

HANNIBAL TAVARES  
Mayor  
TELEPHONE 244-7855



CO

OFFICE OF THE MAYOR  
COUNTY OF MAUI  
WAILUKU, MAUI, HAWAII 96793

April 8, 1986

Mr. Alvin K. Fukunaga  
Director of Public Works  
County of Maui  
Wailuku, HI 96793

Dear Mr. Fukunaga:

SUBJECT: NOTICE OF DETERMINATION OF FINAL EIS  
CENTAL MAUI SANITARY LANDFILL PROJECT

In accordance with the Environmental Impact Statement Rules,  
I hereby accept the Final Environmental Impact Statement for the  
Central Maui Sanitary Landfill Project.

This notice of determination and a copy of the Final EIS shall  
be filed with the Environmental Quality Commission by me.

Very truly yours,

A handwritten signature in cursive script that reads "Hannibal Tavares".

HANNIBAL TAVARES

Mayor, County of Maui

cc: Ms. Letitia N. Uyehara  
QEQC

60000  
31

APR 10 1986

11

OEQC LIBRARY

FINAL ENVIRONMENTAL IMPACT STATEMENT  
**CENTRAL MAUI SANITARY LANDFILL PROJECT**

WASTE MANAGEMENT DIVISION  
DEPARTMENT OF PUBLIC WORKS  
COUNTY OF MAUI

MARCH 1986

**R. M. TOWILL CORPORATION**

677 ALA MOANA BLVD. • SUITE 1016  
HONOLULU, HAWAII 96813  
(808) 524-8200

---

Engineering • Planning • Photogrammetry • Surveying • Construction Management • Energy Systems

---

FINAL  
ENVIRONMENTAL IMPACT STATEMENT  
FOR THE  
CENTRAL MAUI SANITARY LANDFILL PROJECT

MARCH 1986

This Environmental Document is Submitted  
Pursuant to Chapter 343, HRS

TAX MAP KEY: 3-8-03:4,18,19

PROPOSING AGENCY:

Department of Public Works  
County of Maui  
200 South High Street  
Wailuku, Maui, Hawaii 96793

  
Alvin Fukunaga  
Director of Public Works

ACCEPTING AUTHORITY:

Hannibal Tavares, Mayor  
County of Maui

PREPARED BY:

R. M. Towill Corporation  
677 Ala Moana Blvd., Suite 1016  
Honolulu, Hawaii 96813

## TABLE OF CONTENTS

	<u>Page</u>
SECTION 1 - SUMMARY	1-1
SECTION 2 - DESCRIPTION OF THE PROPOSED ACTION	2-1
2.1 Project Overview	2-1
2.2 Project Background	2-1
2.3 Project Description	2-3
2.3.1 Landfill Site Characteristics	2-3
2.3.2 Landfill Life	2-4
2.3.3 Landfill Site Development Method	2-4
2.3.4 Landfill Site Preparation	2-5
2.3.5 Landfill Operation and Maintenance	2-7
2.3.6 Landfill Closure Plan	2-10
2.3.7 Landfill System Off-Site Development	2-10
2.3.8 Utilities Requirements	2-11
SECTION 3 - DESCRIPTION OF THE ENVIRONMENTAL SETTING	3-1
3.1 Physical Environment	3-1
3.1.1 General	3-1
3.1.2 Climate	3-1
3.1.3 Geology and Soils	3-2
3.1.4 Topography and Slopes	3-4
3.1.5 Flora and Fauna	3-4
3.1.6 Hydrology and Drainage	3-5
3.1.7 Groundwater Resources	3-6
3.1.8 Air Quality and Noise Levels	3-7
3.2 Human Environment	3-7
3.2.1 Population and Economy	3-7
3.2.2 Existing Land Use	3-9
3.2.3 Recreation	3-9
3.2.4 Archaeological and Historic Sites	3-9
3.2.5 Infrastructure	3-10
SECTION 4 - THE RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS, POLICIES AND CONTROLS FOR THE AFFECTED AREA	4-1
4.1 Policy Plans	4-1
4.1.1 Hawaii State Plan	4-1
4.1.2 General Plan of the County of Maui	4-3
4.1.3 Wailuku-Kahului Community Plan	4-4

	<u>Page</u>
4.2 Land Use Regulations	4-5
4.2.1 State Land Use District Regulations	4-5
4.3 Other Programs and Controls	4-5
4.3.1 State Environmental Policy	4-5
4.3.2 National Flood Insurance Program	4-6
4.3.3 State Underground Injection Control Program	4-6
4.3.4 Agricultural Lands of Importance to the State of Hawaii	4-7
4.3.5 Hawaii Coastal Zone Management Program and Special Management Area	4-8
<b>SECTION 5 - SUMMARY OF PROBABLE IMPACTS OF THE PROPOSED ACTION</b>	<b>5-1</b>
5.1 Primary Impacts	5-1
5.1.1 Primary Beneficial Impacts	5-1
5.1.2 Primary Adverse Impacts	5-3
5.2 Secondary Impacts	5-6
5.2.1 Secondary Beneficial Impacts	5-6
5.2.2 Secondary Adverse Impacts	5-7
<b>SECTION 6 - PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT             BE AVOIDED AND PROPOSED MITIGATION MEASURES</b>	<b>6-1</b>
6.1 Primary Adverse Impacts and Mitigation Measures	6-1
6.1.1 Leachate Production and Water Quality	6-1
6.1.2 Erosion	6-5
6.1.3 Flora and Fauna	6-6
6.1.4 Visual Impact	6-8
6.1.5 Air Quality and Noise	6-8
6.1.6 Litter	6-10
6.1.7 Archaeological and Historic Sites	6-10
6.2 Secondary Adverse Impacts and Mitigation Measures	6-11
6.2.1 Physical Environment	6-11
6.2.2 Economy	6-11
6.2.3 Traffic	6-11
<b>SECTION 7 - ALTERNATIVES TO THE PROPOSED ACTION</b>	<b>7-1</b>
7.1 No-Project Alternative	7-1
7.2 Solid Waste Disposal by Incineration	7-2

	<u>Page</u>
7.3 Other Alternative Disposal or Processing Methods	7-3
7.3.1 Shredding	7-4
7.3.2 Baling	7-4
7.3.3 Resource Recovery Methods	7-4
SECTION 8 - IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES AND THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY	8-1
8.1 Irreversible and Irretrievable Commitments of Resources	8-1
8.2 The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity	8-2
SECTION 9 - OTHER INTERESTS AND CONSIDERATIONS OF GOVERNMENTAL POLICIES BELIEVED TO OFFSET THE ADVERSE ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION	9-1
SECTION 10 - SUMMARY OF UNRESOLVED ISSUES	10-1
SECTION 11 - LIST OF NECESSARY APPROVALS	11-1
11.1 State of Hawaii	11-1
11.2 County of Maui	11-1
SECTION 12 - ORGANIZATIONS AND PERSONS CONSULTED DURING THE PREPARATION OF THE ENVIRONMENTAL IMPACT STATEMENT	12-1
12.1 County of Maui Agencies	12-1
12.2 State of Hawaii Agencies	12-1
12.3 Federal Agencies	12-1
12.4 Other Organizations and Individuals	12-2

REFERENCES

APPENDICES

APPENDIX A	-	COMMENTS AND RESPONSES TO THE EIS PREPARATION NOTICE
APPENDIX B	-	COMMENTS AND RESPONSES TO THE DRAFT EIS

### LIST OF FIGURES

FIGURE 1-1	Location Map, Island of Maui
FIGURE 1-2	Vicinity Map
FIGURE 2-1	Site Location
FIGURE 2-2	Existing Sanitary Landfill Sites
FIGURE 2-3	Preliminary Site Plan
FIGURE 2-4	Typical Landfill Development
FIGURE 2-5	Cell Construction
FIGURE 2-6	Typical Landfill Cross Section
FIGURE 3-1	Mean Annual Rainfall
FIGURE 3-2	Wind Rose, Kahului Airport, Maui
FIGURE 3-3	Principal Groundwater Resource Areas
FIGURE 4-1	Maui General Plan Map
FIGURE 4-2	Wailuku-Kahului Community Plan
FIGURE 4-3	State Land Use Districts
FIGURE 4-4	UIC Line and Agricultural Lands of Importance to the State of Hawaii

### LIST OF TABLES

TABLE 2-1	Solid Waste Generation, Population Basis
TABLE 2-2	In-Place Volume Projections
TABLE 7-1	Advantages and Disadvantages of Alternate Disposal or Processing Methods

SECTION 1  
SUMMARY

The County of Maui has determined that a new sanitary landfill site is needed for the Island of Maui. Currently, the County operates four landfill sites on Maui. These landfills were established between 1966 and 1970, and with the exception of the Hana Landfill, all are nearing the end of their useful lives. The problem is most critical at the Waikapu Landfill which has reached its design capacity but is continuing to receive refuse. A new landfill site is needed primarily to replace the Waikapu Landfill. It is also the intent of the new landfill to serve as the County's main landfill facility and to accommodate solid waste volumes of 100,000 tons per year and more as the population increases.

The proposed project is a centrally located sanitary landfill for the Island of Maui, and will be referred to as the "Central Maui Sanitary Landfill." The project site is a portion of an existing rock quarry in Central Maui, near the mill town of Puunene (Figures 1-1 and 1-2). This site is centrally located with respect to major population centers; it is also in a rural, agricultural area. One of the primary considerations in landfill design is the availability of nearby cover material. The site has stockpiled soil material from quarry operations that is suitable for cover material, and additional excavation of the quarry floor will yield additional cover material and additional landfill capacity. This combination of a central yet rural location and the nearby availability of suitable cover material makes the site operationally and environmentally well-suited to the development of a major landfill facility.

The project will have both beneficial and adverse environmental impacts. The primary beneficial impact will occur in the area of public services and facilities: a new, centrally located landfill site will come on line in 1987, and this site will accommodate the County's solid waste disposal needs through at least the year 1998. From a public health perspective,

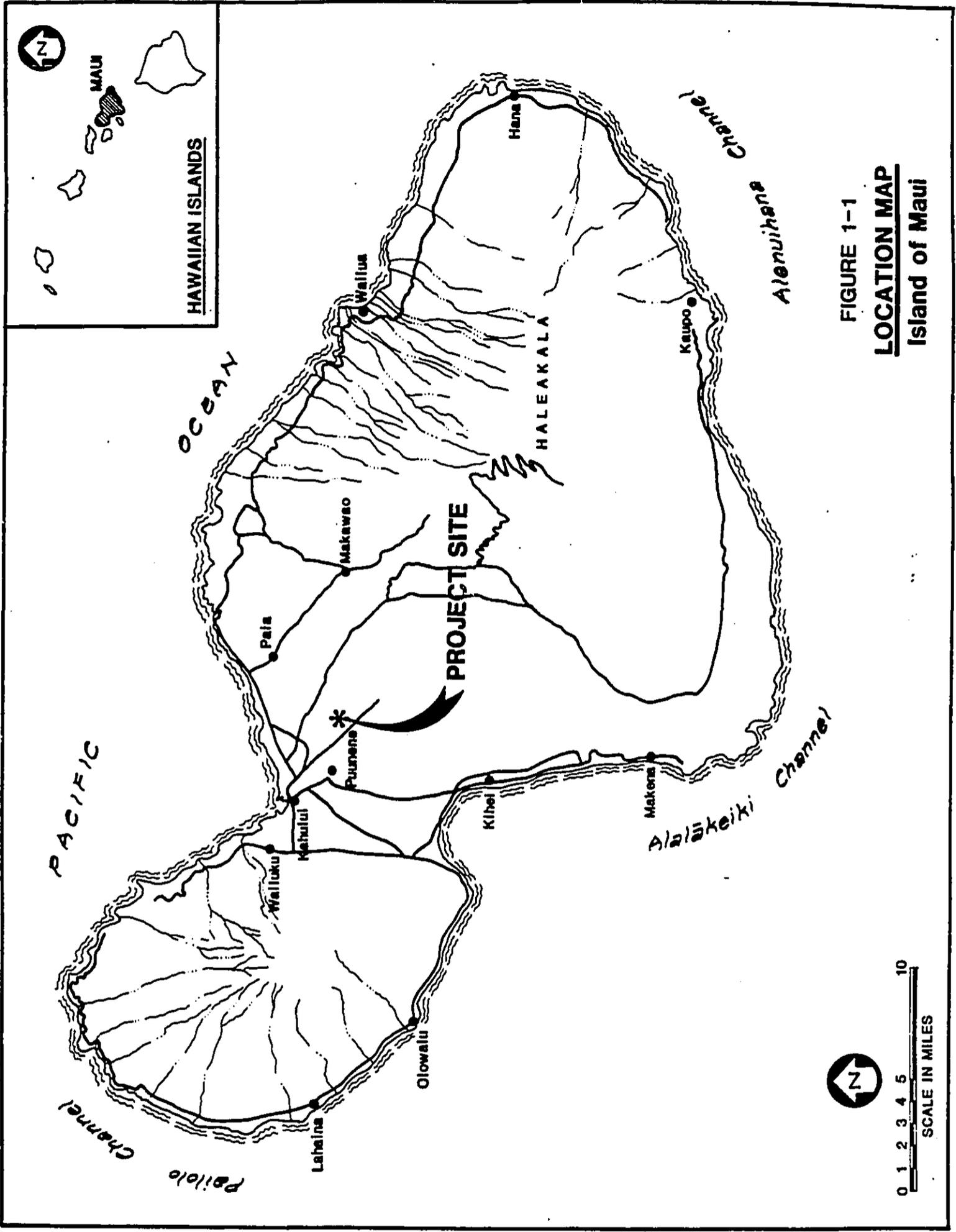


FIGURE 1-1  
**LOCATION MAP**  
 Island of Maui

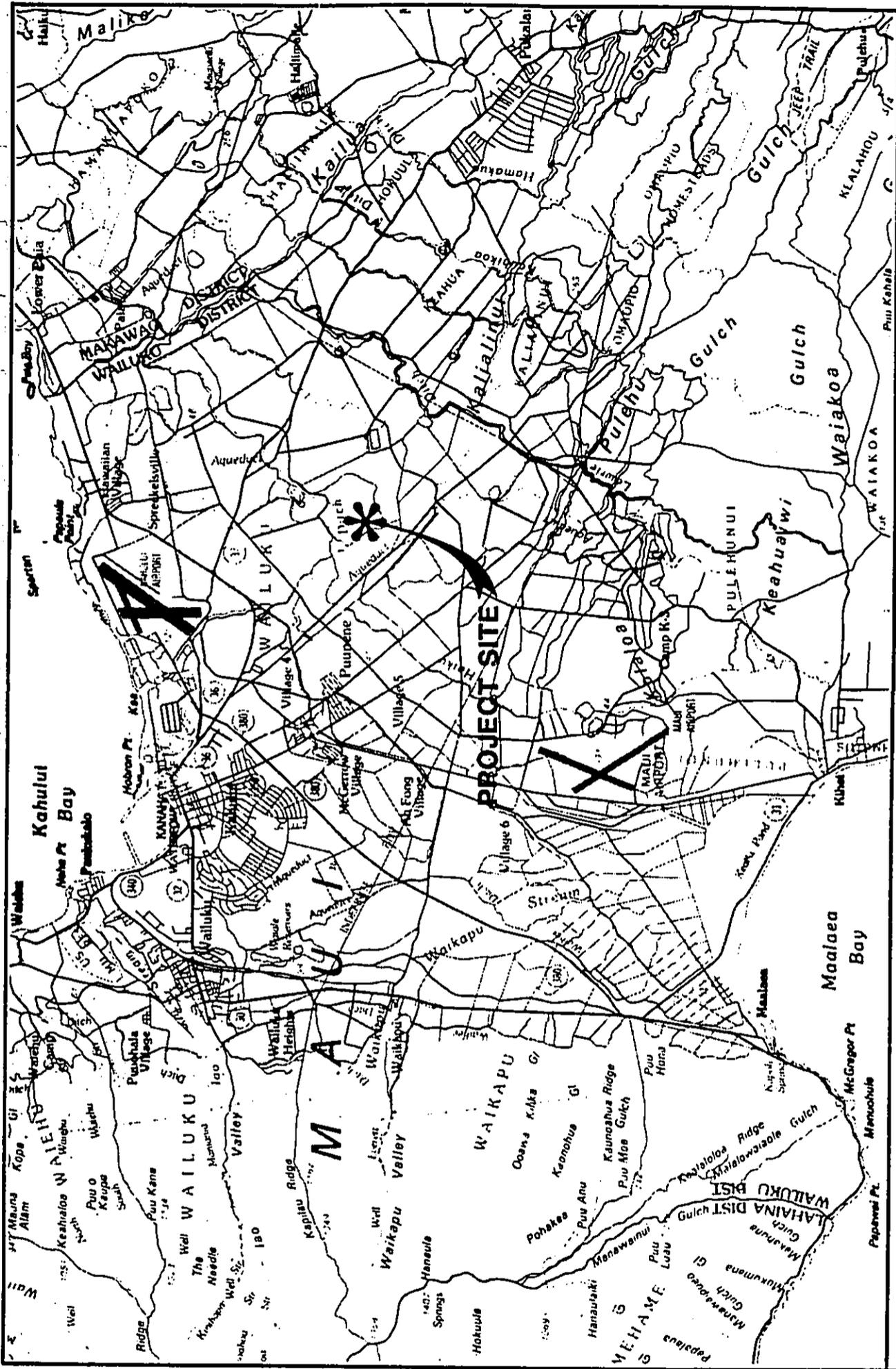


FIGURE 1-2

VICINITY MAP



the project will also provide a solution to an imminent problem at the Waikapu Landfill which is already exceeding its planned capacity. Permitting the closure of the Waikapu Landfill is a major benefit that will result from this project.

The primary potential adverse impact is in the area of contamination of surface water and groundwater resources. Contaminated runoff water or leachate from the landfill site can have a significant adverse effect if allowed to escape into neighboring streams or underground water zones. The project is located far from the closest public water supply well and its design includes a number of runoff and leachate control measures that will minimize the risk of water contamination. The location is also in a low rainfall area which minimizes leachate production.

Other aesthetic impacts such as potential noise, odor, dust and vector problems have been addressed in the design of the facility.

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

SECTION 2  
DESCRIPTION OF THE PROPOSED ACTION

2.1 PROJECT OVERVIEW

The proposed project is a central island-wide sanitary landfill for the County of Maui.

The project site is a portion of the HC&D quarry in Puunene, Maui, and can be identified as portions of the following parcels: Tax Map Key 3-8-03:4, 18, 19. The site is located in the agricultural lowlands of Central Maui, about 3 miles south-southeast of Kahului Airport and 2 miles southeast of Puunene. The HC&D quarry is approximately one-fourth mile east of Pulehu Road and is adjacent to the eastern side of Kalialinui Gulch (see Figure 2-1).

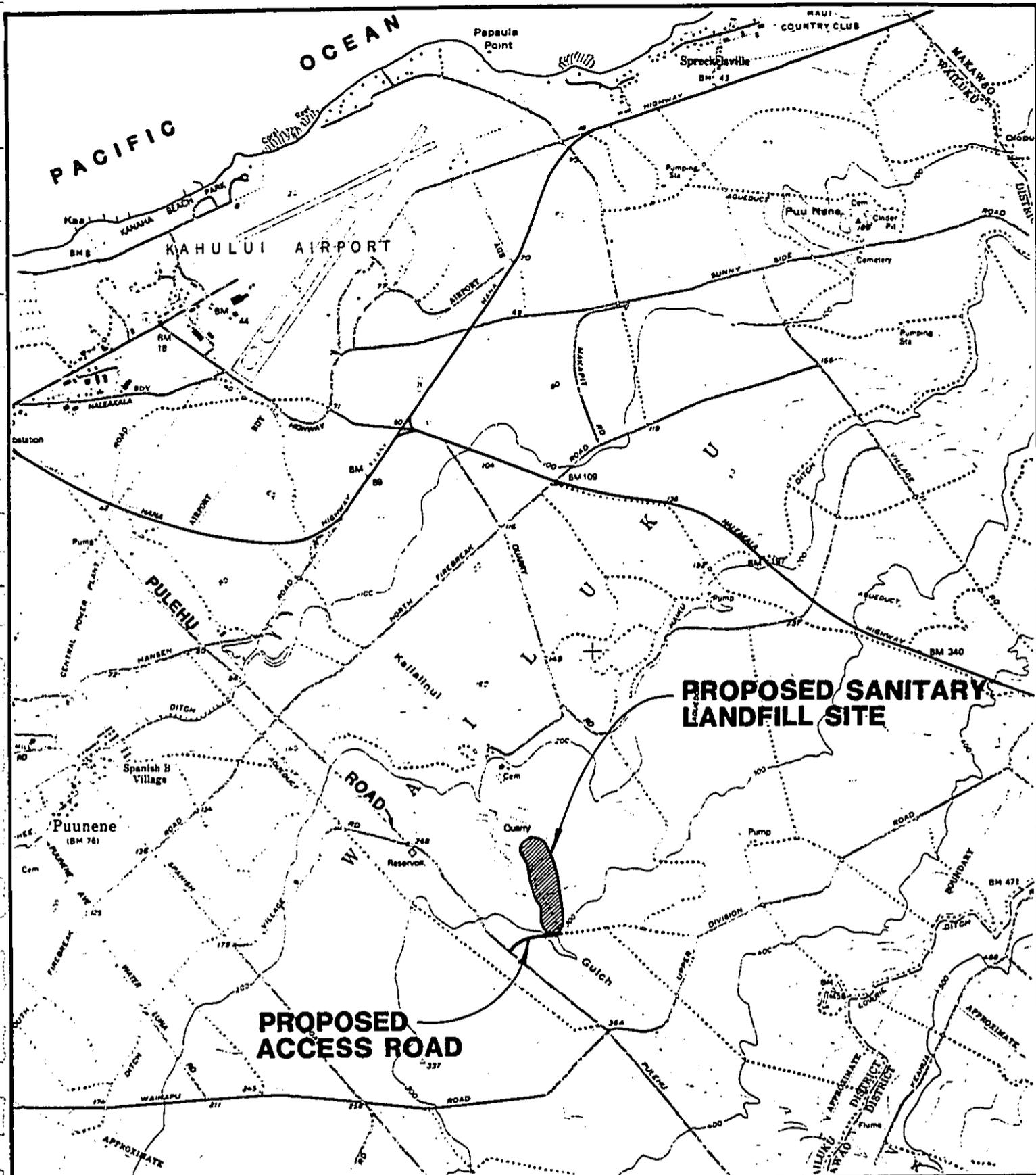
The overall objective of the proposed project is to utilize this existing disturbed site as the County's main landfill facility during the period 1987 to 1998. The long-range plan envisions the possible reuse of the filled site after 1998 for sugarcane cultivation or for some other suitable crop. The filled site may also prove to be suitable for outdoor recreational uses.

The project site is surrounded by cane fields. The quarry is approximately 40 to 50 feet deep, with steep, vertical sides cut into the soil and rock.

The HC&D quarry site is centrally located with respect to the major urban areas of Maui. At the same time, the site is located in a rural area that is not too close to any major cities or towns. This combination of a central yet rural location makes the site operationally and environmentally well-suited to the development of a major landfill facility.

2.2 PROJECT BACKGROUND

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



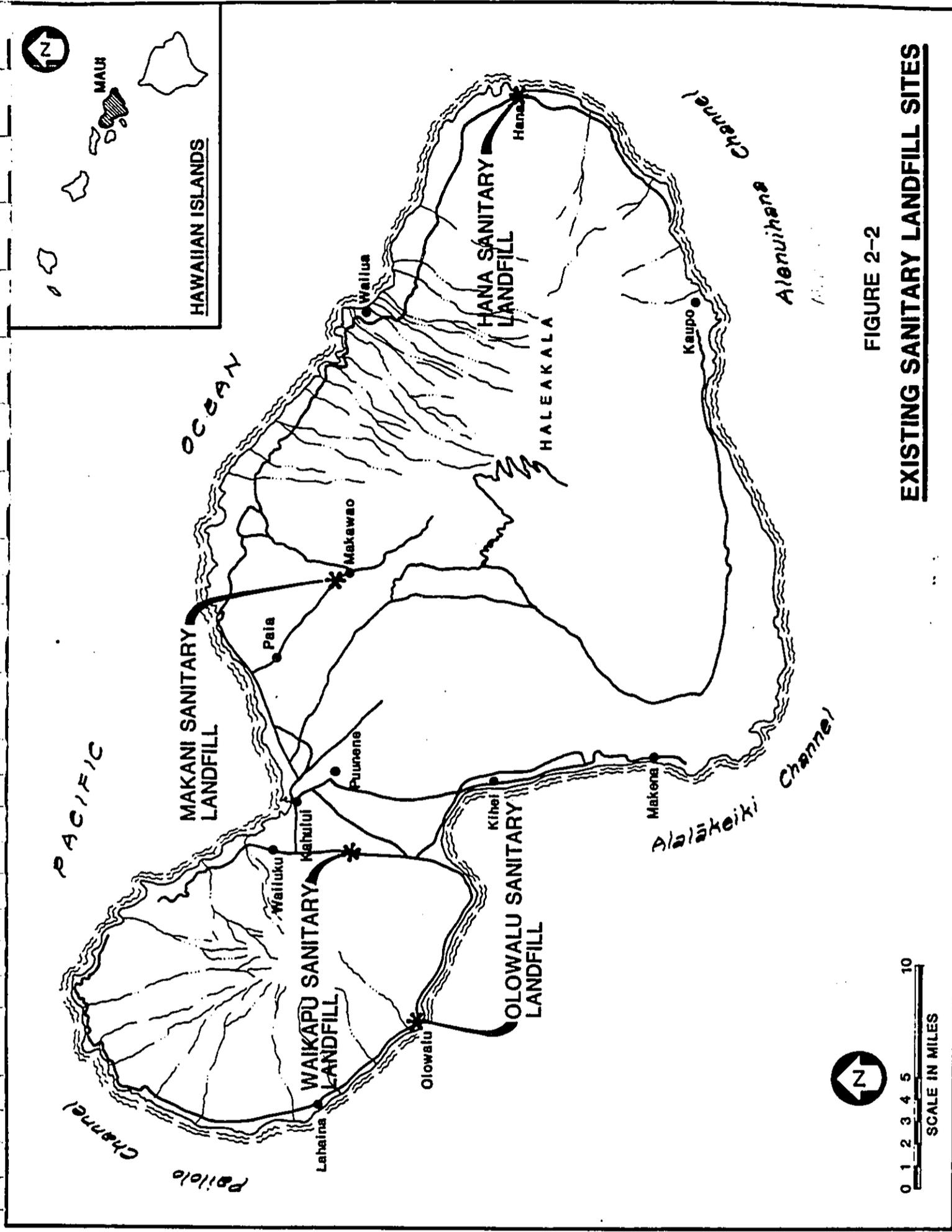
**PROPOSED SANITARY  
LANDFILL SITE**

**PROPOSED  
ACCESS ROAD**

**FIGURE 2-1**

**SITE LOCATION**





**FIGURE 2-2**  
**EXISTING SANITARY LANDFILL SITES**

- \* Makani Landfill - Approximately 13.86 acres, established in 1966.
- \* Olowalu Landfill - Approximately 65.33 acres, established in 1969.
- \* Waikapu Landfill - Approximately 30.37 acres, established in 1970.
- \* Hana Landfill - Approximately 29.06 acres, established in 1969.

The Waikapu Landfill is the most centrally located of the four facilities, and receives approximately 60 percent of the total refuse delivered to the four sites combined. Hana Landfill has the smallest service area, and receives approximately 5 percent of the island's refuse.

All of these landfills, with the exception of the Hana Landfill, have limited capacities remaining. The Waikapu Landfill is already exceeding its planned capacity and requires the most immediate action. Recognizing the need to immediately replace the Waikapu Landfill and eventually to replace the Makani and Olowalu Landfills, the County of Maui funded a three-phase project for the design of a new sanitary landfill. The three phases of the project are:

- \* Phase I - Preliminary Engineering Report
- \* Phase II - Design of the New Central Maui Landfill
- \* Phase III - Closure Plan for the Waikapu Landfill

The Preliminary Engineering Report (PER) was recently completed as a separate document, and Phase II of the project is in progress at the time of this writing. The PER includes estimates of solid waste volumes for Maui, excluding the area serviced by Hana Landfill. These solid waste volumes, based on population projections, are shown in Tables 2-1 and 2-2 as extracted from the PER. Table 2-1 shows annual and cumulative productions based on a 5.0 lb per capita per day generation rate. Table 2-2 compares solid waste volumes at 2 stages of handling: loose refuse is that which is collected and handled at the landfill; and in-place refuse is that which results after the refuse is compacted into the landfill.

These tables indicate that current production is approximately 92,100 tons/year, and that production by the year 1995 will be approximately

TABLE 2-1

SOLID WASTE GENERATION  
POPULATION BASIS

Year	Population <sup>1</sup> (x 1000)	Prod. Rate	Annual Prod.	Cumulative Prod. <sup>2</sup>	
		(Lbs/Capita/Day)	(1000 Tons/Yr)	(1000 Tons)	(1000 Cu Yds) <sup>3</sup>
1980	79.1	5.0	72.2	--	--
1985	100.9	5.0	92.1	--	--
1987	--	--	--	100.0	1000.0
1990	122.6	5.0	111.9	417.9	4179.0
1995	144.0	5.0	131.4	1026.2	10,262.0
2000	162.1	5.0	147.9	1724.5	17,245.0
2005	171.5	5.0	156.5	2485.5	24,855.0

<sup>1</sup>Defacto population from "Hawaii Population and Economic Projection and Simulation Model, Updated State and County Forecasts," Dept. of Planning and Economic Development.

<sup>2</sup>Cumulative Refuse based on starting landfill operation in 1987.

<sup>3</sup>Volume of Refuse based on 200 lbs/cu. yds.

SOURCE: Central Maui Sanitary Landfill Project Preliminary Engineering Report, 1985.

TABLE 2-2  
IN-PLACE VOLUME PROJECTIONS

Year	Loose Refuse <sup>1</sup> (x 1000 cu. yds)		In Place (Compacted) Refuse <sup>2</sup> (x 1000 cu. yds.)	
	Annual	Cumulative <sup>3</sup>	Annual	Cumulative <sup>3</sup>
1985	921	--	184.2	--
1987	1000	1000	200.0	200.0
1990	1119	4179	223.8	835.8
1995	1314	10,262	262.8	2052.4
2000	1479	17,245	295.8	3449.0
2005	1565	24,855	313.0	4971.0

<sup>1</sup>Based on 200 lbs/cu. yds.

<sup>2</sup>Based on 1000 lbs/cu. yds.

<sup>3</sup>Cumulative based on starting landfill operations in 1987.

SOURCE: Central Maui Sanitary Landfill Project Preliminary Engineering Report, 1985.

131,400 tons/year. Using a weight-to-volume ratio of 1,000 pounds of compacted refuse per cubic yard (cu. yd.), the estimated tonnage of solid waste would be the equivalent of 184,200 compacted cubic yards in 1985 and approximately 262,800 compacted cubic yards per year by 1995. Hence, the estimated cumulative in-place volume of solid waste production for Maui (excluding the Hana Landfill service area) from 1987 to 1995 is 2,052,400 cubic yards.

In locating a new landfill site, the objective was to find a central yet isolated area large enough to accept this magnitude of refuse. Such a site was found at the existing HC&D quarry site.

### 2.3 PROJECT DESCRIPTION

#### 2.3.1 Landfill Site Characteristics

The proposed landfill site is an active quarry that produces rock material for use in local construction work. Much of the rock material is used as concrete aggregate or base course material for road construction. The quarry was originally established by the Navy Seabees in 1939. It was subsequently acquired for private use, first by the Kahului Railroad Company, and then by HC&D, Ltd. in 1966. Ameron HC&D currently operates the quarry. The site is entirely surrounded by sugarcane fields, and the quarry land as well as the surrounding fields are owned by Alexander and Baldwin, Inc.

A total of approximately 90 acres has been disturbed by quarry activities. This disturbed area is roughly rectangular in shape, about 1,100 feet wide by 3,700 feet long with the long dimension running north-south and parallel to Kalialinui Gulch. The quarry bottom is approximately 40 to 50 feet below the level of the surrounding sugarcane fields. Within the quarry are several remnant hill-like land areas that have been partially excavated, and stockpiled topsoil which was scraped off to mine the lower rock layer.

Approximately 55 acres of the existing quarry site will be occupied by the proposed landfill. The characteristics of the quarry -- a large, open area that has been excavated -- make this site an ideal location for a landfill.

Additionally, the existing stockpiled soil material can be used as cover material for landfilling operations. This on-site availability of cover material eliminates added costs of transporting cover material to the landfill site.

### 2.3.2 Landfill Life

The life of the proposed landfill was determined using the assumption that the entire volume of refuse generated on Maui, with the exception of the refuse to be deposited at the Hana Landfill, will be delivered to the proposed central landfill for disposal. The operation is anticipated to begin in 1987 at which time it is assumed that the Waikapu, Makani and Olowalu Landfills will no longer be in operation. In actuality, the Waikapu Landfill will indeed be closed as soon as the Central Maui Landfill is opened. But the Olowalu and Makani Landfills may not yet reach their capacities in 1987, so these landfills may continue to accept refuse until their capacities are reached.

The landfill life was determined by estimating the available volume in the prepared landfill site less the soil cover requirements and comparing this volume to the cumulative volumes of in-place refuse shown in Table 2-2. The available volume in the proposed landfill is 3.3 million cubic yards, exclusive of the 0.47 million cubic yards required for cover material. This capacity will accommodate the needs of Maui during the 12-year period from 1987 through 1998. If the Olowalu and Makani Landfills are still accepting refuse in 1987, refuse from the Olowalu and Makani service areas will not be delivered to the proposed landfill until sometime after 1987, thereby lengthening the landfill life past 1998.

### 2.3.3 Landfill Site Development Method

There are three sanitary landfill methods commonly used in the United States: (1) the trench method, (2) the area method, and (3) the ramp method.

The "trench method" is used when there is a large flat area with a deep layer of suitable soil. Trenches are dug and filled with refuse and covered with excavated soil. The "area method" refers to dumping the refuse on an existing flat undisturbed area, then compacting and covering it with material generally obtained from off-site. This method is used where the terrain is irregular and the groundwater is near the surface.

