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**KALAHEO SANITARY
LANDFILL**



**REVISED ENVIRONMENTAL
IMPACT STATEMENT**

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CITY AND COUNTY OF HONOLULU

DEPARTMENT OF PUBLIC WORKS

REVISED

ENVIRONMENTAL IMPACT STATEMENT

FOR

THE PROPOSED

KALAHEO SANITARY LANDFILL

(WINDWARD DISTRICT SANITARY LANDFILL PROJECT)

KAILUA, OAHU, HAWAII

TAX MAP KEY 4-2-15:1 and 6

This environmental document is submitted
pursuant to Chapter 343, HRS

Accepting Authority: Department of Land Utilization
City and County of
Honolulu

Responsible Official:

Michael J. Chun
Michael J. Chun
Director & Chief
Engineer

8/2/83
Date

Prepared by: Environment Impact
Study Corporation
Honolulu & Maui, Hawaii

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Summary

SUMMARY

The Department of Public Works proposes the development of a sanitary landfill at Kalaheo to dispose of a portion of the 700,000 tons of refuse produced on Oahu. Until a resource recovery facility is constructed, landfills will continue to be the City's primary method of solid waste disposal.

Even with maximum use of resource recovery, sanitary landfills will be required for the disposal of ash and residue produced by the resource recovery systems and noncombustible material - demolition material, rock and soil.

The project site is located on TMK 4-2-15:1 and 6 which is near the existing Kapaa Sanitary Landfill. The project site is designated within the Conservation district and no agricultural or urban lands will be taken out of production or used for this project.

The project has been designed to minimize significant environmental impacts during the construction and operational phases of the landfill. For example, leachate production will be minimized by installing a perimeter drainage system to divert storm water around the landfill. Leachate production is minimized by preventing water from entering the landfill. Also, monitoring wells and an interceptor trench will be installed as additional safeguards to immediately detect the production of leachate and to intercept the leachate before it can contaminate the ground water.

The landfill will be designed to control erosion by terracing and minimizing the slope. Also, siltation and debris basins will be constructed and installed to contain silt and debris on site.

There are no homes, schools, or hospitals located adjacent to the proposed landfill site which will be adversely impacted by dust, odor, rodents, insects, litter, noise and other potential environmental impacts associated with a landfill project. Most of these adverse environmental impacts are usually controlled by proper maintenance and operation of the landfill.

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

Proposed Project

1

SECTION 1
DESCRIPTION OF THE PROPOSED PROJECT

I. BACKGROUND

At the present time over 700,000 tons of solid waste are disposed of on Oahu each year. Except for the tonnage disposed at the Waipahu Incinerator, 120,000 tons per year, most of the refuse is disposed of at sanitary landfills. Unless a resource recovery facility is constructed, this will continue to be the City's main method of solid waste disposal.

Even with the maximum use of resource recovery, sanitary landfilling will continue to be an important aspect of solid waste disposal because landfills will be used to dispose of the ash and residue produced by the resource recovery systems and the unprocessable wastes such as bulky items, demolition material, rock, and soil. The landfills are also needed to serve as emergency backup facilities during shutdowns of the resource recovery systems.

The Department of Public Works' goals for sanitary landfills are; 1) to continue to operate a landfill in the Windward District to service the Windward side of the island and a portion of the heavily populated Honolulu district, and, 2) to implement a landfill in Leeward Oahu to service the rapidly expanding Leeward area and a portion of Honolulu District.

There are several difficulties in selecting and developing landfill sites on Oahu [1.7]:

1. Limited land space.
2. Restrictions imposed by the Board of Water Supply in the groundwater supply areas.
3. Low cost, undeveloped, suitable lands are scarce.
4. Community objections to landfill.

Potential landfill sites are located in inland areas, away from population centers, but these sites are situated usually over the groundwater aquifers which supply potable water to the population or are potential sources of domestic water supply.

An inventory study of potential landfills on Oahu done in 1977 by Shimabukuro and Associates identified 26 sites. A supplement to this study done in 1979 identified another 10 sites. However, because most sites are; 1) within groundwater supply areas, 2) within close proximity to communities, or, 3) owned by the Federal or State governments and used for other purposes; only 5 sites were considered by the City. One site, Kapaa, has been developed into a landfill and is presently in use. The City plans to use the remaining four sites within the next fifteen years. These sites shown in Figure 1-1, are Kalaheo, and Bellows Field located on Windward Oahu; Waimanalo Gulch and Ohikilolo, located on Leeward Oahu.

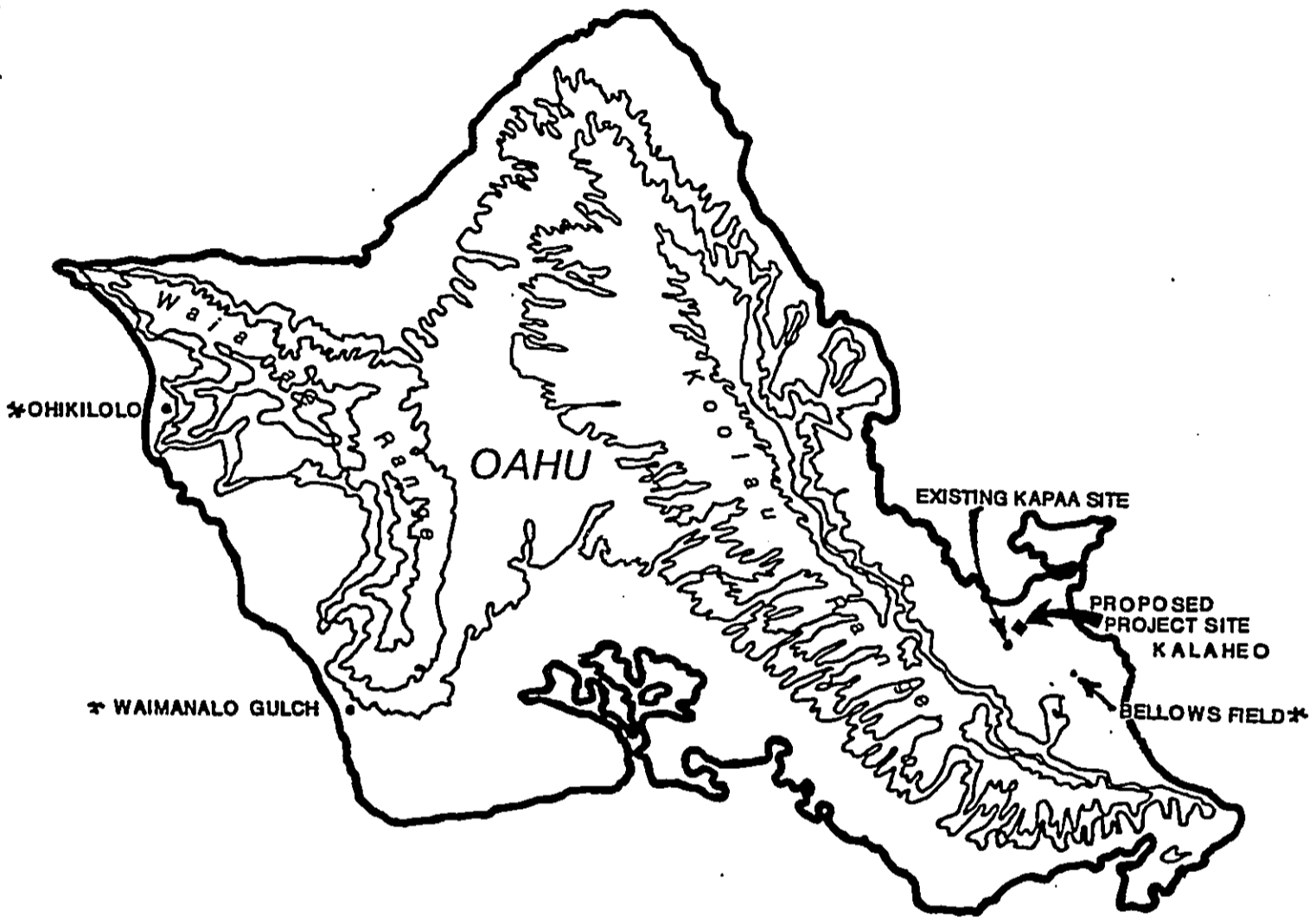
As part of the inventory study several alternative sites in the windward area were investigated and ranked using the criteria presented in Appendix A. The Kalaheo site was ranked behind the Kapaa site followed by Heeia Uka, and Waimanalo North, and Auloa. Heeia Uka and Auloa are no longer considered because of their close proximity to large, dense residences and Waimanalo North is no longer considered because the State is planning to develop the site into an agriculture park. The Bellows Field site was not ranked.

The City therefore, proposes the immediate development of a sanitary landfill at Kalaheo (TMK 4-2-15: portions of 1 and 6). The proposed Kalaheo site is located west of Interstate Route H-3 and Kawainui Swamp, north of the existing HC & D Kapaa Quarry, and south of the Mokapu Saddle Road in Kailua. The site is approximately 2,000 feet northwest of the existing Kapaa Sanitary Landfill, across Interstate Route H-3. Refer to Figures 1-1 and 1-2.

II. EXISTING SOLID WASTE PROCESSING AND DISPOSAL ON OAHU [1.1]

The Department of Public Works (DPW) collects almost all of the refuse generated by residences and smaller business establishments. Others involved in refuse collection or hauling services include:

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
HONOLULU, HAWAII



* PROPOSED SITES

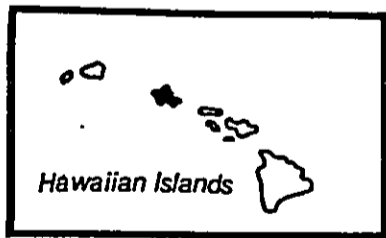
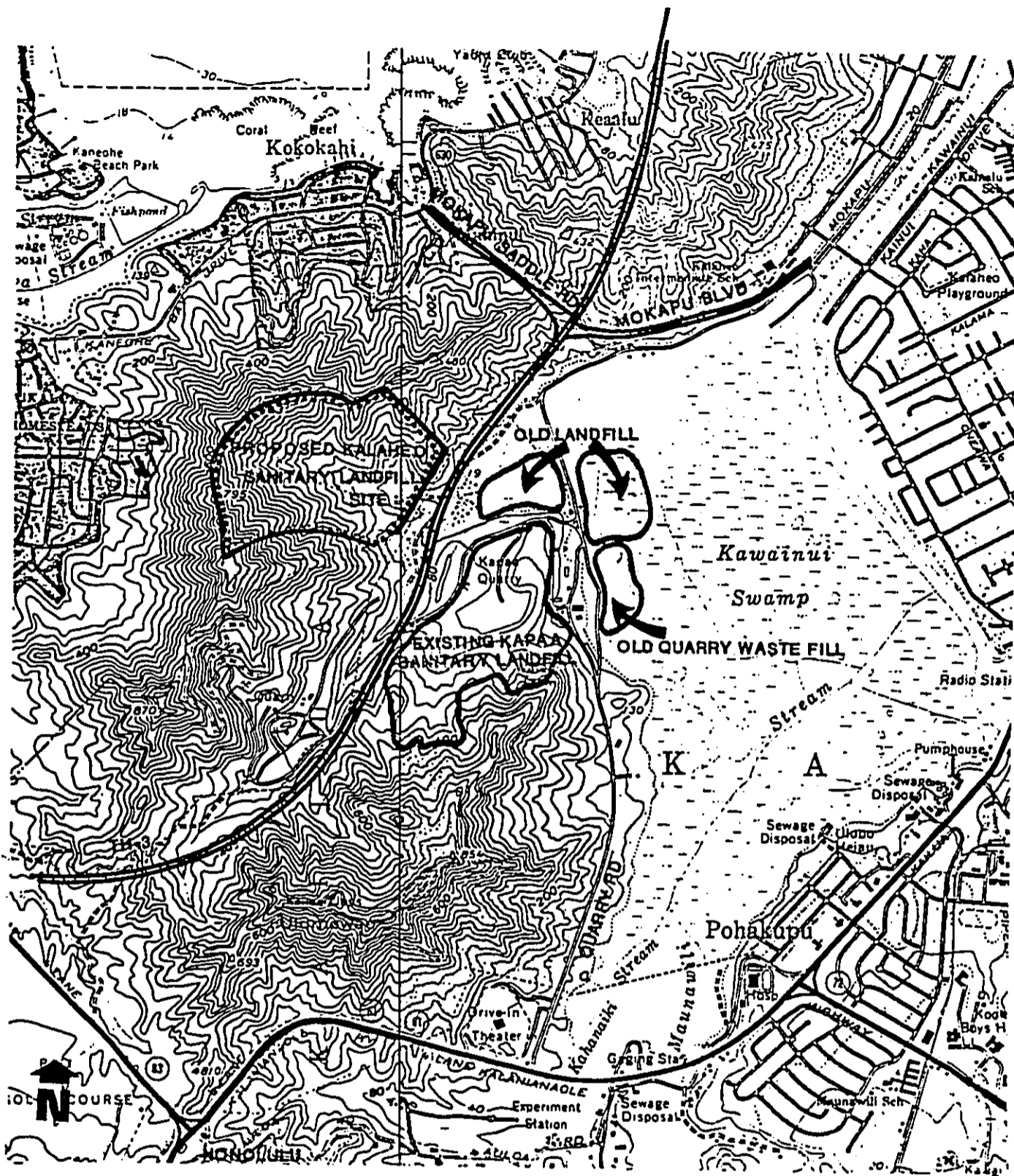


FIGURE 1-1
LOCATION MAP

E.I.S.C.



SCALE: 1:24000

FIGURE 1-2
VICINITY MAP

licensed private haulers; commercial establishments and construction contractors who haul their own refuse to disposal sites; the military; and the State of Hawaii. Generally, condominiums, hotels, and commercial and industrial establishments contract private haulers for collection services. The military either collects its own refuse or contracts with private haulers for solid waste collection. The State provides collection service only to its own facilities. The City and licensed private collectors haul approximately 73 percent of Oahu's solid waste. Refer to Table 1-1.

Presently on Oahu, solid waste is disposed in City (Waipahu Incinerator and the Kapaa, Kawaihoa and Waianae Sanitary Landfills), private (Palailai Sanitary Landfill), and military (Kaneohe MCAS) facilities. The military's Schofield Barracks Landfill was recently closed. The Keehi Transfer Station also plays an integral role in the City's solid waste disposal system. Refer to Figure 1-3.

Based on present rates of disposal (refer to Table 1-2) the above sanitary landfills (SLF) are rapidly reaching their capacity. The Kapaa SLF (present Windward Sanitary Landfill) currently accomodates half of Oahu's total refuse and is estimated to be filled to capacity by the end of 1984. The Waianae and Kawaihoa SLF's are estimated to be closed by the summer of 1984. Palailai SLF is projected to have less than four years of capacity. Only industrial/commercial wastes produced on base are disposed at the Kaneohe MCAS Landfill. While solid waste is incinerated at the Waipahu incinerator at a rate of 120,000 tons per year (TPY), the residue in turn must be deposited in a landfill. The ash disposal site adjacent to the Waipahu Incinerator has an estimated capacity of approximately 5 years.

The purpose of Keehi Transfer Station is to increase cost-effective transporting of solid waste by consolidating several collection loads prior to transport to a disposal facility. Based on the operation of the facility with just one shift, an average of 388 tons per day (TPD) was processed in 1980. The feasibility of installing transfer stations at the existing Kawaihoa, Waianae and Kapaa SLF's is being studied.

Table 1-1

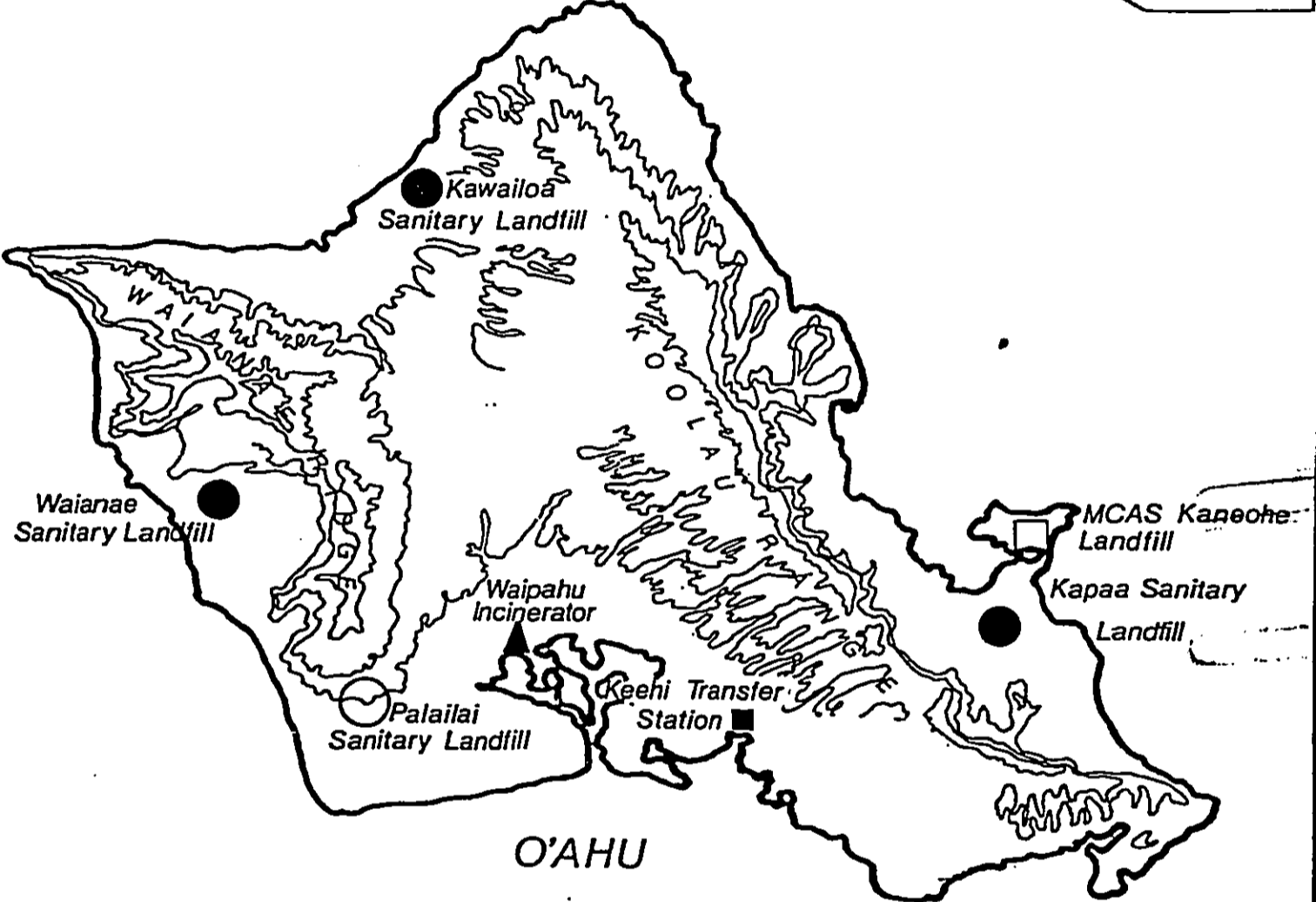
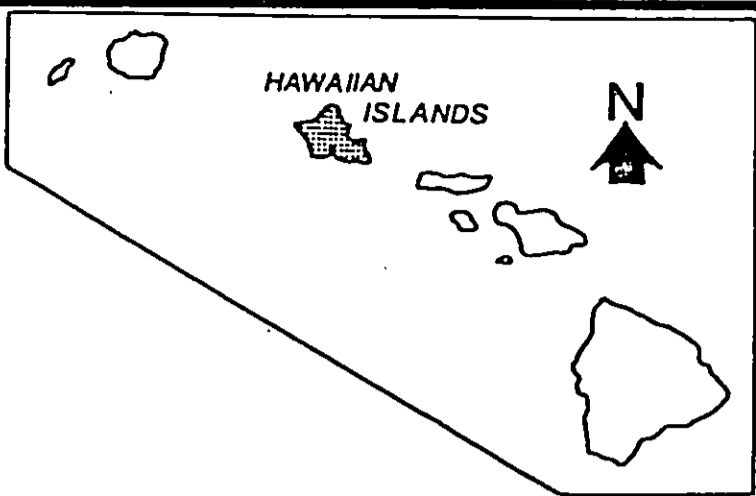
OAHU SOLID WASTE SYSTEM - 1980 CALENDAR YEAR

DISPOSAL SITE	TOTAL TONS	COLLECTION BY			COLLECTION BY		COLLECTION BY "OTHERS" CONTRACTORS, HOUSEHOLDERS, TREE TRIMMERS, ETC.
		CITY REFUSE DIVISION	MILITARY	PRIVATE REFUSE HAULERS	"OTHERS" CONTRACTORS, HOUSEHOLDERS, TREE TRIMMERS, ETC.		
<u>City</u>							
Kapaa L/F	361,000	48,000	-	172,000	141,000		
Waipahu Inc.	119,000	114,000	-	5,000	-		
Waianae L/F	14,000	10,000	-	-	4,000		
Kawailoa L/F	25,000	12,000	-	4,000	9,000		
	519,000 (70%)						
<u>Military</u>							
Kaneohe L/F	10,000	-	10,000	-	-		
Schofield L/F	* 12,000	-	1,000	11,000	-		
	22,000 (4%)						
<u>Privately Owned</u>							
Palailai L/F	196,000	67,000	33,000	96,000	Minor Amounts		
	196,000 (26%)						
TOTAL	737,000	251,000 (34%)	44,000 (6%)	288,000 (39%)	154,000 (21%)		
	2362 TPD**	804 TPD	141 TPD	923 TPD	494 TPD		
<u>Transfer Station</u>							
Keehi TS	121,000						
(City owned)	388 TPD						

* Schofield L/F closed (December 31, 1981)

** Tonnage Per Day (TPD) based on a six-day week.

Source: [1.1]



O'AHU

EXISTING DISPOSAL FACILITIES ON OAHU

- Legend:
- ▲ Municipal
 - Private
 - Military

FIGURE 1-3

Table 1-2

TONNAGE DISPOSITION TO YEAR 2000
(with Resource Recovery)

FY	TOTAL ¹ REFUSE	WINDWARD SANITARY LANDFILL	RESOURCE RECOVERY FACILITY ²	LEeward SANITARY LANDFILL ²	ADDITIONAL RESOURCE RECOVERY FACILITY ³	WAIPAHU INCIN.	PALAILAI SANITARY LANDFILL	WAIANAe SANITARY LANDFILL	KAWAILLOA SANITARY LANDFILL	MILITARY SANITARY LANDFILL ⁴
79-80	2370	1050				390	750	40	70	70
81	2480	1260				390	690	40	70	70
82	2590	1330				390	690	40	70	70
83	2700	1460				390	720	40	70	20
84	2810	1540				390	750	40	70	20
85	2910	1720				390	800	40	70	20
86	2950	1330		730		390	800			
87	2990	420	1800	900		390	600			
88	3020	160	1800	760	890	390				
89	3050	180	1800	770	900	390				
90	3080	190	1800	790	900	390				
91	3110	210	1800	800	900	390				
92	3140	220	1800	820	900	390				
93	3170	240	1800	830	900	390				
94	3200	250	1800	860	900	390				
95	3230	270	1800	860	900	390				
96	3250	280	1800	870	900	390				
97	3270	290	1800	880	900	390				
98	3290	300	1800	890	900	390				
99	3310	310	1800	900	900	390				
2000	3330	320	1800	910	900	390				

¹Refuse generated per day (based on a six-day week).

²Includes ash from Waipahu Incinerator and Resource Recovery Facilities.

³Additional Resource Recovery facilities alternatives include expansion of resource recovery facility, Waipahu Incinerator retrofit, and co-disposal.

⁴MCAS Kaneohe Sanitary Landfill closure FY 83/84 [information from Capt. M. Dallam, CEC, U.S. Navy, Facilities Engineer.]

Source: Refuse Division

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

The tonnage disposition shown for "Windward Sanitary Landfill," in Table 1-2, is the amount of refuse which can be expected to be deposited at the proposed Kalaheo SLF if resource recovery is implemented. Table 1-3 shows the tonnage disposition if no resource recovery facilities are constructed.

III. SANITARY LANDFILLING

A sanitary landfill is an environmentally acceptable method for the disposal of solid waste (refuse). A sanitary landfill is an engineered method in which solid wastes are disposed of by spreading refuse in thin layers, compacting it to the smallest practical volume and covering it with soil each day in a manner that minimizes environmental pollution.

A. Cell Construction

The building block of a sanitary landfill is the construction of a cell, which consists of compacted refuse contained within a soil enclosure. The cell is made by spreading and compacting the refuse in layers (two feet thick) within a confined area (up to 150 feet), and covering the compacted refuse with a thin, daily, continuous layer of soil, (six inches) which is also compacted (to 800-1,000 lb/cubic yard).

Generally the cell is 'square shaped' and its sides are sloped as steeply as practical operation will permit. The sloped sides of 20° to 30° not only minimizes the surface area and the amount of cover material required but also aids in the shredding of the refuse and obtaining a higher field compaction density (up to 800-1,000 lb/cubic yard) - if the refuse is spread in layers not greater than two feet thick and worked from the bottom of the slope to the top. A series of adjoining cells makes up a lift and a series of lifts constitute a sanitary landfill. Refer to Figure 1-4 for an illustrative description of the construction of a cell.

The two basic landfilling methods are the 'area' and 'trench'; other methods are modifications or combinations of the two basic methods. These two methods are further described in the following discussion.

Table 1-3

ASSUMED DISPOSAL LOCATIONS 1980 - 2000
(Without Resource Recovery)

Fiscal Year	Total Refuse*	Waipahu Incinerator	Sanitary Landfill				Military	
			Windward	Leeward**	Palailai	Waianae		Kaunaloa
1979-80	2,370	390	1,050	-	750	40	70	70
81	2,480	390	1,260	-	650	40	70	70
82	2,590	390	1,330	-	690	40	70	70
83	2,700	390	1,460	-	720	40	70	20
84	2,810	390	1,540	-	750	40	70	20
85	2,910	390	1,720	-	800	-	-	-
86	2,950	390	1,330	730	600	-	-	-
87	2,990	390	1,350	1,350	-	-	-	-
88	3,020	390	1,360	1,370	-	-	-	-
89	3,050	390	1,380	1,380	-	-	-	-
90	3,080	390	1,390	1,400	-	-	-	-
91	3,110	390	1,410	1,410	-	-	-	-
92	3,140	390	1,420	1,430	-	-	-	-
93	3,170	390	1,440	1,440	-	-	-	-
94	3,200	390	1,450	1,460	-	-	-	-
95	3,230	390	1,470	1,470	-	-	-	-
96	3,250	390	1,480	1,480	-	-	-	-
97	3,270	390	1,490	1,490	-	-	-	-
98	3,290	390	1,500	1,500	-	-	-	-
99	3,310	390	1,510	1,510	-	-	-	-
2000	3,330	390	1,520	1,520	-	-	-	-

*Refuse generated per day (based on a six-day week)

**Includes ash from Waipahu Incinerator

Source: [1.2]

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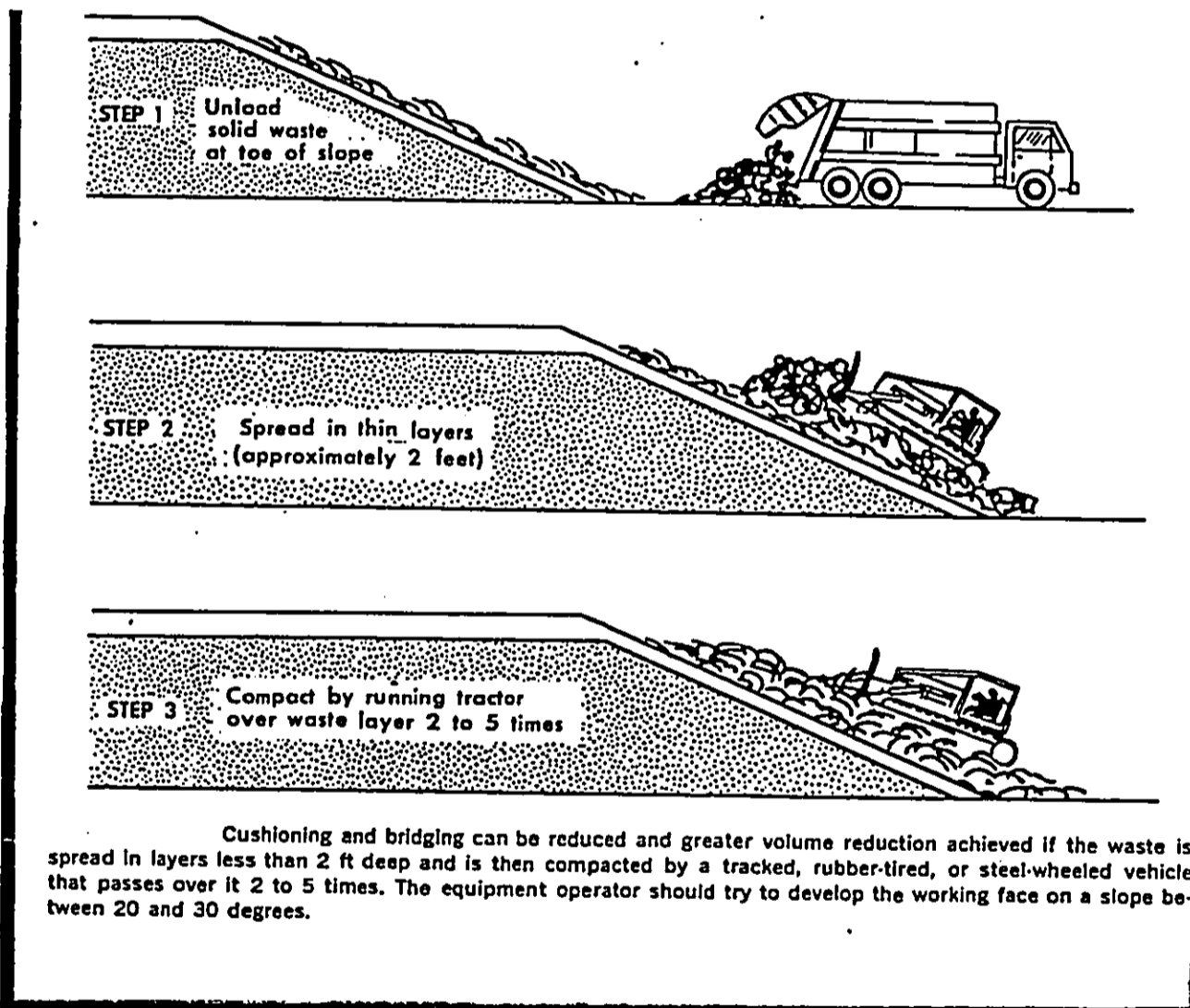
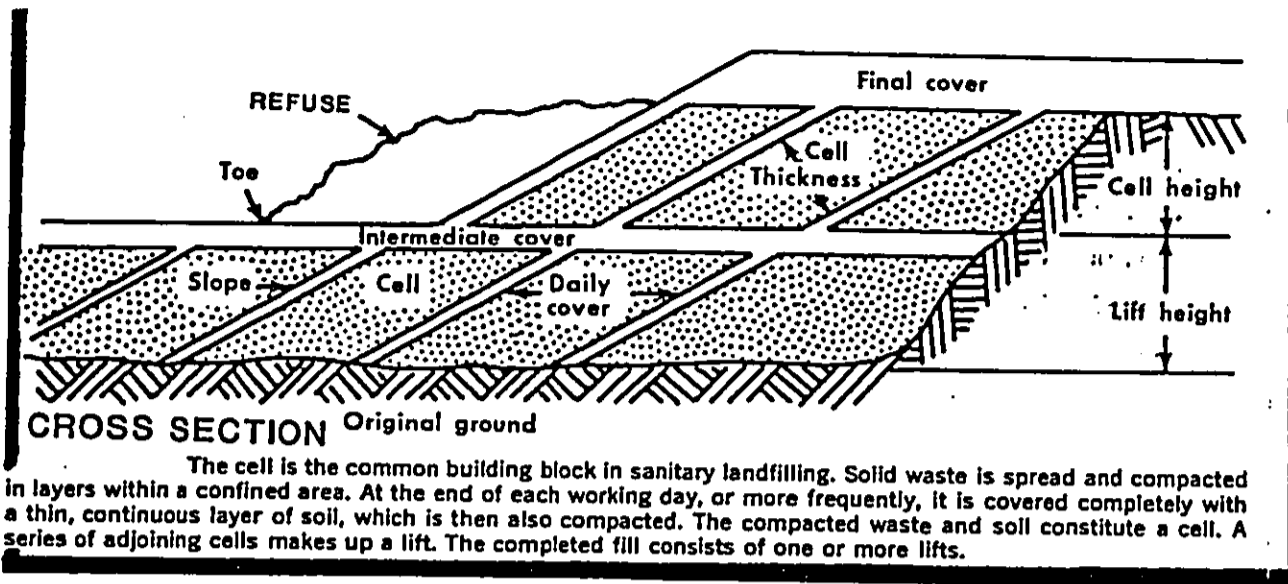


FIGURE 1-4
SOURCE (1.3)

CELL CONSTRUCTION

B. Area Method of Sanitary Landfilling

In this method, the refuse is spread and compacted on the natural surface of the ground and cover material is spread and compacted over it. The area method is used on flat or gently sloping land and also in quarries, ravines, valleys or other land depressions. Refer to Figure 1-5.

C. Trench Method of Sanitary Landfilling

In the trench method, a long narrow excavation is made in the ground and the excavated soil is stockpiled. Refuse is placed in the excavation, spread and compacted. The cover material, which is taken from the spoil of the excavation, is spread and compacted over the deposited refuse to form the basic cell structure. In this method, the cover material is readily available as a result of the excavation and the spoil not needed for daily cover is stockpiled for later use. Refer to Figure 1-5.

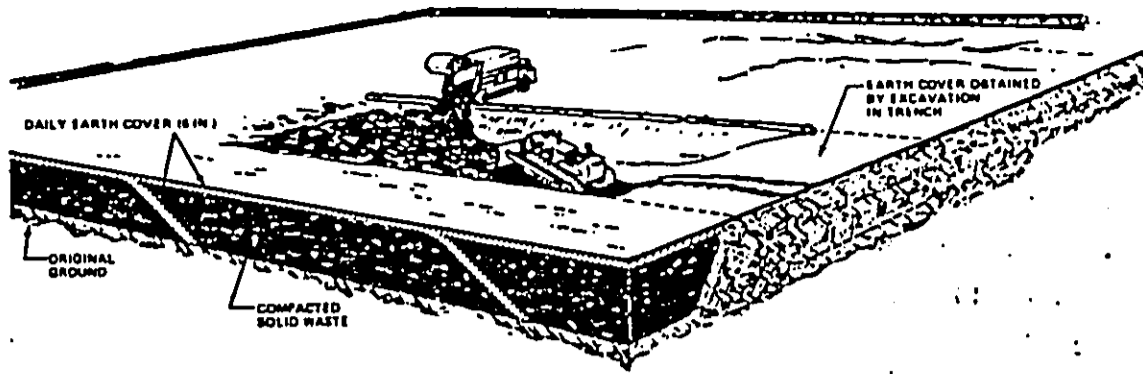
D. Combination Methods

As previously mentioned, the area and trench methods are the two basic methods of sanitary landfilling. However, a sanitary landfill does not need to be operated by using only the area or trench methods. Combinations of the two methods are possible and flexibility in the design and operation of a landfill is one of the greatest assets of a sanitary landfill.

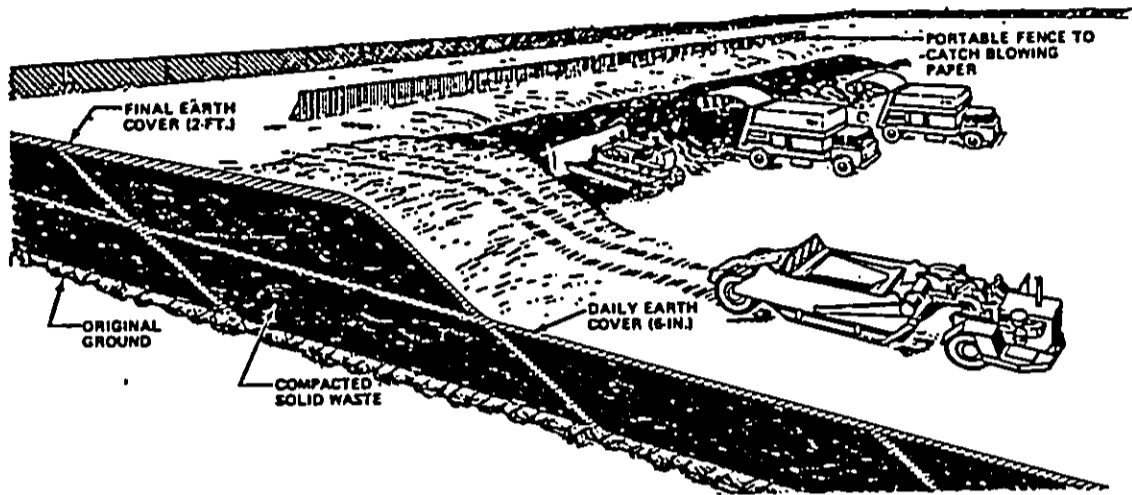
1. Slope or Ramp Method

A common variation is the 'progressive slope' or 'ramp' method, in which the refuse is spread and compacted on a slope. The cover material is obtained directly in front of the working face by daily excavation and the spoil is removed and stockpiled. In this way, a small excavation is made for a portion of the next day's refuse. Refer to Figure 1-5.

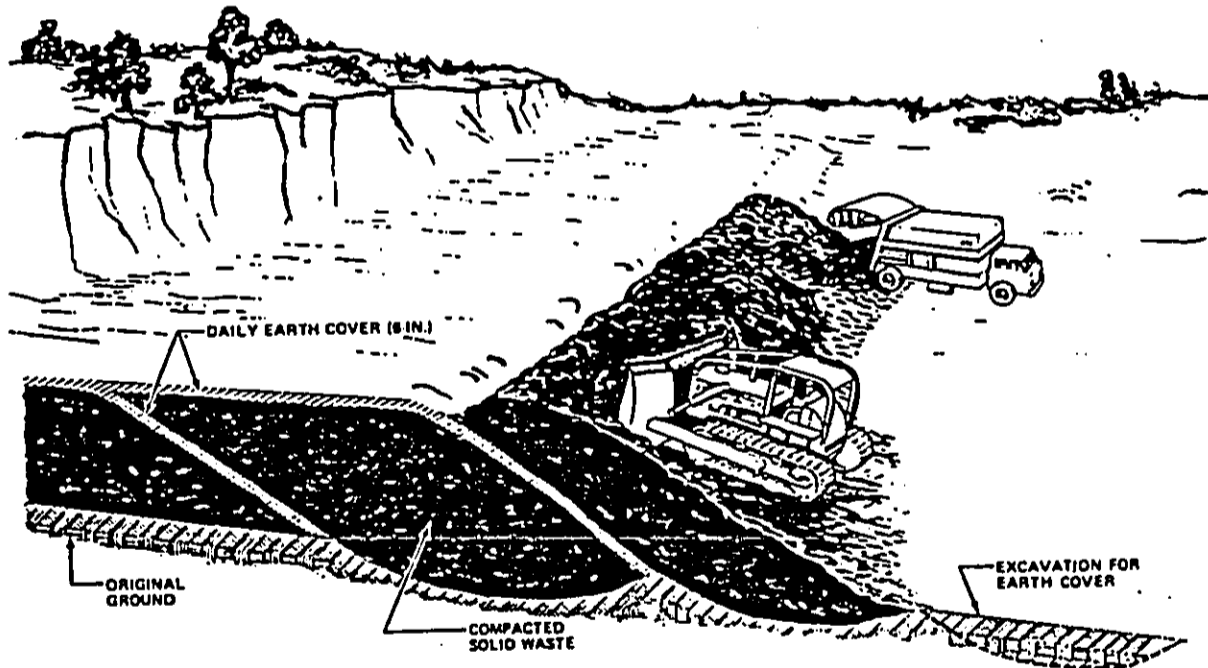
This method allows for more efficient use of the disposal site when a single lift is constructed than the area method does, because cover does not have to be imported and a portion of the waste is deposited below the original ground surface.



In the trench method of sanitary landfilling, the collection truck deposits its load into a trench where a bulldozer spreads and compacts it. At the end of the day, the trench is extended, and the excavated soil is used as daily cover material.



In the area method of sanitary landfilling, a bulldozer spreads and compacts the waste on the natural surface of the ground, and a scraper is used to haul the cover material at the end of the day's operations.



In the progressive slope or ramp method of sanitary landfilling, solid waste is spread and compacted on a slope. Cover material is obtained directly in front of the working face and compacted on the waste.

SOURCE (1.3)

FIGURE 1-5

2. Combination Of Trench And Area Methods

The site conditions determines whether or not a combination of the area and trench method of landfilling is used. In many cases both methods are used within a landfill site if the site has a thick soil zone over much of it and only a shallow soil over the remainder. The initial stage will use the trench method in the thick soil zone and the extra soil material obtained from the trench to carry out the area method of landfilling over the remainder of the site. Once this has been completed, additional lifts can be constructed using the area method by having cover material hauled in.

E. Soil Cover and Placement of Cover Material

1. Soil Cover

The striking visual difference between a 'dump' and a properly designed and operated 'sanitary landfill' is the use of soil cover for the latter. The compacted solid waste is fully enclosed within a compacted earth layer at the end of each working day.

The soil cover material performs numerous functions at a sanitary landfill. The cover material controls flies and other insects by preventing the insects from entering the landfill and their larvae from emerging. Tests conducted on landfills show that a six inch layer of compacted sandy loam soil prevented fly emergence.

The cover material also discourages the entrance of rodents (mice and rats) seeking food and prevents scavenging birds from feeding on the refuse. The daily cover greatly reduces the attraction of birds to the waste and also discourages rodents from burrowing into the landfill to obtain food.

2. Placement of the Cover Material

Cover materials used at a sanitary landfill are generally classified as 'daily', 'intermediate' and 'final'. The classifications depend on the thickness of the soil used. The

thickness is determined by the soils susceptibility to wind and water erosion and to meet certain functional requirements. The guidelines for using different classes of cover material is determined by the length of time the cover material is to be exposed to wind and rain.

For example, if the cover is to be exposed for less than one-week, daily cover (six inch) will suffice. However, if more than a week but less than a year, intermediate cover (one foot) will suffice and if the cover is exposed longer than a year, final cover should be used. Refer to Table 1-4. The cover material is generally compacted to a density of 100 to 135 pounds/cubic foot for coarse grained soils and 70 to 120 pounds/cubic foot for fine grained soils.

Table 1-4

Application of Cover Material		
Cover Material	Minimum Thickness	Exposure Time*
Daily	6 inches	0-7 days
Intermediate	1 foot	7-365 days
Final	2 feet	> 365 days

*The length of time cover material will be exposed to erosion by wind and rain.

a. Daily Cover

The important function of daily cover is the control of vectors, litter, fire and moisture. The daily cover of soil is applied to the compacted refuse at the end of each working day or, when possible, the soil may also be spread and compacted on the top and sideslopes as construction of the cell progresses, leaving only the working face exposed during the day. The working face is closed at the end of each operating day.

b. Intermediate Cover

The functions of intermediate cover are the same as daily cover but may include provisions for gas control and may function as a temporary road base. It is applied in the same manner but differing in the compacted depth of one foot.

c. Final Cover

Final cover functions basically like intermediate cover with the exception that it must also support vegetation. At a minimum, two feet of soil should be used compacted into six-inch thick layers.

3. Grading

Grading is extremely important and the final grade of the landfill is designed to eliminate ponding of water on the landfill surface. Also the final grades are not to exceed two to four percent to prevent water erosion of the final cover material. The side slopes should be less than one vertical to three horizontal to minimize maintenance.

F. Fires

No burning wastes is permitted at a sanitary landfill, but fires occur occasionally because of carelessness in the handling of open flames or "hot wastes".

The enforcement of the following is the first step in preventing fire. Rigid inspection of incoming refuse for smoldering embers and segregation of this waste. Controlled inspection and dumping of refuse at the operating face of the landfill and tight security of the landfill during nonworking hours.

In the event the inspection fails, and a small fire starts at the operating face, all equipment operators are trained to isolate and extinguish the small fires.

For larger fires, waste in the burning area will be isolated so that water and or dirt can be applied. At this stage, the fire department will also render assistance.

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The use of daily cover and the design of the landfill to incorporate 'cells' limits fires to a cell rather than allowing it to spread throughout the entire landfill. This is an effective means of preventing as well as combating a fire once it has started.

G. Decomposition Gas Production

The natural decomposition of refuse produces gas as a byproduct of the decomposition process. The quantity of gas generated and its composition is dependent on the type and amount of refuse.

Methane and carbon dioxide are the major constituents of landfill decomposition gas but other gasses are also present and some may impart a repugnant odor. Landfill gas is important to consider because methane gas can explode when present in air at concentrations between five and fifteen percent. Since there is no oxygen present in a landfill when methane concentration in it reaches this critical level, there is no danger of the landfill exploding. If the methane vents into the atmosphere, it may accumulate in buildings or other enclosed spaces and present a potential problem. This can be easily prevented by venting the gas and preventing movement by the use of impermeable barriers.

Methane gas production from sanitary landfills is not necessarily a liability. Recovering, purifying, and marketing methane gas produced in sanitary landfills are being explored as a means of controlling gas migration, and eliminating a potential hazard, while utilizing an otherwise unexploited resource. Los Angeles has been successful in recovering methane gas from its landfill since 1974. The extracted gas runs an internal combustion engine that produces 200 kilowatts of electrical power for about 350 residences. The NRG NuFuel Co. and the sanitation districts of Los Angeles County are also trying to recover methane from a landfill. The extracted methane has been cleansed for insertion into a natural gas pipeline. "The city of Mountain View, California and the Pacific Gas & Electric Co. are cooperating with EPA in a pilot effort to define parameters involved in gas extraction and to investigate marketing alternatives." [1.5].

H. Leachate [1.11]

Groundwater or infiltrating surface water moving through refuse can produce leachate. Leachate is a solution containing dissolved and finely suspended solid matter and microbial waste products. The exact composition of the leachate varies from one location to another and is dependent on the composition of the refuse.

The leachate percolating through the soils underlying and surrounding the landfill is subject to purification of the contaminants by ion exchange, filtration, absorption complexing, precipitation and biodegradation.

Leachate production is dependent on the availability of water entering the landfill. Through sound engineering design and proper operation, leachate production and movement may be prevented or maintained to the extent that it will not create a water pollution problem. Therefore, the most obvious means of controlling leachate production and movement is to prevent water from entering the sanitary landfill to the greatest extent possible. This can be accomplished by the installation of drainage system around the landfill, correct slopes and grades within the landfill and the use of proper soil cover.

IV. PROPOSED KALAHEO SLF DEVELOPMENT

A. Site Ownership and Land Use

The project site is owned by Michael C. Baldwin Trust, John C. Baldwin Trust, James C. Castle, Jr. Trust and James C. McIntosh Trust, with a small portion of the site leased by HC&D, Ltd. The site is unused and thick with vegetation, a description of which is presented in Section 2.

The State Land Use Designation for the site is Urban and Conservation (Subzones General and Limited). The City and County of Honolulu's General Plan designates the site as Agriculture and the zoning is P-1 (Preservation) and R-6 (Residential). Further details about the land use characteristics and planning for the area are presented in Section 3. The proposed Development Plan designation is for a solid waste public facility.

B. General Site Characteristics

As shown in the photograph of the site (Figure 1-6) the existing topography is a large hillside gulch, shaped much like an amphitheater. "Four defined gullies are located in this depression which begins at elevation 50 feet at the lower eastern end mauka to Interstate Route H-3 and rises westward to elevation 490 feet over a distance of 2300 feet. The site is approximately 1400 feet wide at its widest point."

"The longitudinal slope of the site varies from 6% at the lower end to 45% at the upper end with an average slope of about 23%. The transverse slope of the depression varies from 0% to 10% near its gullies and from 20% to 60% at its upper ends. . . The depth of the depression from the top of the ridges to the gullies varies from 50 feet near the lower end to over 300 feet at the upper end." [1.7]

While the approximate area of the gulch is 100+ acres, only a portion of the lower reaches of the gulch, 50 + acres, is usable as a sanitary landfill. Presently, there is no direct access to the site.

