landfill expansion will provide a waste disposal facility that supports statewide social, economic, and physical objectives. Specifically, the proposed landfill expansion will accommodate the needs of Maui's people for waste disposal facilities. The proposed expansion has been designed in a manner that promotes prudent use of resources and that accommodates public concerns and lessons learned from the existing landfill operations.

The operational plan and proposed leachate control system for the landfill expansion also responds to:

Section 15: Objectives and Policies for Facility Systems - Solid and Liquid Wastes

(a) Planning for the State's facility systems with regard to solid and liquid wastes shall be directed towards the achievement of the following objectives:

- (1) Maintenance of basic public health and sanitation standards relating to treatment and disposal of solid and liquid wastes.
- (2) Provisions of adequate sewerage facilities for physical and economic activities that alleviate problems in housing, employment, mobility, and other areas.

(b) To achieve solid and liquid waste objectives, it shall be the policy of this State to:

- (1) *Encourage the adequate development of sewerage facilities that complement planned growth.*
- (2) *Promote re-use and recycling to reduce solid and liquid waste and employ a conservation ethic.*
- (3) *Promote research to develop more efficient and economical treatment and disposal of solid and liquid wastes.*

The proposed project responds to the objectives and policies for solid waste. The proposed landfill expansion will clearly aid in maintenance of basic public health and sanitation standards relating to treatment and disposal of solid wastes, and will complement planned growth of Maui. Re-use and recycling of sludge and greenwaste through a co-composting operation in conjunction with the landfill reduces solid waste that would otherwise be landfilled, contributing to a conservation ethic. The design of the proposed landfill expansion provides efficient and economical disposal of solid waste at a geographically central and environmentally suitable site.

4.2.3 General Plan of the County of Maui

In 1980, the General Plan of the County of Maui was adopted as a comprehensive plan for the long-range development of the County. It provides for the general welfare and prosperity of the people of the County through objectives and policies of general, social, economic, environmental and design nature. Its intent is also to provide a framework for the more detailed Community Plans. The General Plan is currently being updated by the County of Maui (Hirose, 1995).

Within the General Plan, the Liquid and Solid Waste subsection (Subsection C) of the Utility and Facility Systems section contains the objectives and policies pertinent to the proposed project:

C. LIQUID AND SOLID WASTE

OBJECTIVE:

1. *To provide an efficient, safe, and environmentally sound system for the disposal of liquid and solid waste.*

POLICIES:

1. *Explore new waste disposal methods that are economical, environmentally sound, and aesthetically pleasing.*

2. *Continue programs for the development of Waste Disposal systems which are consistent with planned growth.*
3. *Set adequate public health standards for the treatment and disposal of liquid and solid waste.*
4. *Seek to develop methods of recycling waste materials.*

The proposed project is consistent with the objective and the four policies listed above. The proposed landfill expansion will provide a continuation of existing waste disposal services for the County of Maui. However, the design of the proposed expansion includes several measures, such as leachate control, use of a liner and groundwater monitoring, to provide a more efficient, safe, environmentally sound, and aesthetically pleasing landfill system than the existing landfill. To meet adequate public health standards for the treatment and disposal of liquid and solid waste, the proposed landfill expansion is being designed to comply with Federal "Subtitle D" (defined in Section 2.1) regulations for a sanitary landfill. Various waste disposal alternatives and methods of recycling waste materials are discussed in Section 7.0 of this document.

The General Plan is accompanied by a General Plan Map which depicts general land use guidelines. The portion of the General Plan Map which includes the project site is shown in Figure 4-1. According to this plan, the project site is located within lands intended for agricultural use.

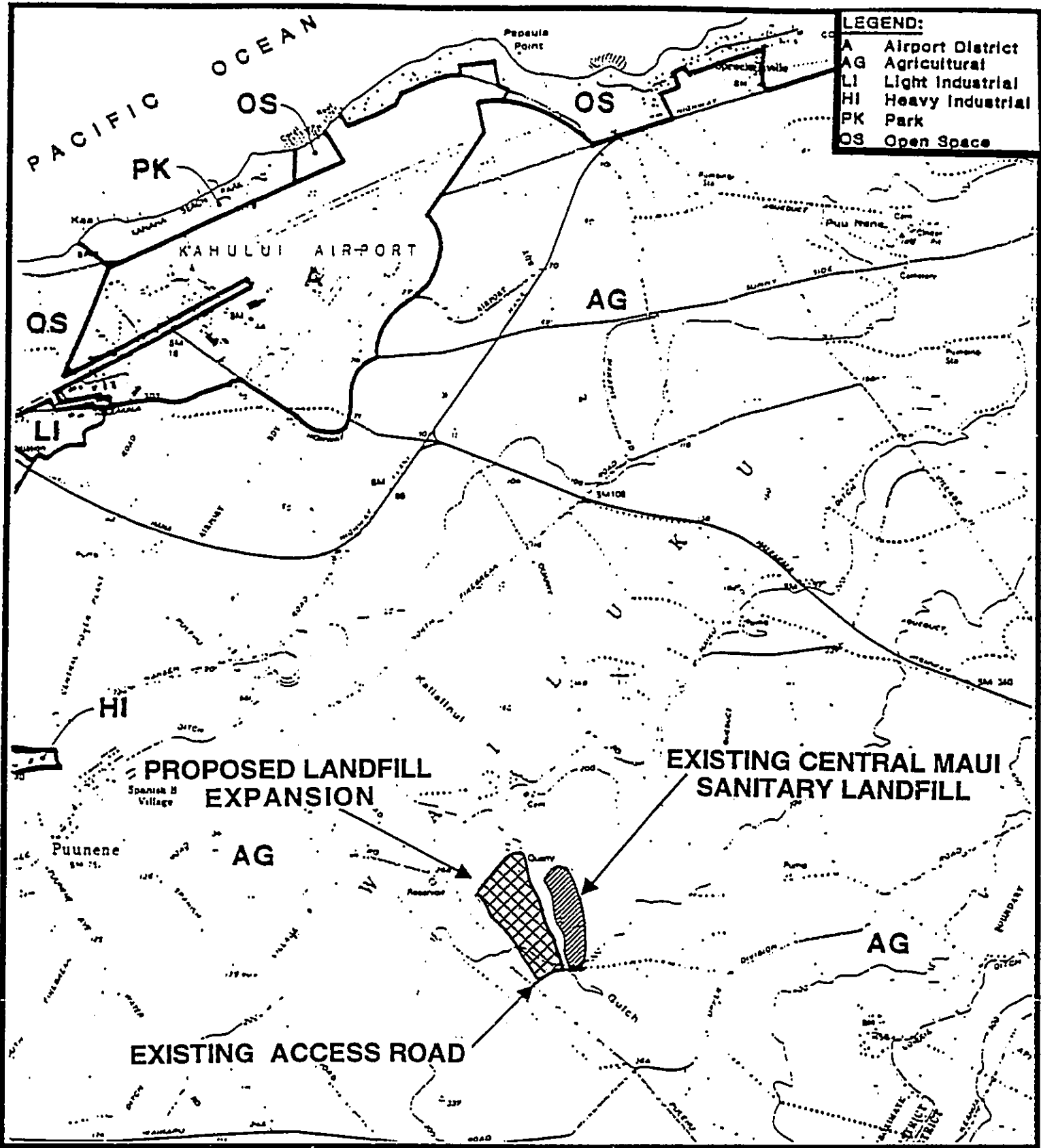
4.2.4 Wailuku-Kahului Community Plan

In 1981, a Community Plan for the Wailuku-Kahului area was initially developed to establish a program for implementing the County General Plan for the Wailuku-Kahului region (R.M. Towill Corp., 1986). The revision to the original plan is currently under review and has not yet been officially adopted. The Community Plan contains basic analysis and recommendations for the Wailuku-Kahului urban area, and the adjacent rural areas of Waihee to the north and Waikapu and Puunene to the southeast.

Among its many recommendations, the Community Plan addresses the issue of solid waste in the section on "SUPPORT SYSTEMS: TRANSPORTATION AND UTILITIES":

3. Liquid and Solid Waste

- c. *As part of the County-wide solid waste management study, address the needs of the planning region for disposal and transfer sites with more convenience to the residential areas. The collection system and location of disposal sites need to be improved to better serve residential areas.*



<p>Scale In Feet</p>	<p>North</p>	<p>Project No. 94128-001</p>	<p>Figure 4-1 Maui General Plan Map Proposed Expansion of the Central Maui Landfill Puunene, Maui, Hawai'i</p>
		<p>Drawn By: LTI</p>	
<p>Approved By: JJK</p>	<p>M_FA MASA FUJIOKA & ASSOCIATES</p>		
<p>Date: 6-28-95</p>	<p>ENVIRONMENTAL • GEOTECHNICAL • HYDROGEOLOGICAL CONSULTANTS</p>		
<p>Base Map: Final Environmental Impact Statement Central Maui Sanitary Landfill Project, March 1986 Prepared by: R.M. Towill Corporation Figure 4-1</p>	<p>Scale: 1" = 3000'</p>		

The proposed landfill expansion clearly addresses this concern to continue to provide a disposal site centrally and conveniently located.

The Wailuku-Kahului Community Plan Map shows the planned land uses for the community. The Community Plan Map portion showing the vicinity of the project site is presented in Figure 4-2. This plan also designates the area of the project site as agricultural land.

4.3 LAND USE REGULATIONS

4.3.1 Overview of Regulations

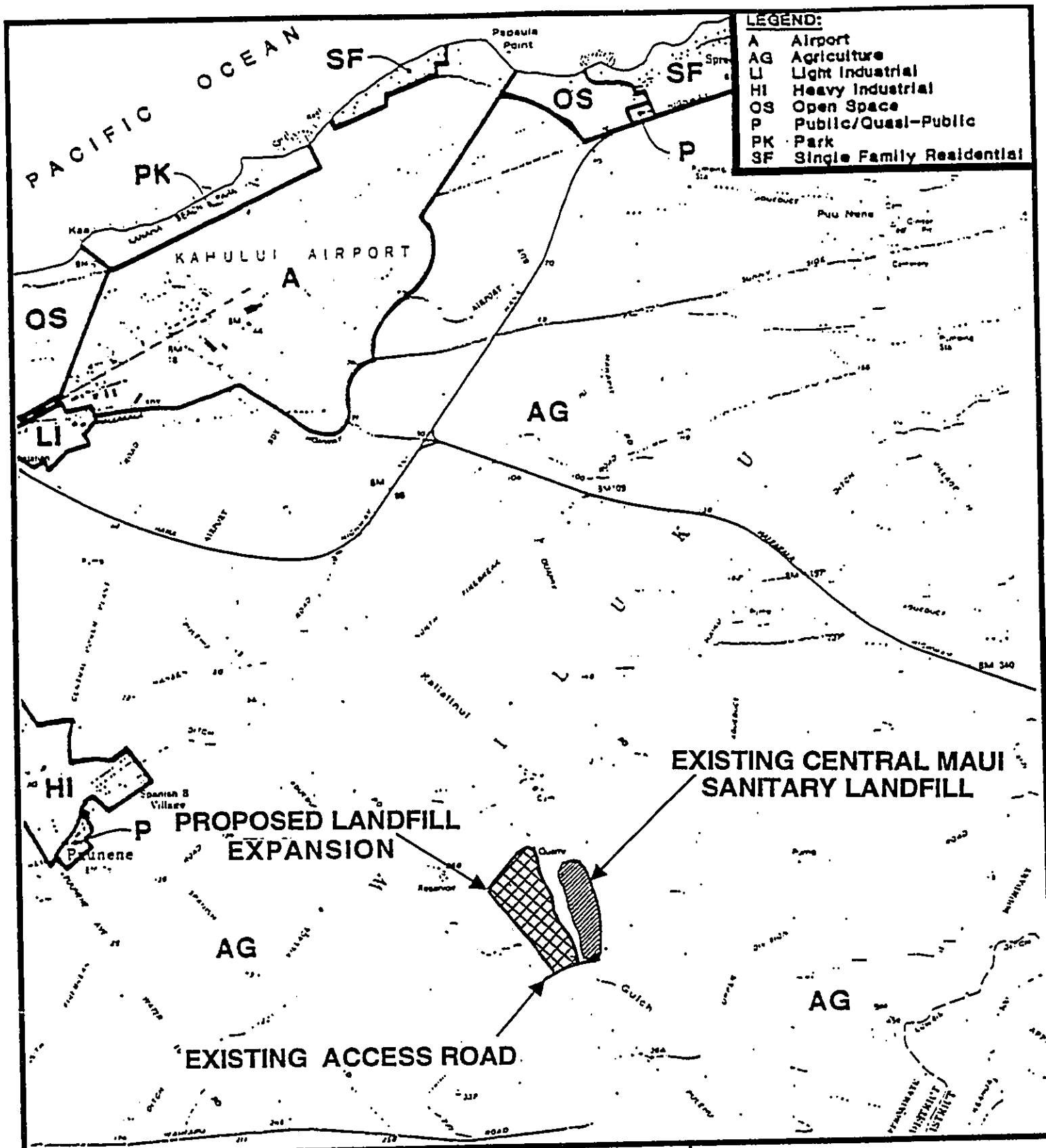
Land use regulations provide specific land use boundaries, land use classifications and permitted use with regulations. The boundaries determine whether or not projects are within the permitted uses of that land classification. The set of land use regulations which pertains to the development of the proposed landfill expansion project is the State Land Use District Regulations.

4.3.2 State Land Use District Regulations

In accordance with Chapter 205, "Land Use Commission," of the Hawaii Revised Statutes §205-2, all lands in the State of Hawaii are placed under one of four major land use districts. These classifications are: urban, rural, agricultural, and conservation. Regulations for permitting uses within each district are outlined in Chapter 205. State land use district maps are a supplement to Chapter 205 and show the boundaries of the four districts.

The current State land use district classifications for the area of the project site are shown in Figure 4-3. According to these classifications, the proposed project site is within an Agricultural District. Permissible uses within an agricultural district include cultivation of crops, game and fish propagation, certain private and public recreational uses, and certain utility installations such as roadways, utility lines, transformer stations, and solid waste transfer stations. Sanitary landfilling and quarrying activities are not included in the list of permitted uses.

Figure 4-3 indicates that a Special Use Permit (SP86-359) was obtained for the existing landfill by the County of Maui Dept. of Public Works in 1986. Figure 4-3 also indicates that prior Special Use Permits were issued to Concrete Industries for "rock products operation" (SP66-21 in 1966) and to Ameron for operation of a quarry (SP77-271 in 1977). These two permits were for the area of the existing landfill, for areas immediately to the north and east of the existing landfill, and for a small portion of Phases IV, V and VI, bordering Kalialinui Gulch (Figure 4-3). Following the approval of the EIS for the proposed landfill expansion, an application for a Special Use Permit will be completed.



0 3000 6000
 Scale In Feet

North

Base Map: Final Environmental Impact Statement
 Central Maui Sanitary Landfill Project, March 1986
 Prepared by: R.M. Towill Corporation
 Figure 4-2

Project No. 94128-001
 Drawn By: LTI
 Approved By: JJK
 Date: 6-28-95
 Scale: 1" = 3000'

Figure 4-2
Wailuku-Kahului Community Plan
 Proposed Expansion of the
 Central Maui Landfill
 Puunene, Maui, Hawai'i

MASA FUJIOKA & ASSOCIATES
 ENVIRONMENTAL • GEOTECHNICAL • HYDROGEOLOGICAL CONSULTANTS

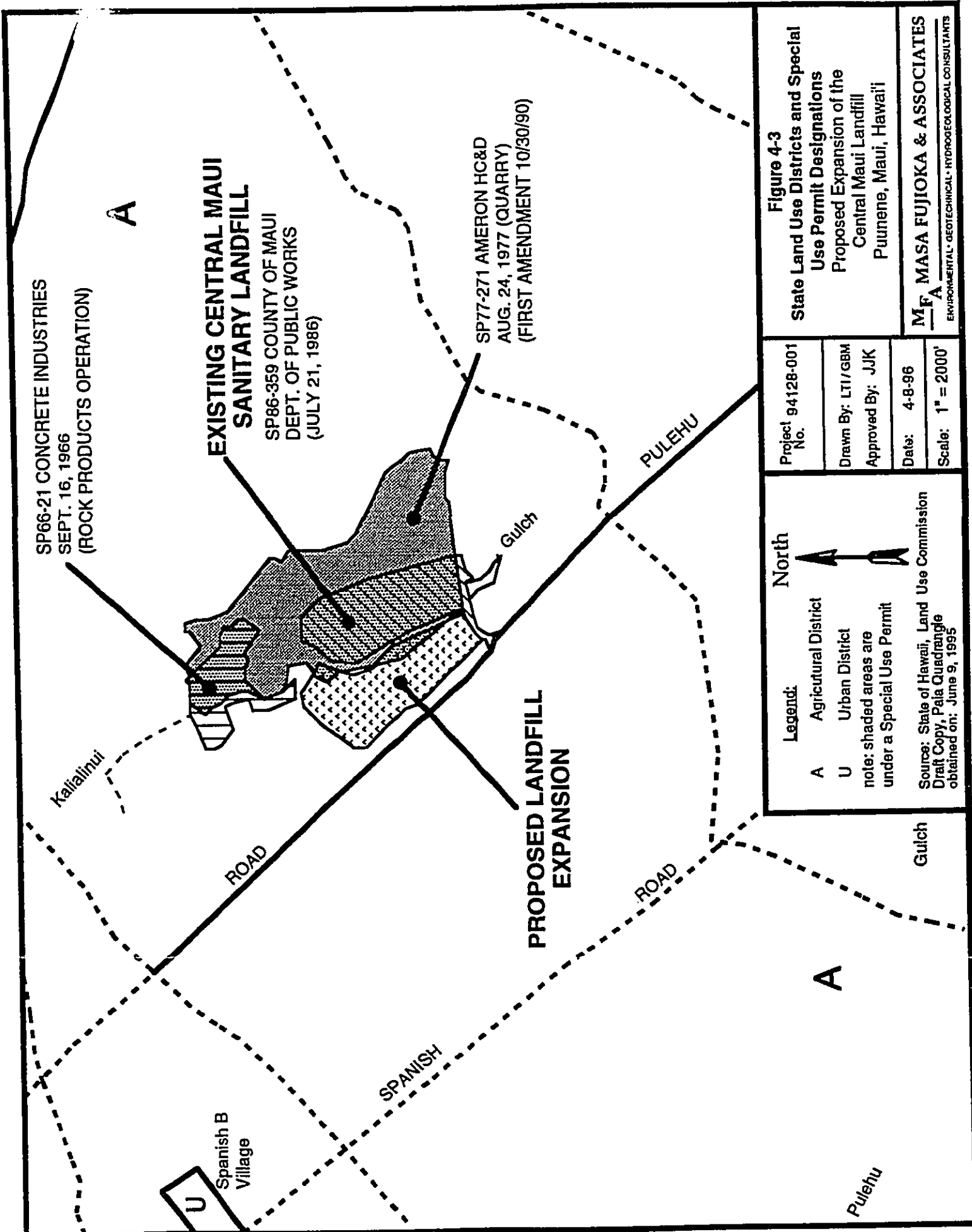


Figure 4-3
 State Land Use Districts and Special Use Permit Designations
 Proposed Expansion of the Central Maui Landfill
 Puunene, Maui, Hawaii

Project No. 94128-001
 Drawn By: LTI/GBM
 Approved By: JJK
 Date: 4-8-96
 Scale: 1" = 2000'

Legend:
 A Agricultural District
 U Urban District
 note: shaded areas are under a Special Use Permit

North

Source: State of Hawaii, Land Use Commission
 Draft Copy, Pala Quadrangle
 obtained on: June 9, 1995

M.F. MASA FUJIOKA & ASSOCIATES
 ENVIRONMENTAL • GEOTECHNICAL • HYDROGEOLOGICAL CONSULTANTS

4.4 OTHER PROGRAM CONTROLS

4.4.1 State Environmental Policy

The State recognizes the need for information on the environmental consequences of a proposed action in decision making (R.M. Towill Corp., 1986). Therefore, an Environmental Impact Statement is required for any project (HRS, 1992) that may have a significant effect on the environment by:

1. *using state or county lands or funds,*
2. *using land within a Conservation District set by the state land use commission,*
3. *using land within the shoreline area,*
4. *using land within any historic site designated in the National Register or Hawaii Register,*
5. *using land within the Waikiki area of Oahu, and/ or*
6. *requiring amendments to be made to the existing county general plans.*

The proposed Central Maui Landfill expansion will be county-funded and the large scale of the project indicates potential significant environmental impacts. This EIS has been prepared to comply with the State's environmental policy and to ensure that all environmental, economic and technical concerns are given appropriate regard.

4.4.2 Hawaii Administrative Rules

The Hawaii Administrative Rules, Title 11, were developed and are enforced by the State Department of Health. Chapter 58.1 of these rules outlines solid waste management control in Hawaii. These rules were finalized on December 15, 1993 and were last revised on January 13, 1994 (HAR, 1994).

The State Department of Health has set regulations for solid waste management control. The purpose of Chapter 58.1 is to establish minimum standards governing the design, construction, installation, operation, and maintenance of solid waste disposal, reclamation, recycling and transfer systems. The following objectives were set:

- 1) *Prevent pollution of the drinking water supply or waters of the State,*
- 2) *Prevent air pollution,*

- 3) *Prevent the spread of disease and the creation of nuisances,*
- 4) *Protect the public health and safety,*
- 5) *Conserve natural resources,*
- 6) *Preserve and enhance the beauty and quality of the environment.*

These general objectives were considered in the design of the existing Central Maui Landfill Expansion project. The proposed landfill expansion clearly responds to these general policies. Leachate collection and surface water control will protect groundwater resources. Compost management, dust control and a gas collection system will reduce potential degradation of air quality in the area of the proposed project. Daily cover and good housekeeping practices will protect public health and safety by preventing the spread of disease and the creation of nuisances. The location of the proposed project preserves the quality of the environment by conserving natural resources, locating a landfill in a former rock quarry.

The objective of the proposed project is to provide for a needed expansion of a current solid waste disposal facility located at a geographically central and environmentally suitable site. Along with these objectives, a permit for operation of the facility must be issued by the State in accordance with Hawaii Revised Statutes, Chapter 342H (HRS, 1995a), and the integrated solid waste management plan for the State of Hawaii.

(The) application for a permit shall be completed on forms furnished by the director and shall be accompanied by the following for approval:

- (a) Detailed plans and specifications for the facility;*
- (b) Certification of compliance with local ordinances and zoning requirements including the recording of its disposal facility with the bureau of conveyances;*
- (c) An operations report detailing the proposed method of operation, population, and area to be served, the characteristics, quantity, and source of material to be processed, the use and distribution of processed materials, method of processed residue disposal, emergency operating procedures, and the type and amount of equipment to be provided and the proposed ultimate use of the land;*
- (d) Other specific requirements as stated for each facility.*

A permit application for the operation of Phase IV of the Central Maui Sanitary Landfill Expansion will be filed with the Department of Health, Solid and

Hazardous Waste Management Division. Applications for operation of landfill Phases V and VI will be filed after the land has been purchased by the County and the facilities have been designed.

4.4.3 National Flood Insurance Program

The Flood Insurance Rate Map for Maui County, Hawaii (FEMA, 1989) was prepared by the Federal Insurance Administration to identify the severity and existence of flood hazards. It was also completed to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 and to aid in the planning of effective flood plain management.

The project site is located about three miles inland from the north shoreline of Maui. The site is designated as "Zone C" or an area of minimal flooding (FEMA, 1989). According to the National Flood Insurance Program, Zone C areas are not considered to be flood plain areas. Therefore, flood-proofing requirements and specific use restrictions are not required for the proposed landfill expansion. In addition, the site is not subject to the restrictions of 40 CFR §258.11 regarding landfills located in the 100-year flood plain.

4.4.4 State Underground Injection Control Program

In 1984, the Underground Injection Control (UIC) Program was established by the State Department of Health by the adoption of Administrative Rules, Title 11, Chapter 23, entitled "Underground Injection Control." The objective of this program is to protect the State's potable groundwater resources from pollution by subsurface wastewater disposal. UIC maps accompany the regulations by illustrating the location of a boundary line known as the "UIC Line." Lands that are makai (toward the ocean) of the UIC line are not restricted from subsurface wastewater disposal while lands that are mauka (inland) of the UIC line are restricted. In general, groundwater located makai of the UIC line is not considered to be a potential drinking water source.

The UIC line in the area of the project site is illustrated in Figure 3-5. The proposed site is located approximately 2,200 feet makai of the UIC line. Although no subsurface disposal is planned at the proposed landfill expansion, the site would probably not be restricted from subsurface disposal. In addition, the landfill design, including liner, leachate collection system, and groundwater monitoring system, will protect groundwater, even though groundwater in this area is not as environmentally sensitive as groundwater in areas above the UIC line.

4.4.5 Agricultural Lands of Importance to the State of Hawaii

The Agricultural Lands of Importance to the State of Hawaii (ALISH) system classifies the agricultural lands within the State of Hawaii (ALISH, 1977). This system was established by the State Department of Agriculture and includes the following three categories of agricultural lands:

- A. *Prime Agricultural Land - Land which has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed according to modern farming methods.*
- B. *Unique Agricultural Land - Land that has a special combination of soil quality, location, growing season, moisture supply, and is used to produce sustained high quality and or high yields of a specific crop when treated and managed according to modern farming methods.*
- C. *Other Important Agricultural Land - Land other than Prime or Unique Agricultural Land that is also of state-wide or local importance for agricultural use.*

Figure 4-4 illustrates the ALISH classifications for the lands in the vicinity of the proposed project site. The project site and all of the surrounding area are classified as prime agricultural land, with the exception of Kalialinui Gulch, which is not classified. The Land Study Bureau has also classified the area as having good productivity potential for agricultural uses, except within the quarry and gulch (see section 3.2.4).