The recommended method of operation for this project is the "ramp method." The ramp method is a hybrid technique combining features of both trench and area methods of landfilling. Refuse is deposited on the face of the slope, spread and compacted by standard landfilling equipment, and then covered with soil which had been stockpiled from the preceding excavation or imported from off-site. This process is repeated again and again at the face of each newly created slope so that a succession of slopes is produced in a line across the landfill site. Because of this successive technique, the ramp method has also been called the "progressive slope" method.

The proposed landfill will be developed by this ramp method in accordance with accepted sanitary landfill criteria, including:

- \* Working face slope maximum: 3 to 1.
- \* Maximum height of lifts: 15 feet.
- \* Compaction of refuse: 800 to 1,200 lbs/cu. yd.
- \* Soil cover: 6 inches minimum depth, to be spread twice a week.
- \* Final soil cover: 3 feet minimum depth. Soil cover of 4 to 4-1/2 feet will be provided if reuse of the site for sugarcane cultivation is contemplated.
- \* Upon landfill closure, final slopes not to exceed 4 to 1.

#### 2.3.4 Landfill Site Preparation

The landfill site will be developed in three construction increments in order to implement the landfill system in the most economical manner. Approximate boundaries of the three increments are shown in the Preliminary

Site Plan, Figure 2-3. The incremental areas will be landfilled in succession beginning with the southern-most increment and proceeding northward. Each area will take approximately four to five years to fill.

Before landfilling operations begin, general improvements must be made to the site. The main access road leading from Pulehu Road to the project will be graded and paved to provide a two-lane road. A quarry access road leading down into the operations area will be constructed. Drainage improvements will be made to the perimeter of the site to prevent off-site water runoff from draining into the landfill. These improvements include a concrete drainage ditch and culvert along the southern boundary to divert off-site runoff into Kalialinui Gulch, and an earthen swale along the eastern boundary. An 8-foot high security fence will be installed around the perimeter of the site to restrict access and to contain litter and debris within the site. Permanent chain link fencing will also be installed along both sides of the main access road for security purposes. Entry gates will be installed at the entrance to the access road and at the intersections where private cane roads cross this access road. Temporary fencing will be installed along the landfill floor as necessary during the incremental landfilling phases for security purposes and to help contain litter.

Development of an incremental landfill will be started by preparing the floor of the particular incremental area. The quarry bottom will be excavated and graded as shown in Figure 2-3 to: recover soil to be used as cover material; shape the landfill floor in order to improve drainage conditions for surface runoff and for the leachate collection system; and increase the landfill capacity. The average depth of excavation will be 4 feet. The excavation activities will extend slightly outside of the landfill limits in order to recover additional cover material and to complete the grading design for the area in general. The ground will then be recompacted to obtain a dense landfill bottom that will be resistant to leachate percolation. An earthen silting basin will be formed at the downslope corner of the incremental landfill area to trap sediments from

PULEHU ROAD

PAVED ACCESS ROAD

SILTING BASIN

PERIMETER FENCE

WEIGH STATION

SILTING BASIN

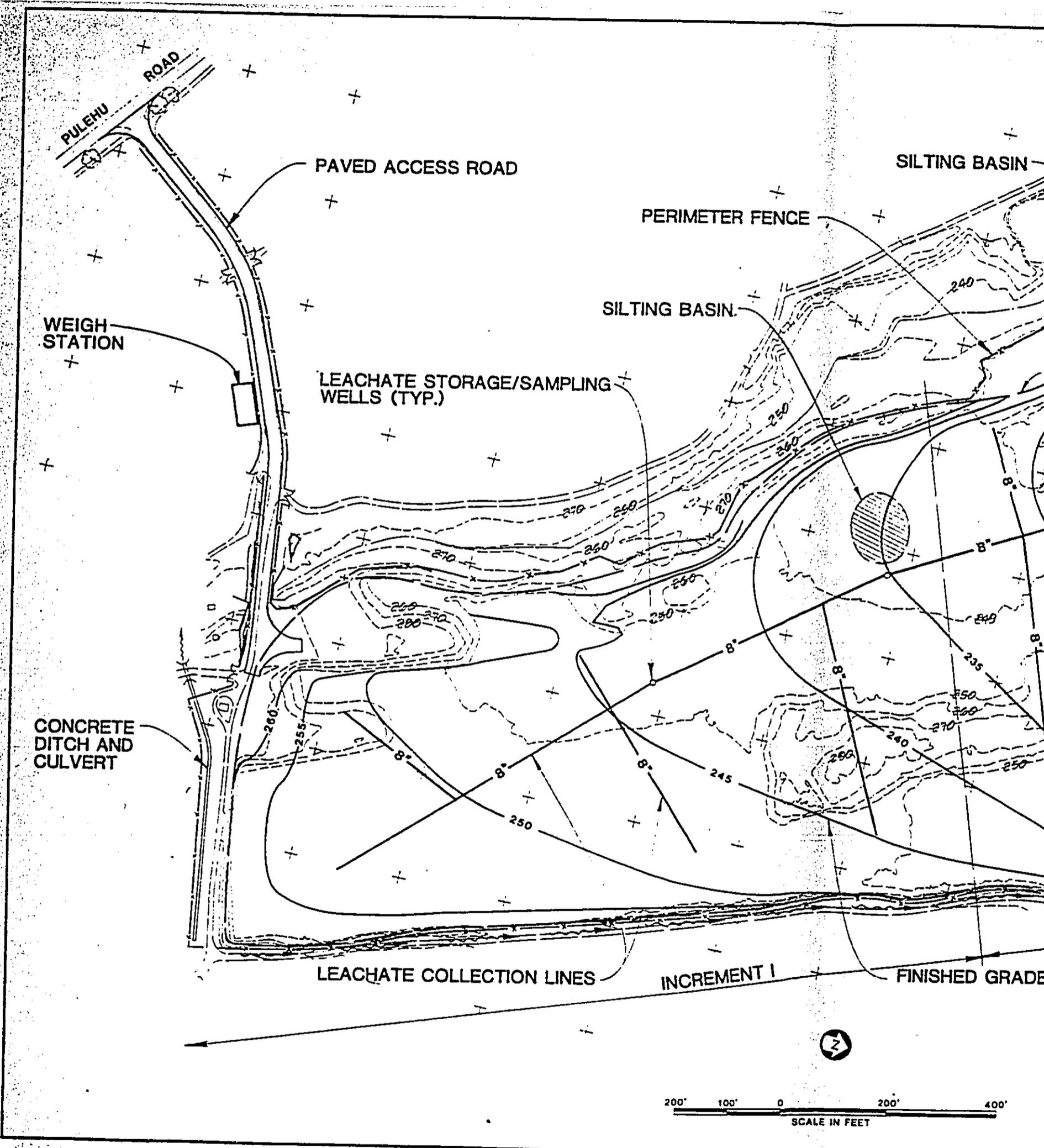
LEACHATE STORAGE/SAMPLING WELLS (TYP.)

CONCRETE DITCH AND CULVERT

LEACHATE COLLECTION LINES

INCREMENT 1

FINISHED GRADE



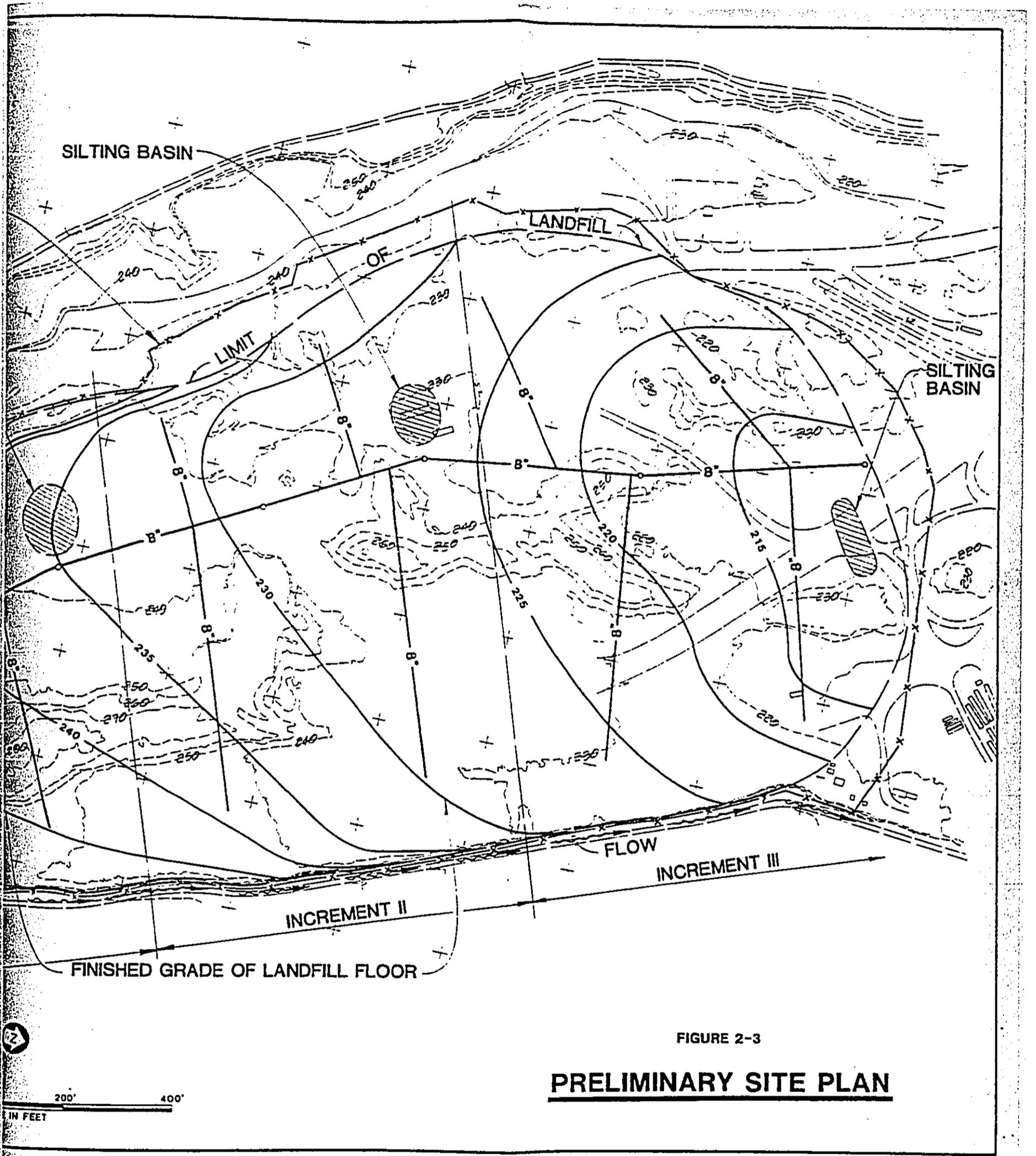


FIGURE 2-3

**PRELIMINARY SITE PLAN**

storm runoff that may be generated during landfill development. A silting basin discharge pipe will be installed to discharge clear runoff water from the basin into Kalialinui Gulch.

The leachate collection system for the incremental area will be installed next. Leachate collection pipes will be installed in trenches dug into the graded landfill floor. The collection pipes will be perforated and 8 inches in diameter. After pipe installation, the trenches will be backfilled with porous material. Leachate collection manholes will be installed along the main collection pipeline. The planned leachate collection system is shown in Figure 2-3. Further discussions of the leachate collection system are presented in Section 6.1.1.

Stockpiled soil material will be relocated to strategic places around the area to facilitate subsequent covering operations. Upon the completion of these site preparations, landfilling operations can begin.

#### 2.3.5 Landfill Operation and Maintenance

Landfill development will begin with refuse being compacted against the southern wall of the quarry, and will proceed northward. The access road into the landfill will be modified as the active landfilling area moves northward. The access road will initially be graded from an existing soil stockpile. As landfilling progresses, cell development will proceed in such a manner as to replace the soil with refuse, which will free the soil for use as cover material.

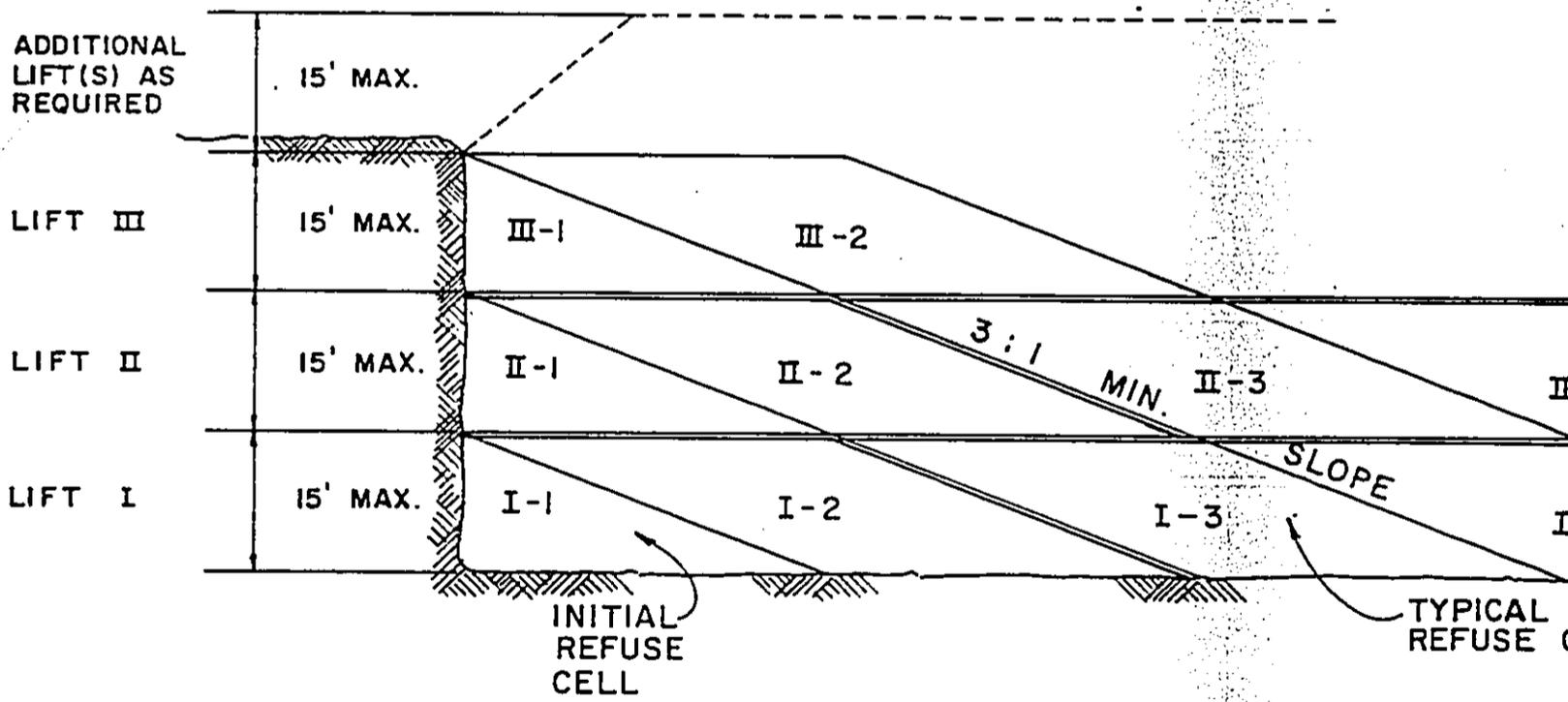
The landfill operation will basically consist of continuous earthwork operations, where the excavated quarry is filled with refuse and on-site stockpiled soil is moved and spread onto the compacted refuse. Landfill operators will perform the required work which includes: spreading and compacting refuse; transporting cover material from the stockpile area; and spreading cover material. Landfill spotters will be available to direct landfill traffic.

The landfill will be developed in "cells." A cell is begun with the spreading and compacting of refuse against the quarry wall or a preceding cell slope. A cell is developed such that its lift height (cell height plus soil cover depth) does not exceed 15 feet. After 3 to 4 days of cell development, the cell is completed by covering it with a 6-inch minimum soil layer. Cells are created in successive rows and in successive lift heights until the incremental landfill is complete. The landfill will be developed to the elevation of the surrounding lands. As one incremental landfill nears completion, the floor of the next incremental area is prepared to receive refuse. Typical lift development is shown in Figure 2-4, a depiction of cell construction is shown in Figure 2-5, and a typical cross section of the completed landfill is shown in Figure 2-6.

The planned operational hours for the landfill are 8 hours/day, 7 days/week. Four employees (two heavy equipment operators, one scale operator and one spotter or utility man) will man the landfill during operating hours. A compactor and D-8 bulldozer will be used to move and spread the refuse and cover material. A dump truck and front-end loader will also be used twice a week to move stockpiled cover material to the active operation area. A scale will be installed at the landfill; a scale operator will be stationed there to weigh incoming refuse trucks (Figure 2-3).

The Central Maui Sanitary Landfill will accept conventional refuse as well as some types of special wastes. Generally, the category of "special wastes" includes hazardous waste, demolition waste, white goods or bulky waste, and abandoned cars. Hazardous waste includes substances such as toxic chemicals and radioactive wastes. Demolition waste includes concrete debris and other waste products generated by construction projects. White goods or bulky waste includes large appliances such as washers and dryers.

Hazardous waste will not be accepted at the landfill. Demolition waste and bulky waste will be accepted at the landfill but will be handled separately. Bulky waste will be compacted by crushing before landfilling. Abandoned cars can be accepted at the landfill, but this practice is not



SOURCE: Central Maui Landfill Project PER.

**PROCEDURE: (For Each Increment)**

1. PREPARE EXISTING GROUND.
2. LAY LEACHATE COLLECTION PIPES.
3. DEVELOP LIFT I. BEGIN AT THE SOUTHEAST CORNER AND PROCEED IN A NORTHERLY AND WESTERLY DIRECTION. STOP AT INCREMENT BOUNDARY.
4. BUILD RAMP AT NORTH END OF LIFT I TO PROVIDE ACCESS TO LIFT II.
5. DEVELOP LIFT II IN SIMILAR MANNER AS LIFT I (STEP 3)
6. REPEAT STEP 4 AT LIFT II FOR LIFT III.
7. REPEAT STEP 3 FOR LIFT III, IV, ETC. AS REQUIRED.

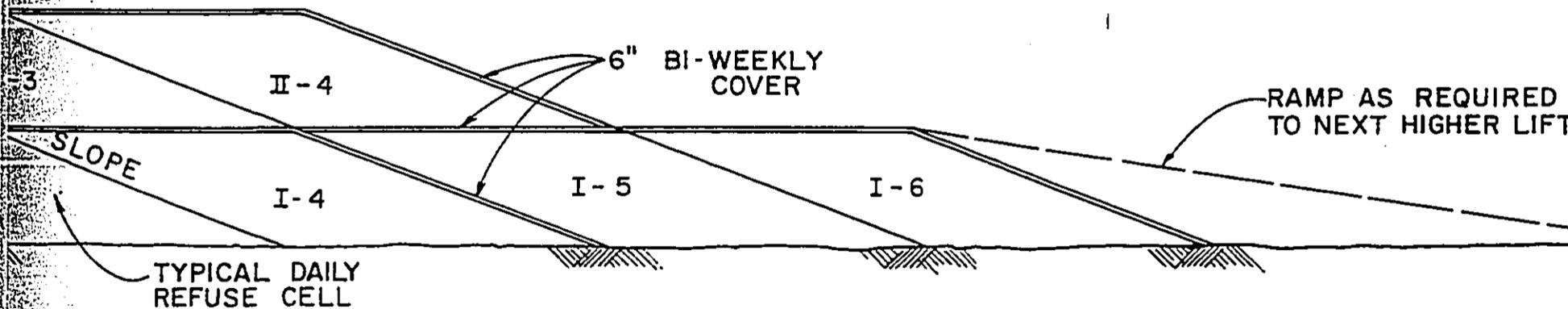


FIGURE 2-4

**TYPICAL LIFT DEV**

SCALES: HORIZ.  
VERT.

CORNER AND PROCEED  
STOP AT INCREMENT BOUNDARY.  
PROVIDE ACCESS TO LIFT II.  
FT I (STEP 3)

REQUIRED.

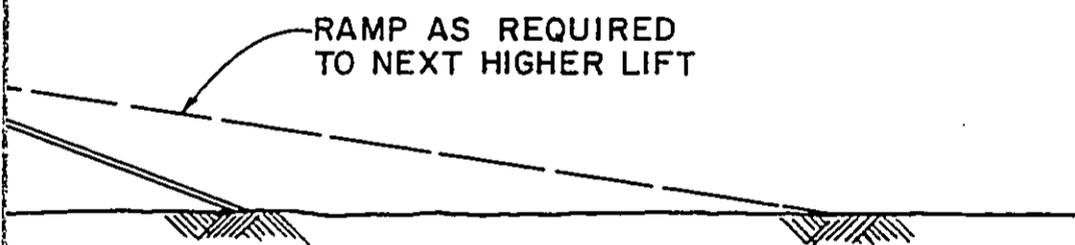


FIGURE 2-4

**TYPICAL LIFT DEVELOPMENT**

SCALES: HORIZ. 1"=20'  
VERT. 1"=20'

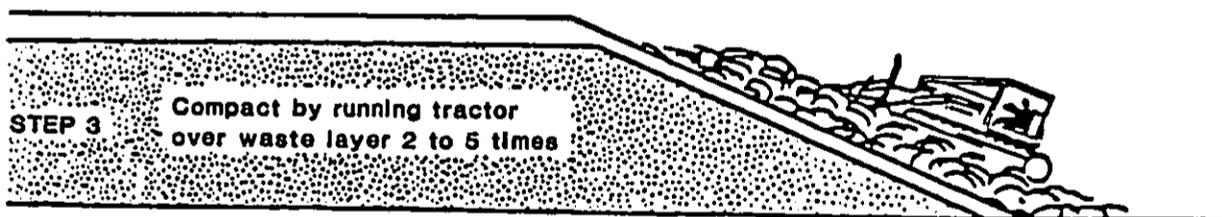
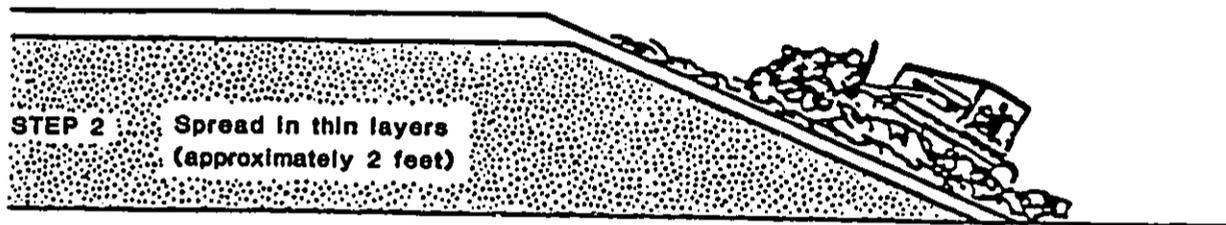
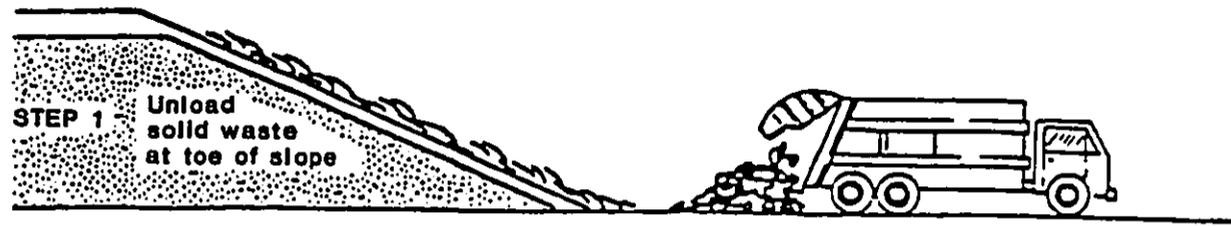
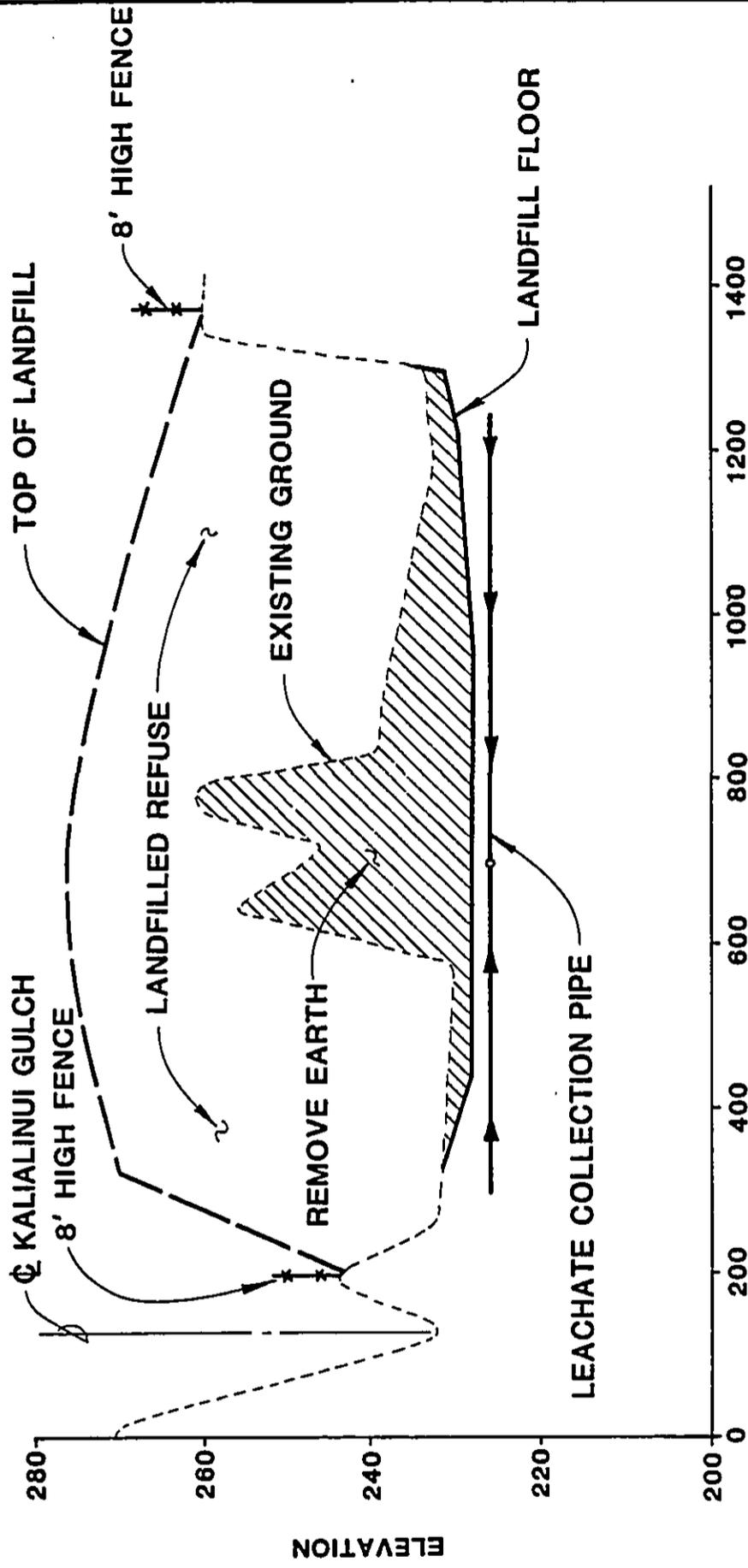


FIGURE 2-5

**CELL CONSTRUCTION**

SOURCE: Sanitary Landfill Design and Operation, EPA, 1970.



**SCALES:**

**HORIZ.**



**VERT.**



**FIGURE 2-6**

**TYPICAL LANDFILL**  
**CROSS SECTION**

recommended because it will unnecessarily use available landfill space. Instead, it is recommended that abandoned cars be processed for recycling at a scrap metal yard or other reclamation facility.

Sewage sludge is normally accepted at sanitary landfills and will be accepted here. The acceptance and handling of these and other types of unconventional wastes will be in accordance with the State Department of Health Administrative Rules, Chapter 58, "Solid Waste Management Control."

General rules-of-thumb for operation of a landfill state that the cover soil should be a well-graded mixture of fine and coarse soil components and that a sufficient amount of cover soil should be available to insure the required proportions of refuse to cover soil. The general practice has been to cover refuse daily, and to estimate soil cover requirements by assuming a volumetric ratio of 4 parts refuse to one part cover soil (4:1). For the proposed project, the compacted refuse will be covered twice per week, and soil cover requirements were based on a 7:1 volumetric ratio. Based on this cover program, 0.47 million cubic yards of cover material will be required through the life of the landfill.

The quarry bottom will be excavated by an average depth of 4 feet to generate additional cover material. The total volume of usable stockpiled and excavated cover material, 0.53 million cubic yards, will meet the soil cover needs of the landfill. The additional excavation will also result in an increased landfill capacity.

When landfill operations begin at the proposed site, Ameron HC&D quarry operations will be moved to an area east of and adjacent to the existing quarry. The landfill and new quarry site will be kept separated by leaving an undisturbed strip of land between the areas. The relocated quarry operations will continue to produce topsoil and non-rock material in addition to its other saleable products. However, additional cover material will not be available from this adjacent site as the non-saleable products will be retained to ultimately return the new quarry site to agricultural land.

### 2.3.6 Landfill Closure Plan

The closure plan for the Central Maui Sanitary Landfill will be prepared when landfilling of the site is near completion. Design elements to be included in the final closure plan are the final cover plan, final grading plan, permanent leachate and gas collection and disposal plans, and irrigation plan.

In concept, the closure plan design will require a minimum final soil cover of 3 feet. It is the intent that the site be returned to agricultural use. If this objective is to be realized, a soil cover of up to 4-1/2 feet will be required. If the land is not reused for agriculture, some other form of vegetative covering will be provided with an accompanying irrigation system. Before revegetation, the top of the landfill will be graded such that runoff will drain away from the landfill without ponding. This measure will minimize leachate generation.

Although cover material is available on-site to meet the needs of the landfilling operations, it is not known whether the on-site resources will also completely meet these final soil cover requirements. If the quantity of stockpiled material is not sufficient, additional cover material must be supplied from off-site.

### 2.3.7 Landfill System Off-Site Development

Off-site developments for the Central Maui Sanitary Landfill system will not be immediately needed when the landfill site is first opened for use. However, as the existing Olowalu and Makani Landfills are closed, a transfer station will need to be established in the vicinity of each closed landfill if other new landfills are not established. Each transfer station will be small-scale and designed primarily to accept refuse from homeowners. County-collected refuse may also be accepted at the stations, but this has not yet been determined. Periodic deliveries of accumulated refuse will be made from the transfer stations to the landfill. Commercial refuse haulers will have to go directly to the Central Maui Landfill to dispose of their refuse. A separate study of these transfer stations will be made in the near future.

### 2.3.8 Utilities Requirements

There will be no water or sewer requirements for the proposed landfill facility. A scale building is required and will be constructed adjacent to the access road (Figure 2-3). There are no telephone requirements. Water requirements for fires and dust control will be provided by water trucks. A portable water closet will be provided for the landfill operators and scale attendant. Electrical power will be brought in for the truck scale.

### SECTION 3

#### DESCRIPTION OF THE ENVIRONMENTAL SETTING

This section of the Environmental Assessment contains a description of the existing physical and social-economic environment. These conditions were considered during the analysis of project components, alternatives and potential impacts.

#### 3.1 PHYSICAL ENVIRONMENT

##### 3.1.1 General

The Hawaiian Islands extend from Kure Atoll and the Midway Islands to the Island of Hawaii, a distance of nearly 2,000 miles. There are 6 major islands which comprise the State of Hawaii. From west to east they are Kauai, Oahu, Molokai, Lanai, Maui and Hawaii.

The project is located on the Island of Maui, the "Valley Isle." It is the second largest island in the State. Maui has an area of 728 square miles and is approximately 58 miles southeast of Oahu. It is composed of two volcanoes and a central isthmus area. The older volcano gives rise to the West Maui mountains and reaches an elevation of 5,788 feet. Haleakala, the second volcano, rises to 10,025 feet and constitutes the greater bulk of Maui's land mass. Linking these volcanoes is the Central Maui isthmus, a relatively level alluvial plain.

##### 3.1.2 Climate

Maui's climate varies significantly according to altitude. Local climatic conditions are also influenced by leeward/windward locations. Lowland areas typically have a semi-tropical climate, while higher elevations are characterized by temperate climates.

Lying in the Tropic of Cancer, the Hawaiian Islands are cooled by northeast tradewinds for 70 percent of the year. These winds are most constant during the spring and summer months. The winter months are characterized by "Kona" weather conditions which are local low pressure systems replacing

the trades. These conditions range from gale force, southerly winds with heavy rains to calm, humid or rainy weather.