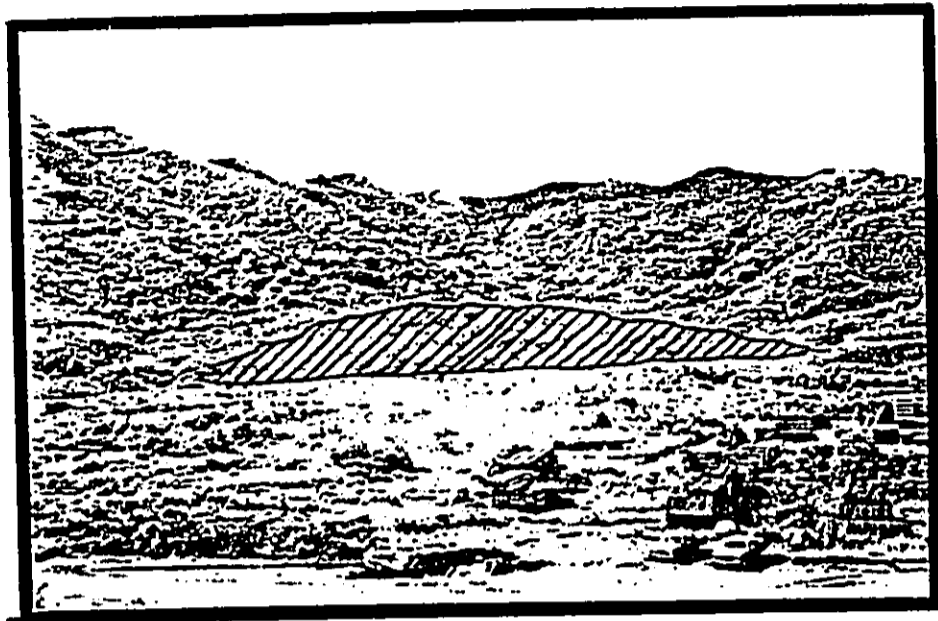
The site's capacity is approximately 5,585,000 cubic yards. Based on an expected average daily disposal rate of 1,300 tons, the estimated landfill life for this site is 5 years.

C. Initial Site Improvements and Construction

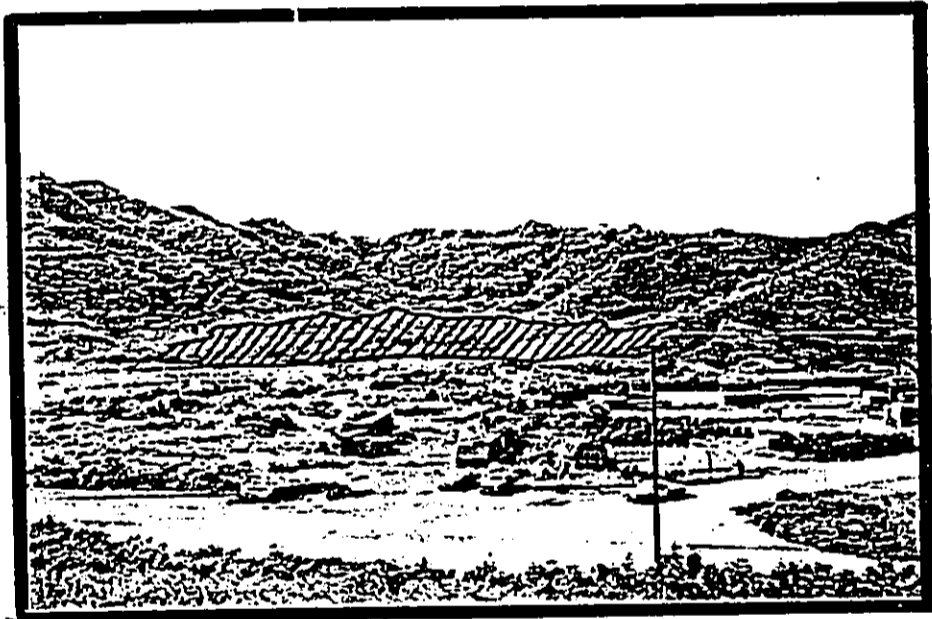
During the initial phases of construction, the existing electrical power line that traverses the site will be relocated. This phase will be coordinated with Hawaiian Electric Company. As the line is being relocated, construction of the access route will commence, and finally, site preparation and construction of the necessary ancillary facilities can be started.

Site preparation will involve clearing and grubbing portions of the site of vegetation and initial grading. Further site improvements include the installation of a peripheral storm drainage system, and leachate interceptor trenches.

FIGURE 1-6
PHOTOGRAPH OF SITE
NORTHWEST VIEW



OUTSIDE
PROJECT AREA



OUTSIDE
PROJECT AREA


 approximate project boundary

FIGURE 1-6

1. Proposed Access Routes to the Site [1.8]

Four alternative access routes to the project site have been considered. A discussion of the four routes is presented below and are shown in Figures 1-7 and 1-8.

- Alternative A - Alternative A proposes the utilization of the Ameron HC&D access road to the Kapaa Quarry Plant. A connecting roadway would be constructed on the west side on Interstate Route H-3's Kapaa Quarry Separation and would parallel the freeway right-of-way to the proposed project.

This alternative route, and Alternatives B and C, would have a 40-foot-wide pavement. Alternative A will require a 10-foot shoulder and a metal beam guardrail on the Route H-3 side of the access road. A 6-foot shoulder will be provided on the western side of the access road. It is proposed that a chain link fence be constructed along the existing Ameron HC&D Access Road fronting the wire fabrication facility and storage area.

This route will also require several culvert crossings which would duplicate the drainage provisions along the Interstate Route H-3, including a 144-inch (12 foot diameter) pipe culvert near the Kapaa Quarry Separation.

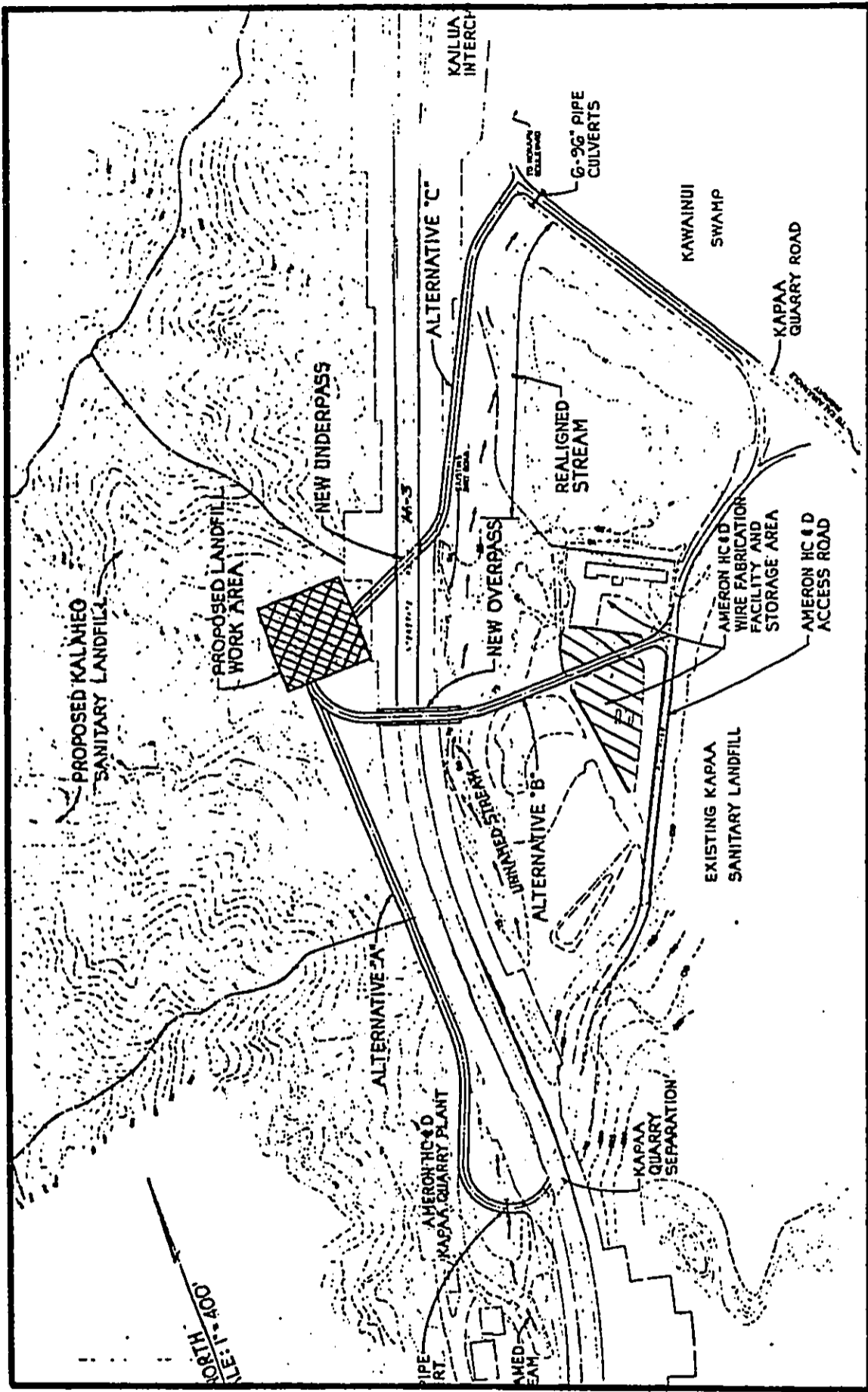
The estimated construction cost for Alternative A is \$1.3 million.

Advantage:

- Most economical; crosses the interstate freeway at an existing underpass

Disadvantages:

1. May present litter problems to Ameron HC&D Kapaa Quarry operation
2. Potential for security problem for Ameron HC&D wire fabrication facility and storage area



ALTERNATE ACCESS ROUTES

FIGURE 1-7



3. Potential for traffic problems that may be presented by the mix in traffic vehicles bound for the proposed landfill and Ameron HC&D

- Alternative B - Alternative B provides direct access from the Kapaa Quarry Road over the Interstate Route H-3. A 52-foot-wide bridge would be constructed, spanning approximately 450 feet.

This alternative would provide for 6-foot graded shoulders and a chain link fence on both sides of the access road.

The construction cost estimate for Alternative B is \$4.3 million, mostly for the bridge structure.

Advantage:

- Shortest, most direct route to project site

Disadvantages:

1. Prohibitive construction cost of the bridge structure
2. Displacement by the access road of a portion of the HC&D storage area fronting the wire fabrication facility

- Alternative C - Alternative C involves the construction of a paved roadway on an existing dirt road between the unnamed stream and H-3 highway, from Kapaa Quarry Road. A new underpass under H-3 will be required, to connect the proposed access road to the project site. This alternative will also require the realignment of the unnamed stream and improvement of a section of Kapaa Quarry Road. As Kapaa Quarry Road is subject to periodic flooding in the section between this proposed access connection and the connection to the Ameron HC&D Access Road, the road profile may have to be raised in order to provide for drain pipe culverts.

In addition, 6-foot graded shoulders on both sides of the improved section of Kapaa Quarry Road and the new access road are proposed.

The construction cost for Alternative C is estimated at \$2.2 million.

Advantage:

- Reduces the mix between Ameron HC&D traffic and proposed SLF traffic

Disadvantages:

1. Requires new underpass structure
 2. Requires drainage improvements to alleviate existing drainage problem on Kapaa Quarry Road
 3. Requires relocation of existing 36-inch waterline on Kapaa Quarry Road
 4. Connects with the existing Kapaa Quarry Road at a curve.
- Interchange Alternative - An Interchange Alternative (which was not part of the project traffic consultant's study) is shown in Figure 1-8 and provides direct access to Interstate Route H-3 for traffic going to and coming from Windward Oahu, between Kaneohe and Kahuku. Traffic going to and coming from Kailua is expected to be relatively light and will continue to use the existing Kapaa Quarry Road.

A 12-foot wide offramp would be constructed just north of the Kapaa Quarry Separation Structure No. 1 and would connect to Kapaa Quarry Road on the east side of H-3. The quarry road on the west side of H-3 would be extended approximately 1200 feet from Separation Struc-

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ture No. 2 toward the Halekou Interchange, ending in a 12-foot wide onramp to H-3. Vehicles utilizing the onramp will be ascending a 4% to 5% grade. To allow trucks to attain the necessary speed to safely merge with highway traffic, the onramp will merge with H-3 just past the crest of the hill. Access from Kapaa Quarry Road to the project site will be provided by a new roadway as described in Alternative A.

Because of its proximity to the Halekou Interchange (less than the Federal guideline of one mile), approval of the interchange may be granted on a temporary basis, with the stipulation that it be demolished and removed upon closure of Kalaheo Sanitary Landfill.

The estimated construction cost for the Interchange Alternative, including \$1.3 million for an Alternative A roadway, is \$2.3 million.

Advantage:

- Direct access to H-3 for predominant flow of traffic.

Disadvantages:

1. See disadvantages of Alternative A.
2. Possible temporary approval and associated demolition costs.

The project traffic consultant has recommended Alternative A as the most desirable access route to the project site. Potential security problems will be mitigated by the installation of chain link fencing. Furthermore, preliminary traffic analysis indicates that except for the City's refuse pickup vehicles that arrive early in the morning, landfill traffic is generally spread out over the day. Private vehicular traffic is heaviest on the weekends when Ameron HC&D operations

INTERSTATE ROUTE H-3
 F.A.I. PROJ. NO. I-H3-1(6):12

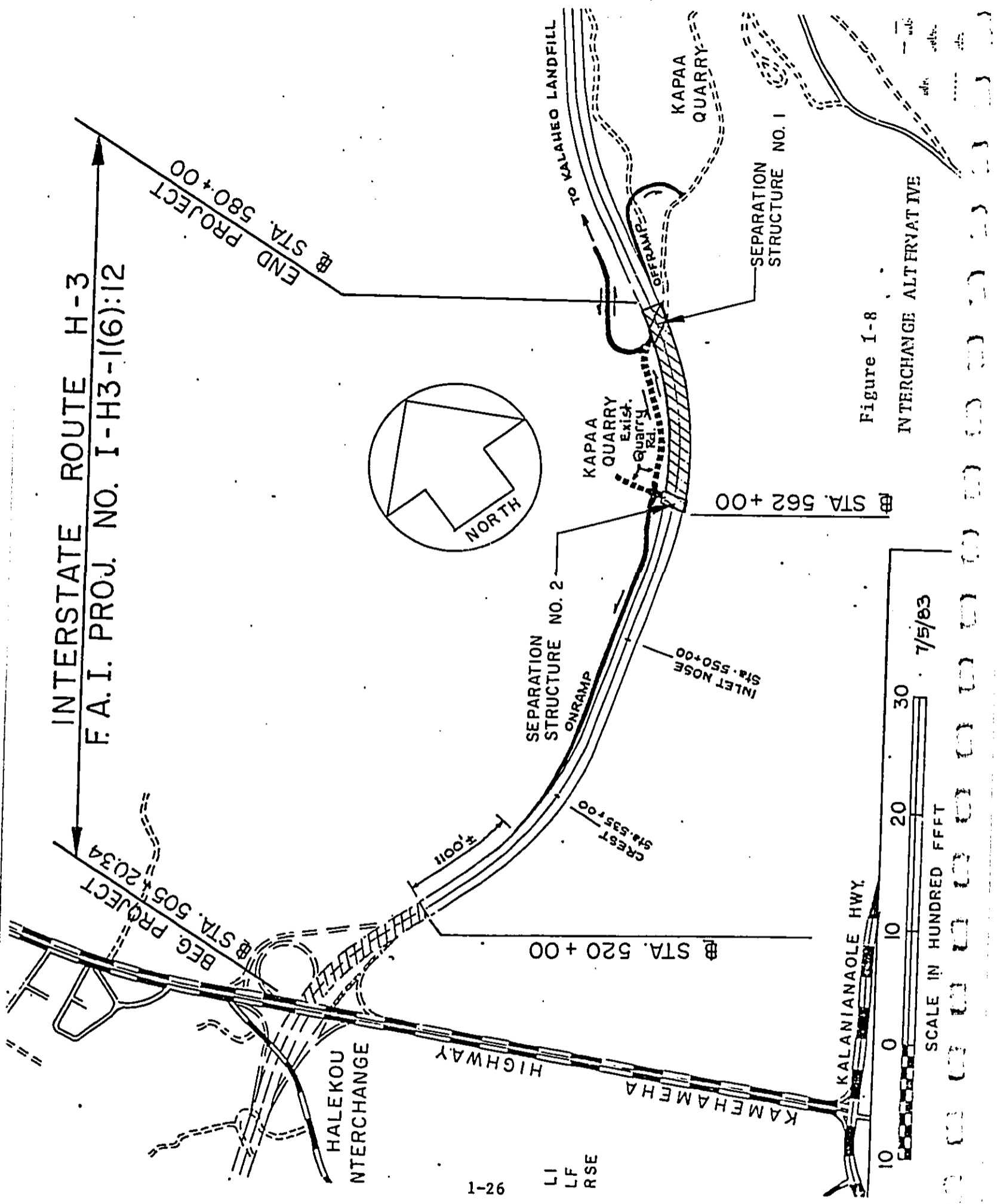
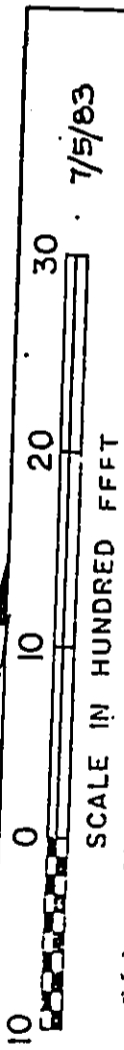


Figure 1-8
 INTERCHANGE ALTERNATIVE



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are either relatively light or closed down. Furthermore, it is the most economical alternative because it utilizes an existing crossing. As access to the project site is expected to account for a major portion of the site development costs, this alternative is considered the most attractive and cost effective.

The Interchange Alternative was recently developed by the City and County and was not part of the analysis conducted by the traffic consultant. If this alternative were to be acceptable to other governmental agencies, this access could be selected.

2. Peripheral Storm Drainage System

Existing storm water drainage at the site sheet-flows into the gully, with overflow discharging into Kawainui Swamp via the unnamed stream. Since excess water entering a landfill can contribute to leachate production, a peripheral drainage system to divert storm water around the landfill is required. Excess storm water collected by the proposed drainage system will be directed to siltation basins prior to conveyance to an existing 120-inch pipe culvert under Interstate Route H-3. Debris barriers will be provided as the drainage exits the siltation basins.

3. Leachate Interceptor Trenches

With the amount of precipitation in this area of the island, leachate formation and migration can be expected unless mitigative measures are taken in the sanitary landfill's design, operations, and maintenance. Also, other provisions will be taken, in addition, to a monitor program and if required, mitigate measures implemented to limit leachate generation.

One of the primary mitigative measures which will be taken is the installation of a peripheral drainage system to be constructed around the landfill. This drainage system

will be designed to divert most of the storm runoff around the site and prevent it from entering the sanitary landfill. While the drainage system will be able to divert surface water around the site, it will not be able to prevent precipitation from falling directly on the landfill's surface. Mitigative measures proposed to reduce the amount of leachate produced within the sanitary landfill include the use of:

- (1) cover soil of adequate thickness and density,
- (2) erosion-resistant, low-maintenance and high-transpiration rate vegetation,
- (3) final grades of 3%-5%, and
- (4) a maintenance program during operation and after completion of landfilling activities.

The soil cover cannot be completely impervious or gas venting will not occur. Potential penetration of water into the sanitary landfill can be effectively mitigated by utilizing grades of 3%-5% to encourage surface runoff from the completed surfaces. Simultaneously, use of high transpiration rate vegetation during the landscaping portion of the maintenance program would reduce the potential of significant amounts of moisture penetrating below the root zone of the vegetation. The maintenance program would involve grading, as necessary, to prevent ponding of water on top of the landfill, and to fill surface cracks which may develop within the landfill.

Findings of a leachate monitoring program at the existing Kapaa SLF indicate the absence of leachate in the marsh. The proposed Kalaheo Sanitary Landfill site is similar to the Kapaa site in hydrogeologic aspects, and there is no evidence that would suggest that leachate accumulation and migration characteristics at the proposed project would differ signifi-

cantly from those at the Kapaa SLF. The findings of the leachate monitoring program at Kapaa indicate that no leachate has been detected and that, if leachate is entering groundwater sources, the present effect can be considered minor. These findings support the premise that any leachate generated will be contained on-site in the short-term. Although the leachate from Kapaa SLF may eventually migrate to Kawainui Swamp via the water table, continuation of the monitoring program should be adequate to detect this process in the early stages. It should be noted that as the initiation of the monitoring program occurred ten years after the start of the Kapaa SLF activities, the findings indicate that rapid migration of leachate has not taken place.

Despite the above stated mitigative measures some leachate generation from the sanitary landfill can be expected. For this reason, leachate interceptor trenches will be incorporated into the sanitary landfill design. The trenches will be about 3 feet deep and 2 feet wide with a minimum 1% gradient, backfilled with coarse gravel, and a pipe within the gravel will conduct collected leachate to sumps located at the lowest level of the gradient.

4. Utilities

Water for the site will be made available from an existing 36-inch transmission line that runs along Kapaa Quarry Road. Water will be required for the 8 to 9 persons employed at the site, including equipment operators and spotters. Water is also required for dust control and equipment cleaning. In addition, during the day the public uses the office restroom. Plans for water requirements and necessary distribution to the proposed site will be coordinated and reviewed by the Board of Water Supply prior to construction.

During relocation of the existing power line at the site, necessary electrical improvements for the office and

maintenance facilities will be completed. All such plans will require review and approval from Hawaiian Electric Company prior to construction. Telephone lines will be provided from existing lines located along Kapaa Quarry Road. This will be coordinated with Hawaiian Telephone Company.

5. Operation and Maintenance Facilities

Necessary facilities required for operation and maintenance of the sanitary landfill include an office facility with a restroom. Since the municipal sewer system does not serve the project area, a cesspool designed according to regulations specified by the State of Hawaii Department of Health is proposed. The office facility may include an office area, scale room, restroom, lunchroom, and maintenance shed. The facility will be fenced to deter vandalism.

V. PROPOSED KALAHEO SANITARY LANDFILL OPERATIONS

Municipal and private refuse collection trucks using the facility will first be weighed before proceeding to the deposition area. Private refuse collection trucks will be charged a fee based on the weight of the load. Homeowners' and non-profit-related vehicles are allowed to proceed directly to the landfill area but the number of vehicles is recorded.

Vehicles approaching the deposition area will be routed by a landfill attendant who will direct the vehicle to the area of the landfill accepting the type of refuse load. The type of refuse accepted at a municipally operated sanitary landfill is standard residential and commercial refuse, some dead animals, demolition materials, and dewatered and digested sludge from sewage treatment plants. Approximately 17 municipal collection trucks (34 round trips), 260 private commercial vehicles, 160 public self-haul vehicles and military collection trucks are expected to use the facility daily. The peak hours for refuse traffic at the sanitary landfill are anticipated to be between 7:00 AM and 11:00 AM, when the City's refuse collection vehicles are in operation.

Refuse unloaded at the working surface will be spread in layers less than two feet deep. Tracked steel-wheeled vehicles will compact the refuse by passing over the layer two to five times. This procedure will be repeated as required according to incoming refuse quantities. At the end of each day, the compacted waste will be covered with a six-inch soil cover, in compliance with Chapter 58 of Title 11, Administrative Rules on Solid Waste Management Control, State Department of Health to mitigate possible vector, odor, fire, and litter problems [1.9]. Sufficient cover material is either available on-site or will be purchased. Hazardous wastes will not be accepted in the proposed sanitary landfill.

As sections of the proposed sanitary landfill attain their design capacities, these areas will be layered with a final soil cover and landscaped according to the engineering management plan. As previously discussed, the sanitary landfill will require periodic maintenance after completion to assure that proper gas and leachate monitoring and mitigative measures are maintained.

VI. FUNDING

Excluding the cost of constructing a vehicular access route to the site, the cost of the proposed project is estimated at \$17,814,000, and will be funded by the City and County of Honolulu. The access route construction costs are dependent upon the access alternative ultimately selected. A breakdown of construction costs is given in Table 1-5.

TABLE 1-5
PROJECT COST

<u>Item</u>	<u>Cost</u>
Development Cost	\$3,494,000
Equipment Cost ¹	\$2,963,000
Administrative, Operation, Maintenance & Supply Cost ¹	\$11,357,000
Fixed Subtotal	\$17,814,000
 Access	
Alternative A	\$1,300,000
Alternative B	\$4,300,000
Alternative C	\$2,200,000
Interchange Alternative	\$2,300,000

¹ Cost over 5 years (landfill life)

REFERENCES TO SECTION 1

- [1.1] Interim Solid Waste Management Plan. July 1981. City and County of Honolulu Department of Public Works.
- [1.2] Takara, Roy. June 1982. Personal Communication. Division of Refuse, Department of Public Works, City and County of Honolulu.
- [1.3] Sanitary Landfill Design and Operation. 1970. Prepared by D.R. Brunner and D.J. Keller for the U.S. Environmental Protection Agency, Washington, D.C.
- [1.4] Ibid.
- [1.5] Decision-Makers Guide in Solid Waste Management. 1976. Environmental Protection Agency. Page 89.
- [1.6] Leachate Study, Landfill Inventory Study, City and County of Honolulu. 1977. Prepared by EMCON Associates for City and County of Honolulu Department of Public Works.
- [1.7] Inventory of Potential Sanitary and Demolition Landfill Sites on the Island of Oahu. August, 1977. Prepared for the City and County of Honolulu Department of Public Works by Stanley S. Shimabukuro & Associates, Inc.
- [1.8] Draft Kalaheo Sanitary Landfill Alternative Access Road Study. 1982. Prepared by Austin, Tsutsumi & Associates for Environment Impact Study Corp. (This report evaluated Alternates Access routes A through C. The "Interchange Alternative" was developed by the City and County, Division of Refuse and Collecting Department of Public Works.)
- [1.9] Public Health Regulations Chapter 58 of Title 11, Administrative Rules on Solid Waste Management Control. State of Hawaii Department of Health. Honolulu, Hawaii.
- [1.10] Op. Cit., [1.3], p. 35, Table 6.
- [1.11] Op. Cit., [1.3], p. 4.

**Affected
Environment**

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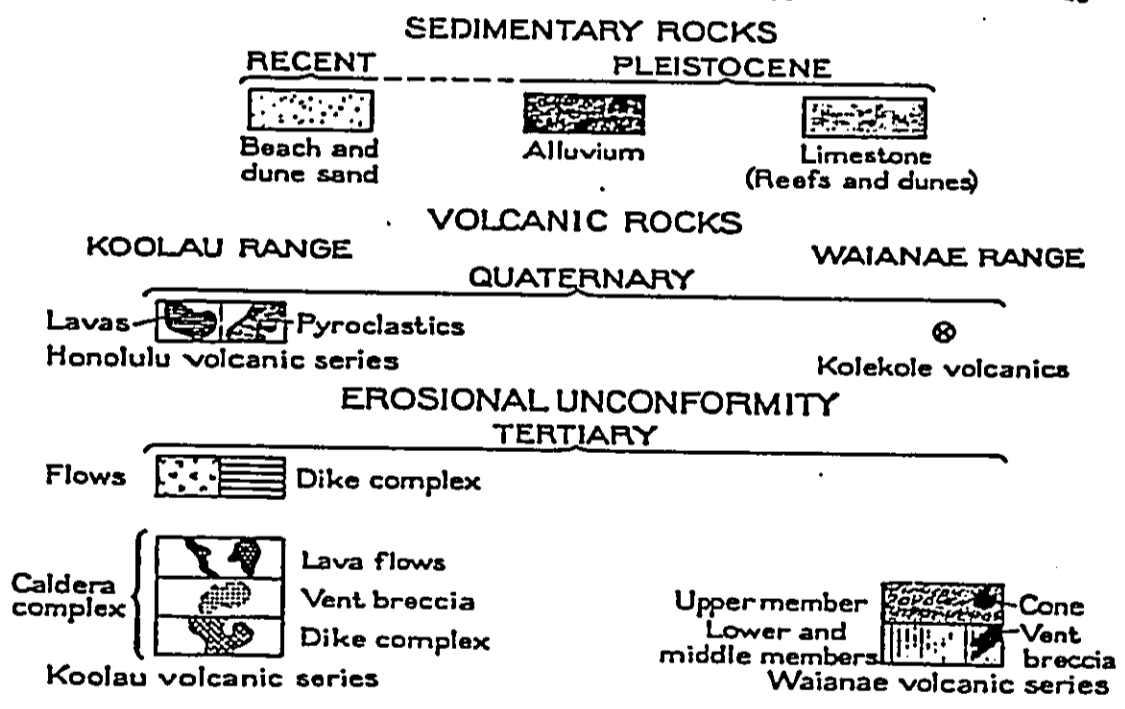
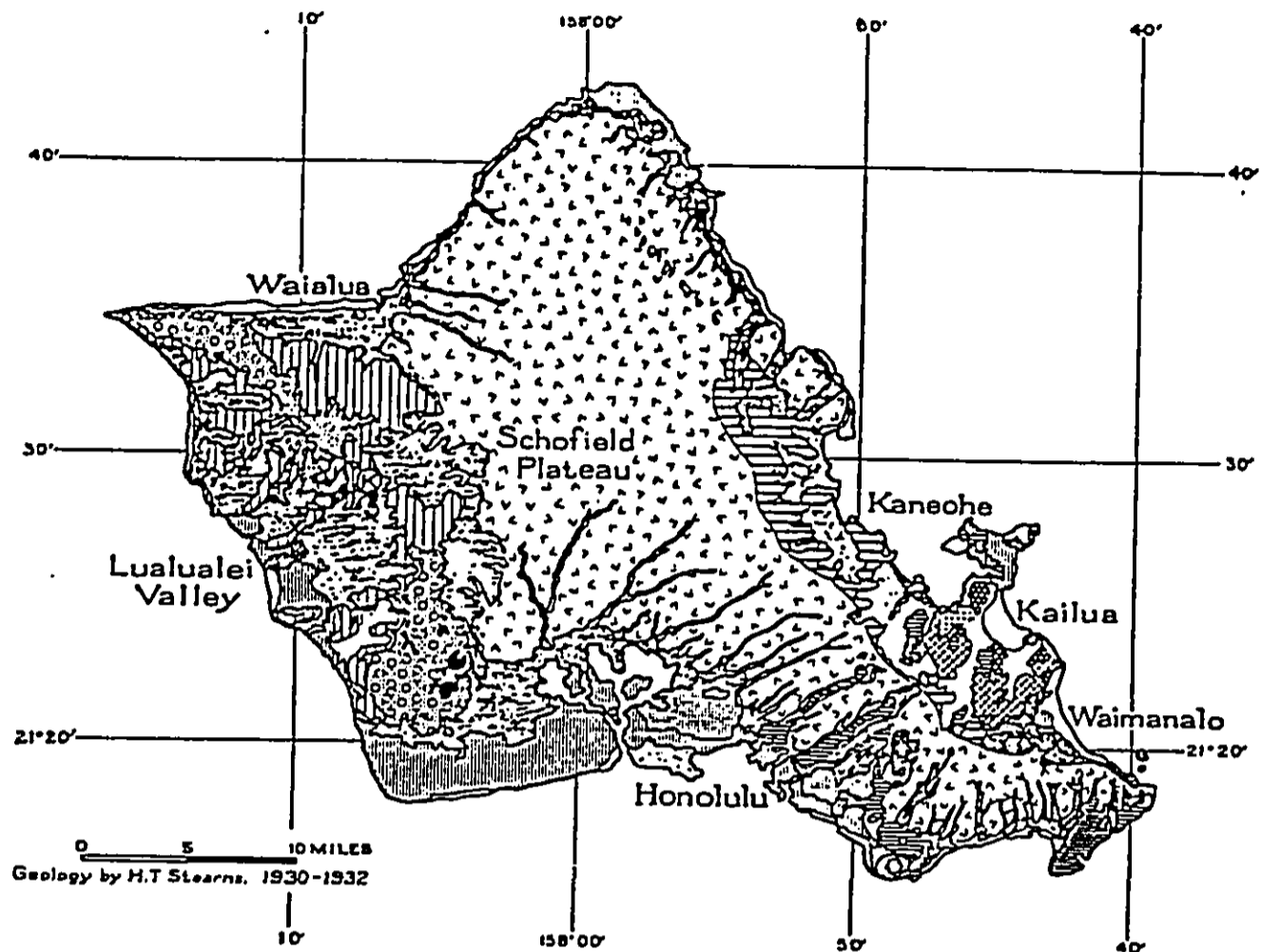
SECTION 2
DESCRIPTION OF THE AFFECTED ENVIRONMENT

I. PHYSICAL CHARACTERISTICS

A. Regional Geology

The island of Oahu represents eroded remnants of two shield (broadly rounded, dome-shaped) volcanoes, Waianae and Koolau. The Koolau volcano was the more recent of the two and its lavas, Koolau Volcanic Series, flowed and banked against the Waianae volcano shield to form the Schofield Plateau. After a long quiet period during which erosion cut canyons several thousand feet deep another series of lava flows, Honolulu Volcanic Series, formed cinder and tuff cones [2.1]. Refer to Figure 2-1.

The project area is located within the remains of the Koolau volcano caldera, the Koolau Range representing the remains of the outer rim of the volcano. The rocks of the Koolau Volcanic Series are almost all tholeiitic basalts and olivine basalts with small amounts of oceanite [2.2]. "The caldera of the Koolau volcano was about 8 miles long and 4 miles wide, extending from near Waimanalo at the southeast to beyond Kaneohe at the northwest. Its southwestern boundary lies near the bases of the Pali, and its eastern boundary is somewhere between the hills at Lanikai and the Mokulua Islands, offshore....Within the caldera the rocks have been much affected by rising volcanic gases and hot water. The original pyroxene of the rocks has commonly been changed to chlorite and clay minerals, giving the rock a greenish to greenish-gray hue. Silica released during the alteration has been redeposited as one or another of the silica minerals (opal, chalcedony, and quartz), in the form of amygdules filling former vesicles or as irregular masses and veinlets filling other openings in the lavas. Other secondary minerals, such as zeolites and epidote, are present, locally, in abundance. Excellent small crystals of quartz and zeolites have been collected in the Keolu Hills area and around Olomana Peak." [2.3]



SOURCE: [2.1]

GEOLOGIC MAP
FIGURE 2-1

Although it cannot be accurately determined if the Koolau caldera ever overflowed, "caldera-filling lavas extend all the way to the top of Olomana Peak - more than 1,600 feet high....The bottom of the caldera fill lies below sea level, and the southwestern rim must have been higher than the top of Koahuanui Peak (3,105 feet), which is composed of thin lava flows sloping toward Honolulu." [2.4]

There is a mass of breccia that caps Ulumawao Peak and forms a large portion of the ridge to the north between Kawainui Swamp and Kaneohe Bay. "It is composed of angular fragments of a variety of rocks, all of them resembling flows or dikes of the associated caldera-filling complex, up to 3 feet, but usually only a few inches, in diameter. The breccia lies on a surface that slopes eastward about 15°, approximately parallel to the bedding in the underlying flows, but in places truncating dikes in the underlying rocks. The breccia itself is cut by later dikes, and at the northeast end of the ridge it appears to be overlain by Koolau lava flows which are also cut by dikes. A maximum thickness of 520 feet of breccia is exposed, for the most part quite massive, but locally with a suggestion of bedding. Its origin is uncertain, but most probably it represents a series of mudflows that spread over the floor of a crater more than 2 miles across that lay within the Koolau caldera; the mudflows were later buried by subsequent caldera-filling lava flows, and the entire mass eventually tilted gently eastward by sagging of the caldera floor. However, the truncation of the dikes by the surface beneath the breccia would seem to demand a long period of erosion within the caldera before the upper part of the caldera fill was formed, which in itself seems improbable. The origin of the Ulumawao breccia is still being studied." [2.5]

B. Site Geology

The project site is located within the dike complex of the Koolau caldera. The predominant soil on-site, Alaeloa (ALF), was formed as a result of in situ weathering of the dike complex,

and the depth to fresh rock is presently unknown. In general the bedrock will consist of slightly metamorphosed basalt flows containing numerous dikes and some breccia [2.6].

C. Soils

As shown in Figure 2-2, soils at the proposed project site are composed of the Alaeloa and Kawaihapai series:

Alaeloa Series [2.7]

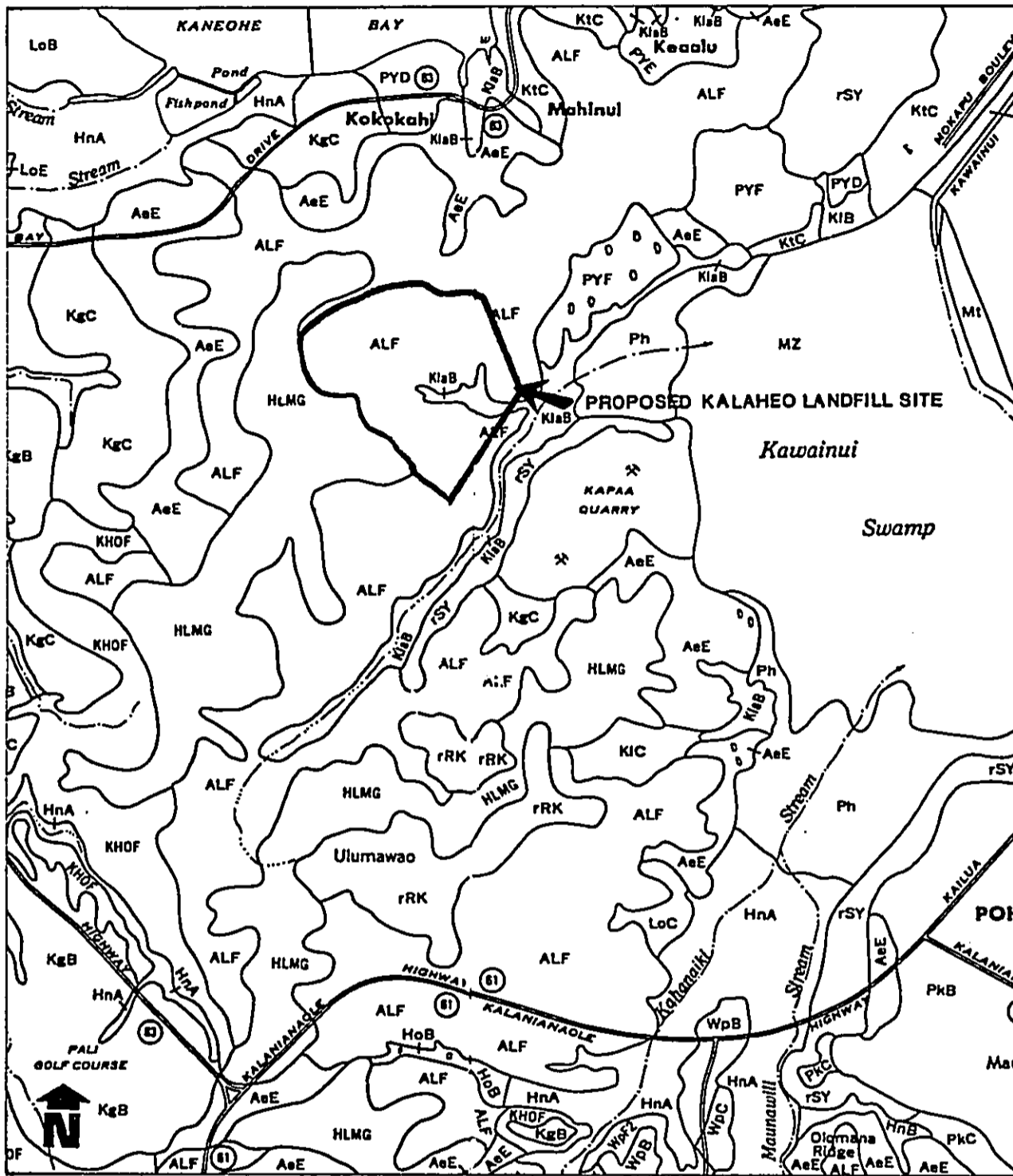
This series consists of well-drained soils along the uplands. These soils developed in material weathered from basic igneous rock, with varying slopes, and can be found at elevations ranging from 100 to 1,500 feet.

Specifically, the soil type of this series, which is found at the proposed project site, is Alaeloa silty clay, 40 to 70 percent slopes (ALF). The commonest slope range is 45 to 53 percent for this soil type; however, small areas on slopes less than 35 percent, stony areas, and rock outcrops were also included in this classification. Runoff is rapid to very rapid and the erosion hazard is severe.

Kawaihapai Series [2.8]

These soils are found on the islands of Oahu and Molokai and consist of well-drained soils in drainageways and on alluvial fans along coastal plains. They are found in alluvium derived from basic igneous rock in humid uplands. Slopes for these soils are nearly level to moderate, and the soils can be found at elevations ranging from nearly sea level to 300 feet.

The specific soil classification found at the proposed project site is Kawaihapai stony clay loam, 2 to 6 percent slopes (K1aB). "This soil is similar to Kawaihapai clay loam, 0 to 2 percent slopes [note excerpt below], except that there are enough stones to hinder, but not prevent, cultivation. Runoff is slow, and the erosion hazard is slight. Included in mapping were small areas of silty clay and small areas where the slope is 6 to 15 percent."



ALF ALAELOA SILTY CLAY, 40%-70% SLOPES
 HLMG HELEMANO SILTY CLAY, 30%-90% SLOPES
 K B KAWAIHAPAI STONY CLAY LOAM, 2%-8% SLOPES
 SCALE: 1:24000

FIGURE 2-2
 SOILS

SOURCE: (2.) SHEETS 80 & 85

2-5
 4

"Kawaihapai clay loam, 0 to 2 percent slopes

(KIA). This soil occupies smooth slopes. Included in mapping were small areas where the slope is 3 to 7 percent and the texture is silty clay. Also included were small areas of poorly drained soils and small areas of Jaucas soils. . . .In a representative profile the surface layer is dark-brown clay loam about 22 inches thick. The next layer is dark-brown stratified sandy loam 32 inches thick. The substratum is stony and gravelly. The soil is neutral in reaction throughout the profile. . . .Permeability is moderate. Runoff is slow, and the erosion hazard is no more than slight. The available water capacity is about 1.8 inches per foot in the surface layer and about 1.6 inches per foot in the subsoil. In places roots penetrate to a depth of 5 feet or more. In some places this soil is subject to flooding."

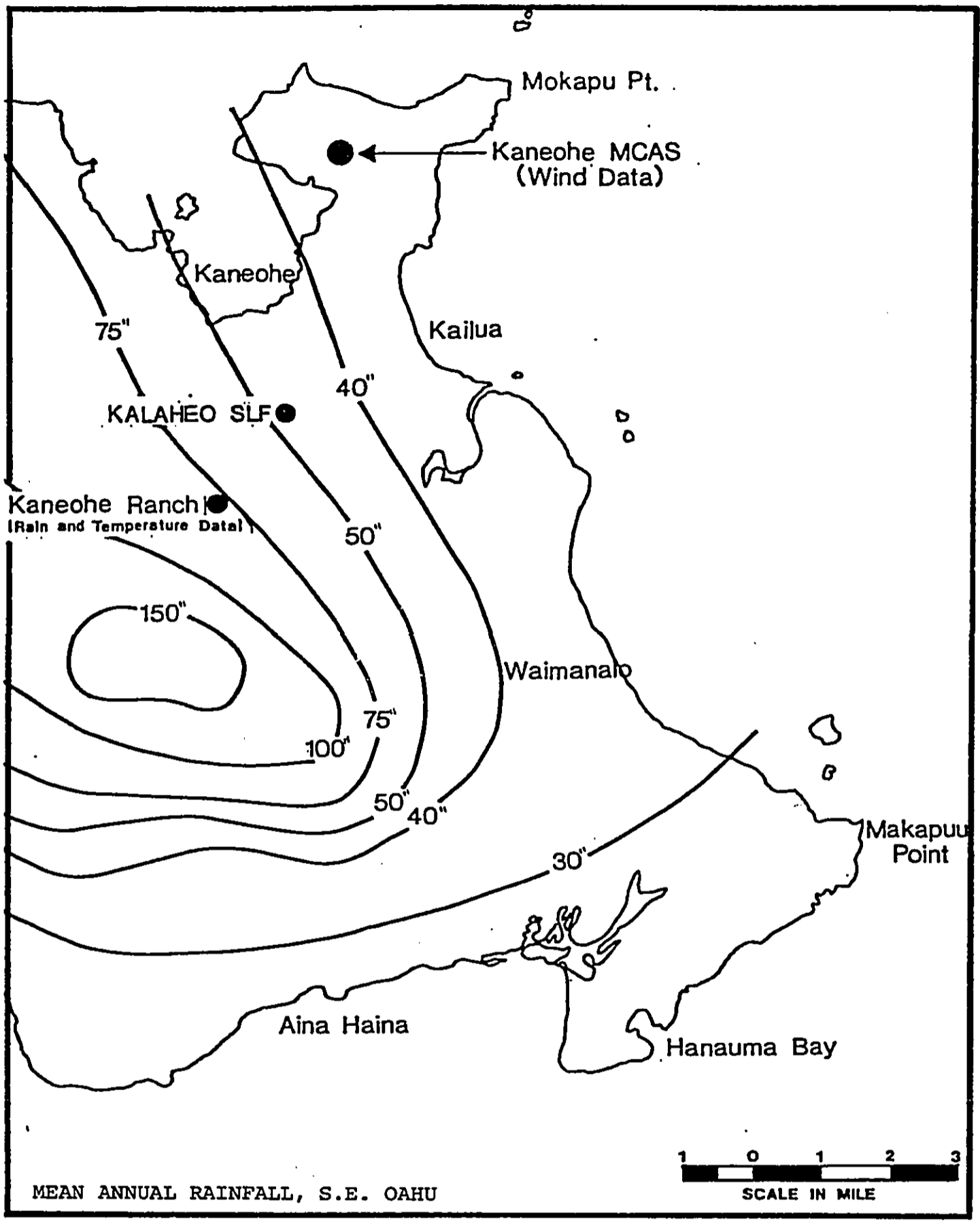
D. Topography

The existing topography of the site consists of a moderately deep, amphitheater-shaped gulch of the Koolau caldera. At the lower eastern end, the elevation of the gulch is 50 feet and rises westward to an elevation of 490 feet over a distance of 2,300 feet. At its widest point, the site is approximately 1,400 feet wide. Four defined gullies are located in the gulch.