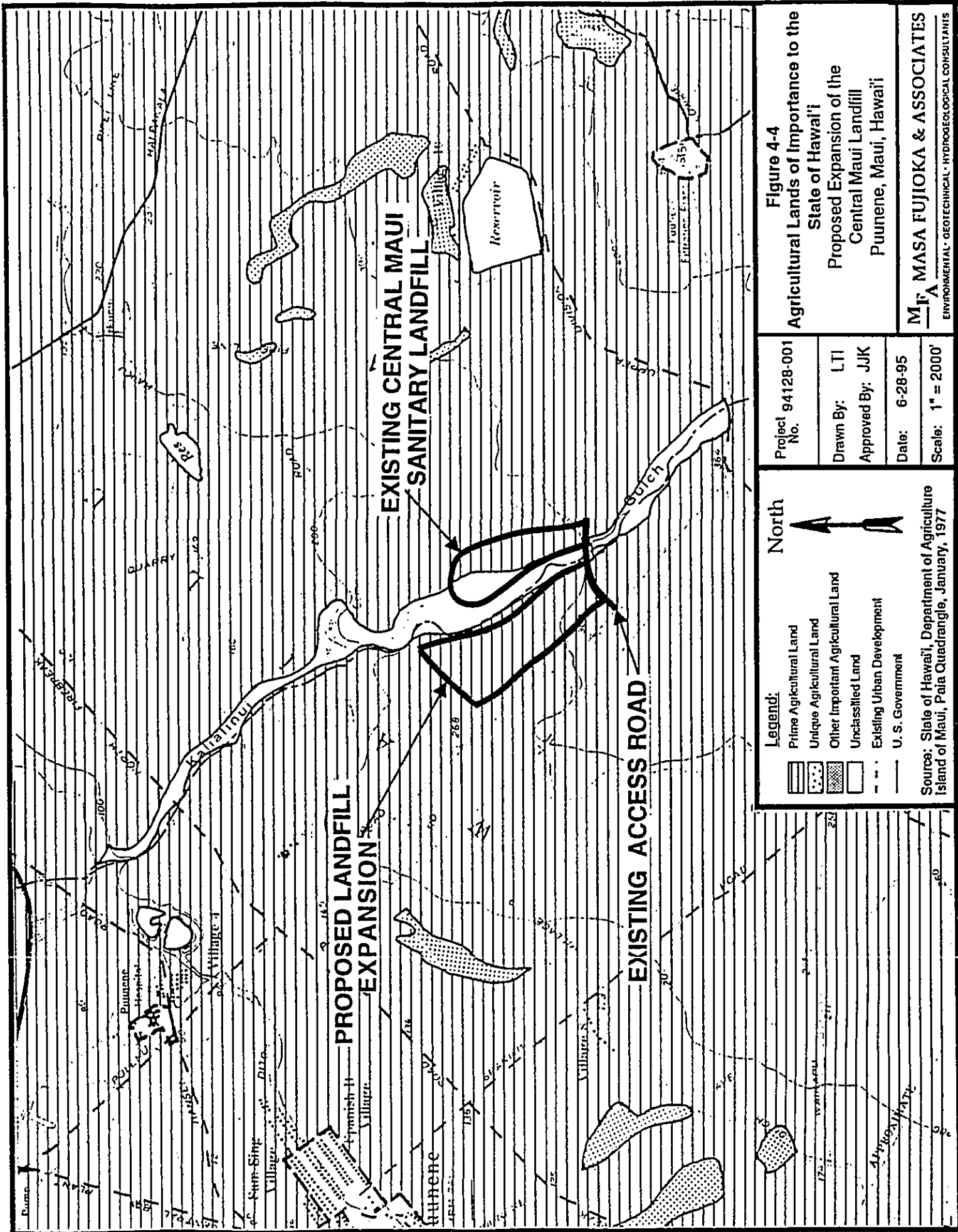
Although the project site is located within an area classified as prime agricultural land, the site is already a disturbed area and will be even more so when quarry operations progress. Use of the site as an extension to the Central Maui Landfill will not disturb activities on the adjacent agricultural lands, as the landfilling activities will make use of the mined areas.

4.4.6 Hawaii Coastal Zone Management Program and Special Management Area

The Hawaii Coastal Zone Management Program (HCZMP) was established to guide the development, protection, and use of the land and ocean resources within Hawaii's coastal zone (OSP, 1990). The Coastal Zone Management Area is defined as all lands of the State of Hawaii. The objectives of the HCZMP are stated in Chapter 205A of the Hawaii Revised Statutes (HRS, 1995b). Any significant development activity within the coastal zone is required by law to conform to the HCZMP objectives and policies. The objectives are listed below:

1. *Recreational resources; (A) Provide coastal recreational opportunities accessible to the public.*
2. *Historic resources; (A) Protect, preserve, and where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.*
3. *Scenic and open space resources; (A) Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources.*
4. *Coastal ecosystems; (A) Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.*
5. *Economic Uses; (A) Provide public or private facilities and improvements important to the State's economy in suitable locations.*
6. *Coastal hazards; (A) Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.*
7. *Managing development; (A) Improve the development review process, communication, and public participation in the management of coastal resources and hazards.*
8. *Public participation; (A) Stimulate public awareness, education, and participation in coastal management.*
9. *Beach protection; (A) Protect beaches for public use and recreation.*
10. *Marine resources; (A) Implement the State's ocean resources management plan.*

The proposed landfill expansion clearly responds to these general policies. The landfill's location and pollution control measures will serve to protect recreational, historic, scenic and open space resources and coastal ecosystems. The proposed expansion will provide a public facility that is highly important to the State's economy and that is in a suitable location. Public participation in the development process has been or will be invited at all appropriate stages of planning.



The HCZMP is expanded on the county level by the establishment of Special Management Areas (SMA) which control development along the shoreline. An SMA permit is usually required from the appropriate County agency for construction activity within the SMA. The SMA boundary line runs approximately parallel to, and 2,000 to 6,000 feet inland of, Maui's coastline. Therefore, the SMA is not applicable because the proposed project site is located outside this area.

4.4.7 National Pollutant Discharge Elimination System Permit

The National Pollutant Discharge Elimination System (NPDES) permit was established as a result of the 1972 amendments to the Federal Water Pollution Control Act (often referred to as the Clean Water Act or CWA). This program was initially established to regulate the obvious sources of contamination, such as industrial and sewage outfalls, of navigational waters. However, recent reports have shown storm water runoff from agricultural areas, urban areas, construction sites, land disposal, and resource extraction to be the major contributors to pollution now that the discharges of industrial wastewaters and municipal sewage plants are under strict control (R.M. Towill Corp., 1986).

The existing Central Maui Landfill currently diverts stormwater runoff into an on-site silting basin. In an event of an overflow of the basin, there is an outfall diverting the collected stormwater off the northern border of Phase III and into the Kalialinui Gulch. The County has applied for a NPDES permit for this operation as part of a group permit application. A NPDES permit application will also be completed for the proposed expansion.

4.4.8 Solid Waste Management Control

The requirements for solid waste management control through siting of solid waste management facilities under HAR §11-58.1 are discussed in this section. HAR §11-58.1-13 lists requirements and restrictions for siting MSWLFs in the proximity of airports, floodplains, wetlands, fault areas, seismic impact zones, unstable areas, and tsunami zones.

Concerning airport safety, there is one requirement that applies to the subject site: owners or operators of MSWLFs located within a five-mile radius of any airport runway end must notify the affected airport and the Federal Aviation Administration (FAA). Because the project site is located approximately 12,000 to 14,000 feet (2 miles) southeast of Kahului Airport, the County will have to notify Kahului Airport and the FAA of the proposed expansion. Effects of the landfill on the Kahului airport are considered in section 6.3.2.

There are many regulations that the owners or operators must comply with when siting a landfill in a 100-year floodplain. The proposed project does not lie in a 100-year flood plain or in a wetland; therefore, these regulations do not apply. For more details on these regulations, see HAR §11-58.1.

A new MSWLF or lateral expansion shall not be located in a wetland, a seismic impact zone, an unstable area, a tsunami zone, or within 200 feet of a fault area that has had displacement in Holocene time, unless the owner can make specific demonstrations of the landfill's integrity. The proposed project does not appear to be located in any of these areas. Specific references documenting the landfill site analysis are being compiled as part of the design and permitting process.

5.0 SUMMARY OF PROBABLE IMPACTS OF THE PROPOSED ACTION

5.1 OVERVIEW OF IMPACTS

This section discusses the probable impacts of the proposed expansion of the Central Maui Landfill. The impacts of the proposed action are classified as primary or secondary impacts. Primary impacts are those impacts which directly result from the proposed project, and secondary impacts are those that arise indirectly as a consequence of the project. Both impacts can be either short- or long-term. Short-term impacts are usually construction related, while long-term impacts can occur during landfilling operations and/or after the closure of the landfill. Many of the impacts listed are identical to the concerns faced by the design of the original Central Maui Landfill (R.M. Towill Corp., 1986).

The impacts listed in this section are potential impacts. Further analysis of the primary and secondary impacts will be performed following the review of the conceptual landfill expansion design and this EIS.

5.2 PRIMARY IMPACTS

5.2.1 Primary Beneficial Impacts

The proposed project will have primary beneficial impacts in the areas of human and physical environments, discussed as follows:

A. Human Environment

The primary beneficial impact of the proposed expansion of the Central Maui Landfill facility is long-term and will occur in the areas of public services and public health. The growing Maui community needs an adequate solid waste disposal system. The proposed landfill expansion will allow the Central Maui Landfill to continue to provide the County with a central, efficient, and environmentally controlled sanitary landfill. Preliminary estimates show that this proposed expansion will meet Maui's refuse disposal needs until at least the year 2016 (Bryan A. Stirrat & Assoc., 1994a).

The project will also have a beneficial short-term economic impact by increasing demand for goods and services from the construction industry during the landfill site preparation.

B. Physical Environment

The expansion of the Central Maui Landfill at the proposed location is ideal for many reasons. Landfilling following quarry operations is an

effective use of the land since the quarry will not be useful once mining has ceased and since the quarry operator is required by its lease agreement to return the land to its original condition, i.e. backfill. Although the area is designated as agricultural land, after quarrying, the proposed site has a poor productivity rating for agricultural uses. Landfilling operations will have some adverse effects on the surrounding agricultural areas. Litter, odor and the reduction of air quality are the primary adverse effects. However, these effects will be minimized through mitigative measures discussed in section 6.2.

The expansion will continue to provide a central and isolated area to conduct landfilling operations. It will also further utilize the ideal climate conditions which allowed the Central Maui Landfill to be placed at the current site. It is in a region of low rainfall, which minimizes leachate production, soil erosion, and refuse washout. There are no significant threats of surface water flooding or infiltration from the nearby intermittent water source, Kalialinui Gulch. Since the groundwater table is more than 200 feet below the current landfill floor and since groundwater is not used for drinking water in areas close to or downgradient of the landfill, there is little threat of contaminating drinking water supplies. The site is located below the State Department of Health UIC line and is far removed and cross-gradient from the existing public groundwater sources. The Department of Water Supply does not have plans to withdraw groundwater in this area.

There are no known historical or archaeological sites of significance in the area and landfilling operations are not likely to uncover such sites since the site was quarried. There are no endangered species of animals or plants residing in the proposed project location that would be disturbed by landfilling activities (R.M. Towill Corp., 1986).

5.2.2 Primary Adverse Impacts

The proposed project is anticipated to have similar potential adverse impacts as the existing Central Maui Landfill. These environmental impacts are in the areas of potential leachate production, erosion, impacts to flora and fauna, aesthetic impacts, air quality and noise, litter, and economy as discussed below.

A. Leachate Production and Water Quality

The primary potential adverse impact is leachate production and the potential contamination of surface water and groundwater resources. If improperly designed, developed, and/or operated, the project could

have significant adverse effects on the water quality in the vicinity of the landfill through the following processes:

- Contamination of nearby surface water bodies by contaminated surface water that may flow off the site.
- Contamination of the groundwater by the percolation of leachate through the landfill liner.
- Contamination of streams and other surface water bodies from springs and seeps originating from contaminated groundwater.
- Contamination of neighboring agricultural crops by lateral leachate migration.

The proposed landfill expansion will institute measures designed to mitigate potential groundwater contamination including a liner, a leachate collection system, surface water channeling and storage, and groundwater monitoring wells. The liner, leachate collection and surface water storage system should ensure the total containment of the leachate. However, it is extremely important that proper installation, operation, and maintenance is performed to ensure the effectiveness of the system. Details regarding the liner material and thickness, and the leachate collection and recovery system are discussed in section 2.3.4.

If the leachate escapes the leachate containment system, there will likely be some purification of the leachate by filtration through the 200 feet of rock above the groundwater water table. Additionally, groundwater monitoring wells will, in the event of a leak, allow early detection of contamination relative to the time it would take for contamination to be detected off-site, so that corrective action can be taken.

A leak in the landfill liner is considered highly unlikely due to the design of the liner and leachate collection system. The slope and impermeability of the liner results in only one location where leachate could collect to form a standing pool, i.e., the sump basin. For immediate detection of leaks near the sump, a lysimeter will likely be installed beneath the liner below the sump. The lysimeter will provide early detection of the presence of a leak.

B. Erosion

Heavy storms could cause sediments to wash off into Kalialinui Gulch. Such events could cause adverse impacts on conditions

downstream of the landfill. The construction of a sedimentation basin in the northern corner of Phase IV, daily cover, and berms to contain surface water are the three main erosion control methods included in the conceptual expansion design. These mitigation methods are discussed in greater detail in section 6.2.2.

C. Flora and Fauna

Solid waste landfilling may attract and encourage the proliferation of scavenger-type fauna. Rats, birds, and flies may lead to disease vector problems. Daily cover and good housekeeping methods, such as dust and litter control, will minimize these problems.

D. Visual Impact

The proposed landfill expansion project will have adverse visual impacts due to the fact that the proposed site is located along Pulehu Road. The proposed expansion will be within view of residents and tourists who use Pulehu Road. A perimeter design, such as trees, will be implemented in order to mitigate the visual impact of landfilling activities.

E. Air Quality and Noise

Adverse impacts on air quality and noise for the proposed project are similar to those endured with the existing Central Maui Landfill with the exception of the co-composting operation which will not be a part of the expansion project. Short-term and long-term adverse impacts of dust, hydrocarbon emissions, noise, odor, and landfill gases will arise from construction and landfilling activities. These vectors will primarily affect the construction workers and landfill operators. Short-term effects will be sustained primarily during the construction of the proposed expansion. Long-term odor generation problems may also arise from decomposing refuse and landfill gases. Construction management measures (i.e., dust control and "good housekeeping"), the landfill gas collection and extraction system, use of appropriate cover, and the remote location of the site, are expected to minimize these adverse effects.

Previously, there have been odor problems with the co-composting project at the Central Maui Landfill. The new operator has upgraded to an aerated system which controls air flow through a static pile with pumps and piping. Wood chips are added to the pile to act as a barrier to odor. Maintenance of the compost moisture content and better housekeeping procedures also help to reduce odor and fugitive dust.

The co-composting operation is planned to continue at its current location; no additional composting is planned for the landfill expansion. With proper management procedures, odor problems should be eliminated entirely.

F. Litter

There have been significant problems with litter at the Central Maui Landfill. Plans for litter control programs are underway to minimize this adverse impact at the present landfill, as well as at the proposed expansion. Details of these plans are discussed later in section 6.2.6.

G. Economy

The expansion to the Central Maui Landfill may adversely impact the island's economy by placing a large capital expenditure on the County to establish the facility. However, this impact will be reduced by dividing the project into three construction increments, according to Phases IV through VI. The conceptual design of Phase IV is included in this EIS. Engineering design of Phases V and VI are planned for later dates, after quarrying operations have been completed in these areas and the land has been purchased by the County.

H. Archaeological and Historic Sites

The uncovering of new archaeological or historic sites or remains is not anticipated since quarrying operations have/or will have removed all the topsoil and approximately 40 feet of rock in the proposed expansion areas. However, excavation work will be performed to grade the landfill floor following cessation of quarry operations, and sites or remains may possibly be encountered. Caution will be taken during construction activities and the State Historic Sites Office will be contacted immediately if such remains or sites are uncovered.

5.3 SECONDARY IMPACTS

5.3.1 Secondary Beneficial Impacts

The secondary beneficial impacts of the proposed project in the area of physical environment and economy are discussed below.

A. Physical Environment

The establishment of the proposed expansion will benefit the Maui community by permitting the closure of the original Central Maui Landfill once it has reached its design capacity. This would prevent the possibility of the "over-landfilling" of the current landfill and also eliminate the present need to locate another landfill at a different site. Allowing the current landfill to close at its design capacity will eliminate many unwanted and preventable problems.

B. Economy

Rather than constructing another landfill to meet the needs of Maui residents in a different location, the proposed expansion will minimize the cost of opening a new landfill. Truck routes will not have to be changed, workers will not have to relocate, and additional utilities will not have to be constructed. Continuing operation of the Central Maui Landfill will be easier and more cost effective than a new landfill location. Also, the proposed site may have adequate cover material on-site from previous quarrying operations, reducing off-site transportation costs.

5.3.2 Secondary Adverse Impacts

The potential secondary adverse impacts of the project are in the areas of physical environment, scavenger bird migratory patterns, economy, and traffic.

A. Physical Environment

The existing quarry operations are planned to proceed south from Phases VI and V and into Phase VI. The new landfilling operations may create problems (such as additional fugitive dust generation, odor, and traffic congestion) and other adverse secondary impacts on the existing quarry operations.

B. Scavenger Bird Migratory Patterns

Sanitary landfills commonly attract scavenger animals such as rodents, birds, and flies that feed off refuse. Most of these animals are inhabitants of the vicinity and their migrations patterns are short in length. One exception to this pattern are cattle egret, which are known to scavenge at landfills. The egret is known to travel relatively long distances from its roosting area to its feeding area. This problem was evaluated in the Final EIS for the Central Maui Landfill. R. M. Towill Corp. (1986) reported that both the U.S. Fish and Wildlife Service and

the Airports District Office of the FAA determined that the landfill would result in little potential for increased bird hazards in aircraft flyaway patterns. We have also observed seagulls feeding at the existing landfill (Masa Fujioka & Associates, 1995c). Details of proposed mitigative methods are discussed in section 6.3.2.

C. Economy

The proposed expansion may have the same adverse impact on Maui's economy as the original Central Maui Landfill. The expansion of the landfill facility may encourage more rapid urban expansion and a corresponding increase in the cost of goods and services in the area, by relieving the pressures of solid waste management.

D. Traffic

The development of the proposed project may have some adverse effects on the traffic flow in the Central Maui Landfill area. The entrance to the expansion must be properly designed to prevent the possibility of traffic hazards. Safety measures must be implemented in order to prevent such adverse impacts of the project.

The possibility of another intersection has been put forth by the County of Maui (Masa Fujioka & Associates, 1995a). However, the conceptual design of the proposed expansion does not include an additional intersection. The entrance to the proposed expansion will be through the original Central Maui Landfill entrance and there will be an emergency entrance through the western corner of the proposed Phase IV. There will be a temporary increase in traffic due to the construction of the proposed expansion. However, since a landfill is already in operation at the site, no additional long-term traffic is anticipated during landfill operations.

6.0 PROPOSED MITIGATION MEASURES TO PROBABLE AND UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

6.1 OVERVIEW OF MITIGATION MEASURES

This section discusses proposed mitigation measures for minimizing unavoidable adverse impacts which were presented in the previous section.

6.2 PRIMARY ADVERSE IMPACTS AND MITIGATION MEASURES

6.2.1 Leachate Production and Water Quality

Previous experience with existing landfills has shown that pollution problems arise essentially from the leaching of contaminants from wastes by infiltrating precipitation, surface water and/or groundwater, and the subsequent migration of these contaminants away from the site (R. M. Towill Corp., 1986). The waste to be accepted at the proposed expansion will be primarily dry and will not produce a significant amount of leachate. Leachate can be produced from infiltrating rain, surface or groundwater which extracts contaminants from the refuse. By proper site selection and mitigative measures, this problem can be avoided.

The proposed project will be located adjacent to the existing Central Maui Landfill. This landfill is located in a region of low rainfall and is not in a flood plain area, which minimizes the chances of infiltration by rainfall or surface water. Additionally, the groundwater table lies over 200 feet below the proposed expansion floor, thus minimizing the chances of groundwater infiltration.

These ideal physical characteristics of the site will be combined with drainage control, a landfill liner, a leachate collection and removal system (LCRS), and groundwater monitoring, further reducing the chances of leachate contamination. Any leachate that accumulates in the LCRS sump will be pumped into an above-ground storage tank for eventual final disposal at a Publicly Owned Treatment Works (POTW). The volume of leachate produced is anticipated to be small, due to the factors mentioned above. Therefore the leachate disposal will have a minimal impact on the operation of the POTW.

The eastern boundaries of Phases IV, V and VI will border Kalialinui Gulch. The proposed landfill berm and liner system designed for Phase IV will prevent waste material from falling down the slope into Kalialinui Gulch. The proposed stormwater control system for the landfill expansion will prevent water moving across the landfill and eroding waste material from the slope into the gulch. The landfill operations will include appropriate maintenance of the gulch near the landfill, including removal of litter, removal of obstacles in the gulch that might cause restricted flow conditions and subsequent scouring of the landfill

boundary, and maintenance of crossing areas. The groundwater monitoring system will provide early detection of degradation to groundwater quality so that prompt corrective action can be initiated if necessary.

6.2.2 Erosion

Despite the fact that the proposed site is located in a region of low rainfall, a heavy storm event could cause erosional problems since earthwork is occurring continuously. Stormwater runoff from the developing expansion could carry soil cover, loose refuse, or contaminated soil out of the landfill and into the Kalialinui Gulch, potentially resulting in soil and refuse accumulation in the gulch.

Erosional problems will be avoided by implementing proper erosion control measures. Soil erosion and refuse washout problems will be avoided by covering the refuse with soil at appropriate intervals and adequately compacting both refuse and soil. Additional erosion control procedures include surface grading and drainage toward the sedimentation pond. After landfill closure, the landfill will be capped with a liner (with a permeability of 10^{-7} cm/sec or less) which will minimize erosion of soil and refuse. Erosion control measures to eliminate stormwater runoff and runoff are included in section 2.3.4.

The potential for wind erosion of the waste will be reduced by using two mitigative measures. First, new, specially designed wheels on the compactor will increase the density of the waste in the landfill. This will reduce the amount of litter due to the wind. Second, daily cover over the waste material will weigh down the compacted waste to further reduce the amount of litter due to the wind.

6.2.3 Flora and Fauna

The project site is currently being utilized by quarry operations. As a result of this activity, the area designated as Phase IV will be relatively barren with no significant animal inhabitants. However, landfilling operations will attract scavenger-type animals such as rats, birds, cats, dogs, and flies which may lead to disease vector problems. Numerous birds, particularly seagulls, have been feeding at the existing landfill (Masa Fujioka & Associates, 1995c). Refuse compaction and daily soil covering are mitigative measures that will be taken to reduce this problem.

6.2.4 Visual Impact

Adverse visual impacts are anticipated due to the location of the proposed expansion adjacent to Pulehu Road. Construction activities will occur during

the site preparation of each incremental phase, providing temporary visual impacts. During landfilling operations, the visual impact of the exposed refuse will be mitigated by soil covering. Vegetation (tree barrier) and fencing will be installed along the western border of the expansion to minimize the visual impact of the landfill on Pulehu Road travelers.

6.2.5 Air Quality and Noise

Odors, fugitive dust, fuel emissions, and noise are expected from short-term construction activities and long-term landfilling operations. These problems are unavoidable due to the nature of the proposed activity. However, the impacts can be minimized through proper mitigative steps and will cease after the closure of the landfill.

Adverse impacts can be greatly reduced through proper construction, operation, and maintenance of the entire landfilling operation. Odor problems will be minimized through good housekeeping procedures, such as proper waste handling and soil covering. The impacts of air pollution on adjacent properties will be minimal. The prevailing winds will favor movement of airborne particulates toward the south and southwest where there are canefields and no major urban areas. A section of Pulehu Road, however, is located downwind of the landfill. Travellers on this section Pulehu Road may be affected by odor from the landfill.

Existing quarry operations are planned to continue in the proposed Phase V and VI during the construction and operation of the proposed landfill in Phase IV. The noise and fugitive dust from the mass grading, blasting, drilling, and stone-crushing activities surpass the noise and fugitive dust that would be created by landfill operations (Masa Fujioka & Associates, 1995c).

Carbon dioxide, methane, and hydrogen sulfide are the three most common gases produced by the decomposition of solid waste. These gases can be toxic and even explosive in high concentrations. The gas collection system will relieve internal gas pressure after closure and prevent gas and odors from emanating uncontrolled from the landfill. Without the gas collection system designed into the proposed expansion, the lined cap could detach from the ground surface causing damage to the liner.

6.2.6 Litter

A 6-foot high chain link fence surrounds the perimeter of the existing landfill to prevent litter from entering the neighboring areas. Temporary fences were installed along the landfill floor during incremental landfilling. However, these measures have not provided the level of litter control needed at the Central

Maui Landfill. Litter has scattered around the area of the landfill and outside the landfill boundaries (Masa Fujioka & Associates, 1995c). The County has responded by contracting with Kalima O Maui to pick up litter. Their efforts have reduced the problem at the existing landfill.