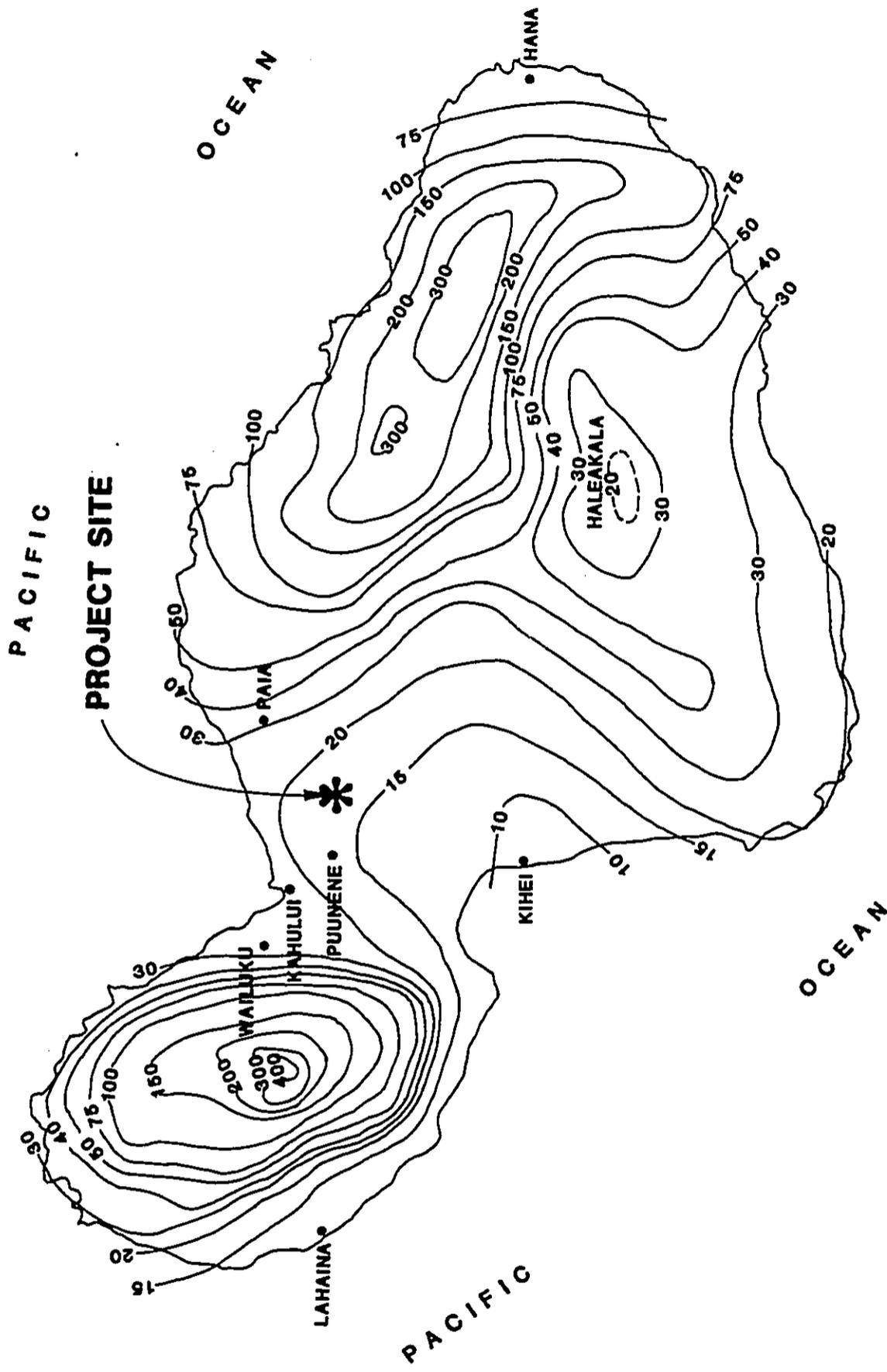
The proposed site for the Maui Central Sanitary Landfill is located in the Central Maui lowlands. Temperatures here usually range from the low 60's during winter to the high 80's in summer. This area is relatively dry, with an average annual rainfall of about 20 inches (see Figure 3-1). Most of the rain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

The tradewinds are especially affected by local topographic conditions on Maui. Coming from the northeast, they become northerly as they are funneled between the mountains of east and west Maui and can attain speeds of greater than 25 miles per hour in the Central Maui areas.

Figure 3-2 shows a wind rose for surface wind direction, speed, and frequency data collected at Kahului Airport, 3 miles northwest of the proposed landfill site. The wind rose was developed from data obtained from the National Weather Service, and reflects surface wind information collected over the periods of 1945-1947 and 1949-1967. The data shows that the predominant wind directions are from the north to east-northeast. Winds blow from this general direction about 70 percent of the time. Wind speeds in this vicinity are relatively low, exceeding 25 miles per hour only about 9 percent of the time from all directions. The average surface wind speed from all directions is 13 miles per hour.

### 3.1.3 Geology and Soils

The undersea mountain range that makes up the Hawaiian Islands was almost wholly built up by volcanic activity. Maui is a large volcanic mass consisting of two volcanoes. West Maui is geologically older, as is evidenced by that area's deep erosional valleys. East Maui is dominated by



**LEGEND:**

- 30— Isohyetal Line
- - -20 - - - Estimated Isohyetal Line

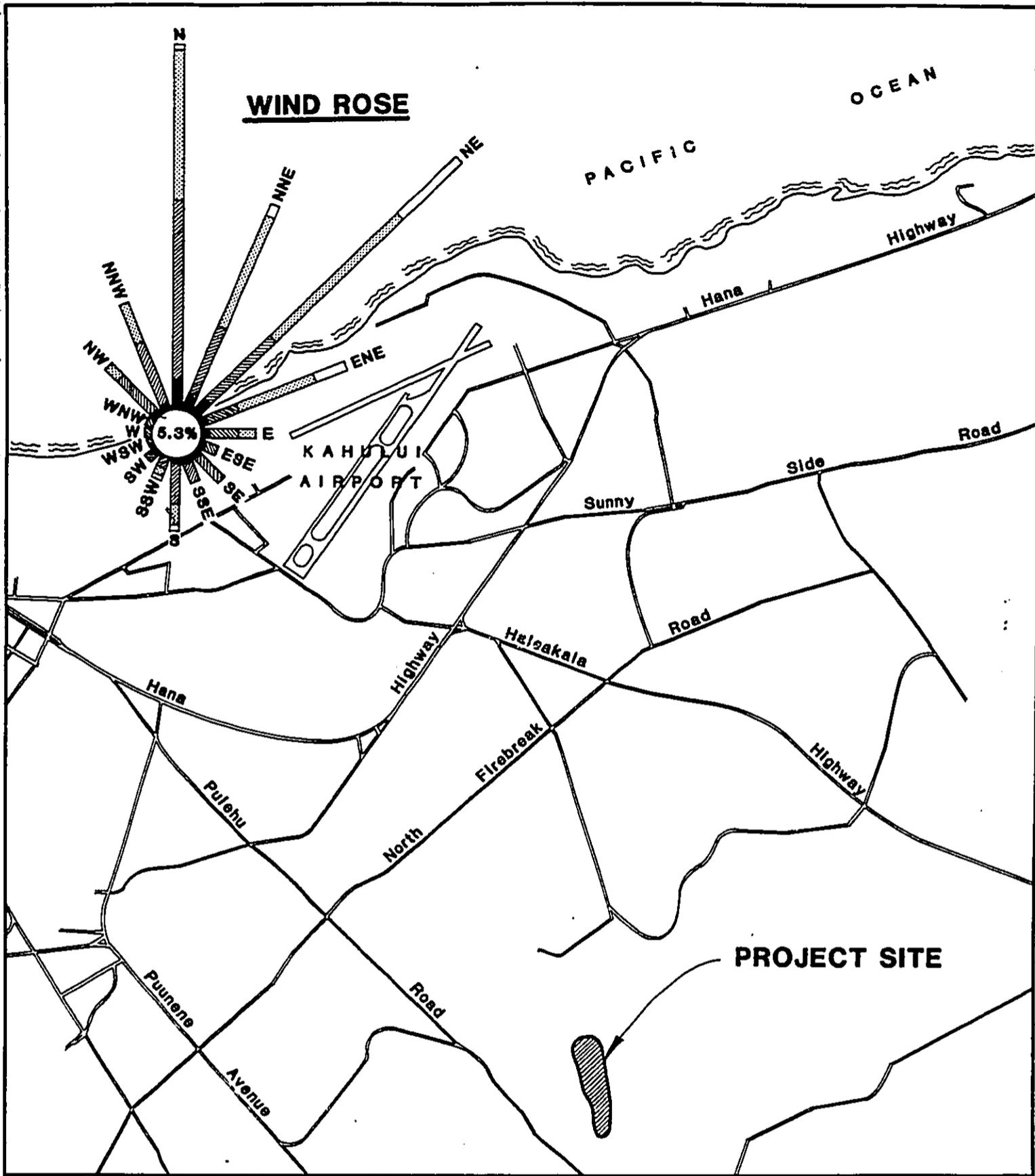
NOTE: Isohyets based on values from 100 gages for period 1933-1967.

SOURCE: Flood Hazard Information, Island of Maui.

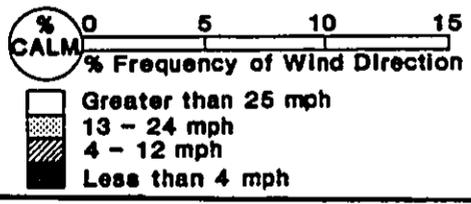


**FIGURE 3-1**

**MEAN ANNUAL RAINFALL**



**LEGEND:**



SCALE IN FEET

FIGURE 3-2

**WIND ROSE**  
**Kahului Airport, Maui**

DATA SOURCE: National Weather Service.

Haleakala, a volcano that is considered dormant. The lava deposits of Haleakala meet with the existing slopes of West Maui, creating the broad plain of the Maui isthmus.

The bedrock geology of the landfill site and vicinity is classified as late stage basaltic lava flows from Haleakala volcano. The site is located near the northwestern edge of this geologic formation. Approximately 1-1/2 to 2 miles to the west, the surface geology changes to the more recent alluvial deposits of Central Maui.

According to the U.S. Soil Conservation Service, the site is generally characterized by two major soil types. The "Rockland" soil type occurs in association with Kalialinui Gulch. This strip of rocky soil is 200 to 300 feet wide in the area of the site. Exposed rock covers 25 to 90 percent of the surface, and soil material is generally shallow and very plastic. The second soil type is "Waiakoa silty clay loam," 3 to 7 percent slopes. This soil type is a fine-textured, well-drained loam with moderate permeability, moderate slope and generally low erodibility. Depth to bedrock is 20 to 40 inches. These soils are generally used for sugarcane, pasture and home sites. The clay loam is considered excellent landfill cover material.

Quarrying activities have revealed that the actual soil strata in this vicinity consist of a topsoil layer of 5 to 6 feet, followed by a rock layer of about 40 feet and a cinder base underlying the rock layer. Quarrying operations have consisted of the removal and stockpiling of the topsoil layer and the excavating of the rock layer down to the cinder base. The topsoil has been stockpiled on-site with the intention of returning the land to agricultural use upon the completion of quarrying activities.

A soils investigation of the quarry bottom was conducted by Dames & Moore in 1976. This investigation was limited in scope, focusing on the central area of the quarry. Shallow test pits were dug with depths ranging from 1.5 to 7.5 feet. The general finding of the test pits was dense reddish brown silty sandy gravel with cobbles, clinkers or boulders at the various

locations. No water was encountered at any of the 9 test pits. Visual inspection of the overall landfill floor has indicated that the floor has intermixed areas of dense basalt and this looser reported soil.

According to the Land Study Bureau (LSB) Detailed Land Classification for Maui, the LSB Overall Productivity Rating of the project area is E72 within Kalialinui Gulch and A51i for the land adjacent to the gulch and currently in sugarcane. According to these designations, the gulch and quarry site have poor productivity potential for most agricultural uses, while the adjacent sugarcane land has a very good productivity potential.

#### 3.1.4 Topography and Slopes

Central Maui is generally characterized by level to gently sloping terrain. The land in the vicinity of the quarry site has an average slope of about 2 percent. Locally, slopes of 5 percent occur. Slope direction is toward the northwest.

The site is located within the 200 to 300-foot elevation levels. It is highly disturbed as a result of the quarry operations. On-site topographic conditions consist of a generally level quarry floor, a steep bank around the quarry perimeter that ranges in height from a few feet to over 50 feet, and several large, irregularly shaped "islands" of partially excavated and stockpiled soil material within the quarry limits. The largest of these last-mentioned features is about 800 feet long and rises about 45 feet above the elevation of the quarry floor.

#### 3.1.5 Flora and Fauna

The existing vegetation in the vicinity of the landfill site consists almost entirely of cultivated sugarcane fields. Immediately to the west of the site is an intermittent stream channel, the Kalialinui Gulch, with an associated strip of natural vegetation about 100 feet wide. The vegetation here consists mainly of common species such as kiawe, klu, pili grass and koa haole. Within the existing quarry, there is sparse vegetation growing on the soil stockpiles. This vegetation is limited to koa haole and kiawe brushes and native grasses.

Animal and bird species found in the vicinity are those typical of the Central Maui cane fields, including a variety of rodent species, the mongoose, and birds such as mynahs, sparrows and doves. No animals are known to inhabit this relatively barren quarry site, with the possible exception of some barn owls (Tyto alba) which may be roosting in crevices in the quarry walls.

There are no rare or endangered plant or animal species on or near the site.

### 3.1.6 Hydrology and Drainage

The proposed landfill 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 this area of Maui. It drains a total of 11,460 acres (17.9 square miles) and runs in a northwesterly direction towards Kahului Airport. Its discharge point is in the vicinity of Kanaha Beach Park. A portion of the gulch runs along the western border of the quarry.

A crest-stage gage station was established in Kalialinui Gulch near Kahului in 1966, and annual maximum discharge flows have been recorded by the USGS and published in its annual report entitled "USGS Water Resources Data." For the 18 water year period of 1967-1984, the gulch received zero flow during 5 water years (1973, 1977, 1981, 1983 and 1984). The largest annual maximum discharge recorded was 1,330 cubic feet per second and occurred in 1971. The average annual maximum discharge for the 18-year period is 305 cubic feet per second.

Generally, the section of Kalialinui Gulch in the vicinity of the project site does not experience any serious flooding problems. On at least one previous occasion, the gulch overflowed and flooded a portion of the northern section of the quarry. This affected area is downstream and outside of the boundary of the proposed landfill site. The section of the berm that was overtopped was subsequently built higher. No overtopping has occurred since then. Along with the periodic clearing of the gulch, these

measures prevent a reoccurrence of flooding. There are at present no significant stormwater flows from the quarry entering Kalialinui Gulch, nor any storm runoff from the Kalialinui Gulch entering the quarry area.

The site is located at a high elevation and approximately 3 miles from the nearest shoreline, far inland from the coastal high hazard and 100-year flood boundary areas.

### 3.1.7 Groundwater Resources

There are four types of principal groundwater resources on Maui: fresh basal water, brackish basal water, dike-confined water and perched water. Figure 3-3 shows the areas where these resources can be found. The project site is located in the central isthmus area which, according to this figure, is predominantly underlain by brackish basal water.

According to the County Department of Water Supply, the project location is down gradient and far removed from any existing groundwater sources used for public water supply. The nearest municipal groundwater source is the Mokuhau Wells, located near Wailuku and about 7 miles northwest of the project site. The Department of Water Supply also does not have future plans to withdraw groundwater in the vicinity of the project.

The nearest known groundwater shaft is located about one mile northwest of the project site and operated by the Hawaiian Commercial and Sugar Company (HC&S) (USGS Water Resources Division). The groundwater withdrawn from this location is brackish, and is used as irrigation water for the HC&S sugarcane fields in the vicinity. The chloride concentration of this source has been monitored annually since 1937. The chloride concentration range over the period from 1937 to 1969 was 350 to 450 mg/l. 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. Water levels at this source were also recorded periodically. The highest water level recorded was 5.42 feet above mean sea level (msl), and the lowest water level recorded was 3.64 feet above msl.

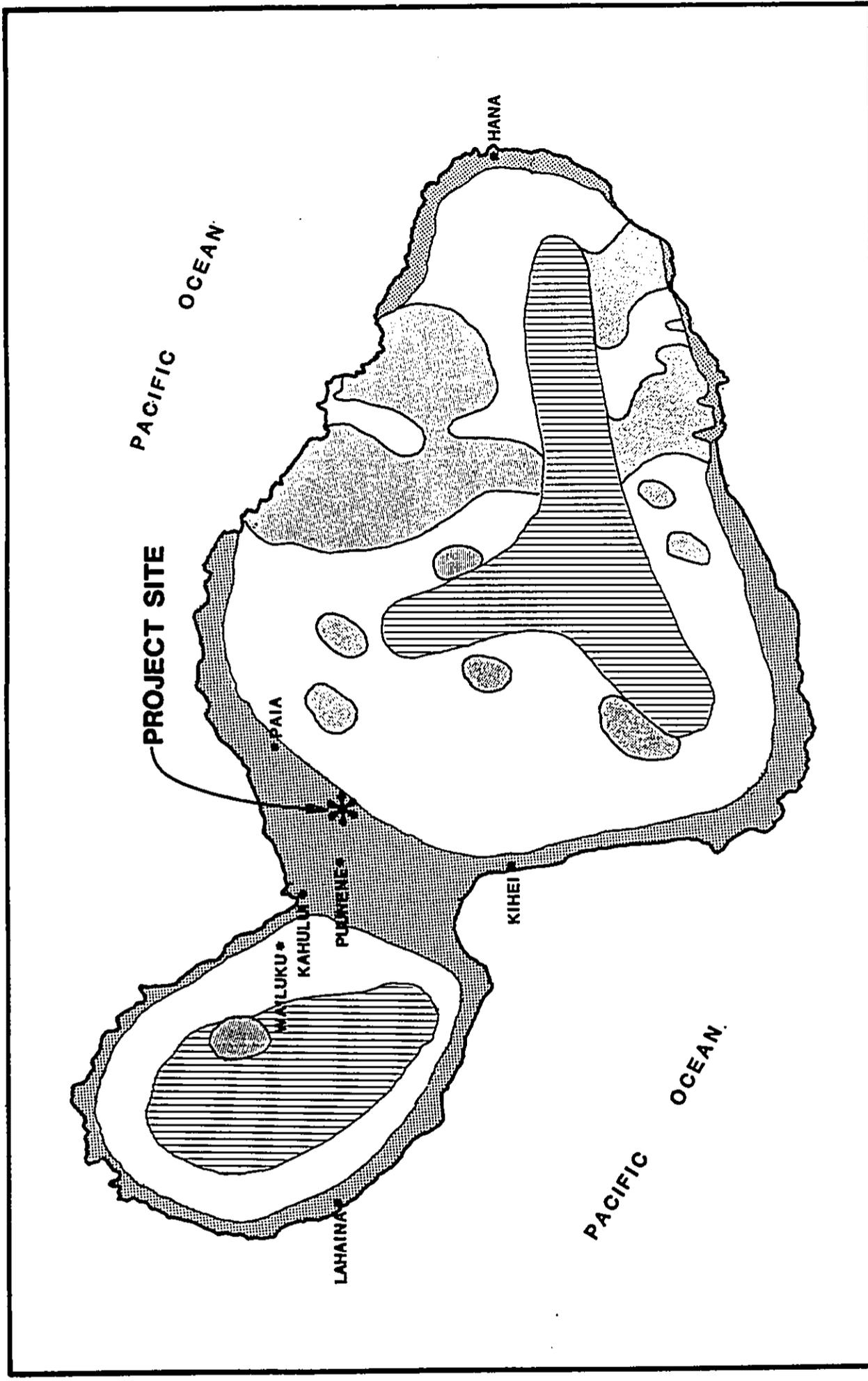


FIGURE 3-3  
**PRINCIPAL GROUNDWATER  
 RESOURCE AREAS**



- LEGEND**
- FRESH BASAL WATER
  - ▨ BRACKISH BASAL WATER
  - ▤ DIKE-CONFINED WATER
  - ▥ PERCHED WATER

SOURCE: HAWAII WATER RESOURCE PLAN, 1979.

Two other HC&S groundwater shafts are located about 1.5 miles northeast of the project site. These sources also yield water with high chloride concentrations, generally ranging from 300 to 600 mg/l. Hence, the groundwater in the vicinity of the project site is not suitable for drinking water use.

### 3.1.8 Air Quality and Noise Levels

The air quality in this rural area of Central Maui is generally quite good, and noise levels are low. 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. Noise from quarry machinery and blasting can be quite significant. However, prevailing winds direct any dust or noise towards sugarcane fields. There are no populated areas in the downwind southern vicinity of the quarry. Noise and air pollutants are also generated by sugarcane harvesting operations in the surrounding fields, but these operations are transient and seasonal.

## 3.2 HUMAN ENVIRONMENT

### 3.2.1 Population and Economy

#### A. Island of Maui

In the 1950's, the mainstay of the Maui economy was agriculture. The chief agricultural activities were sugar, pineapple, cattle and diversified truck farming. Forty-seven percent of Maui's work force was employed by three sugar and six pineapple companies. The population at that time was 37,966. The rest of the business community supported the agricultural industry and resident population. It included 18 construction companies, 13 hotels, 26 small restaurants, 45 doctors, lawyers and dentists, one architect, and 149 "mom 'n pop" retail stores. Because the agricultural sector was relatively static, the rest of the business community was affected, forcing young people to emigrate to either Honolulu or the mainland. Between 1940 and 1960, 11,200 people migrated out of Maui.

Prior to 1954, there were 13 small hotels which catered essentially to commercial travelers. In 1954, the Maui Palms opened as the island's first tourist-oriented hotel, paving the way for the tourist industry on Maui. Tourism is now the major industry here. This new economic order is reflected in the shifting of the work force. In 1952, 49 percent of Maui's work force was in the agricultural industry. By 1977, this percentage had dropped dramatically to a mere 9 percent. At the same time, the total number of jobs during this period increased by 87 percent. The increased number of jobs was primarily due to the visitor industry. The resident population also showed a dramatic upswing, with a 45 percent increase between 1953 and 1975. Population growth was greatest in Lahaina (including Kaanapali and Honolua) and Kula-Kihei where most of the hotels and visitor-oriented condominiums are concentrated. During the period 1970 to 1975, the resident population grew from 5,524 to 9,278 in Lahaina and from 3,670 to 9,347 in the Kula-Kihei area.

The defacto populations projected through the year 2005 were presented in Table 2-1 in conjunction with the discussion on projected solid waste generation. The table shows that the 1985 defacto population is 100,900, and that the population will increase by 70 percent to 171,500 by the year 2005.

B. Puunene

The development closest to the HC&D quarry is the town of Puunene, located approximately 2 miles west of the proposed project site. This town consists of several dozen old homes, two churches, a school, a park and a post office, and is centered on the sugar mill of the Hawaiian Commercial and Sugar Company (HC&S).

In 1970, Puunene had a population of 1,132 people. By 1980, the population had declined to 572 people. Maui County officials estimate that the current (May 1985) population is about 300

people. The population decline is attributed to more efficient operations at the HC&S sugarmill and to the relocation of most of the residents from the HC&S-owned mill camp houses in Puunene to homes purchased in Kahului.

### 3.2.2 Existing Land Use

The site and its surrounding area are within an agricultural district as classified by the State Land Use Commission and the County General Plan. The existing quarry use is permitted here through a Special Use Permit.

The area surrounding the existing quarry site is presently used for sugarcane cultivation, and includes canefield roads and irrigation ditches. Quarrying operations are on-going at the quarry site, and activities include quarry-related operations such as rock crushing and stockpiling. An old Japanese cemetery exists on the quarry site and has been maintained by the quarry owners. This cemetery is located outside of the proposed landfill boundary and will not be affected by the project.

### 3.2.3 Recreation

The surrounding area of the quarry site, to within at least a one-mile radius, is agricultural fields devoted to sugarcane cultivation. The closest public recreational facilities are located at Puunene School, two miles away.

According to the 1980 State Recreation Plan, there are no public recreational facilities planned for the vicinity of the quarry site. The State Recreation Plan is currently being updated by the State Department of Land and Natural Resources.

### 3.2.4 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 the State

Department of Land and Natural Resources, Historic Sites Section. The nearest registered historic site is the Maui Jinsha Mission which is located in Wailuku. No evidence of significant sites or artifacts has been uncovered during excavation activities at the quarry.

### 3.2.5 Infrastructure

The main County road in the area is Pulehu Road, which originates near the outskirts of Kahului and runs in a generally southeastern direction to the village of Pulehu at about elevation 3,000 on the slopes of Haleakala. Vehicular access to the vicinity of the site is provided by paved two-lane private roads of generally good quality. At present, vehicles using the quarry gain access to the site via private canehaul roads to the northeast of the site.

There is no potable water supply available at the quarry area. Neither is the site served by a public wastewater collection and disposal system. The relatively small volume of wastewater currently generated on the quarry site is disposed of via cesspools.

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

SECTION 4  
THE RELATIONSHIP OF THE PROPOSED ACTION TO LAND  
USE PLANS, POLICIES AND CONTROLS FOR THE AFFECTED AREA

This section discusses the relationships of the proposed sanitary landfill to the various plans and policies guiding State and County actions. Other plans and regulations pertaining to the proposed project are also discussed.

4.1 POLICY PLANS

Both the State of Hawaii and the County of Maui have adopted general plans to guide the physical, social and economic development of the islands in general and specifically for Maui. These general plans give in broad outline the objectives and policies that encourage the controlled development of Maui's resources (energy, water, economics, etc.). Although general in nature, these policies provide the framework for the proposed sanitary landfill project.

4.1.1 Hawaii State Plan

The Hawaii State Plan was signed into law on May 22, 1978. It is a long-range guide that "establishes for Hawaii an overall theme, goals, objectives, policies, priority directions and a system for plan formulation and program coordination to provide for the integration of all major State and County activities." It provides a basis for determining priorities and allocating limited resources such as public funds, services, manpower, land, energy and water. It also seeks to assure the coordination of State and County plans, policies, programs, projects and regulatory activities.

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, and utility systems that support State-wide 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 improvement priorities established through the planning process.
- (2) Encourage flexible service delivery systems that can adapt to changing public demands and priorities.
- (3) Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user."

The proposed project clearly responds to this general objective and its related policies: the objective of the proposed Central Maui Sanitary Landfill is to provide for a needed, new solid waste disposal facility located at a geographically central, environmentally suitable site.

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

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

(Objective 1) Maintenance of basic public health and sanitation standards relating to treatment and disposal of solid and liquid wastes."

Details on these aspects of the project are provided in Section 6 of this report.

#### 4.1.2 General Plan of the County of Maui

The General Plan of the County of Maui was adopted in 1980 as a comprehensive plan for the long-range development of the County. It contains objectives and policies of a general, social, economic, environmental and design nature to provide for the general welfare and prosperity of the people of the County. Its intent is also to provide a framework for the more detailed Community Plans.

Within the General Plan, the Liquid and Solid Waste subsection 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 aim of the General Plan to provide an efficient and environmentally sound means of disposing of solid waste.

The General Plan is accompanied by a General Plan Map which depicts general land use guidelines. That 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.

#### 4.1.3 Wailuku-Kahului Community Plan

A Community Plan for the Wailuku-Kahului area was initially developed in 1981 to establish a program for implementing the County General Plan for the Wailuku-Kahului region. This plan has not been officially adopted, and is therefore still considered to be a draft plan. 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.

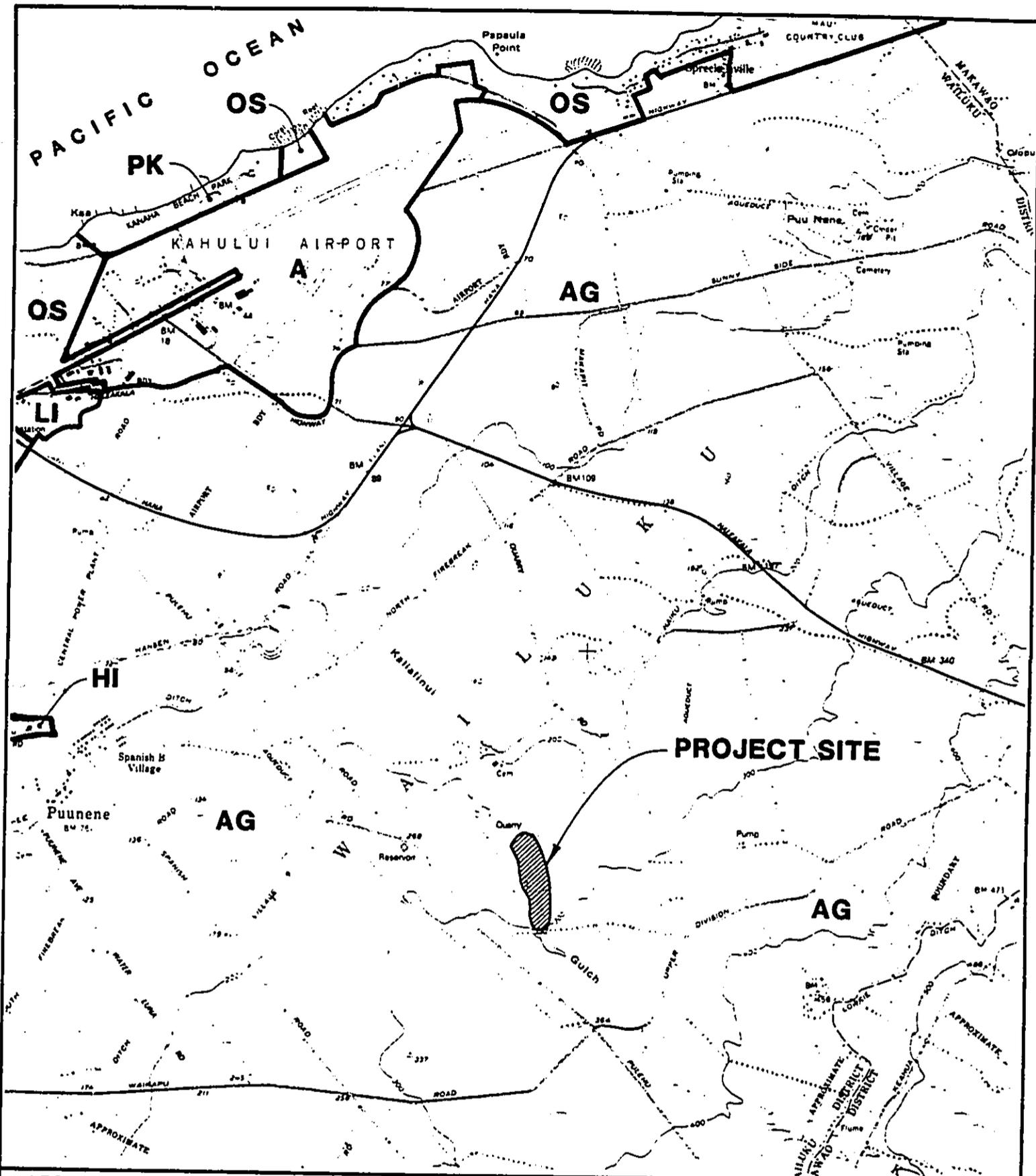
Among its many recommendations, the Community Plan addresses the issue of solid waste in the section on "SUPPORT SYSTEMS: TRANSPORTATION AND UTILITIES":

#### "3. Liquid and Solid Waste

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

The proposed project clearly addresses this concern for a disposal site that is more centrally and conveniently located.

The Wailuku-Kahului Community Plan Map supplements this plan and shows the planned land uses for the community. The Community Plan Map 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.

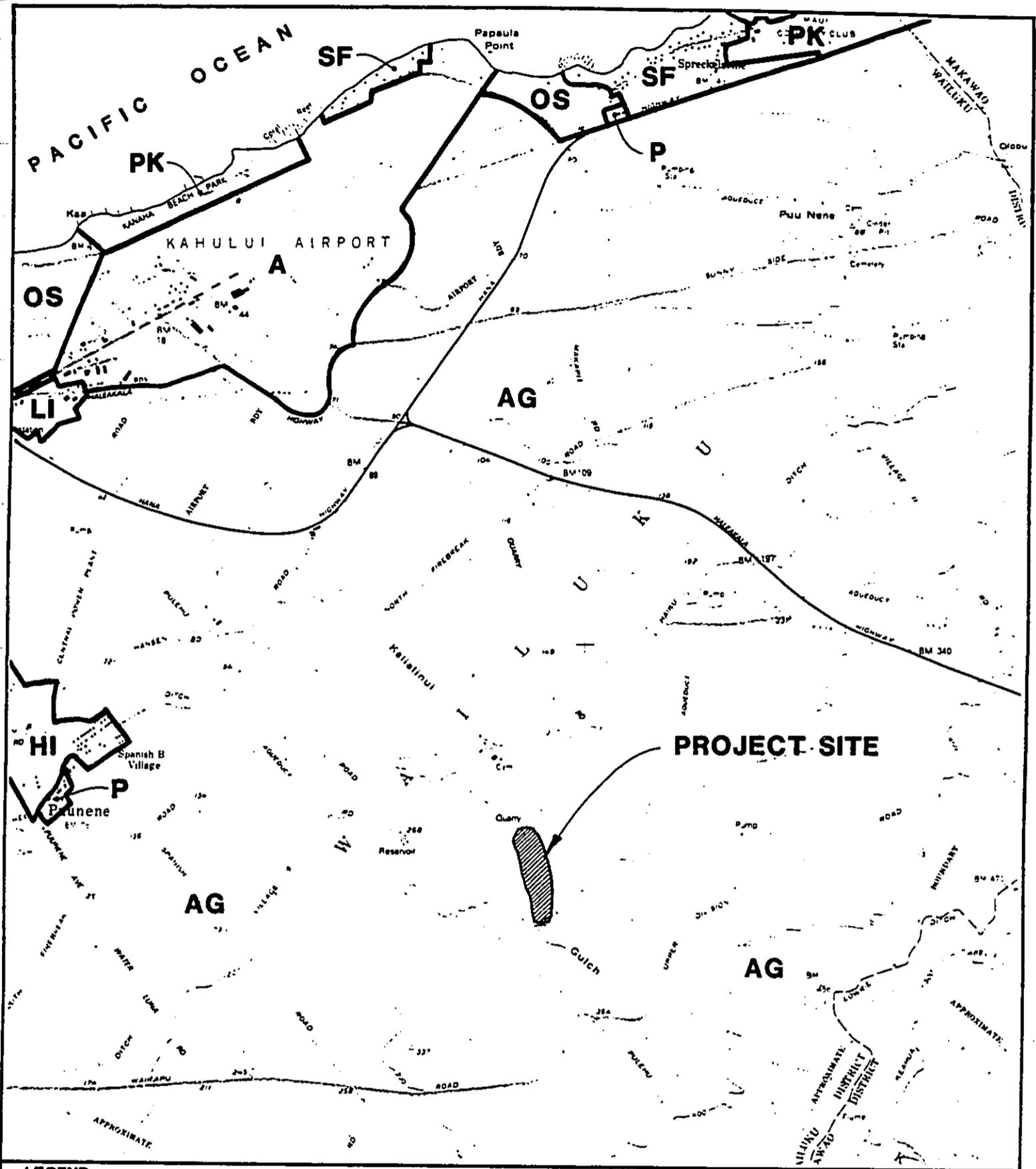


- LEGEND:**
- A Airport District
  - AG Agricultural
  - LI Light Industrial
  - HI Heavy Industrial
  - PK Park
  - OS Open Space



FIGURE 4-1

**MAUI GENERAL PLAN**



**LEGEND:**

- A Airport
- AG Agriculture
- LI Light Industrial
- HI Heavy Industrial
- OS Open Space
- P Public/Quasi-Public
- PK Park
- SF Single Family Residential



**FIGURE 4-2**

**WAILUKU-KAHULUI**  
**COMMUNITY PLAN**

## 4.2 LAND USE REGULATIONS

Land use regulations are more detailed planning tools providing specific land use boundaries, land use classifications and permitted use regulations. The boundaries determine whether or not given 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 project is the State Land Use District Regulations.