The mauka-makai slope of the gulch varies from 6 percent at the lower end to 45 percent at the upper end, with an average slope of about 23 percent. "The tranverse slope of the gulch varies from 0% to 10% near its gullies and from 20% to 60% at its upper ends....The depth of the depression from the top of the ridges to the gullies varies from 50 feet near the lower end to over 300 feet at the upper end." [2.9]

E. Climate

The average rainfall at the Kalaheo landfill site is 50 inches per year. The site is located in an area of large rainfall variation (Figure 2-3). The annual rainfall within a three mile radius



RAINFALL
FIGURE 2-3

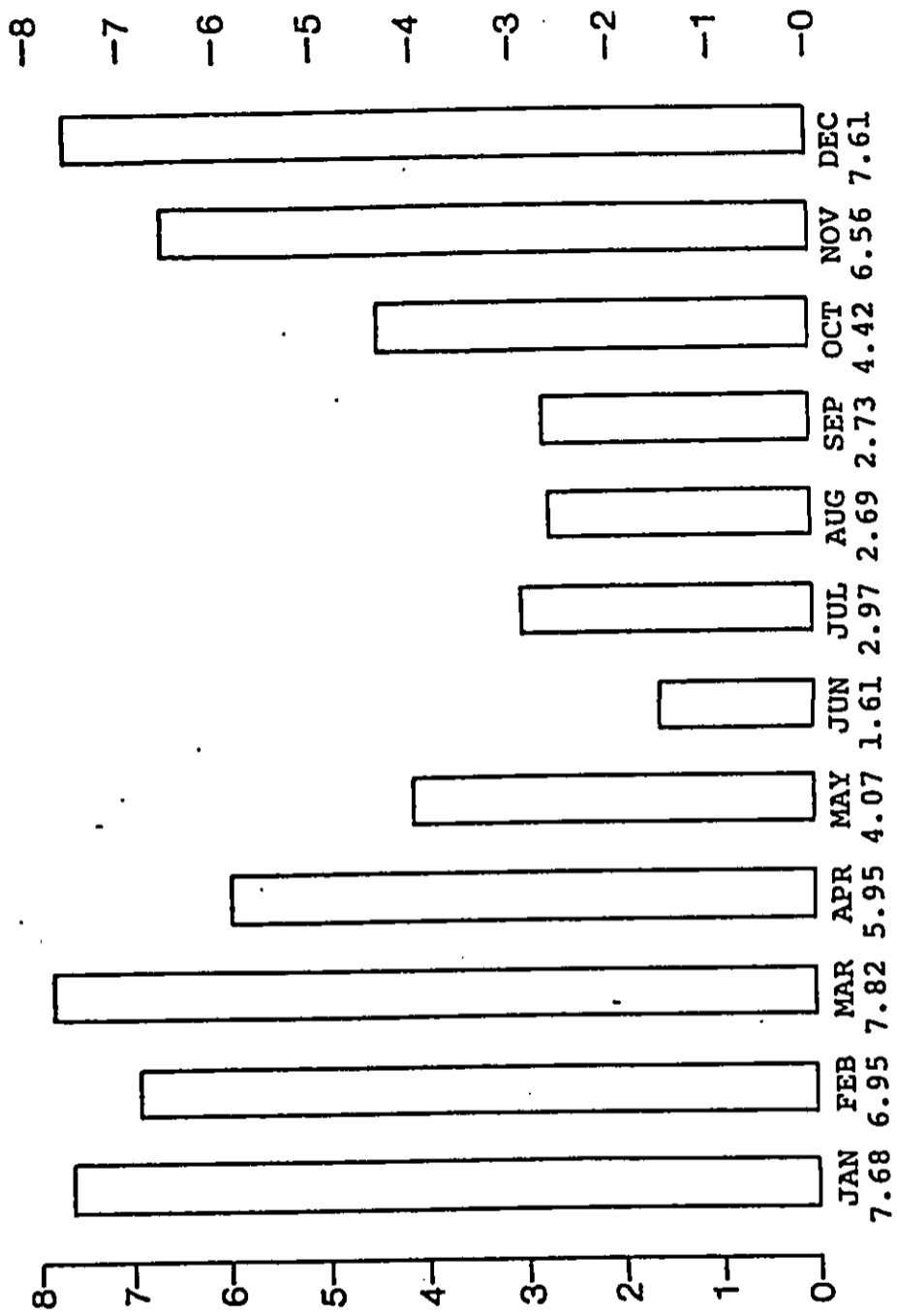
of the site ranges from under 40 inches/year in the Kailua area to over 100 inches/year in the Koolau mountains.

The nearest rainfall and temperature station is located at Kaneohe Ranch, which is located less than two miles mauka from the site. Although the average annual rainfall at Kaneohe Ranch (61.06 inches/year) is significantly higher than at the project site due to its higher elevation, the rainfall and temperature data recorded at Kaneohe Ranch is used to give a good approximation of the climate at the project site.

Figure 2-4 shows the mean monthly rainfall distribution at Kaneohe Ranch (24 year record). Monthly averages range from 1.61 inches in June to 7.82 in March. This is a typical monthly rainfall distribution pattern of most locations in Hawaii with wet winters and dry summers. It should be noted that these averages are not indicative of rainfall intensities per unit of time. An average of five winter storms strike Oahu each year which would affect Kalaheo.

The intensity periods of individual storms for the various regions of Oahu was computed by the U. S. Weather Service and the Army Corps of Engineers, (Wu, 1967) and summarized:

<u>Storm Type</u>	<u>Kalaheo</u>	<u>Explanation</u>
100 year storm; rainfall per 24 hours	15 in.	<u>U.S. Weather Service:</u> Probability of occurrence one in 100 years
Probable maximum 24 hour rainfall	44 in.	<u>U.S. Weather Service:</u> Maximum rainfall that could conceivably occur. Probabi- lity much less than .01
Standard Project Storm	26 in.	<u>U.S. Army Engineers:</u> The hypothetical storm that might be expected from the most severe flood-producing



Monthly average rainfall, Kaneohe Ranch

Figure 2-4

		rainfall, depths-area-area duration relationship, an isohyetal pattern considered characteristic of area involved
Historical 24 hour rainfall	less than 12 in.	Actual storm rainfall experi- enced in region

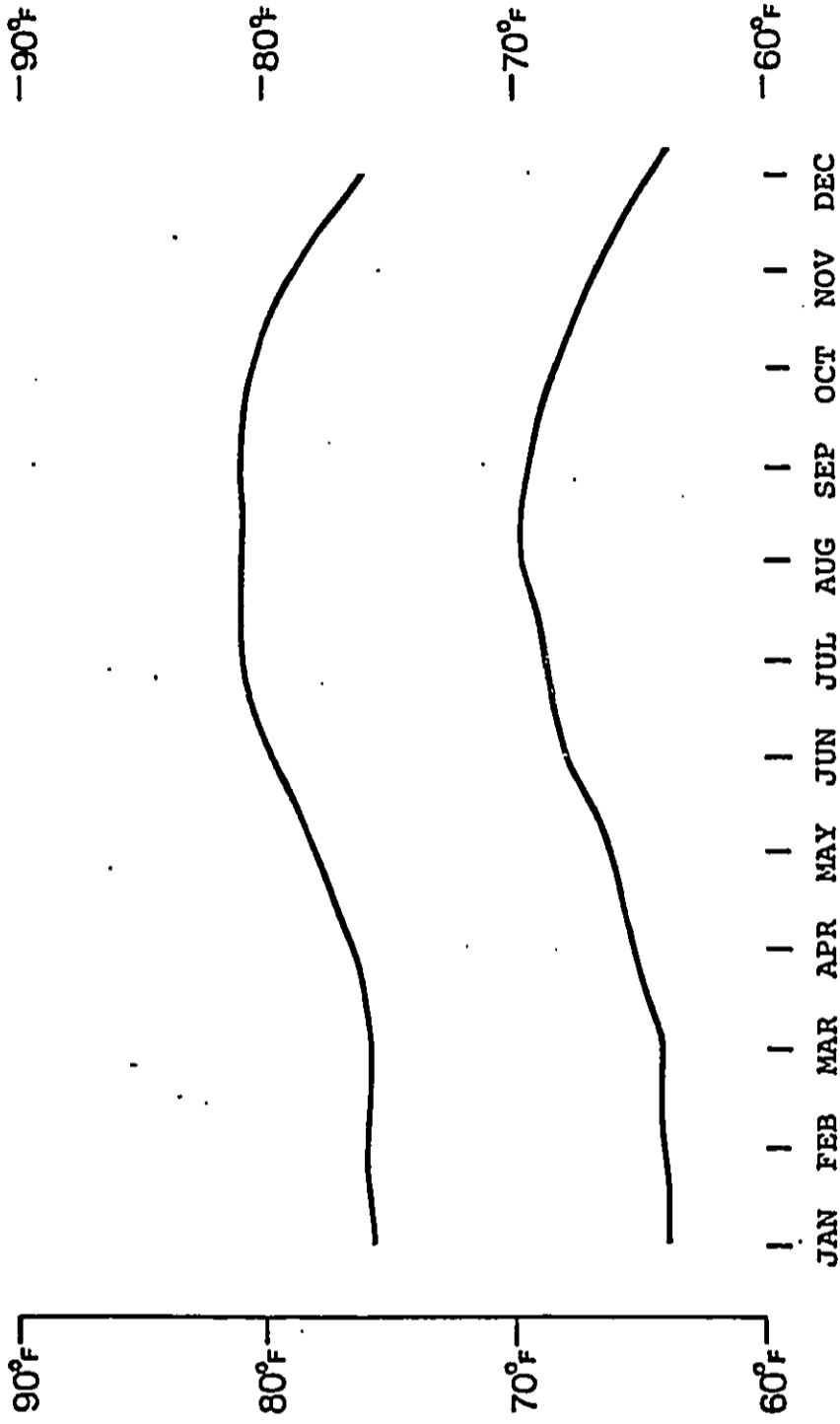
The temperature at Kaneohe Ranch is mild throughout the year (Figure 2-5). The average maximum and minimum temperatures range from 63.8°-75.6° in January to 69.8°-80.8° in August. Since the Kaneohe Ranch Station is located at an elevation of 365 feet, it may be assumed that temperatures at the landfill site are between 1°F and 2°F warmer throughout the year.

The Kalaheo site is exposed to trade winds most of the year. The nearest station with available long-term wind data is located at Kaneohe Marine Air Station (Figure 2-3). The wind rose for that station (Figure 2-6) shows that the most prevalent wind conditions are ENE wind at 10 to 15 miles per hour. Trade winds are modified in direction and in strength by the local topography. Since there is no topographical barrier between the Kalaheo site and the prevailing trades, the wind rose of the Kaneohe Station can be considered representative of the landfill site wind conditions.

F. Flooding

Presently, storm water at the project site sheet flows into the gulch, with overflow discharging into the unnamed stream via an existing 120-inch pipe culvert under Interstate Route H-3. The unnamed stream is intermittent and drains an area of approximately 130+ acres. It drains into the northwestern portion of Kawaiui Swamp. Refer to Figure 2-7.

The project site is located within Zone D of the Flood Insurance Rate Map prepared by the Federal Insurance Administration for the island of Oahu. Zone D designates areas of undetermined but possible flooding; specifically, projects located in Zone D do not require Flood Insurance.



Average daily high and low temperatures, for each month. Kaneohe Ranch

Figure 2-5

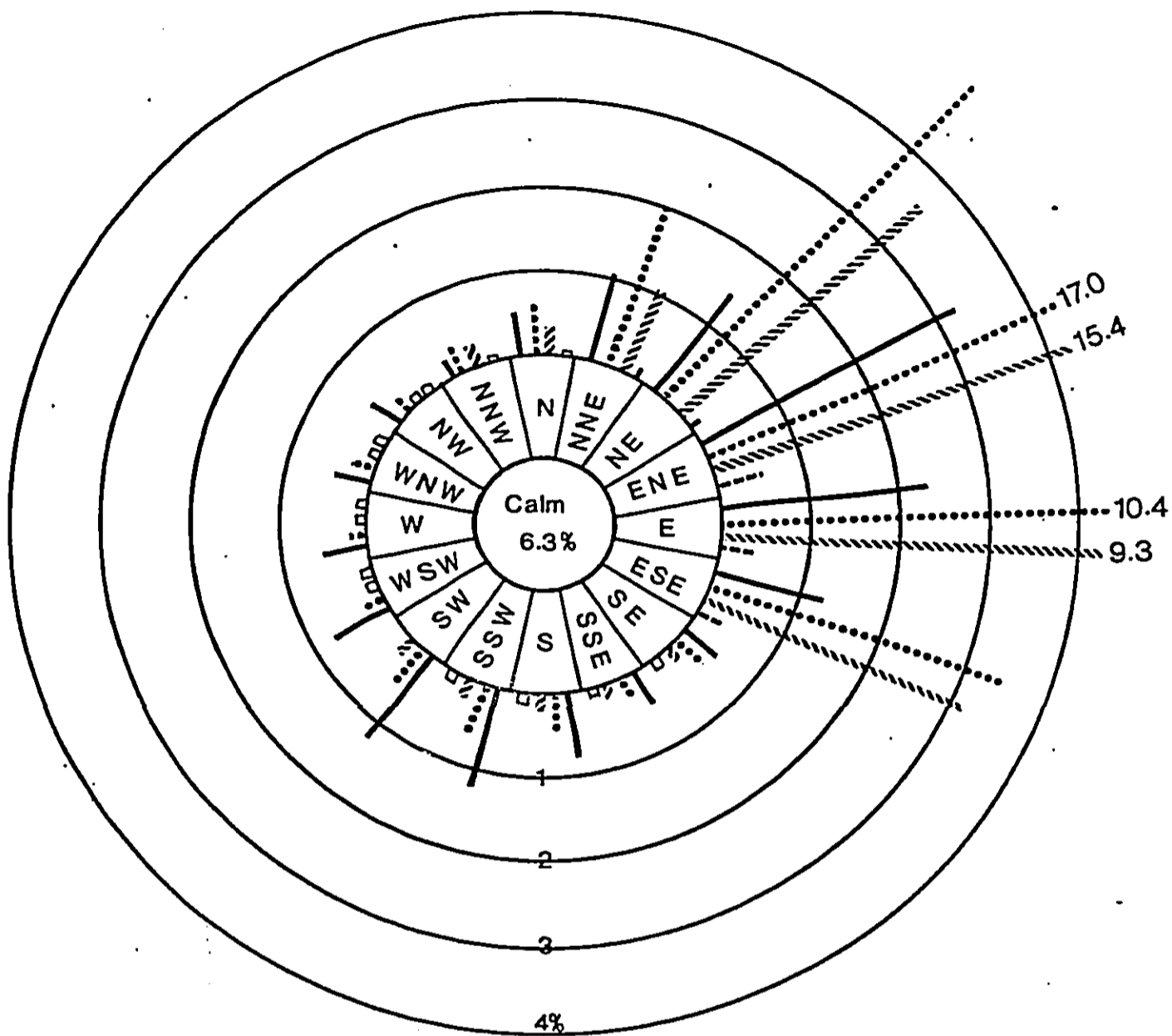


Figure 2-6
 KANEOHE MARINE CORPS AIR STATION
 WIND ROSE - Wind speed in knots

Legend:

- 1 - 2
- 3 - 7
- 8 - 12
- //// 13 - 20
- more than 21

Source of Data: Chief of Naval Operations
 Naval Weather Service

Data Collected: April 1945 thru April 1949 and
 July 1952 thru March 1959

G. Groundwater

It is anticipated that groundwater is found below the site. The saturated flow basalts within the dike compartments of the site are of generally low permeability and have poor hydraulic continuity. These features denote that the site has little or no municipal water development potential.

The project site is located in an area where sanitary landfills are permitted by the Board of Water Supply. Presently, the Technical Review Committee for Underground Injection Control (UIC) is reviewing the exempted aquifer areas of Oahu. It is expected that while the size of the areas where sanitary landfills are permitted will decrease, the Kalaheo site will remain in the exempted area.

Precipitation is the principal form of recharge to the groundwater on-site. During recharge, the dike compartments may overflow, the water discharging via the soil mantle and migrating into the unnamed stream.

A hydrogeologic and soils study of the proposed project site was prepared in 1982 for the Environment Impact Study Corporation (EISC) and is found in Appendix B [2.10]. The study concluded that in most aspects of soils and hydrogeology, the proposed Kalaheo and the existing Kapaa sanitary landfill sites are similar. Therefore an earlier report, "Hydrogeologic and Soils Study of Proposed Sanitary Landfills for Leeward And Windward Oahu, City and County of Honolulu, Honolulu, Hawaii," prepared in 1977 by S.P. Bowles and J.F. Mink, was referred to throughout the 1982 study.

The following are excerpts from the earlier hydrogeologic and soils study (Bowles and Mink, 1977):

"Groundwater occurs but is not feasibly exploitable except, perhaps, for very small agricultural enterprises. Sizeable continuous aquifers do not occur; in general the groundwater saturates flow basalts compartmentalized by dikes and other intrusives. As a result, the water table elevation (head) varies over short distances and hydraulic continuity between dike compartments is poor.

"The surface of Kawainui Swamp represents the general groundwater table in the region. Three unused wells (2446-02; 2446-03; and 2246-01) at the inland margin of the Swamp have measured heads of 18 feet, 27 feet and 80 feet, respectively. The groundwater from the Kapaa land mass, in which these wells are located, drains to the swamp and therefore leachate that would reach the water table would also eventually discharge into the swamp.

"The quality of the groundwater is excellent. Well 2246-01, an exploratory well drilled by the Board of Water Supply but abandoned and sealed because of its poor yield, gave water with the following composition:

	<u>Mg/L</u>		<u>Mg/L</u>
SiO ₂	41.6	HCO ₃	68.0
Al ₂ O ₃	0.7	SO ₄	18.4
FeO	0.1	Cl	10.0
MuO	0.0	F	0.3
Ca	27.9	NO ₃	0.8
Mg	9.5	TDS	226.0
Na + K	28.9	pH	(7.6)

The above would be characteristic of uncontaminated groundwater spilling into Kawainui.

"As suggested earlier, the aquifers in the vicinity of Kapaa are poorly permeable in addition to being small and discontinuous. Their upper parts, which form the inland boundary of the swamp, consist of highly weathered basalt to a depth of 50 feet or more. Two of the wells (2446-02 and 2446-03) could extract no more than 10 gpm while the BWS well (2246-01) was able to pump 300 gpm but only at a drawdown of 200 feet."

II. CULTURAL AND BIOLOGICAL CHARACTERISTICS

A. Archaeological/Historical Perspective

1. Project Site

An archaeological field reconnaissance for the proposed project was conducted on February 20, 1982, to verify the presence or absence of sites of possible archaeological interest in order to determine whether further study would be required (refer to Appendix C). In summary, the archaeologist has concluded that there are no visible indications of prior prehistoric use, and the site requires no further archaeological work. If any unanticipated sites are encountered, the contractor will stop work and contact the State of Hawaii Historic Sites Preservation Office.

2. Adjacent Area

The closest historical site that is included in the National and State Registers of Historic Places is Pahukini Heiau. The heiau is located near the existing Kapaa SLF boundaries and across Interstate Route H-3 from the project site.

B. Flora and Fauna

A biological survey of the project site was conducted by personnel from EISC in February, 1982 (refer to Appendix D). The survey indicated that the gulch floor contains most of the plants cited in the check list of plants. Around the old house foundation located on the gulch floor are common ornamentals, densely overgrown. Also present is a thick growth of koa haole and java plum. The gulch does not contain plants which are considered rare or unique.

Many of the commonly observed birds and mammals found adjacent to urbanized areas were sighted in the area near the mouth of the gulch along the H-3 freeway. The Cattle egret (Bubulcus ibis), Barred dove (Geopelia striata), and lace-necked dove (Streptopelia chinensis) were sighted in this area and within the existing landfill. Evidence of

the presence of various mammals were found including cats (Felix catus), dogs (Canis familiaris), mongoose (Herpestes europunctatus), mice (Mus musculus), and rats (Rattus rattus).

Observed within the gulch were: the Shama thrush (Copsychus malabaricus), mynah (Acridotheres tristis), white-eye (Zosterops palpebrosus japonicus), and cardinal (Richmondia cardinalis).

The biological reconnaissance did not reveal any rare or endangered species of flora and fauna. Most of the species are exotic and all are found elsewhere on the island.

III. SOCIOECONOMIC CHARACTERISTICS

A. Population Characteristics

1. Overall Island Trends

According to the 1981 edition of the State of Hawaii Data Book, the total 1980 de facto population of Oahu, including military personnel, their dependents, and visitors present, and excluding residents temporarily absent, was 822,000; this figure shows a 26.3 percent increase since 1970. During the same period the de facto population for the entire State grew 32.2 percent. The population of the County of Hawaii rose 50.3 percent; Kauai, 45.3 percent; and Maui, 77.3 percent. These figures indicate that Neighbor Island counties have grown much faster in the past decade than the City and County of Honolulu (Oahu).

2. Area Characteristics

The proposed project will serve as a disposal site for refuse generated within the windward districts (Koolauloa and Koolaupoko) of Oahu and that generated in other parts of Oahu. The areas of windward Oahu to be served by the Kalaheo Sanitary Landfill include the medium-density urban areas of Kailua and Kaneohe and the smaller residential communities of Waimanalo, Kahului, Hauula, Sunset Beach and

Kahuku. As shown in Tables 1-2 and 1-3 approximately one-half of Oahu's total solid waste will be disposed at the Windward Sanitary Landfill (Kapaa/Kalaheo). The following population projections include projections for Oahu and the districts of Koolauloa and Koolaupoko.

According to the Honolulu General Plan [2.11], the total residential population of Oahu was 704,403 in 1975. The population of areas within the Koolauloa and Koolaupoko Districts and the percent each of the total, was as follows:

<u>Location</u>	<u>1975 Population</u>	<u>Percent of Total</u>
Koolaupoko	86,641 - 96,503	12.3 - 13.7
Koolauloa	10,566 - 11,974	1.5 - 1.7

The total resident population for Oahu in the year 2000 was originally projected to be 1,039,000 in the 1977 General Plan based on the State of Hawaii Department of Planning and Economic Development's (DPED) Series E-2 projections, then considered the most satisfactory for planning purposes. The population of the above areas was to be as follows:

<u>Location</u>	<u>2000 Population</u>	<u>Percent of Total</u>
Koolaupoko	112,797 - 142,343	12.3 - 13.7
Koolauloa	15,585 - 17,663	1.5 - 1.7

However, DPED has since requested that all agencies use the Series II-F population projection, as it is updated, to establish a uniform planning base. In addition, it is stated in the General Plan, that as DPED's projections are revised, new population figures will be used in the document. The March 1, 1978 revised residential population projection for Oahu for the year 2000 is 917,400.

Using the latest DPED total for Oahu and the Honolulu General Plan percentage breakdown by area, the total resident population in these areas in the year 2000 would be as follows [2.12]:

<u>Location</u>	<u>2000 Population</u>	<u>Percent of Total</u>
Koolaupoko	112,800-125,700	12.3 - 13.7
Koolauloa	13,800-15,600	1.5 - 1.7

The previous discussion was primarily based on two policies from the 1977 Honolulu General Plan. They are both population policies which are quoted below [2.13]:

"Policy 3 - Reduce, or at most maintain, the 1975 proportions of the Island's rural and urban fringe populations."

"Policy 4 - Seek a year 2000 distribution of Oahu's residential population which would be in accord with: [Table 2-1 (revised according to the II-F projections).]"

B. Schools

The nearest school, located approximately 4,000 feet from the project site, is Kalaheo High School. The school is separated from the project site by open space (Kawainui Marsh), Mokapu Saddle Road and H-3. It should be noted that the school is upwind of the proposed project.

IV. INFRASTRUCTURE

A. Utilities

1. Electrical

Electrical power is available. Presently an overhead electrical power line traverses the site, and will be relocated. Project plans will be coordinated with Hawaiian Electric Company (HECO).

2. Telephone

The office building will require at least one telephone. An overhead telephone line running across the project site will be relocated. The relocation of the line will be coordinated with Hawaiian Telephone Company.

3. Water

Potable water is available from a 36-inch transmission main that parallels the Kapaa Quarry Road. Prior to construction, plans for water requirements and delivery to the proposed project will be coordinated and reviewed with the Board of Water Supply (BWS).

TABLE 2-1
DISTRIBUTION OF RESIDENTIAL POPULATION

1980 and 2000

<u>LOCATION</u>	<u>2000 POPULATION</u> ^{a/}	<u>PERCENT OF TOTAL</u> ^{b/}
Primary Urban Center	435,800 - 481,600	47.5 - 52.5
Ewa	74,300 - 81,700	8.1 - 8.9
Central Oahu	122,000 - 134,900	13.3 - 14.7
East Honolulu	56,900 - 62,400	6.2 - 6.8
Koolaupoko	112,800 - 125,700	12.3 - 13.7
Koolauloa	13,800 - 15,600	1.5 - 1.7
North Shore	16,500 - 18,300	1.8 - 2.0
Waianae	39,400 - 43,100	4.3 - 4.7
OAHU TOTAL	871,500 - 963,300	95.0 - 105.0

a/

Population ranges based on the percentages presented in the preceding column and DPED's Series II-F population projection for the year 2000 of 917,400 for Oahu.

b/

From Population Objective C, Policy 4.

Source: [2.12]

4. Sanitary Sewage Disposal

The municipal sewer system does not serve the project area [2.14]. A cesspool that will comply with the regulations of the State of Hawaii Department of Health will be constructed.

5. Solid Waste Collection

Municipal collection is provided 6 days per week, with a twice-a-week pickup from each residence. Refuse is collected by 3-man crews. Crews generally operate with a 20-cubic-yard rear-loading compactor truck. Residential refuse with a density of approximately 150 pounds per cubic yard is compacted within the collection truck to a density of approximately 500 pounds per cubic yard. Each truck carries 4 to 5 tons of refuse per trip and typically makes two trips per day.

The majority of those City collection trucks which dispose at the Kapaa SLF are stationed at the Kapaa Base Yard. In addition, collection trucks from the Laie Base Yard and the Honolulu Yard also dispose at the Kapaa SLF. The collection crews begin their routes at 6:00 AM and continue until they are completed. Generally, waste is disposed at the municipal facility closest to the last stop on a collection route. Portions of waste generated within the Nuuanu and Hawaii Kai areas of the Honolulu District are disposed at Kapaa Sanitary Landfill. In addition, a portion of the refuse processed at the Keehi Transfer Station may also be disposed at Kapaa SLF when the need arises.

The existing Kapaa SLF is open to the general public and a large number of leeward and windward residents use this site for disposal. They are not charged a disposal fee and account for the majority of weekend traffic. The hours of operation of the landfill are from 7:00 AM to 4:30 PM daily.

B. Emergency Services

1. Fire

The project vicinity is served by the Honolulu Fire Department, Aikahi Station (located approximately one mile away). This station has one engine and under ideal conditions, has a response time of approximately 3 minutes to the site. Support services will be provided by the Kailua Station which houses both a ladder and engine company. Additional support will be furnished by the Kaneohe station. Also Capital Improvement Program (CIP) calls for a new fire station in the Olomana Area.

2. Police

The City and County Police Department substation in Kailua serves the vicinity of the project site. The site is located within Beat 427, in District 4. Average response time in District 4, is 5 to 8 minutes.

3. Medical

The project vicinity is served by City and County ambulances located at the Police Department substation/fire station complex in Kailua town. For most cases requiring hospital facilities, the patient would be taken to Castle Memorial Hospital which is located approximately 2 1/2 miles away.

REFERENCES TO SECTION 2

- [2.1] Macdonald, Gordon A. and Agatin T. Abbott. 1970. Volcanos in the Sea. University of Hawaii Press, Honolulu, Hawaii. Pages 352-353.
- [2.2] Ibid., page 363.
- [2.3] Op. Cit., [2.1].
- [2.4] Op. Cit., [2.1].
- [2.5] Op. Cit., [2.1], page 364.
- [2.6] Hydrogeologic and Soils Description of the Kalaheo Sanitary Landfill Site. March 1982. Prepared for prime consultant Environment Impact Study Corporation by Island Resources, Ltd. under contract to the City and County of Honolulu.
- [2.7] Soil Conservation Service, U.S. Department of Agriculture. August, 1972. Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii. Prepared in cooperation with the University of Hawaii Agricultural Experiment Station. Pages 26-27.
- [2.8] Ibid. Pages 63-64.
- [2.9] Inventory of Potential Sanitary and Demolition Landfill Sites on the Island of Oahu. August, 1977. Prepared for the City and County of Honolulu Department of Public Works by Stanley S. Shimabukuro & Associates, Inc.
- [2.10] Op. Cit., [2.6].
- [2.11] City and County of Honolulu. 1977. General Plan, City and County of Honolulu, Statement of Objectives and Policies.
- [2.12] Department of General Planning, City and County of Honolulu. 1982. General Plan Five-Year Review Final Report.
- [2.13] Op. Cit., [2.11].
- [2.14] U.S. Army Engineer District Honolulu. August, 1981. Final Environmental Impact Statement Permit Application for Olomana-Maunawili Sewer Projects, Kawainui Marsh, Oahu, Hawaii.

**Land Use Plans
Policies
Controls**

3

SECTION 3
RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE
PLANS, POLICIES AND CONTROLS FOR THE AREAS

I. LAND USE DESIGNATIONS

A. State Land Use District

The State Land Use designation for the project site is Conservation (Subzones General and Limited) with a small portion in Urban. Refer to Figure 3-1.

A Conservation District Use Permit will be required from the Board of Land and Natural Resources in order to proceed with the proposed action in the Conservation-designated areas. The proposed action is a permitted use within the Urban-designated portion of the site.

B. General Plan Detailed Land Use Map (DLUM)

The DLUM designation for the project site is Open Space and Agriculture. Refer to Figure 3-2.

C. Zoning

Most of the site is zoned P-1 (Preservation), with a small portion zoned R-6 (Residential). Refer to Figure 3-3.

D. Agricultural Lands of Importance, State of Hawaii

According to the State Department of Agriculture, only a small portion of the site is classified as "Other Important Agricultural Land" (Refer to Figure 3-4). While this portion of the site has agricultural potential, presently there are no farming activities occurring on-site or in the near vicinity of the site.

II. SURROUNDING LAND USE CONTROLS

The project site is located west of Interstate Route H-3, Ameron HC&D's wire fabrication facility and storage area, the existing Kapaa Sanitary Landfill and Kawainui Marsh. The interstate, factory, sanitary landfill and a strip of the marsh parallel to Kapaa Quarry Road fall within the Urban-designated State Land Use District. The major portion

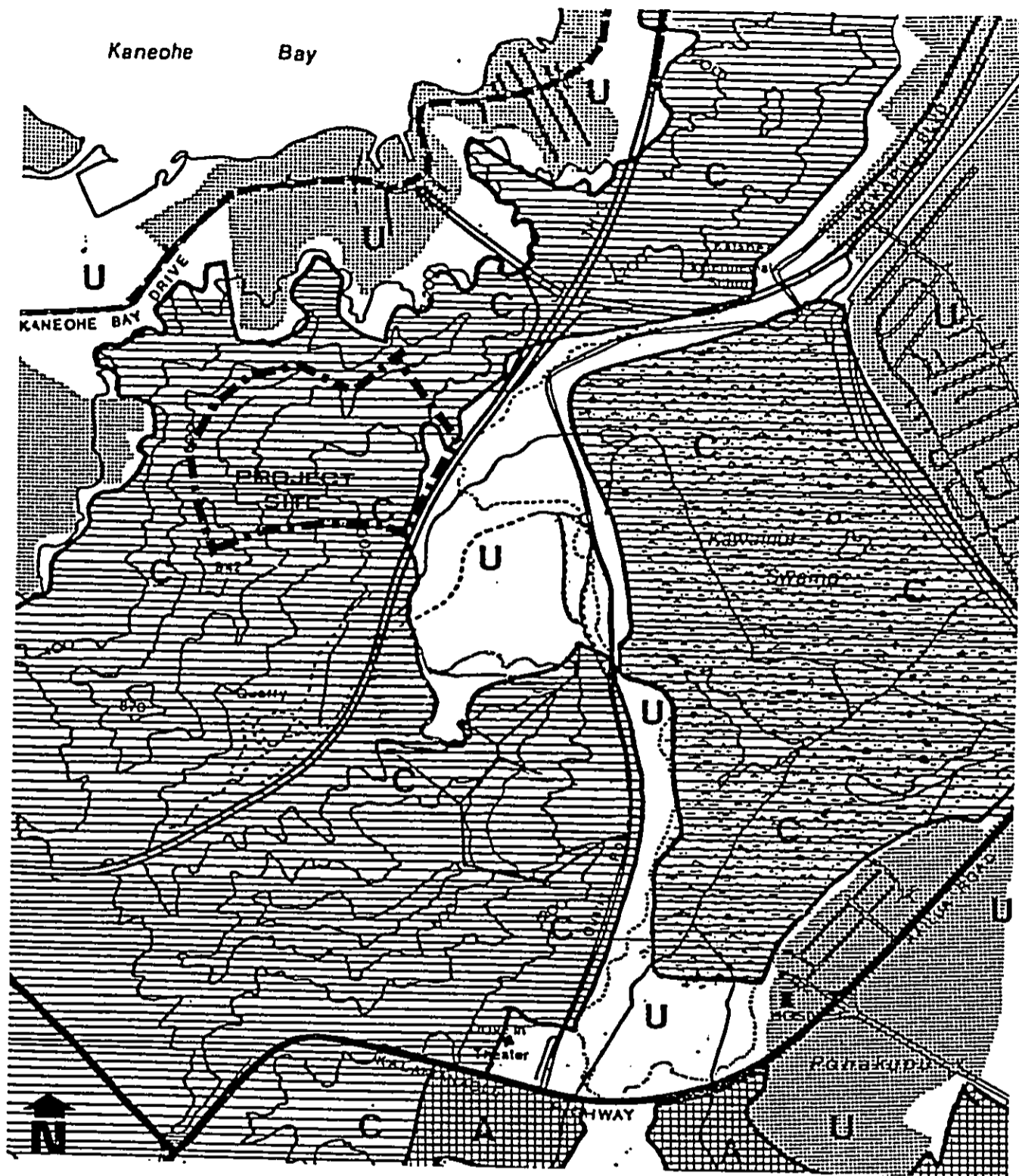


FIGURE 3-1
STATE LAND USE CLASSIFICATION

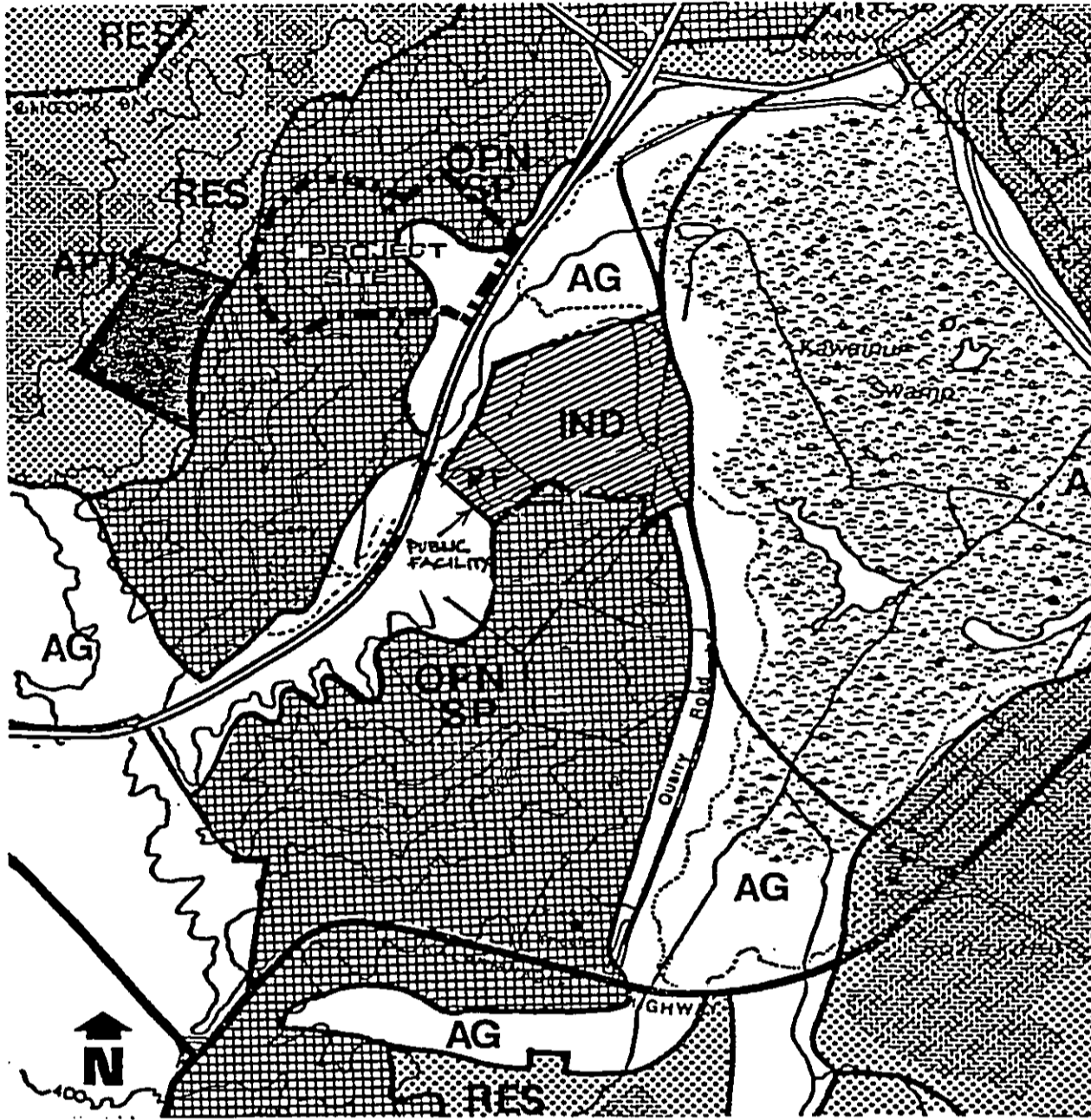


FIGURE 3-2
GENERAL PLAN DESIGNATIONS

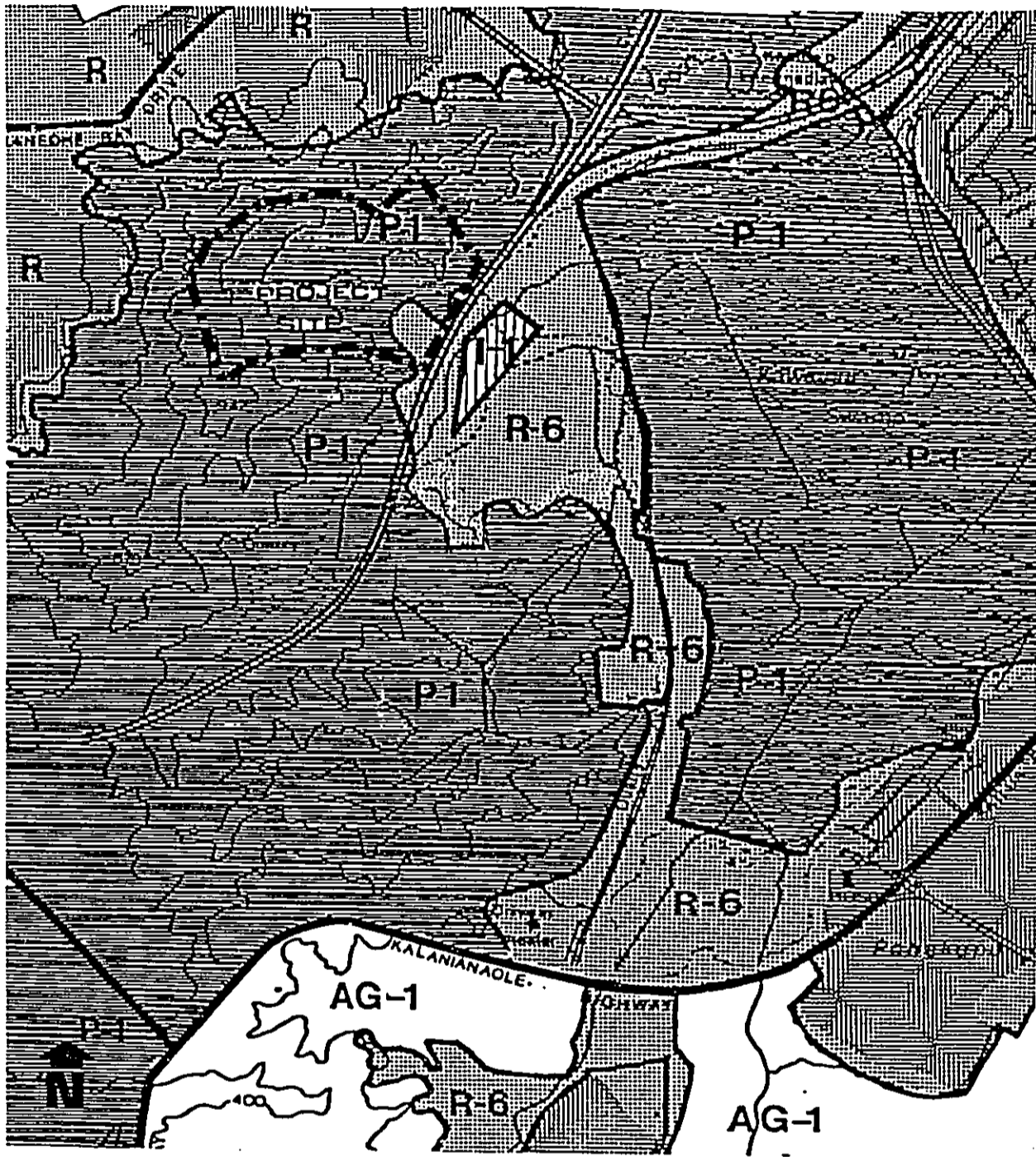
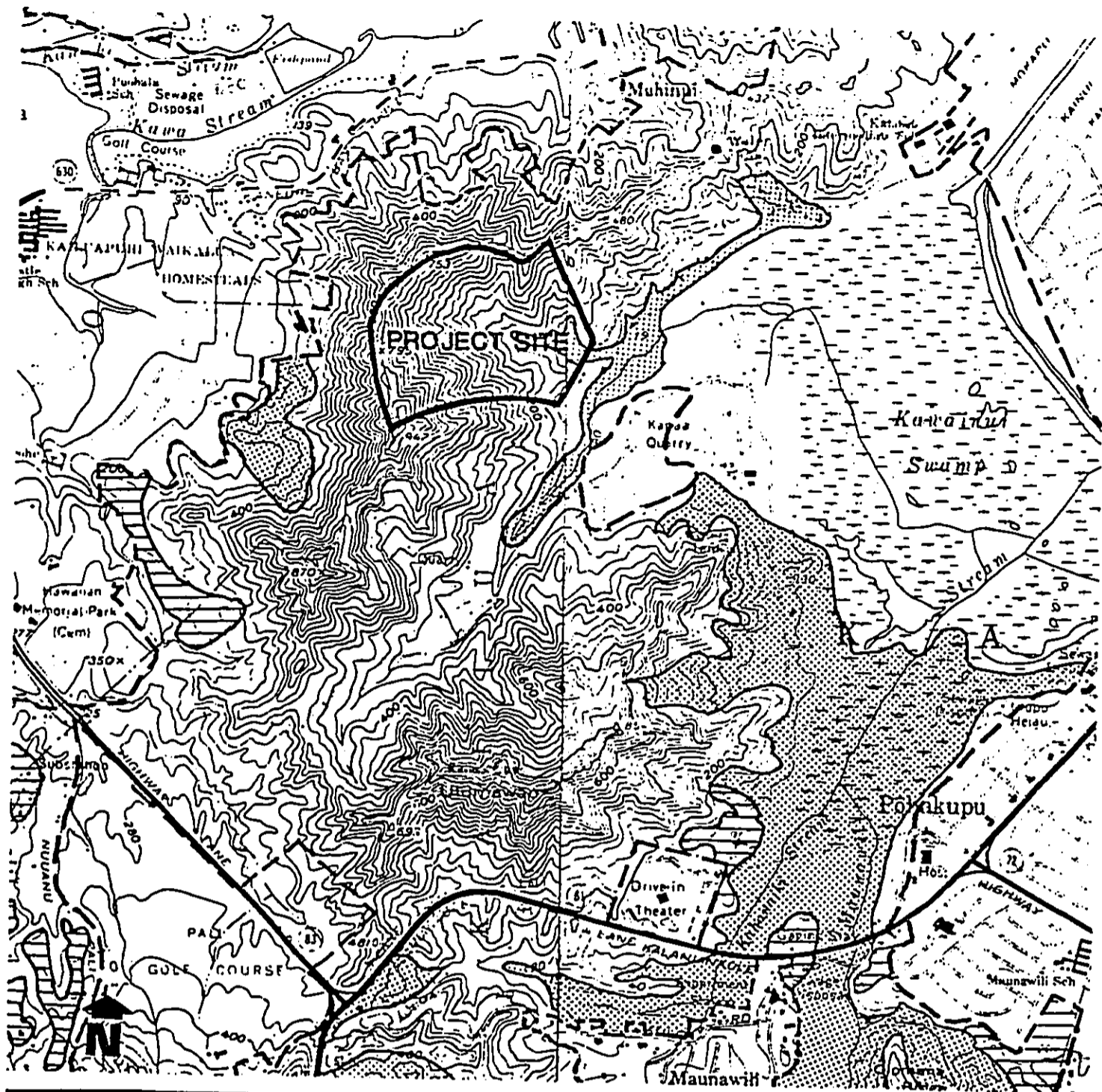


FIGURE 3-3
ZONING








	PRIME AGRICULTURAL LAND - Land which has the soil, quality, growing season, and moisture supply to produce sustained high yields of crops economically when treated and managed according to modern farming methods.
	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 of high yields of a specific crop when treated and managed according to modern farming methods.
	OTHER IMPORTANT AGRICULTURAL LAND - Land other than Prime or Unique Agricultural Land that is also of statewide or local importance for agricultural use.
	EXISTING URBAN DEVELOPMENT - Land which has been developed for urban type use.
	U.S. GOVERNMENT - Land which is currently under the jurisdiction of the U.S. Government.

FIGURE 3-4
**AGRICULTURAL LANDS
 OF IMPORTANCE,
 STATE OF HAWAII**

SOURCE: STATE OF HAWAII DEPARTMENT OF AGRICULTURE, SHEETS 0-12 & 0-14

of the marsh is designated Conservation. In the DLUM, the factory and a portion of the landfill are located in Industrial-designated areas and are zoned Industrial (I-1) and Residential (R-6). The DLUM designation for the interstate and Kawainui Marsh is Agriculture. The portion of the interstate in the vicinity of the proposed project is zoned R-6, and the marsh is zoned P-1 (Preservation).

North of the project site is the Kailua interchange of Interstate Route H-3 where it overpasses Mokapu Saddle Road. The State Land Use Designation of this area is Conservation; in the DLUM, it is designated Agriculture, Open Space and Residential; and it is zoned P-1.

Land south of the project site, including the Kapaa Quarry Plant, is in the Conservation State Land Use District. The land is designated as Agriculture and as Open Space in the DLUM and is zoned P-1.

Land west of the project site is in the Conservation State Land Use District. The land is designated as Open Space in the DLUM and is zoned P-1.

12 10 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

SECTION 4
SUMMARY OF MAJOR IMPACTS

I. INTRODUCTION

This section presents the anticipated environmental impacts of the proposed action on the existing environment. Major primary and secondary impacts, both short-term and long-term, were identified through analysis of the information presented in the first three sections of this report.

Primary impacts are those expected to result directly from the proposed project. Those impacts which develop as an indirect consequence of the proposed project are considered secondary. Whether the impacts are primary or secondary, the duration of effects can be either short-term or long-term. The short-term impacts are related to the construction and operation of the proposed Kalaheo SLF. Long-term impacts are those anticipated to result after completion of the sanitary landfill.

II. SUMMARY OF PRIMARY IMPACTS

A. Landform Alteration

Construction of the landfill and access road will involve clearing and grubbing of the vegetation. The clearing and excavation of the site will be done in increments to minimize major wind and water erosion problems.

Upon completion of the sanitary landfill, the site will be graded to provide drainage and stability. It is anticipated that the present slopes of the gulch will be reduced as the floor of the gulch is filled.

B. Soils

The short-term impact to soils would be associated with potential runoff and erosion during the construction of the operational facilities and during excavation and covering of sections of the sanitary landfill.

Agricultural potential of the completed site will be limited. Unless additional cover material is provided, deep tilling and crops with extensive and deep root systems will not be permitted, to avoid the risk of opening up the landfill by the roots penetrating into the wastes.

C. Water Quality

During construction and operation of the proposed sanitary landfill, some sediment runoff from exposed areas into the proposed drainage system could occur, should there be a substantial storm. However, the impact should be minimal as the drainage area is relatively small, and the surface moderately permeable.

As previously stated, the project site is similar to the existing Kapaa site in all hydrogeologic aspects, and there is no evidence that would suggest that leachate accumulation and migration characteristics at the proposed project would differ significantly from those at the Kapaa SLF. The findings of the leachate monitoring program at Kapaa indicate that no leachate has been detected, and that if leachate is entering groundwater sources, the present effect can be considered minor. These findings support the premise that any leachate generated will be contained on-site in the short-term. Although the leachate from Kapaa SLF may eventually migrate to Kawainui Swamp via the water tables, continuation of the monitoring program should be adequate to detect this process in the early stages. It should be noted that as the institution of the monitoring program occurred ten years after the start of the Kapaa SLF activities, the findings indicate that rapid migration of leachate has not taken place.

D. Air Quality

The main short-term impact to air quality would be from dust generated during the construction and operation of Kalaheo SLF. In addition, there will be fuel emission generated by vehicles on-site and those transporting refuse to the site. However, as the proposed project will replace the existing Kapaa SLF, the emissions generated as a result of activities at the Kalaheo SLF are not anticipated to significantly alter the existing ambient

air quality in the area. Upon completion of the landfill these sources of air pollution will cease to exist and therefore will no longer affect air quality.