To reduce litter problems encountered by the proposed expansion, Masa Fujioka and Associates is currently designing a litter control plan for the existing Central Maui Landfill and the proposed expansion. Planned activities include: (1) improved wheels on the compactor to increase compaction and reduce the amount of litter that is carried away by the area winds; (2) portable litter control fences at the working face of the landfill; and (3) a transfer station to provide residents and small commercial handlers with a place to deposit municipal waste, thus keeping them off the working face so that the County can better control the size of the face and manage the waste compaction. These measures ensure a greater control over litter. In addition, tight windbreak belts of trees and other vegetation are being considered in the Phase IV design. These barriers would help prevent litter from blowing into surrounding areas.

6.2.7 Economy

The potential burden of a large capital expenditure on the County will be reduced by dividing the project into three construction increments, namely Phases IV, V, and VI. The proposed design of Phase IV has been included in this EIS. Engineering design of Phases V and VI are planned for later dates, after quarrying operations have been completed in these areas and the County has purchased the land.

6.2.8 Archaeological and Historic Sites

The uncovering of new archaeological or historic sites or remains is not anticipated since quarrying operations have/or will have removed all the topsoil and approximately 40 feet of rock in the proposed expansion areas. Excavation work will be performed to grade the landfill floor following cessation of quarry operations. Despite the unlikelihood of unearthing unidentified sites or remains, caution will be taken during construction activities and the State Historic Sites Office will be contacted immediately if such remains or sites are uncovered.

6.3 SECONDARY ADVERSE IMPACTS AND MITIGATION MEASURES

6.3.1 Physical Environment

The existing quarry and HC&S agricultural operations will continue in the areas designated as Phase V and Phase VI during the construction and operation of Phase IV. Quarrying, agricultural, and landfill operations must coordinate with each other in order to minimize conflicting activities between the two sites. A detailed plan will be developed once the design of the proposed Phase IV has been completed. The County is currently working with Ameron to coordinate activities in the expansion area.

6.3.2 Scavenger Bird Migratory Patterns

Recent discussions with the FAA Airports District Office indicate that the scavenger bird migratory patterns to the existing Central Maui Landfill do not pose a problem to the Kahului Airport (FAA, 1995). Since the proposed project is not being located at a new site, scavenger bird migratory patterns are not expected to change. However, if problems with scavenger bird migratory patterns should arise in the future, proper mitigative measures will be included in the landfill operations plan.

6.3.3 Economy

Although expansion of the landfill will be needed to serve the present population of Maui, the establishment of this landfill may encourage a more rapid urban growth. A new utility sometimes results in acceleration of development in the vicinity, as the utility is ready to use without immediate concerns for reaching its capacity. In turn, accelerated growth could result in the landfill expansion reaching its capacity prior to the projected time. However, the proposed landfill expansion will be developed in phases based on population growth as planned by the County and State.

6.3.4 Traffic

Due to the variety of activities currently at the site and in the site area (i.e. quarrying, agriculture, composting and landfilling), a traffic control plan will be developed. Currently, refuse delivery vehicles, HC&S traffic, and quarry vehicles are using the access road into the Central Maui Landfill. During the development of the project, construction vehicles will be added to that traffic.

For the proposed expansion, all traffic will be directed through the existing Central Maui Landfill entrance. Only County vehicles, large commercial haulers, and quarry vehicles will be allowed to cross the Gulch into Phase IV. A transfer station at the existing landfill will be provided for others. Only emergency access/exit will be allowed directly from Pulehu Road to the proposed Phase IV.

7.0 ALTERNATIVES TO THE PROPOSED ACTION

7.1 OVERVIEW OF ALTERNATIVES

Alternatives considered to the proposed action were the no-project alternative and solid waste disposal by incineration. The no-project alternative is typically considered when contemplating a new project. In 1980, the County of Maui selected and studied solid waste incineration as a disposal alternative and an alternate energy source. These alternatives were determined to be undesirable for the reasons discussed below.

7.2 NO-PROJECT ALTERNATIVE

The no-project alternative infers that no new solid waste site will be developed. If the proposed project is not undertaken, the current Central Maui Landfill will reach its capacity and no other site will be available to accept the island's solid waste. The only other landfill is the Hana landfill which cannot handle the volume of solid waste produced by Maui. Additionally, its location is remote and it is inaccessible due to the weight limits of the bridges on the Hana Highway. This situation would promote unsanitary conditions and endanger the health of the community.

The County of Maui has suggested the idea of not developing the proposed expansion and moving the existing co-composting operation from Phase III onto Phase II. Following the move of the co-composting operation, Phase III will then be used for landfilling activities. However when Phase III reaches its design capacity, a new landfill site will be needed to prevent unsanitary conditions at the existing Central Maui Landfill. Thus, it is in the best interest of the County of Maui to develop a new site for solid waste disposal to protect the health of the community.

7.3 ALTERNATE LOCATION FOR NEW LANDFILL

The proposed project could be constructed at an alternate location other than adjacent to the Central Maui Landfill. However, to locate an alternate site for a new MWSLF would require additional study. This alternate location would have to comply with all the criteria stated in section 4.4.8.

The current location utilizes previously excavated land from the existing quarry operations. This site is centrally located with respect to the major population centers of Maui, yet it is also in a rural, agricultural district. There will be no additional commitment of resources, which would be required with an alternate location, because landfilling operations at the Central Maui Landfill can simply continue in the proposed expansion areas.

7.4 SOLID WASTE DISPOSAL BY INCINERATION

Incineration reduces solid, liquid or gaseous waste into carbon dioxide, other gases and a relatively non-combustible residue through a controlled combustion process. It can reduce the volume of solid wastes introduced into the system by as much as 80 to 90 percent, thereby considerably extending the life of a landfill (R.M. Towill Corp., 1986). However, the residue that remains after incineration must still be disposed of in a landfill.

In 1980, the County of Maui studied the possibility of refuse incineration as an alternative energy source, in response to rapidly increasing fuel costs. Plans were made for the construction of an incineration facility. However, uncertain efficiencies of existing incinerators and stabilizing oil prices led the County to postpone construction on the incineration facility (R.M. Towill Corp., 1986).

7.5 OTHER ALTERNATIVE DISPOSAL MEASURES

7.5.1 Overview of Alternative Disposal Measures

There are two other alternatives, besides landfilling and incineration, which have been used for solid waste disposal. These methods include shredding and resource recovery, i.e., composting, pyrolysis, and recycling (R.M. Towill Corp., 1986). All of these alternatives are volume reduction methods, much like incineration. Shredding, baling and resource recovery can extend the lifespan of a landfill; however, they all produced residuals which need to be disposed of. Hence, these alternatives do not eliminate the need for a new landfill (R.M. Towill Corp., 1986).

The existing Central Maui Landfill uses a combined system of landfilling, recycling, and composting as a long-term cost-effective system of solid waste management. The following sections provide a brief description of each alternative.

7.5.2 Shredding

Two of the main benefits in shredding are the increase in municipal solid waste (MSW) density and the decrease in volume. Shredded waste thus extends the life of the landfill and reduces transportation costs. Shredded waste also reduces the need for daily earth covering because rodents and flies have more difficulty feeding off of the compact waste (Lipták, 1991).

One problem associated with shredding is explosions. Explosions occur in the shredder cavities when accumulated volatile organic chemicals are ignited by sparks from the rotating cutting elements. Another problem associated with

shredding is that operational costs of shredders include not only the cost of the electric power used but also the replacement costs of worn machinery parts (Lipták, 1991). While shredding extends the life of a landfill and improves certain environmental conditions at the landfill, it does not eliminate the need for a sanitary landfill.

7.5.3 Resource Recovery Methods

A. Composting

Composting is a volume reduction method. First, the organic solid waste must be separated from the inorganic waste. The organic waste is then decomposed at a rapid rate to produce a humus-like substance that is used primarily as a soil conditioner. However, all of the inorganic waste that is separated out must be disposed of. Thus, this alternative does not eliminate the need for the proposed expansion.

Co-composting (bio-solids and greenwaste) operations are planned to continue in Phase III of the existing Central Maui Landfill.

B. Pyrolysis

Pyrolysis involves the decomposition of waste, at high temperatures, in the presence of inert gases which yields hydrogen, methane, carbon monoxide and carbon dioxide. The residue from this process must then be disposed of in a sanitary landfill. Thus, this process does not eliminate the need for the proposed expansion.

C. Recycling

Recycling is the recovery of commodities, either at the source or after collection, from municipal refuse that can be marketed for reuse. On Maui, scrap metal, glass, aluminum and metal cans, plastics # 1, 2, 4, 5, 6, and 7, newspaper, office paper, mixed paper, and cardboard can be recycled. The County has also engaged the services of a private contractor to co-compost the bio-solids (waste water sludge), FOG (fats, oils and grease), with residential and commercial yard trimmings, pallets, and wood waste. For the year 1994, Maui County was credited with a 24% landfill diversion rate, equal to 47,400 tons of discards diverted from the landfill. The transfer station being considered for the existing landfill (see section 6.2.6) may include collection bins for sorted recyclable material.

Incineration, recycling, and co-composting complement each other only when the incinerator takes what cannot be diverted to recycling

or composting and what is left for incineration is still energy-rich and does not reduce heat output and income from the sale of steam or electricity. A small incinerator, 250 to 400 tons per day (tpd), may be a future solution for the remaining materials that are not diverted to recycling and composting.

Materials that are not diverted to recycling or co-composting need to be disposed of in a sanitary landfill. If, in the future, the County seriously considers a small waste-to-energy facility, some waste will still need to be landfilled, as well as the ash from that facility. Therefore, there exists a need for the proposed landfill, now and in the future.

8.0 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The proposed expansion to the Central Maui Landfill will require a number of resources, once committed, which will be irreversible and irretrievable. These resources include the materials, manpower, capital, and energy needed to plan, construct, operate, and maintain the expansion. The commitment of operation and maintenance resources of the proposed project will be relatively straightforward since there is already an existing and operational landfill adjacent to the proposed site.

The 60 acres of land to be committed to the proposed project will be irreversible and irretrievable. The use of this site will eliminate it from other uses, once landfilling operations begin, at least until the year 2016 (Bryan A. Stirrat & Associates, 1994a). At this time the landfill is anticipated to reach its capacity and closure operations will begin. The top of the completed landfill is planned to be graded for open space. The use of stockpiled topsoil for cover material will render it as an irretrievable resource.

The existing quarry operations will leave the site essentially not suitable for any other use. If the site is not used as a landfill, it will be filled and re-graded, once the mineral resources have been depleted, and returned to agricultural use. The minimum effort to make this land farmable would be to cover the quarry floor with the topsoil that is being stockpiled during quarry operations.

Following the closure of the expansion, the landfill may not be converted to accommodate residential or urban uses. This is due to the production of potentially hazardous landfill gas, primarily methane, from the decomposition of the refuse. A gas extraction system will be incorporated in the final cover design and this system will essentially collect all of the hazardous gas. However, as a safety precaution in case of the failure of the gas extraction system, the land should not be used as residential or urban use.

The implementation of this project will not result in the significant loss of natural or cultural resources. There are no endangered species and no historic or archeological sites in the vicinity.

Financial, manpower and material resources will be utilized for site preparation and development. These resources are irretrievable from planning, engineering, construction, operation and maintenance of the proposed project. The capital expenditure required for the establishment of a landfill expansion will include access road and drainage improvements, liner, leachate collection and recovery system, groundwater monitoring system, fencing, final cover, and gas collection system installation.

9.0 THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF
MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT
OF LONG-TERM PRODUCTIVITY

Maui will continually and increasingly produce solid waste in the present and future. The proposed sanitary landfill site is located in a central region of Maui yet, is placed sufficiently far from population centers to minimize the impacts of litter, dust, and odor on populated areas.

Contamination by leachate migration is the primary potential adverse impact of the proposed expansion. This impact is a long-term concern since leachate can be produced during the operation of the landfill and after the landfill has been closed. However, technology in liners and leachate control has advanced, and a leachate collection and recovery system will be installed to control the leachate produced by the decomposing waste. In addition, groundwater monitoring wells will be installed to provide early detection of contamination so that corrective action can take place. We also note that the groundwater table is located over 200 feet below the planned landfill floor and is not used for drinking water downgradient of the site.

There are no future plans to withdraw the groundwater from this region for drinking water use. Despite the fact that there are no future plans for withdrawing groundwater in this area, the proposed expansion is being designed to minimize leachate contamination of groundwater.

The implementation of the proposed project will not result in a significant loss of environmental resources. Although the landfill project would permanently limit the use of the land, the project would aid in the enhancement and maintenance of the Island of Maui in the long term. This project is essential in sustaining the island's population, social and economic growth. There does not appear to be a economical and feasible alternative to the proposed action.

10.0 OTHER INTERESTS AND CONSIDERATIONS OF GOVERNMENTAL
POLICIES BELIEVED TO OFFSET THE ADVERSE ENVIRONMENTAL EFFECTS
OF THE PROPOSED ACTION

The proposed expansion of the Central Maui Sanitary Landfill will not have significant adverse impacts on the physical environment because of the landfill's remote location. In addition, there are no wildlife habitats and no historical and/or cultural resources in the vicinity of the site since quarry operations would have unearthed such resources. The project is, however, environmentally significant due to its large scale planned operation.

The primary environmental concern is the potential for leachate contamination. To mitigate this potential problem, the landfill will be designed with a liner and a system to collect and contain the leachate that will be produced. The installation of groundwater monitoring wells will also allow the operators to monitor for potential leachate contamination.

Due to the fact that the Central Maui Landfill is located adjacent to the site being considered for the expansion, this project is extremely economical. Truck routes will not have to be re-routed. Transfer stations will not have to be constructed. Operation and maintenance tasks will be kept to a minimum since the expansion will allow the Central Maui Landfill to continue to operate after Phases I and II have reached their design capacities. Additionally, landfilling operations will make use of the already excavated and mined land left by the current quarry operations.

The sanitary landfill is currently the most cost effective method for the disposal of solid waste on the Island of Maui. Alternative methods mentioned in Section 7.0 may be costly and do not completely eliminate the need for a landfill. Most of these technologies produce residues that still require disposal at a sanitary landfill.

11.0 SUMMARY OF UNRESOLVED ISSUES

A Land Use Commission Special Use Permit Application will be completed and will be filed with the Maui County Planning Department. Since the proposed project site is within an Agricultural District, as designated by the State of Hawaii, this permit is required in order to perform sanitary landfilling operations. The appropriate government agencies and neighboring land owners will be informed about a public hearing held by the Maui Planning Commission concerning this permit application. Following this public hearing, the Maui Planning Commission will make a recommendation to the State Land Use Commission (LUC). The State LUC will, following further review, render a final decision if the Maui Planning Commission recommends approval of the permit.

A permit application for Solid Waste Disposal Facilities will be filed with the State Department of Health (DOH) following the final design of the proposed expansion. This application must be filed with the Solid and Hazardous Waste Branch of the DOH within sixty (60) days prior to the proposed starting date of operation. No landfilling activities can begin until this permit is obtained.

12.0 LIST OF NECESSARY APPROVALS

12.1 STATE OF HAWAII

Department of Health: Solid Waste Management Permit
NPDES Permit

State Land Use Commission: Special Use Permit

12.2 COUNTY OF MAUI

Department of Public Works
& Waste Management: Grading and Grubbing Permit

**13.0 AGENCIES, ORGANIZATIONS, AND INDIVIDUALS CONSULTED
DURING PREPARATION OF THE ENVIRONMENTAL IMPACT STATEMENT**

The following agencies, organizations, and individuals were consulted in the preparation of the environmental impact statement. Correspondence received in response to the EIS Preparation Notice is attached as Appendix B. Correspondence received in response to the Draft EIS is attached as Appendix C.

13.1 COUNTY OF MAUI AGENCIES

Department of Finance:
Purchasing Division
Department of Parks and Recreation:
Planning and Development Division
Planning Department
Department of Public Works & Waste Management
Office of the Mayor:
Economic Development Agency
Board of Water Supply

13.2 STATE OF HAWAII AGENCIES

Department of Agriculture:
Planning Office
Department of Budget and Finance:
Housing Finance and Development Corporation
Department of Business, Economic Development & Tourism:
Energy, Resources and Technology Division
Land Use Commission
Department of Health:
Solid & Hazardous Waste Branch
Maui District Health Office
Department of Land & Natural Resources:
State Parks/Historic Sites Division
Commission on Water Resource Management
Department of Public Works
Department of Transportation
Office of Hawaiian Affairs

Office of Environmental Quality Control
Governor's Office:
Office of State Planning

13.3 FEDERAL AGENCIES

Department of Agriculture:
Natural Resources Conservation Service

Department of the Army:
Pacific Ocean Division, Corps of Engineers

Department of the Interior:
U.S. Geological Survey, Water Resources Division

Department of the Navy:
Naval Base Pearl Harbor

Federal Aviation Administration:
Airports District Office

13.4 OTHER ORGANIZATIONS AND INDIVIDUALS

A & B Properties

Ameron

Hawaiian Commercial & Sugar Company

James R. Judge

University of Hawaii at Manoa, Environmental Center

Waste Converters International, Inc.

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APPENDIX A

GROUNDWATER QUALITY DATA

Appendix A: Groundwater Quality Data

Three groundwater monitoring wells were recently installed around the perimeter of the existing Central Maui Landfill (see Figure 3-5). Groundwater samples were collected from these wells in October 1995, November 1995 and February 1996. The table below summarizes the laboratory results and compares the data to available water quality standards. Drinking water standards are listed as reference data only. The groundwater beneath the landfill is not required by law to meet drinking water standards, as it is not used for drinking water.

The Department of Water Supply does not have future plans to withdraw groundwater in the vicinity of the landfill (see Section 3.2.8). The drinking water well nearest the landfill site is approximately 5.8 miles northeast of the site and is located hydrogeologically upgradient of the landfill. Furthermore, the landfill lies below the state UIC line (see section 4.4.4), so wastewater disposal by injection wells is permitted in the area. This indicates that the groundwater in the area is not considered suitable for drinking water. The landfill will, therefore, have no impact on local drinking water sources.

Groundwater sampling was performed in accordance with EPA guidelines and ASTM D-4448-85a, the Standard Guide for Sampling Groundwater Monitoring Wells. Laboratory analyses were performed by a laboratory certified by the State of California. The testing methods included EPA methods 130.2, 160.1, 300, 310.1, 335.2, 350.2, 415.1, 601/602, 608, 6010, 7610, 7770, 8150, and 8260. Quality control and quality assurance (QA/QC) procedures were implemented in accordance with the above-referenced standards and methods.

Appendix A
Groundwater Quality Data

					Hawaii
					Drinking Water
<i>Levels detected in monitoring wells:</i>					Standards *
ANALYTE			lowest sample	highest sample	
TOC	mg/l		ND*	17.00	--
Nitrate-N	mg/l		3.30	5.10	10.00
Chloride	mg/l		132.00	216.00	250.00
Sulfate	mg/l		29.00	71.00	250.00
Hardness	mg/l		172.00	202.00	--
Ammonia	mg/l		0.09	0.66	--
OH Alkalinity	mg/l		ND	ND	--
CO3 Alkalinity	mg/l		ND	ND	--
HCO3 Alkalinity	mg/l		239.00	395.00	--
Cyanide	mg/l		ND	0.04	--
TDS	mg/l		662.00	4,910.00	500.00
Antimony	mg/l		ND	0.02	--
Arsenic	mg/l		ND	0.03	0.05
Barium	mg/l		0.004	0.02	2.00
Beryllium	mg/l		ND	0.01	--
Cadmium	mg/l		ND	0.01	0.005
Calcium	mg/l		17.00	25.00	--
Chromium	mg/l		ND	0.01	0.10
Cobalt	mg/l		ND	0.004	--
Copper	mg/l		ND	0.03	1.00
Iron	mg/l		ND	0.27	0.30
Lead	mg/l		ND	0.01	0.05
Magnesium	mg/l		21.00	35.00	--
Manganese	mg/l		ND	0.15	0.05
Mercury	mg/l		ND	ND	0.002
Molybdenum	mg/l		ND	0.02	--
Nickel	mg/l		ND	0.03	--
Potassium	mg/l		9.50	24.00	--
Selenium	mg/l		ND	0.01	0.05
Silver	mg/l		ND	0.18	--
Sodium	mg/l		162.00	219.00	--
Thallium	mg/l		ND	ND	--
Vanadium	mg/l		0.01	0.03	--
Zinc	mg/l		ND	0.14	5.00
* Notes:					
1. Drinking water standards based on Hawaii Dept. of Health, Safe Drinking Water Branch and EPA national secondary drinking water regulations.					
2. *ND* indicates that the quantity of the analyte present in the sample was below detection limits.					

Appendix A
Groundwater Quality Data

					Hawaii
					Drinking Water
<i>Levels detected in monitoring wells:</i>					
ANALYTE			lowest sample	highest sample	Standards *
EPA Method 601/602, Purgable Halocarbons & Aromatics					
Benzene	µg/l		ND	ND	5.00
Carbon Tetrachloride	µg/l		ND	ND	5.00
Chlorobenzene	µg/l		ND	ND	100.00
o-Dichlorobenzene	µg/l		ND	ND	600.00
para-Dichlorobenzene	µg/l		ND	ND	75.00
1,2-Dichloroethane	µg/l		ND	ND	5.00
1,1-Dichloroethylene	µg/l		ND	ND	7.00
trans-1,2-Dichloroethylene	µg/l		ND	ND	100.00
DCP (1,2-Dichloropropane)	µg/l		ND	ND	5.00
Ethylbenzene	µg/l		ND	ND	700.00
Tetrachloroethylene	µg/l		ND	ND	5.00
Toluene	µg/l		ND	ND	1,000.00
1,1,1-Trichloroethane	µg/l		ND	ND	200.00
Trichloroethylene	µg/l		ND	ND	5.00
Vinyl Chloride	µg/l		ND	ND	2.00
Xylenes (total)	µg/l		ND	ND	10,000.00
<i>All other analytes</i>	µg/l		ND	ND	--
EPA Method 608, Organochloride Pesticides and PCBs					
Chlordane	µg/l		ND	ND	2.00
Endrin	µg/l		ND	ND	0.20
Heptachlor	µg/l		ND	ND	0.40
Heptachlor Epoxide	µg/l		ND	ND	0.20
Lindane (gamma-BHC)	µg/l		ND	ND	0.20
Methoxychlor	µg/l		ND	ND	40.00
PCB's	µg/l		ND	ND	0.50
Toxaphene	µg/l		ND	ND	3.00
<i>All other analytes</i>	µg/l		ND	ND	--
EPA Method 8260, Volatile Organics					
cis-1,2-Dichloroethylene	µg/l		ND	ND	70.00
Styrene	µg/l		ND	ND	100.00
TCP (1,2,3-Trichloropropane)	µg/l		ND	ND	0.80
<i>All other analytes</i>	µg/l		ND	ND	--
EPA Method 8150, Chlorinated Herbicides					
2,4-D	µg/l		ND	ND	70.00
2,4,5,-TP	µg/l		ND	ND	50.00
<i>All other analytes</i>	µg/l		ND	ND	--

APPENDIX B

COMMENTS AND RESPONSES TO THE
EIS PREPARATION NOTICE

Letters in response to the EIS Preparation Notice were received from the following organizations and individuals. This section includes copies of these letters and the respective responses given.

1. County of Maui, Department of Public Works and Waste Management
2. County of Maui, Planning Department
3. State of Hawaii, Department of Health, Maui District Health Office
4. County of Maui, Board of Water Supply
5. State of Hawaii, Office of Environmental Quality Control
6. Waste Converters International, Inc.
7. James R. Judge
8. Hawaiian Commercial & Sugar Company



COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
AND WASTE MANAGEMENT
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

LINDA CROCKETT LINGLE
Mayor
CHARLES JENCKS
Director
DAVID C. GOODE
Deputy Director
AARON SHIMOTO, P.E.
Chief Staff Engineer

December 26, 1995

Lloyd Lee
Engineering Division Chief
County of Maui
Department of Public Works and Waste Management
200 South High Street
Wailuku, Maui, Hawaii 96793

Ms. Jennifer Kievenno
MASA FUJIOKA & ASSOCIATES
99-1205 Halawa Valley Street, Suite 302
Aiea, Hawaii 96701-3281

**Subject: Environmental Impact Statement
Preparation Notice
Central Maui Sanitary Landfill Expansion Project**

Dear Mr. Lee:

Thank you for your letter, dated July 12, 1995, in response to our request for comments on the proposed landfill expansion project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division

SUBJECT: PROPOSED EXPANSION OF CENTRAL MAUI SANITARY LANDFILL

Dear Ms. Kievenno:

This is in response to your letter of June 20, 1995 regarding the project's Environmental Impact Statement (EIS).

We provide the following comments relating to traffic concerns:

1. The EIS should address whether increase in truck traffic volumes will impact the intersection of Hansen and Pulehu Road. If the anticipated volume increase is less than 100 vehicle per hour (vph), a brief assessment is acceptable. However, if it's greater than 100 vph during peak hours, a detailed traffic impact report analysis is required.
2. Include left turn lane warrants analysis for the existing access road intersection with Pulehu Road in the traffic assessment.

If you have any further questions, please contact me at (808) 243-7745.

Very truly yours,

Jennifer Kievenno
LLOYD LEE
for Engineering Division Chief

ENCLOSURE

cc: Solid Waste Division

In response to your comments, we do not anticipate a permanent increase in traffic volume to the proposed landfill expansion area. Since the existing landfill is reaching capacity, it will be closed once the proposed expansion has been constructed. Thus, there will only be a temporary increase in traffic due to the construction of the proposed expansion.