### 4.2.1 State Land Use District Regulations

All lands of the State of Hawaii are placed within one of four land use classifications by the State Land Use Commission in accordance with Chapter 205, "Land Use Commission," of the Hawaii Revised Statutes. The four land use classifications are urban, rural, agricultural and conservation. Included within Chapter 205 are regulations for permitted uses within each district. The State land use district maps supplementing Chapter 205 show the boundaries of these districts.

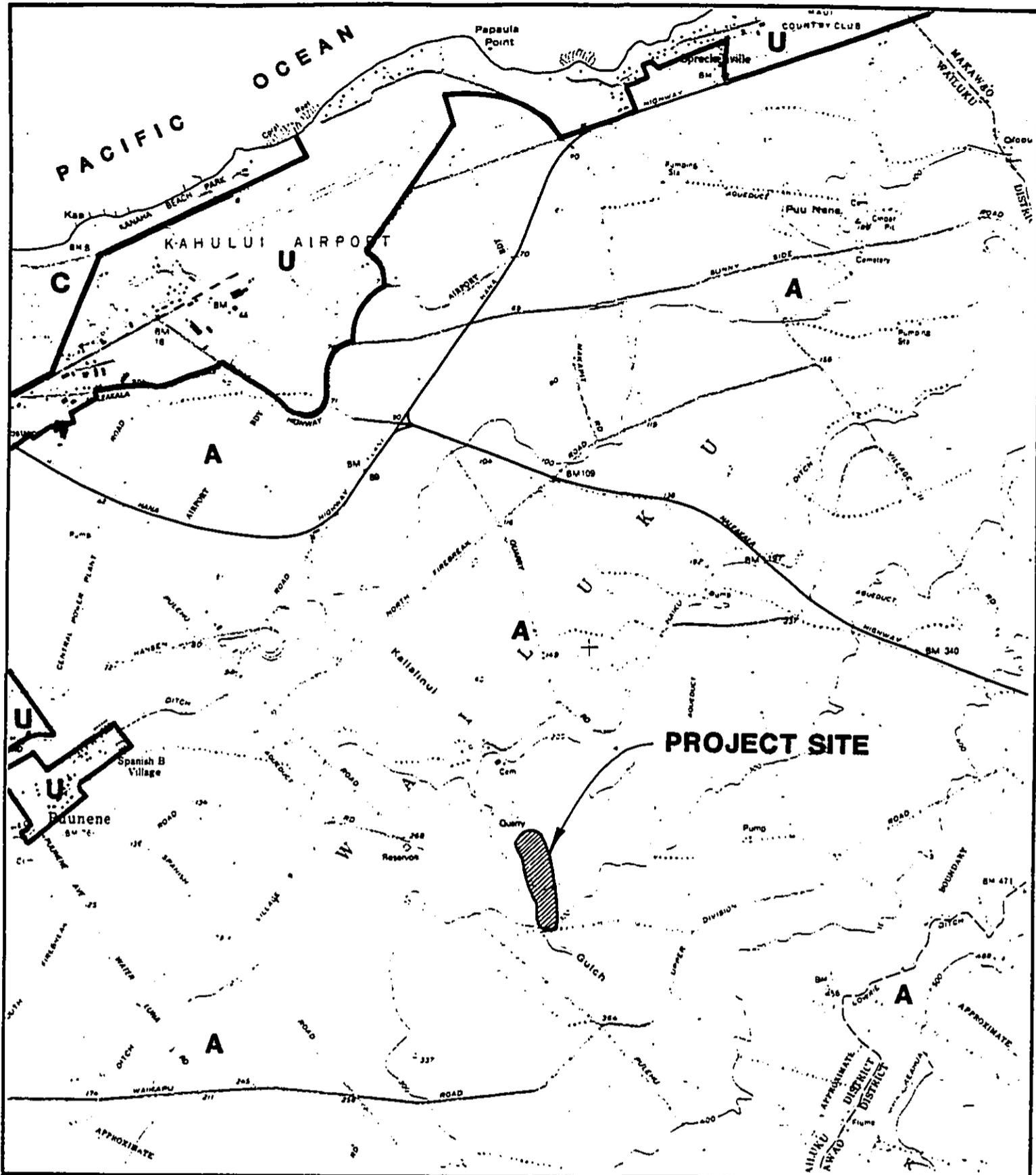
The State land use district classifications for the vicinity of the project site are shown in Figure 4-3. The proposed project site is within an Agricultural District according to these regulations. Permitted uses within this district include crop cultivation, game and fish propagation, certain public and private recreational uses, and certain utility installations such as utility lines, roadways, transformer stations, and solid waste transfer stations. Quarrying activities and sanitary landfilling are not included within these permitted uses.

Existing quarrying operations have been approved by a Special Use Permit granted by the State Land Use Commission in cooperation with the Maui County Planning Commission. A similar permit will be required in order to use this site as a sanitary landfill.

## 4.3 OTHER PROGRAMS AND CONTROLS

### 4.3.1 State Environmental Policy

The State recognizes the need for information on the environmental consequences of a proposed action in making decisions. Therefore, an



**LEGEND:**

- U** Urban
- A** Agricultural
- C** Conservation



**FIGURE 4-3**

**STATE LAND USE DISTRICTS**

Environmental Impact Statement (EIS) is required for any project that: significantly impacts the environment; is not specifically exempted; uses either State or County funds or lands; is in a Conservation District, shoreline setback area, or in certain parts of Waikiki; is a listed historic site; and/or requires a County General Plan amendment. The proposed Central Maui Sanitary Landfill will be County-funded, and the large scale of the project indicates that it could have significant environmental impacts. Therefore, this EIS has been prepared to comply with the State's environmental policy and to insure that environmental concerns are given appropriate consideration along with economic and technical considerations.

#### 4.3.2 National Flood Insurance Program

The "Flood Insurance Study for Maui County, Hawaii" was prepared by the Federal Insurance Administration to identify the existence and severity of flood hazards and to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This document is also intended to aid in the planning of sound flood plain management.

The proposed project site is located about 3 miles inland from the northern shoreline of Maui. According to this study, this site is designated as "Zone C" or an area of minimal flooding. Under 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 applicable to the proposed project.

#### 4.3.3 State Underground Injection Control Program

The State Department of Health established the Underground Injection Control (UIC) Program by the adoption of Administrative Rules, Title 11, Chapter 23 -- "Underground Injection Control," in 1984. The purpose of this program is to protect the State's potable groundwater resources from pollution by subsurface wastewater disposal. These regulations are

accompanied by UIC maps which are marked with a boundary line known as the "UIC Line." Lands that are makai of the UIC line are not restricted from subsurface wastewater disposal by underground injection.

The UIC Line in the vicinity of the project site is shown in Figure 4-4. The proposed site is located approximately 2,200 feet makai of the UIC Line and, therefore, is not restricted from subsurface disposal by these regulations.

Certain water supply agencies at the County level have also adopted similar boundary lines to further protect the underground drinking water sources. For example, the Board of Water Supply of the City and County of Honolulu has a "Pass-No Pass" Line. The Maui County Department of Water Supply does not have such a restriction.

#### 4.3.4 Agricultural Lands of Importance to the State of Hawaii

The State Department of Agriculture has established a system of classifying agricultural lands within the State of Hawaii. The system is entitled "Agricultural lands of Importance to the State of Hawaii" (ALISH) 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 the special combination of soil quality, location, growing season, moisture supply and is used to produce sustained high quality and/or high yields of 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.

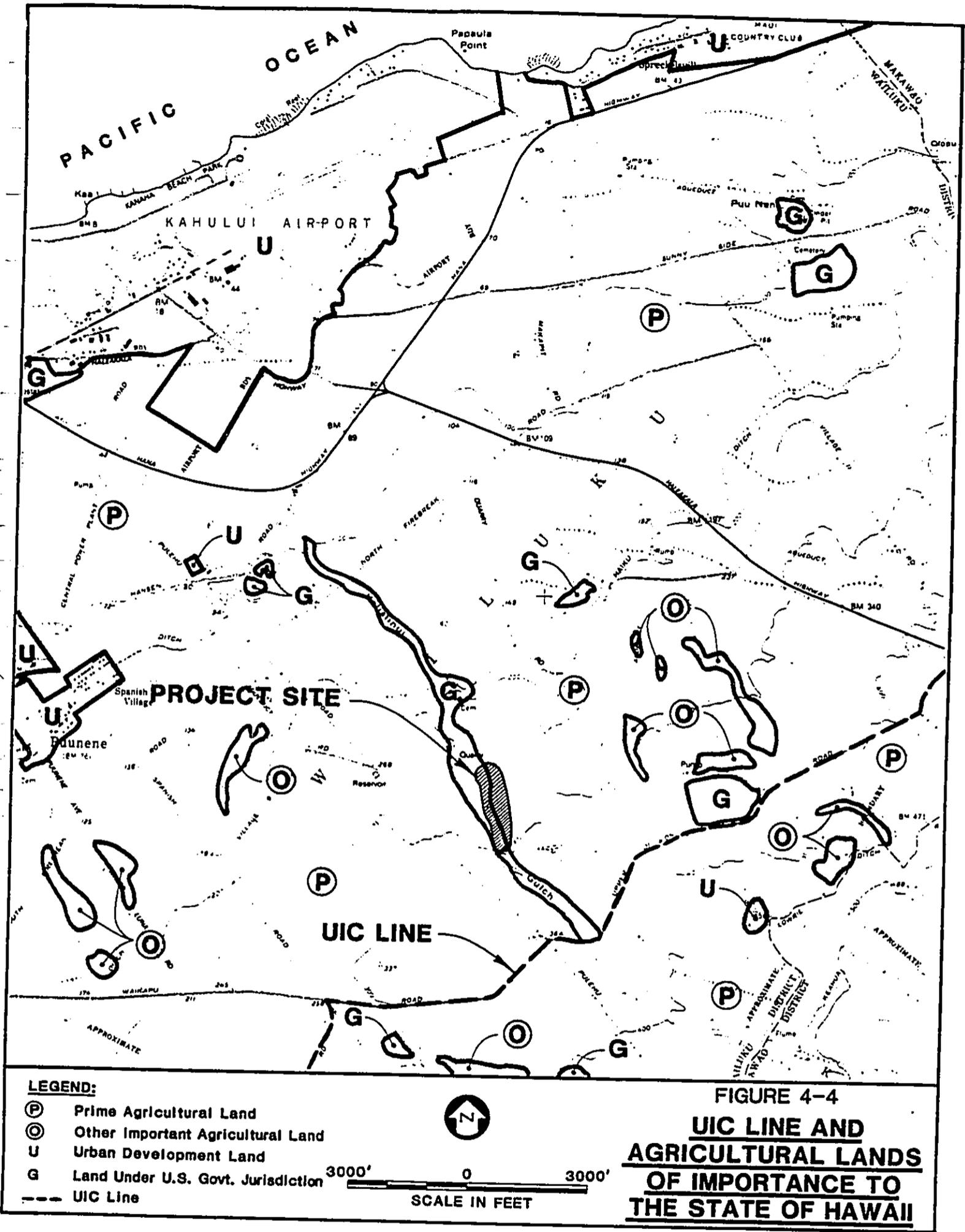


Figure 4-4 shows the ALISH classifications for the lands in the vicinity of the proposed project site. The project site and essentially all of the surrounding area are classified as prime agricultural land. Kalialinui Gulch is not classified according to the ALISH system.

Although the project site is located within ALISH prime agricultural land, the site is already a disturbed area which is not farmable in its present state. Use of the site as a sanitary landfill will not disturb activities on the adjacent agricultural lands. Upon completion of the landfilling, the return of the site to agricultural use is being considered.

4.3.5 Hawaii Coastal Zone Management Program and Special Management Area  
The Hawaii Coastal Zone Management Program (HCZMP) was established to guide the use, protection and development of the land and ocean resources within Hawaii's coastal zone. Its objectives and policies, as stated in Chapter 205A of the Hawaii Revised Statutes, place an emphasis on the following areas: scenic and open spaces, historical resources, recreational resources, development, coastal ecosystem, economic uses, and coastal hazards. Any significant development activity within the coastal zone must conform to the HCZMP objectives and policies mandated by law.

The HCZMP is augmented on the county level by the establishment of Special Management Areas (SMA) which control development along the shoreline. Construction activities within the SMA usually require an SMA permit from the appropriate County agency.

For the vicinity of the project site, the SMA boundary line runs approximately parallel to the coastline and 2,000 to 6,000 feet inland. The proposed project site is not situated within this Special Management Area, therefore, the HCZMP is not applicable.

SECTION 5  
SUMMARY OF PROBABLE IMPACTS  
OF THE PROPOSED ACTION

This section discusses the probable impacts of establishing the proposed Central Maui Sanitary Landfill. The impacts of the proposed action on the environment may be classified as primary or secondary impacts. Primary impacts are those impacts that result directly from the proposed project, while secondary impacts are those that arise indirectly as a consequence of the project. Both impacts can be short- or long-term in duration of effects. Short-term impacts are usually construction related, while long-term impacts can occur during landfilling operations and/or after the completion of the landfill.

5.1 PRIMARY IMPACTS

5.1.1 Primary Beneficial Impacts

The proposed project will have primary beneficial impacts in the areas of the human and physical environments. Discussions of these impacts are as follows:

A. Human Environment

The primary beneficial impact of the proposed 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 and expanding system of public utilities, services and facilities, including an adequate solid waste disposal system. The proposed landfill is scheduled to come on line in 1987, at which time the existing Waikapu Sanitary Landfill will be in the process of closing. The opening of the new landfill will provide the County with a central, efficient and environmentally controlled sanitary landfill site that will meet Maui's refuse disposal needs until at least the year 1998.

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

B. Physical Environment

The siting of a new landfill at the proposed location is ideal for many reasons. The use of an existing quarry for the new landfill site will be an efficient use of land, since the quarry is not useable in its present state for any other purpose. Although the area is designated as agricultural land, the proposed site has a poor productivity potential for most agricultural uses, and will not have an adverse impact on the surrounding agricultural resources. Hence, the project will not require a commitment of land which could be put to other uses. The project site is in a centralized location to facilitate the transporting of refuse from the various population centers of Maui; yet its isolated location minimizes its negative impacts on the general population.

The existing condition of the site is highly conducive to landfilling operations. The site is in an area of low rainfall, which minimizes potential problems of leachate generation, soil erosion and refuse washout. There are no significant threats of surface water infiltration or flooding from the nearby intermittent watercourse, Kalialinui Gulch. Neither is there a threat of groundwater infiltration since the groundwater table is located more than 200 feet below the proposed landfill floor. The site is below the State Department of Health UIC line, and is far removed from and down gradient to the existing public groundwater sources. Additionally, the Department of Water Supply does not have plans to withdraw groundwater in this vicinity. There are no known sites of historic or archaeological significance in the vicinity, and landfilling operations are not likely to uncover such sites. There are no endangered species in

the vicinity which will be disturbed by the project. The quarry site has stockpiled soil material on-site which can be used as cover material. This availability of cover material eliminates the need for acquiring and transporting cover material to the landfill. Access to the site will be via Pulehu Road. This road is not heavily used, so the project will not have a significant impact on local traffic conditions.

#### 5.1.2 Primary Adverse Impacts

The proposed project is anticipated to have adverse environmental impacts in the areas of potential leachate production, erosion, flora and fauna, visual impact, air quality and noise, litter and economy as discussed below.

##### A. Leachate Production and Water Quality

The primary adverse impact is the area of leachate production and the potential contamination of surface water and groundwater resources. If improperly designed and/or improperly developed or operated, a sanitary landfill can have a significant adverse impact on area water quality through several processes, including:

- Contamination of nearby surface water bodies by contaminated surface runoff that may flow from the site into adjacent swales and drainageways.
- Contamination of groundwater resources by the percolation of leachate through the bottom of the landfill and into the underlying groundwater zone.
- Indirect contamination of area streams and other surface water bodies via seeps and springs that derive from contaminated groundwater.

- Contamination of adjacent agricultural crops by lateral leachate migration into the topsoil and attack on root systems or uptake by the plants.

The proposed landfill will incorporate a number of design, operational and eventual closure features to minimize leachate production and its migration into the environment. Despite these proposed precautions, there remains some possibility that leachate will escape and reach the underlying groundwater. However, the 200-foot distance separation between the landfill floor and brackish water table will permit some purification by filtration.

B. Erosion

Although the project site is not prone to serious flooding problems, unusual storm events could cause sediment washoff into the Kalialinui Gulch. Such erosional occurrences could cause adverse impacts on the downstream conditions of the gulch. The landfill design will include erosion control measures to minimize erosional problems.

C. Flora and Fauna

Implementation of the project will result in the removal of the sparse scrub vegetation growing on the stockpiled soil mounds in order to use the soil as cover material. Landfilling operations will also result in the displacement of barn owls roosting in the crevices of the quarry walls.

Solid waste landfilling may attract and encourage the proliferation of scavenger-type animals such as rats, birds, and flies which may lead to disease vector problems.

D. Visual Impact

The proposed landfilling project will not have a significant adverse visual impact because of the remote location of the site.

The site itself is 40 to 50 feet below existing grades in the area, and is surrounded by canefields. The closest population center, Puunene, is located about 2 miles west of the site. Generally, landfill operations will not be visible from this town, nor from Pulehu Road, which is about 1/4 mile away from the site, nor from any of the other roads in the vicinity. The visual impact of the project will primarily affect the landfill operators and those working in the adjacent canefields.

E. Air Quality and Noise

Short-term and long-term adverse impacts of dust, hydrocarbon emissions, noise and odor will arise from construction and landfilling activities. These problems will primarily affect the construction workers and landfill operators. Construction activities will include grading work for the access road, excavation of the quarry floor, stockpiling cover material, and the construction of diversion ditches and fences. These activities will result in the generation of fugitive dust, hydrocarbon emissions and noise, but will be short-term in duration. Additional dust, hydrocarbon emissions, noise and odor will be generated during landfilling operations from the use of earth-moving equipment and the handling of refuse. These impacts are inherent results of the required activities and are unavoidable. However, these impacts are not anticipated to significantly affect adjacent areas.

Long-term odor generation problems may also arise from decomposing refuse, which may be hazardous as well as offensive. This type of problem is not anticipated to be significant due to the small size of the landfill and its remote location, however, provisions will be made to minimize its adverse effects.

F. Litter

The unintentional scattering of litter may occur along the access road and into Kalialinui Gulch and adjacent properties. The

dumping of refuse near the locked entrance gate during off-hours may also occur. Careful depositing of refuse will be encouraged and careless littering checked.

G. Economy

The new landfill project may adversely impact the island's economy by imposing 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, thereby requiring smaller amounts of capital expenditure over a longer period of time. The total estimated capital cost of the project is \$6.2 million. Divided into three increments of approximately equal sizes, the estimated capital costs are \$2.61 million, \$1.75 million and \$1.75 million, respectively. One possible means of reducing this financial burden is to charge a tipping fee to commercial refuse haulers.

5.2 SECONDARY IMPACTS

5.2.1 Secondary Beneficial Impacts

Secondary beneficial impacts of the proposed project in the areas of physical environment and economy are discussed below.

A. Physical Environment

The establishment of a new landfill will significantly benefit the Maui community by permitting the closure of the Waikapu, Olowalu and Makani Landfills. If these landfills are not permitted to be closed when they reach their design capacities, additional landfilling would overload the sites and create a public health hazard. The Waikapu Landfill is still accepting refuse and is already exceeding its planned capacity. The "over-landfilling" of Waikapu Landfill is resulting in litter problems, and the site is in danger of becoming a public health hazard. Permitting the closure of this landfill will halt these mounting problems.

As a by-product of closing these existing landfills, other negative environmental effects now impacting these sites -- e.g., noise, dust, refuse truck traffic -- will be substantially reduced. A limited amount of these impacts will continue to occur at the transfer stations that will be established in these vicinities.

The new landfill site will serve as a designated area for properly disposing of the island's solid waste, and the controlled landfilling operations will minimize the spread of disease by vectors. The end results will be a clean environment for residents and tourists alike and the preservation of the physical beauty of the island.

B. Economy

Once the Central Maui Sanitary Landfill opens for operation and three of the four existing landfills have been closed, some efficiencies and cost-savings are expected for the County's overall solid waste disposal system. The operation of one large centrally located landfill site, rather than three smaller scattered landfill sites, will be easier to operate and manage. Savings on labor, equipment and materials should also be realized. The proposed landfill also has adequate cover material on-site, reducing off-site transporting costs.

5.2.2 Secondary Adverse Impacts

Potential secondary adverse impacts of the project are in the areas of land use, scavenger bird migratory patterns, the economy, and traffic.

A. Physical Environment

The existing quarry site is essentially depleted of saleable quarry material and the existing operations have begun to move to an adjacent area northeast of the site. The new landfilling operations may create nuisance-type problems and other secondary adverse impacts on this existing adjacent land use.

B. Scavenger Bird Migratory Patterns

Sanitary landfills commonly attract scavenger animals such as flies, birds and rodents that feed on the refuse. Most of these animals are inhabitants of the vicinity and migrate a short distance to the landfill. One exception to this behavioral pattern is the cattle egret. This bird is known to scavenge at landfills, and it will travel a relatively long distance from its roosting area to a feeding area. A potential problem can arise if the cattle egret's long migratory flyway pattern conflicts with flyway patterns of aircraft using the nearby Kahului and Old Maui Airports. Conflicting pathways could result in bird air strikes and would also be a safety hazard to aircraft.

This potential problem was evaluated by the U.S. Fish and Wildlife Service and the Airports District Office of the Federal Aviation Administration. Both agencies have indicated that there is little potential for increased bird air strike hazards at the Kahului and Old Maui Airports due to the proposed landfill. (See comment letters from Fish & Wildlife Service and Airports District Office, FAA, in Appendix B). Therefore, a significant adverse impact arising from cattle egret migration is not anticipated.

C. Economy

The new landfill may potentially have an adverse impact on Maui's economy in the way that a public works expansion project often affects a community's economy. The establishment of a new landfill facility can encourage more rapid urban expansion, which in turn may induce an increase in the cost of goods and services in the area. On the other hand, urban growth may be beneficial in that it may generate a higher quality of living for Maui's citizens.

D. Traffic

The delivery of refuse to this new site will change traffic patterns for refuse-hauling vehicles. With the opening of the proposed site, all County and commercial refuse trucks presently delivering refuse to the Waikapu, Olowalu and Makani Landfills will be redirected to this Central Maui Sanitary Landfill site. The new landfill will generate some increase in vehicular traffic on Pulehu Road and on major roads connecting to Pulehu Road, especially coming from Wailuku-Kahului to the north and from West Maui to the west.

In early 1985, some limited traffic counts were made for Waikapu Sanitary Landfill as part of the Central Maui Sanitary Landfill engineering study. Based on these traffic counts, the average daily vehicle count for Waikapu Sanitary Landfill was estimated to be 280 vehicles. By type, these vehicles were:

Cars	99.0
Pickup Truck	142.0
Large Truck	19.5
Refuse Truck	<u>19.5</u>
TOTAL	280.0 vehicles

The Central Maui Sanitary Landfill will generate more traffic than Waikapu Landfill since the new facility will be ultimately replacing three existing landfills. The new landfill will receive about 35 percent more vehicles than the Waikapu Landfill due to the contributions of refuse now going to the Olowalu and Makani Landfills. Hence, by present waste generation volumes, approximately 380 vehicles per day will deliver refuse to the new landfill.

Vehicular traffic will increase as Maui's population -- and resulting solid waste volumes -- continues to increase. Given

these several factors, average daily traffic generated by the Central Maui Sanitary Landfill will probably be in the range of 500 vehicles/day in 1987, and perhaps 600 to 700 vehicles/day by 1995. Based on the traffic distribution studies conducted for Waikapu Landfill, about 70 percent of this traffic will occur between the hours of 9 a.m. and 3 p.m.

This volume of traffic is not insignificant. However, given the relatively low volume of traffic on Pulehu Road, and the absence of any major residential or commercial areas along this road, either existing or proposed, traffic impacts should not be a significant problem. Additionally, the movement of County refuse vehicles will be controlled in order to avoid traffic congestion during commuting hours.

There is a safety consideration to be resolved concerning the existing condition of Pulehu Road. There are two points where the road crosses over drainage ditches. The paved section of the roadway is maintained at the bridges, however, there is little or no shoulder and there are concrete walls close to the pavement edge on both sides of the road. It is not recommended that two large refuse trucks cross these bridges at the same time, in that there is a danger that a truck may run into one of the walls or the oncoming truck. Safety measures should be implemented at these points to prevent such accidents.

## SECTION 6

### PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED AND PROPOSED MITIGATION MEASURES

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

#### 6.1 PRIMARY ADVERSE IMPACTS AND MITIGATION MEASURES

##### 6.1.1 Leachate Production and Water Quality

Past experiences with existing landfills have 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" (Solid Wastes Management, Dec. 1981). Refuse is predominantly a dry product and will not leach a significant quantity of liquid per se. Leachate is primarily produced when water from other sources infiltrates the refuse and extracts contaminants from it. By selecting a strategic location and incorporating various plans into the landfill design, all practicable precautions are being taken to prevent this occurrence.

The geographic location of the landfill in itself significantly contributes to minimizing the chances of leachate generation. The site is located in an area of low rainfall, which minimizes the chances of rainfall infiltration. The area is not likely to be flooded because it is not in a flood plain area. Finally, the underlying brackish water table is located more than 200 feet below the floor of the site, thereby reducing the chances of groundwater infiltration to virtually zero. The combination of these physical conditions is the most ideal situation for preventing the introduction of a liquid phase.

In addition to these site characteristics, the following mitigative measures will be implemented to further reduce the chances of water infiltration into the waste and subsequent leachate escape into the environment:

- A surface drainage system will be constructed to prevent off-site surface runoff from flowing onto the site;
- Throughout the preparation, operation and closure of the landfill, the ground surface will be graded to prevent water-ponding on the surface; and
- A leachate collection system will be installed at the bottom of the landfill to capture any leachate that has percolated through the refuse, in order to prevent its further migration into the lower soil strata.

These systems, described in further detail below, will address drainage conditions both during the development of the landfill and after the completion and closure of the landfill.

A. Surface Drainage System

The project site is basically a large open quarry pit which will accumulate water from rain that falls directly on it. The surface drainage system will consist of swales and a concrete ditch supplemented by planned surface grading. Surface runoff flows generated from the higher elevated adjacent areas of the south and east will be directed around the landfill by a concrete ditch along the southern boundary and a swale along the eastern boundary. These diversions will prevent additional water from flowing onto the site.

There is a small possibility that stormwater discharge from a large storm event could overtop the sides of Kalialinui Gulch and spill onto the landfill. This could result in refuse washout and/or water seepage into the refuse with subsequent leachate production.

The preliminary engineering plans for the landfill indicate that the section of Kalialinui Gulch adjacent the project site can accommodate a large storm event without the occurrence of overtopping.

Nevertheless, a drainage study will be performed to ensure that stormwater flowing through the gulch will not overflow into the landfill. Calculations for the drainage study will be based on a design stormwater flow of 1,330 cfs. This flow was the largest annual maximum discharge recorded by the U.S. Geological Service (during the period 1967-1985) at the Kaliainui Gulch crest-gage station located about 1.5 miles downstream from the project site. The existing capacity of the gulch will be checked based on this stormwater flow, and if necessary, the appropriate sections of the gulch will be built-up to prevent overtopping.

B. Grading

Surface grading within the landfill site during development and after closure will be designed to prevent ponding on the surface, in order to minimize water infiltration into the refuse and subsequent leachate generation. The grading work will also be designed for soil erosion control, which is further discussed in the next section.

Upon the closure of the landfill, a final soil cover of 3 to 4.5 feet will be spread and compacted over the refuse. The soil cover will serve as a semi-impervious layer, minimizing the infiltration of rain water into the layers of decomposing solid waste. The finished surface of the landfill will be graded with a crown along the middle to provide for sheetflow runoff across the surface to off-site drainage areas, thereby further minimizing water percolation through the landfill mass. As each incremental landfill area is completed, hydromulching will be spread over the final soil cover to vegetate and stabilize the surface.

C. Leachate Collection System

A leachate collection and treatment system will be installed to handle any leachate that is generated on-site. The collection system will consist of a network of perforated pipes installed at

the bottom of the landfill. The perforated pipes will be connected to manholes which will serve as sampling/storage wells. Leachate will be intercepted by the perforated pipes and will flow into the manholes. The accumulated leachate will be pumped from these manholes in batch operations periodically and reapplied to the landfill as a means of disposal. Leachate reapplication will allow the leachate to be reduced by (1) evapo-transpiration at the landfill surface and (2) stabilization as it filters through the landfill mass.

This disposal method appears to be the most cost-effective and logical, as the quantity of generated leachate is expected to be minimal due to the low rainfall characteristics of this vicinity. One commonly-used practice has been to not require a leachate collection system in areas where the annual rainfall is less than 30 inches. The vicinity of the project site typically receives 20 inches of rain annually, which would normally eliminate the need for leachate collection. A leachate collection system will be provided, nonetheless, as a conservative, precautionary measure.

Conveyance of the leachate to a municipal sewage treatment plant for disposal is not recommended because of the small quantity expected to be generated. The risk of contamination to potable water supplies is also minimal since there are no existing or potential potable groundwater resources in the vicinity.

An impervious liner at the bottom of the landfill will not be required. The walls and bottom of the landfill have dense soil structures and are relatively impervious in comparison to the overlying lighter refuse materials. This impermeability was evidenced by standing water on the quarry floor which remained for several days following a heavy rainfall. The bottom of the landfill will be graded and topped with a compacted layer of soil wherever necessary to form a relatively impervious bottom shell.

A large portion of the quarry bottom consists of the less dense cinder material. These areas will be excavated, then refilled and compacted with soil to make them resistant to leachate penetration. The landfill floor will be sloped such that it will cause the leachate to flow toward and be intercepted by the leachate collection pipes (see Figure 2-3 in Section 2). Although the compacted floor will not be completely impervious to liquid penetration, its greater density in comparison to the relatively loose overlying refuse would cause the leachate to flow along the surface of the landfill floor and into one of the pipes.

Although the rock material of the quarry walls contains some pockets of porous material, the walls are generally much denser than compacted refuse. Because of this difference in densities between the walls and the refuse, leachate movement will tend to be confined within the less dense refuse mass, and the tendency for leachate to move laterally through the quarry walls will be small. Hence, leachate will generally move downward where it will be intercepted by the perforated pipes, and leachate migration through the walls and bottom will be virtually zero.

#### 6.1.2 Erosion

Despite the low rainfall characteristic of this area, unusual storm events could cause erosional problems at this landfilling project where earthwork is occurring continuously. Storm runoff over the developing landfill could carry soil cover or washed-out refuse out of the landfill and into Kalialinui Gulch. This type of occurrence could result in the loss of cover material for the landfill as well as sediment and/or refuse accumulation problems within the gulch.

This type of problem will be avoided by implementing proper landfilling operations which include measures for erosion control. Refuse washout will be minimized by following the proper landfilling methods of compacting the

refuse adequately and performing the required periodic soil covering. Soil erosion problems will be minimized by properly compacting the soil cover.

Sedimentation runoff will also be controlled at this project by planned grading of the developing landfill and by constructing silting basins at the low point of each incremental landfill. Any surface runoff generated on the landfill site will flow into the silting basin. Sediments that are carried in the runoff will be allowed to settle out in the basin. The clarified runoff will be discharged out of the operations area, eventually flowing into Kalialinui Gulch. Certain sections of the leachate collection pipes will be interconnected with the silting basins such that any storm runoff that flows over the landfill floor surface and is intercepted by the pipes will be discharged without having to be handled as leachate.

After landfill closure, erosion of the final soil cover will be minimized by stabilizing the soil with vegetation. As each incremental landfill is completed, the top surface will be spread with hydromulch to promote immediate vegetation with grasses. After all three of the incremental landfills are completed, the entire area will either be returned to agricultural use or be converted to other uses such as a recreational park.

#### 6.1.3 Flora and Fauna

The project site is a relatively barren area with only sparse scrub vegetation and no significant animal inhabitants. Implementation of the project will result in the removal of the scrub vegetation and the displacement of some barn owls that are roosting in the crevices of the quarry walls. The commencement of landfilling operations in this area may also attract scavenger-type animals such as rats, birds and flies which may lead to disease vector problems.

The removal of the vegetation growing on the stockpiled soil will not have a significant adverse effect on the floral ecology per se. However, the clearing and grubbing of the stockpiles will reduce their stability and may contribute to erosional problems. In order to minimize these on-site erosional problems, vegetation will be removed incrementally as the stockpiles are needed.

The proliferation of scavenging animals will be mitigated by implementing proper landfilling procedures which include soil covering. For this project, it is proposed that the compacted refuse be covered on a twice-per-week basis. Another common practice of existing landfills is to provide soil cover on a daily basis. This alternative was considered, however, the decision to recommend a twice-a-week cover practice was based primarily on experiences from existing landfill operations on Maui. The Waikapu Landfill, which presently receives 60 percent of the island's refuse, has been operating on a twice-a-week cover basis. There have been no complaints from the public concerning odors, vectors, airborne litter, etc., so this practice appears to be adequate. The Olowalu, Makani and Hana Landfills have also been using the twice-a-week cover practice without detrimental impacts.