As the project site is similar to the Kapaa site in nearly all aspects of soil and hydrogeology, it is expected that methane gas migration will be minimal. There are no residential structures adjacent to the proposed sanitary landfill, therefore any methane gas generated will not pose a hazard to public health. Any structures necessary for landfill operations will be designed to control gas from accumulating within the structure.

E. Odor

Odor will be generated in varying levels according to the composition of refuse and the length of time it remains uncovered. The amount of odor expected from the proposed project is not expected to significantly differ from the amount generated by Kapaa SLF. Odor is not anticipated to affect the surrounding area, which is relatively vacant.

F. Litter

Litter will be generated in the area where refuse is deposited by collector and transfer trailer trucks. Litter may also be found along the vehicular access to the project site. Overall litter generation will not differ from that produced by Kapaa SLF. To minimize litter caused by illegal dumping, the city will hire a guard service to patrol the access road after hours of operation.

G. Noise

Noise will be generated by construction equipment and vehicles during site development, access construction and landfill operation. Conventional construction equipment will be used and; the noise levels generated by such equipment are shown in Figure 4-1. No piledriving will be conducted, nor is blasting anticipated. General construction noise should not present a significant problem in the area, since the adjacent areas are vacant. Upon completion of the landfill no noise will be generated except when periodic maintenance of landfill is required.

FIGURE 4-1
CONSTRUCTION EQUIPMENT NOISE RANGES

		NOISE LEVEL (dba) AT 50 FT					
		60	70	80	90	100	110
EQUIPMENT POWERED BY INTERNAL COMBUSTION ENGINES	EARTH MOVING	COMPACTERS (ROLLERS)		H			
		FRONT LOADERS		—			
		BACKHOES		—			
		TRACTORS		—			
		SCRAPERS, GRADERS			—		
		PAVERS				H	
		TRUCKS				—	
EQUIPMENT POWERED BY INTERNAL COMBUSTION ENGINES	MATERIALS HANDLING	CONCRETE MIXERS		—			
		CONCRETE PUMPS			H		
		CRANES (MOVABLE)		—			
		CRANES (DERRICK)				H	
EQUIPMENT POWERED BY INTERNAL COMBUSTION ENGINES	STATIONARY	PUMPS	H				
		GENERATORS		—			
		COMPRESSORS		—			
IMPACT EQUIPMENT		PNEUMATIC WRENCHES			—		
		JACK HAMMERS AND ROCK DRILLS			—		
		PILE DRIVERS (PEAKS)				—	
OTHER		VIBRATOR		—			
		SAWS		—			

Note: Based on Limited Available Data Samples

Source: Noise From Construction Equipment and Operations
Building Equipment, and Home Appliances, EPA, 1971

H. Flora and Fauna

During site development, access construction and project implementation, site vegetation will be removed and it is anticipated that the birds and mammals frequenting the site will relocate to other areas. Operation of the proposed project is not anticipated to significantly affect wildlife in the surrounding area. After completion of the sanitary landfill, it is anticipated that some of the relocated birds and mammals will return to the project site.

I. Vectors

Serious rat or fly infestation has not been experienced at the Kapaa SLF and is not expected at the proposed sanitary landfill, due to the daily application of cover material.

J. Archaeological/Historical

The lack of any archaeological or historical resources at the site precludes any impacts.

K. Traffic

As the proposed project would replace the existing Kapaa SLF, the overall volume of traffic in the surrounding area is not expected to be significantly altered. Impacts associated with the proposed vehicular access to the project site cannot be determined at this time, as a specific route has not yet been chosen. Upon completion of the Kalaheo SLF, no traffic attributed to landfill activities is expected.

L. Fire

Fires can be a potential hazard within the proposed landfill if proper sanitary landfilling procedures are not followed. Burning of wastes is not permitted at a sanitary landfill, but fires can occur if there is: (1) careless handling of open flames; (2) handling of hot wastes; or (3) spontaneous combustion of materials in the presence of appropriate gases.

M. Visual

The project site will be visible from the existing Kapaa Landfill and to motorists along Interstate Route H-3 (when developed). Upon completion of the Kalaheo SLF, the site will be grassed by hydromulching for erosion control until the natural vegetation grows back and, therefore, will not show the clearing and excavation that had occurred during landfill operation. As previously stated, the present slopes of the gulch will be reduced as the floor of the gulch is filled.

N. Economic

Construction of the proposed project will require capital expenditure by the City and County of Honolulu. The cost of operation for the life of the landfill and the cost of the maintenance of the completed landfill will be borne by the City.

III. SUMMARY OF SECONDARY IMPACTS

A. Population

No short-term or long-term impacts on population are expected.

B. Land Use

Hawaiian Papaya Co., Inc. and Associates proposes to construct 660 single-family residential dwelling units on a parcel that will extend 6,000 feet along the western edge of Kawainui Marsh and 5,700 feet along the northern perimeter of the marsh below Mokapu Saddle Road, and will be located adjacent to Kapaa Quarry Road and across Interstate Route H-3 from the proposed Kalaheo Sanitary Landfill. This project is referred to as Phase II of the Kawainui Residential Development.

In the 1977 EIS for the Kawainui Residential Development, it was stated that there were several planned projects in the vicinity including the Kapaa Sanitary Landfill Expansion. The Kapaa SLF has since been implemented and Community Planning, Inc., the contact for Hawaiian Papaya Co., Inc. and Associates, has been notified of the City and County's proposed Kalaheo SLF.

IV. MITIGATION MEASURES PROPOSED TO MINIMIZE ADVERSE ENVIRONMENTAL EFFECTS

A. Introduction

This section presents the mitigation measures proposed for reducing, to insignificant levels, the unavoidable adverse impacts summarized in Section 5.

B. Mitigation Measures

1. Landform Alteration

The landfill will be designed to control erosion that could unearth refuse. The sanitary landfill will be constructed in terraces. The sloping faces of the terraces will not be so steep that erosion will be significant. Upon completion of the sanitary landfill, the terraced sections will be graded according to the engineering design for the eventual use of the site.

2. Visual

At the end of each day, the deposition area will be covered by approximately six inches of soil cover. As sections of the sanitary landfill reach their design capacities, they will be layered with a final soil cover and landscaped.

3. Erosion

During grading operations, erosion control measures will be implemented to prevent silt and other undesirable matter from entering the existing 120-inch pipe culvert under Interstate Route H-3. Siltation basins and debris barriers will be placed at the project-end of the culvert.

4. Noise

Construction noise will be mitigated by limiting the hours of construction. In addition, it is expected that the hours of operation for the proposed landfill will be from 7:00 AM to 4:30 PM. All equipment powered by internal

combustion engines used in the construction and operation of the proposed sanitary landfill will be equipped with properly functioning and maintained mufflers.

5. Air Quality

Air quality can be adversely affected by fugitive dust generated during construction. State of Hawaii Department of Health Rules and Regulations (Chapter 43, Section 10) specify the control measures that are to be implemented to reduce the effects of this type of pollutant. The primary control method involves the frequent wetting down of loose soil with water, oil or suitable chemicals. Another control measure is good housekeeping at the construction site.

The impacts to air quality from fuel emissions may be mitigated somewhat by Federal requirements for the use of emission control devices and lead-free fuel in newer automobiles. These measures would only affect private vehicular traffic, estimated at approximately 160 vehicles per day on weekdays and 525 vehicles on weekends.

10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 100

**Adverse
Environmental
Effects**

5

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

SECTION 5
PROBABLE ADVERSE ENVIRONMENTAL
EFFECTS WHICH CANNOT BE AVOIDED

The only significant long-term and unavoidable impact that will result from the implementation of the proposed project is the reduction of the present slopes of the gulch when the landfill is completed. In addition, there will be some unavoidable short-term impacts related to the construction and operation of the Kalaheo SLF, including visual, erosion, noise and air quality impacts.

Clearing and excavation of the site will result in showing exposed soil and, during the day, disposed refuse. However, as previously stated, this will be visible only from the existing Kapaa SLF and to motorists along Interstate H-3 (when developed).

While the drainage system will be constructed first to minimize the effects of erosion during initial construction of the sites some soil may wash off the site into the surrounding areas during construction of the drainage system. However, the amount of erosion during this phase of construction is not anticipated to be significant.

Noise that will be generated during construction and operation of the proposed landfill is unavoidable. Also unavoidable is the noise created by refuse vehicles traveling along Kapaa Quarry Road. Vehicles associated with the proposed project should not significantly increase the current noise levels generated during the operation of the existing Kapaa SLF, because approximately the same amount of traffic is expected.

Despite the implementation of scheduled water sprinkling, some dust will be generated during construction and operation of the proposed landfill. Fuel emissions generated by landfill-related vehicles during the life of the landfill are unavoidable; however, the amount of these emissions is not anticipated to differ significantly from that generated by the existing Kapaa SLF.

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

Alternatives

6

SECTION 6
ALTERNATIVES TO THE PROPOSED ACTION

I. NO ACTION

If the proposed project is not implemented, refuse disposal for the island will be severely impacted since the existing Kapaa SLF is nearing capacity. If the no-action alternative is chosen, it is highly probable that some landfill disposal services at the Kapaa SLF may be curtailed to extend the landfill life. Curtailment of services can include denial of permission to dispose privately-collected and demolition refuse at the site. Without a windward sanitary landfill, Oahu will be subjected to illegal dumping of refuse. Other landfill sites will have to accommodate these wastes. Increased costs in labor, equipment and fuel will result from longer hauls to these disposal sites. These additional costs will be passed on to those dependent on commercial collection services. This will mean also that the other landfill sites, namely Palailai, will fill up faster. Since the City has not yet found a site for a leeward sanitary landfill, and with a lead time of three years required to construct a new landfill, the City would have no sanitary landfill on Oahu by the end of 1985.

It should be noted that landfills will always be needed as final depositories for: the residue produced by energy recovery systems and incinerators; unprocessable wastes such as bulky items, demolition materials, rock, dirt and soil.

II. ALTERNATIVE SITES

The City and County of Honolulu Department of Public Works (DPW) has investigated several potential landfill sites in the Windward area and has determined that presently only two sites, the project site (Kalaheo) and Bellows Field, would produce the least environmental impacts at the least cost. In addition, these sites were considered to be conveniently located, and to have adequate capacity and cover material.

The Bellows Field Landfill site is situated at the north end of Waimanalo and Bellows Air Force Station. The area of the site is approximately 173 acres, 133 acres of which are usable for landfilling. Specific advantages of the site include: a capacity of 7,510,000+ cubic yards, availability of cover material, favorable prevailing winds, and moderate site preparation and improvement costs. However, according to the military, the site is needed as a training area to maintain military preparedness and is not presently available for sanitary landfill purposes.

Two other sites investigated by DFW, Auloa and Olomana, have been eliminated from consideration at this time because of their closeness to residential areas. In addition, the current optimistic outlook for a resource recovery facility for Oahu further decreases the relative merits of Auloa and Olomana versus those of Bellows and Kalaheo.

In summary, the proposed Kalaheo SLF does not have the land use constraints of Bellows Field Landfill site. In addition, the proposed Kalaheo SLF, unlike the Olomana or Auloa landfill sites, is presently not in use and is located away from the residential areas of Kailua and Kaneohe. Also, some of the existing facilities at Kapaa SLF can be used at the proposed Kalaheo SLF. Please refer to Table 6-1 (Landfill Sites Status, 1982) for additional information.

III. ALTERNATIVE PROCESSING METHODS

The City and County of Honolulu Department of Public Works has indicated that there are presently only two viable methods to reduce the volume of solid waste -- incineration and energy recovery.

A. Incineration

Incineration is defined as controlled combustion that reduces solid, liquid or gaseous combustible wastes primarily to carbon dioxide and other gases which are released into the atmosphere. The residue is usually deposited in a sanitary landfill. Incineration of solid waste reduces volume by 80 to 90 percent and can extend the life of the landfill. However, bulky refuse and non-combustible material cannot be incinerated and, therefore, must be directly disposed of at a landfill.

TABLE 6-1

LANDFILL SITES STATUS (1983)

	<u>Code</u>
1. Kapaa #2 and #3 Landfill Sites	SLF
2. Kapaa #1 Landfill Site	PA
3. Kalaheo Landfill Site	PS
4. Heeia Uka Landfill Site	2
5. Waimanalo North Landfill Site	3
6. Auloa Landfill Site	6
7. Waimanalo South Landfill Site	1
8. Kahaluu, Waihee, Waiahole, Waikane, Kaawa, and Punaluu Landfill Sites	1
9. Olomana Landfill Site	6
10. Bellows Field Landfill Site	3 & 4
11. Heeia Kai Landfill Site	1
12. Makaiwa Landfill Site	2
13. Nanakuli Landfill Site	2
14. Kaloi Landfill Site	1
15. Honouliuli Landfill Site	1
16. Kaukonahua and Waipahu Landfill Sites	1
17. Maili Landfill Site	Q
18. Koko Crater Landfill Site	7
19. Waipio Landfill Site	3
20. Mililani Landfill Site	1
21. Poamoho Landfill Site	1
22. Keekee Landfill Site	1
23. Kaena Quarry Landfill Site	1
24. Makua Landfill Site	3
25. Ohikilolo Landfill Site	5
26. Waimanalo Gulch Site	5
27. Barbers Point	1
28. Diamond Head	3
29. Ewa No. 1	1
30. Ewa No. 2	1 & 3
31. Halawa Sites	1
32. Kahe	1
33. Kunia	1
34. Pearl Harbor	WL
35. Sand Island	3
36. Waianae	2

Code

- 1. Site located within ground water supply area
- 2. Site located within close proximity to communities
- 3. Land owned by Federal or State government and/or in use, unavailable for use as a sanitary landfill
- 4. Site considered for Windward landfill
- 5. Site considered for Leeward landfill
- 6. Alternative site considered for Windward landfill.
- 7. Alternative site considered for Leeward landfill.
- SLF Presently used as a sanitary landfill
- PA Prior agreement not to be used as a landfill in order to obtain the use of Kapaa #2 and #3; and Kalaheo as landfills
- PS The proposed project site
- WL Wetland area, under Federal Regulations
- Q Site is presently being used for quarry operations. It is not contemplated the owners will allow the City to develop a landfill on this site.

Although incineration reduces refuse quickly, it requires large capital expenditure and must be designed to meet Federal and State air quality and emission standards. Up until 1977, the City had three incinerators -- at Kapalama, Kewalo and Waipahu. The incinerators at Kapalama and Kewalo were closed in October 1977, as their small processing capacities were not worth the cost to modify these facilities to meet air quality standards. The Waipahu Incinerator underwent extensive renovations in 1978 and currently processes 120,000 tons of refuse per year (TPY).

B. Energy Recovery

Steam and power generation from solid waste can be achieved by the use of waterwall incinerators. Waste heat from the burning of solid waste is captured by boiler systems incorporated as water-filled tubes in the linings of the furnaces. Steam is generated and sold to users or converted to electrical energy by steam turbines.

Waste may be burnt in bulk or processed before firing. Refuse processing may consist of shredding, drying and air separation to remove the combustible fraction of refuse, with possible metals recovery. The combustible fraction would then be incinerated and the thermal energy so produced used to generate steam which may then be converted to electrical power.

Costs are high for a system including both a processing plant to prepare the refuse as an acceptable fuel, and a power generation plant. Initial capital costs for waterwall incineration plants are estimated at \$100 million for a 2,000 ton per day plant.

Advantages of Steam and Power Generation:

- Reduces refuse volume and weight
- Prolongs use of landfill site
- Provides alternative energy and reduces dependency on conventional fuel while simultaneously disposing of large quantities of solid waste

- Can incorporate a materials recovery system
- Less land required
- Overall total systems cost is lower

Disadvantages of Steam and Power Generation:

- Requires many more skilled operators
- May require conventionally fired support systems as backup facilities when refuse quantities are insufficient
- Adverse operational impacts include possible air pollution by thermal, gas and particulate matter discharges, water pollution from contaminated waste-water discharges, noise, dust and traffic generation
- Requires large captial investment

Since 1971, the City's Department of Public Works has recognized the problem of solid waste disposal and has sought to provide innovative means for the disposal of solid waste. One solution considered was resource recovery and in order to examine the general applicability of alternative resource recovery technologies, the MITRE Corporation in 1977 prepared for the City a report, Analysis of the Feasibility of Resource Recovery for Honolulu. Based on the recommendations in this document, the City published in 1978 a Request for Proposals (RFP) from private industry for the construction and operation of a resource recovery facility. This program was referred to as Honolulu Program of Waste Energy Recovery (HPOWER).

Following an evaluation of the qualifications of the fifteen bidders who responded to the City's RFP, three bidders eventually were invited to submit pricing proposals. Two bidders, CE/Amfac and UOP, Inc., submitted a total of six pricing proposals on October 16, 1980.

A validation of the proposals showed that CE/Amfac submitted the low bid to construct an 1800 ton/day refuse-derived fuel (RDF) facility in Waipahu Town, adjacent to the Oahu Sugar Mill.

An appropriation request for financing, however, was tabled by the City Council after local residents voiced considerable opposition to the project site, and the Mayor declined to go ahead with the project because of its close proximity to existing residential areas and the method of financing the project.

Preliminary investigations of smaller-scale refuse-to-energy alternatives indicate that a combination of small facilities having a minimum capacity of 600 TPD may also be viable; however, this is not as economically attractive as a single 1,800 TPD facility. This alternative may include the retrofitting of the existing Waipahu Incinerator for energy recovery, and the construction of co-disposal facilities for incinerating refuse-derived fuel and sewage sludge at the Sand Island and Honouliuli sewage treatment plants (STP).

The DFW estimates that a minimum of three years will be required from the date of an acceptance of proposal to a facility "shakedown." In the interim, the present primary method of solid waste disposal, sanitary landfills, must continue to be used. As previously stated, all processing alternatives ultimately dispose of their residue in a landfill.

It should be noted that other processing and disposal alternatives have been evaluated by the Department of Public Works; these are presented in Appendix E. Processing alternatives such as baling for ocean disposal or shredding for either incineration or direct disposal in a landfill are no longer viable. These options are relatively unattractive due to the availability of proven waterwall incineration technology for resource recovery with its revenue-producing and volume-reduction aspects. In addition, present Federal regulations prohibit ocean disposal.

**Short
Term Uses · Long
Term Productivity**

7

SECTION 7
RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES
OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND
ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Man will continually produce solid waste and the quantities produced will increase as the population increases. A safe and efficient means to dispose of the waste produced must be developed. Sanitary landfills will continue to be the most economic means of solid waste disposal until resource recovery methods can be implemented. Also sanitary landfills will continue to be the ultimate disposal site for all solid waste processing residue.

A properly operated landfill is a safe method of waste disposal. A properly operated sanitary landfill is generally free of vector, odor, fire, litter, leachate, soil erosion and aesthetic problems. Although the landfill will be committed to only that purpose during its life, once completed the site can be used for permanent outdoor recreation or open space. Agricultural potential of the completed site will be limited.

**Commitment
of Resources**

8

SECTION 8

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

City and County funds, human labor, construction and operating equipment, building materials, fuel, and soil for cover material will be committed to the project and, therefore, unavailable for other projects.

Using the site as a landfill will make it unavailable for other uses during the life of the landfill. However, this use will not result in the loss of rare and endangered vegetation or animal species. Because of uneven settlement of the landfill there can be no development of the land for residential or other urban uses. Once the landfill is completed, its land use can be returned to open space or to passive recreation.

**Government
Policies to Offset
Adverse Effects**

9

SECTION 9
AN INDICATION OF WHAT OTHER INTERESTS AND CONSIDERATIONS OF
GOVERNMENTAL POLICIES ARE THOUGHT TO OFFSET THE ADVERSE
ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION

Since solid waste will continue to be generated, new sites are always being sought for solid waste disposal. Increased urbanization and development on the island of Oahu has reduced the amount of land remote from urban areas. Consequently, it is difficult to find a site for solid waste disposal that is remote from urban areas, yet close enough to make transfer and hauling of disposal to these sites economically reasonable.

Environmental considerations make ocean disposal undesirable; moreover, it is presently prohibited by EPA regulations. The costly processing techniques of shredding and baling extend landfill life but do not eliminate the need for a landfill. Incineration is more costly than landfilling and also requires a landfill for the residue. Resource recovery will not be implemented until 1986 at the earliest. Until that time, landfilling will remain the most economical means of waste disposal. When resource recovery facilities are finally in operation, landfills will still be required to accommodate their residue.

The proposed project would provide for the safe and efficient disposal of waste. The Kapaa SLF is expected to close by the end of 1984, Waianae and Kawaihoa SLF by the middle of 1984 and Palailai SLF by the middle of 1986. At least three years of lead time will be required to develop a resource recovery facility, or a new SLF other than the proposed project. This project would meet a critical need of the Oahu population.

Approvals

10

SECTION 10
LIST OF NECESSARY APPROVALS

1. Conservation District Use Permit from the State Land Board under Regulation 4, to be requested after the completion of the EIS.
2. Certificate of Compliance and Solid Waste Management Permit, from the Department of Health.
3. A permit for grading, excavation and fill pursuant to ordinance No. 3968 (1972). The contractor will obtain said permit from the Department of Public Works, Division of Engineering.
4. Construction Plan Approval from the Board of Water Supply.
5. Construction Plan Approval from the Hawaiian Electric Company.
6. Construction Plan Approval from the Hawaiian Telephone Company.

**Organizations
and Persons
Consulted**

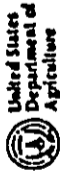
11

SECTION 11
ORGANIZATIONS AND PERSONS CONSULTED
NOTICE OF PREPARATION COMMENTS AND RESPONSES

The following list includes those agencies and organizations to whom Preparation Notices were sent or comments received during the review process. Those with an asterisk sent in written comments, and the comments and corresponding responses are presented on the indicated pages.*

<u>FEDERAL GOVERNMENT</u>	<u>PAGE</u>
*U.S. Department of Agriculture, Soil Conservation Service	11-2
*U.S. Army Corp of Engineers	11-3
*U.S. Navy	11-6
 <u>STATE OF HAWAII</u>	
*Department of Transportation	11-9
*Department of Education	11-10
*Department of Agriculture	11-11
*Department of Planning and Economic Development	11-12
*Office of Environment Quality Control	11-14
*Department of Land and Natural Resources	11-16
*Department of Health	11-18
*University of Hawaii, Water Resources Research Center	11-19
 <u>CITY AND COUNTY OF HONOLULU</u>	
*Honolulu Police Department	11-20
*Department of Parks and Recreation	11-21
*Honolulu Fire Department	11-22
*Department of Transportation Services	11-23
*Board of Water Supply	11-24
*Department of General Planning	11-26
 <u>OTHERS</u>	
*Kailua Neighborhood Board #31	11-30
*Hawaii's Thousand Friends	11-32

*This list includes persons or agencies who were sent a Notice of Preparation, who requested to be a consulted party, or who requested an EIS. In addition to this list, EQC automatically sends copies of the EIS to various other governmental agencies which are not listed here.



Soil Conservation Service

P.O. Box 50006
Honolulu, HI
96850

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
850 SOUTH KING STREET
HONOLULU, HAWAII 96813



SILVER P. ANDERSON
Mayor

MICHAEL J. CHUN, Ph.D.
DIRECTOR AND CHIEF ENGINEER
WILLIAM A. BONNETT
DEPUTY DIRECTOR

R 82-608

November 8, 1982

August 19, 1982

Michael J. Chun
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

Stratford L. Whiting
District Conservationist
U.S. Dept. of Agriculture
Soil Conservation Service
P.O. Box 50006
Honolulu, HI 96850

Dear Dr. Chun:

Subject: Environmental Impact Statement preparation Notice for the
Proposed Kalaheo Sanitary Landfill, Trk: 4-2-14, 1 and 6.

We have reviewed the subject notice and feel that the subjects related
to our expertise have been adequately covered.

Thank you for the opportunity to review this document.

Sincerely,

Stratford L. Whiting
District Conservationist

Dear Mr. Whiting:

SUBJECT: KALAHEO SANITARY LANDFILL PREP. NOTICE

Thank you for reviewing the Preparation Notice for
the Kalaheo Sanitary Landfill Environmental Impact State-
ment.

Your letter dated August 19, 1982 will be incorporated
into the environmental impact statement and a copy will
be sent to you.

Very truly yours,

Michael J. Chun

Michael J. Chun
Director and Chief Engineer

RECEIVED
DEPT. OF PUBLIC WORKS
AUG 23 10 32 AM '82
TO _____



DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96830

FOURD-PF

17 August 1982

Dr. Michael J. Chen
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

RECEIVED
DEPT. OF PUBLIC WORKS
AUG 23 11 39 AM '82

Dear Dr. Chen:

Thank you for the opportunity to review the Environmental Assessment and Environmental Impact Statement Notice of Preparation for the Proposed Kalaheo Sanitary Landfill (Windward District Sanitary Landfill Project), Kailua, Oahu, Hawaii, TRC: 4-2-15:1 and 6 dated July 1982. Based on our review, we provide the following comments.

- a. A Department of the Army (DA) Permit is not required for this project.
- b. The drainage area of 2,250 acres as stated in this report appears excessive; a recalculation should be made to verify this.
- c. The proposed project site is not located within any known flood-prone areas, but is situated in an area of undetermined but possible flood hazard (Zone D), according to the flood hazard map prepared under the Flood Insurance Study (FIS) for the City and County of Honolulu by the Federal Insurance Administration (see Incl 1). The flood hazards have been addressed on page 2-16 of the EIS Notice of Preparation text; however, Zone D areas are actually areas that haven't been studied under the FIS. The report should address the Environmental Protection Agency (EPA) "Criteria for the Classification of Solid Waste Disposal Facilities and Practices" and the conformance of the proposed Kalaheo Sanitary Landfill to EPA's criteria. With regards to Flood Plain Management Practices, probably the most pertinent EPA criteria would be that "Facilities or practices in flood plains shall not...result in washout of solid waste, so as to pose a hazard to human life, wildlife, or land or water resources." Flood plain as defined in the EPA criteria is the area inundated by the 100-year flood.

Sincerely,

KISUK CHEDUNG
Chief, Engineering Division

1 Incl
as

In determination of flood insurance is available on the community, contact your insurance agent, or call the National Flood Insurance Program at (800) 618-6670, or (800) 474-8172.

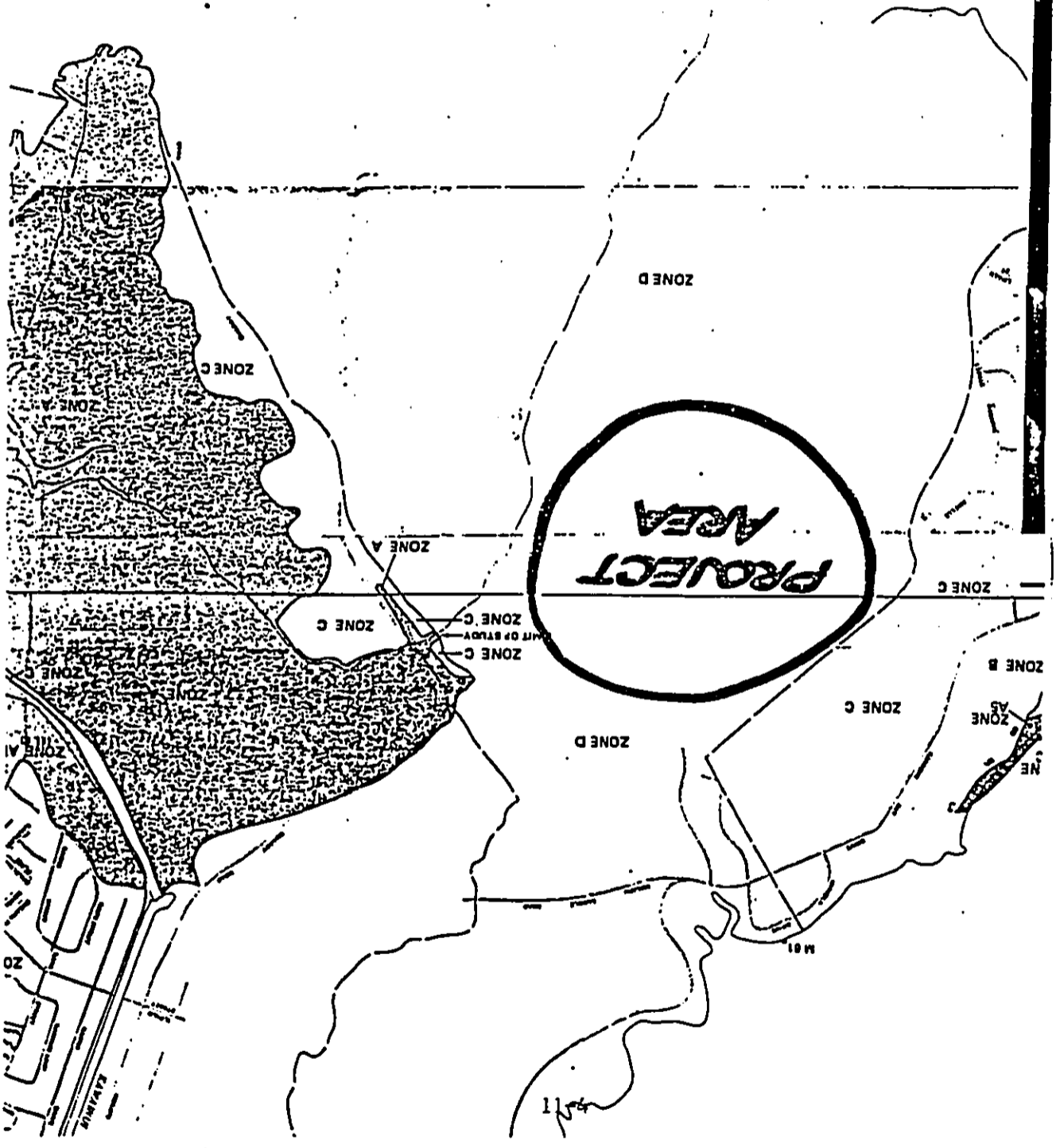
APPROXIMATE SCALE
1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
CITY AND COUNTY OF
HONOLULU, HAWAII
PANEL 90 OF 135
SEE MAP INDEX FOR PANELS NOT PRINTED
COMMUNITY-PANEL NUMBER
150001 0090 A
EFFECTIVE DATE:
SEPTEMBER 3, 1980
U.S. DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

In determination of flood insurance is available on the community, contact your insurance agent, or call the National Flood Insurance Program at (800) 618-6670, or (800) 474-8172.

APPROXIMATE SCALE
1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
CITY AND COUNTY OF
HONOLULU, HAWAII
PANEL 60 OF 135
SEE MAP INDEX FOR PANELS NOT PRINTED
COMMUNITY-PANEL NUMBER
150001 0060 A
EFFECTIVE DATE:
SEPTEMBER 3, 1980
U.S. DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION



EXPLANATION OF ZONE DESIGNATIONS

ZONE

- A** Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
 - B** Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of foundation are shown, but no flood hazard factors are determined.
 - C** Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
 - D** Areas of 100-year flood, base flood elevations and flood hazard factors determined.
 - E** Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
 - F** Areas between limits of the 100-year flood and 500-year flood; or areas subject to 100-year flooding with average depths less than one (1) foot or where the contribution to the total is less than one square mile; areas protected by levees from the base flood. (Ordinary shading)
 - G** Areas of minimal flooding. (No shading)
 - H** Areas of undetermined, but possible, flood hazards.
 - I** Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
 - J** Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.
- The numerals indicate the magnitude of difference between the 100-year and 50-year flood elevations. For numerals between 1-20, the difference is one half of the numeral for values greater than 20, the difference is 10 less than the numeral shown. This information is used in establishing insurance rates.
- 10** 100-year coastal or riverine elevation line, with elevation in feet above mean sea level.
 - 100** Zone boundary line

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

550 SOUTH KING STREET
HONOLULU, HAWAII 96813



DALESON G. ANDERSON
DIRECTOR

MICHAEL J. CHUN, Ph.D.
DIRECTOR AND CHIEF ENGINEER

WILLIAM A. BROWNE
DEPUTY DIRECTOR

R 82-617

November 9, 1982

Kisuk Cheung
Chief, Engineering Division
Department of the Army
U.S. Army Engineer District,
Fort Shafter
Honolulu, Hawaii 96858

Dear Mr. Cheung:

SUBJECT: EIS PREP. NOTICE FOR KALAHEO SANITARY LANDFILL

Thank you for reviewing the Environmental Assessment/
Preparation Notice and providing valuable comments.
The following responses are provided.

Comment

"a. A Department of the Army (DA) Permit is not
required for this project."

Response

Thank you for confirming that a permit is not required.

Comment

"b. The drainage area of 2,250 acres as stated in
this report appears excessive; a recalculation should
be made to verify this."

Response

The drainage area of 2,250 acres for the project site
was excessive and should be 130+ acres. This correction
will be made on page 2-16 of the environmental assessment.

Kisuk Cheung
Page 2
November 9, 1982

Comment

"c. The proposed project site is not located within
any known flood-prone areas, but is situated in an area
of undetermined but possible flood hazard (zone D),
according to the flood hazard map prepared under
the Flood Insurance Study (FIS) for the City and
County of Honolulu by the Federal Insurance Administra-
tion (see Incl 1). The flood hazards have been
addressed on page 2-16 of the EIS Notice of Prepara-
tion text; however, zone D areas are actually areas
that haven't been studied under the FIS. The report
should address the Environmental Protection Agency
(EPA) "Criteria for the Classification of Solid Waste
Disposal Facilities and Practices" and the conformance
of the proposed Kalaheo Sanitary Landfill to EPA's
criteria. With regards to Flood Plain Management
Practices, probably the most pertinent EPA criteria
would be that "Facilities or practices in flood
plains shall not...result in washout of solid waste,
so as to pose a hazard to human life, wildlife, or
land or water resources." Flood plain as defined
in the EPA criteria is the area inundated by the
100-year flood."

Response

The FIS is the first step in the planning process of the
Sanitary Landfill, the second being preliminary construc-
tion plans and specifications. During the later phase,
detailed engineering plans and specification will insure
conformance to applicable Federal and State Regulations.

Your letter will be incorporated into the environmental
impact statement and a copy will be sent to you.

Very truly yours,

Michael J. Chun

Michael J. Chun
Director and Chief Engineer



HEADQUARTERS
NAVAL BASE PEARL HARBOR
BOX 119
PEARL HARBOR, HAWAII 96829

NO DEPLY AFTER 14
0028:WTL:jal
Ser 1863

23 AUG 1982

6. Page 6-3. Enclosure (1), CD MCAS Kaneohe letter of 16 August commented on Bellow Field Landfill site.

It is requested that the Kaneohe Sanitary Landfill, Environmental Impact Statement be mailed:

Dr. Michael J. Chen
Director and Chief Engineer
Department of Land Utilization
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Dr. Chen:

Environmental Assessment and
Environmental Impact Statement Notice
of Preparation for the Proposed
Kaneohe Sanitary Landfill
(Mindward District Sanitary Landfill Project)
Kailua, Oahu, Hawaii
July 1982

Mr. Francis K. Y. Mau, Head
Environmental Branch
Pacific Division
Naval Facilities Engineering Command
Pearl Harbor, HI 96860

Thank you for the opportunity to make comments on the Kaneohe Sanitary Landfill, Environmental Impact Statement.

Sincerely,

M. M. DALLAM
CAPTAIN, CEC, U. S. NAVY
FACILITIES ENGINEER
BY DIRECTION OF THE COMMANDER

Enclosure

Copy to:

Mr. Melvin Lee, Division of
Refuse, Department of Public Works
Environmental Quality Commission

The subject document has been reviewed, and the following comments are submitted:

1. Page 1-9 (Table 1-2) and Page 1-11 (Table 1-3). Show that the MCAS Kaneohe Sanitary Landfill will close at the end of F10/84 vice F102.

2. Page 1-10. Third sentence after the word "Only," change "Industrial waste" to "Industrial/commercial waste."

3. Page 1-28. Paragraph 1, fourth sentence stated that "Certain provisions will be taken, however, to monitor and if required mitigate that amount of leachate generation and its potentially adverse impacts." Although leachate interceptor trenches are included in the design, the Kaneohe Sanitary Landfill does not have an impermeable liner. The groundwater is of excellent quality and may be used by very small agricultural enterprises. What will be done in the event that harmful leachate is discovered in the monitoring wells and is determined to be migrating off-site?

4. Page 1-22. In addition to municipal collection trucks, private commercial vehicles and public self-haul vehicles that are anticipated to use the landfill, include military collection trucks. Also, clarify type of landfill operation to be used, i.e., trench, area, progressive slope, or ramp. Will the sanitary landfill be cleared in increments to minimize erosion and siltation problems? Alkaline soil series will exhibit rapid to very rapid runoff and erosion hazard is severe.

5. Page 1-21. Chapter 46, Public Health Regulations of the State Department of Health is superseded by Chapter 58 of Title 11, Administrative Rules on Solid Waste Management Control.

18 AUG 1982

NAME	LAST	FIRST	MIDDLE
01	01	01	01
02	02	02	02
03	03	03	03
04	04	04	04
05	05	05	05
06	06	06	06
07	07	07	07
08	08	08	08
09	09	09	09
10	10	10	10

UNITED STATES MARINE CORPS
MARINE CORP'S AIR STATION
KALAEHO BAY, HAWAII 96860

NO SHIPY REZER TAN
YDPP/HW/MD
11015
16 AUG 1982

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
590 SOUTH KING STREET
HONOLULU, HAWAII 96813



GILBERT R. ANDERSON
DIRECTOR

MICHAEL J. SHANN, Ph.D.
ASSISTANT AND CHIEF ENGINEER
WILLIAM A. BIRNEY
STAFFY DIRECTOR

R 82-618

November 8, 1982

From: Commanding Officer
To: Commander, Naval Base, Pearl Harbor, Hawaii

Subj: Environmental Impact Statement, Notice of Preparation for Kalaheo Sanitary Landfill

Ref: (a) COMNAVBASE ltr 002B:VXL:1:1 ser 1838 of 5 Aug 1982

1. The reference forwarded a copy of the subject statement for review and comments. Accordingly, the following comments are forwarded:

a. Landfill sites in Windward Oahu are urgently required for both the civilian and military communities. The presently used Kapa Landfill has limited life remaining and new facilities must be pressed into service. The civilian refuse contractor who serves this Station's family housing area needs an environmentally acceptable off-station site to dispose of collected wastes.

b. The Marine Corps is currently in the process of obtaining additional training areas for the First Marine Brigade from the Air Force at Bellow's Air Force Station. If a landfill site at Bellow's Air Force Station were selected, it could significantly impact on the available training and therefore the operational readiness of the First Marine Brigade. Accordingly, this Station would vigorously oppose any landfill at Bellow's Air Force Station if such landfill were to adversely affect the Marine Corp's ability to train there.

2. This command enthusiastically endorses and supports the City and County of Honolulu's efforts to take positive action to secure a replacement site for the Kapa Sanitary Landfill and has no objections to the proposed Kalaheo site.

3. Point of contact for this command is Lieutenant Commander R. L. EVANS, Public Works Officer, phone 257-2171.

COPY TO:
COMNAVBASESTAC
COMFACNAVFACENCOM

M. A. TOHIMAGA
By *[Signature]*

H. M. Dallam
Captain, CEC, U.S. Navy
Facilities Engineer
Headquarters
Naval Base Pearl Harbor
Box 110
Pearl Harbor, Hawaii 96860

ATTENTION: Mr. Francis K. Y. Mau, Head
Environmental Branch
Pacific Division
Naval Facilities Engineering Command
Pearl Harbor, HI 96860

Dear Captain Dallam:

SUBJECT: EIS PREP. NOTICE FOR KALAHEO SANITARY LANDFILL

We appreciate your reviewing the Preparation Notice, and offer the following responses to your comments.

Comment

"1. Page 1-9 (Table 1-2) and Page 1-11 (Table 1-3). Show that the MCAS Kaneohe Sanitary Landfill will close at the end of FY 83/84 vice FY 82."

Response

The corrections requested will be made.

Comment

"2. Page 1-10. Third sentence after the word "Only," change "Industrial waste" to "Industrial/commercial waste."

Captain M. M. Dallam
Page 2
November 8, 1982

Response

The correction requested will be made.

Comment

"3. Page 1-28. Paragraph 3, fourth sentence stated that 'Certain provisions will be taken, however, to monitor and if required mitigate that amount of leachate generation and its potentially adverse impacts.' Although leachate interceptor trenches are included in the design, the Kalaheo Sanitary Landfill does not have an impermeable liner. The groundwater is of excellent quality and may be used by very small agricultural enterprises. What will be done in the event that harmful leachate is discovered in the monitoring wells and is determined to be migrating off-site?"

Response

Studies conducted on leachate production and migration have been ongoing for the existing Kapaa Sanitary Landfill and the results indicate that any leachate produced will be contained on site and rapid migration of the leachate can be ruled out.

Please refer to Appendix B of the Environmental Assessment, page B-7 through B-9 for additional information on leachate migration.

In the remote event that leachate is detected; there will be sufficient time to provide other means of preventing the continued formation of leachate. Also, the leachate, if produced, will be intercepted by trenches; diverted to sumps, removed and disposed of prior to the contamination of any ground water sources.

Comment

"4. Page 1-32. In addition to municipal collection trucks, private commercial vehicles and public self-haul vehicles that are anticipated to use the landfill, include military collection trucks. Also, clarify type of landfill operation to be used, i.e., trench, area, progressive slope, or ramp. Will the sanitary landfill be cleared in increments to minimize erosion and siltation problems? Alacloa soil series will exhibit rapid to very rapid runoff and erosion hazard is severe."

Captain M. M. Dallam
Page 3
November 8, 1982

Response

The correction requested that military collection trucks will also use the facility will be made.

The engineering plans have not been completed and the exact type of landfilling operation to be used has not been determined. However, in all probability, a modified progressive slope method will be used for the landfill operation in which the earth cover will be excavated and placed in a stockpile. Ground cover will be placed immediately after excavation to minimize erosion and a siltation basin constructed to control siltation.

Comment

"5. Page 1-33. Chapter 46, Public Health Regulations of the State Department of Health is superseded by Chapter 58 of Title 11, Administrative Rules on Solid Waste Management Control."

Response

The corrections will be made.

Comment

"6. Page 6-3. Enclosure (1), CO MCAS Kaneohe letter of 16 August commented on Bellows Field Landfill site."

Response

Our statement on the availability of Bellows Field site on page 6-3 is not in conflict with the CO MCAS Kaneohe letter of 16 August 1982. The site is presently unavailable for use as a sanitary landfill.

Your letter will be incorporated into the environmental impact statement and a copy will be sent to you.

Very truly yours,



Michael J. Chun
Director and Chief Engineer

GEORGE A. ARTOBS
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
885 KALANOAHI STREET
HONOLULU, HAWAII 96813

August 9, 1982

RYOKICHI HIGASHIONNA, PH.D.
DIRECTOR

DEPT. DIRECTOR
RYOKICHI HIGASHIONNA
JAMES H. CORRELL
JOHN W. HARRIS
JOHNATHAN K. SHIMADA, PH.D.

RYOKICHI HIGASHIONNA, PH.D.
DIRECTOR

STP 8-8476

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
850 SOUTH KING STREET
HONOLULU, HAWAII 96813



WILSON A. BRUNETT
CITY ENGINEER

R 82-615

November 8, 1982

Mr. Michael J. Chun
Director and Chief Engineer
City and County of Honolulu
Department of Public Works
850 South King Street
Honolulu, Hawaii 96813

Dear Mr. Chun:

Environmental Impact Statement Preparation Notice
Proposed Kalaheo Sanitary Landfill THK1-2-14:1 & 6

Thank you for the opportunity to participate in the preparation of the subject EIS.

We suggest inclusion of the following stipulation that based on State Law (Vol 3A, Title 15, Chapter 264, Part VI, H.R.S.), the proposed landfill will have to be screened if it is visible from Interstate Route H-3.

Very truly yours,

Ryokichi Higashionna
Ryokichi Higashionna
Director of Transportation

Ryokichi Higashionna, Ph.D.
Director of Transportation
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Dr. Higashionna:

SUBJECT: EIS PREP. NOTICE FOR KALAHEO SANITARY LANDFILL

We appreciate your review of the preparation notice. We will include the provision for screening with the design of the project.

Very truly yours,

Michael J. Chun

Michael J. Chun
Director and Chief Engineer

RECEIVED
DEPT. OF PUBLIC WORKS
AUG 13 1 55 PM '82

SCOTT B. ARNONE
SOUTHERN



STATE OF HAWAII
DEPARTMENT OF EDUCATION
P. O. BOX 2360
HONOLULU, HAWAII 96804

August 10, 1982

OFFICE OF THE SUPERINTENDENT

DR DONALD H. THOMPSON
SUPERINTENDENT

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
630 SOUTH KING STREET
HONOLULU, HAWAII 96813



GILBERT A. ANDERSON
MAYOR

MICHAEL J. CHUN, Ph.D.
DIRECTOR AND CHIEF ENGINEER
WILLIAM A. BARNETT
SAFETY DIRECTOR

R B2-610

November 8, 1982

Mr. Michael J. Chun
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 S. King Street
Honolulu, HI 96813

Dear Mr. Chun:

SUBJECT: EIS, Kalaheo Sanitary Landfill
TRK: 4-2-14; 1 and 6

11-10

RECEIVED
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AUG 16 2 19 PM '82
TO _____

The Department of Education has no objection to the proposed Kalaheo Sanitary Landfill as described in the Environmental Impact Statement Notice of Preparation.

Sincerely,
Donnis H. Thompson
Donnis H. Thompson
Superintendent of Education

DHT:HL:jf
cc: Mr. James Edington
Windward District

Donnis H. Thompson, Ph.D.
Superintendent of Education
Department of Education
P.O. Box 2360
Honolulu, Hawaii 96804

Dear Dr. Thompson:

SUBJECT: EIS PREP. NOTICE FOR KALAHEO SANITARY LANDFILL

We appreciate your review of the preparation notice.
Your letter will be incorporated into the environmental impact statement.

Very truly yours,

William C. Baum

Michael J. Chun
Director and Chief Engineer

AN EQUAL OPPORTUNITY EMPLOYER

CLAUDE E. ARIZONA
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

August 18, 1982

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
150 SOUTH KING STREET
HONOLULU, HAWAII 96813



SILVER H. ANDERSON
MAYOR

MICHAEL J. CHUN, Ph.D.
DIRECTOR AND CHIEF ENGINEER
WILLIAM A. BOWNE
DEPUTY DIRECTOR

R 82-609

November 8, 1982

MEMORANDUM

To: Dr. Michael J. Chun, Director
and Chief Engineer
Department of Public Works
City and County of Honolulu

Subject: Environmental Impact Statement Preparation
Notice for the Proposed Kalaheo Sanitary Landfill
TRK: 4-2-14: 1 and 6

The Department of Agriculture has reviewed the subject notice and offers the following comment.

The last paragraph on page 3-1 should be corrected to read: "According to the State Department of Agriculture, only a small portion of the site is classified as 'Other Important Agricultural Land' (Refer to Figure 3-4)."

Thank you for the opportunity to comment.

Jack K. Suwa
JACK K. SUWA
Chairman, Board of Agriculture

Jack K. Suwa
Chairman, Board of Agriculture
Department of Agriculture
1428 So. King Street
Honolulu, Hawaii 96814

Dear Mr. Suwa:

SUBJECT: EIS PREP. NOTICE FOR KALAHEO SANITARY LANDFILL
We appreciate your review of the preparation notice and offer the following response:

Comment:

"The last paragraph on page 3-1 should be corrected to read: 'According to the State Department of Agriculture, only a small portion of the site is classified as 'Other Important Agricultural Land' (Refer to Figure 3-4).'"

Response

The last paragraph on page 3-1 will be corrected.

Your letter will be incorporated into the environmental impact statement and a copy will be sent to you.

Very truly yours,
Michael J. Chun

Michael J. Chun
Director and Chief Engineer

10
AUG 19 2 14 PM '82
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DEPT OF PUBLIC WORKS

"Support Hawaiian Agricultural Products"



DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

Executive Building 250 South King St., Honolulu, Hawaii • Mailing Address: P.O. Box 2348, Honolulu, Hawaii 96802

GEORGE R. AYTOSH
Commissioner
HIDEO KONO
Deputy
FRANK BRAYMANE
Director of Planning

Mr. Michael J. Chun
Page 2
August 16, 1982

August 16, 1982

Ref. No. 6436

Mr. Michael J. Chun
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Chun:

Subject: Preparation Notice for Proposed Kalaheo Sanitary Landfill (SLF)

We have reviewed the subject preparation notice and have the following comments to offer.