We appreciate your comments and will send you a copy of the Draft EIS when it is published. We also look forward to your comments on the Draft EIS. Thank you again.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership

Jennifer J. Kievenno
Jennifer J. Kievenno
Associate

MFA Job No. 95128-001

LINDA CROCKETT SINGLE
Mayor



GWEN Y. OHASHI
Acting Director

COUNTY OF MAUI
PLANNING DEPARTMENT
300 S. HOULI STREET
WAILUKU, MAUI, HAWAII 96793

July 12, 1995

Ms. Jennifer J. Kleveno, Associate
July 12, 1995
Page 2

At some point in time the landfill expansion site should be shown as Public/Quasi-Public on the Wailuku/Kahului Community Plan Update, whereas, the expansion site is currently shown as agriculture on the Wailuku/Kahului Community Plan (1987). The Wailuku/Kahului Community Plan Update has a planning horizon from now until the year 2010. The Wailuku/Kahului Community Plan Update process is currently before the Maui County Council.

Thank you for allowing us to comment during the early consultation process. We look forward to reviewing the draft EIS and receiving the Land Use Commission's Special Use Permit application. Should you have any questions, please contact Mr. Clayton Yoshida, AICP, of this office.

Yours truly,

GWEN Y. OHASHI
Acting Director of Planning

GYO:CIY:osy

cc: Colleen Suyama, Planning Program Manager, Land Use Management Division
Clayton Yoshida, AICP, Staff Planner
Charles Jencks, Director of Public Works and Waste Management
Project File
U:\Planning\landuse\pms\landuse

Ms. Jennifer J. Kleveno, Associate
Masa Fujioka & Associates
99-1205 Halawa Valley Street, Suite 302
Aiea, Hawaii 96701-3281

Dear Ms. Kleveno:

Subject: Proposed Expansion of Central Maui Sanitary Landfill, Puunene, Maui,
Hawaii

☐
☐
☐

We have reviewed your request letter dated June 20, 1995, regarding the proposed expansion of the Central Maui Landfill. You state in your letter that your company has been contracted by the Maui County Department of Public Works and Waste Management to prepare a construction bid package for Phase IV, and to prepare an Environmental Impact Statement (EIS) for the proposed expansion (Phases IV, V, and VI). We understand that our agency will be one of the agencies consulted during the EIS process.

Close consultation should be made with the Department of Transportation because of the major traffic circulation in the area, especially for truck traffic and the proximity of the landfill site to the Kahului Airport. The issues of vector control and mitigative measures with regards to the breeding of small flies due to the landfill should also be addressed. Discussion about the suitability of the lands involved for agricultural production should also be addressed in the EIS document.

We understand, based on previous conversations with your office staff, that the Department of Public Works and Waste Management will be filing for a new Land Use Commission Special Use Permit for the proposed landfill expansion project.

Although it is not an environmental issue, the land use permitting for the project site should be cleared up. When the existing Central Maui Landfill Project was reviewed by the State Land Use Commission in the late 1980s, it was discovered that the project site was also covered under a special use permit for Hawaiian Cement.

MFA **MASA FUJIOKA & ASSOCIATES**
A PROFESSIONAL PARTNERSHIP

ENVIRONMENTAL • GEOTECHNICAL • HYDROGEOLOGICAL CONSULTANTS
1115 HILAWA VALLEY STREET, SUITE 50 • WEA, HAWAII 96791-3261
PHONE: 808-944-1400 • FAX: 808-944-0007

December 26, 1995

Gwen Y. Ohashi
Acting Director of Planning
County of Maui
Planning Department
250 S. High Street
Wailuku, Maui, Hawaii 96793

Subject: Environmental Impact Statement
Preparation Notice
Central Maui Sanitary Landfill Expansion Project

Dear Ms. Ohashi:

Thank you for your letter, dated July 12, 1995, in response to our request for comments on the proposed landfill expansion project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division.

03 - 4

We have taken your suggestions into consideration during preparation of the Draft EIS. The Draft EIS will include a discussion on traffic, vector control, and suitability of lands involved for agricultural production.

Thank you for pointing out that the existing landfill is covered under two special use permits. From recent discussions with Ameron, we understand the expansion area is also currently covered under a special use permit with Ameron. We hope to resolve these issues when filing for the new Land Use Commission Special Use Permit for the proposed expansion.

We appreciate your comments and will send you a copy of the Draft EIS when it is published. We also look forward to your comments on the Draft EIS. Thank you again.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership

Jennifer J. Kleveno
Jennifer J. Kleveno
Associate

MFA Job No. 94128-001



M F A
MASA FUJIOKA & ASSOCIATES
A PROFESSIONAL PARTNERSHIP

ENVIRONMENTAL ENGINEERING • ARCHITECTURE • INTERIOR DESIGN • CONSULTANTS
99-1205 HALAWA VALLEY STREET, SUITE 302 • AIEA, HAWAII 96701-3281
PHONE: 808-484-5501 • FAX: 808-484-5502



STATE OF HAWAII
DEPARTMENT OF HEALTH
MAUI DISTRICT HEALTH OFFICE
54 HIGH STREET
WAILUKU, MAUI, HAWAII 96793

HERBERT S. MATSUBAYASHI
CHIEF SANITARIAN

LAWRENCE MAE
DIRECTOR OF HEALTH

LAWRENCE MAE, D.O., M.P.H.
DISTRICT HEALTH OFFICER

December 26, 1995

Herbert S. Matsubayashi
Chief Sanitarian, Maui
State of Hawaii Department of Health
Maui District Health Office
54 High Street
Wailuku, Maui, Hawaii 96793

July 12, 1995

Ms. Jennifer J. Kleveno, Associate
Masa Fujioka & Associates
99-1205 Halawa Valley Street, Suite 302
Aiea, Hawaii 96701-3281

Dear Ms. Kleveno:

Subject: Proposed Expansion of Central Maui Sanitary Landfill, Maui, Hawaii

Thank you for the opportunity to review and comment on the subject project. We have the following comments to offer:

1. The EIS should address the probable odor problems associated with the expansion of the Landfill.
2. An NPDES Permit may be required. The Clean Water Branch of the Department of Health should be consulted.

If you have any questions regarding the above, please call me at 243-5255.

Sincerely,

HERBERT S. MATSUBAYASHI
Chief Sanitarian, Maui

Subject: Environmental Impact Statement
Preparation Notice
Central Maui Sanitary Landfill Expansion Project

Dear Mr. Matsubayashi:

Thank you for your letter, dated July 12, 1995, in response to our request for comments on the proposed landfill expansion project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division.

We will be addressing the impact of odor in the Draft EIS.

The County of Maui has recently submitted a revised NPDES permit application for the existing landfill (Phases I, II, and III). An additional NPDES permit will be required for the proposed landfill expansion (Phases IV, V, and VI). The NPDES issue will be discussed in the Draft EIS.

We appreciate your comments and will send you a copy of the Draft EIS when it is published. We also look forward to your comments on the Draft EIS. Thank you again.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership

Jennifer J. Kleveno
Jennifer J. Kleveno
Associate

MFA Job No. 94128-001



BOARD OF WATER SUPPLY
 COUNTY OF MAUI
 P.O. BOX 1108
 WAILUKU, MAUI, HAWAII 96793-7108
 16 August 1995

Ms. Jennifer J. Kleveno
 Masa Fujioka & Associates
 99-1205 Malawa Valley Street, Suite 302
 Aiea, Hawaii 96701-3281

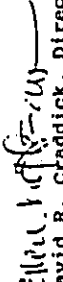
Aloha Ms. Kleveno:

Re: Proposed Expansion of Central Maui Sanitary Landfill at THK: J-8-J:04, Pulehu Road, Maui; Early comments per request letter and schematic maps dated 20 June 1995

Mahalo for providing the Board of Water Supply with the opportunity to review the above-mention proposal. We apologize for the delay in our response.
 We suggest that the following topics be considered in the environmental documents, if effects or changes are expected:

- I. Ground water
 - A. Aquifer underlying the project
 - B. Existing and anticipated impacts, if any
- II. Existing and Proposed water system for the project, if any
 - A. Domestic water source
 - B. Dust control water source
 - C. Current and anticipated average water use in gpd
- III. Proposed Water Conservation Actions, if pertinent
 - A. Conserving water in any erosion control or buffer planting.

In addition, we provide information as follows: 1) The existing landfill is not served by the Board's water system; and 2) We attach an aquifer map of the island of Maui and some conservation information for your use and reference.

Sincerely,
 MAUI BOARD OF WATER SUPPLY

 David R. Craddock, Director

DDS
 Attachments

"By Water All Things Find Life"

THK: J-8-J:04 Proposed Expansion of
 Central Maui Sanitary Landfill

Some of Maui's Native and Polynesian Plants
 For further information and additional native plant listings, see the Maui County Planting Plan. The plan was prepared by the Maui Arborist Committee, and is available at the Volunteer Action office in the Kahului Community Center, 275 Ulu Street, ph. 343-7325, for a \$15.00 donation.

- Vegetation Zones: The area a mature plant can grow naturally.
- 1 - Wet areas on the windward side.
 - 2 - Cool, dry areas in higher elevations (above 1,000 feet.)
 - 3 - Low, drier areas that are warm to hot.
 - 4 - Lower elevations that are wetter due to proximity to the mountains.
 - 5 - Salt-spray zone in coastal areas on the windward side.

- Elevation
- 1 - Sea-level to 1,000 feet
 - M - 1,000 to 3,000 feet
 - H - Higher than 3,000 feet

Common Name	Scientific Name	Ht	Zone of Self-Subsistence	Elevation
Koa	Acacia koa	60'	1 2 3 4	M H
Kiwaui	Calophyllum inophyllum	60'	1 4	L M
Kukui	Aleurites moluccana	50'	1 4 5 L	M
Malo	Pandanus tectorius	35'	1 4 5 L	L
Kou	Cordia subcordata	30'	1 4 5 L	L
'Ohia lehua	Metrosideros polymorpha	25'	1 2 4	L M H
Kou haole	Cordia sebestena	20'	1 3 4 5 L	M
Koki'o Ke'oke'o	Hibiscus waiamea	20'	2 4	M
Mala pepe	Pleomela auahiensis	20'	2 3 4	M
Wiliwili	Erythrina sandwicensis	20'	2 3 4	L
Heo	Rauvolfia sandwicensis	20'	2 3 4	L M
'Ohe makai	Reynoldsia sandwicensis	20'	3	M
Olopuu	Nestegis sandwicensis	15'	2 3 4	M
Ma'i'a	Musa acuminata	6'-30'	1 4	L M
Kolea	Myrsine lasseciana	15'	2 4	M
Keahi	Heulandias polynealium	15'	3	L M
Ho'awa	Piptosporum hoseri	12'	2 4	M
Alaha'e	Canthium odoratum	12'	3 4	L M
Luma	Diospyros sandwicensis	12'	3 4	L M
Maio	Myoporum sandwicensis	10'	2 3 4 5	L M H
Koki'o 'ula'ula	Hibiscus kokio	10'-12'	1	L M
'Awa	Piper methystricum	10'	1	L

Common Name	Scientific Name	Ht	Zone of Self-Subsistence	Elevation				
				2	3	4	L	M
Kulu' i	<i>Notolichium sandwicense</i>	8'	2	3	4		L	M
Hauke	<i>Broussonetia caprifera</i>	8'			4		L	
'Iliahi	<i>Santalum ellipticum</i>	8'	2	3	4		L	M
	<i>Achyranthes solandana</i>	6'	2	3	4		L	M
'A'ali'i	<i>Dodonaea viscosa</i>	6'	2	3	4	5	L	M
Loulu	<i>Pritchardia glabrata</i>	6'	2		4			M
Ki	<i>Cordia alliodora</i>	6'	1	2	4		L	M
Naupaka Kahakai	<i>Scaevola sericea</i>	6'	3	4	5		L	
H'o	<i>Gossypium tomentosum</i>	5'	3		5		L	
Ko'loana	<i>Senna gaudichaudii</i>	5'	2	3	4	5	L	M
'Ulei	<i>Osteospermum angustifolium</i>	4'	2	3	4		L	M
Hai'apalo	<i>Capparis sandwicensis</i>	4'	3	4	5		L	M
'Olana	<i>Curcuma longa</i>	3'	1		4		L	M
Pohinahina	<i>Vitex rotundifolia</i>	3'			5		L	
Nehe	<i>Lipochaeta levarum</i>	3'	2	3	4	5	L	M
'Akia	<i>Solanum nelsoni</i>	3'			5		L	
'Anapanapa	<i>Colubrina asiatica</i>	3'			5		L	
Pua Kale	<i>Argemone glauca</i>	3'	2	3	4	5	L	M
Nehe	<i>Lipochaeta succulenta</i>	2'	1		4		L	
Nehe	<i>Lipochaeta rockii</i>	2'	2	3	4		L	M
'Aninahina Kuehiwi	<i>Artemisia australis</i>	2'	1		4	5	L	M
'Uki'uki	<i>Dianella sandwicensis</i>	2'	2		4			M
'Ohe'o kai	<i>Lycium sandwicense</i>	2'			5		L	
'Akia	<i>Mikstroemia uva-ursi</i>	2'	3	4	5		L	M
Yellow Naupaka	<i>Scaevola gaudichaudii</i>	2'	2		4		L	M
Nehe	<i>Lipochaeta integrifolia</i>	1'			4	5	L	
Ko'oko'olau	<i>Bidens hillebrandiana</i>	1'	1		5		L	
'Aie'ala vai nui	<i>Papaya leptostrachya</i>	1'	2	3	4		L	M
Hinehina ku Kahakai	<i>Heliotropium anomalum</i> var. <i>argenteum</i>	1'			5		L	
'Ii'e	<i>Plumbago zeylanica</i>	1'	2	3	4		L	M
Pohuehue	<i>Ipomoea pes-caprae</i>	1'			5		L	
'Uala	<i>Ipomoea batatas</i>	1'	1	2	3	4	L	M
'Akulikuli	<i>Sesuvium portulacastrum</i>	.5'	1		5		L	
'Ilima papa	<i>Sida fallax</i>	.5'	3	4	5		L	

Common Name	Scientific Name	Ht	Zone of Self-Subsistence	Elevation
Hau' u 'aki'aki	<i>Pennisetum cymosa</i>	.5'	3	5
Pa' Uchi' iaka	<i>Juncus monticola ovalifolia</i> subsp. <i>sandwicensis</i>	.5'	3	4
Seashore Paspalum	<i>Paspalum vaginatum</i>	1'	1	2
			3	4
			5	

For further information and additional native plant listings, see the Maui County Planting Plan. The plan was prepared by the Maui Arborist Committee, and is available at the Volunteer Action office in the Kahului Community Center, 275 Ulu Street, ph. 243-7325, for a \$15.00 donation.

Vegetation Zones: The area a mature plant can grow naturally.

- 1 - Wet areas on the windward side.
- 2 - Cool, dry areas in higher elevations (above 1,000 feet.)
- 3 - Low, drier areas that are warm to hot.
- 4 - Lower elevations that are wetter due to proximity to the mountains.
- 5 - Salt-spray zone in coastal areas on the windward side.

Elevation

- L - Sea-level to 1,000 feet
- M - 1,000 to 3,000 feet
- H - Higher than 3,000 feet

XERISCAPE

The Department of Water Supply is faced with increasing, more difficult demands regarding water--its supply, quality, distribution, purification, management, and associated costs. Potable water is becoming scarce and the costs of building delivery systems and water treatment plants prohibitive. Consequently, there is a need to conserve water, not only during droughts, but to reduce demands of peak loading in systems in an attempt to delay construction of larger, expensive facilities. Saving water saves energy while conserving other valuable resources.

Water conservation takes on two broad aspects. First, efficient manipulation of physical factors in the landscape -- delivery and irrigation systems, soils, percent hardscape used in a design, plants, microclimates, mulch, etc. Secondly, the people factors, which are often more important.

The incorrect perception that water is "cheap" or "inexpensive" has led to the ideas that the water supply is not finite and that it flows toward money. This in turn has fostered a national consciousness that high water use landscapes are normal, desirable and acceptable. Little has been done to change this mind set, particularly as it relates to water conservation in the landscape.

With the increased, continuous demand for high quality water exceeding supply of both surface and below ground sources, a new philosophy for conservation must be engendered; billing must reflect the real costs of water and people must learn and practice the "whys" and "hows" of water conservation. This is why xeriscaping began.

Xeriscap Defined

XERISCAPE (xeris: scap) is an integrated approach to landscape water conservation. Xeriscap was coined from the Greek word "xero" for dry. Thus, xeriscap means dryscap or low water use landscaping. Xeriscap is designed through wise planning, plant and construction materials selection, and proper installation to provide beautiful, water efficient, low maintenance landscapes.

In Hawaiian E' Malama Mai meaning "cherish Our Water" is used to refer to xeriscaping.

Many have misread the term as xeriscap. Xeris means dry, not landscape or no landscape plantings. Others have equated xeriscap with landscaping with "rockscapes." Many of which are not aesthetically pleasing and may not always conserve water or energy. Rockscapes are harsh, produce glare, and do little to prevent noise and air pollution, making them a poor substitute for xeriscap landscaping.

Seven Water Conservation Fundamentals

The xeriscap motto, "water conservation through creative landscaping," provides the umbrella under which a wide variety of landscape water conservation activities may be taught and employed in a community. And although there are many landscape and horticultural techniques that conserve water, xeriscap programming was focused on seven broad, fundamental areas.

1. Planning and Design
2. Soil Improvement
3. Efficient, Zoned Irrigation
4. Limited Turf Areas
5. Use of Mulches
6. Use of Low Water Demand Plants
7. Appropriate Maintenance

Planning and Design

Architects, planners, and homeowners are encouraged and taught to incorporate standard design elements of function, circulation, topography, exposure, seasonal color, texture, safety, etc. into existing landscapes and new designs with emphasis on conserving, limiting and/or reusing water. 40% to 50% of the water homeowners use goes for yard watering. Appropriate design and planning can provide these very necessary aspects of urban life and conserve water at the same time. Xeriscapes can ameliorate the impact of a severe drought and avoid the costly clean-up resulting from a "boom and bust" water policy. Tree removal, replanting of landscapes and turfgrass fields are eliminated and real savings to Maui County.

Thayer and Richman (1986) suggest that designing water-conserving landscapes should be considered in two parts. First, the physical ecology of plants and plant communities must be integrated with the microclimates of the landscape. Logically, plants best adapted to the climate, temperatures, sun, wind, and physical nuances of the site thrive best and require the least expenditures for water, energy and maintenance. Secondly, landscape designers must accept that there is a "human ecology" of water use in landscapes. That is, the intensity of human

activity dictates landscape water use. This includes... whether functional or aesthetic. Thayer and Riechman coined the term "hydrozone" to describe the type and intensity of human activity in the landscape and identified four classes of hydrozones. These will be discussed under the heading "Efficient, Zoned Irrigation".

Soil Improvement

Residential soils can be difficult soils to manage because they have been badly disturbed by construction and urban activities. Normal soil horizons are mixed unevenly both vertically and horizontally. Often, hardpans exist and impede drainage, and most urban soils have been compacted by heavy equipment or traffic. Many of the physical and chemical soil properties plants require for growth are present at less than optimum levels in urban soils. Soil improvements must correct poor water infiltration, percolation, and drainage, while providing adequate water holding capacity and improving the nutritional status of the soil. Organic amendments meet most of these requirements and improve tilth, making it easier to till the soil and manage weeds. Adding 3-5 cubic yards of well composted organic matter per 1000 square feet and tilling it into the top 8-12 inches of soil is recommended.

Other amendments such as lime be added to adjust an undesirable acid soil condition. These adjustments should be made prior to planting.

Efficient, Zoned Irrigation

Matching the amount of water supplied to each plant with the plant's water requirement is the most efficient way to irrigate.

Until recently this was difficult to do and most landscapes were irrigated to meet the needs of the turfgrass or other plants with high water requirements. Sprinklers cover large areas without regard to the water needs of individual plants. To eliminate waste by overwatering and run-off, group plants according to their water requirements and use zoned irrigation systems to deliver water to individual plants or to plants with similar moisture requirements (Figure 10-2). Fewer plants will develop disease or die from overwatering.

not only the irrigation lines themselves, but also the physical or ecological water needs of plants. The landscape architect also recognizes that human activity will impact plant water needs. Thayer and Riechman (1984, describe this irrigation zoning to match man's activity as hydrozone planning, and they define four irrigation regimes (Figure 10-3).

The Principal Hydrozone represents the area with the greatest human activity and consequently the greatest water and energy uses: sites in yards, patios, and play fields where people frequently, play, sit, walk, gather, or relax; places where people regularly contact plants.

The Secondary Hydrozone is less physically impacted by humans, but is visually important: areas of passive activities space delineation or focal interest such as flower and shrub beds, entrances, prominent plantings, etc; areas of high visual impact, but seldom touched by humans.

Buffer zones, distant views, medians, driveways, and landmarks make up the third hydrozone, called the Minimal Hydrozone. In this case, plants are selected that need minimal supplemental water to survive the natural climatic conditions.

The Elemental hydrozone constituted landscape plantings that require only natural precipitation to survive and succeed, if ever, incur human activity. Utility areas, mulched native plantings, and naturally sustainable, exotic vegetation belong to this hydrozone (Figure 10-4).

Flexible sprinkler heads and nozzles, adjustable delivery rates and coverage, modern valves, and automated controllers - these allow greater water conservation through zoned irrigation. On-off watering is easily programmed to match water infiltration rates into soils, thus avoiding surface runoff. Also, water is better applied to meet specific plant needs as impacted by seasonal human activity and changes in the weather.

Collection systems should be designed and constructed throughout the landscape to gather storm runoff from roofs, walks, drives, and slopes. By grouping high or moderate water requiring plants near swales and collection basins, such of their water needs can be met by natural moisture accumulations rather than irrigation. On the other hand, drought tolerant species may succumb to frequent accumulations of water and should be located on southern exposures or at the tops of slopes. Because they often only require supplemental irrigation during establishment or during a severe drought, a permanent irrigation system may not be needed.

Limited Turf Area

Turfgrass plays a primary role in most landscapes. Turfgrasses make excellent ground covers. They tolerate heavy foot traffic in the backyard, at the park, or on the athletic field. And mowed or unmowed, they stabilize slopes and prevent erosion. They serve to unify designs and instill a sense of pride in home and neighborhood when well kept. However, turf helps keep homes and communities cleaner by reducing particulate and chemical air pollution. Unfortunately, a lawn consumes approximately half the landscape water and requires weekly care. As well, equipment, pest control and periodic cultural practices, such as coring or dethatching contribute to the expense, both in time and money, of maintaining a lawn.

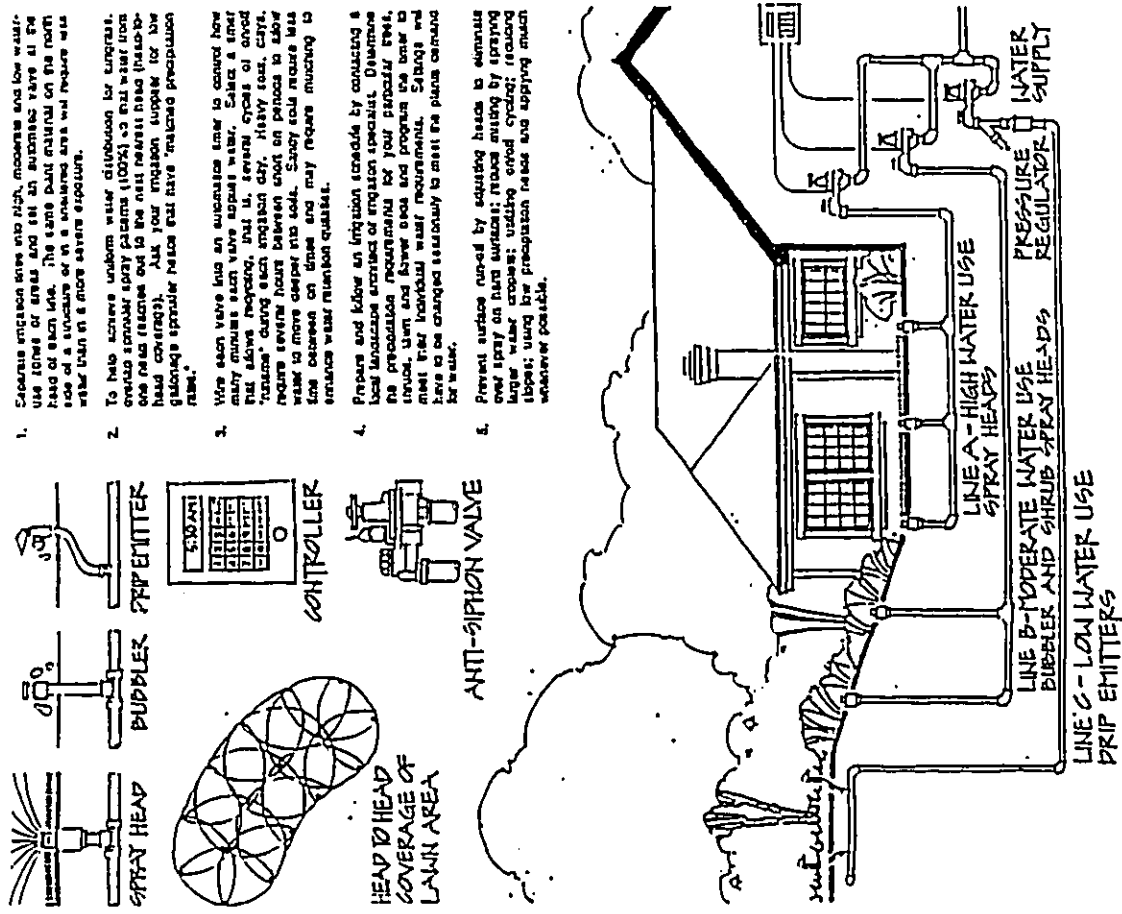


Figure 10-2. Five Steps to Efficient Irrigation

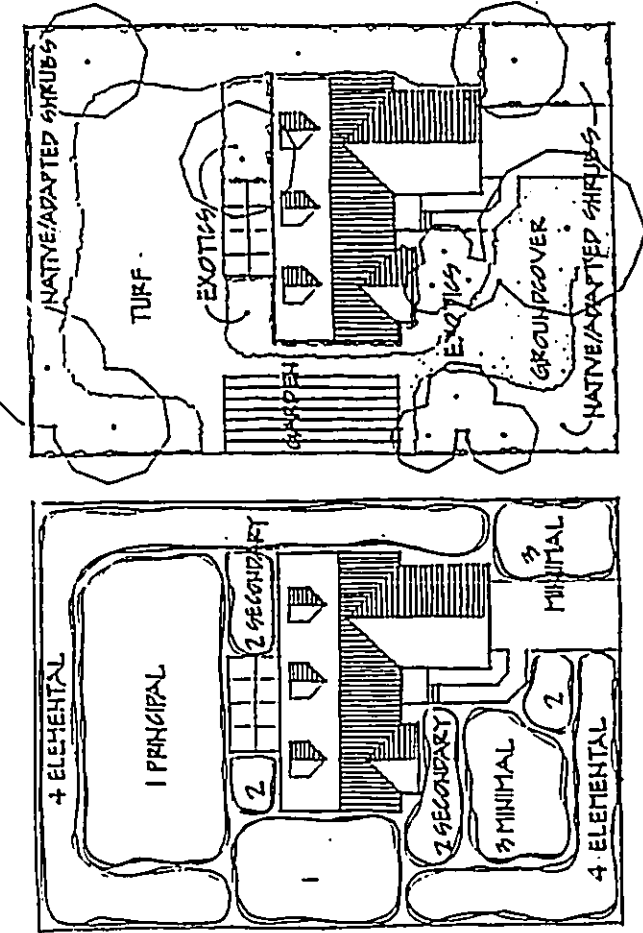


Figure 10-3. Hydrozone Concept Applied to Suburban Lot

Turf should be limited by design to high-use areas in landscapes and separated from other plantings with different water needs. After reviewing the landscape plans, classify the turf areas as either passive or active use and seed and irrigate accordingly. Plant drought-tolerant species with poor resistance to heavy traffic in less-frequented sites.