Vector problems may not be totally eliminated as a result of the soil covering practice. Even if daily cover were to be provided, it would not guarantee the complete absence of problems from rats, cattle egrets or other scavenger-type animals. All landfills usually have some problems of this nature. However, the proposed site is far removed from any populated area, so the nuisance factor and, more importantly, the risk to the public health will be minimized and isolated in this remote location. The existing Waikapu Landfill presently does not have chronic problems with rats, except that rats appear from the surrounding canefields when the cane is burned for harvesting. Any vector problems that may arise at the proposed landfill and cause damage to the adjacent agricultural lands will be corrected by the County.

Because of the remote location, relatively small scale of the landfilling operation, and general lack of evidence that a twice-a-week cover is inadequate, it does not appear to be practical to expend additional resources and money to provide daily cover.

After landfill closure, the top of the landfill will be covered with a final soil layer and revegetated with grass or agricultural crop.

#### 6.1.4 Visual Impact

Adverse visual impacts are expected to be minimal due to the remote location of the site, and will primarily affect those working at the landfill site, future quarry site and in the adjacent canefields.

Construction activities will occur during the site preparation of each incremental landfill. These visual impacts will be of a temporary, short-term nature. During landfill development, the visual impact of exposed refuse will be mitigated by the periodic soil covering. The landfill will be developed up to the elevation of the existing surrounding lands. When it is completed, the appearance of the closed landfill will be a low mound of soil that is slightly higher in elevation than the surrounding canefields. The top of the landfill will ultimately be revegetated with grass or agricultural crop to blend in with the surroundings in appearance and use.

#### 6.1.5 Air Quality and Noise

Noise, fugitive dust, fuel emissions and odors are expected to be generated from the short-term construction activities and long-term landfilling operations. These nuisance-type problems are inherent to the required activities and unavoidable. However, these impacts will not be significant and will cease when the landfill is closed.

Adverse impacts will be minimized to the greatest extent possible by proper maintenance of the construction and landfilling equipment, good housekeeping procedures, and proper landfilling operations. Odor problems will also be minimized by proper solid waste handling and soil covering.

The existing quarry operation will be moved to the adjacent land on the eastern side of the site. The noise created by the future adjacent quarry operations, including mass grading, drilling, blasting and stone-crushing, will overshadow any noise created by the landfill operation. The landfill will not be operated in the evenings.

The decomposition of solid wastes in a landfill produces a number of gases, most commonly carbon dioxide, methane and hydrogen sulfide. The latter two gases are responsible for odors that may occur at improperly operated landfills. These gases can also be toxic or explosive in high concentrations. Methane gas is explosive when in the presence of air and within the concentration range of 5 to 15 percent.

For smaller landfills such as the proposed project, gas production is so small that gases are usually allowed to pass through the top of the landfill and to diffuse into the atmosphere. Venting also occurs through the leachate collection system. Gases can escape through the perforated pipes to the leachate removal manhole. Methane gas is lighter than air ( $\text{CH}_4$  molecular weight = 16; air molecular weight = 29). It would not tend to accumulate in open space along the bottom of the landfill, but could conceivably collect in pockets such as the manholes. Therefore, methane gas concentration will be monitored at the manholes to prevent possible explosions. When the methane concentration exceeds 4 percent, the manhole cover will be removed to facilitate gas escape.

For larger landfills, systems are normally provided for the collection and burning of the produced gases. This landfill gas conversion system provides two benefits. The collected gas has a high calorific value and can be burned to produce energy. Additionally, collection of the landfill gas prevents its release into the atmosphere, thereby reducing odor problems, and minimizing the release of noxious gases and the risk of explosions. Although the proposed landfill is relatively small, the feasibility of installing a gas collection system for energy recovery is being studied. If such a system is installed, it will be done as the landfill is being developed and will be maintained after closure.

The impacts of air pollution on adjacent properties will be minimal. The prevailing winds will carry any air-borne elements toward the south and southwest where there are canefields and no major urban areas.

It should be noted that the proposed project will eliminate odor problems at the Waikapu Landfill which have been significant due to the inadequate soil covering at that site.

#### 6.1.6 Litter

The remote location of the site as well as the site being set well below the surrounding grade will minimize the nuisance problem of litter scattering into adjacent properties and roads. An 8-foot high chain link fence will be installed along the access road and around the landfill site to prevent litter from entering adjacent areas, Kalialinui Gulch, and the quarry office area, which will remain in use for the relocated quarry operations. To further contain the litter, temporary fences will also be installed as required along the landfill floor during incremental landfilling. Litter is not likely to be blown into the eastern new quarry area because it will be upwind of the project site.

In order to discourage indiscriminate littering near the locked entrance gate during non-operating hours, consideration is being given to installing a large trash receptacle near the entrance when the landfill is closed for the day.

#### 6.1.7 Archaeological and Historic Sites

The uncovering of new sites or remains of archaeological or historic significance is not anticipated because of the landfilling nature of the project. A small amount of excavation work will be performed to grade the landfill floor, however, these activities will occur approximately 40 to 50 feet below the surrounding grade level.

Despite the unlikelihood of encountering unidentified sites or remains, caution will be taken during construction activities, and the State Historic Sites Office will be immediately contacted if such remains are uncovered.

## 6.2 SECONDARY ADVERSE IMPACTS AND MITIGATION MEASURES

### 6.2.1 Physical Environment

The existing quarry operations have begun moving from the existing site to the northeast adjacent area. The proposed sanitary landfilling activities which will occur in the existing quarry site may create nuisance-type problems for the quarry operations. Various mitigation measures will be taken to minimize conflicting activities between the two sites. The new landfill and quarry areas will be separated and buffered from each other by a strip of land. The perimeter fence between the two sites will prevent litter from blowing into the new quarry. The two operations will keep each other informed and coordinate activities to minimize conflicts in operations. For example, the quarry operations will give advance notice of blasting to the landfill operators so that landfill spotters can halt traffic into the landfill during blasting operations, which normally occur twice a month between 3:30 p.m. and 4:30 p.m.

### 6.2.2 Economy

By implementing this project, the improvement to Maui's public works infrastructure may impact the island's economy adversely. Although a new landfill is already needed to serve the present population of Maui, the establishment of this landfill may encourage a more rapid urban growth. Wherever a new public utility system becomes available, there is a tendency for development to accelerate in its vicinity because of the fact that the new utility is in-place and ready to use without immediate concerns for reaching its capacity. The design of the landfill is based on population growth as planned by the County and State. Therefore, in order to prevent a possible accelerated growth, the County will need to carefully implement the State and County growth policy plans.

### 6.2.3 Traffic

The eventual closure of the Waikapu, Olowalu and Makani Landfills will result in the redirection of the refuse hauling vehicles from those sites to this new centralized landfill site. The new traffic pattern will have

some impact on the traffic in the project site's vicinity as well as on the traffic within the affected refuse service areas. Traffic congestion by refuse delivery vehicles will be minimized by concentrating refuse collection and delivery during non-commuting hours.

In the immediate vicinity of the project site, the access road to the landfill will be used by the refuse delivery trucks and by HC&S vehicles that require access to the adjacent canefields. Use by HC&S vehicles will not be on a regular basis. The majority of the HC&S traffic will occur seasonally during harvesting and planting periods. Improvements of the existing access road into a two-lane road will minimize traffic congestion along this road section.

Due to the relatively low traffic volume of Pulehu Road, it appears that Pulehu Road will be able to adequately accommodate the increased traffic flow of the refuse vehicles. The general condition of Pulehu Road is good, with the exception of potential driving hazard conditions at two drainage ditch bridges. The narrowed road conditions at these bridges pose a safety hazard if two large trucks cross the bridge at the same time.

These bridges will not be widened; instead, the anticipated light traffic conditions indicate that it may be more practical to have the trucks simply yield to one another at the crossings. In order to prevent vehicles from sideswiping the walls, it is recommended that reflectors and/or warning signs be posted at the approaches to the bridges to warn vehicles of the oncoming restrictions.

SECTION 7  
ALTERNATIVES TO THE PROPOSED ACTION

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 any new action. The second alternative, solid waste incineration, was selected and studied by the County of Maui several years ago as a disposal alternative and alternate energy source. The reasons for eliminating these alternatives from further consideration are discussed below. Also included within this section is a brief description of other methods of processing and disposing of solid waste.

7.1 NO-PROJECT ALTERNATIVE

The no-project alternative implies that no new solid waste disposal site will be developed. If the proposed project is not undertaken, the Makani, Olowalu and Waikapu Landfills will soon reach their capacities, after which time there will be no other site available to accept the island's solid waste. Lack of a location for or means of disposing of the island's refuse will promote unsanitary conditions, endangering the health of the community.

A formal study was not conducted in selecting the site of the new sanitary landfill. However, it is widely believed that the proposed site is an ideal landfill location for three reasons.

First, available quarry sites are always seriously considered as potential landfill sites in order to take advantage of their inherent characteristics. The dense soil structure typically found at quarries can serve as a highly impermeable barrier against leachate migration. Quarry operations conveniently leave a large open pit where landfilling can immediately begin. Quarrying also conveniently leaves discarded excavated material which can be used as refuse cover.

In addition to the inherent characteristics, the central location of the proposed site is convenient for collection and disposal of refuse from all parts of western Maui. Finally, the site is available for landfill use as the landowner is agreeable to permitting use of the site for landfilling.

## 7.2 SOLID WASTE DISPOSAL BY INCINERATION

The process of incineration involves a controlled combustion that reduces solid, liquid or gaseous solid wastes into carbon dioxide, other gases and a relatively noncombustible residue. 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.

This system is, however, one of the most costly alternatives due to the higher construction costs necessitated by the increasingly strict air pollution control requirements set forth by the Federal government. The advantages and disadvantages of incineration are listed in Table 7-1 of the next section.

Several years ago, the County of Maui studied the possibility of refuse incineration as an alternate energy source, in response to rapidly increasing fuel oil costs. The County's primary concern was to reduce its dependence on petroleum oil importation. The investigation resulted in a report entitled "Feasibility Study for Alternate Fuel Production: Municipal Solid Waste, Energy Recovery, Island of Maui." At the time of the study, all indications were that the facility would be economically feasible based on the assumption that oil prices would continue to escalate rapidly.

Plans were made for the construction of an incineration facility. County officials then visited similar facilities in operation in other states and found varying degrees of performance, ranging from good to poor. Due to the uncertainty in the performance efficiency of such facilities, the high capital investment required, and the lack of experience and expertise locally in operating refuse incineration facilities, the County postponed its decision on starting construction.

The urgency for constructing such a facility subsided because of an unanticipated change in fuel price trends. Oil prices have declined since the time of the study, and the cost savings in fuel that could be derived today would no longer be great enough to make the project economically feasible.

Solid waste disposal by incineration will not be realized in the near future, certainly not by the time the three existing landfills reach their capacities. In any case, the incineration process will not be able to eliminate all solid waste. A sanitary landfill will still be required to dispose of solid residue produced from incineration and refuse that cannot be incinerated.

### 7.3 OTHER ALTERNATIVE DISPOSAL OR PROCESSING METHODS

There are three other alternative disposal or processing methods which have been used for solid waste disposal. These methods include shredding, baling and resource recovery. Resource recovery methods are processes by which energy and/or materials are recovered from refuse, and include composting, pyrolysis, and recycling. A brief description of each process is included below, and their advantages and disadvantages are listed in Table 7-1.

Similar to the incineration method previously discussed, these alternative methods are volume reduction measures which produce residues that must be disposed of. Although these alternatives can extend the lifespan of a landfill by substantially reducing the volume of refuse to be handled, a landfill is still needed. Hence, these alternatives do not eliminate the need for a new landfill.

A combined system of resource recovery and landfiling could possibly be a cost-effective alternative when considering long-term economics. However, such a system is not being considered at this time because it requires substantial time to carefully plan and design, and cannot be implemented quickly enough to meet the immediate solid waste disposal needs.

TABLE 7-1

ADVANTAGES AND DISADVANTAGES OF ALTERNATE  
DISPOSAL OR PROCESSING METHODS

METHOD	ADVANTAGES	DISADVANTAGES
Shredding	<p>Significantly reduces solid waste volume.</p> <p>A large portion of solid waste can be shredded.</p> <p>Reduced volume provides an advantage in hauling, handling and landfilling.</p> <p>Shredded waste is easily compacted and can extend the life of the landfill.</p> <p>When compacted, a landfill has fewer voids than unprocessed waste density and is 25 to 60 percent greater depending if daily coverages is required.</p> <p>Does not attract vectors, support combustion, have an objectionable odor or lead to littering.</p> <p>Produces a more uniform fuel for incineration. The problem of agitating the fuel to prevent uneven fire beds is minimized.</p> <p>Produces a uniform material so it is a common prerequisite for composting.</p> <p>Public acceptance to shredding facilities have been relatively good in comparison to acceptance of more conventional solid waste processing or disposal facilities.</p> <p>Compared to other reduction processes, the initial investment and operation cost is relatively low.</p>	<p>Some waste cannot be introduced into a shredder system due to size, density, high moisture content, hazardous qualities or any other qualities requiring specialized handling in any system.</p> <p>Municipal solid waste is known to have a high percentage of flammable materials which have started fires in the shredder.</p> <p>There is a potential for explosions within the shredder due to explosive materials which may enter the facility.</p> <p>Shredders are noisy and are dust producers so the entire operation must be enclosed with dust collectors installed.</p> <p>Uneven feeding or jamming of the shredder can significantly reduce the output of the mill.</p>
Incineration	<p>Solid waste is reduced in both weight and volume.</p> <p>Reduces refuse quickly and efficiently.</p> <p>Reduced volume is advantageous in terms of hauling, handling and landfilling.</p> <p>Can extend landfill life significantly.</p> <p>It is adaptable to energy recovery processes such as steam generation and recovery of minerals from the residue.</p>	<p>Requires large capital expenditures and has high operating costs.</p> <p>Skilled labor is required for the operation and maintenance of the facility.</p> <p>Improper operations can result in air, water and land pollution.</p> <p>Residents may object to having an incinerator in their neighborhood.</p>
Baling	<p>Can almost double the lifespan of a landfill.</p> <p>Can handle most types of solid wastes.</p> <p>Bales are easier to transport and to handle.</p> <p>Cost is comparable to cost of other forms of solid wastes.</p> <p>Allows more immediate use of the disposal site since only a minimal amount of settling is anticipated.</p>	<p>A greater initial investment is required than with a conventional transfer station handling the same amount of solid waste.</p> <p>A resource recovery system cannot be used in conjunction with this process once a bale has been formed.</p> <p>Presently, data on the economics and effects of baling on decomposition, gas and leachate formation and settling are incomplete.</p>

SOURCE: EIS for the Proposed Leeward Sanitary Landfill.

TABLE 7-1 - CONTINUED

ADVANTAGES AND DISADVANTAGES OF ALTERNATE  
DISPOSAL OR PROCESSING METHODS

METHOD	ADVANTAGES	DISADVANTAGES
Composting	<p>Reduces the volume and weight of refuse.</p> <p>Extends the lifespan of a landfill.</p> <p>The end product can be used as a soil conditioner to improve soil characteristics.</p>	<p>Municipal refuse does not contain the necessary amount of nitrogen to ensure proper digestion. This means a supplemental source of nitrogen must be introduced.</p> <p>A composting facility requires a large amount of land for the process.</p> <p>The organic matter undergoing decomposition is an attractant to vectors and generates odor.</p> <p>The total amount of solid waste is not accounted for in the process because of the required separation of organic refuse from inorganic.</p> <p>It becomes uneconomical when applied on a large scale due to the high cost of application to land.</p> <p>Sale of the end product is dependent on the market.</p>
Pyrolysis	<p>It reduces the weight and volume of solid wastes which facilitates its handling.</p> <p>Landfill life is extended.</p> <p>The process is not influenced by weather conditions.</p> <p>A liquid or gas fuel can be produced by this process from solid waste.</p>	<p>The system requires skilled operators.</p> <p>If an efficient production of fuel is required, shredding and separating is required prior to pyrolysis.</p> <p>Impacts which may occur during operation of the facility include noise, dust, thermal atmospheric discharge and contaminated wastewater.</p> <p>The cost for this process is high.</p>
Recycling	<p>Conserves irreplaceable resources.</p> <p>Reduces the quantity of refuse to be disposed thereby increasing the landfill life.</p> <p>Recovered material can lower disposal costs.</p> <p>Siting of a resource recovery facility would possibly generate less opposition than a landfill due to public concern with conservation.</p>	<p>Aside from aluminum, Hawaii has little demand for secondary materials since the Islands are not a major manufacturing center.</p> <p>The degree of risk varies with the complexity of the system.</p> <p>The economies of any system are based on projected maintenance costs, separation systems, an assumed value for the product and a market for the secondary materials.</p>

### 7.3.1 Shredding

A major advantage of the shredding process is that it reduces the volume of solid waste and converts it into a relatively homogeneous material which in many cases does not need daily cover (only final or cell covers). The machinery required for this process is commercially available in various types. The most commonly used is the hammermill. An important consideration in choosing the equipment is the size of the particles produced. This size consideration is important with regard to the process following shredding, i.e., energy recovery, disposal, or a combination of both.

### 7.3.2 Baling

Baling is another means of reducing the volume of solid waste that must be landfilled. When transfers and long hauls are necessary to dispose of solid waste, it can save on costs. It not only can extend the life of the landfill, but the handling and transport of wastes becomes easier.

### 7.3.3 Resource Recovery Methods

#### A. Composting

Composting is also an alternative process for volume reduction. The first step involves the separation of organic solid wastes from the inorganic fraction. The organic wastes are then decomposed at a rapid rate in open windrows or in a confined stand. The final product is a humus-like substance that is used primarily as a soil conditioner. However, in the United States, this has proven to be an extremely costly process and is being phased out. The failure of composting as a viable alternate disposal method rests on four factors: (1) there has been no steady market found for the end product; (2) the initial investment and the operating costs have been found to be generally high when compared to other disposal systems; (3) a high quality product cannot be derived from refuse without excessive expense; and (4) the separation of organic from inorganic wastes requires a secondary disposal method, i.e., landfilling.

B. Pyrolysis

Pyrolysis involves the thermal decomposition of refuse in an anaerobic or near anaerobic condition. The high temperatures generated and the lack of oxygen breaks the materials down into three parts. The first is a gas which is primarily hydrogen, methane and carbon monoxide. The second product is a liquid fuel which includes organic chemicals (acetic acid, acetone and methanol). Lastly, a char is produced which is composed of almost pure carbon and includes any glass, metal or rocks that may have been included in the initial material. The end result is the conversion of solid wastes into a storable, transportable liquid or gas fuel.

C. Recycling

Recycling involves the recovery of materials from municipal refuse that can be marketed for reuse. There are basically two methods of recovery that are available. The first is recovery before refuse is placed within a collection vehicle, as is often done in Hawaii with aluminum cans. The second method is recovery from the mixed municipal refuse after its collection.

Types of materials that are recoverable include paper, glass and metal containers. These are generally separated at the source of generation and directly transported to a dealer of recycled materials or to a manufacturer. In Hawaii, the largest market is for aluminum cans which has been steadily increasing. Landscape trimmings for composting, and recycled steel and paper are not viable markets here.

## SECTION 8

### IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES AND THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

#### 8.1 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The proposed Central Maui Sanitary Landfill will require the irreversible and irretrievable commitment of a number of resources. These resources include the materials, capital, manpower and energy needed to plan, construct, operate and maintain the landfill facility.

The commitment of 55 acres of land to establish the site will be irreversible and irretrievable. The use of the site as a landfill will eliminate it from other uses through at least the year 1998, when the landfill is anticipated to reach its capacity. However, the existing quarry site in its present state is not suitable for other uses, permitted or otherwise.

If the site is not established as a landfill, it would probably be returned to agricultural use when the mineral resources of the area are depleted. In this case, the minimum effort required to make the area farmable would be to cover the quarry floor with the topsoil stockpiled on-site.

The use of the site as a landfill will result in the use of the stockpiled topsoil as refuse cover material, which will be an irretrievable loss of the topsoil resource. However, the top of the completed landfill is being planned for limited agricultural or open space use. Because of this intent, the landfill design will include the reservation of sufficient topsoil to provide a final soil cover over the refuse to permit revegetation. Therefore, whether or not the site is used as a landfill, it will probably be eventually returned to agricultural use.

Implementation of the proposed project will not result in the significant loss of natural or cultural resources. The site is not a significant

wildlife habitat, nor are there any endangered species known to inhabit the area. There are also no known archaeological or historic sites within the vicinity.

Site preparation and development will utilize financial, manpower and material resources which are irretrievable for planning, engineering, construction, and operation and maintenance. The capital expenditure required for the establishment of the new landfill, including access road and drainage improvements, leachate control system and fencing installations, landfilling equipment purchases, and final grassing and irrigation after closure, will amount to approximately \$6.1 million. When separated into three increments, the incremental capital costs will be \$2.6 million, \$1.75 million, and \$1.75 million, respectively, at the beginning of each incremental period.

Upon the closure of the landfill, the site will be limited in the number of feasible uses. The uneven, long-term settlement of the landfill and the generation of potentially hazardous landfill gas (methane) will preclude the future development of the site for residential or urban uses.

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

Solid waste will be continually and increasingly produced in the foreseeable future. A safe and efficient means of disposal must be available to the people of Maui. A sanitary landfill, strategically located and properly operated, is safe, and can be free of vector problems with minimal litter and dust generated and no odor impacts on populated areas. The landfill is presently the most efficient and economical means for the disposal of solid waste on Maui. Even with the implementation of a resource/energy recovery system, a landfill must still be available for the disposal of residual solid wastes.

Potential contamination by leachate migration is the primary adverse impact of the proposed project. This impact is a long-term concern since leachate migration can occur during landfill development as well as long after the

landfill is closed. Fortunately, the project site is located over a groundwater region that is not suitable for drinking water use, hence, the threat of potable water contamination is remote.

There is a possibility that the underlying brackish water may be withdrawn in the future and desalinated to produce a potable water supply. However, if and when desalinization is implemented, there are other locations on the island where brackish water can be withdrawn. Figure 3-3 in Section 3 shows that brackish water can be found along the entire central isthmus area. Brackish water is also available along the coastline, although water withdrawn from this area probably has a high chloride concentration and would be expensive to desalinate.

Despite the fact that there are no definite future plans to withdraw the underlying groundwater for desalination and potable water use, the landfill is being designed with all practical precautions to minimize leachate contamination of the groundwater.

The proposed project will not result in a significant loss of environmental resources. Although the implementation of the project will preclude the use of the land for other purposes for at least the next twelve years, the existing site conditions and land use regulations governing the site already restrict its feasible uses. The most feasible use for the site in its present state other than for a sanitary landfill is to reuse it as agricultural land. The intent of this project after landfill closure is to ultimately return the land to agricultural use or create a recreational park.

Although the landfill project will require the irretrievable use of the land for the next decade, and will thereafter permanently limit the feasible use of the land, the project will aid in the maintenance and enhancement of long-term productivity for the Island of Maui. The project is essential for the desired social and economic growth of the island's population. There does not appear to be any acceptable alternative to this proposed action.

SECTION 9

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

The proposed Central Maui Sanitary Landfill Project will not have significant adverse impacts on the physical environment because of its location in a remote agricultural area, with an absence of sensitive wildlife habitats and other natural or cultural resources. However, the project is environmentally significant because of its large scale of planned operation. The primary environmental concern of this project is its potential for causing leachate contamination. To mitigate this potential problem, the landfill will be designed to minimize leachate generation and migration.

The implementation of the proposed landfill will have a significant, secondary beneficial impact by permitting the closure of the Waikapu Landfill. The existing landfill is still accepting refuse but has exceeded its design capacity. Because of the over-landfilling, the site is having problems with scattering litter and is rapidly becoming a public health hazard. The establishment of a new landfill site will halt refuse disposal at this site.

The sanitary landfill is currently the most cost-effective method for disposing of solid waste for the Island of Maui. Alternative methods such as shredding and incineration are more costly and do not completely eliminate the need for a landfill because the residues produced from these processes still require disposal.

Solid waste disposal by incineration has been previously studied by the County of Maui. The construction of such a facility on Maui has been deferred indefinitely, but will probably be reconsidered in the near future. The planning and construction of this type of facility will take at least three years. However, the immediate needs of the population of Maui must be addressed. The proposed action will provide a safe and efficient means of meeting this need.

SECTION 10  
SUMMARY OF UNRESOLVED ISSUES

A Land Use Commission Special Use Permit Application is being filed with the Maui County Planning Department at the time of this writing. The permit is required in order to perform sanitary landfilling operations in this agricultural-designated area. Procedures for approval will include a public hearing to be held by the Maui Planning Commission before a decision is rendered by the State Land Use Commission.

The only other known issue that is unresolved at this time is the question of establishing a tipping fee for the disposal of refuse by commercial refuse haulers. The County presently does not charge a tipping fee at any of its existing landfills. With the inclusion of the weigh station, a tipping fee will probably be established when the Central Maui Sanitary Landfill is open to help offset operating costs.

SECTION 11  
LIST OF NECESSARY APPROVALS

The establishment of the Central Maui Sanitary Landfill will require a number of State and County government permits. All of the necessary permits will be obtained at the appropriate time. The necessary permits include the following:

11.1 STATE OF HAWAII

Department of Health:	Solid Waste Management Permit
State Land Use Commission:	Special Use Permit

11.2 COUNTY OF MAUI

Department of Public Works:	Grading and Grubbing Permit
-----------------------------	-----------------------------

SECTION 12

ORGANIZATIONS AND PERSONS CONSULTED DURING THE PREPARATION  
OF THE ENVIRONMENTAL IMPACT STATEMENT

12.1 COUNTY OF MAUI AGENCIES

Department of Parks and Recreation  
Department of Public Works, Waste Management Division  
Department of Water Supply  
Office of Economic Development  
Office of the Mayor

12.2 STATE OF HAWAII AGENCIES

Department of Agriculture  
Department of Accounting and General Services  
Department of Defense  
Department of Health:  
    Environmental Permits Branch  
    Maui District Health Office  
Department of Land & Natural Resources:  
    State Parks/Historic Sites Division  
    Division of Forestry & Wildlife, Maui Office  
Department of Planning & Economic Development  
    Energy Division  
Land Use Commission  
Office of Environmental Quality Control  
University of Hawaii:  
    Environmental Center  
    Water Resources Research Center

12.3 FEDERAL AGENCIES

Department of the Army  
Department of the Navy

Federal Aviation Administration, Airports District Office  
National Weather Service  
Soil Conservation Service  
U.S. Coast Guard  
U.S. Geological Survey, Water Resources Division  
U.S. Fish & Wildlife Service

12.4 OTHER ORGANIZATIONS AND INDIVIDUALS

Alexander & Baldwin, Inc.  
Hawaiian Commercial & Sugar Company (HC&S)  
Ameron-HC&D  
Leslie Skillings, Jr.  
The Sierra Club  
Alu Like

## REFERENCES

1. County of Kauai, Revised Environmental Impact Statement - Kekaha Sanitary Landfill Expansion Project, prepared for the Department of Public Works, prepared by R. M. Towill Corporation, 1983.
2. County of Maui, Central Maui Sanitary Landfill Project Preliminary Engineering Report, prepared for the Waste Management Division, Department of Public Works, prepared by R. M. Towill Corporation, 1985.
3. County of Maui, Feasibility Study for Alternate Fuel Production: Municipal Solid Waste, Energy Recovery, Island of Maui, prepared for the U.S. Department of Energy, Office of Procurement Operations, prepared by the Department of Public Works, 1980.
4. County of Maui, The General Plan of the County of Maui, June 1980.
5. County of Maui, Title 19: Zoning.
6. County of Maui, Wailuku-Kahului Community Plan (Draft), prepared by Aotani & Associates, Inc., October 1981.
7. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study for Maui County, Hawaii, December 1980.
8. Federal Register, Environmental Protection Agency National Secondary Drinking Water Regulations, Volume 44, No. 140, July 1979.
9. HC&D Limited, Environmental Analysis for Concrete Industries Maui, Puunene, Maui.
10. Hawaii Water Resources Regional Study, Hawaii Water Resources Plan, January 1979.
11. Scott, M. P., "Leachate Treatment Options," Solid Wastes Management, December 1981.
12. State of Hawaii, Environmental Impact Statement Regulations, Environmental Quality Commission, June 1975.
13. State of Hawaii, State Recreation Plan, Department of Land and Natural Resources, September 1980.
14. State of Hawaii, The Hawaii State Plan.
15. State of Hawaii, Title 11, Chapter 58, Administrative Rules: Solid Waste Management Control, Department of Health, November 1981.
16. State of Hawaii, Title 11, Chapter 200, Administrative Rules: Environmental Impact Statement Rules, December 1985.

17. U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii, 1972.
18. U.S. Department of the Army, Pacific Ocean Division, Corps of Engineers, Flood Hazard Information, Island of Maui, August 1971.
19. U.S. Geological Survey, An Investigation of Floods in Hawaii Through September 30, 1973, January 1974.
20. U.S. Geological Survey, Water Resources Data for Hawaii and Other Pacific Areas, Water Years 1973-1984.
21. University of Hawaii, Department of Geography, Atlas of Hawaii, 2nd Edition, University of Hawaii Press, 1983.

APPENDIX A  
COMMENTS AND RESPONSES TO THE  
EIS PREPARATION NOTICE

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

1. Leslie E. Skillings, Jr.
2. Maui Group, Hawaii Chapter, Sierra Club
3. Airports District Office, Federal Aviation Administration

LOW ENTROPY SYSTEMS  
LESLIE E. SKILLINGS, JR.  
272 Humepea Place  
Kihei, HI 96753  
Phone 1-808-879-2382

"In tune with nature."

November 19, 1985

R.M. Towill Corporation  
Suite 101G  
672 Ala Moana Blvd.  
Honolulu, HI 96813

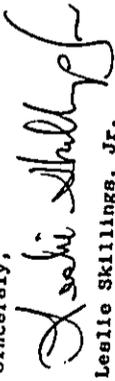
Dear Sir/Madam:

Both I and the Maui Group of the Sierra Club would like to be consulted parties in the proposed landfill at Puunene, Maui. The mailing address for the Maui Group is:

Maui Group, Hawaii Chapter  
The Sierra Club  
P.O. Box 2000  
Kahului, Maui, HI 96732

Thank you, for your assistance.

Sincerely,

  
Leslie Skillings, Jr.

November 22, 1985  
Ref: 1-14622-30

Mr. Leslie Skillings, Jr.  
272 Humepea Place  
Kihei, Maui, Hawaii 96753

Dear Mr. Skillings:

Environmental Impact Statement  
Preparation Notice  
Central Maui Sanitary Landfill Project

We are writing in response to your letter dated November 19, 1985. Thank you for expressing an interest in the proposed landfill project. We have enclosed a copy of the EIS Preparation Notice for your use.

We wish to bring to your attention the fact that the landfill project has been studied in greater detail since the publication of the EIS Preparation Notice, and that the Draft EIS to be published in the near future will more thoroughly address the project's impacts such as leachate control and erosion. A copy of the Draft EIS will be sent to you when it is published.

The consulting period for the EIS Preparation Notice ends on December 8, 1985 so we would appreciate it if you would submit your comments of the report, if any, to us by that date.

Very truly yours,

Druce T. Tsuchida, Manager  
Department of Planning and  
Land Development

CKO:ew

Enclosure

cc Waste Management Division (E. Kagehiro)

November 22, 1985

Ref: 1-14622-3D

Hauf Group, Hawaii Chapter  
The Sierra Club  
P. O. Box 2000  
Kahului, Maui, Hawaii 96732

Gentlemen:

Environmental Impact Statement  
Preparation Notice  
Central Maui Sanitary Landfill Project

We are writing in response to your letter dated November 19, 1985. Thank you for expressing an interest in the proposed landfill project. We have enclosed a copy of the EIS Preparation Notice for your use.

We wish to bring to your attention the fact that the landfill project has been studied in greater detail since the publication of the EIS Preparation Notice, and that the Draft EIS to be published in the near future will more thoroughly address the project's impacts such as leachate control and erosion. A copy of the Draft EIS will be sent to you when it is published.

The consulting period for the EIS Preparation Notice ends on December 8, 1985 so we would appreciate it if you would submit your comments of the report, if any, to us by that date.

Very truly yours,

Bruce T. Tsuchida, Manager  
Department of Planning and  
Land Development

CKO:ew

Enclosure

cc Waste Management Division (E. Kagehiro)



US Department  
of Transportation  
Federal Aviation  
Administration

AIRPORTS DISTRICT OFFICE  
BOX 50244  
HONOLULU, HI 96850-0001  
Telephone: (808) 546-7129

**R. M. TOWILL CORPORATION**

Engineering - Planning - Programmatic - Surveying - Construction Management - Energy Systems

677 ALA MOANA BLVD - SUITE 1016  
HONOLULU, HAWAII 96813  
(808) 524-8200

November 22, 1985

R. M. Towill Corporation  
677 Ala Moana Blvd., Suite 1016  
Honolulu, Hawaii 96813

Gentlemen:

This is in regard to the proposed EIS for the Central Maui Landfill Project, County of Maui. Since the proposed landfill site lies in the approach pattern to Kahului Airport, we are concerned with the potential for bird attractants and possible impacts with aircraft which should be addressed in the EIS.

Sincerely,

David J. Melhouse  
Planning Engineer

Henry A. Sumida  
Airports District Office Manager

cc: County of Maui

December 13, 1985

Ref: 1-14622-30

Mr. David J. Melhouse  
Planning Engineer  
Airports District Office  
Federal Aviation Administration  
Box 50244  
Honolulu, Hawaii 96850-0001

Dear Mr. Melhouse:

Environmental Impact Statement  
Preparation Notice  
Central Maui Sanitary Landfill Project

Thank you for your letter of November 22, 1985 expressing an interest in the Central Maui Sanitary Landfill Project. Per our subsequent telephone conversation with you on November 26, 1985, we will send you a copy of the Draft Environmental Impact Statement of the subject project when it is published in late December. After your review of the document, we hope to resolve any issues that may affect Kahului Airport. We look forward to future discussions with you and appreciate your assistance in the project.