In consideration of the policies proposed in the draft Kawaihi Marsh resource management plan, we envision two areas of potential concern with respect to long-term management of the Marsh.

Sedimentation

Draft Policy: The integrity of the Marsh as a flood control and sedimentation basin must be maintained to the maximum extent feasible to protect the Kailua town area from flooding.

Draft Policy: Existing grading and erosion control ordinances should be enforced and special conditions applied to minimize sedimentation impacts from development.

The subject preparation notice discusses several mitigation measures for reducing the sediment load entering the Marsh, including sedimentation basins and debris traps. To demonstrate the consistency of the proposed action to the relevant draft policies of the management plan, the EIS should elaborate on the anticipated long-term effectiveness of these measures in controlling sedimentation and on monitoring and maintenance programs that may be required.

Leachates

Draft Policy: In order to resolve potential water quality problems, (Ecological - leachate monitoring requirements should be applied to any Water Quality) landfill activity within the drainage area of the Marsh.

To mitigate leachate impacts on the Marsh, the preparation notice mentions several structural measures, a long-term maintenance program for them, and continued leachate monitoring. The EIS should elaborate on the implementation of these measures, particularly the revegetation of the landfill, the long-term maintenance program, and leachate monitoring procedures.

We appreciate very much the opportunity to comment on the proposed activity.

Sincerely,

Hideto Kono

RECEIVED
DEPT. OF PUBLIC WORKS
AUG 23 2 46 PM '82
TO _____

11-12

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
430 SOUTH KING STREET
HONOLULU, HAWAII 96813



WILLIAM A. ANDERSON
DIRECTOR

MICHAEL J. CHUNG, Ph.D.
DIRECTOR AND CHIEF SCIENTIST
WILLIAM A. BOWEN
DEPUTY DIRECTOR

R 82-614

Hidetō Kono
Page 2
November 8, 1982

traps. To demonstrate the consistency of the proposed action to the relevant draft policies of the management plan, the EIS should elaborate on the anticipated long-term effectiveness of these measures in controlling sedimentation and on monitoring and maintenance programs that may be required."

November 8, 1982

Hidetō Kono
Director Department of Planning
and Economic Development
P.O. Box 2159
Honolulu, Hawaii 96804

Dear Mr. Kono:

SUBJECT: EIS PREP. NOTICE FOR KALAHEO SANITARY LANDFILL

We appreciate your review of the preparation notice and provide the following responses:

Comment

"In consideration of the policies proposed in the draft Kalaheo Marsh resource management plan, we envision two areas of potential concern with respect to long-term management of the Marsh."

"Sedimentation

Draft Policy: The integrity of the Marsh as a flood (economic - control and sedimentation basin must Controls and be maintained to the maximum extent Coordination) feasible to protect the Kailua town area from flooding.

Draft Policy: Existing grading and erosion control (Ecological - ordinances should be enforced and Water Qual- special conditions applied to minimize ity) sedimentation impacts from development.

The subject preparation notice discussed several mitigation measures for reducing the sediment load entering the Marsh, including sedimentation basins and debris

Response

Engineering plans for the project will be prepared after the EIS has been approved. The engineering plans will specifically deal with grading and erosion control during site preparation of the landfill; during the landfilling operation and after landfilling activities are terminated. The engineering plans and specification for grading and erosion control of the landfill will conform to all applicable governmental regulations.

Comment

"Leachates

Draft Policy: In order to resolve potential water (Ecological - quality problems, leachate monitoring Water Quality requirements should be applied to any landfill activity within the drainage area of the Marsh.

To mitigate leachate impacts on the Marsh, the preparation notice mentions several structural measures, a long-term maintenance program for them, and continued leachate monitoring. The EIS should elaborate on the implementation of these measures, particularly the revegetation of the landfill, the long-term maintenance program, and leachate monitoring procedures."

Response

After final approval of the EIS, landscape plans will be prepared as part of the engineering plans for the project. These plans will specifically deal with revegetation of the landfill. Mitigative measures for leachate migration are found on pages 1-28 to 1-30 of the Notice of Preparation/Environmental Assessment. A leachate monitoring program similar to the existing Kapaa Sanitary Landfill will be implemented.

6205214

Hidetō Kono
Page 3
November 8, 1982

Your letter will be incorporated into the environmental impact statement and a copy will be sent to you.

Very truly yours,

Michael J. Chun

Michael J. Chun
Director and Chief Engineer



STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
100 HANALEIUA ST.
HONOLULU, HAWAII 96813

Jacqueline Parnell
TELEPHONE NO.
548-8118

August 19, 1982

Dr. Michael J. Chun
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Dr. Chun:

Subject: Environmental Impact Statement Preparation Notice
for the Proposed Kalaheo Sanitary Landfill

We have reviewed your preparation notice and submit our comments for your consideration:

1. Of primary importance in the development of a landfill is that sufficient distance be provided between the project and residential areas. A buffer zone large enough in area can serve to mitigate a number of problems while too small a buffer zone can exacerbate minor problems. For this reason we suggest that the subject of a buffer zone be discussed as a topic, covering ownership and zoned use of the buffer as well as its mitigating effects.
2. Underground fires occasionally occur in sanitary landfills which are difficult to locate and extinguish. These fires can smolder for a long time causing an air pollution problem. This problem should be addressed with discussion of proposed mitigating measures.

Thank you for the opportunity to comment on your preparation notice. We look forward to reviewing your draft EIS.

Sincerely,

Jacqueline Parnell
Jacqueline Parnell
Director

RECEIVED
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AUG 20 2 37 PM '82

11-14

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
430 SOUTH KING STREET
HONOLULU, HAWAII 96813



GILBERT ANDERSON
MAILING

MICHAEL J. CHUN, Ph. D.
DIRECTOR AND CHIEF ENGINEER
WILLIAM A. BRUNET
CHIEF ASSISTANT

R 82-613

November 8, 1982

Jacqueline Parnell, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Mrs. Parnell:

SUBJECT: EIS PREP. NOTICE FOR KALAHEO SANITARY LANDFILL

We appreciate your review of the preparation notice and offer the following response:

Comment

- 1. Of primary importance in the development of a landfill is that sufficient distance be provided between the project and residential areas. A buffer zone large enough in area can serve to mitigate a number of problems while too small a buffer zone can exacerbate minor problems. For this reason we suggest that the subject of a buffer zone be discussed as a topic, covering ownership and zoned use of the buffer as well as its mitigating effects."

Response

We are in agreement that a large buffer zone separating a landfill from an urban area can mitigate most of the adverse environmental problems. We have selected the isolated Kalaheo site for this reason, on three sides (North, West and South) the landfill is screened by the hills and the mouth (east) by the H-3 Highway. The land use classification and zoning have been described in Section 3 of the Environmental Assessment. The future planned use for the R-6 area fronting the project site is unknown at this time.

Jacqueline Parnell
Page 2
November 8, 1982

Comment

- "2. Underground fires occasionally occur in sanitary landfills which are difficult to locate and extinguish. These fires can smolder for a long time causing an air pollution problem. This problem should be addressed with discussion of proposed mitigating measures."

Response

The problem of underground fires is a problem which can be dealt with through the enforcement of the following:

1. Rigid inspection of incoming refuse for smoldering embers and refusal of this waste. Controlled inspection and dumping of refuse at the operating face of the landfill.
2. Tight security of the landfill during nonworking hours.
3. The use of daily cover and the design of the landfill to incorporate 'cells' which contain the refuse. The constructed cell limits fires to a cell rather than allowing it to spread throughout the entire landfill. This is an effective means of combating a fire once it has started.

Your letter will be incorporated into the environmental impact statement and a copy will be sent to you.

Very truly yours,

Michael J. Chun

Michael J. Chun
Director and Chief Engineer

STANDARD & MATHISON
ENGINEERS & ARCHITECTS



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P O BOX 551
HONOLULU, HAWAII 96808

1-205243

RECEIVED
DEPT. OF PUBLIC WORKS
AUG 26 2 16 PM '82

Your: R 82-382

Honorable Michael J. Chun
Director and Chief Engineer
Department of Public Works
City & County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Dr. Chun:

Thank you for notifying us of the environmental impact statement (EIS) to be prepared for the new landfill being proposed at Kapaa Valley. We have considered the notice from a number of viewpoints.

Groundwater and Surface Water

We anticipate no adverse effect on groundwater or the waters of the Kawaiunui Swamp. We base this expectation on the studies referred to by the notice.

Nevertheless, we recommend continuation of the leachate monitoring program inasmuch as a new site is involved, and because Kawaiunui Swamp provides habitat for endangered waterbirds. In addition to a monitoring program, we recommend that there be a contingency plan to prevent contamination of the marsh in the event leaching is detected.

Historic Sites

Our records indicate that this project does not occur on historic properties listed on the Hawaii Register or the National Register of Historic Places, or eligible for inclusion on the National Register of Historic Places.

Due to the lack of archaeological surveys in the vicinity, we are not aware that significant resources exist in the project area. This does not confirm the absence of historical, cultural, architectural or archaeological

Hon. Michael J. Chun
re: Kapaa Valley Landfill EIS
Page Two
AUG 24 1982

resources on the property. If any previously unidentified sites or remains (artifacts, shell, bone, or charcoal deposits; human burials; rock or coral alignments, pavings, or walls) are encountered, please inform the applicant to stop work and contact our historic sites office at 548-7460 immediately.

Sincerely,

SUSUMU ONO, Chairman
Board of Land and Natural Resources
and
State Historic Preservation Officer

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
830 SOUTH KING STREET
HONOLULU, HAWAII 96813



SILVER C. ANDERSON
MAYOR

MICHAEL J. CHUN, Ph.D.
DIRECTOR AND CHIEF ENGINEER
WILLIAM A. BOWEN
DEPUTY DIRECTOR

R 82-612

November 8, 1982

The Honorable Susumu Ono, Chairman
Board of Land and Natural Resources
and
State Historic Preservation Officer
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Ono:

SUBJECT: EIS PREP. NOTICE FOR KALAEHO SANITARY LANDFILL

We appreciate your review of the preparation notice
and offer the following response:

Comment

"Groundwater and Surface Water"

"We anticipate no adverse effect on groundwater or
the waters of the Kawaiwi Swamp. We base this expect-
tation on the studies referred to by the notice."

"Nevertheless, we recommend continuation of the leach-
ate monitoring program inasmuch as a new site is
involved, and because Kawaiwi Swamp provides habitat
for endangered waterbirds. In addition to a monitoring
program, we recommend that there be a contingency
plan to prevent contamination of the marsh in the
event leaching is detected."

Response

We appreciate your evaluation of our study which indicate
that no adverse effect on groundwater or the waters of
the Kawaiwi Swamp is anticipated.

The Honorable Susumu Ono
Page 2
November 8, 1982

We agree that the continuation of the leachate monitoring
program be continued for the existing Kepaa Site and also
implemented for the proposed project site. Leachate if
produced, will be intercepted by trenches; diverted to
sumps, removed and disposed of prior to the contamination
of any groundwater sources.

Comment

"Historic Sites"

"Our records indicate that this project does not
occur on historic properties listed on the Hawaii
Register or the National Register of Historic Places,
or eligible for inclusion on the National Register
of Historic Places."

"Due to the lack of archaeological surveys in the
vicinity, we are not aware that significant resource
exist in the project area. This does not confirm
the absence of historical, cultural, architectural
or archaeological resources on the property. If any
previously unidentified sites or remains (artifacts,
shell, bone, or charcoal deposits; human burials,
rock or coral alignments, pavings, or walls) are
encountered, please inform the applicant to stop
work and contact our historic sites office at 548-7460
immediately."

Response

We appreciate confirmation that the project is not located
on historic properties listed on the Hawaii Register or
the National Register of Historic Places or eligible for
inclusion on the National Register of Historic Places.

A surface archaeological reconnaissance for the project
site was conducted by our consultants Environment Impact
Study Corp. and the results can be found in Appendix C of
the assessment. Should you have questions or require
clarification, please contact Dr. Marvin Miura at 833-7724.

Very truly yours,

Michael J. Chun
Director and Chief Engineer

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



MICHAEL J. CHUN, PW D.
DIRECTOR AND CHIEF ENGINEER
WILLIAM A. BRUNET
DEPUTY DIRECTOR
R 82-611

EILEEN M. ANDERSON
ASSISTANT

CHARLES G. CLARK
DIRECTOR OF HEALTH

JAMES F. CHALKER, M.D.
DEPUTY DIRECTOR OF HEALTH
HELEN M. THOMPSON, M.A.
DEPUTY DIRECTOR OF HEALTH
MELVIN K. KOIZUMI
DEPUTY DIRECTOR OF HEALTH
ADRIANNE SAKAGUCHI, M.A., J.D.
DEPUTY DIRECTOR OF HEALTH



STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 5079
HONOLULU, HAWAII 96812

August 24, 1982

November 8, 1982

MEMORANDUM

To: Michael J. Chun, Director
Department of Public Works
City and County of Honolulu

From: Deputy Director for Environmental Health

Subject: Request for Comments on Proposed Environmental Impact Statement (EIS) for the Proposed Kalaheo Sanitary Landfill, THK: A-2-14; 1 and 6

Thank you for allowing us to review and comment on the subject proposed EIS. Please be informed that we do not have any comments or objections to this project at this time.

We realize that the statements are general in nature due to preliminary plans being the sole source of discussion. We, therefore, reserve the right to impose future environmental restrictions on the project at the time final plans are submitted to this office for review.

Melvin K. Koizumi
MELVIN K. KOIZUMI

MC:jh

Melvin K. Koizumi
Deputy Director of Health
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Dear Mr. Koizumi:

SUBJECT: EIS PREP. NOTICE FOR KALAHEO SANITARY LANDFILL

We appreciate your review of the preparation notice. Your letter will be incorporated into the environmental impact statement and a copy will be sent to you.

Very truly yours,

William A. Brunet

Michael J. Chun
Director and Chief Engineer

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11-18



University of Hawaii at Manoa

Water Resources Research Center
Holmes Hall 283 • 2540 Dole Street
Honolulu, Hawaii 96822

10 August 1982

*8-20-82
EJH
Report*

**DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU**

650 SOUTH KING STREET
HONOLULU, HAWAII 96813



GILSEW B. ANDERSON
Mayor

MICHAEL J. CHUN, Ph.D.
DIRECTOR AND CHIEF ENGINEER
WILLIAM A. BARNETT
DEPUTY DIRECTOR

R 82-616

November 8, 1982

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

Dear Mr. Murabayashi:

SUBJECT: EIS PREP. NOTICE FOR KALAEHO SANITARY LANDFILL

We appreciate your review of the preparation notices.

Your letter will be incorporated into the environmental impact statement and a copy will be sent to you.

Very truly yours,

Michael J. Chun

Michael J. Chun
Director and Chief Engineer

Dr. Michael J. Chun
Director & Chief Engineer
Department of Public Works
City & County of Honolulu
650 S. King Street
Honolulu, Hawaii 96813

Dear Dr. Chun:

Subject: EIS Preparation Notices, Proposed Kalaeo Sanitary Landfill, TMS: 4-2-14: 1 & 6

We have reviewed the subject EIS Preparation Notice and have no comments to offer at this time. Thank you for the opportunity to comment. This material was reviewed by WRC personnel.

Sincerely,

Edwin T. Murabayashi

Edwin T. Murabayashi
EIS Coordinator

ETH:jm

TO _____
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AN EQUAL OPPORTUNITY EMPLOYER

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POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU

150 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813

JUL 30 10 14 AM '82
DIVISION OF RECORDS
COLLECT-JUL & DISPOSAL



WILHELM B. ANDERSON
CHIEF

OUR REFERENCE EPS-ES
R 82-382

July 27, 1982

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JUL 29 1 46 PM '82

TO: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM: FRANCIS KEALA, CHIEF OF POLICE
HONOLULU POLICE DEPARTMENT

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
FOR THE PROPOSED KALAHEO SANITARY LANDFILL

We have reviewed the subject notice and find nothing objectionable in it. We may have comments when planning for this project becomes more detailed.

FRANCIS KEALA
Chief of Police
By *Earl Thompson*
EARL THOMPSON
Assistant Chief of Police

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

810 SOUTH KING STREET
HONOLULU, HAWAII 96813



WILHELM B. ANDERSON
CHIEF

MICHAEL J. CHUN, P.O. B.
DIRECTOR AND CHIEF ENGINEER
WILLIAM A. BOWMETT
SECURITY DIRECTOR

R 82-606

November 8, 1982

MEMORANDUM

TO: MR. FRANCIS KEALA, CHIEF
POLICE DEPARTMENT
ATTN: EARL THOMPSON

FROM: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

SUBJECT: EIS PREPARATION NOTICE FOR KALAHEO SANITARY
LANDFILL

We appreciate your reviewing the preparation notice/
environmental assessment.

We will keep you informed and a copy of the environ-
mental impact statement will be made available for your
review.

William C. Bunt

Michael J. Chun
Director and Chief Engineer

11-20

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
630 SOUTH KING STREET
HONOLULU, HAWAII 96813



MICHAEL J. CHUN, Ph.D.
DIRECTOR AND CHIEF ENGINEER
WILLIAM A. BERRY
DEPUTY DIRECTOR

R 82-605

November 8, 1982

MEMORANDUM

TO: MRS. EMIKO KUDO, DIRECTOR
DEPARTMENT OF PARKS AND RECREATION

FROM: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

SUBJECT: EIS PREPARATION NOTICE FOR KALAHEO SANITARY
LANDFILL

We appreciate your reviewing the preparation notice/
environmental assessment and we provide the following
response to your comment.

Comment

"We have no objections to the construction of the
Kalaheo Sanitary Landfill, provided that the ecological
system of Kawaiunui Marsh is not detrimentally affected
during construction and post construction activities."

Response

We believe that Kawaiunui Marsh will not be adversely
affected by the construction activities and during the
operation of the landfill. The engineering plans and
specification will incorporate specific controls for ero-
sion and sediment control, leachate detection and control
to name a few of the areas which will be covered.

Your letter will be incorporated into the environmental
impact statement.

William Berry

Michael J. Chun
Director and Chief Engineer

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU
630 SOUTH KING STREET
HONOLULU, HAWAII 96813



SILVER G. ANDERSON
DIRECTOR

ROBERT K. MASUDA
DIRECTOR

SILVER G. ANDERSON
DIRECTOR

July 28, 1982

MEMORANDUM

TO: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM: ROBERT K. MASUDA, DIRECTOR

SUBJECT: EIS PREPARATION NOTICE FOR THE PROPOSED KALAHEO SANITARY
LANDFILL, TRK 4-2-14:1 AND 6

We have no objections to the construction of the Kalaheo Sanitary Landfill,
provided that the ecological system of Kawaiunui Marsh is not detrimentally
affected during construction and post construction activities.

Thank you for the opportunity to review the EIS Preparation Notice.

RKM:jf

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Mr. Melvin M. Honaka
Page 2
November 8, 1982

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
HONOLULU MUNICIPAL BUILDING
510 SOUTH KING STREET
HONOLULU, HAWAII 96813



SILVER R. ANDERSON
DIRECTOR

Response

The description of fire fighting facilities on page 2-29 and 2-30 will be modified to include the additional support available from the Kanoche Station and the proposed Olomana fire station.

Your letter will be incorporated into the environmental impact statement and a copy will be sent to you.

Michael J. Chun

Michael J. Chun
Director and Chief Engineer

August 19, 1982

MEMORANDUM

TO: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM: ROY A. PARKER, DIRECTOR

SUBJECT: EIS PREPARATION NOTICE FOR
MALAIHO SANITARY LANDFILL
TRK: 4-2-1411, 6 (REF: R-82-382)

We have reviewed the Environmental Assessment for the project and concur with its conclusion that the overall volume of traffic in the surrounding area would not be significantly altered since the proposed project would only replace a similar activity at the nearby Kopua Sanitary Landfill site.

Roy A. Parker
ROY A. PARKER

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DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
510 SOUTH KING STREET
HONOLULU, HAWAII 96813

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
620 SOUTH KETTANIA
HONOLULU, HAWAII 96843



SILEN R. ANDERSON, Mayor
YOSHIE H. FUJINAKA, Chairman
ROBERT A. SOUZA, Vice Chairman
MICHAEL J. CHUN
MILTON J. AGADER
RICHARD M. KANE
WILLIAM A. BARNETT
DONNA M. HOWARD
Milton J. Agader
KAZU HAYASHIDA
Manager and Chief Engineer



MICHAEL J. CHUN, P.E.
DIRECTOR AND CHIEF ENGINEER
WILLIAM A. BARNETT
DEPUTY MANAGER

R 82-607

November 8, 1982

August 18, 1982

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DEPT OF PUBLIC WORKS
AUG 20 2 37 PM '82

MEMORANDUM

TO: MR. ROY A. PARKER, DIRECTOR
DEPARTMENT OF TRANSPORTATION SERVICES

FROM: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

SUBJECT: EIS PREPARATION NOTICE FOR KALAHEO SANITARY
LANDFILL

We appreciate your reviewing the document and concurr-
ing with our conclusion that there will not be significant
alteration of the traffic volume.

Your letter will be incorporated into the environmental
impact statement and a copy will be sent to you.

William A. Barnett
Michael J. Chun
Director and Chief Engineer

TO: MICHAEL J. CHUN
DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM: KAZU HAYASHIDA
BOARD OF WATER SUPPLY

SUBJECT: YOUR MEMORANDUM OF JULY 21, 1982, ON THE
ENVIRONMENTAL IMPACT STATEMENT (EIS)
PREPARATION NOTICE FOR THE PROPOSED
KALAHEO SANITARY LANDFILL, TRK: 4-2-14:1 & 6

We have the following comments on your proposed
project:

1. The availability of water will be determined
when the construction drawings are submitted
for our review and approval.
2. The water service limit for the area is the
172-foot elevation. Therefore, the office
with the restroom should be located at or
below that elevation in order to receive water
service from us.
3. We anticipate no adverse impact to potable
groundwater resources by the proposed landfill.

If you have any questions, please contact Lawrence
Whang at 548-5221.

Kazu Hayashida
KAZU HAYASHIDA
Manager and Chief Engineer

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

810 SOUTH KING STREET
HONOLULU, HAWAII 96813



SILVER B. AMERSON
DIRECTOR

MICHAEL J. CHUN, Ph.D.
DIRECTOR AND CHIEF ENGINEER
WILLIAM A. BOWNEY
DEPUTY DIRECTOR

R 82-602

November 8, 1982

Kazu Hayashida, P.E.
Page 2
November 8, 1982

Comment

"3. We anticipate no adverse impact to potable ground-water resources by the proposed landfill."

Response

Your evaluation concurs with our initial finding that no adverse impact to the ground water resource is anticipated.

Your letter will be incorporated into the environmental impact statement and a copy will be sent to you.

Michael J. Chun

Michael J. Chun
Director and Chief Engineer

MEMORANDUM

TO: MR. KAZU HAYASHIDA, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

FROM: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

SUBJECT: EIS PREPARATION NOTICE FOR KALAHEO SANITARY
LANDFILL

We appreciate your reviewing the document and offer the following responses to your comments.

Comment

"1. The availability of water will be determined when the construction drawings are submitted for our review and approval."

Response

The construction drawing will be submitted to you for review and approval.

Comment

"2. The water service limit for the area is the 172-foot elevation. Therefore, the office with the restroom should be located at or below that elevation in order to receive water service from us."

Response

The restroom and offices will be located below the 172-foot elevation.

DEPARTMENT OF GENERAL PLANNING
CITY AND COUNTY OF HONOLULU
 450 SOUTH KING STREET
 HONOLULU, HAWAII 96813



Dr. Michael J. Chun
 Page 2

HILLARD T. CHON
 DEPT. PLANNING OFFICER
 RALPH PORTNORE
 DEPT. OF GENERAL PLANNING OFFICER

ENGINEER
 DATE

DGP7/82-2496

August 24, 1982

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MEMORANDUM

TO: Dr. Michael J. Chun, Director and Chief Engineer
 Department of Public Works

VIA: Andrew I. T. Chang, Managing Director

SUBJECT: Proposed Kalaheo Sanitary Landfill, THK 4-2-14: 1 & 6
 Environmental Impact Statement Preparation Notice

It might be helpful in assessing the project if the reviewer is provided the following information.

Leachate Formation and Disposal

Additional discussion may be needed to describe the effectiveness of providing interceptor trenches on site for purposes of collecting leachate to sumps located at the lowest level of the gradient. e.g. with the relatively high amount of rainfall in the area of the landfill site, the possibility for leachate collections overflowing the sump and eventually reaching the environmentally sensitive Kawaiinui Marsh with potentially damaging effects. There is also the possibility of leachate seepage from the sump to subsurface water tables and a likelihood of discharge into the marsh.

Since findings of a leachate monitoring program at the neighboring Kapaia Sanitary Landfill indicate the absence of leachate in Kawaiinui Marsh, and the fact that the proposed Kalaheo site is similar to Kapaia in hydrogeologic aspects, description of the precautions used to control leachate formation at Kapaia would be helpful.

Besides instituting a leachate monitoring program at Kawaiinui Marsh, there should also be attempts to monitor and detect other likely contaminants reaching Kawaiinui Marsh. With the introduction of heavy equipment, trucks, vehicles, etc., into

the relatively undeveloped area, the composition of drainage surface runoff will be different from now. If marsh contamination comes about, the steps that can be taken to protect the Kawaiinui natural resource should be discussed.

Disturbance to Natural Vegetation

There will be impact to air quality at the site and neighboring areas from fugitive dust generated during construction of on-site and off-site improvements. Operation of the landfill will again result in continuous production of dust and vehicular emissions. The preparation notice does not describe the extent of potential disturbance to natural vegetation in the surrounding conservation district due to presence of increased dust and fuel emission.

Impact to Scenic Views

The project site and the vehicular access road will be visible to motorists traveling along Interstate Route H-3 when developed. Litter very likely will be generated in the landfill area when refuse is deposited by commercial and public refuse collectors, transfer trailers, trucks, and individual depositors. Without proper housekeeping, litter may also be found scattered along the vehicular access to the project site. With the site being exposed to persistent tradewinds most of the year, mitigative measures to curtail adverse visual impacts may be needed inasmuch as scenic views are afforded from the section of H-3 route.

Ralph Kawamoto
 RALPH KAWAMOTO
 Planner

APPROVED:
Ralph Portnore
 HILLARD T. CHON

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
810 SOUTH KING STREET
HONOLULU, HAWAII 96813



STANDARD ADDRESS
MAIL

MICHAEL J. CHUN, Ph.D.
DIRECTOR AND CHIEF ENGINEER

WILLIAM A. BURGEE
DEPUTY DIRECTOR

R 82-604

November 8, 1982

Mr. Willard T. Chow
Page 2
November 8, 1982

MEMORANDUM

TO: MR. WILLARD T. CHOW, CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING
ATTN: MR. RALPH KAWAMOTO, PLANNER

FROM: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

SUBJECT: PIS PREPARATION NOTICE FOR KALAHEO SANITARY
LANDFILL

We appreciate your reviewing the Preparation Notice/
Environmental Assessment and provide the following response
to your comments.

Comment

"It might be helpful in assessing the project if
the reviewer is provided the following information."

"Leachate Formation and Disposal"

"Additional discussion may be needed to describe
the effectiveness of providing interceptor trenches
on site for purposes of collecting leachate to sumps
located at the lowest level of the gradient, e.g.,
with the relatively high amount of rainfall in the
area of the landfill site, the possibility of leachate
collections overflowing the sump and eventually reach-
ing the environmentally sensitive Kawaiui Marsh with
potentially damaging effects. There is also the
possibility of leachate seepage from the sump to
subsurface water tables and a likelihood of discharge
into the marsh."

"Since findings of a leachate monitoring program at
the neighboring Kapaa Sanitary Landfill indicate
the absence of leachate in Kawaiui Marsh; and the
fact that the proposed Kalaheo site is similar to
Kapaa in hydrogeologic aspects, description of the
precautions used to control leachate formation at
Kapaa would be helpful."

"Besides instituting a leachate monitoring program
at Kawaiui Marsh, there should also be attempts to
monitor and detect other likely contaminants reaching
Kawaiui Marsh." "With the introduction of heavy
equipment, trucks, vehicles, etc., into the relatively
undeveloped area, the composition of drainage surface
runoff will be different from now." "If marsh con-
taminants come about, the steps that can be taken
to protect the Kawaiui natural resource should be
discussed."

Response

The formation of leachate and the potential impact to
Kawaiui Marsh and the ground water was evaluated and
the entire report included as Appendix B of the environ-
mental assessment/preparation notice.

The Kapaa Sanitary landfill (in existence for over 10
years) has been monitored for leachate production since
1978 and the data analyzed in 1980. The results of the
analysis confirmed that leachate was not being produced
and no consistent correlation could be found to relate
individual constituents concentration of leachate (i.e.,
COD) to groundwater levels, rainfall, on seasonal and/or
annual changes. In the event leachate was produced, it
will be contained on-site in the short-term and rapid
migration is ruled out.

It is a commonly accepted design feature of landfills to
divert storm waters around the landfill and to provide
sufficient slope for the surface of the landfill to allow
rapid runoff of storm water. Preventing stormwater from
entering the landfill prevents the formation of leachate
and gas. This design was incorporated for the Kapaa SLP
and will be for the Kalaheo site.

Mr. Willard T. Chow
Page 3
November 8, 1982

Onsite drainage system will incorporate ditches, swales and other means of diverting stormwater into onsite siltation basins where the water will pond and evaporate. The drainage plans will be evaluated when the preliminary engineering plans are developed.

Comment

"Disturbance to Natural Vegetation"

"There will be impact to air quality at the site and neighboring areas from fugitive dust generated during construction of on-site and off-site improvements." "Operation of the landfill will again result in continuous production of dust and vehicular emissions." "The preparation notice does not describe the extent of potential disturbance to natural vegetation in the surrounding conservation district due to presence of increased dust and fuel emission."

Response

The present landfilling activity at the Kapaa Sanitary Landfill has not produced a significant dust pollution or fuel emission problem which has adversely affected the natural vegetation of the surrounding conservation district. (The Kapaa sanitary landfill has been in operation for over ten years).

Comment

"Impact to Scenic Views"

"The project site and the vehicular access road will be visible to motorists traveling along Interstate Route H-3 when developed." "Litter very likely will be generated in the landfill area when refuse is deposited by commercial and public refuse collectors, transfer trailers, trucks, and individual depositors." "Without proper housekeeping, litter may also be found scattered along the vehicular access to the project site." "With the site being exposed to persistent tradewinds most of the year, mitigative measures to curtail adverse visual impacts may be needed inasmuch as scenic views are afforded from the section of H-3 route."

Mr. Willard T. Chow
Page 4
November 8, 1982

Response

We agree that the project site and access road, the H C & D, Ltd. rock quarry and the existing Kapaa landfill and Kalwainui Marsh will be visible to the motorists travelling at about 50 mph along the Interstate Route H-3; and that their scenic views may be curtailed by litter along the operating face of the landfill. We will attempt to provide visual mitigative measures such as landscaping and a litter abatement program to prevent curtailment of scenic views along that section of H-3 impacted by the project.

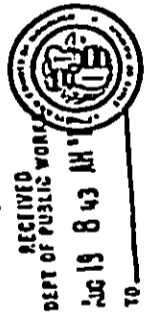
Michael J. Chun

Michael J. Chun
Director and Chief Engineer

11-28

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KAILUA NEIGHBORHOOD BOARD NO. 31
141 Kailua, Hawaii 96701



RECEIVED
DEPT OF PUBLIC WORKS
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August 18, 1982

Mr. Michael Chun, Director
Department of Public Works
650 S. King Street, 11th Floor
Honolulu, Hawaii 96813

Dear Mr. Chun:

We realize that there is a never ending need for sanitary landfills, but we have reservations about the Kalaboo site. Our greatest concern is that of migration of leachate into Kavalua Marsh. The E.I.S. states that provisions will be made for monitoring leachate formation, that any leachate generated will migrate slowly to the Marsh, and that its effects would be minor. We question the effectiveness of such a monitoring program. Once leachate is detected, what then? Also who will be responsible for the monitoring program after the five year life of the landfill is expanded?

The site of the Bellore site, almost three times that of the Kalaboo site, and its other amenities (see page 6-3, E.I.S.) suggest it as the preferred option.

At the August 12, 1982 meeting the Kailua Neighborhood Board passed the following motion:

"The Kailua Neighborhood Board opposes the Kalaboo site for the next sanitary landfill on Waihoana O'ahu and recommends that the Bellore site be pursued, as the preferred location."

Thank you for your consideration of our position on this matter.

Sincerely,

Robert A. O'Sullivan

ROBERT A. O'SULLIVAN, CHAIRMAN
Kailua Neighborhood Board No. 31

cc: Kailua Community Council
Lanikai Outdoor Circle
Kawaii's Thousand Friends
Neighborhood Commission

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
500 SOUTH KING STREET
HONOLULU, HAWAII 96813



GILBERT A. ANDERSON
Mayor

MICHAEL J. SMITH, Ph.D.
DIRECTOR AND CHIEF ENGINEER
WILLIAM A. BRADLEY
DEPUTY DIRECTOR

R 82-619

November 8, 1982

Harriet A. O'Sullivan, Chairman
Kailua Neighborhood Board No. 31
c/o Kailua Satellite City Hall
302 Kuulei Road
Kailua, HI 96734

Dear Ms. O'Sullivan:

**SUBJECT: EIS PREPARATION NOTICE/ENVIRONMENTAL ASSESSMENT
FOR KALAEHO SANITARY LANDFILL**

We appreciate your reviewing the Preparation Notice/
Environmental Assessment and provide the following response
to your comments.

Comment

"We realize that there is a never ending need for
sanitary landfills, but we have reservations about
the Kalaeho." "Our greatest concern is that of migra-
tion of leachate into Kawaiui Marsh." "The E.I.S.
states that provisions will be made for monitoring
leachate formation, that any leachate generated will
migrate slowly to the Marsh, and that its effects
would be minor." "We question the effectiveness of
such a monitoring program." "Once leachate is detected,
what then?" "Also who will be responsible for the
monitoring program after the five year life of the
landfill is expended?"

Response

The Kapa Sanitary Landfill has been in existence for
over ten years. A leachate detection system was installed
in 1978 and the data analyzed in 1980. The results of
the analysis indicate that no leachate can be detected.
That if leachate were to be produced, it will be contained

Ms. Harriet A. O'Sullivan
Page 2
November 8, 1982

on site and rapid migration can be ruled out. The monitor-
ing system for the existing Kapa site is effective and
there is no reason to believe that it will not be effective
for the proposed site.

In the remote event leachate is detected, there will be
sufficient time to provide other means of preventing the
continued formation of leachate. Also, the leachate, if
produced, will be intercepted by trenches; diverted to
sumps, removed and disposed of prior to the contamination
of any ground or surface water sources.

We will be responsible for a monitoring program after
the landfilling operation have terminated.

Additional information on leachate is found on page B-7
through B-9, Appendix B of the environmental assessment.

Comment

"The size of the Bellova site, almost three times
that of the Kalaeho site, and its other amenities
(see page 6-3, E.I.S.) suggest it as the preferred
option." "At the August 12, 1982 meeting the Kailua
Neighborhood Board passed the following motion:

"the Kailua Neighborhood Board opposes the
Kalaeho site for the next sanitary landfill on
Windward O'ahu and recommends that the Bellova
site be pursued as the preferred location."

Response

The Bellova site is needed as a training area for the
military and not available for a sanitary landfill (page
6-3 of the environmental assessment). This fact has been
recently confirmed by a letter to us by Captain M. M.
Dallum, U.S. Navy Facilities Engineer.

Your letter will be incorporated into the environmental
impact statement and a copy will be sent to you.

Very truly yours,

William A. Bradley

Michael J. Chun
Director and Chief Engineer

cc: Captain M. M. Dallum
Attn: Francis Mau



RECEIVED
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Standard on the Mail, Suite 220 • 1154 P.O. Street, Honolulu, Hawaii 96813 • (808) 536-3140

August 27, 1982

- BOARD OF DELEGATES
- Bill Wines, President
- Bill Dwyer, Vice President
- Berry Gordon, Treasurer
- Carroll Sobel, Secretary
- Fred Adler
- Cobby Black
- Charles Chung
- Joan Collins
- Jack Hill
- Emma Hirsch
- Karen Hoch
- Dave Marston
- Bob Nakau
- Muriel Sato
- Marguerite Swanson
- Cynthia Hill Thibodeau
- Ed Tuckman
- R. Lynn Whitaker
- Michael Wilson
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- Marilyn Bombard
- Tom Coughlin
- Billie Hunt
- Anna C. Kachelmeier
- Frances Kawakawa
- Madeline Wong Kingman
- Dave Kury
- Fred Kuyper

Mr. Michael Chun, Director
Department of Public Works
650 S. King Street
Honolulu, Hawaii 96813

Dear Mr. Chun:

HWTF thanks you for the opportunity to comment on the Environmental Assessment and EIS Preparation Notice for the proposed Kalaheo Sanitary Landfill. While the Preparation Notice contains substantial information about the proposed project, there are four points which we feel need clarification.

1. Page 1-2 of the Notice states that the City has preselected eight out of 36 potential Sanitary Land Fill ("SLF") sites. One has been developed and "the City plans to use the remaining seven sites within the next fifteen years." To comply with the Environmental Quality Commission's EIS Regulation 142 (g), "Alternatives to the Proposed Action," the EIS must include "a rigorous exploration and objective evaluation of the environmental impacts of all reasonable alternative actions ... in order not to prematurely foreclose options which might enhance environmental quality or have less detrimental effects." Nevertheless, the Notice discusses only three alternative sites in Section 6. II. At a minimum, the EIS should provide information of all seven selected sites. Optimally, because a total of 36 sites were identified as possible alternatives, the Department of Public Works should disclose the environmental and feasibility considerations which led to the preselection of only eight sites.

2. More than once the Preparation Notice points out that there is a possibility of leachate from the SLF which may adversely impact Kalaheo Marsh. Mitigative measures to be taken are disclosed, including the use of "cover soil of adequate thickness and density" (p. 1-29). The proposed SLF operations add that "the compacted waste will be covered with a six-inch soil cover, in compliance with Chapter 46, Public Health Regulations of the State Department of Health." (p. 1-33). The relevant chapter of the Public Health Regulations has been renumbered to Chapter 58.)

Mr. Michael Chun
August 27, 1982
Page 2

A daily six-inch soil cover is the minimum required depth. In an area with known leachate problems, a thicker soil-cover may be necessary. Therefore, the EIS should explain how it was determined that the minimum required depth would be satisfactory. In addition, possible alternative leachate control measures - such as the use of an impervious bottom layer - should also be described and explained.

3. The estimated cost of the proposed project is stated at page 1-33. The estimated cost for alternative sites, however, is only alluded to without discussion at page 6-2. To permit an informed evaluation of the proposed action, additional cost information should be included.

4. The proposed Kalaheo SLF lies within the Secondary Area of the Draft Kalaheo Marsh Resource Management Plan prepared by the Department of Planning and Economic Development. While this Draft Plan has yet to be approved by the Governor, as a matter of comity the EIS should include reference to the Plan and possible impacts it may have on operation of the SLF.

With the exception of the above comments, the Preparation Notice appears to be satisfactory. I anticipate that the EIS will be acceptable.

Sincerely,

John D. Steel
John D. Steel
Executive Director

JDS:gl

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

400 SOUTH KING STREET
HONOLULU, HAWAII 96813



GILSEN B. ANDERSON
CLERK

MICHAEL J. ENYU, P.E.
DIRECTOR AND CHIEF ENGINEER

WILLIAM A. BROWNE
CHIEF ENGINEER

R 82-620

November 8, 1982

Ms. Jane B. Hall
Executive Director
Hawaii's Thousand Friends
Blaisdell on the Mall, Suite 220
1154 Fort Street
Honolulu, Hawaii 96813

Dear Ms. Hall:

SUBJECT: EIS PREPARATION NOTICE/ENVIRONMENTAL ASSESSMENT
FOR KALAEHO SANITARY LANDFILL

Thank you for reviewing the document and we provide the following responses to your letter (August 27, 1982) requesting clarification.

1. The total thirty-six potential sanitary landfill sites include all of the sites which were considered for use as sanitary landfills. Most of the sites were rejected because of their location, within groundwater supply areas (total of 15 sites), within wetland (1 site) and adjacent to communities (total of 5 sites). Other potential landfill sites were considered but were unavailable for use as a sanitary landfill because of landowners by either the federal or state government (5 sites). Please refer to Table 6-1.

The three sanitary landfill sites for the Leeward area will be discussed in detail in the environmental impact statement for the Leeward sanitary landfill.

2. The preparation notice's reference to Chapter 46 will be changed to Chapter 58.

The existing operation at Kapaa uses a minimum 6" cover and a final cover of approximately 2.0 feet. This operation has been in existence for over ten years and there is no evidence of leachate formation.

Ms. Jane B. Hall
Page 2
November 8, 1982

3. The cost for the alternative sites are difficult to estimate without preliminary engineering plans. However, an attempt to estimate the cost for the alternative site will be made.

4. The proposed project's impacts will be evaluated against that of the Kawaihuli Marsh Resource Management Plan (Draft DPED).

Very truly yours,

Michael J. Chun
Director and Chief Engineer

11-32

TABLE 6-1

LANDFILL SITES STATUS (1982)

	Code
1. Kapas #2 and #3 Landfill Sites	SLP
2. Kapas #1 Landfill Site	PA
3. Kalaheo Landfill Site	PS
4. Heela Uka Landfill Site	2
5. Waimanalo North Landfill Site	3
6. Auloa Landfill Site	4
7. Waimanalo South Landfill Site	1
8. Kahaluu, Wahee, Waipahoehoe, Waikane, Kaava, and Punaluu Landfill Sites	1
9. Olowana Landfill Site	4
10. Bellows Field Landfill Site	3
11. Heela Kai Landfill Site	4
12. Makaiwa Landfill Site	2
13. Nanakuli Landfill Site	2
14. Kalo Landfill Site	2
15. Honouliuli Landfill Site	1
16. Kaukonahua and Waipahu Landfill Sites	1
17. Mail Landfill Site	1
18. Koko Crater Landfill Site	0
19. Maipio Landfill Site	3
20. Hiliiani Landfill Site	3
21. Poaoho Landfill Site	1
22. Keekee Landfill Site	1
23. Keena Quarry Landfill Site	1
24. Haku Landfill Site	3
25. Ohikilolo Landfill Site	3
26. Waimanalo Gulch Site	3
27. Barbers Point	5
28. Diamond Head	3
29. Ewa No. 1	3
30. Ewa No. 2	3
31. Halawa Sites	1 4 3
32. Kane	1
33. Kunia	1
34. Pearl Harbor	1
35. Sand Island	WL
36. Malanai	3

Code

1. site located within ground water supply area
 2. site located within close proximity to communities
 3. Land owned by Federal or State government and/or in use, unavailable for use as a sanitary landfill
 4. Site considered for Windward landfill
 5. Site considered for Leeward landfill
- SLP Presently used as a sanitary landfill
 PA Prior agreement not to be used as a landfill in order to obtain the use of Kapas #2 and #3; and Kalaheo as landfills
- PS The proposed project site
 WL Wetland area, under Federal Regulations
 O Site is presently being used for quarry operations. It is not contemplated the owners will allow the City to develop a landfill on this site.

**EIS Responses
and Comments**

12

SECTION 12

ORGANIZATIONS AND PERSONS
CONSULTED IN THE PREPARATION OF THE EIS

The following list includes those agencies and organizations to whom Environmental Impact Statement were sent during the EIS review process. Those with an asterisk sent in written comments. The comments and their responses follow this list.*

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Congress of the Hawaiian People	
American Lung Association of Hawaii	
Bishop Museum	
Hawaii's Thousand Friends	
Michael C. Baldwin Trust	
John C. Baldwin Trust	
James C. Castle, Jr. Trust	
James C. McIntosh Trust	

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DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



MICHAEL J. CHUN, Ph.D.
DIRECTOR AND CHIEF ENGINEER
MAURICE H. KATA
CHIEF DIRECTOR

R 83-320

May 12, 1983

SILVER H. ANDERSON
CHIEF

Kenneth W. Cowan
Colonel, USAF
Director of Civil Engineering
Department of the Air Force
Headquarters 15th Air Base Wing (PACAF)
Hickam Air Force Base, Hawaii 96853

Dear Colonel Cowan:

Subject: Kalaheo Sanitary Landfill Environmental Impact Statement

We appreciate your review of the impact statement and continued valuable input.

The following response is provided to your comment that the Bellows AFS be deleted as a potential landfill site. On page 6-2 of the environmental impact statement, we stated that the site (Bellows AFS) is needed as a training area to maintain military preparedness and is not presently available for sanitary landfill purposes. This would not preclude its consideration as a future landfill site.

We plan to develop the Kalaheo Sanitary Landfill by 1984 and implement a resource recovery by 1987, thereby delaying the need for additional landfills on the windward side of Oahu.

Please contact John Lee at 527-5366 if there are any questions.

Very truly yours,

Michael J. Chun
MICHAEL J. CHUN
Director and Chief Engineer

cc: DLU
EISC

83-03146
R
Ref

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 15TH AIR BASE WING (PACAF)
HICKAM AIR FORCE BASE, HAWAII 96853



MEMO TO
ATTENTION: DEEV

22 April 1983

SUBJECT: Environmental Impact Statement (EIS) for the Kalaheo Sanitary Landfill
(Your Ltr, 18 Mar 1983)

TO: Director
Office of Environmental Quality Control
550 Halekuanila Street, Room 301
Honolulu HI 96813

1. Review of subject EIS was accomplished and Air Force comments are provided as follows:

a. Nonconcur with Bellows AFS or immediate adjacent areas as potential landfill sites. Least impact, least cost factors cannot be arbitrarily assumed as done in EIS with brief, nondescript statements. Assumptions appear very one-sided without full consideration to impact on Department of Defense operations. Request Bellows AFS be deleted as a potential landfill site under the City and County plans.

b. In regards to Kalaheo Sanitary Landfill, the Air Force has no negative comments at this time.

2. We appreciate your efforts in attempting to resolve a serious landfill problem and hopefully we can be of assistance in the future.

Kenneth W. Cowan

KENNETH W. COWAN, Colonel, USAF
Director of Civil Engineering

Cy to: Dept of Land Utilization
City and County of Honolulu
650 South King St, 7th Flr
Honolulu HI 96813
Dept of Public Works
City and County of Honolulu
650 South King St, 11th Flr
Honolulu HI 96813
State Dept of Land/Natural Resources
1151 Punchbowl Street
Honolulu HI 96813

HQ PACAF/DEEV

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



MICHAEL J. CHUN
DIRECTOR AND CHIEF ENGINEER
MAURICE H. KAYA
DEPUTY DIRECTOR
R 83-320

May 12, 1983

GILSON M. ANDERSON
MAIL ROOM

Mr. Maurice N. Fujimoto
Acting Director of Facilities Engineering
Department of the Army
Headquarters
U.S.A. Support Command Hawaii
Fort Shafter, Hawaii 96958
Dear Mr. Fujimoto:

SUBJECT: Kalaheo Sanitary Landfill Environmental Impact Statement

We appreciate your review of the impact statement and continued valuable input.

Your letter will be incorporated into the Revised Environmental Impact Statement.

Should you require additional information, please contact John Lee at 527-5366

Very truly yours,

Michael J. Chun
Michael J. Chun
Director and Chief Engineer

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TO _____

March 31, 1983

Directorate of Facilities Engineering

Department of Land Utilization
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Comment:

The Environmental Impact Statement (EIS) for the proposed Kalaheo Sanitary Landfill, Kilauea, Oahu has been reviewed and we have no substantial comments to offer. We support your efforts to site sanitary landfills on the Island of Oahu in an environmentally acceptable manner.

Thank you for the opportunity to comment on the EIS.

Sincerely,

Maurice N. Fujimoto
MAURICE N. FUJIMOTO
Acting Director of Facilities Engineering

Copies furnished
Department of Public Works
City and County of Honolulu
650 South King Street, 11th Floor
Honolulu, Hawaii 96813



United States
Department of
Agriculture

Soil
Conservation
Service

COPY

P.O. Box 50004
Honolulu, Hawaii
96850

April 7, 1983

Mr. Michael M. McElroy, Director
Department of Land Utilization
City & County of Honolulu
630 S. King St., 7th Floor
Honolulu, HI 96813

Dear Mr. McElroy:

Subject: EIS for the Proposed Kalaheo Sanitary Landfill Project
Kailua, Oahu, HI

We have reviewed the subject environmental impact statement and have
no comments to make.