Not only should the total turf areas be reduced in a landscape, but the perimeter measurement also must be reduced as much as possible. Long, narrow strips of turf are difficult to properly mow, fertilize, keep pest free, and irrigate. Such strips require hand work to keep them attractive, which increases maintenance time and labor costs. Water from over-spraying turf in narrow planter islands, parkways, side yards, and around entrances not only runs off and is wasted but also contributes to the deterioration of paint, walls, walks, and asphalt in parking lots and streets. Mulches or groundcovers and shrubs on drip or underground irrigation can appropriately replace turf in many landscape sites. Drip emitters or bubblers can be used to irrigate individual plants and eliminate waste caused by overspray. Mulches need no water, and well-chosen groundcovers require less water and maintenance than turf.

Likewise, the amount of turfgrass in a landscape may be reduced by increasing the hardscape. Paving, wooden decks, screened and graveled walls limit the turf area while reducing the water requirement.

Use of Mulches

Mulches function to buffer soils against climatic extremes. In summer, they reduce soil heating and slow evaporation water loss from soil surfaces. They also reduce weeds and make those present easier to remove. Proper use of mulches reduces or prevents soil erosion. Organic mulches also contribute to the nutritional level and tilth of the soil as they breakdown.

These practical functions are important; however, many mulches are included in the landscape for their design flexibility and attractiveness, not simply because they save water, protect roots, and reduce maintenance.

Mulches are classified as organic, inorganic, and living. Organic mulches include plant refuse, such as chips and clean from tree trimming operations, saw dust, composted leaves and manures, peat moss, and graded bark products. Sized and washed rocks and gravels are popular inorganic mulches which come in many sizes, colors, and textures. Impervious sheet plastics covered with either organic or inorganic mulches were popular, but because sheet plastic prevents gas and water exchange between air and soil and creates a water-logged root environment, woven, porous plastics are now preferred. Mulches are applied 3 to 4 inches deep over bare soil and only 2 to 3 inches deep over woven fabrics. Living mulches include low growing groundcovers and low maintenance turfgrasses. They function well as mulches, but may be heavy competitors for water and nutrients under newly planted trees and shrubs. If used, select hardy, drought-tolerant species that resist common diseases. These species provide the best results and require less maintenance.

Use Of Low Water-Demand Plants

Many beautiful and functional plants, both exotics and natives, are available that thrive with natural precipitation or small amounts of supplemental water.

Chapter Two lists tree characteristics including their water requirements ranging from dry (less-thirsty) to wet (very thirsty).

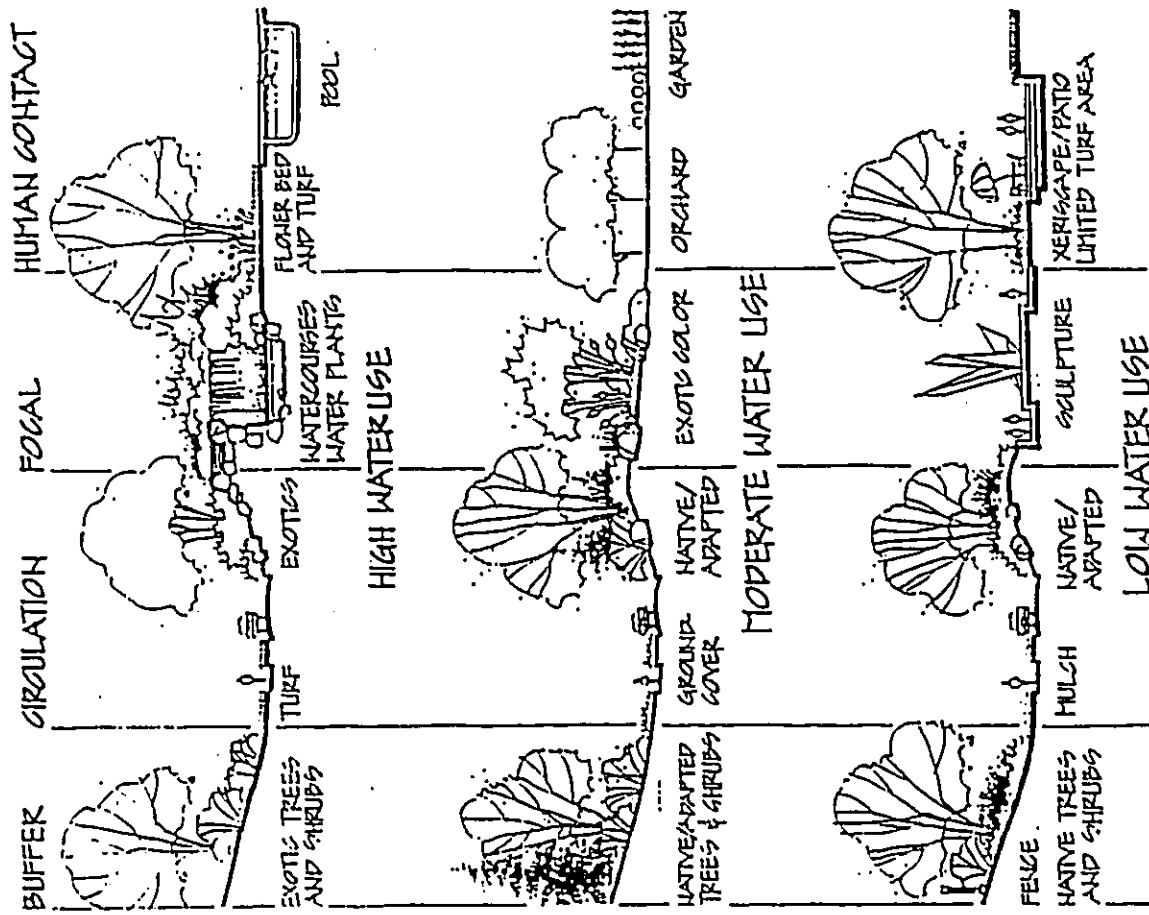


Figure 10-4. Water Use Relating to Human Use—Three Approaches

All types of plants with low water requirements are now available and more will become available as demand increases. The range of drought-tolerant plant species and those with low water requirements is now wide enough to permit selecting for function, beauty, and seasonal interest. As with all plant selections and planting, take care to match the specific needs of the plant to the environmental conditions and the intensity of human activity at the planting site. This is critical when using drought tolerant and low water use plants in the landscape. Choosing the proper plants and planting them correctly will reduce water consumption and maintenance costs over many years.

Appropriate Maintenance

Low maintenance is not no maintenance. The use of all or most of the xeriscape principles will reduce but not eliminate maintenance. And generally, the greater the human activity at a site, the greater its maintenance requirements will be. Trees, shrubs, groundcovers, and turfcovers are living organisms that require care. Timely fertilizing, watering, pruning, pest management, and other cultural practices are necessary in xeriscape landscapes, but at reduced levels compared to conventional landscape plantings. Even mulched sites without plants must have litter removed periodically. Irrigation components for drip and sprinkler systems require routine checks and servicing. Xeriscape landscaping coupled with sound maintenance produces water and energy savings and environmentally adapted landscapes that are aesthetically pleasing.

As has been stressed, integrating these principles in landscapes will conserve water and reduce annual maintenance costs. Most importantly though, xeriscape landscaping provides these benefits without sacrificing function or beauty. And although these seven points are stressed in xeriscape literature and are the basis for xeriscape programming, there is no substitute for creativity as a means of discovering and sharing new ways to conserve water without making yards and patios into xeriscapes.

Community education in xeriscape landscaping is the key to a successful water conservation program. The principles of xeriscape landscaping challenge the widespread but mistaken belief that water is cheap, unlimited resource which will always be available. Hopefully, the public will recognize that this is a misconception and that water conserving landscapes are necessary and should be considered "normal" within our society. At the same time, it teaches people the "whys" and "hows" of effective water conserving horticulture. To reach these objectives requires the cooperation of government leaders,

agencies, landscape architects, contractors, irrigation specialists, concerned citizens, and so on, or volunteers enthusiastically supporting and promoting landscape programming. Community water management

Xeriscape landscaping, when followed, will conserve water, reduce maintenance costs, and establish beautiful, environmentally sound landscapes, parks, recreation facilities and green spaces throughout a community. Conserving water means the need to construct costly new delivery systems and water treatment plants that would otherwise be needed to meet periods of peak loading. Xeriscaping also leads to changes in attitudes about water quality, water use, and how a community's water should be managed, especially in landscape irrigation.

Literature Cited

Urban and Community Forestry - A Guide for the Interior Western United States - United States Department of Agriculture - Forest Service

Thayer, Jr., Robert L. and TG. Richman, "Water-Conserving Landscape Design." In Energy Conserving Site Design, Ed. G. McPherson, Am. Soc. Landscape Architects, 1984.

LOW WATER USE/DROUGHT TOLERANT PLANT LIST

All plants require water for establishment. After they are rooted and growing well their water requirements will vary.

The following is an incomplete list of drought tolerant plants. It is provided for your convenience.

Please review the following reference lists for many other suggestions.

1. Drought Resistant Plants For Hawaiian ardens by Norman C. Benzona, County Extension Agent, Cooperative Extension Service.
2. Drought Tolerant Native Hawaiian Plants for the Landscape - by Heidi Bornhorst Horticulturist, Honolulu Botanic Gardens.
3. Hawaii Xeriscape Garden Registry of Nurseries that grow Less-Thirsty-Plants-Honolulu Board of Water Supply, November 1989.

Key to Symbols

A	Accent Plant	Zone 1 - Normal watering level.	Key to Zones
F	Flower Color	Includes lush lawns and gardens.	
GC	Groundcover		
G	Grass	Zone 2 - Moderate watering level.	
OB	Ornamental Grass	Includes lawns, ground covers and shrubs.	
S	Shrub		
SC	Succulent	Zone 3 - Low watering level.	
ST	Small Tree	Includes self-sustaining plant materials and natural vegetation with emphasis on plants that require little or no supplemental irrigation.	
MT	Medium Tree		
LT	Large Tree		
V	Vines		

Type	Botanical Name	Zone	Common Name	Type	Botanical Name	Zone	Common Name
S	<u>Abutilon menziesii</u>	3	Ko'o Loa'ula	MT	<u>Caesalpinia ferrea</u>	2	Brazilian Ironwood
MT	<u>Acacia koa</u>	3	Koa	A,S,F	<u>Caesalpinia pulcherrima</u>	3	Chai Jii (3 colors)
A,F,S,SC	<u>Adenium obesum</u>	2	Desert Rose	S	<u>Calotropis gigantea</u>	3	Crown Flower
A,F,GC	<u>Agave attenuata</u>	3	Lily of the Nile	ST	<u>Cantium odoratum</u>	3	Alaha'e
A,SC,S	<u>Agave attenuata</u>	3	Agave	S	<u>Cassia grandiflora</u>	3	Natal Plum
MT	<u>Aleurites moluccana</u>	2	Kukui	S,GC	<u>C. grandiflora prostrata</u>	3	Creeping Natal Plum
S,GC,F	<u>Anticarsus thurberi</u>	3	Desert Honeysuckle	S,ST,F	<u>C. surratensis</u>	3	Kolomona
V,GC,F	<u>Antigonon leptopus</u>	3	Mexican Creeper (3 colors)	SC,GC	<u>Carobrotus edulis</u>	3	Hotentot Fig
S,GC,A	<u>Asparagus densiflorus</u>	2	Foxtail Asparagus	MT,F	<u>Cassia fistula</u>	3	Yellow Shower
S,GC,A	<u>Asparagus densiflorus</u>	2	Sprenger Asparagus	MT,F	<u>Cassia fistula</u>	2	Rainbow Shower
A	<u>Aspidistra dilatata</u>	2	Cast Iron Plant	ST	<u>C. javanica</u>	3	(All Colors)
GC	<u>Asystasia gangetica</u>	3	Asystasia	V,GC,S	<u>Caratonia siliqua</u>	3	Caroa Tree
V,SC,GC	<u>Atenia cordifolia</u>	3	Hearts and Flowers	MT	<u>Clatodendron inerme</u>	3	Glory Bower
MT,F	<u>Bauhinia blakeana</u>	2	Hong Kong Orchid Tree	S	<u>Clusia rosea</u>	3	Autograph Tree
V,F	<u>B. galpinii</u>	2	Red Bauhinia	MT,F	<u>Clusia sp.</u>	3	Small Leaf Clusia
ST,F	<u>B. tomentosa</u>	3	Yellow Bauhinia	MT,F	<u>Cochlospermum vitifolium</u>	3	Buttercup Tree
A,SC,ST	<u>Bauhinia recurvata</u>	3	Pony tail	OG	<u>Cordia subcordata</u>	2	Kou
A,V,F	<u>Bougainvillea 'Crimson Jewel'</u>	2		S,SC,A	<u>Cordia subcordata</u>	3	Pampas Grass
A,V,F	<u>Bougainvillea 'Jazzica White'</u>	2		ST	<u>Crassula argentea</u>	3	Jade Plant
A,V,F	<u>Bougainvillea 'Roseanka'</u>	2		V	<u>Crassula cuneata</u>	3	Caladash Tree
A,V,F	<u>Bougainvillea 'Teapig'</u>	2		A,S	<u>Crysantha grandiflora</u>	2	India Rubber Vine
ST	<u>Brexia madagascariensis</u>	2	Brexia	G	<u>Cycas revoluta</u>	3	Sago Palm
				A,S,SC	<u>Cynodon dactylon</u>	3	Bermuda Grass
				MT,A,F	<u>Dasylium wheeleri</u>	3	Spoon Flower
				S	<u>Daltonia regia</u>	2	Royal Poinciana (3 colors)
					<u>Dodonaea viscosa</u>	3	'A'ali'i
				LT	<u>Enterolobium cyclocarpum</u>	3	Earpod
				MT	<u>Eriobotrya japonica</u>	2	Loquat
				MT	<u>Erythrina sandwicensis</u>	3	Hiliwili
				MT	<u>Erythrina 'Tropic Coral'</u>	2	Tropic Coral
				MT	<u>E. variegata</u> var.	2	Hiliwili
				MT	<u>E. orientalis</u>	2	Tigers Claw
				S,SC,A	<u>Euphorbia cotinifolia</u>	2	Hierba mala
				A,GC,SC	<u>E. milli</u>	3	Crown of Thorns
				ST,A	<u>Feijoa sellowiana</u>	2	Pineapple Guava
				S	<u>Ficus buxifolia</u>	2	Boxwood Ficus
				ST,A	<u>Ficus carica</u>	3	Fig
				S,A	<u>F. diversifolia</u>	2	Mistletoe Fig
				LT	<u>F. microcarpa</u>	3	Chinese Banyan
				S,GC	<u>F. microcarpa</u> var.	3	Taiwan Ficus
				A,SC	<u>Crassifolia</u>	3	Variegated Furcraea
					<u>Furcraea aff. gigantea</u>	3	
					<u>variegata</u>		

Type	Botanical Name	Zone	Common Name	Type	Botanical Name	Zone	Common Name
S,A	<u>Gardenia brighamii</u>	2	Nanu	S	<u>Rosemarinus officinalis</u>	3	Rosemary
S,GC	<u>G. jacobin</u>	2	Creeping Gardenia	GC	<u>R. officinalis var.</u>	3	Creeping Rosemary
S	<u>Gossypium tomentosum</u>	3	Ma'o	S,A,F	<u>Prostrata</u>	2	Coral Plant
S,A	<u>Grewia occidentalis</u>	2	Lavendar Star	T	<u>Russelia equisetifolia</u>	3	Monkey Pod
ST,A	<u>Gualacum officinale</u>	3	Lignum vitae	A	<u>Samanea saman</u>	3	Sansevieria
S,A,F	<u>Hibiscus brackenridgei</u>	2	Ma'o hau hele	MT	<u>Sansevieria spp.</u>	2	Soapberry Tree
S,GC	<u>H. calyphyllus</u>	3	Rock's Hibiscus	S	<u>Sapindus saponaria</u>	3	Naupaka
S,A,F	<u>H. carnation.</u>	2	Carnation Hibiscus	ST	<u>Scavola taccaga</u>	3	California Pepper Tree
S,A,F	<u>H. cooperi</u>	2	Calico Hibiscus	GC,SC	<u>Schinus molle</u>	3	Sedum
S,A,F	<u>H. schizopetalus</u>	2	Pagoda Hibiscus	V,F	<u>Sedum spp.</u>	2	Mexican Flame Vine
S,A,F	<u>H. schizopetalus 'Pagoda'</u>	2	Koki'o ke'o ke'o	V,GC	<u>Senecio confusus</u>	3	Giant Carrion Flower
S,A,F	<u>H. waiamea</u>	2	Pikake	G	<u>Strobilia nobilis</u>	2	St. Augustine Grass
S,F	<u>Jasminum sambac</u>	2	Pikake	OB	<u>S. secundatum variegatum</u>	2	Augustine Grass
S,F	<u>J. sambac 'Duke</u>	2	Giant Pikake	A,F	<u>Strelitzia reginae</u>	2	Bird of Paradise
GC	<u>OT Tuscany.</u>	2	Japanese Garden	MT	<u>Tabebuia argentea</u>	2	Silver Trumpet Tree
S,GC,F	<u>Juniperus chinensis</u>	2	Juniper	LT	<u>T. chrysantha</u>	2	Gold Tree
GC,F	<u>Procumbens</u>	2	Lantana	LT	<u>T. donnel-smithii</u>	3	Desert Athel
S,A	<u>Lantana camara 'Radiation'</u>	2	Trailing Lantana	MT	<u>Tamaria abhyllia</u>	3	Be-still Tree
S,F	<u>Lantana cv 'Gold Mound'</u>	2	Bay Laurel	V,GC,F	<u>Thevetia peruviana</u>	3	Oyster Plant
S,A	<u>L. montevidensis</u>	2	Naso	GC	<u>Tradescantia spathacea</u>	3	'Akia
ST	<u>Laurus nobilis</u>	3	Dwarf Mandina	S,GC	<u>Hibsteromia uva-ursi</u>	3	Spanish Bayonet
S,A	<u>Myoporum sandwicense</u>	2	Oleander	A,SC	<u>Yucca gloriosa</u>	2	
S,F	<u>Nandina domestica</u>	3	Dwarf Oleander	G	<u>Zoysia tenuifolia</u>	2	
S,F	<u>Nerium oleander</u>	3	Kului	G	<u>'Elegance'</u>	2	
S	<u>Nerium oleander f. 'dwarf'</u>	3	'Ulei		<u>Z. tenuifolia 'Emerald'</u>	2	
MT	<u>Noterichium sandwicense</u>	3	Seasore Paspalum				
S	<u>Olea europaea</u>	2	Variegated Opiuma				
G	<u>Osteomeles anthyllidifolia</u>	2	Wheeler's				
MT	<u>Paspalum vaginatum</u>	2	Pittosporum				
S,GC	<u>Pithecellobium dulce</u>	2	Cape Leadwort				
S,F	<u>'variegata'</u>	2	'Iliia'e				
S,F	<u>Pittosporum tobira</u>	3	Plumeria				
S,GC	<u>'wheeleri'</u>	3	Miniature Jade				
MT,F	<u>Plumbago auriculata</u>	2	Pink Bombax				
S,A,SC	<u>P. zeylanicum</u>	3	Pomegranate				
MT,F	<u>Plumeria hybrid (and spp.)</u>	2	Dwarf Pomegranate				
S,ST	<u>Potulacaria afro</u>	3					
S,ST	<u>Pseudobombax ellipticum</u>	3					
A,GC	<u>Punica granatum</u>	3					
	<u>P. granatum nana</u>	3					

MFA **MASA FUJIOKA & ASSOCIATES**
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December 26, 1995

David R. Craddock, Director
Board of Water Supply
County of Maui
P.O. Box 1109
Wailuku, Maui, Hawaii 96793-7109

Subject: Environmental Impact Statement
Preparation Notice
Central Maui Sanitary Landfill Expansion Project

Dear Mr. Craddock:

Thank you for your letter, dated August 16, 1995, in response to our request for comments on the proposed landfill expansion project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division.

The Draft EIS will address the groundwater and water system topics you discussed in your letter. Currently, there is no plan for a water system at the proposed landfill expansion site. Proper groundwater pollution prevention procedures will be discussed in detail in the Draft EIS.

We appreciate your comments and will send you a copy of the Draft EIS when it is published. We also look forward to your comments on the Draft EIS. Thank you again.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership

Jennifer J. Kleveno
Jennifer J. Kleveno
Associate

MFA Job No. 94128-001

December 16, 1995

Gary Gill, Director
Office of Environmental Quality Control
220 South King Street, Fourth Floor
Honolulu, Hawaii 96813

Subject: Environmental Impact Statement
Preparation Notice
Central Maui Sanitary Landfill Expansion Project

Dear Mr. Gill:

Thank you for your letter, dated September 25, 1995, in response to the proposed landfill expansion project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division.

The Draft EIS will include drawings showing site-specific topographic contours both prior to landfilling operations and at the proposed final landfill elevation. The drawings will indicate water flow pathways and will show the proposed sedimentation basin.

The Draft EIS will also discuss measures the County has considered to minimize the introduction of hazardous wastes and hazardous constituents in the landfill.

We appreciate your comments, and will be submitting the Draft EIS to your office next month. Thank you again.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership

Jennifer J. Kleveno
Jennifer J. Kleveno
Associate

MFA Job No. 94128-001



STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
220 SOUTH KING STREET
FOURTH FLOOR
HONOLULU, HAWAII 96813
TELEPHONE 808-548-2116
FACSIMILE 808-548-2117

September 25, 1995

The Honorable Charles Jencks, Director
Department of Public Works and Waste Management
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Jencks:

Having reviewed the environmental assessment for the Expansion of [the] Central Maui Sanitary Landfill Project, September 1995, we submit the following comments for your consideration in the draft EIS.

1. Please provide site-specific topographic contours to give the reader an indication of water flow pathways.
2. Please discuss what measures the County has considered to minimize the introduction of hazardous wastes and hazardous constituents in the landfill area.

If there are any questions, please call Mr. Leslie Segundo, toll-free at 1-800-468-4644, extension 64185.

Sincerely,
Gary Gill
GARY GILL
Director

BENJAMINE J. CANTLAND
COUNTY CLERK

95 SEP 28 11:41
COLL
FILE

GARY GILL
DIRECTOR

7-18

1135 Mahalo Avenue - Suite 103-331
Maunaloa, Maui, Hawaii 96768
Tel: 808 573 3003
Fax: 808 878 3305

Creating a Sustainable Future



An Opportunity of Value

How Can Waste Converters International, Inc. (WCI) and the Hydromex process serve you? To appreciate the unique value of this opportunity, it is necessary to understand the background of WCI and the applications of this highly versatile technology.

Waste Converters International, Inc. is a newly formed marketing and business development corporation. Under an agreement with Hydromex, Inc., a scientific research firm which has created a process to safely convert all types of waste materials into a wide variety of usable products, WCI has launched a program to market the Hydromex waste conversion technology to a national and international network of customers.