Very truly yours,

Bruce T. Tsuchida, Manager  
Department of Planning and  
Land Development

CKD:ew

cc Waste Management Division (E. Kagehiro)

APPENDIX B

COMMENTS AND RESPONSES TO THE  
DRAFT EIS

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

Comments to the Draft EIS were received from 23 agencies, organizations and individuals as listed below. This section includes copies of the comments received and the responses given to the comments.

1. U.S. Department of the Navy
2. County Office of Economic Development
3. U.S. Department of the Army
4. County Department of Water Supply
5. State Department of Accounting & General Services
6. State Department of Planning & Economic Development
7. County Office of the Mayor
8. State Department of Defense
9. State Department of Agriculture
10. Maui District Health Office, State DOH
11. U.S. Coast Guard
12. Office of Environmental Quality Control
13. University of Hawaii, Water Resources Research Center
14. County Department of Parks and Recreation
15. Energy Division, State DPED
16. U.S. Soil Conservation Service
17. State Department of Land & Natural Resources
18. County Planning Department
18. U.S. Fish & Wildlife Service
20. University of Hawaii, Environmental Center
21. Leslie E. Skillings, Jr.
22. Alu Like
23. Airports District Office, FAA



DEPARTMENT OF THE NAVY  
HEADQUARTERS  
NAVAL BASE PEARL HARBOR  
BOX 110  
PEARL HARBOR, HAWAII 96804-0110

IN REPLY REFER TO

9510  
Ser 002B/2365  
24 DEC 1985

Honorable Hannibal Tavares  
Mayor of the County of Maui  
200 South High Street  
Wailuku, HI 96793

Dear Mayor Tavares:

DRAFT ENVIRONMENTAL IMPACT STATEMENT  
CENTRAL MAUI LANDFILL PROJECT

We have reviewed the Draft EIS for Central Maui Landfill Project and have no comments to offer. Since we have no further use for the EIS, the EIS is being returned to the Office of Environmental Quality Control, by copy of this letter.

Thank you for the opportunity to review the Draft EIS.

Sincerely,

HENRY J. RINNERT  
Captain, CEC, U. S. Navy  
F-100's Engineer  
By: Successor of the Commander

Enclosure

Copy to:  
Department of Public Works  
County of Maui  
200 South High Street  
Wailuku, HI 96793

✓ R. M. Towill Corporation  
677 Ala Moana Blvd., Suite 1016  
Honolulu, HI 96813

Office of Environmental Quality Control

NO LETTER OF RESPONSE NECESSARY  
TO THE U.S. DEPARTMENT OF THE NAVY

HANNIBAL TAVARÉS  
Mayor



FRED MATSUMOTO  
Coordinator

COUNTY OF MAUI  
**OFFICE OF ECONOMIC DEVELOPMENT**  
WAILUKU, MAUI, HAWAII 96793  
TELEPHONE 244-7710

December 27, 1985

Ms. Letitia N. Uyehara, Director  
Office of Environmental Quality Control  
State of Hawaii  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813

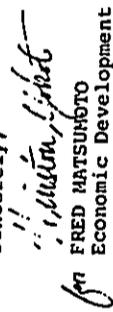
Dear Ms. Uyehara:

**SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR CENTRAL  
MAUI LANDFILL PROJECT, PUUNENE, MAUI**

The Office of Economic Development has reviewed the Subject Environmental Impact Statement and find that, in general, it has adequately identified and assessed the major environmental impacts which can be anticipated to result from the proposed project.

We have no other comments to offer at this time, however, we thank you for the opportunity to review the Environmental Impact Statement.

Sincerely,

  
FRED MATSUMOTO  
Economic Development Coordinator

cc: Public Works  
County of Maui

R.M. Towill Corp.

NO LETTER OF RESPONSE NECESSARY  
TO THE COUNTY OFFICE OF ECONOMIC DEVELOPMENT



DEPARTMENT OF THE ARMY  
U. S. ARMY ENGINEER DISTRICT, HONOLULU  
FT. SHAFTER, HAWAII 96899 -5440

December 31, 1985

1133

HAMBAL TAVARES  
Mayor  
ALVIN FUKUNAGA, P.E.  
Director of Public Works  
BRIAN HASHIRO, P.E.  
Deputy Director of Public Works  
LOUIS ABREU  
Superintendent of Highways  
FRED ARAKI, P.E.  
Engineering Chief  
EDWIN KAGEHRO, P.E.  
Waste Management Chief  
AARON SHIMOTO, P.E.  
Land Use Administrator



COUNTY OF MAUI  
DEPARTMENT OF PUBLIC WORKS  
399 SOUTH HIGH STREET  
WAILUKU, MAUI, HAWAII 96793 84-248

Mr. Ralph Hayashi, Director  
Department of Public Works  
County of Maui  
200 S. High St.  
Wailuku, Hawaii 96793

Dear Mr. Hayashi:

Thank you for the opportunity to review and comment on the Draft EIS for Central Maui Landfill Project, Puunene, Maui. The following comments are offered:

- a. A Department of the Army permit is not required since no fill or drainage improvements are planned below the ordinary high water mark of Kaliainui Gulch.
- b. According to the Flood Insurance Study for Maui, prepared by the Federal Insurance Administration, the landfill project site is designated Zone C or area of minimal flooding. Under the National Flood Insurance Program, Zone C areas are not considered flood plain areas. Floodproofing, requirements and specific use restrictions, therefore, are not applicable to the project.

Sincerely,

*Alvin Fukunaga*  
Kisuk Cheung  
Chief, Engineering Division

Mr. Kisuk Cheung, Chief  
Engineering Division  
U. S. Army Engineer District  
Ft. Shafter, Hawaii 96858-5440

Dear Mr. Cheung:

SUBJECT: Draft Environmental Impact Statement  
Central Maui Sanitary Landfill Project

We are writing in response in your letter dated December 31, 1985 commenting on the subject project.

Thank you for providing the information regarding the Department of the Army permit and flood plain areas. The flooding information will be incorporated into the Final EIS under Section 4.3.2, National Flood Insurance Program.

Very truly yours,

*Alvin Fukunaga*  
Alvin Fukunaga  
Director of Public Works

M132



**DEPARTMENT OF WATER SUPPLY**

**COUNTY OF MAUI**

P. O. BOX 1109  
WAILUKU, MAUI, HAWAII 96793



**COUNTY OF MAUI  
DEPARTMENT OF PUBLIC WORKS**

288 SOUTH HIGH STREET  
WAILUKU, MAUI, HAWAII 96793 86-299

HANUHAL TAVARES  
Mayor  
Alvin Robinson, P.E.  
Director of Public Works  
BRIAN HASHIRO, P.E.  
Deputy Director of Public Works  
LOUIS ABREU  
Superintendent of Highways  
FRED ARAKI, P.E.  
Engineering Chief  
EDWIN KAGEHIRO, P.E.  
Waste Management Chief  
AARON SHIMAMOTO, P.E.  
Land Use Administrator

866 9 3 133

January 2, 1986

Mr. Brian Hashiro, Acting Director  
Department of Public Works  
County of Maui  
200 S. High Street  
Wailuku, HI 96793

Subject: CENTRAL MAUI SANITARY LANDFILL PROJECT  
EIS REVIEW  
TKM 3-8-02:4, 18, 19

Dear Mr. Hashiro:

Since our groundwater sources are located far away and up-gradient from the proposed landfill operation, the project will have no effect on this Department. In the future, we do not have plans to withdraw groundwater in the vicinity of the landfill.

Sincerely,

Vince G. Bagoyo, Jr.  
Director

Mr. Vince G. Bagoyo, Jr.  
Director  
Department of Water Supply  
County of Maui  
P. O. Box 1109  
Wailuku, Maui, Hawaii 96793

Dear Mr. Bagoyo:

SUBJECT: Draft Environmental Impact Statement  
Central Maui Sanitary Landfill Project

We are writing in response to your letter dated January 2, 1986 commenting on the Draft EIS for the proposed sanitary landfill. We are pleased to hear that the proposed project will not affect your existing and future groundwater sources.

Thank you for your comments.

Very truly yours,

Alvin Fukunaga  
Director of Public Works

w132

"By Water All Things Find Life"

NO LETTER OF RESPONSE NECESSARY  
TO THE STATE DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

(P)1014.6

JAN 7 1986

Honorable Hannibal Tavares  
Mayor  
County of Maui  
Wailuku, Maui, Hawaii 96793

Dear Mayor Tavares:

Subject: Draft EIS for Central Maui Landfill Project

We have reviewed the subject document and have no comments to offer.

Respectfully,

*Mike A. Ferguson*

HIDEO MURAYAMA  
State Comptroller

JH:rmr

cc: Department of Public Works  
✓ R. M. Towill Corporation

# CORRECTION

THE PRECEDING DOCUMENT(S) HAS  
BEEN REPHOTOGRAPHED TO ASSURE  
LEGIBILITY  
SEE FRAME(S)  
IMMEDIATELY FOLLOWING

(P)1014.6

JAN 7 1986

NO LETTER OF RESPONSE NECESSARY  
TO THE STATE DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

Honorable Hannibal Tavares  
Mayor  
County of Maui  
Wailuku, Maui, Hawaii 96793

Dear Mayor Tavares:

Subject: Draft EIS for Central Maui Landfill Project

We have reviewed the subject document and have no comments to offer.

Respectfully,

*Mike R. Aden*

HIDEO MURAKAMI  
State Comptroller

JH:EMF  
cc: Department of Public Works  
K. M. Towill Corporation



**DEPARTMENT OF PLANNING  
AND ECONOMIC DEVELOPMENT**

1500 KALANANĀ'ŪHOE DRIVE, SUITE 200  
HONOLULU, HAWAII 96813

GEORGE S. AMOS  
Director  
KENT M. KEITH  
Assistant Director  
JAMES L. TOWILL  
Assistant Director  
INDA KAPUNAI BOGHEE  
Assistant Director

DIVISIONS  
PLANNING AND POLICY DEVELOPMENT DIVISION  
INTEGRATED PLANNING DIVISION  
NATURAL RESOURCES DIVISION  
LAND USE DIVISION  
RESEARCH AND ECONOMIC ANALYSIS DIVISION  
ADMINISTRATIVE SERVICES OFFICE  
INFORMATION OFFICE

Ref. No. P-3280

January 8, 1986

The Honorable Hannibal Tavares  
Mayor  
County of Maui  
200 South High Street  
Wailuku, Hawaii 96793

Dear Mayor Tavares:

Subject: Draft EIS for Central Maui Landfill Project

We have reviewed the subject report and have no comments. Thank you for the opportunity to review the draft EIS.

Very truly yours,

*Murray E. Towill*  
Kent M. Keith

cc: Dept. of Public Works,  
County of Maui  
M.M. Towill Corporation  
Office of Environmental Quality Control

NO LETTER OF RESPONSE NECESSARY  
TO THE STATE DEPARTMENT OF PLANNING & ECONOMIC DEVELOPMENT

HANNIBAL TAVARES  
Mayor  
TELEPHONE 244-2155  
jb



OFFICE OF THE MAYOR  
COUNTY OF MAUI  
WAILUKU, MAUI, HAWAII 96793  
January 8, 1986

Mr. Brian Hashiro  
Acting Director of Public Works  
County of Maui  
200 South High Street  
Wailuku, Hawaii 96793

Dear Mr. Hashiro:

SUBJECT: CENTRAL MAUI SANITARY LANDFILL DRAFT EIS

We have reviewed the Draft EIS for the Central Maui Landfill Project and have the following comments to offer.

1. Section 3.1.8. Should also include the air pollutants and noise from the sugar cane operations.
2. Section 3.2.1.B. The dramatic decline in the population of Puanene is primarily due to the employees buying their own in Kahului.
3. Sections 5.2.2.B. and 6.2.2. How does the project encourage more rapid urban expansion? What about increase in hauling costs?
4. Section 7.2. What was the result of the study on the possibility of energy generation by refuse incineration?

Thank you for the opportunity to review the Draft EIS.

Very truly yours,

*William S. Haines*  
WILLIAM S. HAINES  
Executive Assistant

cc: Mayor Hannibal Tavares  
R. M. Towill Corporation  
(677 Ala Moana Blvd #1016  
Honolulu, HI 96813)

HANNIBAL TAVARES  
Mayor  
Alvin Fickage, P.E.  
Director of Public Works  
BRIAN HASHIRO, P.E.  
Deputy Director of Public Works  
LOUIS ABREU  
Superintendent of Highways  
FRED ARAKI, P.E.  
Engineering Chief  
EDWIN KAGENIRO, P.E.  
Waste Management Chief  
AARON SHENAGOTO, P.E.  
Land Use Administrator



COUNTY OF MAUI  
DEPARTMENT OF PUBLIC WORKS  
200 SOUTH HIGH STREET  
WAILUKU, MAUI, HAWAII 96793 86-304

Mr. William S. Haines  
Executive Assistant  
Office of the Mayor  
County of Maui  
Wailuku, Maui 96793

Dear Mr. Haines:

SUBJECT: Draft Environmental Impact Statement  
Central Maui Sanitary Landfill Project

We have received your letter dated January 8, 1986 commenting on the Draft EIS for the proposed Central Maui Sanitary Landfill. We offer the following responses to your comments:

1. Existing Air Pollutants and Noise  
As requested, Section 3.1.8 will be revised to include mention of existing air pollutants and noise which are seasonally generated from adjacent sugarcane harvesting operations.
2. Population of Puanene

You are correct to point out the inaccurate information given concerning the reason for the decline in resident population at Puanene. This section should state that the HC&S sugarcane operations at Puanene are still very active, but that the resident population has declined because the employees have moved out of the HC&S subsidized housing in Puanene to homes in Kahului. This correction will be made in the Final EIS.

3. Economic Impacts

To clarify the statement regarding a possible acceleration of urban expansion, this general statement is typically made for all public utilities projects. Wherever a new public utility system becomes available, development tends to follow because of the fact that the new utility is in-place and ready to be used without immediate worries for reaching its capacity. The concern of an existing landfill exceeding its capacity. The concern in potential public health problems dictates the undertaking of this project. The potential of an accelerated urban expansion is a secondary concern in this respect.

Mr. William S. Haines

-2-

January 28, 1986

Concerning your question about increases in hauling costs, there will not be an immediate impact on this cost with the opening of the proposed landfill. When the Waikapu Landfill closes, refuse that would have been delivered to that site will be taken to the Central Maui Landfill site. The new site is about 6 miles away from the Waikapu site and is in a more isolated location, however, it is considered to be an excellent location because of its centrality with respect to the communities to be served. In changing the delivery destination from Waikapu to the proposed site, the hauling distances will shorten for some deliverers and lengthen for others. But these changes will balance out, and the overall hauling distances for those in this vicinity will remain approximately the same.

When the Olowalu and Makani Landfills eventually close, the hauling distances from those areas to the Central Maui Landfill, and therefore the hauling costs, will increase. The feasibility of establishing transfer stations at one or both locations are being studied. The transfer stations would act as nearby disposal sites for homeowners, and may also possibly accept refuse from County haulers. As a result, hauling costs for homeowners will not increase. Hauling costs for commercial refuse haulers will probably increase if the Central Maui Landfill is the closest site that will accept their refuse. However, the Olowalu and Makani Landfills will not be closed in the immediate future, and it should not be assumed that other landfills will not be established near Olowalu and/or Makani upon their closure. If other landfills are established on the island, they will benefit the proposed project by allowing it to extend its landfill life beyond the estimated 12 years.

#### 4. Energy Generation by Refuse Incineration

To summarize Section 7.2, the County studied the feasibility of refuse incineration several years ago as an alternate energy source, in response to rapidly increasing fuel oil costs. At the time of the study, all indications were that the facility would be economically feasible based on the assumption that oil prices will continue to escalate rapidly.

The County had proceeded as far as planning the construction of an incineration facility. But after visiting several existing facilities in other states and finding a mixed range of performance efficiencies, the County postponed construction indefinitely. It did not appear to be wise to make such a large capital commitment on a system given the facts that its performance is not predictable and there was no experience and expertise locally in operating refuse incineration facilities.

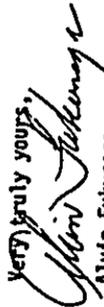
Mr. William S. Haines

-3-

January 28, 1986

Increases in fuel oil prices have slowed down since the time of the study, and the cost savings in fuel that could be derived today is not great enough to make this facility economically feasible. So in terms of energy generation, a refuse incineration facility is not presently economically viable.

Thank you for your comments.

Very truly yours,  
  
Alvin Fukunaga  
Director of Public Works

W139

STATE OF HAWAII  
DEPARTMENT OF DEFENSE  
OFFICE OF THE ASSISTANT SECRETARY  
3949 DUNLAP ROAD, HONOLULU, HAWAII 96815-4495

MEMO

JAN 9 1985

Honorable Hannibal Tavares  
Mayor of the County of Maui  
200 South High Street  
Wailuku, Maui 96793

Gentlemen:

Draft EIS for Central Maui Landfill Project

Thank you for providing us the opportunity to review the above subject project.

We have completed our review and have no comments to offer at this time.  
Yours truly,

SIGNED:

Jerry H. Matauda  
Major, Hawaii Air  
National Guard  
Combat & Regt Officer

Enclosure

cc: Department of Public Works, County of Maui  
R.H. Towill Corporation

NO LETTER OF RESPONSE NECESSARY  
TO THE STATE DEPARTMENT OF DEFENSE

GEORGE R. ABIYOSHI  
GOVERNOR



JACK K. SUWA  
CHAIRMAN, BOARD OF AGRICULTURE  
SUZANNE D. PETERSON  
DEPUTY TO THE CHAIRMAN

State of Hawaii  
DEPARTMENT OF AGRICULTURE  
1428 So. King Street  
Honolulu, Hawaii 96814

Mailing Address:  
P. O. Box 22159  
Honolulu, Hawaii 96822

January 10, 1986

Honorable Hannibal Tavares  
January 10, 1986  
Page -2-

Honorable Hannibal Tavares  
Mayor, County of Maui  
200 South High Street  
Wailuku, Hawaii 96793

Dear Mr. Tavares:

Re: Draft Environmental Impact Statement (EIS) for  
Central Maui Landfill Project

The Department of Agriculture has reviewed the subject  
application and offers the following comments.

According to the draft EIS, the Maui County Department of  
Public Works has selected a site for the subject landfill  
outside of Punahoa town at the former Ameron HC&D quarry in  
Kaliialinui Gulch. The site is adjacent to sugarcane lands owned  
by Alexander and Baldwin, Inc. and cultivated by HC&S.

The draft EIS states that approximately 55 acres of the  
existing quarry site will be occupied by the proposed landfill  
(EIS, page 2-3). It is also indicated that the proposed use  
will not disturb activities on the adjacent agricultural lands  
and upon completion of the landfilling, the return of the site  
to agricultural use will be considered (EIS, page 4-8).

The Soil Conservation Service Soil Survey information  
included in the document is correct. The Land Study Bureau  
(LSB) Detailed Land Classification for Maui was not included.  
The subject parcel has LSB Overall Productivity Ratings of E72  
within the gulch and A511 for land adjacent to the gulch and  
currently in sugarcane. By this method of classification, both  
the gulch and quarry site have poor productivity potential for  
most agricultural uses. The adjacent sugarcane land has very  
good productivity potential.

The area adjacent to the gulch is classified "Prime" but  
the gulch itself is not classified according to the Agricultural  
Lands of Importance to the State of Hawaii (ALISH) system.

The Department of Agriculture has no objections to the  
proposed landfill as it does not appear to have any adverse  
impact on the agricultural resources of the surrounding area.

Thank you for the opportunity to comment.

Sincerely,

JACK K. SUWA  
Chairman, Board of Agriculture

cc: Department of Public Works,  
County of Maui  
R. M. Towill Corporation  
OEQC

"Support Hawaiian Agricultural Products"

MANTIBAL TAVARES  
Mayor

Alvin Fukunaga, P.E.  
Director of Public Works

BRUN HUSHIRO, P.E.  
Deputy Director of Public Works

LOUIS ABREU  
Superintendent of Highways

FRED ARAKI, P.E.  
Engineering Chief

EDWIN KAGEHIRO, P.E.  
Waste Management Chief

AARON SHIGEMOTO, P.E.  
Land Use Administrator



COUNTY OF MAUI

DEPARTMENT OF PUBLIC WORKS

300 SOUTH HIGH STREET  
WAILUKU, MAUI, HAWAII 96793

26-300

FEB 17 1988

Mr. Jack K. Suwa  
Chairman, Board of Agriculture  
Department of Agriculture  
P. O. Box 22159  
Honolulu, Hawaii 96822

Dear Mr. Suwa:

SUBJECT: Draft Environmental Impact Statement  
Central Maui Sanitary Landfill Project

We have received your letter dated January 10, 1986 commenting on the Draft EIS for the proposed Central Maui Sanitary Landfill. Thank you for providing us additional information regarding the agricultural classification and productivity potentials of the lands in the vicinity of the project site. We are pleased to hear that the proposed project will not have an adverse impact on the agricultural resources of the area. The additional LSB and ALISH information will be incorporated into the Final EIS.

Very truly yours,

Alvin Fukunaga  
Director of Public Works

w132



**COUNTY OF MAUI**  
**DEPARTMENT OF PUBLIC WORKS**  
 500 SOUTH HIGH STREET  
 WAILUKU, MAUI, HAWAII 96793 86-305

**HANNIBAL TAVARES**  
 Mayor  
**Alvin Fukunaga, P.E.**  
 Director of Public Works  
**BRIAN HOSHINO, P.E.**  
 Deputy Director of Public Works  
**LOUIS ABREU**  
 Superintendent of Highways  
**FRED ARAKI, P.E.**  
 Engineering Chief  
**EDWIN KAGEHORO, P.E.**  
 Waste Management Chief  
**AARON SHIMOTO, P.E.**  
 Land Use Administrator

**Mr. David H. Hakagawa**  
 Chief Sanitarian  
 Maui District Health Office  
 State Department of Health  
 State Office Building  
 Wailuku, Maui, Hawaii 96793

Dear Mr. Hakagawa:

**SUBJECT: Draft Environmental Impact Statement  
 Central Maui Sanitary Landfill Project**

We have received your letter dated January 10, 1986 commenting on the Draft EIS for the proposed Central Maui Sanitary Landfill. We offer the following responses to your comments:

**1. Landfill Operation and Maintenance (Section 2.3.5)**

The alternative to cover the compacted refuse on a daily basis has been considered during the initial planning and design of the proposed landfill. However, the decision to recommend a twice-a-week cover practice was based primarily on experiences from existing landfill operations on Maui. You are probably aware that the Waikapu landfill, which presently receives 60 percent of the island's refuse, has been operating on a twice-a-week cover basis. We understand that there have been no complaints from the public concerning odors, vectors, airborne litter, etc., so this practice appears to be adequate. The Olowalu, Makani and Hana Landfills have also been using the twice-a-week cover practice without detrimental impacts.

The proposed landfill will be located in a deep quarry and surrounded by agricultural fields. It will be more isolated from the public than the Waikapu landfill and, hence, will have less nuisance and public health problems. Because of its remote location, it does not appear to be practical to expend additional resources and money to provide daily cover.

**2. Acceptance of Construction Materials and Sewage Sludge**

The EIS will be revised to state that construction materials and sewage sludge will be accepted at the proposed landfill. These volumes are included in the solid waste generation projections



**STATE OF HAWAII**  
 DEPARTMENT OF HEALTH  
 MAUI DISTRICT HEALTH OFFICE  
 STATE OFFICE BUILDING  
 WAILUKU, MAUI, HAWAII 96793

January 10, 1986

Honorable Hannibal Tavares  
 Mayor of the County of Maui  
 200 South High Street  
 Wailuku, Hawaii 96793

Dear Mayor Tavares:

**Subject: Draft Environmental Impact Statement for Central Maui  
 Landfill Project**

Thank you for permitting us to review the subject Draft Environmental Impact Statement. We are forwarding the following comments relative to the proposed central landfill to you:

1. Section 2.3.5 - Landfill Operation and Maintenance - proposes a biweekly cover of the cell face. Considering the centralizing of the landfill sites and the estimated increase in tonnage of solid waste from 184,000 compacted cubic yards in 1985 to 262,850 compacted cubic yards by 1995, we feel that a daily covering of cell face is necessary and appropriate to the proposed operation.
2. The Draft Environmental Impact Statement does not address the acceptance of construction materials and how the County plans to dispose of these materials. Large debris, e.g. tree stumps, demolished material, concrete, etc., will shorten the life span of a landfill. Also such materials cannot be disposed of by burning.
3. The Draft Environmental Impact Statement also does not address the acceptance of sewage sludge from the three major sewage treatment plants operated by the County. Acceptable methods of sludge disposal should be defined in the Draft Environmental Impact Statement.

If you have any questions on the above, please contact me at 244-4255.

Sincerely,

*David H. Hakagawa*  
**DAVID H. HAKAGAWA**  
 Chief Sanitarian

cc: Dept. of Public Works  
 R. M. Towill Corporation  
 Environmental Permits Branch

Mr. David H. Makagawa

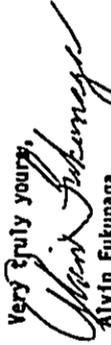
-2-

January 28, 1986

(Table 2-1) that was used to determine the estimated 12-year life of the landfill. We do not plan to dispose of any materials by burning.

Thank you for your review and comments.

Very truly yours,

  
Alvin Fukunaga  
Director of Public Works

w139



Commander (dpl)  
Fourteenth Coast Guard District

Prince Kūnikūmānoa  
Federal Building  
300 Ala Moana Blvd.  
Honolulu, Hawaii 96850  
Phone: (808) 546-2861

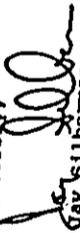
16475.2/1-86  
Serial No. 6/061  
January 10, 1986

Honorable Hannibal Tavares  
Mayor of the County of Maui  
200 South High Street  
Wailuku, HI 96793

Re: Draft EIS for Central Maui Landfill Project  
Dear Mayor Tavares:

The Fourteenth Coast Guard District has reviewed the subject document and has no comment on it at this time. Thank you for the opportunity to review it.

Sincerely,

  
Jay Silberman  
Environmental Protection Specialist  
District Planning Office  
Fourteenth Coast Guard District  
By direction of the District Commander

Copy: Maui Co. Dept. of Public Works  
R. M. Towill Corporation

NO LETTER OF RESPONSE NECESSARY  
TO THE U. S. COAST GUARD

GEORGE A. LARSON  
DIRECTOR



STATE OF HAWAII  
OFFICE OF ENVIRONMENTAL QUALITY CONTROL  
465 South King Street, Room 115

HONOLULU, HAWAII 96813

January 13, 1986

LETITIA M. UYEHARA  
DIRECTOR  
TELEPHONE NO.  
248-8815

Honorable Hannibal Tavares  
January 13, 1986  
Page 2

3. Although the proposed landfill is on the "pass" side of the underground injection control line, we suggest that the landfill floor be compacted and made relatively impervious to water so that leachates can be contained within the landfill.

Thank you for providing us the opportunity to review this draft EIS.

Sincerely,

Letitia M. Uyebara  
Director

Honorable Hannibal Tavares  
Mayor of the County of Maui  
200 South High Street  
Wailuku, Hawaii 96793

Dear Mayor Tavares:

Subject: Draft EIS for Central Maui Landfill Project,  
Puunene, Maui

We have reviewed your draft environmental impact statement and offer the following comments for consideration:

1. Page 5-4 indicates that there are owls presently living in the crevices of the quarry walls where the proposed landfill is to be situated and the landfilling operation will result in their displacement. In addition to this information, the EIS should disclose the type of owl that is presently inhabiting the quarry and whether it is on the endangered species list. If the owls are on the endangered species list, mitigating measures should be proposed to ensure their survival and propagation.
2. We recommend that refuse be covered daily rather than bi-weekly as proposed in the EIS. Without daily cover, vectors, odors and other factors become problems. Additionally we suggest that the cover material be clay-based soil to minimize percolation of surface runoff.

cc: DPM, County of Maui  
B. M. Towill Corporation

HAMBAL TAVARES  
Mayor  
Alvin Fukunaga, P.E.  
Director of Public Works  
BRIAN HASHIRO, P.E.  
Deputy Director of Public Works  
LOUIS ABREU  
Superintendent of Highways  
FRED ARAKI, P.E.  
Engineering Chief  
EDWIN KAGESHIRO, P.E.  
Waste Management Chief  
AARON SHIMAMOTO, P.E.  
Land Use Administrator



COUNTY OF MAUI  
DEPARTMENT OF PUBLIC WORKS  
388 SOUTH HIGH STREET  
WAILUKU, MAUI, HAWAII 96793  
86-307  
FEB 13 1986

Ms. Letitia N. Uyehara

-2-

January 28, 1986

The proposed landfill will be located in a deep quarry and surrounded by agricultural fields. It will be more isolated from the public than the Waikapu Landfill and, hence, will have less nuisance and public health problems. Because of its remote location, it does not appear to be practical to expend additional resources and money to provide daily cover.

Concerning the type of cover material to be used, the cover material available at the proposed site will be a combination of silty clay loam and silty sand gravel. The silty clay loam is the original top soil layer that was scraped off and stockpiled in order to excavate the desirable dense rock layer beneath it. The silty sandy gravel is the additional soil along the quarry floor that will be excavated to grade and prepare the site for landfilling. During the preparation of the landfill floor, the stockpiled top soil and additional excavated material will be stockpiled together so that the resultant soil cover will be a mixture though not necessarily homogeneous -- of these soils.

The silty clay loam is fine textured with moderate permeability and low erodibility and is considered excellent landfill cover material. On the other hand, the silty sandy gravel has high permeability and is not considered good cover material in terms of minimizing percolation of surface runoff. However, the soil will function adequately as a cover material to minimize vector, odor, and airborne litter problems.

Although the cover material mixture is not the best choice for landfill covering, its on-site availability and satisfactory properties make it the most practical source of soil cover. The cost of acquiring and transporting better cover material from off site in the quantities required (0.47 million cubic yards over the life of the landfill) would make the project cost-prohibitive.

In order to minimize potential long-term leachate generation problems after the closure of the landfill, special attention will be given to the type of soil used as the final soil cover to minimize percolation and to sustain a dense vegetative cover. The appropriate sections of the Final EIS will include this discussion.

### 3. Landfill Floor Preparation

We agree with your concern that although the proposed site will be outside of the restricted area for underground injection control, this fact does not release us from the responsibility

Ms. Letitia N. Uyehara  
Director  
Office of Environmental  
Quality Control  
465 South King Street, Rm 115  
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

SUBJECT: Draft Environmental Impact Statement  
Central Maui Sanitary Landfill Project

We have received your letter of January 13, 1986 on the proposed Central Maui Sanitary Landfill and wish to respond to your comments as follows:

#### 1. Existing Owls

The Maui Office of the Wildlife Biologist, Division of Forestry and Wildlife, DLMR, inspected the project site to determine the type of owl that is inhabiting the area. All indications are that the introduced barn owl (Lyto alba) are inhabiting the area.

This bird is not on the endangered species list, so no special mitigative measures will be taken upon its displacement. The species of owl inhabiting the area will be clarified in the Final EIS.

#### 2. Refuse Cover

The recommendation to cover the refuse on a twice-a-week basis instead of daily was based primarily on experiences from the existing landfills on Maui. The existing Waikapu Landfill, which presently receives 60 percent of the island's refuse, has been operating on a twice-a-week cover basis. There have been no complaints from the public concerning odors, vectors, airborne litter, etc., so this practice appears to be adequate. The Olowalu, Makani and Hana Landfills have also been using the twice-a-week cover practice without detrimental impacts.

Ms. Letitia Uyehara

-3-

January 28, 1986

for taking all reasonable precautions against leachate contamination. As stated in Section 6.1.1 of the Draft EIS, the landfill floor will be reworked and compacted to make it relatively impervious to leachate penetration. Other precautions, such as the planned grading of the landfill floor and the leachate collection system, will contribute to the mitigative plan for preventing leachate migration.

Thank you for your comments.

Very truly yours,

  
Alvin Fukunaga  
Director of Public Works

w132



# University of Hawaii at Manoa

Water Resources Research Center  
Holmes Hall 203 • 2540 Dole Street  
Honolulu, Hawaii 96822

14 January 1986

Honorable Hannibal Tavares  
Mayor of the County of Maui  
200 South High Street  
Wailuku, HI 96793

Dear Mayor Tavares:

**SUBJECT:** Draft Environmental Impact Statement  
for the Central Maui Sanitary Landfill Project,  
December 1985

We have reviewed the subject DEIS and offer the following comment. We suggest that the landfill's probability of polluting the groundwater at this locale is of serious concern inasmuch as this is a potential source of water for desalination in the future. Although the groundwater is brackish, a chloride content of 300-500 mg/l is comparatively low to the 19,500 mg/l in ocean water. In most of today's desalination processes, the lower the concentration of soluble solids that need to be removed, the less expensive it is. It stands to reason, therefore that it is much cheaper to desalinate brackish water than ocean water. Therefore it would be shortsighted to risk contaminating the groundwater with leachate from the proposed landfill.

Thank you for the opportunity to comment. This material was reviewed by WRRC personnel.

Sincerely,

*Edwin T. Murabayashi*  
Edwin T. Murabayashi  
EIS Coordinator

ETM:jm

cc: DPW, County of Maui  
R.M. Towill

HANNIBAL TAVARES  
Mayor

Alvin Fickinger, P.E.  
Director of Public Works

BRIAN MASCHIRO, P.E.  
Deputy Director of Public Works

LOUIS ABREU  
Superintendent of Highways

FRED ARAKI, P.E.  
Engineering Chief

EDWIN MAGEHIRO, P.E.  
Waste Management Chief

AARON SHIMOTO, P.E.  
Land Use Administrator



# COUNTY OF MAUI DEPARTMENT OF PUBLIC WORKS

300 SOUTH HIGH STREET  
WAILUKU, MAUI, HAWAII 96793 86-306

Mr. Edwin T. Murabayashi  
EIS Coordinator  
Water Resources Research Center  
Holmes Hall 283  
2540 Dole Street  
University of Hawaii  
Honolulu, Hawaii 96822

Dear Mr. Murabayashi:

**SUBJECT:** Draft Environmental Impact Statement  
Central Maui Sanitary Landfill Project

We have received your letter dated January 14, 1986 commenting on the Draft EIS for the proposed Central Maui Sanitary Landfill, and wish to respond to your comment regarding the potential use of the groundwater in the vicinity as a source for desalination.