Thank you for the opportunity to review this document.

Sincerely,

Francis C.H. Lum

FRANCIS C.H. LUM
State Conservationist

cc: Jacqueline A. Parnell, Director
Office of Environmental Quality Control
550 Halekaunila St., Room 301
Honolulu, HI 96813

Michael J. Chun
Director & Chief Engineer
Department of Public Works
City & County of Honolulu
650 S. King St., 11th Floor
Honolulu, HI 96813

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



EILEEN M. ANDERSON
SECRETARY

MICHAEL J. CHUN
DIRECTOR AND CHIEF ENGINEER
MAURICE H. KAYA
DEPUTY DIRECTOR
R 83-320

May 12, 1983

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

Dear Mr. Lum:

SUBJECT: Kalaheo Sanitary Landfill Environmental Impact Statement

We appreciate your review of the impact statement and continued valuable
input.

Your letter will be incorporated into the Revised Environmental Impact
Statement.

Should you require additional information, please contact John Lee at
527-5366.

Very truly yours,

Michael J. Chun
Michael J. Chun
Director and Chief Engineer



HEADQUARTERS
NAVAL BASE PEARL HARBOR
BOX 110
PEARL HARBOR, HAWAII 96860

IN REPLY REFER TO
0023:WEL:jam
Ser 631
4 APR 1983

Department of Land Utilization
City and County of Honolulu
630 South King Street, 7th Floor
Honolulu, Hawaii 96813

Gentlemen:

Environmental Impact Statement
Kalaheo Sanitary Landfill

The EIS for the Kalaheo Sanitary Landfill has been reviewed and the Navy has no comments to offer.

Thank you for the opportunity to review the EIS.

Sincerely,

M. H. DALLAM
CAPTAIN, CEC, U. S. NAVY
FACILITIES ENGINEER
BY DIRECTION OF THE COMMANDER

Copy to:
Department of Public Works
City and County of Honolulu

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DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
630 SOUTH KING STREET
HONOLULU, HAWAII 96813



GILLEN R. JENSEN
DIRECTOR

MICHAEL J. CHUN
DIRECTOR AND CHIEF ENGINEER
MAURICE H. KAYA
DEPUTY DIRECTOR
R 83-320

May 12, 1983

Captain M. H. Dallam
CEC, U. S. NAVY
Facilities Engineer
Headquarters
Naval Base Pearl Harbor
Box 110
Pearl Harbor, Hawaii 96860

Dear Captain Dallam:

SUBJECT: Kalaheo Sanitary Landfill Environmental Impact Statement
We appreciate your review of the impact statement and continued valuable input.

Your letter will be incorporated into the Revised Environmental Impact Statement.

Should you require additional information, please contact John Lee at 527-5366.

Very truly yours,

Michael J. Chun
Michael J. Chun
Director and Chief Engineer



DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

COMMANDER (dpl)
Fourteenth Coast Guard District
Prince Kalanianoʻe Federal Bldg.
300 Ala Moana Blvd.
Honolulu, Hawaii 96850

(808) 546-2861
11000
Serial 532
30 March 1983

Department of Land Utilization
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Dear Sir:

The Fourteenth Coast Guard District has reviewed the Environmental Impact Statement for Kalaheo Sanitary Landfill and has no objection or constructive comments to offer at the present time.

Sincerely,

J. E. SCHWARTZ
Commander, U. S. Coast Guard
District Planning Officer

By direction of
Commander, Fourteenth Coast Guard District

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



EILEEN R. ANDERSON
MAIL ROOM

MICHAEL J. CHUN
DIRECTOR AND CHIEF ENGINEER
MAURICE H. KAYA
DEPUTY DIRECTOR

R 83-320

May 12, 1983

Commander J. E. Schwartz
U. S. Coast Guard
District Planning Officer
Fourteenth Coast Guard District
Prince Kalanianoʻe Federal Bldg.
300 Ala Moana Blvd.
Honolulu, Hawaii 96850

Dear Commander Schwartz:

SUBJECT: Kalaheo Sanitary Landfill Environmental Impact Statement

We appreciate your review of the impact statement and continued valuable input.

Your letter will be incorporated into the Revised Environmental Impact Statement.

Should you require additional information, please contact John Lee at 527-5366.

Very truly yours,

Michael J. Chun
Director and Chief Engineer

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DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



MICHAEL J. CHUN
REGISTERED PROFESSIONAL ENGINEER
MAURICE H. KAYA
DEPUTY DIRECTOR
R 83-320

May 12, 1983

SILEN M. ANDERSON
CHIEF

83-01949

Reply

(P)1349.3

RECEIVED: MHPWS

DEPT. OF PUB. WORKS

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10

APR 13 1983

Mr. Michael McElroy
Director
Department of Land Utilization
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Dear Mr. McElroy:

Subjects: Kalaheo Sanitary Landfill
Environmental Impact Statement

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

Very truly yours,

HIDEO MURAKAMI
State Comptroller

MS:jl
cc: ✓ Dr. Michael J. Chun

Mr. Hideo Murakami
State Comptroller
State of Hawaii
Department of Accounting and General Services
P. O. Box 110
Honolulu, Hawaii 96810

Dear Mr. Murakami:

SUBJECT: Kalaheo Sanitary Landfill Environmental Impact Statement

We appreciate your review of the document.
Your letter will be incorporated into the revised environmental impact
statement.

Very truly yours,

Michael J. Chun
Michael J. Chun
Director and Chief Engineer

cc: DLU
EISC

GEORGE E. ARIYOSHI
GOVERNOR



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96822

83-01851
JACK K. SUWA
CHAIRMAN, BOARD OF AGRICULTURE

Signature

MEMORANDUM

To: Mr. Michael McElroy, Director
Department of Land Utilization
City and County of Honolulu

Subject: Environmental Impact Statement
Kalaheo Sanitary Landfill
TRK: 4-2-15: 1 and 6
Kaliua, Oahu

The Department of Agriculture has reviewed the subject statement and finds that our concerns have been addressed.

Thank you for the opportunity to comment.

Jack K. Suwa

JACK K. SUWA
Chairman, Board of Agriculture

cc: Department of Public Works
City and County of Honolulu

RECEIVED
DEPT OF PUBLIC WORKS
APR 23 PM '83

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



EILEEN M. ANDERSON
MAYOR

MICHAEL J. CHUN
DIRECTOR AND CHIEF ENGINEER
MAURICE H. KAYA
DEPUTY DIRECTOR

May 12, 1983

R 83-320

Mr. Jack K. Suwa
Chairman, Board of Agriculture
State of Hawaii
Department of Agriculture
1428 South King Street
Honolulu, Hawaii 96822

Dear Mr. Suwa:

SUBJECT: Kalaheo Sanitary Landfill Environmental Impact Statement

We appreciate the review of the document and your continued valuable input.

Your letter will be incorporated into the revised environmental impact statement.

Please contact John Lee at 527-5366 if there are any questions.

Very truly yours,

Michael J. Chun
Michael J. Chun
Director and Chief Engineer

cc: DLW
EISC

100-102-101-102-103-104-105-106-107-108-109-110-111-112-113-114-115-116-117-118-119-120-121-122-123-124-125-126-127-128-129-130-131-132-133-134-135-136-137-138-139-140-141-142-143-144-145-146-147-148-149-150-151-152-153-154-155-156-157-158-159-160-161-162-163-164-165-166-167-168-169-170-171-172-173-174-175-176-177-178-179-180-181-182-183-184-185-186-187-188-189-190-191-192-193-194-195-196-197-198-199-200-201-202-203-204-205-206-207-208-209-210-211-212-213-214-215-216-217-218-219-220-221-222-223-224-225-226-227-228-229-230-231-232-233-234-235-236-237-238-239-240-241-242-243-244-245-246-247-248-249-250-251-252-253-254-255-256-257-258-259-260-261-262-263-264-265-266-267-268-269-270-271-272-273-274-275-276-277-278-279-280-281-282-283-284-285-286-287-288-289-290-291-292-293-294-295-296-297-298-299-300-301-302-303-304-305-306-307-308-309-310-311-312-313-314-315-316-317-318-319-320-321-322-323-324-325-326-327-328-329-330-331-332-333-334-335-336-337-338-339-340-341-342-343-344-345-346-347-348-349-350-351-352-353-354-355-356-357-358-359-360-361-362-363-364-365-366-367-368-369-370-371-372-373-374-375-376-377-378-379-380-381-382-383-384-385-386-387-388-389-390-391-392-393-394-395-396-397-398-399-400-401-402-403-404-405-406-407-408-409-410-411-412-413-414-415-416-417-418-419-420-421-422-423-424-425-426-427-428-429-430-431-432-433-434-435-436-437-438-439-440-441-442-443-444-445-446-447-448-449-450-451-452-453-454-455-456-457-458-459-460-461-462-463-464-465-466-467-468-469-470-471-472-473-474-475-476-477-478-479-480-481-482-483-484-485-486-487-488-489-490-491-492-493-494-495-496-497-498-499-500-501-502-503-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600-601-602-603-604-605-606-607-608-609-610-611-612-613-614-615-616-617-618-619-620-621-622-623-624-625-626-627-628-629-630-631-632-633-634-635-636-637-638-639-640-641-642-643-644-645-646-647-648-649-650-651-652-653-654-655-656-657-658-659-660-661-662-663-664-665-666-667-668-669-670-671-672-673-674-675-676-677-678-679-680-681-682-683-684-685-686-687-688-689-690-691-692-693-694-695-696-697-698-699-700-701-702-703-704-705-706-707-708-709-710-711-712-713-714-715-716-717-718-719-720-721-722-723-724-725-726-727-728-729-730-731-732-733-734-735-736-737-738-739-740-741-742-743-744-745-746-747-748-749-750-751-752-753-754-755-756-757-758-759-760-761-762-763-764-765-766-767-768-769-770-771-772-773-774-775-776-777-778-779-780-781-782-783-784-785-786-787-788-789-790-791-792-793-794-795-796-797-798-799-800-801-802-803-804-805-806-807-808-809-810-811-812-813-814-815-816-817-818-819-820-821-822-823-824-825-826-827-828-829-830-831-832-833-834-835-836-837-838-839-840-841-842-843-844-845-846-847-848-849-850-851-852-853-854-855-856-857-858-859-860-861-862-863-864-865-866-867-868-869-870-871-872-873-874-875-876-877-878-879-880-881-882-883-884-885-886-887-888-889-890-891-892-893-894-895-896-897-898-899-900-901-902-903-904-905-906-907-908-909-910-911-912-913-914-915-916-917-918-919-920-921-922-923-924-925-926-927-928-929-930-931-932-933-934-935-936-937-938-939-940-941-942-943-944-945-946-947-948-949-950-951-952-953-954-955-956-957-958-959-960-961-962-963-964-965-966-967-968-969-970-971-972-973-974-975-976-977-978-979-980-981-982-983-984-985-986-987-988-989-990-991-992-993-994-995-996-997-998-999-1000

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



MICHAEL J. CHUN, Ph.D.
DIRECTOR AND CHIEF ENGINEER
MAURICE M. KATA
SENIOR DIRECTOR
R 83-342

SILKEN M. ANDERSON
SECRETARY

May 18, 1983

State of Hawaii
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
3449 Diamond Head Road
Honolulu, Hawaii 96816

8 APR 1983

HJDMG

Department of Land Utilization
City and County of Honolulu
650 So. King St., 7th Floor
Honolulu, Hawaii 96813

Courtesy:

Kalaheo Sanitary Landfill

Thank you for providing us the opportunity to review the proposed project,
"Kalaheo Sanitary Landfill" Environmental Impact Statement.

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

Yours truly,

Jerry M. Matsuda
JERRY M. MATSUDA
Captain, RASE
Contr & Engr Officer

cc: Dept of Public Works
Env Quality Commission v/EIS

Captain Jerry Matsuda
Construction and Engineering Officer
State of Hawaii
Department of Defense
Office of the Adjutant General
3449 Diamond Head Road
Honolulu, Hawaii 96816

Dear Captain Matsuda:

Subject: Kalaheo Sanitary Landfill Environmental Impact Statement
We appreciate your review of the Kalaheo Sanitary Landfill Environmental
Impact Statement.

Your letter will be incorporated into the revised environmental impact
statement.

Very truly yours,

Michael J. Chun
MICHAEL J. CHUN
Director and Chief Engineer

cc: DLU
EISC

GEORGE S. ANTONIO
DIRECTOR OF PUBLIC WORKS



STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 229
HONOLULU, HAWAII 96840
April 22, 1983

CHARLES G. CLARK
DIRECTOR OF HEALTH

JANE F. CHAMBERLAIN, M.D.
CHIEF, DIVISION OF HEALTH
HEALTH SERVICES
HEALTH SERVICES
HEALTH SERVICES
HEALTH SERVICES
HEALTH SERVICES
HEALTH SERVICES

MEMORANDUM

To: Mr. Michael M. McElroy, Director
Department of Land Utilization
City & County of Honolulu

From: Deputy Director for Environmental Health

Subject: Environmental Impact Statement (EIS) for Kalaheo Sanitary Landfill, Kailua, Oahu, Hawaii

Thank you for allowing us to review and comment on the subject EIS. On the basis that the project will comply with all applicable Public Health Regulations, please be informed that we do not have any objections to this project.

In the subject EIS study, an assumption is made that the Kalaheo site is similar to the Kepaa site hydrogeologically and thus no leachate problem is anticipated. If the substrata at Kalaheo should differ from that at Kepaa and leachate does become a problem, preventative measures should be studied and considered for containment, collection and disposal of the leachate.

The statement that no leachate is generated at the Kepaa landfill may not be valid for the intermediate and long-term period.

We realize that the statements are general in nature due to preliminary plans being the sole source of discussion. We, therefore, reserve the right to impose future environmental restrictions on the project at the time final plans are submitted to this office for review.

cc: OEQC
Dept. of Public Works ✓

Melvin K. Koizumi
MELVIN K. KOIZUMI

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
450 SOUTH KING STREET
HONOLULU, HAWAII 96813



SILEEN M. ANDERSON
MAYOR

MICHAEL J. CHAN, M.D.
PHLEBO AND CLINICAL DIRECTOR
MALVIN M. HATA
DEPUTY DIRECTOR

R 83-418

June 9, 1983

Mr. Melvin K. Koizumi
Deputy Director
Department of Health
State of Hawaii
P. O. Box 3378
Honolulu, Hawaii 96840

Dear Mr. Koizumi:

SUBJECT: Kalaheo Sanitary Landfill Environmental Impact Statement

We appreciate your valuable comments and offer the following response.

Comment:

"Thank you for allowing us to review and comment on the subject EIS. On the basis that the project will comply with all applicable Public Health Regulations, please be informed that we do not have any objections to this project."

Response:

All applicable governmental permits and conditions will be obtained and conformed to. We will be working with your staff during the design phase of this project.

Comment:

"In the subject EIS study, an assumption is made that the Kalaheo site is similar to the Kepaa site hydrogeologically and thus no leachate problem is anticipated. If the substrata at Kalaheo should differ from that at Kepaa and leachate does become a problem, preventative measures should be studied and considered for containment, collection and disposal of the leachate."

Response:

Provisions will be incorporated in the design of the sanitary landfill for a leachate interceptor trench and sumps. Leachate monitoring wells will be installed and a program established for the recording of various parameters.

Comment:

"The statement that no leachate is generated at the Kepas landfill may not be valid for the intermediate and long-term period."

Response:

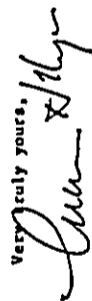
We are in agreement with your statement that leachate generation may occur over a long period of time. Current data indicate that no leachate is being produced from the existing Kepas Sanitary landfill. However, as a precaution, the existing Kepas leachate monitoring wells will continue to be sampled and new monitoring wells will be installed at the Kalahan site.

Comment:

"We realize that the statements are general in nature due to preliminary plans being the sole source of discussion. We, therefore, reserve the right to impose future environmental restrictions on the project at the time final plans are submitted to this office for review."

Response:

We will continue to keep you informed on the project and will submit preliminary plans for your review.

Very truly yours,


MICHAEL J. CHON
FOR Director and Chief Engineer

cc: DLU
EISC

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



EILEEN A. ANDERSON
Director

APR 12 1983

MICHAEL J. CHUN
DIRECTOR AND CHIEF ENGINEER

HAURICE H. KAYA
DEPUTY DIRECTOR

R 83-320

May 12, 1983

Honorable Michael M. McElroy
Director and Chief Engineer
Department of Land Utilization
City and County of Honolulu
650 So. King Street
Honolulu, Hawaii 96813

Dear Mr. McElroy:

We have reviewed the environmental impact statement for the proposed Kalaheo landfill and have a number of concerns to express:

Water Resources

The mitigation measures proposed to prevent or minimize leachate production appear to be adequate, and the Department of Public Works has agreed to continuation of the leachate monitoring program. In addition, a contingency plan has been provided for handling leachate should such be produced (ref. ltr dtd 11/8/82).

Historic Sites

A reconnaissance walk-thru of the site has been made to determine if the surface of the site contains historic or archaeological objects. None were found by the consultants to the Department of Public Works. Nevertheless, if during construction or operation of the landfill, any historic, archaeological, or paleontological objects are encountered, the work should be stopped and our historic sites office contacted at 548-7460 immediately.

Land Use

As noted on page 3-1, a Conservation District permit is required by Chapter 13-1, Administrative Rules, Hawaii.

Sincerely,

Susumu Ono
SUSUMU ONO
Chairman of the Board
and

State Historic Preservation Officer

cc: Dept. of Public Works

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

Dear Mr. Ono:

SUBJECT: Kalaheo Sanitary Landfill Environmental Impact Statement
We appreciate your review of the document and offer the following response to your comment regarding archaeological objects.

We concur with your recommendation that in the event that archaeological or historic objects are found during construction and/or operation of the landfill, all work will be stopped in the impacted area and the historic sites office contacted immediately. We will include a provision to take such action in our construction contract document.

Your letter will be incorporated into the revised environmental impact statement.

Very truly yours,

Michael J. Chun
for
Michael J. Chun
Director and Chief Engineer

cc: DLU
EISC



DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

CHANCE & ASSOCIATES
1405 KALANANAKU DRIVE
HONOLULU, HAWAII 96813
TELEPHONE: 533-1111

Mr. Michael McElroy
Page 2
April 21, 1983

COPY

April 21, 1983

Ref. No. 7358

Mr. Michael M. McElroy
Director
Department of Land Utilization
City and County of Honolulu
650 South King Street - 7th Floor
Honolulu, Hawaii 96813

Dear Mr. McElroy:

Subject: EIS for the Kalaheo Sanitary Landfill, Kailua, Oahu

We have reviewed the subject document with respect to the objectives and policies of the Hawaii Coastal Zone Management (CZM) Program and the CZM Plan which has been recently approved for implementation.

We find the proposed activity as described in the subject EIS generally consistent with the referenced document policies, with the following exception:

Policy E-3 of the Ecological component of the Kawaihi Marsh Plan states that "leachate monitoring requirements should be applied to any landfill activity within the drainage area of the Marsh."
(This policy is related to policy 205A-2(c)(4)(D) of the CZM Program.)

Page 4-2 of the EIS indicates that monitoring for leachates at the adjacent Kapaa Sanitary Landfill (SLF) was initiated ten years after the Kapaa SLF was opened. The negative findings of this 1978-1980 monitoring effort are interpreted as an indication that there is no rapid migration of leachate from SLF to the waters of the Marsh. This is confirmed by Island Resources, Ltd. in their report to the City and County of Honolulu (appendix B-1 to B-9). In its report Island Resources also recommends that two new monitoring wells be located makai of the proposed Kalaheo SLF and that monitoring at both existing and new wells be continued.

While the EIS indicates that the present Kapaa SLF monitoring program will be continued, we find no reference to the addition of the recommended new monitoring wells in the section dealing with mitigative measures. Nor do we find any reference to a time frame during which the monitoring will be continued.

In light of the reported certainty that rapid migration of leachate has not occurred, it would appear important to continue monitoring until such time as it can be assured that landfill operations above the Marsh do not contribute to the degradation of water quality.

While we cannot offer recommendations for a specific time frame, we do recommend that, at a minimum, the Kapaa leachate monitoring program be continued until more definite criteria are developed under the Marsh management program.

Thank you for the opportunity to comment.

Sincerely,

Hideto Kono

cc: Dept. of Public Works
City & County of Honolulu

Office of Environmental Quality Control

12-14

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
450 SOUTH KING STREET
HONOLULU, HAWAII 96813



MICHAEL J. CHUN, Ph.D.
DIRECTOR AND CHIEF ENGINEER

MAURICE W. RAY
DEPUTY DIRECTOR

R 83-342

EILEEN M. ANDERSON
CLERK

May 18, 1983

Mr. Hideto Kono, Director
Department of Planning and Economic Development
State of Hawaii
P. O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Kono:

Subject: Kalaheo Sanitary Landfill Environmental Impact Statement

We appreciate the review of the impact statement and your continued valuable input.

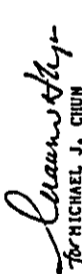
We are in complete agreement with your recommendation on the installation of two leachate monitoring wells for the Kalaheo site and continued monitoring for leachate at the existing Kapa sanitary landfill site.

Two leachate monitoring wells will be installed at the Kalaheo site and the existing wells at the Kapa site will be monitored. The schedule of sampling and the time frame will be worked out among qualified experts and coordinated with applicable State and Federal agencies.

Your letter will be incorporated into the revised environmental impact statement.

Should you require additional information, please contact John Lee at 527-5366

Very truly yours,


MICHAEL J. CHUN
Director and Chief Engineer

cc: DLU
EISC

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G. ORCE B. JANTOPE
CONTROLLER



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
891 KOWALEW STREET
HONOLULU, HAWAII 96813

April 20, 1983

RODOLPH MCASHORWA, Ph.D.
DIRECTOR

DEPUTY DIRECTORS

WAYNE J. YAMASUO

JAMES B. MCCORMICK

JONATHAN L. SIMMONS, Ph.D.

IN REPLY REFER TO:

527
H-2003

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
830 SOUTH KING STREET
HONOLULU, HAWAII 96813



SILVER R. ANDERSON
MAYOR

June 9, 1983

MICHAEL J. CHUN, Ph.D.
DIRECTOR AND CHIEF ENGINEER
MAURICE H. BAYLOR
DEPUTY DIRECTOR

R 83-418

Mr. Michael McCleary, Director
Department of Land Utilization
City & County of Honolulu
650 S. King Street, 7th Floor
Honolulu, Hawaii 96813

Dear Mr. McCleary:

Kalahao Sanitary Landfill,
Environmental Impact Statement

Thank you for the opportunity to review and comment on
the subject document.

We have no substantive comments to offer which could
improve the document.

Very truly yours,

Ryokichi Higashionna
Ryokichi Higashionna
Director of Transportation

JT:gm

cc: DPW, HWY-PA, -D, -PS

Mr. Ryokichi Higashionna
Director of Transportation
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 97813

Dear Mr. Higashionna:

SUBJECT: Kalahao Sanitary Landfill Environmental Impact Statement

We appreciate your review of the document and your letter will be
incorporated into the Revised Environmental Impact Statement.

Please contact John Lee at 527-5366 if there are any questions.

Very truly yours,

Michael J. Chun
MICHAEL J. CHUN
FOR Director and Chief Engineer

cc: DPW
EISC

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



MICHAEL J. CHUN, PH.D.
DIRECTOR AND CHIEF ENGINEER
MAURICE M. RAYA
DEPUTY DIRECTOR

R 83-418 ✓

SILVEM H. ANDERSON
MANAGER

June 9, 1983

JACQUELINE PARNELL
DIRECTOR
TELEPHONE NO.
548915



STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
518 HALAUKAWILA STREET
ROOM 301
HONOLULU, HAWAII 96813

April 21, 1983

SILVEM H. ANDERSON
MANAGER

Dr. Michael J. Chun
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street, 11th Floor
Honolulu, Hawaii 96813

Dear Dr. Chun:

Subject: Draft EIS for the Proposed Kalaeo Sanitary Landfill

In response to our comments on your preparation notice, you indicated that the future planned use for the R-6 area fronting the proposed project site is unknown at this time.

We suggest that the landowners of the R-6 area, since they are the ones most severely affected, be notified of your proposed project.

Sincerely,

Jacqueline Parnell
Jacqueline Parnell
Director

cc: DLU

Ms. Jacqueline Parnell
Director
State of Hawaii
Office of Environmental Quality Control
550 Halekauwila St., Room 301
Honolulu, Hawaii 96813

Dear Ms. Parnell:

SUBJECT: Kalaeo Sanitary Landfill Environmental Impact Statement

We appreciate your valuable comments and offer the following response.

The landowners of the R-6 are aware of the proposed project and will be kept informed of the project. We have requested that the project engineer consult with the landowners during the preliminary engineering design phase of the project.

Please contact John Lee at 527-5366 if there are any questions.

Very truly yours,

Michael J. Chun
MICHAEL J. CHUN
FOR Director and Chief Engineer

cc: DLU
EISC



University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 946-7361

Mr. Michael M. McElroy, Director
Department of Land Utilization
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. McElroy:

Draft Environmental Impact Statement
Kalaeo Sanitary Landfill
Kaliua, Oahu

Thank you for the opportunity to review the above cited plan. Our Environmental Center review has been prepared with the assistance of Matthew Spriggs, Anthropology; Alexander Dollar, Public Health; Jacquelin Miller and Mark Ingoglia, Environmental Center. The following comments are offered for your consideration:

Archaeology

In the Appendix C-1 by R. Bordner, the possibility of subsurface archaeological remains is not discussed. The proximity of the site to the Kawaiua Marsh with its widely recognized archeological significance causes us to be concerned that no sub-surface test borings have been made. The destructive nature of a land fill operation will certainly eliminate any future opportunity for archeological investigations. Since part of the makai parcel is alluvial soil (Kawaihapai Stoney Clay Loam), with a portion of it possibly being recent in nature, the likelihood of finding archeologically significant buried sites exists. Any evaluation of archeological potential in areas of alluvial build up should directly address the possibility of finding buried sites. A program of coring or test pit excavation should be carried out in the alluvial area to verify the possible existence of any archaeological sites that may be lost after the landfill site is constructed.

Land Commission Awards and other descriptions of land use are valuable indicators of potential prehistoric use of an area. To compliment the archeological survey, a search should be performed to evaluate the land sites historical significance.

The historic house site located by Burdner (page C-3) was a rebuilding of an earlier house. This sight may have older associated subsurface remains with potential to yield important archeological information. Will this house site be investigated further?

AN EQUAL OPPORTUNITY EMPLOYER

Mr. Michael M. McElroy

- 2 -

April 19, 1983

Leachates

On pages 1-27 to 1-30, it is stated that leachates will be collected by peripheral interceptor trenches and piped to sumps located at the lowest level of gradient. It is unclear what the disposition will be of the leachate collecting in these sumps. Except for a single reference to handling leachate in Appendix B, there is inadequate detail to show the leachate will be handled after it is collected by the sumps.

We appreciate your consideration of our comments.

Yours truly,

Doak C. Cox
Director

cc: OEQC
Matthew Spriggs
Alexander Dollar
Jacquelin Miller
Mark Ingoglia
DPH

April 19, 1983
RE:0372

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



SILVER M. ANDERSON
MAYOR

MICHAEL J. CHUM, PH.D.
DIRECTOR AND CHIEF ENGINEER
MAURICE M. HAYA
DEPUTY DIRECTOR

R 83-418

June 9, 1983

Mr. Donk C. Cox, Director
Environmental Center
University of Hawaii
Crawford 317
2550 Campus Road
Honolulu, Hawaii 96822

Dear Mr. Cox:

SUBJECT: Kalaeo Sanitary Landfill Environmental Impact Statement

We appreciate your valuable comments and offer the following responses:

Comment: "Archaeology"

Response:

The possible presence of subsurface archaeological artifacts or remains was not discussed because the archaeologist conducting the field reconnaissance did not believe additional work was warranted.

We agree that Land Commission Awards and other descriptions of land uses are valuable indicators of prehistoric use of an area and did literature research prior to conducting the field survey.

No additional archaeological work is required for the house site because there is no indication that the site is significant and that important information will be obtained.

Comment: "Leachates"

Response:

The leachate collected from the sumps will be conveyed to the working face of the landfill and mixed with the rubbish. The practice of mixing

the leachate with the incoming refuse is an accepted method for the disposal of the leachate and used at the existing Kapaa Sanitary Landfill.

Please contact John Lee at 527-5366 if there are any questions.

Very truly yours,

MICHAEL J. CHUM
FOR Director and Chief Engineer

cc: DLU
EISC



University of Hawaii at Manoa

Water Resources Research Center
Holmes Hall 283 - 2540 Dole Street
Honolulu, Hawaii 96822

4 May 1983

83-02509
Ryue

RECEIVED
DEPT OF PUBLIC WORKS
MAY 10 2 19 PM '83

Department of Land Utilization
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Gentlemen:

Subject: Environmental Impact Statement for the Proposed Kalaheo Sanitary Landfill, Kailua, Oahu, Hawaii, TRK 4-2-15:1 & 6, March 1983

We have reviewed the subject EIS and have no comments to offer. Thank you for the opportunity to comment. This material was reviewed by WRRC personnel.

Sincerely,

Edwin T. Murabayashi
Edwin T. Murabayashi
EIS Coordinator

ETH:jm

cc: DPW, City & County /

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



SILEEN R. ANDERSON
ADMIN

MICHAEL J. CHUN, Ph.D.
DIRECTOR AND CHIEF ENGINEER
MAURICE W. RAY
DEPUTY DIRECTOR

R 83-342

May 18, 1983

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

Dear Mr. Murabayashi:

Subject: Kalaheo Sanitary Landfill Environmental Impact Statement

We appreciate your review of the document and your letter will be incorporated into the Revised Environmental Impact Statement.

Please contact John Lee at 527-5366 if there are any questions.

Very truly yours,

Michael J. Chun
MICHAEL J. CHUN
Director and Chief Engineer

cc: EISC
DLU

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU



COPY

April 13, 1983

EILEEN W. ANDERSON
SECRETARY

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



MICHAEL J. CHUN
DIRECTOR AND CHIEF ENGINEER
MAURICE H. KAYA
DEPUTY DIRECTOR
R 83-320

TO: MICHAEL M. MCLEROY, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM: KAZU HAYASHIDA
BOARD OF WATER SUPPLY

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT FOR
KALAEHO SANITARY LANDFILL

We have no comments on the information presented in the environmental document nor any objections to the project.

If you have any questions, please contact Lawrence Whang at 548-5221.

Kazu Hayashida
KAZU HAYASHIDA
Manager and Chief Engineer

cc: Dept. of Public Works

MEMORANDUM

TO: KAZU HAYASHIDA, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

FROM: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

SUBJECT: Kalaheo Sanitary Landfill Environmental Impact Statement

May 12, 1983

We appreciate your review of the document. Your letter will be incorporated into the revised environmental impact statement.

Please contact John Lee at 527-5366 if there are any questions.

Michael J. Chun
MICHAEL J. CHUN
Director and Chief Engineer

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



MICHAEL J. CHUN
DIRECTOR AND CHIEF ENGINEER
MAURICE H. KAYA
DEPUTY DIRECTOR
R 83-320

EILEEN M. ANDERSON
MAYOR

May 12, 1983

MEMORANDUM

TO: ROY H. TANJII, DIRECTOR AND BUILDING SUPERINTENDENT
BUILDING DEPARTMENT

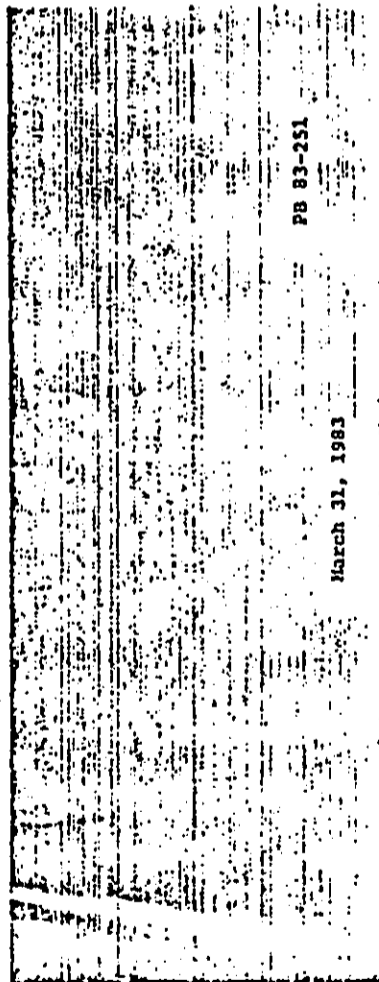
FROM: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

SUBJECT: Kalaheo Sanitary Landfill Environmental Impact Statement

We appreciate your review of the document. Your letter will be incorporated into the revised environmental impact statement.

Please contact John Lee at 527-5366 if there are any questions.

Michael J. Chun
MICHAEL J. CHUN
Director and Chief Engineer



PB 83-251

March 31, 1983

RECEIVED
DEPT. OF PUBLIC WORKS
APR 5 10 26 AM '83

TO: MR. MICHAEL McELROY, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM: ROY H. TANJII
DIRECTOR AND BUILDING SUPERINTENDENT

SUBJECT: KALAHEO SANITARY LANDFILL
KAILUA, OAHU, HAWAII

We have reviewed the EIS for the proposed Kalaheo Sanitary Landfill and have no comments.

Thank you for the opportunity to review the EIS.

Roy H. Tanjii
ROY H. TANJII
Director and Building Superintendent

TH:jo
cc: J. Harada
Public Works Dept.

2/11/83

DEPARTMENT OF GENERAL PLANNING
CITY AND COUNTY OF HONOLULU
610 SOUTH KING STREET
HONOLULU, HAWAII 96813



EILEEN M. ANDERSON
MAYOR

WILLARD T. CHOW
CHIEF PLANNING OFFICER
RALPH KAWAMOTO
DEPUTY CHIEF PLANNING OFFICER

DGP3/83-5727

April 18, 1983

MEMORANDUM

TO: Mr. Michael M. McElroy, Director
Department of Land Utilization

VIA: Mr. Andrew I. T. Chang, Managing Director *at*

SUBJECT: Kalaheo Sanitary Landfill
Environmental Impact Statement

We have no further comments on the subject environmental impact statement. Our earlier comments have been acknowledged by the applicant and are discussed in the EIS.

Ralph Kawamoto
RALPH KAWAMOTO
Planner

APPROVED:
W.T. Chow
WILLARD T. CHOW
cc: DPW

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
610 SOUTH KING STREET
HONOLULU, HAWAII 96813



EILEEN M. ANDERSON
MAYOR

MICHAEL J. CHUN
DIRECTOR AND CHIEF ENGINEER
MAURICE H. KAYA
DEPUTY DIRECTOR
R 83-320

May 12, 1983

MEMORANDUM

TO: WILLARD T. CHOW, CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING

FROM: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

SUBJECT: Kalaheo Sanitary Landfill Environmental Impact Statement

We appreciate your review of the document. Your letter will be incorporated into the revised environmental impact statement.

Please contact John Lee at 527-5366 if there are any questions.

Michael J. Chun
MICHAEL J. CHUN
Director and Chief Engineer

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
450 SOUTH KING STREET
HONOLULU, HAWAII 96813



GILBERT R. ANDERSON
MAYOR

MICHAEL J. CHUN
DIRECTOR AND CHIEF ENGINEER
MAURICE H. KAYA
DEPUTY DIRECTOR
R 83-320

Dept. of Housing & Community Development
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 5th FLOOR
HONOLULU, HAWAII 96813

April 18, 1983

May 12, 1983

MEMORANDUM

TO: Michael M. McElroy, Director
Department of Land Utilization

FROM: Joseph K. Conant

SUBJECT: Kalaheo Sanitary Landfill
Environmental Impact Statement (EIS)

MEMORANDUM

TO: JOSEPH K. CONANT, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

FROM: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

SUBJECT: Kalaheo Sanitary Landfill Environmental Impact Statement

Thank you for the opportunity to review the subject document.
We have no substantive comments to offer.
We will retain this EIS for our files.

JOSEPH K. CONANT
Original Signed
JOSEPH K. CONANT

✓ cc: Department of Public Works

We appreciate your review of the document. Your letter will be incorporated into the revised environmental impact statement.

Please contact John Lee at 527-5366 if there are any questions.

MICHAEL J. CHUN
Director and Chief Engineer

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
800 SOUTH KING STREET
HONOLULU, HAWAII 96813-1013



KILBURN H. ANDERSON
MAYOR

MICHAEL M. MCELROY
DIRECTOR

ROBERT A. JONES
DEPUTY ASSISTANT
LUS/83-1216(SM)

April 12, 1983

MEMORANDUM

TO : DR. MICHAEL J. CHUN, DIRECTOR & CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM : MICHAEL M. MCELROY, DIRECTOR

SUBJECT : DRAFT ENVIRONMENTAL IMPACT STATEMENT
KALAHED SANITARY LANDFILL
TAX MAP KEYS: A-2-14: 1, 6

12-25

We have reviewed the above and have the following comments to offer:

1. Reference: Page 1-18
Comment: Has the City and County negotiated a lease with the private landowner for the use of the project site as a sanitary landfill? Are there any plans for the project site's use after the landfill has reached capacity?
2. Reference: Page 1-24
Comment: We concur that Alternative A is the most desirable accessway to the sanitary landfill, in terms of cost and long-term environmental impact.
3. Reference: Pages 1-24 to 1-27
Comment: A larger scale, detailed map of the project site should be included in the text of this discussion, which would show the storm drainage system, leachate interceptor trenches, and other infrastructure and building requirements. Will the runoff from the landfill flow into Kawaiunui Marsh?

MEMO TO DR. MICHAEL J. CHUN, DIRECTOR & CHIEF ENGINEER
Page 2

4. Reference: Page 6-2 to 6-6
Comment: How does the proposed project relate to the proposed Solid Waste Processing and Resource Recovery Facility?
If there are any further questions, please contact Sampson Mar of our staff at 523-4077.

Coretta Chee
MICHAEL M. MCELROY
Director of Land Utilization

MHM:s1

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
450 SOUTH KING STREET
HONOLULU, HAWAII 96813



SILVER R. ANDERSON
JUNIOR

MICHAEL J. CHUN, Ph.D.
DIRECTOR AND CHIEF ENGINEER
DENISE SUZUKI
DEPUTY DIRECTOR

R 83-382

May 18, 1983

MEMORANDUM

TO: MR. MICHAEL M. McELROY, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

SUBJECT: KALAEHO SANITARY LANDFILL ENVIRONMENTAL IMPACT STATEMENT

We appreciate your valuable comments and offer the following responses to your comments.

1. Comment: Reference Page 1-18

"Has the City and County negotiated a lease with the private landowner for the use of the project site as a sanitary landfill? Are there any plans for the project site's use after the landfill has reached capacity?"

Response:

We have conducted preliminary negotiations with the landowner for the use of the site as a landfill. The landowner has not raised any objections to the use of the site as a landfill. Future negotiations will be conducted to work out the lease arrangements. After the site has been used as a landfill and normal post maintenance work conducted, the site will be returned to the owner.

2. Comment: Reference Page 1-24

"We concur that Alternative A is the most desirable accessway to the sanitary landfill, in terms of cost and long-term environmental impact."

Response:

None required.

Mr. Michael M. McElroy, Director

May 18, 1983

Page 2

J. Comment: Reference Pages 1-24 to 1-27

"A larger scale, detailed map of the project site should be included in the text of this discussion, which would show the storm drainage system, leachate interceptor trenches, and other infrastructure and building requirements. Will the runoff from the landfill flow into Kawaihau Marsh?"

Response:

The detailed maps requested are unavailable. The level of detail can only be provided during the preliminary engineering phase of the project and work can only be authorized after the environmental impact statement is approved. Your department will be consulted during the preliminary engineering phase and afforded the opportunity to participate in the site layout.

The landfill will be designed to divert stormwater flow around the area used for landfilling. Prior to entering the marsh, the natural runoff will pass through a detention basin to reduce potential silt contamination of the marsh.

4. Comment: Reference Page 6-2 to 6-6

"How does the proposed project relate to the proposed Solid Waste Processing and Resource Recovery Facility?"

Response:

The Kalaeho Sanitary landfill is immediately needed to meet the refuse disposal needs. This facility will be in operation by 1985 and the resource recovery facility by 1987. Even with resource recovery, sanitary landfills will be needed to dispose of the ash, noncombustible material and demolition waste. The estimated tonnages with and without resource recovery are presented in Tables 1-1 and 1-2 of the environmental impact statement. Simply stated, with resource recovery, the life of the landfill will be considerably extended.

Should you have questions or require additional information, please contact John Lee at 527-5366.

Michael J. Chun
MICHAEL J. CHUN
Director and Chief Engineer

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU 83-01603
 830 SOUTH KING STREET
 HONOLULU, HAWAII 96813



GILLEN B. ANDERSON
 DEPUTY DIRECTOR

ENVU
Refer
 EMIKO I. KUDO
 DIRECTOR
 DEPARTMENT OF PARKS AND RECREATION
 830 SOUTH KING STREET
 HONOLULU, HAWAII 96813

March 24, 1983

RECEIVED
 DEPT OF PARKS AND RECREATION
 MAR 29 9 01 AM '83

TO: MICHAEL M. McELROY, DIRECTOR
 DEPARTMENT OF LAND UTILIZATION

FROM: EMIKO I. KUDO

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT FOR THE KALAHEO SANITARY LANDFILL

Inasmuch as you have assured the monitoring of contaminants which may reach Kawaihi Marsh and that mitigative measures, if required, will be taken to ensure safeguarding the ecological system of the marsh, we have no objection to the proposed project.

Thank you for the opportunity to review the EIS.

Emiko I. Kudo
 (Mrs.) EMIKO I. KUDO, Director

EIK:vc
 cc: DPM/

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
 830 SOUTH KING STREET
 HONOLULU, HAWAII 96813



GILLEN B. ANDERSON
 DEPUTY DIRECTOR

MICHAEL J. CHUN
 DEPUTY DIRECTOR
 DEPARTMENT OF PUBLIC WORKS
 R 83-320

May 12, 1983

MEMORANDUM

TO: EMIKO I. KUDO, DIRECTOR
 DEPARTMENT OF PARKS AND RECREATION

FROM: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER
 DEPARTMENT OF PUBLIC WORKS

SUBJECT: Kalaheo Sanitary Landfill Environmental Impact Statement

We appreciate your review of the document. Your letter will be incorporated into the revised environmental impact statement.

Please contact John Lee at 527-5366 if there are any questions.

Michael J. Chun
 MICHAEL J. CHUN
 Director and Chief Engineer

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
 HONOLULU MUNICIPAL BUILDING
 430 SOUTH KING STREET
 HONOLULU, HAWAII 96813



EILEEN R. ANDERSON
 WARD

William A. Bonnet
 DIRECTOR
 DAIL WALKER
 COUNTY ENGINEER

EILEEN R. ANDERSON
 WARD

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
 430 SOUTH KING STREET
 HONOLULU, HAWAII 96813



MICHAEL J. CHUN
 DEPARTMENT OF PUBLIC WORKS
HAURICE H. KAYA
 DEPUTY DIRECTOR
 R 83-320

DPW

April 15, 1983

TE 3/83-1142

May 12, 1983

12-28

MEMORANDUM

TO: MICHAEL M. McELROY, DIRECTOR
 DEPARTMENT OF LAND UTILIZATION

FROM: WILLIAM A. BONNET, DIRECTOR

SUBJECT: EIS - KALAHEO SANITARY LANDFILL

We have reviewed the EIS and are satisfied with its assessment of the traffic impact from the proposed project.

William A. Bonnet
 WILLIAM A. BONNET

cc: Department of Public Works

MEMORANDUM

TO: WILLIAM A. BONNET, DIRECTOR
 DEPARTMENT OF TRANSPORTATION SERVICES

FROM: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER
 DEPARTMENT OF PUBLIC WORKS

SUBJECT: Kalaheo Sanitary Landfill Environmental Impact Statement

We appreciate your review of the document. Your letter will be incorporated into the revised environmental impact statement.

Please contact John Lee at 527-5366 if there are any questions.

Michael J. Chun
 MICHAEL J. CHUN
 Director and Chief Engineer

EJC

Dept. of Public Works

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
530 SOUTH KING STREET
HONOLULU, HAWAII 96813



MICHAEL J. CHUN, PH.D.
DIRECTOR AND CHIEF ENGINEER
MAURICE H. WATA
DEPUTY DIRECTOR

R 83-342

ZFS-JS

March 30, 1983

May 18, 1983

MEMORANDUM

TO: HAROLD FALK, ACTING CHIEF OF POLICE
HONOLULU POLICE DEPARTMENT

FROM: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

SUBJECT: KALAEHO SANITARY LANDFILL ENVIRONMENTAL IMPACT STATEMENT

TO: MICHAEL MCELROY, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM: FRANCIS KEALA, CHIEF OF POLICE

SUBJECT: KALAEHO SANITARY LANDFILL

We appreciate your review of the document. Your letter will be incorporated into the revised environmental impact statement.

Please contact John Lee at 527-5366 if there are any questions.

We have reviewed the environmental impact statement for the proposed kalaeo sanitary landfill forwarded to us on March 18, 1983, and find nothing in it that requires comment.

Francis Keala
FRANCIS KEALA
Chief of Police

Michael J. Chun
MICHAEL J. CHUN
Director and Chief Engineer

cc: Department of Public Works



HAWAIIAN ELECTRIC COMPANY, INC.

Box 2750 / Honolulu, Hawaii / 96840

April 26, 1983

ENV 2-1
NV/G

RICHARD L. O'CONNELL, P.E.
MANAGER, ENVIRONMENTAL DEPARTMENT
1983 148 148

Department of Land Utilization
City and County of Honolulu
650 S. King Street, 7th Floor
Honolulu, Hawaii 96813

Dear Sir:

Subject: Environmental Impact Statement for the
Kalaheo Sanitary Landfill

We have reviewed the above Environmental Impact Statement and offer the following comments:

1. The cost to relocate the existing powerline has not been addressed.
2. No alternative routes for the powerline relocation have been addressed. This is critical because of the following:
 - a. If relocation is through an urban area, agreement with the various landowners must be secured.
 - b. If the relocation is through a conservation district, this EIS must address its impact.
3. The line in question is 46 kv and could prove costly to relocate.
4. Reference page 2-19, paragraph IV.A. states that electric power is available and discusses the overhead line (46 kv) that traverses the site. Distribution power, if required, would not be available from this 46 kv line but could be made available from a 4 kv circuit nearby.

Thank you for the opportunity to comment on this Environmental Impact Statement.

Sincerely,

Richard L. O'Connell
Richard L. O'Connell
Manager, Environmental Department

JHP,jr.:ca1

cc: Dept. of Public Works ✓

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU

590 SOUTH KING STREET
HONOLULU, HAWAII 96813



EILEEN W. ANDERSON
CLERK

MICHAEL J. CHUM, PhD
DIRECTOR AND CHIEF ENGINEER

MAURICE W. KATA
DEPUTY DIRECTOR

R 83-475

June 24, 1983

Mr. Richard L. O'Connell
Manager, Environmental Department
Hawaiian Electric Company, Inc.
Box 2750
Honolulu, Hawaii 96840

Dear Mr. O'Connell:

Subject: Kalaheo Sanitary Landfill Environmental Impact Statement

We appreciate your valuable comments and offer the following responses.

Comment:

"1. The cost to relocate the existing powerline has not been addressed."

Response:

The cost to relocate the existing powerline, if required, will be provided after the preliminary engineering phase of the project has been completed. This phase will be initiated after the approval of the Environmental Impact Statement.

Comment:

"2. No alternative routes for the powerline relocation have been addressed. This is critical because of the following:

- a. If relocation is through an urban area, agreement with the various landowners must be secured.
- b. If the relocation is through a conservation district this EIS must address its impact."

"3. The line in question is 46 kv and could prove costly to relocate."

Mr. Richard L. O'Connell
June 24, 1983
Page 2

Response:

No alternate routes for the powerline or cost have been provided in the document. This information will be provided after the preliminary engineering phase has been completed. The preliminary engineering phase will determine the need for relocation of the powerline and the alignment. We will coordinate the project with you at the appropriate time.