The Hydromex process is made available to customers through processing plants of various sizes which can handle from 50 to 2,000 tons of waste per 8 hour shift. These plants are sold under a cooperative business agreement in which the Buyer, WCI and Hydromex share in the profits.

After the plants are purchased, WCI and Hydromex supervise construction and provide continuing assistance to the plant owner as needed to insure successful operation, maintenance and output of products. WCI, in cooperation with the Plant Owner and appropriate local businesses, develop a regional marketing program for the Hydromex products.

The Hydromex process is capable



1135 Mahalo Avenue, Suite 103-331
Maunaloa, Maui, Hawaii 96768
Tel: 808 573 3003
Fax: 808 878 3305

Creating a Sustainable Future

10 October 95

Charles Jencks, Director
Maui County Public Works
200 South High Street
Wailuku, HI 96793

Dear Mr. Jencks,

According to a recent article in the Maui News, we understand that you are inviting input concerning the planned expansion of the Central Maui landfill. Accordingly, kindly accept the following comments and suggestions as our initial input concerning this matter. Additionally, please place our company and myself on your list of those who wish to be "consulted parties" as the State's environmental review of the project progresses.

As you perhaps know, our company represents the Hydromex process, a technology which converts all kinds of waste into usable products. A brief description of our business (entitled "An Opportunity of Value") is attached for your review.

We have contracted with a company on Kauai to develop a Hydromex plant on that island and are seeking a similar arrangement here on Maui. Such a plant here would not only alleviate the problems and fears suggested in the Maui News article (contamination of ground water and surface water, windblown litter, impact on traffic, air quality, etc.) but could actually turn a problem in to a benefit and an expense into a profit.

I would like the opportunity to meet with you in person, to review the benefits of the Hydromex process as a waste management system and to discuss how this technology can be applied here on Maui.

I look forward to your reply.

Sincerely,

Chris Wayne
Chris Wayne
President

"We're double the size of the group of the highest committed customers."

Margaret Head



It is anticipated that the innovative technology of the Hydromex process will engender skepticism as to its feasibility. To overcome this skepticism and to demonstrate the extensive capabilities of this waste conversion technology, Hydromex has built an experimental prototype at its research facility in Colorado. WCI has contracted with a Kauai-based waste management firm to build and operate the first 200 ton plant in Hawaii. This plant will also serve as a demonstration of the effectiveness of the Hydromex technology.

The WCI management team is comprised of six individuals all of whom are experienced in business development, marketing and sales. They are creating a network of contacts which will enable WCI to expand incrementally into markets worldwide by establishing plants in key areas which will simultaneously serve as a demonstration of the technology in those areas and as a manufacturing center for products suited to that region.

Inquiries are invited from governmental agencies and private firms interested in the application of this technology to their particular circumstances. WCI will work cooperatively with such parties in assessing local needs, developing appropriate plans and structuring suitable financial arrangements to insure that the resulting operations utilizing this technology are environmentally sound, efficient and profitable.

of producing an array of useful products, including: fuel briquettes which can be used in place of coal or oil), construction materials (a wide range of building blocks, lumber, siding and roofing substitutes, insulation, foundation materials, a type of concrete, etc.), agricultural and landscaping materials (compost, soil amendments, etc.) and a line of consumer goods (lawn furniture, patio and walkway tiles, etc.).

A full range of waste materials (household, municipal, agricultural, industrial, hospital—virtually everything except radioactive waste) can be converted into consumer products through the Hydromex process with no harmful emissions to the atmosphere and with no harmful residues, smoke, fumes or other negative environmental impact. The plants are energy efficient and can be built mostly from locally available materials. The closed system conversion process requires catalysis (reagents/chemicals), which are widely available.

Hydromex plants represent an environmentally sound, efficient and cost effective alternative to conventional methods of waste management. Additionally, the products produced by this process are superior to their conventional counterparts by most standards of comparison, and are substantially less expensive to produce. By receiving front-end fees for waste disposal and by selling the resulting products through wholesale and retail outlets, a high level of profitability can be achieved.

WCI 9/25/95

M F A MASA FUJIOKA & ASSOCIATES

PROFESSIONAL PARTNERSHIP
ENVIRONMENTAL • CIVIL/STRUCTURAL • HYDROGEOLOGICAL CONSULTANTS
1911 HILAWA VALLEY STREET, SUITE 502 • MAUI HAWAII 96763
PHONE 907 541-5940 • FAX 907 541-5007

December 26, 1995

Chris Wayne, President
Waste Converters International, Inc.
1135 Makawao Avenue, Suite 103-331
Makawao, Maui, Hawaii 96768

Subject: Environmental Impact Statement
Preparation Notice
Central Maui Sanitary Landfill Expansion Project

Dear Mr. Wayne:

Thank you for your letter dated October 10, 1995, expressing an interest in the proposed landfill expansion project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division.

We appreciate your comments and will send you a copy of the Draft EIS when it is published. We also look forward to your comments on the Draft EIS. Thank you again for your input.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership

Jennifer J. Kleveno
Jennifer J. Kleveno
Associate

MFA Job No. 94128-001

10/8/95
Maui
News

Landfill expansion could do harm, officials admit

FUJIOKA — Planned expansion of the Central Maui landfill into rugged and abandoned quarry areas carries a risk of harming the environment, county officials acknowledge.

Although those areas already have been identified for the expansion, officials say the move could contaminate groundwater and surface water, create windblown litter and have negative effects on traffic, archeology, historic and archaeological features, scenic areas and fire and fauna.

These possibilities for harm and ways to reduce them are to be studied during preparation of an environmental impact statement, officials say.

Among the benefits of the project would be the continued location of a landfill site in Central Maui without the difficulties of locating a new site.

The expanded facility can be expected to accommodate Maui's rubbish until the year 2016, a notice published by the Office of Environmental Quality Control says.

The EIS preparation notice gives members of the public until Oct. 31 to become consulted parties at the state's environmental review of the project progress. Citizens also have until that date to submit written comments to officials about the environmental effects of the project. A draft EIS must address those comments.

The EIS will be prepared by MASA Fujioka & Associates for the county Department of Public Works and Waste Management.

Comments can be sent to county Public Works Director Charles Jencks at 200 S. High St., Wailea 96793. His phone number is 283-7845.

MFA MASA FUJIOKA & ASSOCIATES
A PROFESSIONAL PARTNERSHIP

ENVIRONMENTAL • GEOTECHNICAL • HYDROLOGICAL • PHYSICAL CONSULTANTS
94-1205 HUALAIA VALLEY STREET, SUITE 202 • WAILUKU, HAWAII 96793
PHONE: (808) 242-4388 • FAX: (808) 242-4388

December 26, 1995

James R. Judge
2233 Vineyard Street, Suite B
Wailuku, Maui, Hawaii 96793

Subject: Environmental Impact Statement
Preparation Notice
Central Maui Sanitary Landfill Expansion Project

Dear Mr. Judge:

Thank you for your letter, dated October 23, 1995, expressing an interest in the proposed landfill expansion project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division.

We have taken your comments into consideration in preparation of the Draft EIS. The topics of potential groundwater contamination, litter, and air quality will be addressed in the Draft EIS.

We appreciate your comments and will send you a copy of the Draft EIS when it is published. We also look forward to your comments on the Draft EIS. Thank you again.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership

Jennifer J. Kleveno
Jennifer J. Kleveno
Associate

MFA Job No. 94128-001

DRU

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JAMES R. JUDGE
2233 VINEYARD STREET, SUITE B
WAILUKU, MAUI, HAWAII 96793
TELEPHONE: (808) 242-4355
FAX: (808) 242-4388

October 23, 1995

Mr. Charles Jencks
Public Works Director
200 South High Street
Wailuku, Maui, Hawaii 96793

Re: Planned expansion of the Central Maui Landfill

Dear Mr. Jencks,

I would like to become a consulting party and go on record with the following comments about the environmental effects of the proposed expansion of the Central Maui Landfill.

A primary concern is potential contamination of the ground water.

Also of concern is the trash that litters Omoapio/Pulehu Road. The road to the dump now looks like the dump.

We all know that landfills have to be placed somewhere, and nobody wants them in their own back yard, but matters such as air quality and wind blown litter have to be appropriately addressed when the Environmental Impact Statement is prepared.

Lastly, speaking from personal observation regarding the Omoapio Road, much trash is deposited along the stretch of Omoapio Road from Lower Kula Highway to the dump. The narrow, winding Omoapio Road was simply not engineered or built to take the heavy trucks or traffic that now utilizes Omoapio Road to gain access to the landfill.

Accordingly, trash pick up should be also include the area from the landfill up to the Lower Kula Road on Omoapio Road. Since the landfill has opened, I have noticed more trash along side the road that is obviously destined for the landfill, but fell off the truck too soon.

I recognize that some road resurfacing has occurred on the bottom of the Omoapio/Pulehu Road, but all of Omoapio should be resurfaced as heavy truck use of Omoapio had caused the road surface to wear more rapidly.

Very truly yours,

James R. Judge
JAMES R. JUDGE

JRJ:jfoa676

AAB HAWAII, INC.
HONOLULU

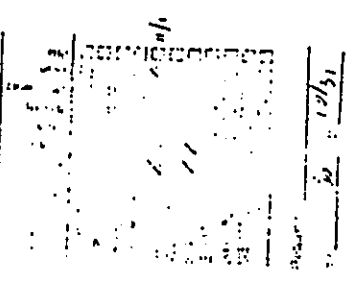
TELEPHONE (808) 577-0881
DFW

HAWAIIAN COMMERCIAL & SUGAR COMPANY

P.O. BOX 266, PUUNENE, MAUI, HAWAII 96784

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October 27, 1995

County of Maui, Department of Public Works
Attn: Charles Jenks
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Jenks:

SUBJECT: Central Maui Landfill Expansion Environmental Impact Statement Preparation Notice

Thank you for this opportunity to provide comments on the Central Maui Landfill Expansion Environmental Impact Statement Preparation Notice. HIC&S has the following comments concerning the project:

Section 2.3.1 Landfill Site Characteristics -- The statement concerning "stockpiled material from quarry operations" (page 2-5) is misleading. The soil or loose over burden may be sold to the County for cover material. This soil is not considered part of the property purchase.

Section 3.2.7 Hydrology and Drainage -- The Kaliainui Gulch must remain open to handle storm drainage water. The County of Maui should be required to maintain the gulch/storm drain next to the landfill. The landfill edge must be strong enough to prevent any waste material from eroding and washing down the stream. Any culverts or crossings of the gulch must be large enough to handle the storm water flows.

Section 3.2.8 Groundwater Resources -- Several HIC&S irrigation wells are located in the vicinity of the landfill. HIC&S Well 6 is located only 3,000 FT. from the landfill. Wells 8, 19, 2 and 7 should be added to Table 3-2, Other Wells in the Area. These wells provide irrigation water (Wells 6, 9, 5, 2, 4 and 7) or cooling water for the Puunene Power Plant (Wells 8 and 19).

Page Two

Section 6.2.1 Leachate Production and Water Quality -- Reasonable mitigating measures to eliminate the chances of leachate contamination of the nearby ground water resources should be required. The wells in the vicinity provide irrigation water and power plant cooling water for HIC&S sugar operations. With Kaliainui Gulch next to the landfill and major irrigation ditches near the landfill, these important water resources must be protected to prevent contamination.

Section 6.2.3 Flora and Fauna -- Barn owls were seen in this area earlier this year (See reference in Section 3.2.6). Other scavenger animals, such as cats and dogs, should be added to the EIS and should be controlled at the landfill and the vicinity to prevent the spread of disease.

Section 6.2.5 Air Quality -- Odors from the existing landfill and composting operations are existing problems. The landfill expansion area is even closer to the Pulehu Road, a public road, and therefore odor problems are expected to continue. Workers in the nearby cane fields and the quarry area are affected by these odors, as well as flies and other health concerns. The operation and maintenance of the new landfill should mitigate these problems.

Section 6.2.6 Litter -- Litter continues to enter our property and the public roadways due to the strong trade winds in this area. The County needs to clean the litter in the Kaliainui Gulch, the HIC&S fields and roads near the existing landfill and improve the litter program for the Phase IV area. This area is much closer to Pulehu Road and will therefore be more visible.

In addition to the wind blown litter, the County needs to address the problem of illegal dumping of House hold and other rubbish near the landfill entrance and in the HIC&S cane fields along Pulehu and Omaopio Roads. The EIS should consider the use of a transfer station at the landfill for items such as tires, vehicles and white goods/appliances which cannot be disposed of at the landfill and are therefore frequently dumped in nearby cane fields. The County should extend the hours of the landfill from sunup to sun set to reduce the illegal dumping of household trash. The County should also provide bins or containers to accept trash during "after hours" periods. These mitigating measures should reduce the problems of rubbish dumping near the landfill and other areas on Maui.

Section 6.3.1 Physical Environment -- The EIS should address the nearby agricultural operations of HIC&S as well as the quarry operations.

M F A MASA FUJIOKA & ASSOCIATES

1000 KALANANAKU DRIVE, SUITE 1000
HONOLULU, HAWAII 96813
PHONE: 808-941-5500 • FAX: 808-941-5507

Page Three

Section 6.3.4 Traffic -- A second entrance to the new landfill area may be needed.

We request that HC&S be consulted in the preparation of the EIS. Thank you for this opportunity to express our concerns.

Sincerely,



Richard F. Cameron
Plantation General Manager

Richard F. Cameron
Plantation General Manager
Hawaiian Commercial & Sugar Company
P.O. Box 266
Punene, Maui, Hawaii 96784
December 26, 1995

Subject: Environmental Impact Statement
Preparation Notice
Central Maui Sanitary Landfill Expansion Project

Dear Mr. Cameron:

Thank you for your letter, dated October 27, 1995, expressing an interest in the proposed landfill expansion project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division.

We are taking your suggestions into consideration in the preparation of the Draft EIS. Specific responses to your concerns follow:

Section 2.3.1 Landfill Site Characteristics - The Draft EIS will clarify that the stockpiled material from the quarry may be available for purchase by the County. Thank you for clarifying that the stockpiled material is not considered part of the property purchase.

Section 2.2.7 Hydrology and Drainage - The proposed landfill berm and liner system will prevent waste material from falling down the slope into Kaliainui Gulch. In addition, the proposed stormwater control system for the landfill expansion will prevent water from moving across the landfill and eroding waste material into the gulch. The landfill operations will include appropriate maintenance of the gulch near the landfill, including removal of litter, removal of obstacles in the gulch that might cause restricted flow conditions and subsequent scouring of the landfill boundary, and maintenance of culverts or crossings.

Section 3.2.8 Groundwater Resources - We have revised Figure 3-5 and Table 3-2 to include all the wells within 2 miles of the site. Thank you for providing information on the HC&S irrigation wells.

Section 6.2.1 - Leachate Production and Water Quality - Phase IV will be a lined landfill which will collect and remove the leachate to prevent groundwater contamination. In addition, groundwater monitoring wells will be installed around the landfill and a groundwater protection standard will be developed which will include periodic sampling of groundwater and reporting to the Department of

cc: Masa Fujioka & Associates, J. Kleveno
H. J. Ching
A&B Properties

Richard F. Cameron
December 26, 1995
Page 2

Health. The Draft EIS will discuss these mitigating measures to protect groundwater resources.

Section 6.2.3 - Flora and Fauna - Cats and dogs will be added to the list of scavenger animals, and we will include the recent barn owl sightings in Section 3.2.6.

Section 6.2.5 - Air Quality and Noise - The landfill expansion and proposed management will reduce negative effects on air quality as much as possible. The County has recently hired a new contractor for the co-composting operation, and the problem with odor from this facility has improved significantly. Also, planned improvements to the landfill operation (litter control and transfer station) should help mitigate negative effects on air quality.

Section 6.2.6 - Litter - We are currently working with the County to improve the litter program at the existing landfill, and many of the measures we are implementing will be useful for the expansion also. In addition, the County has begun to more actively remove litter around the landfill and adjoining areas. A transfer station is planned for the existing landfill and will probably be incorporated into the landfill expansion. The EIS will address these measures to control litter.

Section 6.3.1 - Physical Environment - We have revised the EIS to address the nearby agricultural operations of HC&S.

Section 6.3.4 - Traffic - The preliminary design for the landfill expansion includes access to Phase IV over the Gulch and an emergency entrance/exit off Pulehu Road. These accesses will be discussed in the EIS.

We appreciate your comments and will send you a copy of the Draft EIS when it is published. We also look forward to your comments on the Draft EIS. Thank you again for your detailed input early in the EIS process.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership

Jennifer J. Kleveno
Jennifer J. Kleveno
Associate

MFA Job No. 94128-001

APPENDIX C
COMMENTS AND RESPONSES
TO THE DRAFT EIS

Letters in response to the Draft EIS were received from the following organizations and individuals. This section includes copies of these letters and the respective responses given.

1. State of Hawaii, Department of Business, Economic Development & Tourism; Energy, Resources & Technology Division
2. State of Hawaii, Department of Transportation
3. State of Hawaii, Department of Health, Maui District Health Office
4. U.S. Department of the Interior, U.S. Geological Survey, Water Resources Division
5. State of Hawaii, Department of Business, Economic Development & Tourism, Land Use Commission
6. U.S. Department of Agriculture, Natural Resources Conservation Service
7. U.S. Department of the Army, Pacific Ocean Division, Corps of Engineers
8. State of Hawaii, Office of Hawaiian Affairs
9. U.S. Department of the Navy, Naval Base Pearl Harbor
10. State of Hawaii, Department of Budget and Finance, Housing Finance and Development Corporation
11. County of Maui, Department of Parks and Recreation
12. County of Maui, Planning Department
13. State of Hawaii, Department of Land and Natural Resources, Commission on Water Resources Management
14. State of Hawaii, Department of Public Works
15. State of Hawaii, Office of Environmental Quality Control
16. James R. Judge
17. University of Hawaii at Manoa, Environmental Center
18. State of Hawaii, Office of State Planning
19. State of Hawaii, Department of Land and Natural Resources, State Historic Preservation Division



BENJAMIN J. CAVETANO
Governor
SEIUFU HAYA
Deputy Governor
MICK EGGERD
Deputy Governor

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT, AND TOURISM

Energy, Resources, and Technology Division, 315 Merchant Street, Room 110, Honolulu, Hawaii 96813
PH: (808) 587-3807 FAX: (808) 546-2536

097jencds

January 25, 1996

Mr. Charles Jencks
County of Maui
Department of Public Works
and Waste Management
200 South High Street
Wailuku, Hawaii 96793

NO LETTER OF RESPONSE NECESSARY
TO THE DEPARTMENT OF BUSINESS, ECONOMIC
DEVELOPMENT, AND TOURISM

Dear Mr. Jencks:

SUBJECT: Draft Environmental Impact Statement (DEIS) for the Expansion of
Central Maui Sanitary Landfill Project

We wish to inform you that we have no comments regarding the subject DEIS for
the Expansion of Central Maui Sanitary Landfill Project.

Thank you for the opportunity to submit any comments or recommendations.

Sincerely,

Maurice H. Kaya
Energy, Resources, and Technology
Program Administrator

MFK:aw

c: Jennifer J. Kleveno, Masa Fujioka & Association ✓



BENJAMIN J. CAYETANO
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5087

January 26, 1996

Mr. Charles Jencks, Director
Department of Public Works and Waste Management
Solid Waste Division
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Jencks:

0
1
3

Subject: Draft Environmental Impact Statement (DEIS) for the
Expansion of Central Maui Sanitary Landfill Project

Thank you for your transmittal requesting our review of the subject DEIS.

The subject project is not anticipated to have a significant impact on our State transportation facilities.

We appreciate the opportunity to provide comments.

Very truly yours,

KAZUO HAYASHIDA
Director of Transportation

cc: Ms. Jennifer Kleveno, Masa Fujiooka & Associates

KAZUO HAYASHIDA
DIRECTOR
DEPUTY DIRECTORS
JERRY U. MATSUDA
GLENN H. OKUNO

IN REPLY REFER TO:
STP 8.7193

M F A
MASA FUJIOKA & ASSOCIATES
A PROFESSIONAL PARTNERSHIP

ENVIRONMENTAL • GEOLOGICAL • HYDROGEOLOGICAL CONSULTANTS
99-1214 HIALAWA VALLEY STREET, SUITE 302 • AIEA, HAWAII 96701-1281
PHONE: 808-864-5366 • FAX: 808-864-1867

April 1, 1996

Mr. Kazu Hayashida, Director
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813-5097

Dear Mr. Hayashida:

Subject: Draft Environmental Impact Statement
Expansion of Central Maui Sanitary Landfill Project
Wailuku, Maui, Hawaii: TMK: (2) 3-8-03:4

Thank you for your letter, dated January 26, 1996, commenting on the subject project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division.

We appreciate your comment that the subject project is not anticipated to have a significant impact on the transportation facilities of the State of Hawaii.

Thank you for your comments.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership

Jennifer J. Kleveno
Principal

94128-001



BERNARD J. CAUTERANO
GOVERNOR OF HAWAII

96 JAN 31 P2:12
STATE OF HAWAII
DEPARTMENT OF HEALTH
COUNTY OF MAUI
MAUI DISTRICT HEALTH OFFICE
PUBLISHED ADDRESS
84 1901 STREET
WAILUKU MAUI HAWAII 96793

January 29, 1996

Mr. Charles Jencks
Director
Department of Public Works
and Waste Management
County of Maui
200 S. High Street
Wailuku, Hawaii 96793

Dear Mr. Jencks:

Subject: Draft Environmental Impact Statement, Expansion of Central Maui Sanitary
Landfill Project, TMK: (2) 3-8-03:4, Maui, Hawaii

This office has completed its review of the proposed expansion. We have no comments to offer at this time.

Should you have any questions, please call me at 243-5255.

Sincerely,

HERBERT S. MATSUBAYASHI
Chief Sanitarian

c: OEQC

LAWRENCE HARRIS
DIRECTOR OF PUBLIC WORKS

LAWRENCE HARRIS, M.D., M.P.H.
DIRECTOR OF PUBLIC HEALTH

DEPT. CH.	00000000
PUBLIC WORKS	00000000
DIR.	00000000
ASST. DIR.	00000000
PLANNING	00000000
STAFF SER.	00000000
ADM. SER.	00000000
INSTR. DIV.	00000000
LABORATORY	00000000
HEALTH PROM.	00000000
COMM. REL.	00000000
TRAINING	00000000
INFORM. SYS.	00000000
LEGAL COUNSEL	00000000
RECORDS MGMT.	00000000
FIN. & ADM. SER.	00000000
PROPERTY	00000000
SECURITY	00000000
OTHER	00000000

NO LETTER OF RESPONSE NECESSARY
TO THE MAUI DISTRICT HEALTH OFFICE

C 1 4





United States Department of the Interior

U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii 96813

January 30, 1996

Mr. Charles Jencks
County of Maui
Department of Public Works and Waste Management
Solid Waste Division
Wailuku, Hawaii 96793

Dear Mr. Jencks:

Because of prior commitments, the staff of the U.S. Geological Survey, Water Resources Division, Hawaii District, is unable to review the Draft Environmental Impact Statement for the Expansion of Central Maui Sanitary Landfill Project.

Thank you for sending the DEIS. We are returning it for your future use.

Sincerely,


William Meyer
District Chief

Enc.

cc: Office of Environmental Quality Control
Masa Fujioke and Associates

NO LETTER OF RESPONSE NECESSARY
TO THE UNITED STATES DEPARTMENT OF THE INTERIOR



BENJAMIN J. CAVETANO
CONFIDENTIAL

ESTHER UEDA
EXECUTIVE OFFICER

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
Room 104, Old Federal Building
335 Merchant Street
Honolulu, Hawaii 96813
Telephone: 587-3822

Mr. Charles Jencks, Director
January 31, 1996
Page 2

January 31, 1996

Mr. Charles Jencks, Director
Department of Public Works and
Waste Management
Solid Waste Division
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Jencks:

Subject: Draft Environmental Impact Statement (DEIS) for
the Expansion of Central Maui Sanitary Landfill
Project. THK 3-8-01: 4

The Department of Business, Economic Development, & Tourism
has forwarded the subject DEIS to our office for review.

We have reviewed the subject DEIS and have the following
comments:

1) We confirm that the proposed landfill expansion site is
located within the State Land Use Agricultural
District. As noted on page 4-6 of the DEIS, there have
been three Special Permits issued near the expansion
site: LUC Docket Nos. SP86-359/County of Maui,
Department of Public Works, SP77-271/Ameron HC&D, and
SP66-21/Concrete Industries.

We note that on Figure 4-3, the date of the First
Amendment to LUC Docket No. SP77-271 should be
10/30/90, and not 10/30/96. Also, the Decision and
Order date for LUC Docket No. SP86-359 should be
revised to July 21, 1986, instead of July 12, 1986.

Upon review of LUC Docket No. SP86-359, we note that
Condition 13 imposed by Decision and Order dated
July 21, 1986, states that:

"13. Petitioner will submit to the Commission a letter
from Ameron HC&D requesting an amendment to the Special
Permit issued under Docket No. SP77-271 to delete a

portion of land consisting of the Property, currently
approved for quarrying purposes, for the establishment
of the Project, pursuant to Section 205-6, Hawaii
Revised Statutes."

A review of our files indicates that this condition
remains unsatisfied at this time. Clarification should
be provided as to whether the County Department of
Public Works and Waste Management (fka Department of
Public Works) will address this condition.