We agree with you that the groundwater in the project area has a relatively low chloride content and could potentially be used in the desalination process to yield potable water. However, the proposed landfill site is not the only location on the island where brackish or other types of groundwater can be tapped. The attached figure is adapted from the "Hawaii Water Resources Plan" and shows the various types of groundwater resources for Maui. If a brackish water source is needed, it can be withdrawn at various other locations along the isthmus of Central Maui. Brackish water is also available along the coastline of Central Maui. Although we realize that the chloride content of the waters from these areas will probably be higher than the 300 to 500 mg/l concentration characteristic of the groundwater in the project area.

We wish to point out that the project site is located far from and down-gradient to the fresh basal water sources currently being tapped by the Department of Water Supply. Additionally, the Department has stated that it does not have future plans to withdraw groundwater in the vicinity of the proposed landfill.



HANNIBAL TAVARES  
Mayor



HOLLE R. SMITH, JR.  
Director

MARILYN M. MONIZ  
Deputy Director

COUNTY OF MAUI  
DEPARTMENT OF PARKS AND RECREATION

1580 Kaahumanu Avenue  
Wailuku, Maui, Hawaii 96793

January 15, 1986

NO LETTER OF RESPONSE NECESSARY  
TO THE COUNTY DEPARTMENT OF PARKS AND RECREATION

Honorable Hannibal Tavares  
Mayor  
County of Maui  
200 South High Street  
Wailuku, HI 96793

Dear Mayor Tavares:

We have reviewed the Draft Environmental Impact Statement for Central Maui Landfill Project and no comments to submit.

Thank you for the opportunity to review the Environmental Impact Statement.

Sincerely,

Marilyn M. Moniz  
Acting Director

cc: Department of Public Works  
R. M. Towill Corporation

6/10/86



UNITED STATES  
DEPARTMENT OF  
AGRICULTURE

SOIL  
CONSERVATION  
SERVICE

P. O. BOX 50004  
HONOLULU, HAWAII  
96850

January 17, 1986

Honorable Hannibal Tavares  
Mayor, County of Maui  
200 South High Street  
Wailuku, HI 96793

HANNIBAL TAVARES  
Mayor

ALVIN RABERGE, P.E.  
Director of Public Works  
BRIAN HASHIRO, P.E.  
Deputy Director of Public Works

LOUIS ABEJU  
Superintendent of Highways

FRED ARAKI, P.E.  
Engineering Chief

EDWIN KAGENIRO, P.E.  
Waste Management Chief

AARON SHIMAMOTO, P.E.  
Land Use Administrator

COUNTY OF MAUI  
DEPARTMENT OF PUBLIC WORKS

200 SOUTH HIGH STREET  
WAILUKU, MAUI, HAWAII 96793  
16-307

Mr. Francis C. H. Lum  
State Conservationist  
Soil Conservation Service  
U.S. Department of Agriculture  
P. O. Box 50004  
Honolulu, Hawaii 96850

Dear Mr. Lum:

Dear Mayor Tavares:

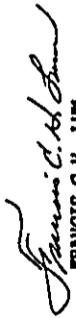
Subject: Draft EIS for Central Maui Landfill Project

We reviewed the subject document and offer the following comment for your consideration:

The discussion on hydrology and drainage in Section 3.1.6, as it is presently written, does not clarify the probability of future flooding in Kailiinui Gulch. It would be helpful if the document includes discussion of the degree of protection that the existing, built-up berm offers, so that any need for further flood proofing could be evaluated.

Thank you for the opportunity to review the document.

Sincerely,

  
FRANCIS C.H. LUM  
State Conservationist

cc:  
Department of Public Works, County of Maui  
R.M. Towill Corporation, 677 Ala Moana Blvd., Honolulu, HI

SUBJECT: Draft Environmental Impact Statement  
Central Maui Sanitary Landfill Project

We have received your letter dated January 17, 1986 commenting on the Draft EIS for the proposed Central Maui Sanitary Landfill, and are writing in response to your comment regarding the potential flooding of Kailiinui Gulch.

Section 3.1.6 of the Draft EIS mentions a gulch overflowing occurrence in the vicinity of the project site. This section of the gulch that was overtopped and subsequently improved is adjacent to the existing quarry site, but is actually downstream of the smaller area designated for the proposed landfill. Hence, the conditions along the repaired section of the gulch will not affect the proposed project. Appropriate revisions will be made to the EIS to clarify this situation.

With regard to the actual section of the gulch that lies adjacent to the project site, a drainage study will be performed to ensure that stormwater flowing through the gulch will not overflow into the landfill. Calculations for the drainage study will be based on a design stormwater flow of 1,330 cfs. This flow was the largest annual maximum discharge recorded by the U.S. Geological Service (during the period 1967-1985) at a crest-gage station about 1.5 miles downstream from the project site. The existing capacity of the gulch will be checked based on this stormwater flow, and if necessary, the appropriate sections of the gulch will be built-up to prevent overtopping. These clarifications will be made in the Final EIS.

Thank you for your assistance in this project.

Very truly yours,

  
Alvin Fukunaga  
Director of Public Works

GEORGE R. ANTONIO  
Mayor of Maui



STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
P. O. BOX 621  
HONOLULU, HAWAII 96809

SUSUMU ONO, CHAIRMAN  
County of Maui and Natural Resources  
EDGAR A. HALLAM  
Mayor of the County  
DIVISIONS:  
AGRICULTURE DEVELOPMENT  
CIVIL ENGINEERING  
CONSERVATION AND  
RECREATION  
CONSTRUCTION  
LAND MANAGEMENT  
STATE PLANS  
WATER AND LAND DEVELOPMENT

HANNIBAL TAVARES  
Mayor  
Alvin Fukunaga, P.E.  
Director of Public Works  
BRIAN HASHIRO, P.E.  
Deputy Director of Public Works  
LOUIS ABREU  
Superintendent of Highways  
FRED ARAKI, P.E.  
Engineering Chief  
EDWIN KAGUCHIRO, P.E.  
Waste Management Chief  
AARON SHIMAZOTO, P.E.  
Land Use Administrator



COUNTY OF MAUI  
DEPARTMENT OF PUBLIC WORKS  
280 SOUTH HIGH STREET  
WAILUKU, MAUI, HAWAII 96793 66-303

Honorable Hannibal Tavares  
Mayor of Maui  
200 So. High Street  
Wailuku, Hawaii 96793

JAN 20 1986

Dear Mayor Tavares:

Thank you for the opportunity to review the draft environmental impact statement for the Central Maui Landfill.

We find it reassuring that the draft calls for leachate and erosion control measures to minimize contamination of nearby ground water.

Due to lack of archaeological surveys in the vicinity, we are not aware if significant resources exist in the project area; however, there may be.

If any previously unidentified sites or remains (such as artifacts, shell, bone, or charcoal deposits, human burials, rock or coral alignments, pavings, or walls) are encountered, please direct the County Engineer to stop work and contact our historic sites office at 548-7460 immediately. Work in the immediate area should be stopped until the office is able to assess the impact and make further recommendations for mitigative activity.

Sincerely,

SUSUMU ONO  
Chairperson  
and

State Historic Preservation Officer

xc: Maui Public Works  
R.M. Towill

Mr. Susumu Ono  
Chairperson and State  
Historic Preservation Officer  
Department of Land & Natural  
Resources  
State of Hawaii  
P. O. Box 621  
Honolulu, Hawaii 96809

Dear Mr. Chairperson:

SUBJECT: Draft Environmental Impact Statement  
Central Maui Sanitary Landfill Project

We are writing in response to your letter dated January 20, 1986 commenting on the Draft EIS for the proposed Central Maui Sanitary Landfill.

With regard to your concern for previously unidentified archaeological sites or remains, we do not anticipate uncovering any new archaeological resources due to the nature of the project. The significant work for the project will be the landfilling of an area previously excavated by quarrying activities. A small amount of excavation work will be performed to grade the landfill floor and to install the leachate collection system. However, the excavation activities will occur approximately 40 to 50 feet below the surrounding ground level.

Despite the unlikelihood of encountering archaeological remains, caution will be taken during construction activities and, as you requested, the State Historic Sites office will be immediately contacted if such remains are uncovered.

Thank you for your comments.

Very truly yours,  
  
Alvin Fukunaga  
Director of Public Works

w132

MAUI PLANNING COMMISSION  
Zedec Brown, Chairman  
Victoria Cheng, Vice-Chairman  
Tommi Anani  
Joseph Felice  
Joseph J. France  
Darryl T. Masuda  
Roy Suda  
Joseph C. Vaneau  
Ramon HAYASHI, Esq. - Office  
Vince Sappaya, Jr., Esq. - Office



COUNTY OF MAUI  
PLANNING DEPARTMENT  
280 S. HIGH STREET  
WAILUKU, MAUI, HAWAII 96793

January 21, 1986

Honorable Hannibal Tavares, Mayor  
County of Maui  
200 South High Street  
Wailuku, HI 96793

Dear Mayor Tavares:

Re: Draft EIS for Central Maui Landfill Project

We have reviewed the subject EIS and submit the following comments:

1. A Land Use Commission Special Use Permit will be required for the project. Since the project entails an area greater than fifteen (15) acres, the State Land Use Commission shall render a decision on the permit application upon completion of the public hearing requirement by the Maui Planning Commission.
2. Page 4-5, Section 4.2.2 Comprehensive Zoning Ordinance, of the subject EIS states that "a variance must be obtained in accordance with Chapter 19.44 of this ordinance." We believe that a variance is not required.

Should there be any questions, please contact this office.

Very truly yours,

*Ralph Masuda*  
RALPH MASUDA  
Deputy Planning Director

RM:hk  
cc: Public Works  
/ R.M. Towill Corp.

HANNIBAL TAVARES  
Mayor  
TOSH ISHIKAWA  
Planning Director  
RALPH N. MASUDA  
Deputy Planning Director

HANNIBAL TAVARES  
Mayor  
Alvin Fukunaga, P.E.  
Director of Public Works  
BRYAN HASHIRO, P.E.  
Deputy Director of Public Works  
LOUIS ABREU  
Superintendent of Highways  
FRED ARAKI, P.E.  
Engineering Chief  
EDWIN KAGDERO, P.E.  
Waste Management Chief  
AARON SHIMAZU, P.E.  
Land Use Administrator



COUNTY OF MAUI  
DEPARTMENT OF PUBLIC WORKS  
280 SOUTH HIGH STREET  
WAILUKU, MAUI, HAWAII 96793

66-302

FEB 11 1986

Mr. Ralph Masuda  
Deputy Planning Director  
Planning Department  
County of Maui  
200 South High Street  
Wailuku, Maui, Hawaii 96793

Dear Mr. Masuda:

SUBJECT: Draft Environmental Impact Statement  
Central Maui Sanitary Landfill Project

We are writing in response to your letter dated January 21, 1986 commenting on the Draft EIS for the proposed sanitary landfill. Thank you for providing us with the information concerning permit requirements. Since a variance to the Comprehensive Zoning Ordinance will not be required, the appropriate corrections will be made to the EIS. We plan to submit an application for a Land Use Commission Special Use Permit to your office in the near future.

Very truly yours,

*Alvin Fukunaga*  
Alvin Fukunaga  
Director of Public Works

W132



United States Department of the Interior

FISH AND WILDLIFE SERVICE  
300 ALA MOHA BOULEVARD  
P. O. BOX  
HONOLULU, HA

ES  
Room 6307

Jan 21 1993

The Honorable Hannibal Tavares  
Mayor of the County of Maui  
200 South High Street  
Wailuku, Maui 96793

Re: Draft Environmental Impact Statement, Central Maui Sanitary Landfill  
Project, Maui

Dear Mayor Tavares:

The U.S. Fish and Wildlife Service has reviewed the referenced Draft Environmental Impact Statement (DEIS) and offers the following comments for your consideration.

The DEIS states that owls are found in the crevices of the existing quarry walls. The DEIS does not distinguish whether the owls are the endemic Hawaiian owl (*Asio flammeus sandwichensis*) or the introduced barn owl (*Tyto alba*). We recommend that the site be inspected by wildlife biologists from the Division of Forestry and Wildlife or the Service to determine the affected species.

The proposed project poses little potential for increased bird air strike hazards at the Kahului Airport or the old Maui Airport. There are currently 2 principal cattle egret roosts on Maui, one at Kanaha Pond and the other at a reservoir east of the old Maui Airport. If these birds were to use the proposed landfill site, daily migrations from either roost would probably not overfly the runways at these airports (see enclosure).

We appreciate the opportunity to comment.

Sincerely,

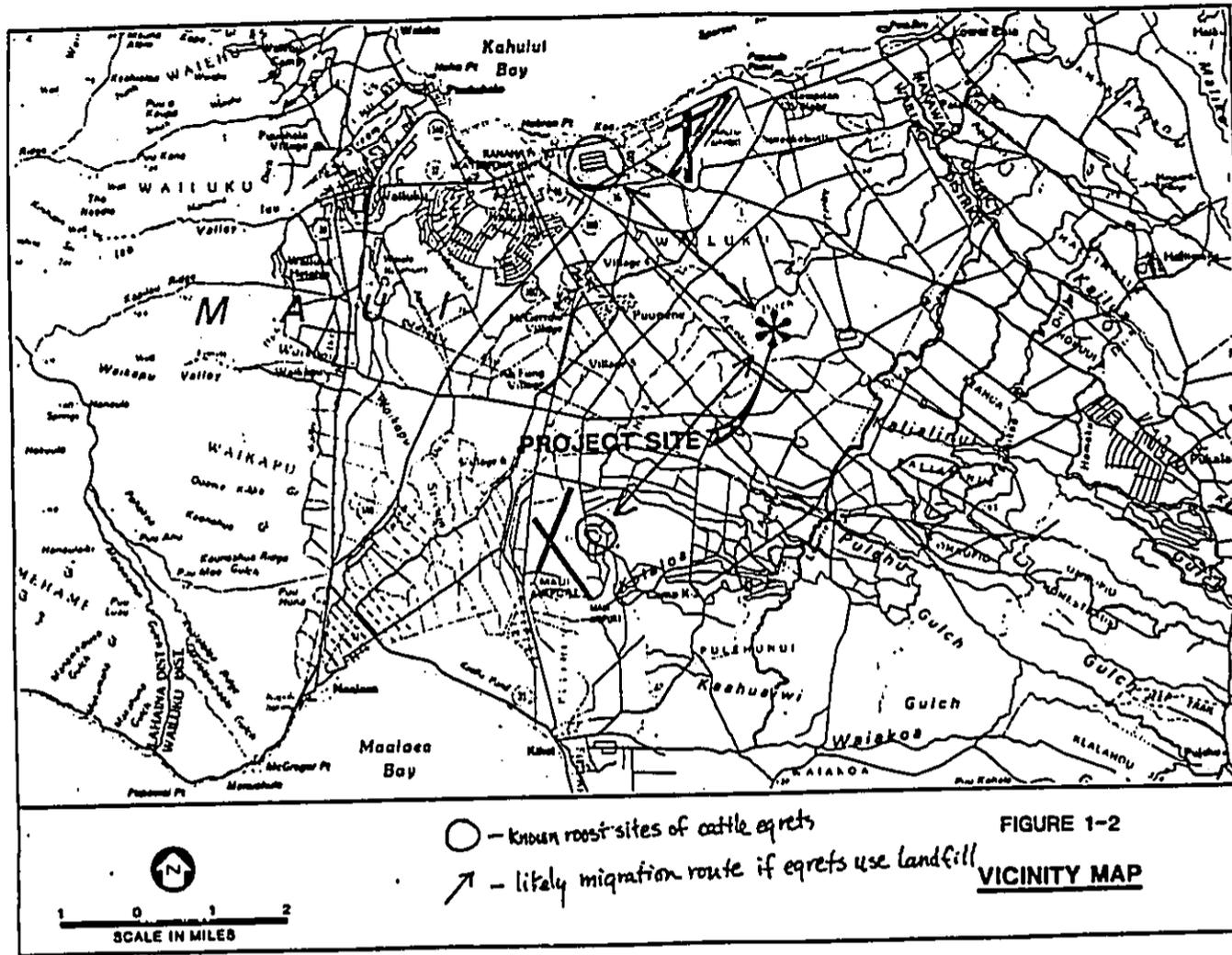
*Ernest Kosaka*  
Ernest Kosaka  
Project Leader  
Office of Environmental Services

Enclosure

cc: DPH, County of Maui, ATTN: Mr. Edwin Kagehiro  
✓ R.H. Towill Corporation, ATTN: Mr. Bruce Tsuchida



ERIC FURBER and VANCE GARRIS Associates





HAMMIBAL TAVARES  
Mayor  
Alvin Fukuzaga, P.E.  
Director of Public Works  
BRIAN HASHIRO, P.E.  
Deputy Director of Public Works  
LOUIS ABREU  
Superintendent of Highways  
FRED ARAKI, P.E.  
Engineering Chief  
EDWIN KAGIHIRO, P.E.  
Waste Management Chief  
AARON SHIMOTO, P.E.  
Land Use Administrator

COUNTY OF MAUI  
DEPARTMENT OF PUBLIC WORKS

240 SOUTH HIGH STREET  
WAILUKU, MAUI, HAWAII 96793

84-509

Mr. Ernest Kosaka

-2-

January 28, 1986

air strike hazards is focused on conflicting flyway patterns between aircraft and birds which travel long distances between roosting and feeding areas. We are also aware that past experiences at other landfills indicate the cattle egret is the only significant landfill scavenger that would travel long distances to its feeding area. We are pleased to hear from you that, if cattle egrets were to establish the proposed landfill as a feeding area, there is little potential for their flyway patterns to conflict with aircraft operations at the two local airports.

Thank you for your comments.

Very truly yours,

*Alvin Fukunaga*  
Alvin Fukunaga  
Director of Public Works

W132

Mr. Ernest Kosaka  
Project Leader  
Office of Environmental Services  
Fish and Wildlife Service  
U. S. Department of the Interior  
P. O. Box 50167  
Honolulu, Hawaii 96850

Dear Mr. Kosaka:

SUBJECT: Draft Environmental Impact Statement  
Central Maui Sanitary Landfill Project

We have received your letter dated January 21, 1986 commenting on the Draft EIS for the proposed subject project. We wish to respond to your comments as follows:

1. Existing Owls

At your recommendation, we requested the Maui Office of the Wildlife Biologist, Division of Forestry & Wildlife, DLNR, to inspect the project site to determine the type of owl that is inhabiting the area. After inspecting the site and speaking with the quarry personnel, the wildlife biologist reported that all indications are that the owls are the introduced barn owl (*Ixto alba*) and not the endemic Hawaiian owl (*Asio flammeus sanowichensis*). The Hawaiian owl typically roosts in open grasslands and not in kiawe trees or enclosed areas such as the quarry wall crevices, as was observed by the quarry personnel. The quarry personnel also observed that the owls in the area are typically seen in the early morning and late afternoon, which is characteristic of the nocturnal barn owl. The Hawaiian owl is typically a day hunter and would have been spotted during the day. This clarification will be made in the Final EIS.

2. Potential Bird Air Strike Hazard

Thank you for evaluating the potential of the proposed project to create increased bird air strike hazards for Kahului Airport and the Old Maui Airport. We understand that the concern for bird



# University of Hawaii at Manoa

Environmental Center  
Crawford 317 • 2550 Campus Road  
Honolulu, Hawaii 96822  
Telephone (808) 948-7201

January 22, 1986  
RE:0430

Mayor Hannibal Tavares  
County of Maui  
200 South High Street  
Wailuku, Hawaii 96793

Dear Mayor Tavares:

## Draft Environmental Impact Statement Central Maui Landfill Puuene, Maui

The project for which the above cited document has been prepared proposes the use of approximately 55 acres of an existing rock quarry for a landfill. The new landfill would serve as the County's main landfill facility and accommodate solid waste volumes of 100,000 tons per year. The primary issues of concern include: leachate production, traffic impacts and irreversible loss of brackish groundwater resources. We also note that the proposed action is located within an agriculturally zoned area and thus is not a generally permitted use. The project will require a special use permit from the State Land Use Commission and County of Maui, Planning Commission.

The Environmental Center review has been prepared with the assistance of Gordon Dugan, Sanitary Engineering; Dick Mayer, Geography-Maui Community College; Frank Peterson, Geology and Geophysics; and Martha Diaz, Environmental Center.

### Infrastructure (Traffic)

Page 3-9, of the Draft EIS presents a cursory discussion of the capacity of existing road networks to accommodate increased volumes of "redirected refuse vehicles."

Our reviewers have commented that without sufficient traffic flow data it is difficult to determine whether or not the increased volumes of traffic can be safely facilitated or if limited hours of use by refuse trucks need to be assigned. It is our understanding that, at present, Pulehu Road cannot safely accommodate large vehicles (i.e. trucks) and that perhaps mitigative measures should be incorporated into the Final EIS prior to granting the requested action. We are aware that the Maui refuse collectors operate on the "Ukupa System," and that refuse collection generally occurs prior to rush-hour traffic. Therefore, we assume that most of the traffic will occur after collection takes place. We recommend that prior to any decision-making, the applicant be required to incorporate a traffic study to address the aforementioned concerns.

AN EQUAL OPPORTUNITY EMPLOYER

Mayor Hannibal Tavares

-2-

January 22, 1986

### Physical Environment

Page 5-2, of the Draft EIS references the existing conditions of the site as conducive to land filling operations, since the low rainfall, minimizes the potential for soil erosion, refuse washout, and leachate generation. Furthermore, the area does not include any potable groundwater sources in the vicinity, and the site is below the Department of Health underground injection control (UIC) line. Where is the UIC line for the island of Maui? It should be included in the Final EIS.

It is our understanding, that the sources of water cited in the Draft EIS are brackish, 3-500 ppm chlorides. Thus it may be economically feasible to desalinate these brackish water resources to meet the future potable needs. Has the County examined other methods of utilizing these resources. Could these sources of brackish water be utilized as potable sources if the high pumping rates for sugar companies were reduced?

### Leachate

Page 5-3 of the Draft EIS states that the possibility of contamination of potable water supplies will be remote because the groundwater in the underlying vicinity is not suitable for drinking and thus is not being planned for potable use.

The 200-plus elevation, as cited in this discussion does not necessarily prevent leachate from migrating downward into the water table. The soil strata which underlies the proposed project consists of "silty, sandy gravel with cobbles," and is highly porous. It should be noted that although leachate generation can be minimal, some migration is likely to filter into the water table.

### Commitment of Resources

Page 8-3 of the Draft EIS states that even with the implementation of a resource/energy recovery system, that a landfill must still be available for the disposal of the residual solid wastes. Has the County considered the possibility of designing a combination resource recovery/landfill facility, that would extend the capacity of the landfill, while decreasing the overall total number of landfills necessary? Would the long term economics of this type of facility outweigh the short-term approach, which continually requires land which could otherwise be utilized for other more beneficial uses such as agricultural, recreation and open space. Perhaps the Final EIS should include a discussion of this combination resource recovery/landfill approach.

Yours truly,

*Joseph N. Miller*  
Joseph N. Miller  
Acting Associate Director

cc: OEQC  
Dept. of Public Works, County of Maui  
RM Towill Corp.  
Gordon Dugan  
Dick Mayer  
Frank Peterson  
Martha Diaz  
Patrick Takahashi,  
Acting Director, Environmental Center

HAMBIBAL TAVAKES  
Mayor  
Alvin Fukuzono, P.E.  
Director of Public Works  
BIRAH HASHINO, P.E.  
Deputy Director of Public Works  
LOUIS ABREU  
Superintendent of Highways  
FRED ARAKI, P.E.  
Engineering Chief  
EDWIN KAGEHIRO, P.E.  
Waste Management Chief  
AARON SHIMOTO, P.E.  
Land Use Administrator



COUNTY OF MAUI  
DEPARTMENT OF PUBLIC WORKS  
220 SOUTH HIGH STREET  
WAILUKU, MAUI, HAWAII 96793  
86-310  
808-253-6100

Ms. Jacquelin K. Miller  
Acting Associate Director  
Environmental Center  
Crawford 317  
2550 Campus Road  
University of Hawaii  
Honolulu, Hawaii 96822

Dear Ms. Miller:

SUBJECT: Draft Environmental Impact Statement  
Central Maui Sanitary Landfill Project

We have received your letter dated January 22, 1986 commenting on the Draft EIS for the proposed Central Maui Sanitary Landfill, and offer the following responses to your comments:

1. Traffic on Pulehu Road

Concerning your comment on the ability of Pulehu Road to accommodate the refuse vehicles, we feel that Pulehu Road is not presently used heavily enough to necessitate a traffic study, and we feel that Pulehu Road will be able to adequately handle the increase in traffic flow due to the refuse vehicles.

You are correct to note that there is a safety consideration to be resolved concerning the existing condition of Pulehu Road. There are two points where the road crosses over drainage ditches. The paved section of the roadway is maintained, however, there is little or no shoulder and there are concrete walls close to the pavement edge on both sides. It is not recommended that two large refuse trucks cross that bridge at the same time, in that there is a danger that a truck may run into one of the walls or the oncoming truck. The bridges will not be widened; instead, the anticipated traffic conditions indicate that it may be more practical to have the trucks simply yield to one another at these crossings. In order to prevent vehicles from sideswiping the walls, we will recommend that reflectors and/or warning signs be posted at the approaches to the bridges to warn vehicles of the oncoming restriction.

Ms. Jacquelin K. Miller

-2-

January 28, 1986

2. Groundwater Resources and Leachate Migration

In response to your question concerning the UIC line, that portion of the line that passes near the vicinity of the project site is shown in Figure 4-4 of the Draft EIS. A discussion of the State Underground Injection Control Program is given in Section 4.3.3 on page 4-7.

You also commented on the possibility of desalinating the brackish water underlying the project area to meet future potable needs. Although we agree that the groundwater in the area could potentially be used in the desalination process to yield potable water, we contend that if and when this process becomes implemented, there are other locations on the island of Maui where brackish water can be withdrawn. The attached figure, adapted from the "Hawaii Water Resources Plan," shows that brackish water can be withdrawn at various other locations along the isthmus of Central Maui. Brackish water is also available along the coastline of the island, although the chloride concentration of the water from this area is probably higher than that of the water underlying the inland Central Maui area.

Your point is well taken that the 200-foot difference in elevation between the proposed landfill floor and the underlying water tables does not necessarily prevent leachate from migrating into the water table. The revised EIS will note, as requested, that although leachate generation may be minimal, there is a possibility that some leachate migration will filter into the water table. However, this leachate migration would be affecting a brackish water source that the County Department of Water Supply is not using and does not plan to use. The Department has stated that the proposed landfill will not affect its existing groundwater sources which are up-gradient of the site, and that it does not have future plans to withdraw groundwater in the vicinity of the landfill site. Hence, we conclude that the risk of contaminating the public water supply is low.

3. Commitment of Resources

You commented on the possibility of implementing a resource recovery/landfill system to extend the life of the landfill. We recognize that resource recovery is an excellent alternative to consider when dealing with the question of solid waste disposal. Its ability to reduce the volume of waste to be landfilled while recovering usable resources is clearly an efficient use of available resources. As you suggested, the combined system could possibly be the more cost-effective alternative when considering



LOW ENTROPY SYSTEMS  
 LESLIE E. SKILLINGS, JR.  
 272 Humana Place  
 Kihel, HI 96753  
 Phone 1-808-879-2382

"In tune with nature."

January 23, 1986

R.M. Towill Corporation  
 677 Ala Moana Blvd., Suite 1016  
 Honolulu, HI 96813

Attention: Mr. Bruce Tsuchida

BM12	DK	VM	SCA	WFS	PTS
REC'D JAN 28 1986 BMT/C					
BY	DATE	BY	DATE	BY	DATE
CSY	1/28	DK		VM	
WB		VM		VM	

re: Draft EIS CENTRAL MAUI SANITARY LANDFILL PROJECT  
 December 1985

Landfills may be the "cheapest" method of disposal, but landfills have a very poor track record in protecting the environment. "There is a scientific consensus that no matter how well a landfill is designed, no matter what the liner and cap are made of, the landfill will eventually leak." (Environmental Science and Technology, 1983) "Seventy-five percent of all active and inactive landfills in the nation leak. (Srep Davis, former administrator of the EPA) Because of these facts it is imperative that any landfill proposal be done with the greatest of care.

The draft EIS has several shortcomings. These shortcomings fall into the following areas. First, the potential for groundwater pollution is great. The water table at the site is less than 200 feet below the present quarry floor. The floor (pp. 3-3,4) is made-up of cinder which will permit any liquid waste to penetrate very rapidly after it has moved through the layer of added compacted soil. The 1976 test of the quarry bottom would appear to support the rapid drainage of liquid, toxic or otherwise, which would reach this point in the proposed landfill.

The leachate collection system made of "perforated asbestos cement pipes 8 inches in diameter" is not adequate. (p. 2-6) The system will only "capture" a small portion of the leachate that percolates through the refuse. At a distance of between 250 and 300 feet between each 8 inch pipe it is difficult, if not impossible, to imagine the leachate moving laterally over such

distances to find a pipe to be captured by. This would appear to violate the laws of physics and fluid dynamics. Many, many more pipes will be necessary if capture of the leachate is intended. Failure in this will mean that leachate and its content could reach the surrounding groundwater in a matter of days.

If sewage sludge is to be buried in this proposed landfill as it was at the Waikapu site then viruses may also be a problem. Studies done on the movement of viruses have shown that they can move up to 300 meters per day and survive for 188 days in groundwater. (Bruce H. Keswick and Charles P. Gerba, Viruses in Groundwater) Pesticides may survive for years and move in similar ways. Once released we have little or no way to track the leachate movement. It would be hoped that a sunshine monitoring system would be installed in and around the proposed site with sufficient testing wells for monitoring the proposed landfill. All testing data should be available to the public. The disposal method for the captured leachate is unclear. Methane gas(CH4) along with other gases will present a long term health and fire hazard. The EIS is silent on this point, also.

Along with this a fourth point would be control of what is put into the landfill in the first place. Two points should be made here: The County should pass a container bill which would help to reduce the volume of material going into the landfill and increase its life beyond the 11 years projected.

The second point is controlling toxic substances which may enter the landfill. The County should pass rules governing the types of waste and the handling of each class of waste. Household and industrial chemicals, gasoline and other toxic substances should not be placed in the landfill, and should be marked for special handling under these guidelines. The point here is if you don't put it in, in the first place, we will not need to capture the leachate before it leaches through the bottom.

Furthering the point above, it is questionable that this proposed site should not come under Coastal Zone Management(CZM). With the planned 4:1 slope next to Kaliainui Gulch and the proposed discharge of "clear runoff water from the basin into Kaliainui Gulch"(p. 2-6), with the discharge of the gulch into the ocean at Kanaha(sic) Beach Park. This EIS should be reviewed by CZM authority. "Clear" does not mean clean or non-polluted. Flows in the gulch will flush this discharge into the ocean. Before this is permitted the contents of the discharge should be determined to be safe not just "clear."

Sincerely,

*Leslie E. Skillings, Jr.*

Leslie E. Skillings, Jr.

HAMBAL TAVARES  
Mayor  
ALVIN FUKUNAGA  
Director of Public Works  
BRIAN HUSHINO, P.E.  
Deputy Director of Public Works  
LOUIS ABENU  
Superintendent of Highways  
FRED ARARI, P.E.  
Engineering Chief  
EDWIN KAGEHNO, P.E.  
Waste Management Chief  
AARON SAKUMOTO, P.E.  
Land Use Administrator



COUNTY OF MAUI  
DEPARTMENT OF PUBLIC WORKS  
300 SOUTH HIGH STREET  
WAILUKU, MAUI, HAWAII 96791

March 4, 1986

Mr. Leslie E. Skillings, Jr.

-2-

March 4, 1986

The geographic location of the landfill in itself significantly contributes to minimizing the chances of leachate generation. The site is located in an area of low rainfall, which minimizes the chances of rainfall infiltration. The area is not likely to be flooded because it is not in a flood plain area. Finally, the underlying brackish water table is located more than 200 feet below the floor of the site, thereby reducing the chances of groundwater infiltration significantly. The combination of these physical conditions is the most ideal situation in terms of preventing the introduction of a liquid phase.

In addition to these site characteristics, the Draft EIS explains that the following series of mitigative measures will be implemented to further reduce the chances of water infiltration into the waste and subsequent leachate escape into the environment:

- (1) A surface drainage system will be constructed to prevent off-site surface runoff from flowing onto the site;
- (2) Throughout the preparation, operation and closure of the landfill, the ground surface will be graded to prevent water-ponding on the surface; and
- (3) Before landfilling even begins, the bottom of the landfill will be graded and topped with a compacted layer of soil to form a relatively impervious bottom shell. The 1976 soils investigation, focusing on the central area of the quarry and visual inspection of the overall landfill floor has indicated that the floor has intermixed areas of dense basalt and looser cinder soil. When grading operations are begun, the areas of the quarry floor composed of the porous cinder material will be excavated, then filled and recompact with soil to create the bottom shell.

Although the compacted floor will not be completely impervious to liquid penetration, its greater density in comparison to the relatively loose overlying refuse would cause the leachate to follow the grade of the landfill floor until it is intercepted by one of the leachate collection pipes.

Under normal practices, a leachate collection system is not considered to be necessary at landfills where the annual rainfall is less than 30 inches. Despite the fact that this site has an annual rainfall of 20 inches, it was decided that a leachate collection system be installed as an extra precaution.

Mr. Leslie E. Skillings, Jr.  
272 Humupee Place  
Kihei, Maui, Hawaii 96753

Dear Mr. Skillings:

SUBJECT: Draft Environmental Impact Statement  
Central Maui Sanitary Landfill Project

We have received your letter dated January 23, 1986 commenting on the Draft EIS for the proposed Central Maui Sanitary Landfill, and offer the following responses to your comments.

Your various comments focused primarily on the potential for leachate to contaminate the underlying groundwater. We share your concern for preventing the contamination of our water resources at all times, and we agree with you that sanitary landfilling must be performed with the greatest of care. But contrary to your comments, we feel that the proposed project has been designed such that it adequately addresses this issue. The primary concern of this project has been leachate contamination, so the combination of the site's strategic location and the proposed series of mitigative measures have been carefully planned to minimize this risk.