Comment:

"4. Reference page 2-19, paragraph IV.A. states that electric power is available and discusses the overhead line (46 kv) that traverses the site. Distribution power, if required, would not be available from this 46 kv line but could be made available from a 4 kv circuit nearby."

Response:

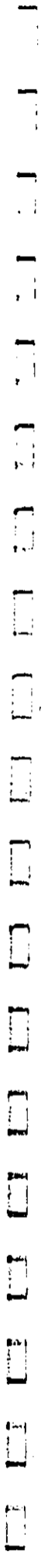
The electrical needs and point of connection to the distribution line will be evaluated during the engineering phase of the project. We will, at that time, consult with your company on the specific details.

Please contact John Lee at 527-5366 if there are any questions.

Very truly yours,



MICHAEL J. CHUN
Director and Chief Engineer





Michael J. Chun
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

April 6, 1983

Subject: EIS for the Kalaheo Sanitary Landfill

Please send us a copy of the Revised EIS when it becomes available. We are somewhat concerned that because Kawaiinui Marsh is not a source of drinking water, the City feels no qualms about exposing the Marsh to long-term hazard from leachate and soil erosion.

We would appreciate it if the Revised EIS explicitly addressed the following points:

1. the strike of the dikes across the basalt underlying the proposed Kalaheo landfill site;
2. ground water elevation versus elevation of landfill excavation for those parts of the site now below an elevation of 120 feet;
3. the location, ground elevation, and static head of all wells in the project vicinity;
4. typical velocities for migration of ground water through the soil mantle overlying the Kalaheo site;
5. typical velocities for migration of ground water confined by the dike complex;
6. how long after completion of the landfill will the City continue to monitor for leachate; and
7. estimated total soil runoff during the project lifetime and analysis of where soil runoff will end up.

Yours,

Art
for
Arthur Mori
President

cc: DEQC
cc: EISC

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



EILEEN M. ANDERSON
CLERK

MICHAEL J. CHUN, Ph.D.
DIRECTOR AND CHIEF ENGINEER
MAURICE W. HAY
DEPUTY DIRECTOR

R 83-320

May 12, 1983

Mr. Arthur Mori, President
Life of the Land
250 S. Hotel Street, Room 211
Honolulu, Hawaii 96813

Dear Mr. Mori:

Subject: Kalaheo Sanitary Landfill Environmental Impact Statement

We appreciate your review of the document. Your letter will be incorporated into the revised environmental impact statement.

The City and County is concerned about the impacts of leachate and soil runoff into Kawaiinui Marsh and prior to the design of the landfill engaged the services of a qualified geohydrologist to evaluate the impacts of the leachate production movement and potential impact to the marsh. The results of the study by the geohydrologist is contained in Appendix B of the environmental impact statement. Simply stated, there is no evidence to suggest that leachate accumulation and migration will differ from that of the existing Kapaa Sanitary Landfill which has been in operation for over ten years. During the last three years, our water quality monitoring program has not detected the production of leachate from this operation. The potential soil runoff will be evaluated during the preliminary engineering phase of the project and acceptable engineering mitigative measures are available to prevent significant impacts from siltation.

Should you require additional information, please contact John Lee at 527-5366.

Very truly yours,

Michael J. Chun
MICHAEL J. CHUN
Director and Chief Engineer

cc: DLU
cc: EISC

201 4/83 - 1818

KAWAI NUI HERITAGE FOUNDATION, INC. RESPONSE TO THE PROPOSED KALAHEO SANITARY LANDFILL

April 22, 1983

Mr. Michael McElroy
City and County of Honolulu
650 S. King Street, 7th Floor
Honolulu, HI 96813

Dear Sir:

Attached is a statement which the Kawai Nui Heritage Foundation would like to present in response to the Kalaheo Sanitary Landfill, Environmental Impact Statement. We would like to go on record as being opposed to the Kalaheo proposed site. The Foundation would like to thank you for providing us with the opportunity to present our viewpoint as well as provide input into major concerns and problem areas which we feel are not compatible with our Directional Plan.

I would like also to make available representatives from our Foundation to discuss this matter with you and your staff. Please contact me at 842-8279(ok) or 261-3714(hm); or Robert Carter at 261-1559.

Thank you for your attention in the above matter.

Sincerely,

Dr. Verileann Malina-Wright, President

enclosure

cc: Executive Board

The Kawai Nui Heritage Foundation would like to present a formal response to the Proposed Kalaheo Sanitary Landfill Environmental Impact Statement. The Kawai Nui Heritage Foundation would like to go on record that the Environmental Impact Statement is incomplete. The Kawai Nui Heritage Foundation is also opposed to the Kalaheo Sanitary Landfill as an extension of the Kapa'a Sanitary Landfill.

THE FOUNDATION

The Kawai Nui Heritage Foundation is the formal organization of the previous Kawai Nui Ad Hoc Committee of the Kailua Lani Outdoor Circle. Our membership is made up of citizens of Kailua, as well as individuals active in the more than fifty organizations which supported the Ad Hoc Committee's efforts. The Foundation has been incorporated as a non-profit foundation whose sole purpose is to serve as "Na Ki'ai Pono O Kawai Nui," "the proper caretakers of Kawai Nui."

The Kawai Nui Heritage Foundation through the previous efforts of the Kawai Nui Ad Hoc Committee, has been actively seeking to put in place aspects of the Kawai Nui Directional Plan, developed over a ten year period with input from several hundred knowledgeable citizens and experts, which covers the Kailua Ahupua'a with Kawai Nui Marsh at its heart. The purpose of the Foundation is to "educate the public about the inherent natural educational, recreational, agricultural, historical and cultural resources within the watershed (Ahupua'a) of Kailua, Ko'olau Piko, O'ahu and to preserve the integrity of the Foundation's Directional Plan for the benefit and enjoyment of Hawaii's people and visitors."

THE FOUNDATION'S POSITION

The Kalaheo Sanitary Landfill Environmental Impact Statement is incomplete because present problems that exist at the Kapa'a Landfill site, as well as long range environmental impacts of the Kapa'a Landfill site have not been addressed adequately. Problems with the new site at the Kalaheo Sanitary Landfill will be similar in nature and increase the deterioration of the Kawai Nui Marsh area. The Kalaheo Sanitary Landfill Environmental Impact Statement has inferred a close association with the Kapa'a Landfill practices that are currently in operation and ignores the unaddressed problems of the Kapa'a Landfill site. The Foundation would like to address these problems as well as suggestions for their alleviation.

Na Kia'i Pono 'O Kawai Nui

KAWAI NUI HERITAGE FOUNDATION

This process does not adequately deter the large amount of

unlawfully dumped refuse, but encourages continued abuse and dumping.

THE RECORD SHOWS THAT WITHIN THE AGENCY DEPARTMENTS OF THE CITY AND COUNTY

A LACK OF COOPERATION AND COORDINATION EXISTS THAT COULD IMPROVE AND ENHANCE

THE GOVERNMENT'S RESPONSIBILITY TO MAINTAIN THE KAPA'A LANDFILL SITE. THIS

LACK OF COOPERATION AND COORDINATION IS ASSURED TO CONTINUE AT THE KALAHOO

SANITARY LANDFILL SITE TOO.

THE RECORD SHOWS THAT CITY AND COUNTY SHOULD ASSESS HOW ENFORCEMENT OF

UNLAWFUL RUBBISH DUMPING CAN BE ADDRESSED MORE EFFECTIVELY THEN IS CURRENTLY

BEING DONE, LEST SIMILAR INCREASED DUMPING CONTINUE AS PART OF THE KALAHOO

SANITARY LANDFILL SITE

The present transportation and access road for the proposed Kalahoo

Sanitary Landfill site is the Kapa's Quarry Road--a private road only for the

use of a private business HCGD, and related City landfill refuse haulers. The

road is owned by Castle Estate. Because the road is private and very poorly

maintained from either a security or safety perspective, the two lessees

who have responsibility for this road have not addressed this concern. Problems

that exist are people using the road as a public thoroughfare, no speed limits,

and security against dumping in the area. As a result along the whole perimeter

of the Kawai Nui Marsh area, piles of refuse, auto bodies and pollution soil/water

run-off have consistently encouraged a large-scale pollution effort of the

Kawai Nui Marsh area by providing an access road open to the public.

THE RECORD SHOWS THAT CITY AND COUNTY SHOULD ASSESS HOW ENFORCEMENT OF

UNLAWFUL RUBBISH DUMPING CAN BE ADDRESSED MORE EFFECTIVELY THEN IS CURRENTLY

BEING DONE, LEST SIMILAR INCREASED DUMPING CONTINUE AS PART OF THE KALAHOO

SANITARY LANDFILL SITE

The Kapa'a Landfill sites inadequate grass planting and water sprinklers

have caused and continue to cause erosion and increased dust pollution in the

air. The overall lack of environmental concern are obvious to any visitor.

The Foundation feels that the same lack of sensitivity to the environment will

continue at the proposed Kalahoo Sanitary Landfill site. The Foundation is

requesting an ad hoc community task force be established of representatives from

the community to work with the City to prevent and solve environmental problems

before they happen. The Foundation feels that the resources needed to address

these problems can be obtain within the City and County agency departments

who have the responsibility and authority to maintain the Kawai Nui Marsh area

and the Kapa'a Landfill site area.

THE RECORD INDICATES THAT PROPER MONITORING AND ALLOCATION OF CITY AND

COUNTY RESOURCES BY THE APPROPRIATE CITY AGENCY DEPARTMENTS CAN BE

ACCOMPLISHED COOPERATIVELY WITH COMMUNITY PARTICIPATION LEST CONTINUED

LACK OF MAINTAINING THE ENVIRONMENT EXPANSION TO NEW PROMISED SITES.

CURRENT UNADDRESSED PROBLEMS WITH THE CITY AND COUNTY AND THE KAPA'A LANDFILL

The draft of the Kalahoo Sanitary Landfill Environmental Impact Statement

refers consistently to a continuation of the same practices and examples

that exist at the present Kapa'a Sanitary Landfill. The current practices have

demonstrated on the part of the City and County of Honolulu a complete disregard

for the overall environmental, cultural, and safety concerns for current and

short and long-range impacts caused by the Kapa'a site. These practices are

a continuation of serious threats to the Kawai Nui resources as well as the

Kailua Ahupua'a.

Pahukini Heiau is a glaring example of cultural disregard and wanton

destruction. The City and County's record for dealing with a large

historically registered site(Pahukini Heiau is the largest walled heiau on

O'ahu) is not only an example of negligence and forgotten promises

of maintenance and protection of the property. Presently the Pahukini Heiau

is in a state of continued destruction. Major walls have been undercut by

grading and erosion caused by soil movement and are in danger of collapse. The

City and County has taken no action other than allowing trees to grow within

the heiau, dragging and destroying the structure with the constant movement

of soil associated with landfill settling. The City and County employees also

discourage Hawaiian people from visiting this religious temple. The City and

County's past performance indicate that promises to maintain an area have no

credibility. Other sites with petroglyphs have been destroyed when sections

of rock outcroppings were blasted away.

THE RECORD SHOWS THAT THE CITY AND COUNTY DOES NOT TAKE ACTION REQUIRED

TO SAFEGUARD ANY ARCHAEOLOGICAL SITES BE THEY REGISTERED OR UNIDENTIFIED.

The pollution of Kawai Nui Marsh consists of migration of litter

associated with the present Kapa'a Sanitary Landfill and its access road which

the proposed landfill will continue. Efficient maintenance is not undertaken

to control this migration. Compounded because the city does not maintain its

property of the Kawai Nui Regional Park. This lack of maintenance is presently

causing a build-up of decayed litter on the adjacent property that is owned by

the City and County, and other private land owners. Steps that should be

taken to remedy the problem would be high fencing on the makai side of the

road and regular maintenance instead of the current practice of simply bull-

dozing the litter into large piles to later be picked up by heavy equipment.

The Foundation wishes to emphatically express that the City and County is gambling very dangerously that a vast supply of fresh water will not be contaminated by leachate from the present as well as the proposed sanitary landfill sites. The Environmental Impact Statement states, "that leachate may enter Kawai Nui through the water table which is at the same level of the Kawai Nui Marsh."

The water captured within the accretion barrier area which comprises the "coconut grove" community of residential homes is one of the last untapped areas of fresh water on O'ahu. Presently 8 million gallons of water flows daily into the Kawai Nui Marsh from streams fed by the Maunawili watershed. Similar to the problems at Love Canal and Times Beach, the City and County is dangerously playing a "wait and see roulette game" with the stakes being high for our children and their future generations. The dangerous flirtation with toxic contamination increases in importance because there is minimum monitoring and because the City and County does not know what toxins are located in the landfill. There is no examination of toxic materials or documentation of materials dumped in the landfill site because the entire system is based on honor. In a recent news article, the League of Women Voters urged that the Hawaii State Legislature search out the chemical hazards that exist less we learn the hard way where Hawaii's toxic waste ends up--in the fresh water supply. The City and County still allows the dumping of liquids at the Kapa'a landfill site. These liquid carrying trucks regularly discharge their wastes at Kapa'a. This procedure increases the pollution and thus the amount of leachate entering the water table through the Kawai Nui Marsh. An independent study entitled "Is Kawai Nui Polluted," by Robinson and Ollival found large levels of leachate near the landfill site. These aspects leave little doubt that in the future large quantities of leachate will reach the water table. City policy of returning leachate found in landfill catch-wells back to the top of the dump is improper. Waste water and leachate found in wells should not be placed within the landfill. They should be treated at sewage waste water facilities.

THE RECORD SHOWS THAT THE CITY AND COUNTY CONTINUES TO IGNORE THE POLLUTION OF KAWAI NUI MARSH BY NOT ADEQUATELY MONITORING FOR LEACHATE CONTAMINATION AND ENDANGER A LARGE AMOUNT OF FRESH WATER THAT COMPRISES THE MARSH AREA. THIS PRACTICE WOULD ONLY CONTINUE AND ADD FURTHER POLLUTION TO THE MARSH AREA BY THE PROPOSED KALAHEO LANDFILL SITE.

The Kawai Nui Heritage Foundation would once more like to reiterate the significance of the Kailua Ahupua'a and the Kawai Nui Marsh. Historic, scientific, cultural, education and economic enhancement through preservation of Kawai Nui Marsh and its heritage have been documented in previous archaeological studies by Wheeler, Kelly, Nakamura, et al. The proposed Kalaheo landfill site area comprises approximately 50 acres where an archaeological study was conducted to meet the requirements of the Environmental Impact Statement. The Foundation is concerned about the thoroughness of the survey, the lack of reference to any previous archaeological studies conducted in the area, and the lack of primary informed sources that could describe the area and its uses. It is not surprising that this section focuses on only a small area, or that because of prior grading no significant prehistoric sites of importance would be found in the proposed Kalaheo Landfill site area. The ridge line where the prehistoric cultural material would then most likely be found was not thoroughly examined. It should have been examined because Pahukini heiau which was located buried beneath thick vegetation was at a similar elevation. Many other sites such as petroglyphs, caves, etc., have been found at these higher elevations at nearby areas within the district, especially when significant rock outcroppings exist on the slopes. The Environmental Impact Statement acknowledges these geological conditions. The archaeologist spent most of his time looking at the unlawful dumping of refuse rather than any historical significant cultural wall, village site, etc. which may be located in the area. According to Kelly and Clark, "it is important to keep in mind that Kawai Nui fishpond, marsh and surrounding slopes were all part of a series of larger sociocultural systems...An adequate understanding of the Kawai Nui area cannot be achieved if it is divorced from the larger context."

THE FOUNDATION RECOMMENDS THAT AN INDEPENDENT STUDY BE CONDUCTED AS PART OF A CONTINUED EFFORT BY THE PREVIOUS ARCHAEOLOGISTS WHO HAVE WORKED IN THE KAWAI NUI MARSH AREA.

The Kailua Ahupua'a is a major center of settlements by the Polynesian voyagers. Carbon datings of archaeological findings in the area have indicated settlement at 200 A.D. to 600 A.D. Not only noted for its archaeological treasure, endangered water bird species and fresh water, unless the ahupua'a (watershed) is protected, the whole Kawai Nui Marsh area will continue to be in danger of deterioration. There is no indication that the City and County plans to clean up and restore the Kawai Nui Marsh area once the landfill

sites have reached maximum capacity. The recommended practice to channel water run off into Kapa'a stream and therefore the Kawai Nui Marsh is a continued practice that has contaminated the area despite siltation ponds. Increased flow via Kapa'a stream will cause overflow of the quarry siltation ponds and provide a need for reassessing alternative methods for water run off and continued contamination/pollution of the Kawai Nui Marsh area. This process continues to devalue the cultural significance of the area and ignores the need to address a larger problem of refuse management.

RECOMMENDATIONS OF THE FOUNDATION

The Kawai Nui Heritage Foundation would like to encourage that the current Environmental Impact Statement be re-examined in order to prevent and negate any unwanted impacts as addressed by the problems identified in this statement.

The Kawai Nui Heritage Foundation recognizes that the City and County has a problem of how to provide refuse disposal for a growing population, however, sanitary landfills may not be the best solution to a long-range and continuous problem. The Foundation commends the City and County and its Council for addressing this concern by seeking new alternatives such as Hi-Power, recycling plants, and incineration according to environmental standards.

The Kawai Nui Heritage Foundation demands that the Kalaheo Landfill site be reconsidered and not implemented.

The Kawai Nui Heritage Foundation requests that the City and County examine possible shredders for the Kapa'a Landfill area to treat refuse and compact the refuse prior to burying so as to increase the tonnage possible and delay the closing of the landfill area until Hi-Power and other alternatives are implemented.

The Kawai Nui Heritage Foundation recommends that only solids be placed in the Kapa'a landfill area and that liquids be treated elsewhere at an appropriate sewage plant, perhaps at Mokapu.

The Kawai Nui Heritage Foundation recommends that the City and County consider a tax credit to homeowners who purchase compost shredders and use their compost in their yard. Compost shredder centers could also be established within a community similar to community gardens, where members could process their own paper and garden rubbish for further community/individual use.

The Kawai Nui Heritage Foundation recommends that the City and County in cooperation with other government agencies educate the public about refuse treatment and processing and reducing the amount of rubbish by recycling materials. An attempt should be made to involve the private sector of free enterprise to assist with this endeavor and relieve the City and County of finding additional landfill site areas.

The Kawai Nui Heritage Foundation recommends that the City and County and the proper agency's departments be held accountable to the problems identified in this paper. That a report be presented to Kailua community organizations indicating how these problem areas will be solved. This process should be contingent upon any further consideration of the proposed new landfill site at Kalaheo.

The Kawai Nui Heritage Foundation would like to thank the Department of Land Utilization, City and County of Honolulu for the opportunity to provide input into the government process for the Kalaheo Sanitary Landfill site. The Foundation representatives would be willing to meet with the appropriate government staff members to discuss this matter further.

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
480 SOUTH KING STREET
HONOLULU, HAWAII 96813



WILENA M. ANDERSON
CLERK

MICHAEL J. CHUM, Ph.D.
DIRECTOR AND CHIEF ENGINEER

MAURICE M. KAYA
DEPUTY DIRECTOR

R 83-528

July 20, 1983

Dr. Verlie Ann Malina-Wright
President
Kawai Mui Heritage Foundation
P. O. Box 1101
Kailua, Hawaii 96734

Dear Dr. Wright:

Subject: Kalaheo Sanitary Landfill Environmental Impact Statement

We appreciate your comments and offer the following responses to your statement attached to the letter dated April 22, 1983. The responses to comments contained in the seven page statement entitled "Kawai Mui Heritage Foundation, Inc. Response to the Proposed Kalaheo Sanitary Landfill" will address substantive comments applicable to the Kalaheo Sanitary Landfill Environmental Impact Statement (EIS) and the comments will be labeled as "comments" and the City's responses labeled "responses."

Comment: "THE FOUNDATION" Page 1

Response:

The information you have provided in your statement on your organization, its purpose and goals is useful. We wish to compliment your organization on taking on such a broad purpose as to "educate the public about the inherent and cultural resources within the watershed (Ahupua'a) of Kailua, Ko'olau Piko, O'ahu and to preserve the integrity of the Foundations' Directional Plan for the benefit and enjoyment of Hawaii's people and visitors." Perhaps your organization can help us educate the people who are illegally dumping refuse along the roads leading to the sanitary landfill about the potential health risks, the increased cost of picking up the refuse, and the aesthetic degradation of the area around the marsh.

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Comment: "THE FOUNDATION'S POSITION" Page 1

"The Kalaheo Sanitary Landfill Environmental Impact Statement is incomplete because present problems that exist at the Kapa's Landfill site, as well as long range environmental impacts of the Kapa's Landfill site have not been addressed adequately. Problems with the new site at the Kalaheo Sanitary Landfill will be similar in nature and increase the deterioration of the Kawai Nui Harah area. The Kalaheo Sanitary Landfill Environmental Impact Statement has inferred a close association with the Kapa's Landfill practices that are currently in operation and ignores the unaddressed problems of the Kapa's Landfill site. The Foundation would like to address these problems as well as suggestions for their alleviation."

Response:

The Kapa and Kalaheo Sanitary Landfills are two separate projects. There are numerous similarities in the operation of a sanitary landfill, but each project must be evaluated separately. The Kapa Sanitary Landfill expansion was started after the acceptance of the revised environmental impact statement (prepared in January 1, 1978) and approval of the construction plans for the landfill.

The proposed landfill at the Kalaheo site has been described in the environmental impact statement and the anticipated environmental impacts and mitigative measures have been described and evaluated in this document.

It is therefore our opinion that the Kalaheo Environmental Impact Statement is complete.

Comment: "CURRENT UNADDRESSED PROBLEMS WITH THE CITY AND COUNTY AND THE KAPA LANDFILL" Page 2

"The draft of the Kalaheo Sanitary Landfill Environmental Impact Statement refers consistently to a continuation of the same practices and examples that exist at the present Kapa's Sanitary Landfill. The current practices have demonstrated on the part of the City and County of Honolulu a complete disregard for the overall environmental, cultural, and safety concerns for current and short and long-range impacts caused by the Kapa's site. These practices are a continuation of serious threats to the Kawai Nui resources as well as the Kailua Ahupua'a."

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Response:

We believe that the current practice at the Kapa Sanitary Landfill mitigates environmental impact and is responsive to cultural and safety concerns, and that the landfilling activities do not constitute a serious threat to Kawai Nui Harah.

Some of the actions and programs undertaken by the City and County for environmental protection are: the installation of a siltation basin and energy dissipators during the construction of the Kapa Sanitary Landfill expansion which prevented significant siltation to the marsh; the installation of leachate trenches and sumps for the interception and collection of leachate; the installation of leachate monitoring wells and the continuous testing for leachate - we point out that current testing indicates that no leachate is being produced; the installation and testing of gas monitoring wells; operator training by sending personnel to workshops sponsored by the Federal Environmental Protection Agency and the State Department of Health; continued picking up of litter within the landfill site and along the roadsides; use of water to prevent the generation of excessive fugitive dust; conducting archaeological surface surveys prior to landfilling activities and the stabilization and reconstruction of archaeological structures previously impacted by other activities not related to landfilling.

Comment: Page 2

"Pahukini Heiau is a glaring example of cultural disregard and wanton destruction. The City and County's record for dealing with a large historically registered site (Pahukini Heiau is the largest valued Heiau on O'ahu) is not only an example of negligence and forgotten promises of maintenance and protection of the property. Presently the Pahukini Heiau is in a state of continued destruction. Major walls have been undercut by grading and erosion caused by soil movement and are in danger of collapse. The City and County has taken no action other than allowing trees to grow within the heiau, dragging and destroying the structure with the constant movement of soil associated with landfill settling. The City and County employees also discourage Hawaiian people from visiting this religious temple. The City and County's past performance indicate that promises to maintain an area have no credibility. Other sites with petroglyphs have been destroyed when sections of rock outcroppings were blasted away."

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"THE RECORD SHOWS THAT THE CITY AND COUNTY DOES NOT TAKE ACTION REQUIRED TO SAFEGUARD ANY ARCHAEOLOGICAL SITES BE THEY REGISTERED OR UNIDENTIFIED."

Response:

The City and County has and will continue to meet its responsibility regarding Pahukini Heiau. Some of the actions taken by this department:

1. Prior to initiating landfilling at the Kapas site next to the heiau, an archaeological investigation was conducted by Archaeological Research Center Hawaii in 1977. The findings were that there were no significant archaeological sites other than Pahukini Heiau. The study also indicated that the heiau was in fair condition and that quarrying operations prior to 1969 had cut into the north side of the heiau, approximately 10 feet from the wall. There are no petroglyphs within the Kapas or Kalahao project sites. This Department initiated actions to rectify the situation by diverting natural storm runoff water around the heiau, backfilling against the cut (backfilling was completed in 1977), installing protective chain link fence around the perimeter of the heiau to prevent vandalism to the structure, and establishing and maintaining a 100-foot buffer zone around the heiau.

2. The Bishop Museum was contacted to provide technical assistance and mapping of the heiau and to supervise the rebuilding of the heiau wall damaged by quarrying and subsequent landfill operations. The wall repair was completed in 1981, except for a small section which rests on landfilled ground. This section will be rebuilt when consolidation of the refuse and settlement of the ground surface stop.

3. Trees around the heiau were poisoned but vegetation within the heiau were left intact to prevent wind erosion to the heiau's features (Bishop Museum recommendation, May 7, 1980).

4. The City and County has never discouraged the Hawaiian people or any people from visiting the heiau. On the average, two groups per year from Kamehameha School visit the heiau. Arrangements to visit the heiau can easily be made by calling the Refuse Division at 523-6775.

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Comment: Pages 2 and 3

"The pollution of Kawai Mui Marsh consists of migration of litter associated with the present Kapa'a Sanitary Landfill and its access road which the proposed landfill will continue. Efficient maintenance is not undertaken to control this migration. Compounded because the city does not maintain its property of the Kawai Mui Regional Park. This lack of maintenance is presently causing a build-up of decayed litter on the adjacent property that is owned by the City and County, and other private land owners. Steps that should be taken to remedy the problem would be high fencing on the makai side of the road and regular maintenance instead of the current practice of simply bulldozing the litter into large piles to later be picked by heavy equipment. This process does not adequately deter the large amount of unlawfully dumped refuse, but encourages continued abuse and dumping."

"THE RECORD SHOWS THAT WITHIN THE AGENCY DEPARTMENTS OF THE CITY AND COUNTY A LACK OF COOPERATION AND COORDINATION EXISTS THAT COULD IMPROVE AND ENHANCE THE GOVERNMENT'S RESPONSIBILITY TO MAINTAIN THE KAPA'A LANDFILL SITE. THIS LACK OF COOPERATION AND COORDINATION IS ASSUMED TO CONTINUE AT THE KALAHAO SANITARY LANDFILL SITE TOO."

Response:

Landfilling personnel are regularly assigned to pick up litter within the boundary of the landfill. The City's Road Division maintains and cleans Kapas Quarry Road leading to the landfill as necessary.

Fencing along the makai side of Kapas Quarry Road was tried on several occasions for litter control. The fencing disappeared almost as fast as we could put it up, and dumping within the roadway itself increased.

In conjunction with the opening of the Kalahao site, a private guard service will be contracted to patrol the area and discourage illegal dumping.

Comment: Page 3

"The present transportation and access road for the proposed Kalahao Sanitary Landfill site is the Kapa'a Quarry Road -- a private road only for the use of a private business Hc60, and

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related City landfill refuse haulers. The road is owned by Castle Estate. Because the road is private and very poorly maintained from either a security or safety perspective, the two leasees who have responsibility for this road have not addressed this concern. Problems that exist are people using the road as a public thoroughfare, no speed limits, and security against dumping in the area. As a result along the whole perimeter of the Kawai Nui Marsh area, piles of refuse, auto bodies and pollution soil/water run-off have consistently encouraged a large-scale pollution effort of the Kawai Nui Marsh area by providing an access road open to the public."

"THE RECORD SHOWS THAT CITY AND COUNTY SHOULD ASSESS HOW ENFORCEMENT OF UNLAWFUL RUBBISH DUMPING CAN BE ADDRESSED MORE EFFECTIVELY THAN IS CURRENTLY BEING DONE, LEST SIMILAR INCREASED DUMPING CONTINUE AS PART OF THE KALAHEO SANITARY LANDFILL SITE"

Response:

Illegal dumping of refuse is an island-wide problem, and this cannot be solved readily. However, we are planning to provide "refuse convenience centers" at two locations, Ewa and Waianae, to provide the public with a ready location for the disposal of refuse. If these centers prove successful, six other locations will be considered for future "refuse convenience centers."

As stated earlier, in conjunction with the opening of the Kalaheo site, a private guard service will be contracted to patrol the area and discourage illegal dumping.

Comment: Page 3

"The Kapa's Landfill site's inadequate grass planting and water sprinklers have caused and continue to cause erosion and increased dust pollution in the air. The overall lack of environmental concern are obvious to any visitor. The Foundation feels that the same lack of sensitivity to the environment will continue at the proposed Kalaheo Sanitary Landfill site. The Foundation is requesting an ad hoc community task force be established of representatives from the community to work with the City to prevent and solve environmental problems before they happen. The Foundation feels that the resources needed to address these problems can be

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obtain within the City and County agency departments who have the responsibility and authority to maintain the Kawai Nui Marsh area and the Kapa's Landfill site area."

"THE RECORD INDICATES THAT PROPER MONITORING AND ALLOCATION OF CITY AND COUNTY RESOURCES BY THE APPROPRIATE CITY AGENCY DEPARTMENTS CAN BE ACCOMPLISHED COOPERATIVELY WITH COMMUNITY PARTICIPATION LEST CONTINUED LACK OF MAINTAINING THE ENVIRONMENT EXPANDS TO NEW PROPOSED SITES."

Response:

Standard operations at the Kapa Landfill require grassing of the landfill as significant areas are completed. The newly planted areas are then irrigated until the grass is established. Natural rainfall is then sufficient to maintain growth. This procedure has been successful in the past and we are satisfied that the revegetation of the landfill helps to minimize erosion. The Department of Public Works will be happy to work with representatives of the community to prevent and solve environmental concerns resulting from its sanitary landfill operations.

Comment: Page 4

"THE RECORD SHOWS THAT THE CITY AND COUNTY CONTINUES TO IGNORE THE POLLUTION OF KAWAI NUI MARSH BY NOT ADEQUATELY MONITORING FOR LEACHATE CONTAMINATION AND ENDANGER A LARGE AMOUNT OF FRESH WATER THAT COMPRISES THE MARSH AREA. THIS PRACTICE WOULD ONLY CONTINUE AND ADD FURTHER POLLUTION TO THE MARSH AREA BY THE PROPOSED KALAHEO LANDFILL SITE."

Response:

As part of the Kapa Landfill site No. 3 expansion program, leachate interceptor trenches and monitoring wells were installed. Testing for leachate is an ongoing program. The results over the years indicate that no leachate is being produced and the marsh has not been adversely affected by leachate.

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Response:

Thank you for your recommendations. The city is progressing as scheduled with its Resource Recovery Project. It should be noted however that even with the maximum use of resource recovery, sanitary landfills will continue to play an important role in solid waste disposal because landfills will be needed to dispose of the ash and residue produced by the resource recovery system and the unprocessable waste such as bulky items, demolition material, rock and soil. The landfills will also be needed to serve as emergency backup facilities during shutdowns of the resource recovery facility.

Comment: Page 6

"The Kawai Mui Heritage Foundation demands that the Kalaheo Landfill site be reconsidered and not implemented."

Response:

As noted above, there will always be a need for sanitary landfill and we believe that the Kalaheo site is an appropriate site for the proposed operation. Our efforts to develop this site as a landfill must be continued.

Comment: Page 6

"The Kawai Mui Heritage Foundation requests that the City and County examine possible shredders for the Kapa's Landfill area to treat refuse and compact the refuse prior to burying so as to increase the tonnage possible and delay the closing of the landfill area until H-Power and other alternatives are implemented."

Response:

The City examined shredding and baling as ways of reducing waste volume to conserve landfill capacity. However, shredders or balers capable of handling the amount of refuse disposed of at Kapa alone would be large, complex machines, requiring the siting, construction,

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Comment: Page 5

"THE FOUNDATION RECOMMENDS THAT AN INDEPENDENT STUDY BE CONDUCTED AS PART OF A CONTINUED EFFORT BY THE PREVIOUS ARCHAEOLOGISTS WHO HAVE WORKED IN THE KAWAI MUI MARSH AREA."

Response:

The archaeological reconnaissance conducted by Richard Bordner for the Kalaheo Landfill site is essentially an independent study completed by a highly qualified and competent archaeologist. The surface survey was sufficient in detail to recommend that no further archaeological work needs to be done. We are satisfied that the work is adequate and that we can proceed with confidence.

Comment: "RECOMMENDATIONS OF THE FOUNDATION" page 6

"The Kawai Mui Heritage Foundation would like to encourage that the current Environmental Impact Statement be re-examined in order to prevent and negate any unwanted impacts as addressed by the problems identified in this statement."

Response:

As stated previously, we believe that the Environmental Impact Statement adequately describes the major issues and conforms to applicable regulations dealing with the content of environmental impact statements.

Comment: Page 6

"The Kawai Mui Heritage Foundation recognizes that the City and County has a problem of how to provide refuse disposal for a growing population, however, sanitary landfills may not be the best solution to a long-range and continuous problem. The Foundation commends the City and County and its Council for addressing this concern by seeking new alternatives such as H-Power, recycling plants, and incineration according to environmental standards."

Dr. Vertie Ann Malina-Wright
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operation, and maintenance of a sizable facility to house them. The cost of such a system is not justifiable when compared to the relatively small increase in landfill life it provides.

The City is continuing its efforts to procure a resource recovery facility which, along with the existing Waipahu Incinerator, will burn all of the combustible refuse generated on Oahu each day. With the implementation of resource recovery, only non-combustibles such as demolition and construction debris, bulky items, and ash from the combustion processes will have to be landfilled, thereby tripling landfill life. The landfills will also be needed to serve as emergency backup facilities during shutdowns of the resource recovery facility.

Comment: Page 6

"The Kawai Mui Heritage Foundation recommends that only solids be placed in the Kapa'a landfill area and that liquids be treated elsewhere at an appropriate sewage plant, perhaps at Mokapu."

Response:

The only liquid waste accepted is very limited amounts from kitchen grease traps. This material is not accepted at the sewage treatment plant, and if refused at the landfill, would result in the indiscriminate dumping of the grease along the roadways or perhaps even in the marsh. No other liquids are accepted at the landfill.

Comment: Page 6

"The Kawai Mui Heritage Foundation recommends that the City and County consider a tax credit to homeowners who purchase compost shredders and use their compost in their yard. Compost shredder centers could also be established within a community similar to community gardens, where members could process their own paper and garden rubbish for further community/individual use."

"The Kawai Mui Heritage Foundation recommends that the City and County in cooperation with other government agencies educate the public about refuse treatment and processing and reducing the amount of rubbish by recycling [sic] materials. An attempt should be made to involve the private sector of free enterprise to assist with this endeavor and relieve the City and County of finding additional landfill site areas."

Dr. Vertie Ann Malina-Wright
July 20, 1983
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Response:

Our general position on solid waste is to encourage all feasible methods for the disposal of refuse including recycling. Recycling, primarily with aluminum and cardboard, has unfortunately found limited success and acceptance on Oahu. Full scale compost or sorted refuse programs, though subsidized in the initial phases, have not worked on the Mainland and have not had a major impact on reducing solid waste volumes.

Modern and efficient collection and disposal systems are a basic necessity to assure adequate public health and safety.

Very truly yours,



MICHAEL J. CHUM
Director and Chief Engineer

KAILUA NEIGHBORHOOD BOARD NO. 31
c/o Kailua Satellite City Hall
302 Kuulei Road
Kailua, HI 96738



April 11, 1983

EILEEN M. ANDERSON
SECRETARY



DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

MICHAEL J. CHUN, Ph. D.
DIRECTOR AND CHIEF ENGINEER
MAURICE M. KATA
DEPUTY DIRECTOR

R 83-320

May 12, 1983

Michael Chun
Director and Chief Engineer
Department of Public Works
650 S. King St., 11th Floor
Honolulu, Hawaii 96813

Dear Mr. Chun:

The Kailua Neighborhood Board No. 31 appreciates the time you and your staff have spent with us discussing the proposed Kalaheo Sanitary Landfill site. While recognizing the merits of the site, especially that of its proximity to the current site, we still feel it is time to relocate out of the environs of Kawaiinui. The visibility of the proposed site from Kailua Road and H-3 heightens our preference for the Bellows site, and we hope this option will be aggressively pursued.

Thank you again for your time and consideration in this matter.

Sincerely,

Harriet A. O'Sullivan

HARRIET A. O'SULLIVAN, CHAIRMAN
KAILUA NEIGHBORHOOD BOARD NO. 31

cc: Neighborhood Commission

Ms. Harriet A. O'Sullivan, Chairman
Kailua Neighborhood Board No. 31
Kailua Satellite City Hall
302 Kuulei Road
Kailua, Hawaii 96734

Dear Ms. O'Sullivan:

Subject: Kalaheo Sanitary Landfill Environmental Impact Statement

Thank you for reviewing the environmental impact statement and your continued valuable input.

In response to your comment favoring the Bellows AFB site, we stated on page 6-2 of the environmental impact statement that this site is needed by the military and not presently available for sanitary landfilling. We intend, however, to pursue its acquisition for future landfilling.

Your letter will be incorporated into the revised environmental impact statement.

Should you have any questions or require additional information, please contact John Lee at 527-5386.

Very truly yours,

Michael J. Chun

MICHAEL J. CHUN
Director and Chief Engineer

cc: DLU
EISC



Copy for Dept. of Public Works

SIERRA CLUB, HAWAII CHAPTER
P.O. BOX 22897 HONOLULU, HAWAII 96822
(808)946-8494

22 April 1983

Mr. Michael McElroy, Director
Department of Land Utilization
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Dear Mr. McElroy:

Subject: Environment Impact Statement (Draft) for the proposed Kalaheo Landfill

Thank you for the opportunity to comment on the subject DEIS. The comments which follow are based on our concerns for Kawai Nui Marsh and on the potentials for energy conservation inherent in recycling and re-use of materials.

1. Storm water runoff

The draft EIS is heavily dependent for many of its conclusions on alleged similarities between the present Kapa'a site and the proposed Kalaheo site. It is interesting to note, therefore, that in dealing with stormwater run-off, the DEIS states that it will be diverted around the proposed landfill and collected in settling ponds to evaporate. This is nice in theory, but anyone who has traveled Kapa'a Quarry Road during or after a storm is aware that very large quantities of silt-laden water wash across the road below the landfill and end up on the edges of or in the Marsh.

Captain Dallam's comments (p. 11-6) regarding the rapid runoff and severe erosion hazard characteristics of Alaaloa soil series (the principal soil in the proposed site) and the Department of Public Works' response to the Department of General Planning that "it is a commonly accepted design feature of landfills...to provide sufficient slope for the surface of the landfill to allow rapid runoff of storm water" indicate the sources of this problem. Will the capacity of the ponding basins be sufficient to deal with this problem? And, if not, what is the potential effect on Kawaihuli Marsh--and also the base of the H-3 roadbed?

2. In Appendix E (p.E-1), resource recovery is noted as including the following: recovered materials, soil conditioner, and energy. However, in the following text and in the body of the DEIS, "resource recovery" is used as if it were synonymous with and only included energy recovery, by pyrolysis. "Refuse-to-energy" would be more accurate and would help to raise public consciousness that "resource recovery" is a broader term, including such energy-conserving activities as re-use and recycling.

Sincerely, *[Signature]*
Susan F. Miller, Executive Director, Sierra Club Hawaii Chapter

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
450 SOUTH KING STREET
HONOLULU, HAWAII 96813



GILBERT ANDERSON
MAYOR

MICHAEL J. CHUNG, Ph.D.
DIRECTOR AND CHIEF ENGINEER

MAURICE H. KATA
DEPUTY DIRECTOR

R 83-540

July 26, 1983

Mr. Sam Goo
Chairman
Honolulu Group
Sierra Club, Hawaii Chapter
P. O. Box 22895
Honolulu, Hawaii 97822

Dear Mr. Goo:

Subject: Kalaheo Sanitary Landfill Environmental Impact Statement

We appreciate your valuable comments and offer the following responses.

Comment

"1. Storm water runoff

The draft EIS is heavily dependent for many of its conclusions on alleged similarities between the present Kapa'a site and the proposed Kalaheo site. It is interesting to note, therefore, that in dealing with stormwater run-off, the dEIS states that it will be diverted around the proposed landfill and collected in settling ponds to evaporate. This is nice in theory, but anyone who has traveled Kapa'a Quarry Road during or after a storm is aware that very large quantities of silt-laden water wash across the road below the landfill and end up on the edges of or in the marsh."

Response

The natural storm water runoff will be diverted around the landfill. The siltation basin and energy dissipators will be designed to minimize the amount of silt entering the marsh. The design standards for these structures will conform to applicable standards and regulations.

The siltation basin is designed to remove silt and not for the complete retention and evaporation of the storm water.

Mr. Sam Goo
July 26, 1983
Page 2

Comment

"Captain Dallas's comments (p. 11-6) regarding the rapid runoff and severe erosion hazard characteristics of Alseaola soil series (the principal soil in the proposed site) and the Department of Public Works' response to the Department of General Planning that "it is a commonly accepted design feature of landfills...to provide sufficient slope for the surface of the landfill to allow rapid runoff of storm water" indicate the sources of this problem. Will the capacity of the ponding basins be sufficient to deal with this problem? And, if not, what is the potential effect on Kawaimi Marsh--and also the base of the H-3 roadbed?"

Response

The Alseaola soil is found within the project site and will be used for intermediate cover of the refuse. The soil will be excavated and stock-piled until used. Precautions will be implemented to prevent erosion and siltation of the marsh from the stockpiled material. A stockpiling permit will be obtained which will require the sides of the pile to be compacted and vegetated if the material is not used within a reasonable time. The area around the stockpiled material will be graded to divert surface runoff into the drainage system and siltation basin.

The final cover material for the completed landfill may be imported from other areas. The final grading plans will require grassing of the surface to prevent erosion from water and wind.

The intermediate and final grades of the landfill are sloped to provide for the rapid runoff of water to prevent leachate formation by water entering the landfill. The potential problem of siltation from the landfill is mitigated by providing perimeter drains which lead to siltation basins and grassing and by revegetation of the landfill.

Comment

"2. In appendix E (p. E-1), resource recovery is noted as including the following: recovered materials, soil conditioner, and energy. However, in the following text and in the body of the dEIS, "resource recovery" is used as if it were synonymous with and only included energy recovery, by pyrolysis. "Refuse-to-energy" would be more accurate and would help to raise public consciousness [sic] that "resource recovery" is a broader term, including such energy-conserving activities as re-use and recycling."

Mr. Sam Goo
July 26, 1983
Page 3

Response

The term "pyrolysis", used in the text of Appendix E, means the use of heat and pressure in the absence of air to form a char and a fuel. This process is different from incineration. The wording will be clarified.

Your letter will be incorporated into the revised environmental impact statement.

Please contact John Lee at 527-5366 if there are any questions.

Very truly yours,



MICHAEL J. CHIU
Director and Chief Engineer

**Unresolved
Issues**

13

SECTION 13

UNRESOLVED ISSUE

This section briefly describes the unresolved issue.

The unresolved issue is primarily concerned with the final selection of providing access to the landfill site.

Various alternatives are being considered, each requiring further analysis during the preliminary engineering phase of the project. The evaluation during the preliminary engineering phase will provide the details required for the final selection of the access route. The discussion of the alternatives are found in Section 1 of this report.

Appendices

APPENDIX A

SITE SELECTION AND EVALUATION CRITERIA

APPENDIX A
SITE SELECTION AND EVALUATION CRITERIA

In the Inventory Study of Potential Sanitary and Demolition Landfill Sites, prepared by Stanley S. Shimabukuro and Associates, Inc., for the City and County of Honolulu, the selection and evaluation of landfill sites were based primarily on the following criteria, not necessarily listed in order of importance: [A.1]

A. Capacity

Each potential site must have sufficient volume to make it worthwhile, since opening a new landfill involves major capital cost. Capacity is a very important factor in landfill development economics. Desirable minimum capacity should provide for approximately 5 years of life based on 500 tons/day of refuse.

B. Access to Adequate Roads

Any major landfill operation will attract additional traffic to the roadways in the area and an adequate, modern highway is needed to prevent excessive congestion and hazards. Site should be within 2,000 feet of an adequate main highway.

C. Availability to Utilities

All major landfill sites will need power, communication, sanitary and water systems for proper operation. The immediate availability of these utilities can be a major factor in the evaluation of the site.

D. Proximity to Incompatible Land Uses

A landfill operation is a nuisance type activity, similar to heavy construction work, and most land uses would conflict with it. Generally, a buffer area with landscaping is needed to isolate the landfill if its location is not in low land use areas or is not remote.

E. Pollution of Ground and Surface Water

A landfill can produce leachates and silt. Our potable ground water supply sources must be protected from leachates, and our surface water needs protection from siltation. The protection of our potable ground water supply is absolutely necessary.

F. Availability of Cover Material

Cover material is an important ingredient in a sanitary landfill. Without it, an ordinary dump exists. The economic availability of this cover material can be decisive. When cover material must be imported, the cost, depending on the location, of the landfill site can vary from \$1.50 to \$5.00 per ton.

G. Travel Distance

When conditions permit, landfill sites should be located close to the refuse generation centers. Hauling is an important factor in the economic operation of a landfill.

H. General Nuisance

A landfill operation will cause noise, dust, litter, odor and other nuisances. Unless these nuisances are properly provided for, the site should be remote. Wind direction is a factor. This item relates directly to D and G.

I. Existing Land Use

The existing land use of sites should be low or open so that use of the sites as landfills will not be objectionable to owners and interested groups.

J. Final Land Use of Landfill

The final land use after the landfill operation should be of equal or higher use than at present and should be compatible with the surrounding land uses. This item relates directly to item I.

K. Zoning, City General Plan and State Land Use District

An active landfill may operate for an extended time and could affect the overall growth plan of the island. This item relates directly to land acquisition cost, the overall general plan of the island and items I and J.

L. Geology

The geology of the site must be considered to protect the ground water supply and to determine the amount of cover material available. This item relates directly to items E and F. It must be studied in greater detail in the EIS stage.

M. Drainage

On- and off-site drainage systems are required to minimize the generation of leachates and silt and for protection against floods. Gullies with large drainage basins behind them present major drainage problems and costs.

N. Topography

The topography of the site determines the capacity and a substantial portion of the development cost. It also determines the visual impact of the site. Generally, gullies, swamps and low lying areas are desirable sites.

O. Objection by Landowners, Adjacent Landowners, Public and Community Organizations, etc.

This item can be an important factor, as the City's need for additional landfill space is becoming critical. Protests by owners or interested groups can cause major delays and produce a crisis situation, but should not be the major consideration in the landfill site selection process.

P. Destruction of Natural Resources

We must protect our natural resources from irreparable damages as much as possible, while providing suitable landfill sites for the general welfare.

Q. Other Environmental Factors, Including Displacement, Historical and Archaeological Sites, and Flora and Fauna

Historical and archaeological significance and flora and fauna of the sites must be studied. Also, visual pollution and displacement of persons and businesses must be considered. This item must be studied further in the EIS stage.

R. Safety

Sites must have safe access and must not present any hazard to the public or to property. Sites must be able to meet State Department of Health requirements, Public Health Regulations, Chapter 58 of Title 11, Administrative Rules on Solid Waste Management Control.

S. Major Development Costs

These costs are generally related to most of the items previously discussed. These costs can become prohibitive when:

1. Leachate abatement measures are required.
2. New access to site must be constructed to an adequate roadway.
3. Utilities are not available nearby and must be brought in from remote sources.
4. Cover material is not available on-site or nearby and must be hauled in from afar and stored.
5. Land is zoned for high uses such as residential or higher, or when land is in use.

Although this tabulation lists nineteen items as the criteria, each site was only required to have the following essential basic characteristics before being considered for further evaluation as a potential landfill site:

- Adequate capacity
- Adequate protection of our ground water supply
- No apparent significant environmental damage to the land, air, ocean or population
- Apparent economical feasibility

To rank the sites, a numerical value was placed on all of the nineteen criteria. Due to the fact that some of the criteria could not be quantified, weighted subjective values were placed on the criteria.