2) Clarification should be provided as to the Ameron
Special Permit referenced for Phases IV, V, and VI. We
are unable to find any record of such Special Permit in
our files.

3) It is our understanding that the County Department of
Public Works and Waste Management, Solid Waste
Division, will apply for a Special Permit with the
Planning Department for the proposed 60-acre expansion.

In light of this, we would like to clarify the
statement in Section 11.0 Summary of Unresolved Issues
on page 11-1 pertaining to the review of the Special
Permit by the Land Use Commission (LUC). The LUC will
render a final decision on the Permit only if the
Planning Commission recommends approval of the Permit
to the LUC.

We have no further comments to offer at this time. We
appreciate the opportunity to review and comment on this matter.

Should you have any questions, please feel free to call me
or Bert Saruwatari of our office at 507-3822.

Sincerely,

ESTHER UEDA
Executive Officer

EU:th

cc: DBEDT (#96-211-R)
Jennifer J. Kleveno
OEQC

MFA

MASA FUJIOKA & ASSOCIATES

ENVIRONMENTAL • GEOLOGICAL • HYDROGEOLOGICAL CONSULTANTS
99-1205 HALEAKA VALLEY STREET, SUITE 302 • AIEHA, HAWAII 96701-3201
PHONE: 935-5560 • FAX: 935-5561

MFA

MASA FUJIOKA & ASSOCIATES

ENVIRONMENTAL • GEOLOGICAL • HYDROGEOLOGICAL CONSULTANTS
A PROFESSIONAL PARTNERSHIP

April 1, 1996

Ms. Esther Ueda
April 1, 1996
Page 2

Ms. Esther Ueda, Executive Officer
State of Hawaii
Department of Business, Economic Development & Tourism
Land Use Commission
Room 104, Old Federal Building
335 Merchant Street
Honolulu, HI 96813

Thank you for your comments.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership

Jennifer J. Kleveno
Jennifer J. Kleveno
Principal

Dear Ms. Ueda:

Subject: Draft Environmental Impact Statement
Expansion of Central Maui Sanitary Landfill Project
Wailuku, Maui, Hawaii. TMK: (2) 3-8-03:4

94128-001

Thank you for your letter, dated January 31, 1996, commenting on the subject project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division. Our response to your comments follows:

1. Thank you for confirming that the proposed project site is located within the State Land Use Agricultural District. We will make the necessary corrections to the Special Permit dates shown in Figure 4-3 of the draft EIS.
Regarding LUC Docket No. SP86-359, Condition 13, imposed by Decision and Order dated July 21, 1986: the County has requested the required letter from Ameron. Ameron's attorney has prepared a response addressed to you which the County will forward to your office shortly.
2. Ameron's Special Permit SP77-271 covers a small portion of Phases IV, V, and VI adjacent to the Kaliainui Gulch. Section 4.3.2 of the EIS and Figure 4-3 will be corrected to reflect this.
3. We will correct section 11.0 of the EIS to indicate that your office will render a final decision on the Permit only if the Maui Planning Commission recommends approval of the Permit.

C-7



United States
Department of
Agriculture

Natural
Resources
Conservation
Service

P. O. Box 50004
Honolulu, HI
96850-0001

MFA **MASA FUJIOKA & ASSOCIATES**
A PROFESSIONAL PARTNERSHIP

ENVIRONMENTAL • GEOLOGICAL • HYDROLOGICAL CONSULTANTS
99-1205 HALAWA VALLEY STREET, SUITE 302 • AIEA, HAWAII 96701-3281
PHONE: (808) 494-5366 • FAX: (808) 494-1987

February 6, 1996

Mr. Charles Jencks
Department of Public Works and Waste Management
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Jencks:

Subject: Draft Environmental Impact Statement (DEIS) - Expansion of Central Maui Sanitary Landfill Project, Wailuku, Maui

We have reviewed the above-mentioned document and have the following comments to offer: Possible litter control and visual impacts can be utilized together by planning for tight windbreak belts (25-30 feet) together with landscaping plants not only along Pulehu Road but along other wind corridors.

We thank you for the opportunity to review this document.

Sincerely,

KENNETH M. KANESHIRO
State Conservationist

cc: Ms. Jennifer J. Kleveno, Masa Fujioka & Associates, 99-1205 Halawa Valley Street, Suite 302, Aiea, HI 96701-3281

April 1, 1996

Kenneth M. Kaneshiro
Natural Resources Conservation Service
United States Department of Agriculture
P.O. Box 50004
Honolulu, HI 96850-0001

Dear Mr. Kaneshiro:

Subject: Draft Environmental Impact Statement
Expansion of Central Maui Sanitary Landfill Project
Wailuku, Maui, Hawaii; TMK: (2) 3-8-03:4

Thank you for your letter, dated February 6, 1996, commenting on the subject project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division.

We appreciate your suggestion of a method to improve litter control and visual impacts of the landfill expansion. We will consider utilizing tight windbreak belts together with landscaping plants along Pulehu Road and other wind corridors. This and other possible mitigation techniques will be addressed in Section 6.2 of the final EIS.

Thank you for your comments.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership

Jennifer J. Kleveno
Principal

94128-001

The Natural Resources Conservation Service
formerly the Soil Conservation Service, works
hand-in-hand with the American people to
conserve natural resources on private lands.

AN EQUAL OPPORTUNITY EMPLOYER



DEPARTMENT OF THE ARMY
PACIFIC OCEAN DIVISION, CORPS OF ENGINEERS
FT. SHAFTER, HAWAII 96858-5440

DATE OF
ATTENTION OF

February 7, 1996

Planning and Operations Division

Mr. Charles Jencks
County of Maui
Department of Public Works
and Waste Management
200 South High Street
Wailuku, Maui 96793

Dear Mr. Jencks:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement (DEIS) for the Expansion of the Central Maui Sanitary Landfill Project, Wailuku, Maui (TMK 3-8-3: 4). The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1960 and to issue Department of the Army (DA) permits under the Clean Water Act; the Rivers and Harbors Act of 1899; and the Marino Protection, Research and Sanctuaries Act.

- a. Based on the information provided, the landfill is not in any waters of the U.S.; therefore, a DA permit will not be required for the project.
- b. The flood hazard information provided on page 4-11 of the DEIS is correct.

Sincerely,

Paul Mizue, P.E.
Acting Chief, Planning
and Operations Division

Copy Furnished:

Ms. Jennifer J. Koleveno
Masa Fujioka and Associates
99-1205 Halawa Valley Street, Suite 302
Aiea, Hawaii 96701-3281

MFA
MASA FUJIOKA & ASSOCIATES
A PROFESSIONAL PARTNERSHIP

ENVIRONMENTAL • GEOTECHNICAL • HYDROLOGICAL CONSULTANTS
99-1205 HALAWA VALLEY STREET, SUITE 302 • AIEA, HAWAII 96701-3281
PHONE: 808-261-5300 • FAX: 808-261-4800

April 1, 1996

Paul Mizue, P.E.
Planning and Operations Division
Department of the Army
Pacific Ocean Division, Corps of Engineers
Fort Shafter, HI 96858-5440

Dear Mr. Mizue:

Subject: Draft Environmental Impact Statement
Expansion of Central Maui Sanitary Landfill Project
Wailuku, Maui, Hawaii. TMK: (2)3-8-03:4

Thank you for your letter, dated February 7, 1996, commenting on the subject project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division.

We appreciate your confirmation of the flood hazard information provided on page 4-11 of the draft EIS. We also understand that a Department of the Army permit will not be required for the project.

Thank you for your comments.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership

Jennifer J. Koleveno
Jennifer J. Koleveno
Principal

94128-001

PHONE (808) 594-1888



FAX (808) 594-1865

STATE OF HAWAII
OFFICE OF HAWAIIAN AFFAIRS
711 KAPOLANI BOULEVARD, SUITE 500
HONOLULU, HAWAII 96813

February 8, 1996

Mr. Charles Jencks
County of Maui
Department of Public Works and Waste Management
Solid Waste Division
200 South High Street
Wailuku, Hawaii 96793

Re: Expansion of Central Maui Sanitary Landfill Project
Wailuku, Maui, Hawaii, TMK: (2) 3-8-03:4

Dear Mr. Jencks:

Thank you for the opportunity to review the Draft Environmental Impact Statement for the Expansion of Central Maui Sanitary Landfill Project. At this time, the Office of Hawaiian Affairs has no comments on this project.

If you have any question or need any additional information, please contact Linda Delaney, Land and Natural Resources Officer or Lynn Lee, EIS Planner at 594-1888.

Sincerely,

Linda M. Colburn
Administrator

cc: Clayton H.W. Hee, Chairperson
Board of Trustees
Office of Environmental Quality Control
Masa Fujioka & Associates

NO LETTER OF RESPONSE NECESSARY
TO THE OFFICE OF HAWAIIAN AFFAIRS



DEPARTMENT OF THE NAVY
COMMANDER
NAVAL BASE PEARL HARBOR
BOX 110
PEARL HARBOR, HAWAII 96340-5020

IN REPLY REFER TO
11010
Ser RA(23)/5915
12 Feb 96

Mr. Charles Jencks
County of Maui
Department of Public Works and Waste Management
Solid Waste Division
200 South King Street
Mailuku, HI 96793

Dear Mr. Jencks:

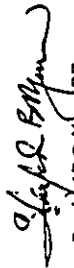
Subj: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE EXPANSION
OF CENTRAL MAUI SANITARY LANDFILL PROJECT OF
JANUARY 1996

Thank you for the opportunity to review the Draft
Environmental Impact Statement for the Expansion of Central Maui
Sanitary Landfill Project of January 1996.

The Navy has no comments to offer at this time and
appreciates the opportunity to participate in the review process.

The Navy's point of contact is Mr. Stanford Yuen at 474-0439.

Sincerely,


Stanley B. C. Yuen/PIE.
By direction

Copy to:
Ms. Jennifer J. Kleveno
Masa Fujioka & Associates
99-1205 Halawa Valley Street, Suite 302
Aiea, HI 96701-3281

NO LETTER OF RESPONSE NECESSARY
TO THE DEPARTMENT OF THE NAVY

SEKULANI J. CAVETIARO
CHIEF OF BUREAU



STATE OF HAWAII
DEPARTMENT OF BUDGET AND FINANCE
HOUSING FINANCE AND DEVELOPMENT CORPORATION
877 QUEEN STREET, SUITE 300
HONOLULU, HAWAII 96813
TEL: (808) 547-0800

ROY S. OSHIRO
EXECUTIVE DIRECTOR

MAIL ROOM

96: PFE/580

February 12, 1996

The Honorable Charles Jencks
Director
Department of Public Works and
Waste Management
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Jencks:

Re: Draft EIS for Expansion of Central Maui Sanitary Landfill
Project

Thank you for the opportunity to review the subject draft EIS.
We have no comments to offer.

Sincerely,

ROY S. OSHIRO
Executive Director

c: OROC (with CEIS)
~~Other Distribution Applicable~~

NO LETTER OF RESPONSE NECESSARY
TO THE HOUSING FINANCE
AND DEVELOPMENT CORPORATION





DEPARTMENT OF
PARKS AND RECREATION
COUNTY OF MAUI

1510-C KAAHUMANU AVENUE
WAILUKU, HAWAII 96793

LINDA CROCKETT LINGLE
Mayor

HENRY OLIVA
Director

ALLEN SIBSIBIDO
Deputy Director

PLANNING & DEVELOPMENT
(808) 243-7931

February 14, 1995

Charles Jencks, Director
Department of Public Works & Waste Management
Solid Waste Division
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: EXPANSION OF CENTRAL MAUI SANITARY LANDFILL PROJECT; EIS
COMMENT LETTER.


Dear Mr. Jencks,

We have reviewed the subject environmental impact statement for this project and offer the following comment:

1. The proposed development does not entail the subdivision of land that would trigger park assessment conditions.

Should you have any questions please contact Patrick T. Matsui, Planning and Development Division Chief at 243-7931.

Sincerely,


Henry Oliva
Director

HO:PTM:GU

cc: Patrick T. Matsui, Chief Planning & Development
Gerald Unabia, Project Manager
Masa Fujioka & Associates
OEQC, State of Hawaii
Files

419tceatrf111.tr

MFA
MASA FUJIOKA & ASSOCIATES
A PROFESSIONAL PARTNERSHIP

ENVIRONMENTAL • GEOTECHNICAL • HYDROGEOLOGICAL CONSULTANTS
94-1205 HALAWA VALLEY STREET, SUITE 502 • AIEA, HAWAII 96701-4281
PHONE: 808-491-5260 • FAX: 808-491-4747

April 1, 1996

Henry Oliva, Director
Department of Parks and Recreation
County of Maui
1580-C Kaahumanu Avenue
Wailuku, HI 96793

Dear Mr. Oliva:

Subject: Draft Environmental Impact Statement
Expansion of Central Maui Sanitary Landfill Project
Wailuku, Maui, Hawaii. TMK: (2) 1-3-8-03-3

Thank you for your letter, dated February 14, 1996, commenting on the subject project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division.

We understand that the subject project does not trigger park assessment conditions.

Thank you for your comments.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership


Jennifer J. Kleveno
Principal

94128-001

LINDA CROCKETT LUNAILE
Mayor



DAVID W. BLANE
Director
OWEN OHASHI HIRAJOA
Deputy Director

COUNTY OF MAUI
PLANNING DEPARTMENT
240 S. HIGH STREET
WAILUKU, MAUI, HAWAII 96783

February 16, 1996

Mr. Gary Gill
Office of Environmental Quality Control
220 South King Street, 4th Floor
Honolulu, Hawaii 96813

Dear Mr. Gill:

RE: Expansion of the Central Maui Sanitary Landfill
Project, TMK: 3-8-314, Wailuku, Maui, Hawaii

We have reviewed the Draft Environmental Impact Statement (EIS) for the above-referenced project and provide the following comments:

1. The Detailed Land Classification, overall productivity rating should also be included in analyzing the suitability of lands for agricultural production.
2. The Department of Transportation should be consulted with to analyze possible impacts on state highway facilities (e.g., effects of truck traffic circulation on the Kahului Airport operations).
3. "Good housekeeping methods" to minimize disease vector problems should be elaborated on in greater detail.
4. Public health impacts on surrounding uses from the adverse air quality of the composting operation should be recognized and present mitigation measures should be discussed in detail. What has the new contractor for the co-composting operation done to significantly improve the odor problem? These impacts and mitigation measures should be discussed in the text of the Draft EIS.

C - 14

Mr. Gary Gill
February 16, 1996
Page 2

Finally, from a land use perspective, it is suggested that the applicant petition the Maui County Council to change the land use designation of the property from Agriculture to Public/Quasi-Public in the Wailuku-Kahului Community Plan. The Community Plan update process for this region is currently before the Council.

Thank you for the opportunity to comment. Should you have any questions, please contact Mr. Daren Suzuki of my staff at 243-7735.

Very truly yours,

David W. Blane

DAVID W. BLANE
Director of Planning

DWB:DS:cmp
cc: Colleen Suyama, Planning Program Manager-Land Use Management
Daren Suzuki, Staff Planner
Clayton Yoshida, AICP, Staff Planner
Charles Jencks
General File
Project File

Mr. David W. Blane
April 1, 1996
Page 2

April 1, 1996

David W. Blane, Director of Planning
County of Maui Planning Department
250 S. High Street
Wailuku, HI 96793

Dear Mr. Blane:

Subject: Draft Environmental Impact Statement
Expansion of Central Maui Sanitary Landfill Project
Wailuku, Maui, Hawaii: TMK: 21-3-8-034

Thank you for your letter, dated February 16, 1996, commenting on the subject project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division. Our response to your comments follows:

1. Section 3.2.4 of the draft EIS, entitled "Soils" addresses the Detailed Land Classification Overall Productivity Rating. In the final EIS, we will include reference to this section in section 4.4.5 which discusses the Agricultural Lands of Importance to the State of Hawaii.
2. The traffic impacts of the proposed expansion are anticipated to be minimal since landfill operations already occur at the site, the amount of waste accepted daily will not increase, and the expansion will utilize the existing landfill entrance (see Section 5.3.2 of the draft EIS). The Department of Transportation (DOT) was sent a copy of the draft EIS. In a letter dated January 26, 1996, the DOT stated that the subject project is not anticipated to have a significant impact on the State transportation facilities.
3. "Good housekeeping methods" include daily cover, watering of hauling roads to control dust, and daily litter cleanup. These and other requirements for proper operation of the expansion will be addressed in the Operations Plan for the facility, which must be approved by the State Department of Health Office of Solid Waste Management. The current Operations Plan for the Central Maui Sanitary Landfill addresses vector control in Section 3.12.
4. Previously, there have been odor problems with the co-composting project at the Central Maui Landfill. The new co-composting operator

has undertaken several measures to reduce odors. These measures are addressed in Section 5.2.2.E of the draft EIS. Co-composting is planned to continue at its current location; no additional composting is planned for the landfill expansion.

5. We appreciate your suggestion to petition the Maui County Council to change the land use designation of the property from Agriculture to Public/Quasi-Public in the Wailuku-Kahului Community Plan. The Department of Public Works and Waste Management, Solid Waste Division has petitioned the Council to change the designation of Phases I through VI of the landfill.

Thank you for your comments.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership


Jennifer J. Kleveno
Principal

94128-001

April 1, 1996

Ms. Rae M. Loui, Deputy Director
 State of Hawaii, Department of Land and Natural Resources
 Commission on Water Resources Management
 P.O. Box 621
 Honolulu, HI 96809

Dear Ms. Loui:

**Subject: Draft Environmental Impact Statement
 Expansion of Central Maui Sanitary Landfill Project
 Wailuku, Maui, Hawaii; TMK: 21-3-8-03:3**

Thank you for your letter, dated February 21, 1996, commenting on the subject project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division. Our response to your comments follows:

1. A permit for operation of the facility must be issued by the State in accordance with Hawaii Revised Statutes, Chapter 342H, and the integrated solid waste management plan for the State of Hawaii. Prevention and mitigation of possible ground and surface water contamination is incorporated into the design of the landfill expansion and will be addressed in the permit. A permit application for the operation of Phase IV of the Central Maui Sanitary Landfill Expansion will be filed with the Department of Health (DOH), Environmental Management Division, Office of Solid Waste Management. Applications for operation of landfill Phases V and VI will be filed after the land has been purchased by the County and the facilities have been designed (see Section 4.4.2 of the draft EIS).

The project will accept and must comply with any requirements related to water quality included in the DOH permit.

2. Three monitoring wells are currently in place for the existing landfill. In accordance with the current DOH policy, these wells are sampled quarterly for several ground water properties, including water levels, chlorides, and temperature. Well construction permits were obtained from your office for these existing wells. Permits will be obtained before construction begins on any additional monitoring wells.

MICHAEL D. WILSON
 Chairman
 ROBERT G. GARDAL
 DAVID A. HOPWOOD
 LAWRENCE H. LANE
 ROBERT H. COLE
 ROBERT L. HENNINGER, JR.
 RAE M. LOUI, P.E.
 DEPUTY



STATE OF HAWAII
 DEPARTMENT OF LAND AND NATURAL RESOURCES
 COMMISSION ON WATER RESOURCE MANAGEMENT
 P. O. BOX 621
 HONOLULU, HAWAII 96809
 FEB 21 1996

Mr. Charles Avels
 County of Maui
 Solid Waste Division
 300 South Mokuia St.
 Wailuku, HI 96793

Dear Mr. Avels:

SUBJECT: DEIS for Expansion of Central Maui Sanitary Landfill Project

Thank you for the opportunity to review the subject documents. Our comments related to water resources are marked below. In general, the CWRM strongly promotes the efficient use of our water resources through conservation measures and use of alternative non-potable water resources wherever available, feasible, and there are no harmful effects to the ecosystem. Also, the CWRM encourages the protection of water recharge areas which are important for the subsistence of streams and the replenishment of aquifers.

- () We recommend coordination with the county government to incorporate this project into the county's Water Use and Development Plan.
- (X) We are concerned about the potential for ground or surface water depletion, contamination and recommended that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.
- () A Well Construction Permit and a Pump Installation Permit from the CWRM would be required before ground water is developed as a source of supply for the project.
- () The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit from the CWRM would be required prior to use of this source.
- () Groundwater withdrawals from this project may affect streamflow. This may require an increase flow standard amendment.
- () We recommend that no development take place affecting highly erodible slopes which drain into streams within or adjacent to the project.
- () If the proposed project diverts additional water from streams or if new or modified stream diversions are planned, the project may need to obtain a stream diversion works permit and petition to amend the interim stream flow standard for the affected stream(s).
- () Based on the information provided, it appears that a Stream Channel Alteration Permit pursuant to Section 11-169-50, HAR will be required before the project can be implemented.
- () Based on the information provided, it does not appear that a Stream Channel Alteration Permit pursuant to Section 11-169-50, HAR will be required before the project can be implemented.
- () An amendment to the increase flow standard from the CWRM would be required before any streamflow is diverted.
- () Any new development that is permitted along a stream that is not yet channelized should be based on the stream condition that no streams will be channelized to prevent flooding of the development. Development in the open floodplain should not be allowed, other economic uses of the floodplain should be encouraged.

(X) OTHER:

Since monitoring wells are proposed for the project it would be beneficial to consider making provisions to enclose monthly water level, chloride, and temperature. If one or more of these monitoring wells can provide such information a monitoring well construction permit is required and can be substantiated approved by our office.

If there are any questions, please contact Roy Hardy at 317-0714.

Sincerely,

 RAE M. LOUI
 Deputy Director

OEQC
 Masa Fujioka & Associates

MFA **MASA FUJIOKA & ASSOCIATES**
A PROFESSIONAL PARTNERSHIP
ENVIRONMENTAL • GEOTECHNICAL • INTERDISCIPLINARY CONSULTANTS

Ms. Rae M. Loui
April 1, 1996
Page 2

Thank you for your comments.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership

Jennifer J. Kleveno
Jennifer J. Kleveno
Principal

94128-001

(P)1136.6

FEB 26 1996

County of Maui
Department of Public Works
and Waste Management
Solid Waste Division
200 South High Street
Wailuku, Maui, Hawaii 96793

Attention: Mr. Charles Jencks

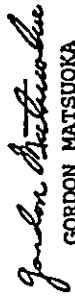
Gentlemen:

Subject: Expansion of Central Maui Sanitary
Landfill Project
Wailuku, Maui, Hawaii
Draft Environmental Impact Statement

Thank you for the opportunity to review the subject document. We have no comments to offer.

If there are any questions, please have your staff contact Mr. Ralph Yukumoto of the Planning Branch at 585-0488.

Very truly yours,



GORDON MATSUOKA
State Public Works Engineer

RY:jy

cc: ~~Mr. Charles Jencks~~
OEQC

NO LETTER OF RESPONSE NECESSARY
TO THE STATE PUBLIC WORKS

BENJAMIN J. CAYETANO
Secretary



STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

210 SOUTH KING STREET
FOURTH FLOOR
HONOLULU, HAWAII 96813
TELEPHONE (808) 548-4118
FACSIMILE (808) 548-4118

GARY GILL
DIRECTOR

The Honorable Charles Jencks, Director
Department of Public Works & Waste Management
County of Maui
March 6, 1996
Page 2 of 2

March 6, 1996

VIA TELEPHONE FACSIMILE 9-1-808-243-7955

The Honorable Charles Jencks, Director
Department of Public Works and Waste Management
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Jencks:

The Office of Environmental Quality Control published notice of availability of a draft environmental impact statement (DEIS) for the *Central Maui Expansion of Sanitary Landfill Project*, TMK 3-8-03:4, in its January 23, 1996, February 8, 1996, and February 23, 1996, editions of the *Environmental Notice*. After review of the DEIS, we submit for your response the following comments.

1. **SUMMARY SHEET.** A summary serves to highlight key pieces of information to allow the reader to decide what portions of the DEIS warrant further review. The summary sheet must also include the administrative elements identified in HAR §11-200-17(b). Please append the following items to the summary found on pages 1-1 and 1-2 of the DEIS and include a revised summary sheet in the final environmental impact statement for the project.
 - A. Concise abstract of alternatives considered in Section 7.
 - B. Concise abstract of unresolved issues discussed in Section 11.
 - C. Concise discussion of the compatibility of the proposed landfill expansion with land use plans and policies, and a listing of permits and approvals. We respectfully suggest abstracting relevant information from sections 4 and 12 of the DEIS.

2. **INCORPORATION OF NECESSARY DATA FOR DIRECT OR INDIRECT SOURCES OF POLLUTION**

Section 11-200-17(f), Hawaii Administrative Rules requires that "necessary data" for direct and indirect sources of pollution be incorporated in the DEIS. Please provide in the final environmental impact statement, available data (e.g., priority pollutants, hazardous constituents, primary and secondary drinking water standards, etc.) regarding water and air quality near the site of the proposed landfill expansion. Please also provide an indication of the reliability of such data (as defined in any approved quality control sampling plan or a quality control project plan).

Please include this letter and your response in the final environmental impact statement for this project. If there are any questions, please call Mr. Leslie Segundo, Environmental Health Specialist toll-free at 1-800-468-4644 extension 64185. Thank you.