You stated in your comments that "the potential for groundwater pollution is great." This statement would be true if it were not for the careful site selection and design of this project. Past experiences with existing landfills have 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" (Solid Wastes Management, Dec. 1981). Refuse is predominantly a dry product and will not leach a significant quantity of liquid per se. Leachate is primarily produced when water from other sources infiltrates the refuse and extracts contaminants from it. By selecting a strategic location and incorporating various plans into the landfill design, we believe we are taking all practicable precautions to prevent this occurrence.

Mr. Leslie E. Skillings, Jr. -3-

March 4, 1986

The landfill floor grading and the layout of the collection pipes were designed together to cause the leachate to flow toward and be intercepted by these pipes. The design for the distance intervals between lateral pipes was based on other existing landfill designs. But prompted by your question, the distance between laterals will be reviewed, and additional pipes will be designed into the system if necessary to assure an adequate leachate collection system design.

Sewage sludge is accepted at existing landfills, and will be accepted at this new landfill. Viruses may pose a problem if leachate percolation occurs, however, there is no other suitable disposal site for sewage sludge, and no practical means of destroying viruses in sewage sludge to date.

Given all of the precautions being taken to minimize leachate production, there appears to be no significant, immediate threat to the community or environment. It is not practical nor justifiable to install a test well monitoring system, especially in light of the fact that the underlying groundwater is not being used as a drinking water supply. The County Department of Water Supply has stated that the proposed project will not affect their existing groundwater sources which are far removed from this area, and that it does not have future plans to use the groundwater in this vicinity.

Concerning your question about leachate disposal, Section 6.1.1 of the Draft EIS states that the leachate accumulated by the collection system will be periodically pumped from the collection manholes and reappplied to the surface of the landfill. The leachate will basically be reduced by permitting the liquid to evaporate at the surface. The balance of the leachate that seeps back into the landfill will become stabilized as it trickles down through the landfill mass.

Section 6.1.5 addresses your concern regarding methane gas production. This section discusses the possibility of installing a gas monitoring system to prevent possible explosions, which may occur if the methane gas concentration falls within the range of 5 to 15 percent. This section also states that a gas conversion system to recover the methane gas for energy production is being considered.

You commented on the possibility of the County enacting regulations to (1) control the types of materials being placed into the landfill, and (2) reduce the volume of material going into the landfill. On your first point, the State Department of Health is the agency in Hawaii which

Mr. Leslie E. Skillings, Jr. -4-

March 4, 1986

regulates sanitary landfills. Chapter 58 of Title 11, "Administrative Rules," defines the methods of handling and disposal of all types of solid wastes. Hazardous wastes which include toxic, caustic, volatile and flammable chemical wastes will not be accepted at this proposed landfill.

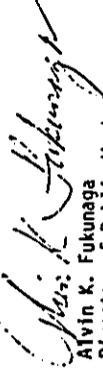
Your second point regarding the enactment of a container bill is well taken, however, it is not directly relevant to the proposed project. Although a container bill would result in a reduction of the volume of refuse to be landfilled, it would not eliminate the need for a new landfill.

Regarding your question on the applicability of the Coastal Zone Management Program, this landfill project does not come under its jurisdiction for the following reasons:

- the project site is not within the Special Management Area (SMA);
- the proposed project is not Federally-funded;
- the proposed project will not require any permits from any Federal agency.

We appreciate your review of and comments on the Draft EIS. The appropriate revisions and clarifications will be made in the Final EIS.

Very truly yours,

  
Alvin K. Fukunaga  
Director of Public Works

JK:jm  
cc: R. M. Towill

January 23, 1986

DMTC	SCM
DK	WES
YM	FTL
REC'D JAN 31 1986 DMTC	
BT	151
QW	DM
WD	AK
	YJK



MAUI ISLAND CENTER  
 400 Hoolahai Street, R-209, Wailuku, Maui, Hawaii 96793  
 Telephone: (808) 242-9774

January 22, 1986

Letitia N. Dyehara  
 Director  
 Office of Environmental Quality Control  
 550 Halekauwila St., Rm 301  
 Honolulu, Hawaii 96813

Dear Ms. Dyehara:

SUBJECT: Environmental Impact Statement (E.I.S.),  
 Central Maui Sanitary Landfill Project

We appreciate the opportunity to review and to provide comments on the Environmental Impact Statement for the Central Maui Sanitary Landfill Project.

We know that a new sanitary landfill is urgently needed and that the proposed site is ideally suited for a landfill. We are, therefore, supportive of the project and the location.

We have attached our detailed comments to this letter for your consideration and should you require clarification please contact us at 244-9774.

Sincerely,

Francis Goodness  
 Island Center Administrator

cc: Winona E. Rubin, Chief Executive Officer  
 Iris Young, Administrative Services Director  
 Pualani Labarre, Special Assistant to Island Centers

A printed, non-profit, social change organization, serving Hawaii's economic and social self-sufficiency.

E ala like mai kākou. e nā 'ōiwi 'ō Hawai'i

January 22, 1986  
 Comments on E.I.S for Central Maui Sanitary Landfill Project

Page 2-2 In other portions of the document, mention has been made that the Waikapu Landfill site has exceeded the capacity. Has the capacity been exceeded and what is the design capacity of the Waikapu site? Tables 2-1 and 2-2. The solid waste generated based strictly on population may not give a true picture on the amount and type of waste generated. Much of the waste generated from the resort areas can exceed the value of 5 lbs/capita/day. There is no indication of the amount of automobiles and other wastes, such as demolition wastes or wastes from meat packing houses, these wastes may decrease the life expectancy of the landfill.

P.2-3- "...from 1987 to 1995 is 2,052,400 cubic yards." please check on this figure we come out with 3,088,200 cubic yards.

P.2-4 - 2.3.2 Landfill life -We assume that the landfill life of the other sanitary landfills have been determined and that they will be closed when the Central Maui landfill site is developed in 1987. Is this a correction assumption?

P.2-5 - We strongly recommend that the operating face of the landfill be covered daily rather than twice a week. The only exception to daily cover is if the refuse is shredded.

P.2-8 - A scale should be installed, this will not only provide data on the amount of refuse generated but also provide a means of charging for refuse disposal. We are unclear about the policy regarding "special wastes". We assume that hazardous waste, toxic chemicals and radioactive wastes will not be accepted and that abandoned cars and demolition wastes may be accepted. There is a need to accept abandoned cars and demolition wastes at the proposed sanitary landfill, the abandoned cars cannot be processed at a scrap metal shop. A serious problem exists for the disposal of used pesticide containers and other containers used for hazardous wastes. Provisions should be made to isolate these containers in one section of the landfill. Also, provisions should be made for the disposal of dead animals and wastes from meat packing and slaughter houses.

P.2-9 - Landfill Closure Plan We believe that methane gas generation is a potential problem and plans for venting should be incorporated now rather than in the Landfill Closure Plan.

P. 2-10 - The concept of transfer stations is excellent, but unrealistic, if the stations will accept only refuse from homeowners. There will be a problem of enforcement, there must be some form of negative incentives for the private commercial refuse haulers to conform to this. We believe that a structure will be required to provide an area for eating, lockers, showers, first aid equipment and storage of required safety equipment.

P.3-4 & 3-5 - We agree that there is probably no endangered species of birds, mammals or plants within the project site. However, your statement that "...some owls which have been observed to fly out of crevices in the walls of the quarry" leads one to believe that there may be at least the presence of the endemic Hawaiian owl, and the presence should be clarified.

Change "Kanaka Beach Park" to Kanaha Beach Park.  
 P.3-6 - Groundwater Resources We are aware of the fact that the landfill is not located over potable water resources and outside of UIC line. However, the site is located over a brackish water aquifer which could have a future potential as potable water resource by desalination or for aquaculture. We therefore recommend that all precautions be taken to prevent contamination of this potential resource.

P.3-7 Population - Since most of the calculations on the amount of refuse which is and will be generated is based on population, we believe that current census information should be used, i.e. 1980 census information. We would like to see a population breakdown of the major areas generating the refuse and the contribution of refuse to the central landfill. Current census information should be used, i.e. 1980 census information.

We would like to see a population breakdown of the major areas generating the refuse and the contribution of refuse to the central landfill.

P.3-9 - Archaeological and Historic Sites - mention was made in the document of the presence of the Japanese cemetery within the quarry. Is it a grave or a cemetery and is the cemetery significant historically.

Clarification with the Historic Sites Section is warranted.

P.4-5 - What is the status of the Special Use Permit? Should not the procedure have been to solicit the permit prior to final engineering plans?

P.4-6 - Based on the wording contained in the third paragraph, we are unsure that the proposed project qualifies for a variance, either delete the paragraph or expand.

P.5-4 - Solid waste landfilling will attract rodents, mammals, birds, insects and other vermin which can be vectors for various disease. One of the accepted preventive measures is to cover the refuse daily. It is a known fact that the rats on Maui show positive antibodies for typhus and all measures should be taken to build up of the rat population.

P.5-5 - Enforcement of indiscriminate litter during non-working hours is a potential problem and the design of the facilities could go a long way to alleviate this problem. Large containers could be placed in strategic locations for depositing the refuse.

P.5-5 - Economy - Since no dollar figure has been given for the proposed facility we cannot determine if the island's economy will be adversely affected. What ever the cost, sanitary landfilling is the most economical method of refuse disposal and without the sanitary landfill adverse environmental and health impacts will result, this will then have a adverse impact on the economy. We are in agreement that a tipping fee be charged for all users of the facility, both commercial and governmental agencies.

P.5-7 - Economy We agree that operating a central landfill will provide for some cost savings. However, the transporting of refuse from Lahaina and Mula may be costly for the County. We believe that some additional analysis is warranted in determining the actual cost for hauling refuse over these great distances. Some provisions in the future for major transfer stations, compaction of the refuse and larger trucks to haul the refuse will be required.

P.6-1 Leachate Production - Protection of the ground water supplies is important and all precautions must be taken to prevent future contamination of this resource. We must be certain that the bottom of the landfill be impervious, please clarify how this will be accomplished since an impervious liner at the bottom of the landfill will not be required. The statement that "...impermeability was evidenced by standing water on the quarry floor [sic] which remained for several days following a heavy rainfall," may be true but hardly sufficient to guarantee protection of the groundwater resource.

P.6-5 - We disagree that semi-weekly covering will be sufficient to prevent potential vector and rodent problems. We also find it unreasonable to believe that the existing Waikapu Landfill does not have a chronic problem with rats and that the proposed facility will not have a rat problem. We also believe that a potential problem with Cattle egrets will occur if the landfill is not covered daily.

P.6-6 Air Quality - We believe that insufficient analysis has been given to methane generation. Methane will be generated, the amount is the major question. Methane being a heavy gas will stay near the bottom of the quarry pit and could accumulate in pockets which could become explosive. We suggest that additional analysis be conducted and some thought be given for installation of gas collection and venting systems with monitors and alarms.

P.6-8 Economy - "...the establishment of this landfill may encourage a more rapid urban growth." We believe that the implementation of the landfill will not encourage growth but is designed to meet the growth which has occurred based on existing State and County General Plans.

P.10-1 - Other unresolved issues which should be included are the status of Special Use Permit and the variance.

Other concerns  
The amount of material needed if daily cover is implemented and is there an adequate source of final cover material.

What will be the impact when the existing landfills are closed and how much time and energy will be required to haul the refuse from Mula and Lahaina.

RECEIVED

86 JUN 30 AM 109

OFC OF ENVIRONMENTAL  
QUALITY CONTROL

HANABAL TAVANES  
Mayor  
ALVIN FUKUHAGA  
Director of Public Works  
BRIAN HASKINS, P.E.  
Deputy Director of Public Works  
LOUIS ASBECU  
Superintendent of Highways  
FRED ARAKI, P.E.  
Engineering Chief  
EDWIN KAGERNO, P.E.  
Waste Management Chief  
AARON SHIMOTO, P.E.  
Land Use Administrator



COUNTY OF MAUI  
DEPARTMENT OF PUBLIC WORKS  
888 SOUTH HIGH STREET  
WAILUKU, MAUI, HAWAII 96793  
March 4, 1986

Mr. Francis Goodness

-2-

February 19, 1986

rate was based on limited sampling at the Waikapu Landfill and on averages used by the City and County of Honolulu Refuse Division. The current waste generation rate for Honolulu, which includes the Waikiki resort area, is 4.2 lb/capita/day, so the rate assumed for Maui is actually somewhat conservative.

3. Solid Waste Projections (p. 2-3)

We believe the 2,052,400 cubic-yard figure is correct. See attachment for sample calculations.

4. Landfill Life (Section 2.3.2)

You asked about the relative timing of the closure of the existing landfills and the opening of the proposed landfill. For calculation purposes, it was assumed that the Waikapu, Olowalu and Makani Landfills will be closed as soon as the proposed landfill is opened. In actuality, the Waikapu Landfill will indeed be closed as soon as the Central Maui Landfill is opened. But the Olowalu and Makani Landfills may not yet reach their capacities in 1987, so these landfills may continue to accept refuse until their capacities are reached. If this is the case, refuse from the Olowalu and Makani service areas will not be delivered to the proposed landfill until sometime after 1987, and the landfill life will be extended.

5. Landfill Cover (p. 2-5, 5-4 and 6-5)

The alternative to cover the compacted refuse on a daily basis was considered during the initial planning and design of the proposed landfill, however, the decision to recommend a twice-a-week cover practice was based primarily on experiences from existing landfill operations on Maui. The Waikapu Landfill, which presently receives 60 percent of the island's refuse, has been operating on a twice-a-week cover basis. There have been no complaints from the public concerning odors, vectors, airborne litter, etc., so this practice appears to be adequate. The Olowalu, Makani and Hana Landfills have also been using the twice-a-week cover practice without detrimental impacts.

Waikapu Landfill is having more problems than the other existing landfills because (1) it is continuing to be filled past its capacity, and (2) sand is being used as soil cover for lack of a better soil supply. Sand is not considered a good soil cover because its poor cohesion and compaction properties are not conducive to providing any kind of tight seal over the refuse. We do not plan to use sand as soil cover at the proposed landfill.

Mr. Francis Goodness  
Island Center Administrator  
Maui Island Center  
Alu Like  
400 Hookahi Street R-209  
Wailuku, Maui, Hawaii 96793

Dear Mr. Goodness:

SUBJECT: Draft Environmental Impact Statement  
Central Maui Sanitary Landfill Project

We have received your letter dated January 22, 1986 commenting on the Draft EIS for the proposed Central Maui Sanitary Landfill, and offer the following responses to your comments.

1. Waikapu Landfill (p. 2-2)

The capacity of Waikapu Landfill has been exceeded as evidenced by the refuse being piled higher than the surrounding ground level. The design capacity of this landfill is not known.

2. Solid Waste Generation Rate (Tables 2-1 and 2-2)

You questioned the selection of the solid waste generation rate used for the design of this landfill. This rate and the projected solid waste volumes were extracted from the "Preliminary Engineering Report for the Central Maui Sanitary Landfill Project" (September 1985). The 5 lb/capita/day figure is an overall rate; it includes special wastes that will be accepted at the landfill, e.g., demolition and bulky wastes. As discussed in the engineering report, the decision to use this

Even if daily cover were to be provided, it would not guarantee the complete absence of problems from rats, cattle egrets or other scavenger-type animals. All landfills usually have some problems of this nature. However, the proposed site is far removed from any populated area, so the nuisance factor and, more importantly, the risk to the public health will be minimized and isolated in this remote location. The Draft EIS states that any vector problems that may arise will be corrected by the County. Because of its remote location and lack of evidence that a twice-a-week cover is inadequate, it does not appear to be practical to expend additional resources and money to provide daily cover.

6. Landfill Operation (p. 2-8)

Your recommendation to install a scale is well taken. We are planning to install one at the landfill.

Concerning your questions on special wastes, you are correct in stating that hazardous wastes, which include various types of toxic chemicals and radioactive waste, will not be accepted at the landfill. The EIS will be revised to state that demolition waste will be accepted. Regarding abandoned cars, we encourage their processing and recycling by scrap metal yards or other metal reclamation facilities, however, abandoned cars will be accepted at the landfill if there is no other alternative.

The procedures for disposing of pesticide containers, hazardous waste containers, dead animals and all other types of solid waste are defined by the State Department of Health Administrative Rules, Chapter 58, Title 11, "Solid Waste Management Control." For example, dead animals and household-type pesticide containers can be accepted at this landfill with separate handling and burial. The Draft EIS states that hazardous waste will not be accepted at this landfill. Other types of wastes will be accepted and handled per the DOH rules and as approved by the Director of the Department of Health.

7. Methane Gas Generation and Landfill Closure (p. 2-9 and 6-6)

In response to your concerns on methane gas, methane generation has not been a significant problem at the existing landfills on Maui. Gas collection systems are not normally installed for small landfills such as the proposed project. However, the feasibility of installing a gas collection system for energy recovery purposes is being studied. If such a system is installed, it will be done as the landfill is being developed and will be maintained after closure.

Per your suggestion, the discussion on methane gas generation will be expanded in Section 6.1.5 of the Final EIS. To correct a statement you made, methane gas is lighter than air (CH<sub>4</sub> molecular weight = 16; air molecular weight = 29). Methane could conceivably collect in pockets such as the leachate collection manholes, but would not tend to accumulate in open space along the bottom of the landfill. Methane gas is explosive only when it is in the presence of air and within the concentration range of 5 to 15 percent. It is for these reasons that the methane gas concentration will be monitored at the leachate collection manholes, and manhole covers will be removed when the concentration exceeds 4 percent.

8. Transfer Stations (p. 2-10)

The feasibility and design of transfer stations near Olowalu and Makani are out of the scope of this study, which is focused on designing a new centralized sanitary landfill to alleviate problems at the overfilled Waikapu Landfill. Studies of those transfer stations will be made in the near future, at which time the facility dimensions and other details will be determined.

To date, it is known that the transfer stations will primarily accept homeowners refuse. County-collected refuse may also be accepted, but this has not yet been confirmed. Methods other than negative incentives can be implemented to prevent commercial haulers from using these stations, e.g., designing the facility with height restrictions to keep out large trucks. The obvious absence of a commercial hauler at the landfill would also be an indication that the hauler may be illegitimately dumping its refuse at a transfer station, in which case corrective action can be taken by the County. The transfer stations will not be manned, so a facility for eating, showers, equipment storage, etc., will not be required.

9. Existing Owls (p. 3-4 and 3-5)

The EIS will be clarified to state that the existing owls are the introduced barn owl (Iyto alba) and not the endemic Hawaiian owl.

10. Kanaha Beach Park (p. 3-5)

The spelling correction will be made.

11. Groundwater Resources and Leachate Production (p. 3-6 and 6-1)

We share your concern for protecting potential water resources, so despite the fact that we are locating the landfill over a brackish water source, we have made plans to take all practical precautions to protect the groundwater.

As one of the precautionary measures, the landfill floor will be graded and topped with a compacted layer of soil to form a relatively impervious bottom shell. The bottom will be sloped and shaped to work with the leachate collection pipe system in causing the leachate to flow toward these pipes. The compacted floor will not be completely impervious to liquid penetration, but is greater density in comparison to the relatively loose overlying refuse would cause the leachate to follow the sloping landfill floor until it is intercepted by one of the leachate collection pipes.

12. Population (p. 3-7)

As indicated by the footnote on Table 2-1, the defacto population projection data was obtained from the "Hawaii Population and Economic Projection and Simulation Model, Updated State and County Forecasts (July 1984)" prepared by the State Department of Planning and Economic Development. We believe that the data developed is the best forecast that can be made.

A breakdown of the population projection by communities is not available.

13. Archaeological and Historic Sites (p. 3-9)

The Japanese cemetery mentioned in the Draft EIS under Section 3.2.2 is located on the outskirts of the existing quarry site and has no historical significance. The landfill area will encompass only a portion of the quarry site. The cemetery is not included within this proposed area, therefore, it will not be affected by the project.

14. Special Use Permit (p. 4-5)

The Special Use Permit application is being filed at the time of this writing. Engineering plans for the project have not yet been finalized; preliminary plans are being submitted with the Special Use Permit application.

15. Variance (p. 4-6)

This section will be deleted. The use of the agriculture-designated land for landfilling purposes will be permitted upon approval of the Special Use Permit application submitted to the State Land Use Commission.

16. Disease Vectors (p. 5-4)

Response included in item no. 5 above.

17. Litter (p. 5-5)

Your suggestion of establishing a designated area for off-hour refuse disposal is well taken, and will be considered.

18. Economy (p. 5-5)

The estimated capital cost of the project is \$6.2 million. The landfill will be developed in three construction increments (of relatively similar volume) so that the total capital expenditure may be distributed over a longer period of time. The estimated costs of the increments are \$2.61 million, \$1.75 million, and \$1.75 million, respectively.

We acknowledge your support for establishing a tipping fee for all users of the landfill.

19. Refuse Disposal at Lahaina and Kula (p. 5-7)

Disposal of refuse generated in the Lahaina and Kula areas will be studied separately in the near future. See item no. 8 above.

20. Leachate Production (p. 6-1)

Response included in item no. 11 above.

21. Potential Vector Problems (p. 6-5)

Response included in item no. 5 above.

22. Methane Gas Generation (p. 6-6)

Response included in item no. 7 above.

23. Economy (p. 6-8)

You are correct to point out that the proposed landfill is designed based on population growth as planned at the County and State. The statement made in the Draft EIS regarding a possible acceleration of urban expansion is a general statement typically made for all public utilities projects. Whenever a new public utility system becomes available, development tends to follow because of the fact that the new utility is in-place and ready to be used without immediate worries for reaching its capacity. So as stated in the Draft EIS, the County and State growth plans should be carefully implemented to prevent this tendency for accelerated growth.

Mr. Francis Goodness

-7-

February 19, 1986

We wish to emphasize that this economic impact is a secondary concern of the project. The primary concern is to deter potential public health problems by providing a new site for refuse disposal.

24. Unresolved Issues (p. 10-1)

Per your suggestion, the status of the Special Use Permit application will be included in this section.

25. Other Concerns

You requested information on soil cover requirements if daily cover is provided. For daily cover, soil volume calculations are typically based on 4 parts refuse to 1 part soil, as opposed to the 7 to 1 ratio used for the proposed twice-a-week cover. Based on a total landfill capacity of 3.77 million cubic yards (cu. yds.), the table below shows the volume of soil cover required and the volume of refuse that can be accepted:

	Soil Cover	
	Twice per Week	Daily
Refuse to Cover Ratio	7:1	4:1
Refuse Capacity (cu. yd.)	3.3 million	3.02 million
Soil Cover Required (cu. yd.)	0.47 million	0.75 million
<b>TOTAL LANDFILL CAPACITY</b>	<b>3.77 million</b>	<b>3.77 million</b>

A daily cover practice would require 0.28 million cu. yd. or 60 percent more soil than the semi-weekly practice. Since only 0.53 million cu. yd. of soil is available on site, 0.22 million cu. yd. more soil would need to be acquired and transported from off-site. This will increase the cost of operating the landfill. Also note that the increased soil cover requirement would cause a 0.28 million cu. yd. or 8 percent reduction in the volume of refuse that can be accepted.

The ratios used to calculate soil cover requirements are only rules-of-thumb. Section 2.3.6 of the Draft EIS states that although the on-site soil supply will probably meet the on-going semi-weekly cover needs, it is not definitely known whether this stockpile will also completely meet the needs of the final soil cover. The stockpile will be depleted more rapidly if the daily soil cover practice is implemented.

The major concern of this study was to find an alternative disposal site for the Waikapu Landfill. As mentioned in item no. 8 above, feasibility studies for the other refuse destination points will be made in the near future, before their respective landfills are closed.

Mr. Francis Goodness

-8-

February 19, 1986

We appreciate your review of and comments on the Draft EIS. The appropriate revisions and clarifications will be made in the Final EIS.

Very truly yours,

*Alvin Fukunaga*  
Alvin Fukunaga  
Director of Public Works

JK:ym  
Attachment  
cc: R. H. Towill

SOLID WASTE PROJECTIONS  
SAMPLE CALCULATIONS

Refer to Tables 2-1 and 2-2:

A. 1987 Projection

1. 1987 Population = Interpolation between populations for 1985 and 1990  
 =  $100.9 + 2/5 (122.6 - 100.9) = 109.58$  persons
2. 1987 Annual Production of Compacted Refuse  
 =  $\frac{109.58 \times 5.0 \text{ lb/capita/day} \times 365 \text{ days/yr}}{1000 \text{ lb/cu. yd.}}$   
 = 199.98 or 200 cu. yd.

B. 1990 Projection

1. 1990 Annual Production of Compacted Refuse  
 =  $\frac{122.6 \times 5 \times 365}{1000} = 223.8$  or 223.8 of cu. yd.
2. Cumulative Compacted Refuse, 1987 to 1990  
 = Average Annual Production x 3 years  
 =  $\frac{200 + 223.8}{2} \times 3$   
 = 635.7 or 635.8 cu. yd.
3. Cumulative Compacted Refuse Since 1987  
 = 200 + 635.8  
 = 835.8 cu. yd.

C. 1995 Projection

1. 1995 Annual Production of Compacted Refuse  
 =  $\frac{144.0 \times 5 \times 365}{1000} = 262.8$  cu. yd.
2. Cumulative Compacted Refuse 1990 to 1995  
 =  $\frac{223.8 + 262.8}{2} \times 5 = 1216.5$  cu. yd.
3. Cumulative Compacted Refuse Since 1987  
 = 835.8 + 1216.5 = 2052.3 or 2052.4 cu. yd.



US Department  
of Transportation  
Federal Aviation  
Administration

RMTC	SCA	
OK	WIB	
TM	PIB	
REC'D FEB 4 1986 RMTC		
BT	DRM	
QTY	AK	
WD	YJK	

AIRPORTS DISTRICT OFFICE  
BOX 50244  
HONOLULU, HAWAII 96850  
Telephone: (808)546-7129

February 3, 1986

Honorable Hannibal Tavares  
Mayor, County of Maui  
Haliuku, Hawaii 96793

Dear Mayor Tavares:

We have reviewed the Draft Environmental Impact Statement for the Central Maui Sanitary Landfill Project. We were concerned that this location may increase the potential for birdstrikes at Kahului Airport by presenting a bird attractant; however, coordination with the Air Traffic Tower has determined that this proposal will not increase the bird strike problem.

Thank you for the opportunity to review this project.

Sincerely,

*David J. Melhouse*

David J. Melhouse  
Planning Engineer

Henry A. Sumida  
Airports District Office Manager

cc:  
County of Maui, DPH  
(Attn: Edwin Kagehiro)  
R.M. Tomlin Corp.  
(Attn: Bruce Tsuchida)

NO LETTER OF RESPONSE NECESSARY TO  
FEDERAL AVIATION ADMINISTRATION  
AIRPORTS DISTRICT OFFICE

**END**

CERTIFICATION

I HEREBY CERTIFY THAT THE MICROPHOTOGRAPH APPEARING IN THIS REEL OF  
FILM ARE TRUE COPIES OF THE ORIGINAL DOCUMENTS.

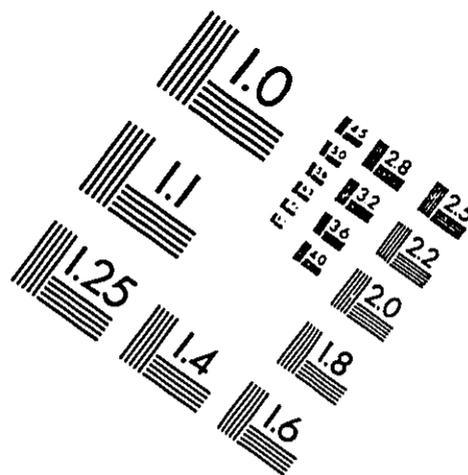
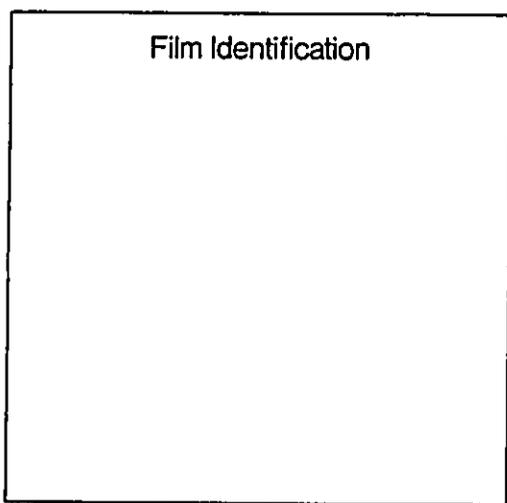
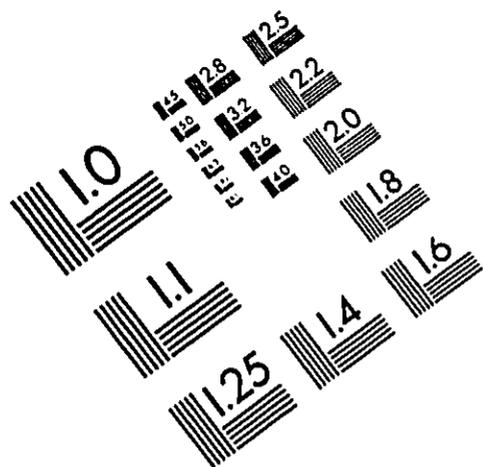
2006

DATE

Sammy Yoshimura

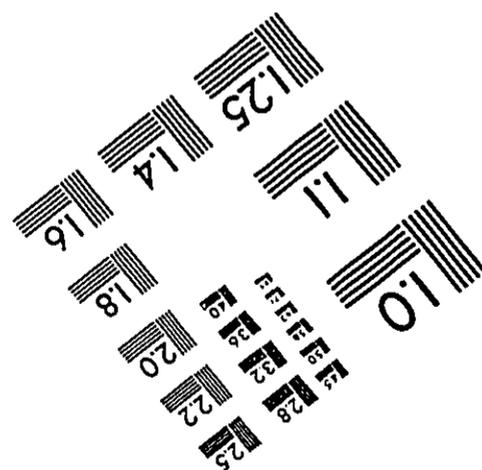
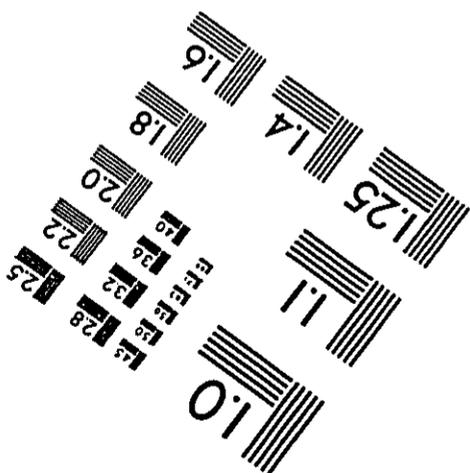
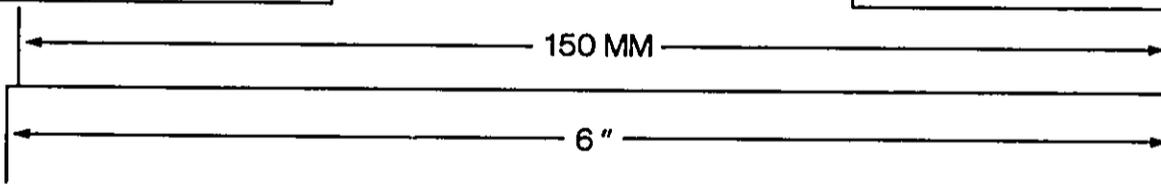
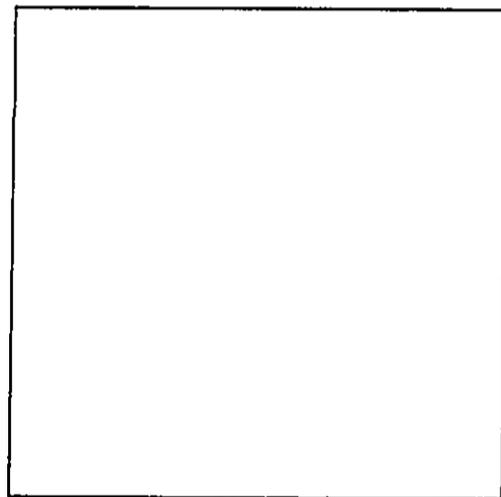
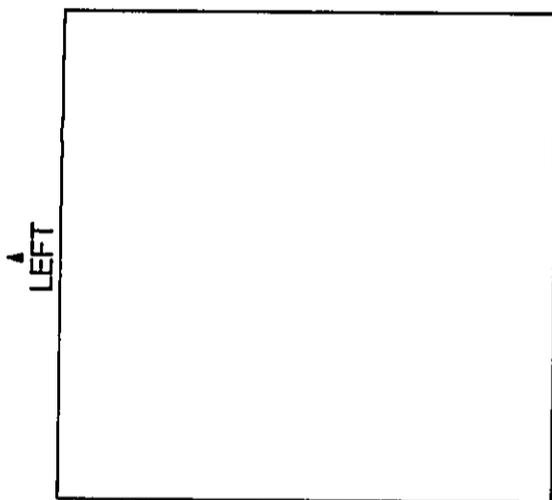
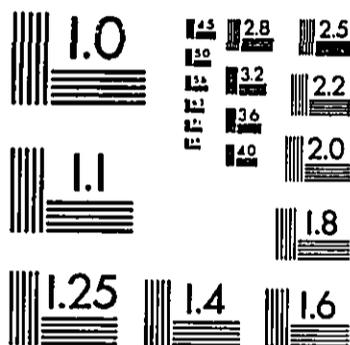
SIGNATURE OF OPERATOR

TOP



A & P International  
715/262-5788 • Fax 715/262-3823  
577 Locust Street • Prescott, WI 54021  
Web Site <http://www.zimc.com/apintl>

PRECISION<sup>SM</sup> RESOLUTION TARGETS



PA-3 8½"x11" PAPER PRINTED GENERAL TARGET

DENSITY TARGET



ADVANCED MICRO-IMAGE SYSTEMS HAWAII