Sincerely,


GARY GILL
Director

c: Ms. Jennifer Klevemo, Masa Fujioka & Associates

MFA **MASA FUJIOKA & ASSOCIATES**
A PROFESSIONAL PARTNERSHIP

ENVIRONMENTAL • GEOTECHNICAL • HYDROGEOLOGICAL CONSULTANTS
92-1205 HUALAWEA VALLEY STREET, SUITE 402 • AIEA, HAWAII 96706-1201
PHONE: 808-961-5366 • FAX: 808-961-0007

April 1, 1996

Mr. Gary Gill, Director
State of Hawaii, Office of Environmental Quality Control
220 South King Street, fourth floor
Honolulu, HI 96813

Dear Mr. Gill:

Subject: Draft Environmental Impact Statement
Expansion of Central Maui Sanitary Landfill Project
Waialuku, Maui, Hawaii. TMK: (2) 3-8-03:4

Thank you for your letter, dated March 6, 1996, commenting on the subject project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division. Our response to your comments follows:

1. We appreciate your suggestion to include additional information in the summary section of the EIS. We will include summaries of the information in sections 7, 11, 4 and 12, as you requested.
2. We will include available data regarding groundwater quality at the site of the proposed landfill expansion in section 3.2.8 of the final EIS. No air quality data are available at this time. We will provide an indication of the reliability of the groundwater data and the procedures used to obtain the data (sampling was performed in accordance with ASTM D 4488-85a and EPA guidelines).

Thank you for your comments.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership

Jennifer J. Kleveno

Jennifer J. Kleveno
Principal

94128-001

County of Maui
Department of Public Works
Page two
March 7, 1996

JAMES R. JUDGE
2233 VINEYARD STREET, SUITE B
WAILUKU, MAUI, HAWAII 96793
TELEPHONE: (808) 242-4955
FAX: (808) 242-4366

March 7, 1996

County of Maui
Department of Public Works
Attention: Mr. Charles Jencks
200 South High Street
Wailuku, Maui, Hawaii 96793
Re: Expansion of Central Maui Sanitary Landfill Project

Gentlemen:

I have now had an opportunity to review the Draft Environmental Impact Statement (DEIS) for the Expansion of the Central Maui Sanitary Landfill Project.

I have the following comments:

Paragraph 2.3.5, Landfill Operation and Maintenance. This paragraph seems to indicate that the operations plan will be developed later as part of the permitting process, and would address all of the items that would be of concern for the expansion, including control measures for litter and odor.

What is obvious is that the existing operation plan does not effectively deal with either the wind blown litter, the pick up of trash that falls off private trucks on the way to the landfill or the odors emanating from the existing landfill operation.

Paragraph 2.3.6, Utility Requirements. I note that there is no water hook up for the proposed landfill expansion. Further, paragraph 3.2.2 indicates on page 3-3 that the area has only an average annual rainfall of approximately twenty (20) inches. In paragraph 5.2.2, Primary Adverse Impacts, under subparagraph D, Visual Impact, it is suggested that a perimeter design including trees will be implemented in order to mitigate the visual impact of landfilling activities. Paragraph 6.2.4, Visual Impact also refers to vegetation. If you want trees or vegetation to grow, you are going to have to find a way to water them.

Paragraph 3.2.9, Air Quality and Noise Levels acknowledges the odor and other problems that have previously occurred at the landfill involving co-composting activities (sludge and green waste). This paragraph makes it sound like the co-composting problems have all been solved, but I must let you know that,

driving by the existing composting project, which is far away from the road, is still a very fragrant proposition as recently as the beginning of this week.

Along those same lines, paragraph 4.4.2, Hawaii Administrative Rules on page 4-10 contains the statement "Compost management, dust control and a gas collection system will reduce potential degradation of air quality in the area of the proposed project". The foregoing is a pretty bold statement which I don't think can be substantiated in actual practice, at least if the present situation is an indicator of success in this regard.

Paragraph 6.2.4, Visual Impact also indicates a vegetation (tree barrier) and fencing will be installed along the western border of the expansion to "minimize the visual impact of the landfill on Pulehu Road travelers". As I mentioned, any kind of vegetation is going to require water, which has not been provided for. Additionally, a chain link fence littered with plastic bags is not going to be very attractive.

Paragraph 6.2.5, Air Quality and Noise. I am confused by the statement "Odor problems will be minimized through good housekeeping procedures, such as proper waste handling and soil covering". The odor problems are not minimized presently through existing procedures. The subsequent reference to the prevailing winds blowing "airborne particulates toward the south and southwest where there are canefields and no major urban areas", disregards the fact that this wind blows directly onto the Pulehu Road, which is a main thoroughfare for many of the Kula residents.

Paragraph 6.2.6, Litter acknowledges that the existing six foot high chain link fence surrounding the perimeter of the existing landfill has done literally nothing to prevent the bulk of the litter from entering the neighboring areas. Litter, as primarily plastic bags, has scattered around the landfill, as well as Pulehu Road. It is unclear to me what is meant when it is stated that "A litter control program for the proposed project is being evaluated and community involvement is being considered". What is the litter control program being considered that the public may or may not be brought in to comment upon?

Paragraph 6.3.4, Traffic doesn't reflect the fact of the increased traffic on Pulehu and Omaopio Roads. A point that must be emphasized is the fact that not only is the access road into the Central Maui Landfill involved, but also the public roads leading to it. Trash is strewn the length of Omaopio Road, largely due to things blowing or falling out of trucks on the way to the landfill. Any plan must necessarily include cleaning the

County of Maui
Department of Public Works
Page three
March 7, 1996

length of Omaopio Road on a regular basis, not only just the area out in front of the landfill access road.

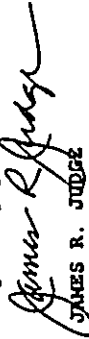
After the current landfill was started, I noted that the County of Maui paved the portion from the landfill access road down to Hansen Road a number of times before it got around to doing any repaving going up the Pulehu Road. It must be understood that refuse trucks don't simply come up Pulehu Road from Hansen Road, but also go down the Omaopio and Pulehu Roads. As such, the Omaopio Road must also be paved on a regular basis as the increased large truck use is causing a faster deterioration of the old asphalt road.

In paragraph 9.0, Groundwater Contamination is a statement that groundwater monitoring wells will be installed to provide early detection of contamination "so that corrective action can take place" (page 9-1). I am not sophisticated about these things, but I would like to know what exactly can be done after contamination is detected.

In closing, my family has lived on Omaopio Road for thirty years. As an upcountry resident, I am more than a little ashamed by the look and the smell of the existing landfill area. The proposed expansion is much closer to the road and will magnify whatever problems currently exist. I must share with you the fact that when, giving driving directions to my home to a relative newcomer on Maui, his comment was "Oh, I know where that is, that's the dump road isn't it? That's the one that smells like crap and looks like it, too." I was very embarrassed. We must do this expansion better than the first phase.

Please contact me if you have any questions regarding the above.

Very truly yours,


JAMES R. JUDGE

JRJ:jfoa756
pc: State of Hawaii, Office of Environmental Quality Control
Attn.: Mr. Brian J. J. Choy
Maui Fujioka & Associates
Attn.: Ms. Jennifer J. Kleveno
Hawaiian Commercial & Sugar Company
Attn.: Mr. Richard F. Cameron, Plantation General Manager
Department of Water Supply
Attn.: Mr. David R. Craddick, Director
Planning Department
Attn.: Mr. David Blane, Director

James R. Judge
2233 Vineyard Street
Suite B
Wailuku, HI 96793

April 1, 1996

Mr. James R. Judge
April 1, 1996
Page 2

Dear Mr. Judge:

Subject: Draft Environmental Impact Statement
Expansion of Central Maui Sanitary Landfill Project
Wailuku, Maui, Hawaii. TMK: (2) 3-8-03:4

Thank you for your letter, dated March 7, 1996, commenting on the subject project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division. Our response to your comments follows:

1. Landfill Operation and Maintenance: We are aware that there have been problems with litter and odors at the existing landfill. The County of Maui is in the process of updating the operations plan to address and resolve these problems.
2. Utility Requirements: The trees and vegetation planned for perimeter areas will be irrigated by water from a water truck, which is the landfill's current source of water.
3. Air Quality and Noise Levels: The landfill management and the contractor that operates the co-composting operation are working to identify the source of the current odor problems in order to correct them. It appears that the odor problems are primarily due to biowaste (sludge) from one particular wastewater treatment facility. The contractor, Solid Waste Division personnel, and the management of the wastewater facility are investigating possible solutions to the odor problem. For the time being, the parties are attempting to coordinate their schedules in order to minimize the amount of time that the sludge is exposed.
4. Hawaii Administrative Rules: "Compost management" in this instance refers to diverting green waste from the Phase IV expansion. The co-composting operation will not be part of the proposed expansion, so odor problems associated with that operation will be addressed outside the context of the proposed landfill expansion. Gas collection and dust

control for the proposed expansion will meet or exceed the requirements of the regulations.

5. Visual Impact: Water trucks will provide the water for the vegetation, as previously discussed. To minimize the amount of litter that collects on the perimeter fence, regular litter cleanup will be undertaken. In addition, the County is in the process of constructing portable litter fences which will be placed directly adjacent to the working face of the landfill. These fences will collect the majority of windblown litter, so that litter reaching the perimeter fence is minimized.

6. Air Quality and Noise: The odor problems discussed in the quoted statement refer to odor problems at the landfilling areas of Phase IV, not the composting area of the existing landfill where the present odor problem is the worst. As mentioned previously, the County is working to minimize the odors associated with the co-composting operation. As far as the landfill working face is concerned, the existing procedures are being evaluated and methods for improvement will be implemented. Measures that are presently being implemented include improved waste compaction, a smaller working face of the landfill, and litter control fences closer to the working face.

Regarding airborne particulates, we will include your observation that Pulehu Road is in the path of particulates during prevailing winds. Improved litter control on the working face of the landfill combined with the perimeter fence and plantings is planned to minimize the impact on Pulehu Road.

7. Litter: A litter control program for the existing landfill is currently being evaluated and portions of this plan have recently been implemented. The County has recently begun to use improved methods of compacting the fill, which is helping to prevent loose rubbish from blowing away. In addition, the County is constructing new portable litter fences for the working face and is currently designing a transfer station which will keep the public off the working face, thus decreasing the size of the face and minimizing litter.

8. Traffic: The section on Traffic is focused on addressing potential traffic impacts resulting from the proposed action (construction and operation of the landfill expansion). Since the existing landfill will have reached

Mr. James R. Judge
April 1, 1996
Page 3

capacity by the time the expansion area is being landfilled, and since the amount of trash is not anticipated to increase, increases in traffic are not anticipated for the expansion. The improvements to the litter control program should help to reduce the amount of litter collecting on Pulehu Road adjacent to the landfill. For litter on Omaopio Road and other areas of Pulehu Road, the County will look into cleaning up litter in these areas and reminding haulers to secure their loads.

The County undertakes an annual survey of all county roads to evaluate the need for maintenance work. Scheduled maintenance is based on road condition and usage, and is determined by the County each year.

9. Groundwater Contamination: The groundwater monitoring wells are only one part of the groundwater protection measures for the proposed expansion. As described in section 6.2.1, the site and landfill design should result in very minimal leachate production. For any leachate that might be produced, the landfill liner and leachate collection system should prevent contamination of groundwater. To detect possible leaks in the liner, a lysimeter will most likely be installed under the leachate sump (at the low point of the landfill liner). This is the only area where leachate would collect into a standing pool.

In the unlikely event that these preventative measures should fail, the monitoring wells will allow any leachate to be detected soon after it reaches the groundwater. There are two primary options for removing contamination at this site once it is detected: vapor extraction and air sparging. These methods are standard practice in the remediation industry.

Thank you for your comments.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership

Jennifer J. Kleveno
Jennifer J. Kleveno
Principal

94128-001



University of Hawai'i at Mānoa

Environmental Center
A Unit of Water Resources Research Center
Crawford 317 • 2550 Campus Road • Honolulu, Hawai'i 96822
Telephone: (808) 956-7381 • Facsimile: (808) 956-3980

March 8, 1996
RE-0670

Mr. Charles Jencks
County of Maui
Department of Public Works and Waste Management
Solid Waste Division
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Jencks:

Draft Environmental Impact Statement Central Maui Expansion of Sanitary Landfill Project Puunene, Maui

With the existing Central Maui Landfill nearly at capacity, the County proposes to expand the current landfill to the other side of Kaliahuni Gulch. The project will include Phases IV, V, and VI. Phases IV and V are currently being used by a quarry operation, while Phase VI is occupied by sugar cane. The site is centrally located with respect to Maui's population, yet resides in a rural, agricultural district. The planned expansion is designed to serve the County's waste disposal needs through at least the year 2016.

We reviewed this draft Environmental Impact Statement (EIS) with the assistance of P.Y. Yang, Agricultural Engineering; Frank Peterson, Emeritus, Geology and Geophysics; Roger Babcock, Civil Engineering; and Paul Berkowitz of the Environmental Center. In general, the document adequately addresses most of the major issues; however, we offer the following comments to clarify noted subjects.

Mr. Charles Jencks
March 8, 1996
Page 2

Groundwater Monitoring System

According to Section 2.3.4 (p. 2-17), at least three monitoring wells will be installed around the Phase IV expansion, with additional wells being provided for Phases V and VI. Instead of simply listing the number of wells, the location of these wells should be identified on a map. Otherwise, it is virtually impossible to assess the suitability of the groundwater monitoring program.

Section 5.2.2 claims that if the leachate escapes containment, then monitoring wells will permit early detection of contamination. Our reviewers find this claim optimistic. In general, before detection can occur, the leachate must percolate through 200 feet of rock and then be transported via groundwater to a monitoring well. Since this process takes a considerable amount of time, a fairly extensive contamination problem may exist by the time detection occurs. While carefully placed monitoring wells can reduce this detection time, these wells may not necessarily prevent contamination from migrating offsite.

It may be possible to utilize existing groundwater modeling work to characterize the time course of leachate percolation and migration. Using these data, one might devise a strategy for detecting leaks before the contaminants reach the water table. If so, then this technique would be preferable, since it would reduce the extent of contamination.

Leachate Disposal Procedures

The document fails to provide details on the disposal procedures for the leachate. Section 2.3.4 mentions that the leachate will be collected and stored in an above ground storage tank for eventual disposal at a Publicly Owned Treatment Works (POTW). However, the details of the POTW are omitted. Is there a POTW currently available which will accept the leachate? What will be the impact of the leachate on POTW operations? Have any on-site treatment and disposal alternatives been considered? Similar concerns exist for the management of the landfill gas condensate.

Landfill gases

Chapter 5, which summarizes the probable impacts of the proposed project, excludes the issue of landfill gases. These gases, which are discussed elsewhere in the document (Section 2.3.4), have the potential to create odor and safety problems if they are not collected and disposed of properly. The gas collection system must be in place during all phases of the filling operations, not just after closure, since gas production often peaks after only two years.

Mr. Charles Jencks
March 8, 1996
Page 3

Composting Alternatives

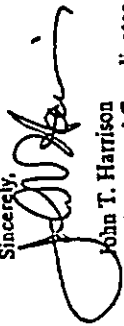
Future plans for the landfill include a continuation of the co-composting (bio-solids and green waste) activities of Phase III. Additionally the technique of traditional aerobic composting is suggested as an alternative disposal measure. Assuming that bio-solids and green waste can be sorted in the municipal wastes, anaerobic composting processes ought to be considered as a means of augmenting co-composting. "Biowastes" can be further processed anaerobically for stabilization and the production of the biofuel methane. Similar to other processes within landfill operations, the co-anaerobic process can be considered a "controlled" process which will both reduce leachate volumes and make leachate collection easier. In addition, gas collection from anaerobic composting can be managed easily within the landfill operation.

Conclusion

In general, we have only minor comments regarding the proposed Central Maui Landfill expansion. Compared to most documents we review, this EIS is concise, thorough, and well-organized. In particular, Chapter 4 which describes the relationship of the proposed action to various plans and policies was extremely well done. Before continuing with the proposed project, the Department of Public Works ought to provide further information on groundwater monitoring, leachate disposal, landfill gases, and anaerobic composting. All of these topics can easily be addressed at the final EIS stage.

Thank you for opportunity to comment.

Sincerely,


John T. Harrison
Environmental Coordinator

cc: OEQC
Masa Fujioka & Associates
Roger Fujioka
P.Y. Yang
Roger Babcock
Frank Peterson
Paul Berkowitz

April 1, 1996

Mr. John T. Harrison, Environmental Coordinator
Environmental Center
University of Hawaii at Manoa
Crawford 317, 2550 Campus Road
Honolulu, HI 96822

Dear Mr. Harrison:

Subject: Draft Environmental Impact Statement
Expansion of Central Maui Sanitary Landfill Project
Wailuku, Maui, Hawaii. TMK: (2) 3-8-03:4

Thank you for your letter, dated March 8, 1996, commenting on the subject project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division. Our response to your comments follows:

1. **Groundwater Monitoring System:** The location and exact number of monitoring wells for Phase IV of the planned landfill expansion have not yet been determined. The location and number of wells must be approved by the State of Hawaii Department of Health (DOH) Office of Solid Waste Management as part of the groundwater protection standard for the landfill. A groundwater protection standard is required under Hawaii Administrative Rules (HAR) §11-58.1-16, and will be prepared after the landfill expansion design is finalized. The groundwater monitoring program will be part of the groundwater protection standard. The monitoring wells will permit early detection of contamination in the groundwater relative to the time it would take for contamination to be felt at off-site locations, such as downgradient irrigation wells or the ocean (the closest well is about 3,000 feet from the landfill and the ocean is over two miles distant). The likelihood of a leak is considered highly unlikely due to the design of the liner and leachate collection system. The slope and impermeability of the liner results in only one location where leachate could collect to form a standing pool; this is the sump basin. For immediate detection of leaks near the sump, a lysimeter will most likely be installed underneath the liner below the sump. The lysimeter, installed beneath the liner, will be able to detect the presence of a leak well before the groundwater monitoring wells could detect a leak.
2. **Leachate Disposal Procedures:** The County of Maui, Department of Public Works and Waste Management operates several Publicly Owned

Mr. John T. Harrison
April 1, 1996
Page 2

Treatment Works (POTW) facilities. It has not yet been determined which of these facilities will accept leachate from the proposed expansion, but the Solid Waste Division and the Wastewater Division will coordinate this decision internally. As discussed in section 6.2.1 of the draft EIS, the landfill expansion is in an area of low rainfall and is being designed to minimize leachate production. We do not anticipate that leachate disposal will have a significant impact on the operation of the POTW.

Currently there are no plans for on-site treatment and disposal of leachate or landfill gas condensate. On-site treatment was considered; however, due to lack of available space in Phase IV, off-site treatment and disposal were selected. On-site treatment and disposal may be employed for Phases V and VI in the future.

3. **Landfill Gases:** We will include the possible impact of landfill gases in Section 5.2.2.E of the final EIS. Any gas collection system would be installed in phases as the landfill is developed and new benches are completed (see section 2.3.4.E of the draft EIS). In this manner, landfill gas can be collected and delivered to the flare station prior to closure of Phase IV.
4. **Composting Alternatives:** There are no current plans to undertake anaerobic composting at the Central Maui Landfill. The Department of Public Works and Waste Management believes that aerobic composting is effective and easy to control. They are committed to aerobic composting at the Central Maui Landfill.

Thank you for your comments. We are very pleased that you found the draft EIS to be concise, thorough and well-organized.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership

Jennifer J. Kleveno
Jennifer J. Kleveno
Principal

94128-001

MFA
MASA FUJIOKA & ASSOCIATES
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STATE OF HAWAII
OFFICE OF STATE PLANNING
P.O. Box 3540
Honolulu, Hawaii 96811-3540

April 1, 1996

Gregory G.Y. Pai, Ph.D., Director
State of Hawaii
Office of State Planning
P.O. Box 3540
Honolulu, HI 96811-3540

Ref. No. Z-0059

March 12, 1996

The Honorable Charles Jencks
Director
Department of Public Works and
Waste Management
County of Maui
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Jencks:

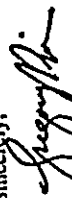
We have reviewed the draft environmental impact statement (EIS) for the expansion of the Central Maui sanitary landfill project and have the following comments.

It appears that the project is predicated on increasing the landfill capacity to meet future needs of waste disposal. While we support the project, we also believe that the issue of waste generation and disposal should be systematically examined and opportunities to reduce the volume for landfill disposal be incorporated into the project design. The alternatives presented in the EIS provide good economic and environmental ideas.

In addition, the statement at the top of page 4-14, "Therefore, the HCZMP is not applicable because the project site is located outside the area," is incorrect. While it is true that the project site is not in the Special Management Area, it is in the Coastal Zone Management (CZM) area. As you will note in Chapter 205A, the CZM law, the CZM area encompasses the entire State. Therefore, the project is subject to compliance with the CZM objectives and policies, and an assessment of this compliance should be incorporated into the EIS.

If there are any questions regarding these comments, please feel free to contact Ms. Christina Meller at 587-2845.

Sincerely,


Gregory G.Y. Pai, Ph.D.
Director

cc: Ms. Jennifer J. Kleveno, Masa Fujioka & Associates

Dear Dr. Pai:

Subject: Draft Environmental Impact Statement
Expansion of Central Maui Sanitary Landfill Project
Wailuku, Maui, Hawaii. TMK: (2) 3-8-03:4

Thank you for your letter, dated March 12, 1996, commenting on the subject project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division. Our response to your comments follows:

1. The Department of Public Works and Waste Management, Solid Waste Division has several programs designed to reduce the volume of wastes for landfill disposal. These programs include composting and recycling, as described in section 7.5.3 of the draft EIS. The County is also considering the use of a transfer station located near the entrance to the existing landfill that could be used to aid in sorting materials for composting, recycling or disposal in the landfill.
2. We have reviewed the Coastal Zone Management (CZM) plan and will correct section 4.4.6 of the EIS to reflect that the project is within the CZM boundary but outside of the Special Management Area boundary. Thank you for bringing this issue to our attention.

Thank you for your comments.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership


Jennifer J. Kleveno
Principal

94128-001



STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 5TH FLOOR
HONOLULU, HAWAII 96813

NICHOLAS B. WELCH, CHAIRMAN
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
DIRECTOR

ADVISORY BOARD

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Mr. Charles Jenks
Page 2

We would like the opportunity to inspect the gulch in order to determine whether petroglyphs or shelter sites are present. If sites are identified, we will recommend that an inventory survey be conducted of the gulch area, and a mitigation plan be developed for the protection of the sites during the period of landfill use.

Please contact Ms. Theresa K. Donham at 243-5169 regarding the procedures and contact person for access to the gulch area for an inspection.

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

KD:jen

cc: OEQC

199-1205-Haiaawa Valley Street, Suite 302,
Honolulu, Hawaii 96813

March 18, 1996

Mr. Charles Jenks, Director
Department of Public Works and Waste Management
200 South High Street
Wailuku, Hawaii 96793

LOG NO: 16385 ✓
DOC NO: 9603KD20

Dear Mr. Jenks:

SUBJECT: County of Maui, Historic Preservation Review of the Central Maui Landfill
Expansion Project, Wailuku, Wailuku District, Maui
TMK: 3-8-03: 4

Thank you for the opportunity to review the draft Environmental Impact Statement for the expansion of the Central Maui Landfill. The proposed c. 60 acre expansion area is located between Pulehu Road and Kaliainui Gulch, to the west of the existing Central Maui landfill. The expansion is expected to occur in three phases (Phases IV, V and VI) that will consist of abandoned portions of an existing Ameron rock quarry and crushing operation. Most of the expansion area (phases IV and V) is presently in use for rock mining.

The draft EIS states that there are no known archaeological or historic sites within or near the proposed project area. We agree that it is unlikely that historic sites are present within the proposed expansion area, due to prior use of the land for cane cultivation and due to the present use for rock mining. We believe that the use of this quarry area for landfill will have "no effect" on historic sites.

We do, however, have some concerns regarding Kaliainui Gulch. As described in the Draft EIS, this gulch is located between the existing landfill and the proposed expansion. In a recent visit to the landfill area by State Historic Preservation Division staff, it was noted that the gulch is being impacted by the existing landfill operation. Rubbish is accumulating in the gulch area, despite the presence of a fence around the landfill. We have no records of any survey or inspection of this gulch, and are uncertain whether historic sites are present. This gulch contains numerous significant petroglyph and habitation shelter sites further upstream. It is possible that there are petroglyphs and/or shelter sites in this section of the gulch as well. If such sites are present, they should be identified so that they can be protected from inadvertent disturbance or impacts that might arise during landfill excavation, use, or future filling.

MFA
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PHONE: 808-886-5344 • FAX: 808-886-6887

April 1, 1996

Mr. Don Hibbard, Administrator
State Historic Preservation Division
State of Hawaii, Department of Land and Natural Resources
33 South King Street, 6th floor
Honolulu, HI 96813

Dear Mr. Hibbard:

Subject: Draft Environmental Impact Statement
Expansion of Central Maui Sanitary Landfill Project
Wailuku, Maui, Hawaii. TMK: 21-3-8-03:4

Thank you for your letter, dated March 18, 1996, commenting on the subject project. We have prepared this reply on behalf of the County of Maui, Department of Public Works and Waste Management, Solid Waste Division.

We understand that your office considers it unlikely that historic sites are present within the proposed expansion area, due to prior use of the land for cane cultivation and due to the present use for rock mining. We understand that your office believes the use of the quarry area for landfill will have "no effect" on historic sites.

We further understand that your office has no records of any survey or inspection of Kaliainui Gulch in the area adjoining the landfill. We agree that an inspection should be undertaken to determine if any historical sites are located within the gulch. Personnel from the County of Maui will contact Ms. Theresa Donham, as you requested, regarding the procedures and contact person for access to the gulch area for an inspection.

Thank you for your comments.

Very truly yours,

MASA FUJIOKA AND ASSOCIATES
A Professional Partnership

Jennifer J. Kleveno

Jennifer J. Kleveno
Principal

94128-001