The criteria used by Stanley S. Shimabukuro and Associates, Inc. in selecting appropriate potential sanitary landfill sites includes those proposed by the Federal Register, "Landfill Disposal of Solid Waste." [A.2] Basically, the Federal Register recommends: "Site selection must be accomplished in consideration of: ground and surface water conditions; geology, soils and topographic features; solid waste types and quantities; social, geographic and economic factors, and aesthetic and environmental impacts." [A.3]

This issue of the Federal Register also emphasizes avoiding or giving low priority to "environmentally sensitive areas, including wetlands, 100-year floodplains, permafrost areas, critical habitats of endangered species, and recharge zones of sole source aquifers" [A.4] as potential sites for a sanitary landfill. In addition, the following criteria for site selection should be considered: [A.5]

"Zones of active faults and karst terrain should be avoided in locating landfill disposal facilities unless a site-specific evaluation demonstrates minimum potential for adverse effects, especially upon ground water."

"The cost effectiveness of a site's selection should be determined, if considered environmentally feasible. This cost analysis should include not only the economics of the disposal facility operation but also the impact of the planned future use of the site after completion of landfill operations."

"The possible incorporation of a site into a regional solid waste disposal system whether currently in existence or a future possibility, should be considered during environmental and economic evaluations. Furthermore, programs for the location, design and operation of solid waste facilities should be consistent with residual waste disposal programs developed pursuant to §208(b)(2)(J) of the Clean Water Act and §35.1519-6(f) of the Proposed Water Quality Management Regulations (43 FR 40752, September 12, 1978)."

"Sites traversed by pipes or conduits (for sewage, storm water, etc.) should be rejected unless their relocation or protection is feasible. Since such pipes may serve as pathways for gas and leachate, extreme caution must be observed and a plan for pipe maintenance and repair developed."

"Characteristics and availability of on-site soil should be evaluated with respect to their effects on site performance and site operations, such as, use of the soil for cover material and soil suitability for vehicle maneuverability."

"Sites located in the vicinity of airports, where birds attracted to the landfill disposal facility could pose a hazard to aircraft, should be avoided."

"Sites should be accessible to appropriate vehicles by all-weather roads leading from the public road system."

"The potential socio-economic effects of a site's selection should be determined. Topics to be addressed include aesthetic and safety considerations such as vehicular traffic, litter, noise and other possible nuisance conditions."

The criteria used by the City's consultant, Stanley S. Shimabukuro and Associates, Inc., therefore, has taken into consideration the conservative recommendations provided by the Federal government, as well as other environmental factors. Finding a potential sanitary landfill site that will be completely acceptable is extremely difficult on an island such as Oahu. The sites which are environmentally suitable are located in areas which are populated. This creates a situation where an optimum balance of all criteria is sought.

A summary of the criteria that were considered in evaluating and ranking potential sanitary and demolition landfill sites are listed below:

1. Approximate Capacity, in million cubic yards
2. Approximate Life as Sanitary Landfill, in years
3. Access to Adequate Roads
4. Availability of Utilities
5. Measures Required for Protection of Ground Water
6. Objection by Public, Community Groups, etc.
7. Objection by Landowner and Adjacent Landowners
8. Impact on Nearby Land Uses

9. Site Location
10. Measures Required for Protection of Surface Water
11. Availability of Fill Material
12. General Nuisance (Litter, Dust, Noise, Odor, Traffic, etc.)
13. Land Cost
14. Drainage Improvements On and Off Site
15. Topography
16. Hazard to Public Health and Safety

REFERENCES TO APPENDIX A

- [A.1] Department of Public Works, City and County of Honolulu. August, 1977. Inventory of Potential Sanitary and Demolition Landfill Sites on the Island of Oahu. Appendix A. Prepared by Stanley S. Shimabukuro and Associates, Inc., Honolulu, Hawaii.
- [A.2] Federal Register, Environmental Protection Agency. Monday, March 26, 1979, Part II. Landfill Disposal of Solid Waste, Proposed Guidelines. 40 CFR Part 241. Docket No. 1008.1; FRL 1063-5.
- [A.3] Ibid. [A.2]. page 18142.
- [A.4] Ibid. [A.3].
- [A.5] Ibid. [A.3].

APPENDIX B

HYDROGEOLOGIC AND SOILS DESCRIPTION

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STEPHEN P. BOWLES
 President

March 1982

TELEPHONE
 885-4759

**HYDROGEOLOGIC AND SOILS DESCRIPTION
 OF THE KALAHEO SANITARY LANDFILL SITE
 CITY AND COUNTY OF HONOLULU**

SITE DESCRIPTION

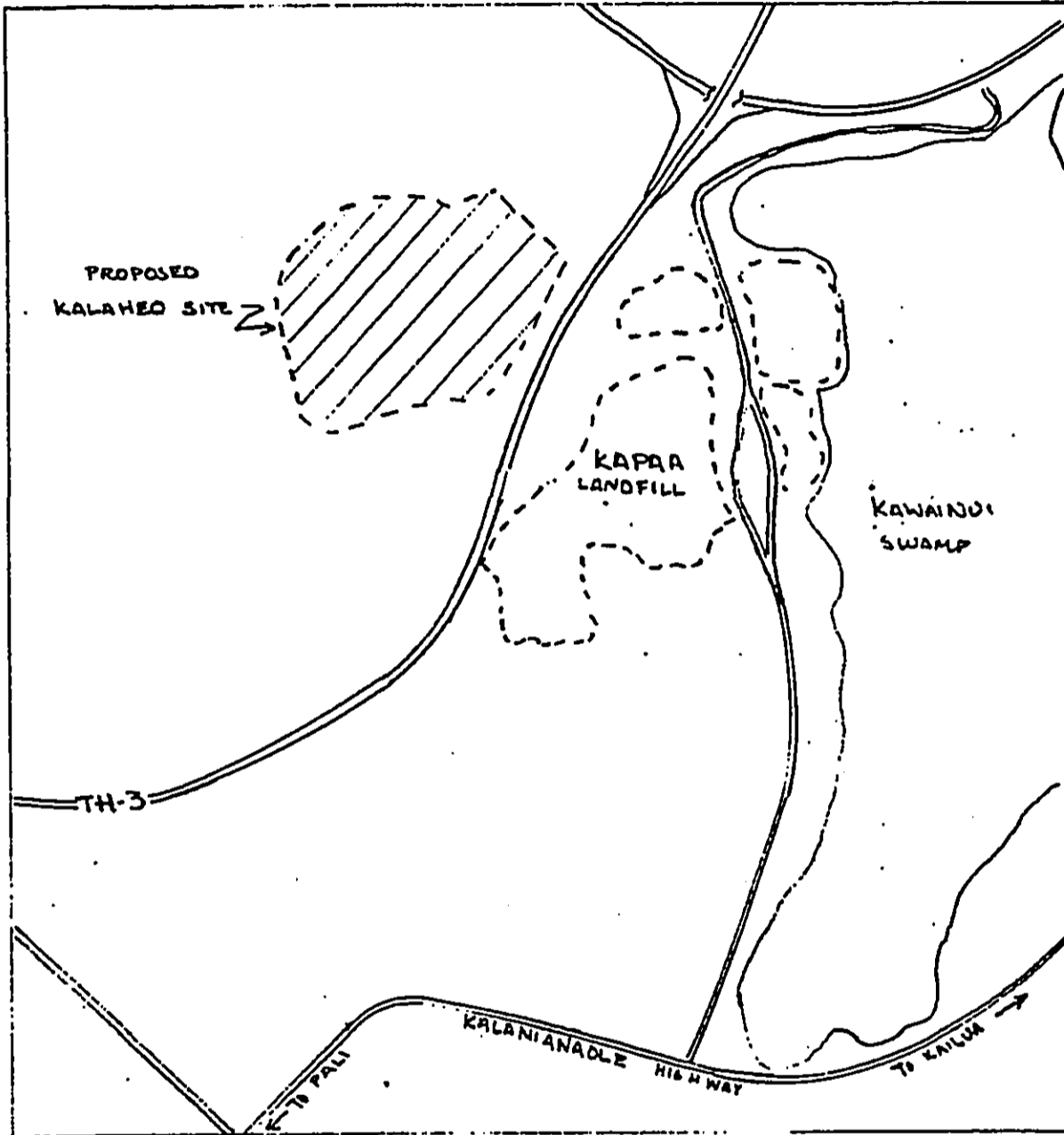
The Kalaheo landfill site lies 1500 feet west of the currently active Kapaa landfill (see location map). In most aspects of the soil and hydrogeology, the two sites are strikingly similar and, therefore, offer a predictable analysis of landfill activity. The Kapaa site was formerly an open face quarry which was backfilled as sanitary landfill. To this extent, the two sites are dissimilar. In a report prepared in 1977 entitled, "Hydrogeologic And Soils Study Of Proposed Sanitary Landfills For Leeward And Windward Oahu City & County of Honolulu, Honolulu, Hawaii" by S.P. Bowles and J.F. Mink, the rainfall and climate of the Kapaa site was thoroughly described and is referred to as background for this summary description.

Rainfall on the Kalaheo site will be nearly identical to the Kapaa site and of equal intensity and duration. The following description is from the 1977 report (page 2):

<u>STORM TYPE</u>	<u>LEEWARD SITES</u>	<u>KAPAA</u>	<u>EXPLANATION</u>
100 yr. storm; rainfall per 24 hours	14 in.	15 in.	U.S. Weather Service: probability of occurrence once in 100 years
Probable maximum 24 hour rainfall	40 in.	44 in.	U.S. Weather Service: Maximum rainfall that could conceivably occur. Probability much less than .01.
Standard Project Storm	26 in.	26 in.	U.S. Army Engineers: The hypothetical storm that might be expected from the most severe flood producing rainfall, depth-area-duration relationship, and isohyetal pattern considered characteristic of area involved.
Historical 24 hour rainfall	12 in.	12 in.	Actual storm rainfall experienced in region.

General Delivery • Kamuela, Hawaii 96743

KALAHED SANITARY LAND FILL
LOCATION MAP



SCALE
1" = 2000'

FIGURE 1

The Kalaheo site will have an annual average rainfall of about 50 inches.

Soils on the site will be the Alaeloa silty clay (ALF) and Kawaihapai stony silty clay loam (KlaB) as described in the Soil Survey of Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii published in 1972 by the U.S. Department of Agriculture Soil Conservation Service. The soils map attached shows the distribution of these soils on the Kalaheo site. Both soils may be considered moderately permeable. The Kawaihapai soils are alluvial in origin and lie on the stream banks. The Alaeloa are residual soils overlying the igneous bedrock. Detailed soil descriptions may be found in the above mentioned S.C.S. report or in Bowles and Mink (1977).

As at the Kapaa site, the Kalaheo site is located within the dike complex of the Koolau caldera. The Alaeloa soil throughout the site is a result of insitu weathering of the dike complex and the depth to fresh rock is presently unknown. Generally, the bedrock will consist of slightly metamorphosed basalt flows containing numerous dikes and some breccia.

Groundwater will be found throughout the site and other intrusives. These compartments have poor hydraulic continuity which will result in a wide variation of water table elevations (head) throughout the site. As described in the 1977 report, the head varies markedly between the three known wells nearby. The hydrogeologic map (Figure 3) generally illustrates the flow direction. It is expected that the water table elevation will rise significantly in the up slope direction.

The generally low permeability of the saturated flow basalts within the dike compartments makes for poorly productive wells and, therefore, the site is of little or no significance for municipal water development. Regardless, the groundwater is presently of excellent quality (Bowles & Mink 1977, pg 17). The high heads contained within the area may present some problems during excavation and preparation for landfill activities. An adequate test boring program can define potential groundwater problems.

Recharge to the groundwater is largely from on-site precipitation. It is unlikely that there is significant intervalley groundwater migration in the vicinity of the Kalaheo site. The dikes forming the groundwater compartments will minimize lateral flow. Typically, these compartments will fill and overflow to discharge via soil mantle. Such discharge will migrate and find its way to nearby streams and the Kawainui swamp.

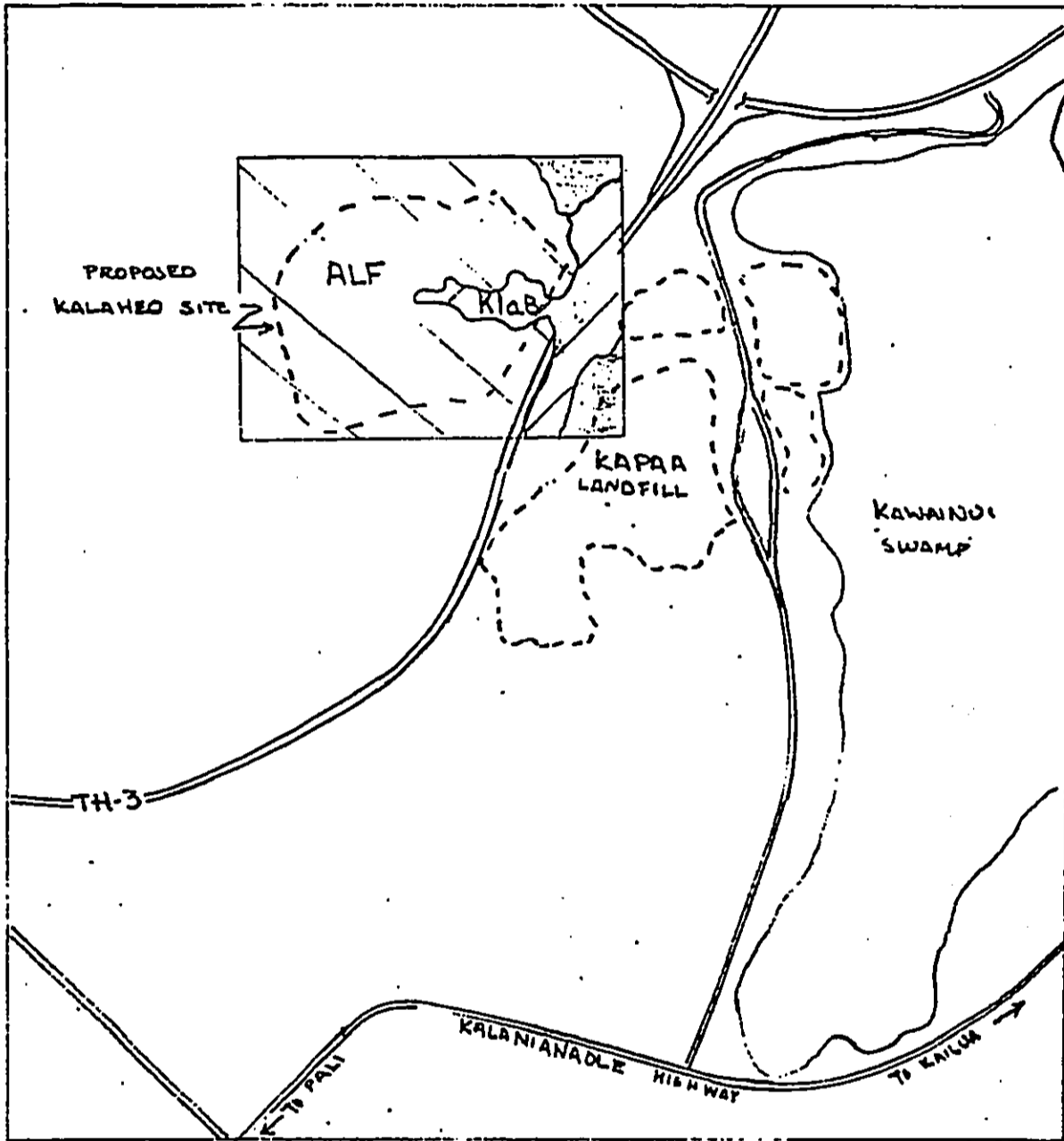
KAPAA LEACHATE MIGRATION

Bowles and Mink (1977) delineated the expected groundwater flow directions from the Kapaa landfill site and outlined a general leachate monitoring program. The Refuse Division of the Department of Public Works, City and County of Honolulu, initiated such a program in 1978. The initial results of this program (from 1978 through 1980) are to be published in Water Resources Research Center Technical Report No. 140 entitled, "Environmental Aspects of Kapaa Landfill, Kawainui, Oahu, Hawaii" by Michael J. Chun and Gordon L.

KALAHEO SITE - SOILS

ALF - AIAELOA silty clay

KIaB - KAWAIHAPAI STONY silty clay loam



PROPOSED
KALAHEO SITE

ALF

KIaB

KAPAA
LANDFILL

KAWAIHAKAI
SWAMP

TH-3

KALANIANA'OLE HIGHWAY

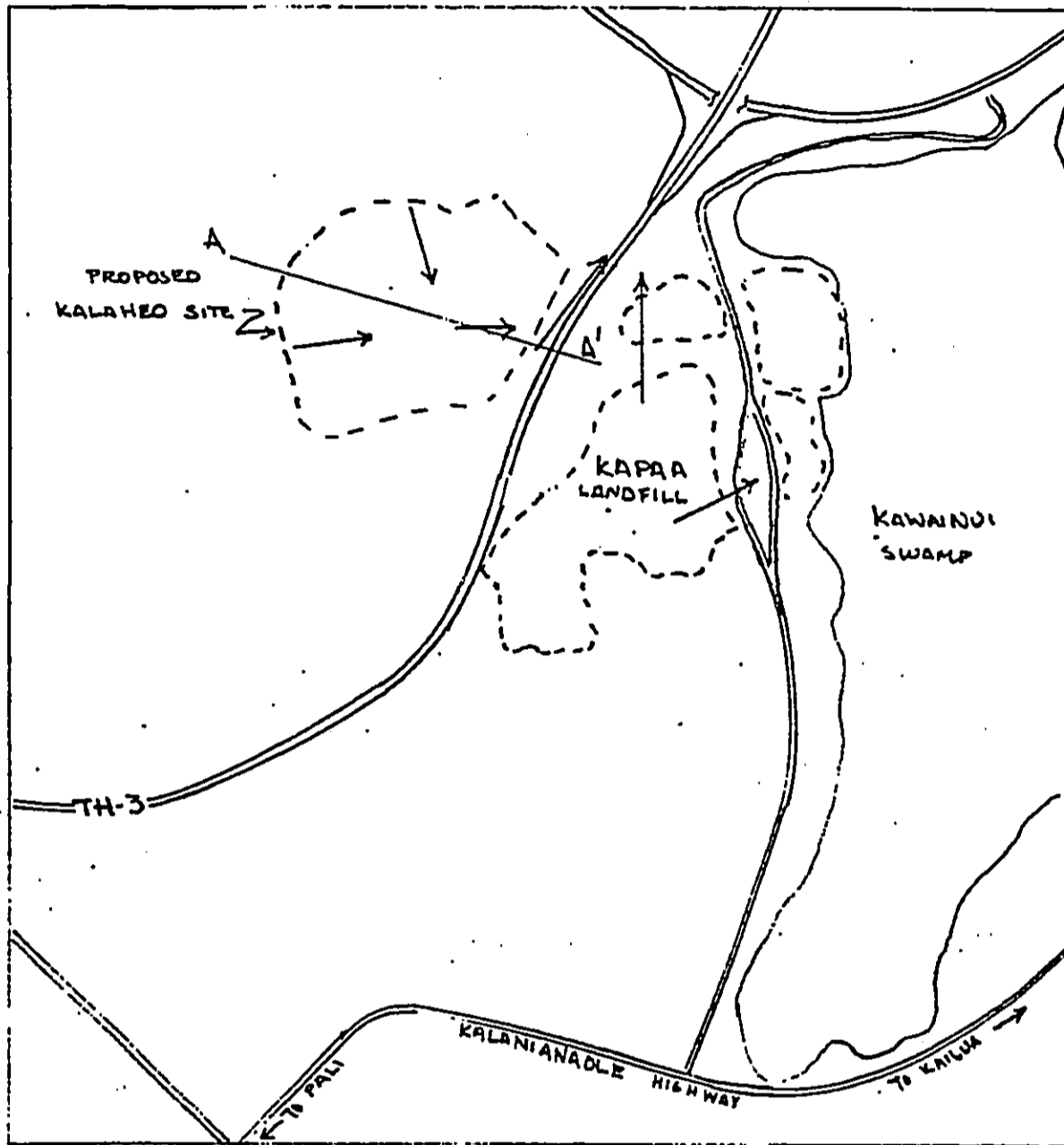
SCALE
1" = 2000'

FIGURE 2

N

KALAHEO SITE

A → GROUND WATER FLOW DIRECTION
A' CROSS SECTION - FIGURE 3A



SCALE
1" = 2000'

FIGURE 3

KALAHED SITE
HYDROGEOLOGIC CROSS SECTION
..... APPROXIMATE BOUNDARY OF WEATHERING
→ SOIL WATER (RECHARGE) MIGRATION

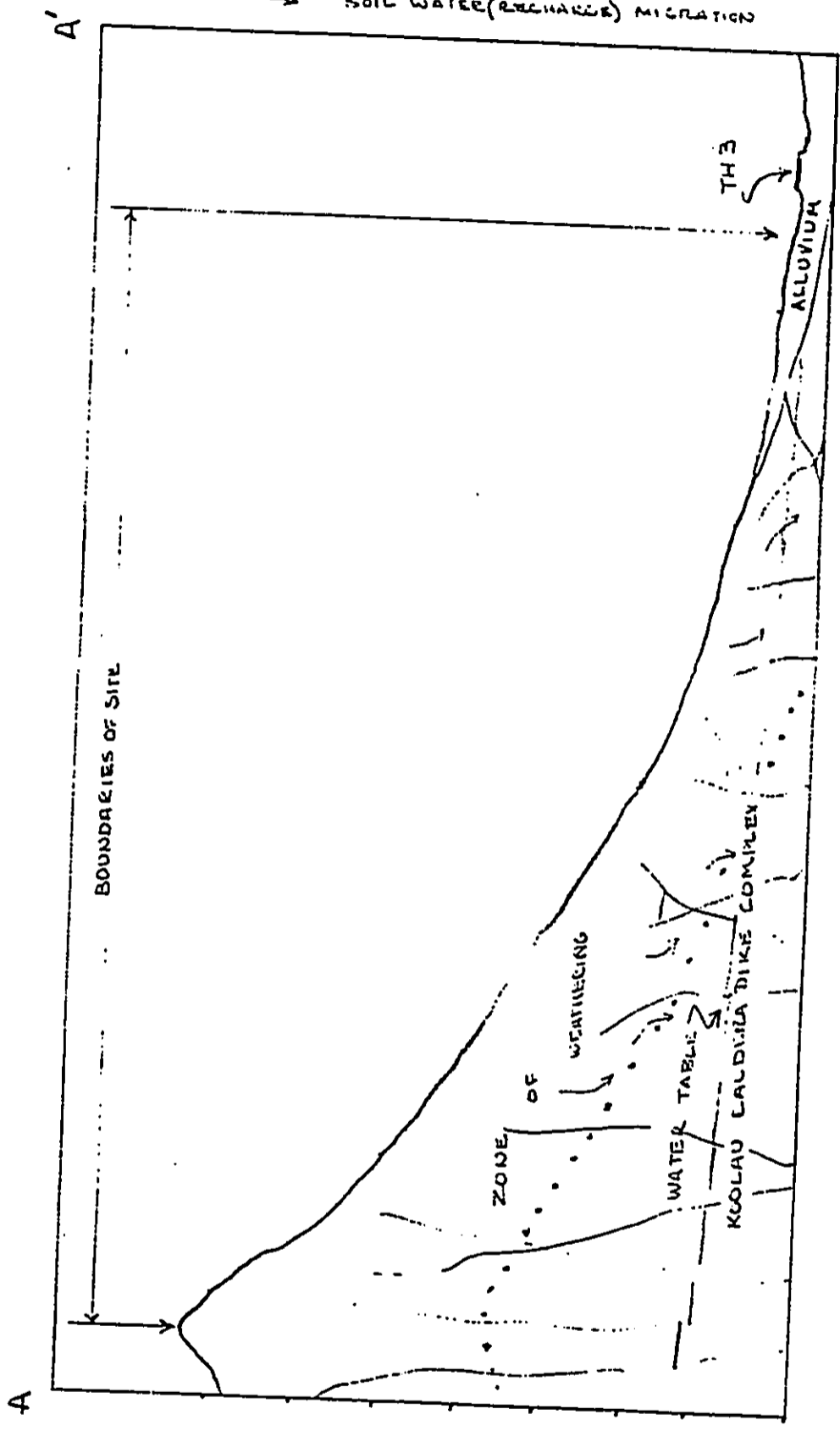


FIGURE 3A

B-6

100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100

Dugan. It is understood that the Refuse Division will continue the monitoring program established in the study. Because this report remains in draft, it is appropriate here only to quote the abstract as follows:

"The operation of the City and County of Honolulu, Kapaa Sanitary Landfill, located next to Kawainui marsh on Windward Oahu, Hawaii, raised concern over the possibility that landfill leachate could have adverse effects on the marsh. Thus, this study established six sampling sites each for surface water, groundwater, and combustible gas. Analyses were conducted for typical surface water and leachate parameters. The combustible gas monitoring was primarily for methane. There was obvious interchange of the marsh water and groundwater, with the higher mineral constituents of seawater intrusion being more evident in the monitoring wells with lower water levels. The outstanding characteristic of leachate, COD, with a reported typical concentration of 18,000 mg/l, was only found at a maximum median value of 38 mg/l in one of the six monitoring wells, while its surface water sampling station counterpart was nearly the same, 39 mg/l. No particular consistent correlation could be found to relate individual constituent concentrations of the surface water stations or monitoring wells to groundwater levels, rainfall, or seasonal and/or annual changes. If leachate is indeed entering the underlying groundwater its effect at this time would have to be considered minor. It was determined that no methane was detected in the gas monitoring wells."

These findings are consistent with field evidence of groundwater movement as reported by Bowles and Mink (1977) and further support the premise that any leachate generated will generally be contained on-site in the short term. Such accumulation may eventually migrate via the water table towards Kawainui swamp. Continuation of this elemental monitoring program should be adequate to detect such migration in the early stages. Because of the time lapse between initiation of Kapaa landfill activities (10 years) and the actual institution of the monitoring program, any rapid migration must be ruled out. The evidence presented by Chun and Dugan is quite conclusive.

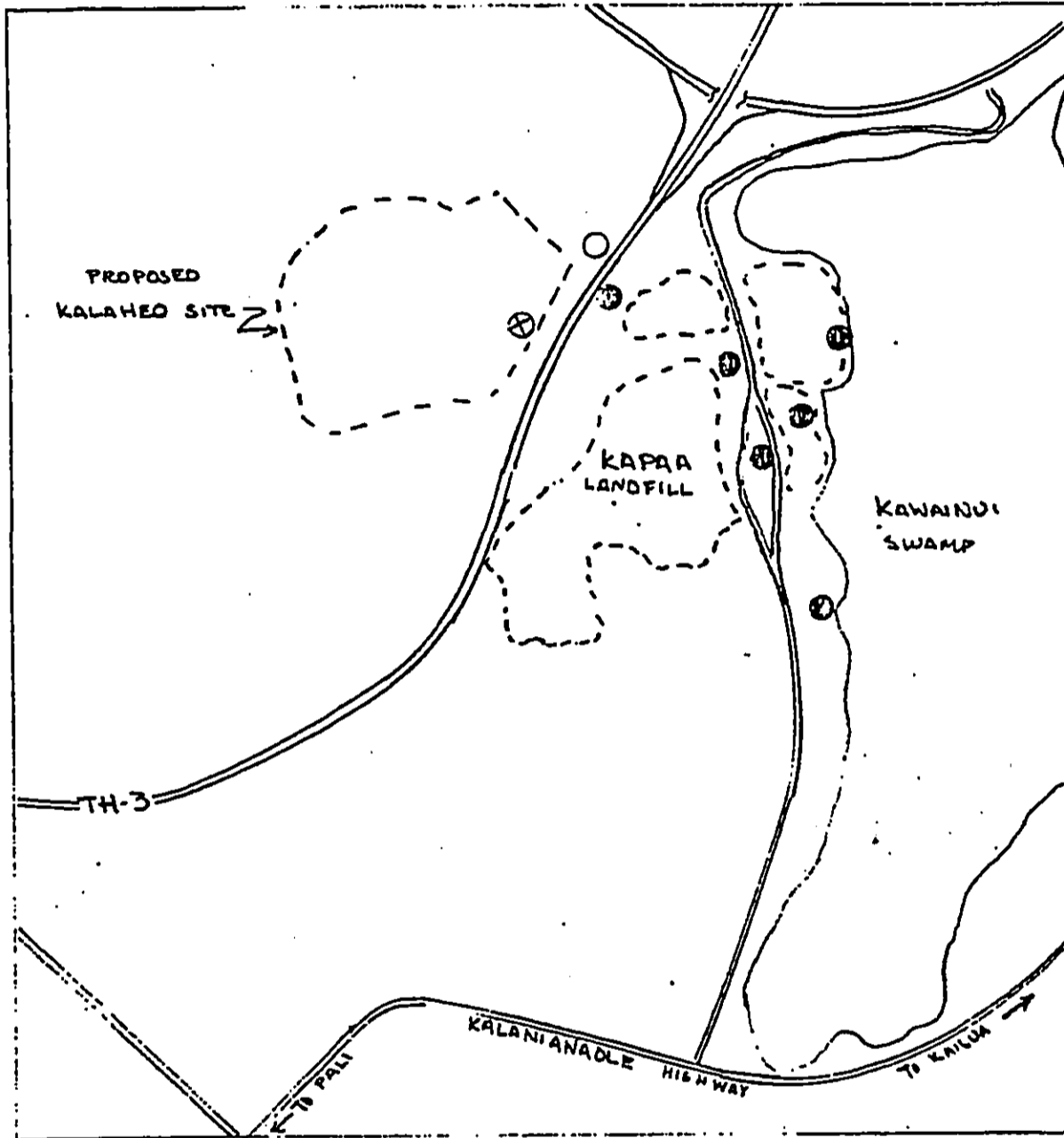
KALAEHO SITE LEACHATE MIGRATION

As stated earlier, the Kalaheo site is similar to the Kapaa site in all hydrogeologic aspects and there is presently no evidence to speculate that leachate accumulation and migration will differ significantly between the two sites. The soils (Alaeloa and Kawaihapai) to be used in backfill appear to have adequate permeability to permit ventilation of gases generated within the landfill.

Based on evidence from the monitoring program of the Kapaa site (Chun and Dugan 1981) and the expected hydrogeology of the Kalaheo site, it is recommended that additional monitoring wells be located as shown on Figure 4. In order to provide a basis for predicting leachate generation within the Kalaheo site and as a means of obtaining leachate facts for other future sites, it is further recommended that a small diameter well (4" diameter minimum) be drilled to a depth of elevation -100 feet (see Figure 4). This well should be equipped

KALAHEO SITE
LEACHATE MONITORING

- ⊗ EXISTING KAPAA MONITOR WELLS (CHUN & DUGAN 1981)
- PROPOSED MONITOR WELL - SHALLOW
- ⊗ PROPOSED MONITOR WELL - DEEP



SCALE
1" = 2000'

FIGURE 4

with a small (1 to 3 Hp) submersible pump as part of the monitoring program. By pumping periodically, any leachate accumulation can be detected at a very early stage of generation. Waste water from this pump can be discharged back on site.

APPENDIX C

ARCHAEOLOGICAL RECONNAISSANCE OF
TMK 4-2-15:1 and 6

Archaeologist
Richard Bordner, M.A.

APPENDIX C
ARCHAEOLOGICAL RECONNAISSANCE OF
PROPOSED KALAHEO SANITARY LANDFILL SITE
Kailua, Oahu, Hawaii

On February 20, 1982, an archaeological field reconnaissance was conducted for the proposed Kalaheo Sanitary Landfill site, located across from the existing Kapaa Sanitary Landfill and along the proposed H-3 freeway. Refer to Figure 1. The study site consists of several small dissected gullies in the upper reaches, with narrow drainage channels and high steep slopes. Vegetation was dominated by koa haole, java plum, guava, banana, banyan and coconut. Of native species, the only two noted were noni and ti. Refer to Appendix D for a description of the biological species located at the site.

The study was conducted during and after an extended period of rain. Stream flow was limited, but there were sizeable amounts of standing water in some areas. The recent climatic conditions combined with steep slope and vegetation characteristics created dangers and difficulties which necessitated exclusion of the ridgeline of the site. However, the area of expected impact, the lower areas of the site, were examined on foot. Accurate mapping was not included in this reconnaissance since its primary purpose was to determine the presence or absence of sites of possible archaeological or historic interest, thus enabling a decision of whether further study would be required.

The study area was divided into two general sections:

A. Mauka Section

This section includes a series of smaller narrow gulches with very limited stream flow, no sign of ponding, and limited plantings of native and introduced food crops. The lower portion of this section appears to have been bulldozed lightly in the past, probably clearing for cattle-ranching. Where the drainages begin to converge in the lower portion of this section the land is level enough to have supported prehistoric plantings of sweet potatoes or other crops which do not require terraced field systems;

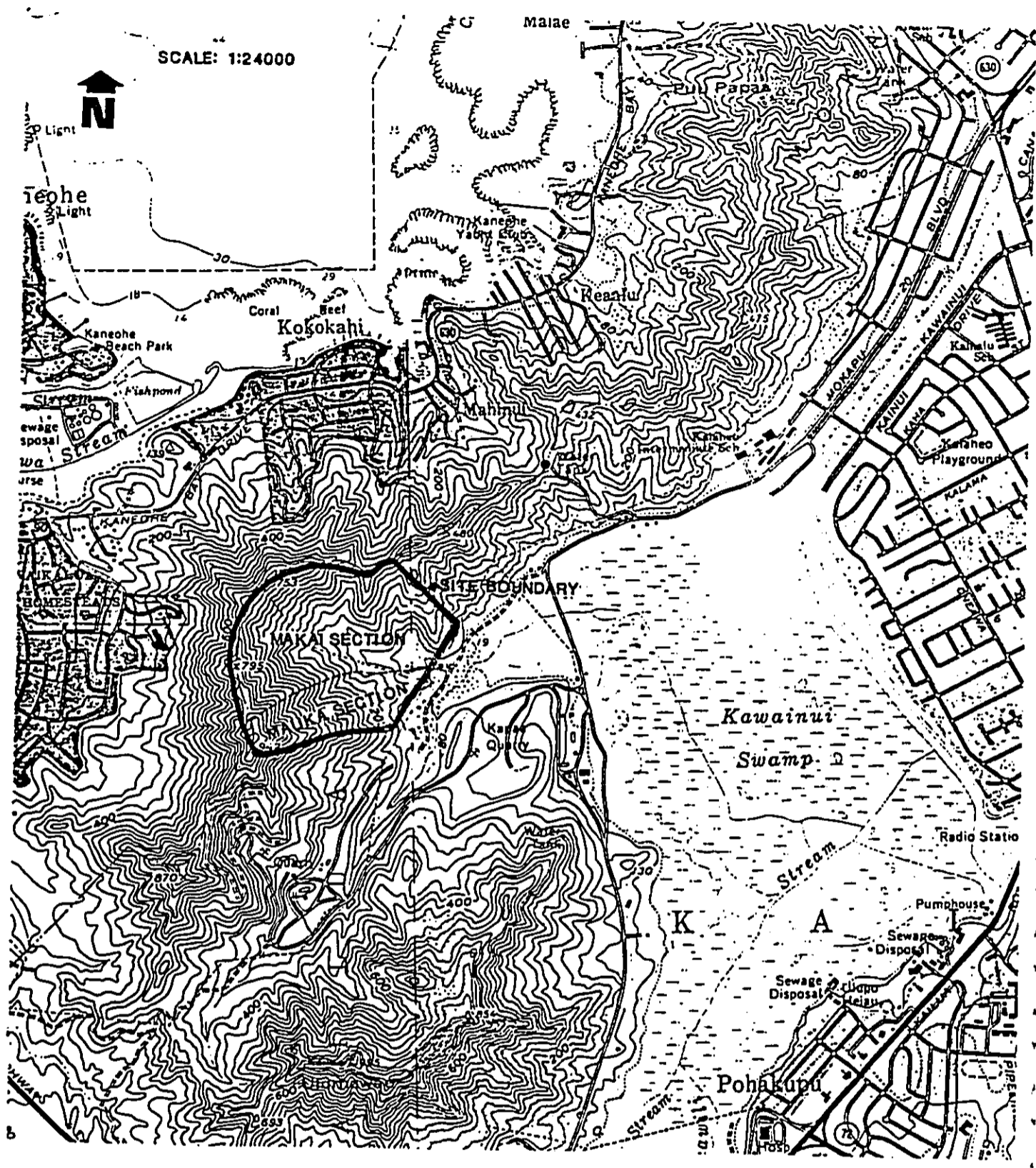


FIGURE 1
 ARCHAEOLOGICAL STUDY AREAS

however, there was no surface indication of such use of this area. The upper reaches of this section are on an extreme slope characterized by rock talus and outcrops, which are generally unsuitable for agricultural purposes. There was no indication of prior use of this area.

B. Makai Section

This section was considerably different than the mauka section, both in form and use patterns. This section is much wider at its base, with the upper drainages forming swamp plateaus before draining into the lower reaches. Approximately two-thirds of the makai section has been extensively bulldozed fairly recently historically. There are remnants of extensive banana planting areas, along with remains of two or more historic house sites.

A small garbage dump was located along the major drainageway, from which several bottles were recovered, the majority of which being glassware apparently dating since the 1940's. The dump included beer, sake, "Best Foods", "Ponds", catsup, and soda bottles. Noted were: a "Best Foods" faceted container; a "Primo" Beer with a paper label stating "No Deposit No Return", with base numbers 6312-MG-55-44; a clear glass "Kist Beverages" soda, "Bottled by Honolulu Soda Water (Educated guess by R. Border) Ltd.", with Owens-Corning glass; a "Chlorox" 32 oz. screw-top with pebble embossing in brown glass; and a celadon blue sake container in porcelain with dark blue writing in traditional Japanese script down the front. As previously noted, the glassware is probably of fairly recent origin, an observation substantiated by the existence of incompletely decomposed paper labels continually subjected to a drainage flow.

The major house site was located by the presence of coconut and banyan trees, concrete slabs, and the remnants of a double-axle truck (World War II type). The major access to the valley is indicated on the USGS map, with the major house site located at the end of the road. There was indirect evidence of other house sites, but no concrete indications.

Viable areas of possible prehistoric use have been bulldozed, for what appears to have been a post 1940's banana plantation. The gully would have been suitable for dryland crops on the slopes, and with sufficient rain, taro cultivation would have been possible in spots without further land modification; however, the upper reaches and steep lower slopes did not show signs of prehistoric use.

Neither mauka nor makai sections showed visible indications of prior prehistoric use, although the makai section exhibited possible extensive use during the past 40 years. It appears, therefore, that the area is of limited interest archaeologically. The recent date of the glassware, combined with the limited extent of the dumping, makes additional historic work of limited interest. It is thus recommended that the area requires no further archaeological work.

In summary, no significant adverse impacts are anticipated. A recommendation of "no further work" means the sites are not of sufficient significance to preserve. Should, however, any unanticipated sites or remains such as artifacts, shell, bone or charcoal deposits, human burials, rock or coral alignments, pavings, or walls be encountered, the contractor will be instructed to stop work immediately and contact the client or the State of Hawaii Historic Sites Preservation Office, Department of Land and Natural Resources, for further instructions.

APPENDIX D

TERRESTRIAL FLORA AND FAUNA

APPENDIX D
TERRESTRIAL FLORA AND FAUNA
AT THE PROPOSED KALAHEO SLF SITE

I. SURVEY METHODOLOGY

A biological field survey was conducted in February, 1982 to inventory the flora and fauna of the project site.

The field survey was conducted after a period of prolonged rain and the vegetation was in excellent condition. A transect from the mouth of the gulch along the gulch floor, to the top of the ridge was set using compass bearing and an altimeter to determine the elevation.

The survey was carried out along the compass bearing to the highest elevation of the landfill with right-angle surveys along either side of the gulch floor.

The results of the survey are listed under flora and fauna.

A. Flora

The plants observed throughout the gulch are listed under Checklist of Plants and have also been listed under Transect Sections A through G for comparison. General observations are:

1. The gulch floor contains most of the plants (Sections A and B).
2. On either side of the gulch floor and near the ridgeline, the trees became smaller and more dense on the upper reaches.
3. The plants of the gulch floor around the old house foundation are common ornamentals, densely overgrown. A thick growth of koa haole and java plum is also present.
4. The gulch does not contain plants which are considered rare or unique.

B. Fauna

The area near the mouth of the gulch along the H-3 freeway contains many of the commonly observed birds and mammals found adjacent to urbanized areas. The Cattle Egret (Bubulcus ibis), Barred dove (Geopelia striata), and lace-necked dove (Streptopelia chinensis) can be seen in this area and within the existing landfill. Evidence of the presence of various mammals found including

that for cats (Felis catus), dogs (Canis familiaris), mongooses (Herpestes europunctatus), mice (Mus musculus), and rats (Rattus rattus).

Within the gulch the Shama thrush (Copsychus malabaricus), Mynah (Acridotheres tristis), white-eye (Zosterops japonica), and cardinal (Richmondia cardinalis) were present.

No endangered species of plants or animals were observed. The gulch does provide a suitable habitat for wildlife and this habitat will be altered by the proposed project. However, the project will only have an impact on the floor of the gulch and will not affect the upper portions.

The alteration of the gulch floor will provide a suitable feeding area for the cattle egret, doves and mynah birds. The other birds, the shama thrush, white-eye and cardinals will either move to new areas or to the unaltered area of the gulch.

APPENDIX D

FLORA AND FAUNA CHECKLISTS

For each species, the following information is provided:

1. Family
2. Scientific name
3. Vernacular name
4. Status of the species. The following symbols are employed.
 - E endemic to the Hawaiian Islands, i.e., occurring naturally nowhere else in the world.
 - I indigenous, i.e., native to the Hawaiian Islands, but also occurring naturally (without the aid of man) elsewhere.
 - X exotic, i.e., species of accidental or deliberate introduction after the western discovery of the island.
 - P Polynesian introduction; includes those species brought by the Polynesian immigrants previous to Captain Cook's discovery of the islands.
 - A ABUNDANT, generally the major or dominant species in a given area.
 - C COMMON, generally distributed throughout a given area in large numbers.
 - O OCCASIONAL, generally distributed through a major portion of a given area, but in small numbers.
 - U UNCOMMON, observed uncommonly but more than 10 times in a given area.
 - R RARE, observed 2 to 10 times in a given area.
 - S SINGLE, only one specimen observed.
 - L LOCAL, restricted to a confined area, although within that area it may occur in large numbers.

APPENDIX D, cont'd

FLORA AND FAUNA CHECKLISTS

Flora References

- Neal, Marie C. 1965. In Gardens of Hawaii. B. P. Bishop Museum, Special Pub. 50. Bishop Museum Press. Honolulu, Hawaii.
- St. John, Harold. 1977. List and Summary of the Flowering Plants in the Hawaiian Islands. Pacific Tropical Botanical Garden Memoir Number 1, Lawai, Kauai, Hawaii.
- Pope, Willis T. 1968. Manual of Wayside Plants of Hawaii. Charles E. Tuttle Co., Rutland, Vermont and Tokyo, Japan.
- Haselwood, E. L., and G. G. Motter. 1966. Handbook of Hawaiian Weeds. Experiment Station/Hawaiian Sugar Planter's Association.

Fauna References

- Berger, Andrew J. 1972. Hawaiian Birdlife. The University Press of Hawaii. Honolulu, Hawaii.
- Hawaii Audubon Society. 1978. Hawaii's Birds. Edited by Robert J. Shallenberger. Hawaii Audubon Society. Honolulu, Hawaii.
- State of Hawaii, Department of Land and Natural Resources, Division of Fish and Game, Wildlife Branch. Annotated Checklists of the Birds and Mammals of Hawaii.

APPENDIX D
CHECK LIST OF PLANTS

SCIENTIFIC NAME	COMMON NAME	STATUS	OVER- All	Transect Section						
				A	B	C	D	E	F	G
PTERIDOPHYTA										
ASPIDIACEAE										
<u>Cyclosorus dentatus</u> (Forsk.) Ching	Oak fern, downy wood fern	I	U	-	-	-	-	-	-	-
POLYPODIACEAE										
<u>Microsorium scolopendria</u> (Burm.) Copel.	Laua'e, lauwa'i'i	X	C	-	C	C	-	-	-	-
<u>Dryopteris denta</u> (Forsk.)	Oak fern	I	U	U	U	-	-	-	-	-
MONOCOTYLEDONAE										
AMARYLLIDACEAE										
<u>Philodanfron scandens</u>		X	O	-	-	-	-	A	-	-
<u>Syngonium podophyllum</u>		X	U	-	-	-	-	U	-	-
COMMELINACEAE										
<u>Commelina diffusa</u> Burm. f.	Honohono	X	A	A	A	O	-	-	-	-
GRAMINEAE										
<u>Bambusa anguttata</u>	Chinese dwarf bamboo	X	O	-	-	-	-	C	-	-
LILIACEAE										
<u>Cordyline terminalis</u> (L.) Kunth.	Ti, Ki	P	O	-	O	-	-	-	-	-
MUSACEAE										
<u>Musa x paradisiaca</u> var. <u>sapientum</u> (L.) Ktze.	Banana, ma'i'a	X	U	U	U	-	-	-	-	-
<u>Musa</u> sp.	Banana	X	U	U	U	-	-	-	-	-
PALMAE										
<u>Cocos nucifera</u> L.	Coconut, niu	X	U	-	U	-	-	-	-	-
ANACARDIACEA										
<u>Mangifera indica</u> L.	Mango	X	R	-	-	-	-	-	R	R
<u>Schinus terebinthifolius</u> Raddl.	Christmas berry, wilelaiki	X	A	A	A	A	C	-	A	A
DICOTYLEDONAE										
BIGNONIACEAE										
<u>Spathodea campanulata</u> Beauv.	African tulip tree	X	O	O	O	-	-	-	U	O
CACTACEAE										
<u>Hylocereus undatus</u> (Haw.) Britt. & Rose	Night blooming cereus	X	U	-	-	-	-	O	-	-
<u>Hylocereus triangularis</u> L.	Night blooming cereus	X	U	-	-	-	-	O	-	-

APPENDIX D
CHECK LIST OF PLANTS

SCIENTIFIC NAME	COMMON NAME	STATUS	OVER- All	Transect Section						
				A	B	C	D	E	F	G
DICOTYLEDONAE										
COMPOSITAE										
<u>Bidens pilosa</u> var. <u>honor</u> L. (Bl.) Sheriff	Koko'iau, spanish needle, beggar's tick	X	O	-	-	-	-	-	C	C
<u>Emilia sonchifolia</u> (L.) DC.	Lilace pualele, Floras paintbrush	X	U	-	-	-	-	-	O	O
CONVOLVULACEAE										
<u>Convolvulus arvensis</u> L.	Field bindweed	X	U	U	U	-	-	-	-	-
EUPHORBIACEAE										
<u>Codiaeum variegatum</u> (L.) Bl.	Croton	X	U	-	-	-	-	-	-	-
<u>Euphorbia prostrata</u>	Prostrate spurge	X	-	-	-	-	-	-	-	-
<u>Euphorbia pulcherrima</u> Willd. ex Klotzsch	Poinsettia	X	U	-	-	-	-	-	-	-
LEGUMINOSAE										
<u>Cassia bicapsularis</u> L.		X	R	-	-	-	R	-	R	R
<u>Cassia leschenaultiana</u> DC.	Partridge pea, lauki, Japanese tea	X	O	-	-	-	-	-	C	C
<u>Desmodium uncinatum</u> (Jacq.) DC.	Spanish clover	X	U	-	-	-	-	-	C	C
<u>Leucaena leucocephala</u> (Lam.) de Wit	Koa-haole	X	A	A	A	C	C	A	-	A
<u>Mimosa unijuga</u> (Duchass. & Walp.) Grieseb.	Sensitive plant, pua-hilahila	X	U	-	-	-	-	-	-	-
<u>Mimosa pudica</u> L.	Sensitive plant, pua-hilahila	X	U	-	-	-	-	-	-	-
<u>Samanea saman</u> (Jacq.) Herr.	Monkeypod	X	U	-	U	-	-	-	-	U
MALVACEAE										
<u>Hibiscus tiliaceus</u>	Hau	I	U	-	-	-	U	-	O	C
<u>Malva tricuspidatum</u>	False mallow	X	O	O	O	-	-	-	O	O
<u>Coromandelianum</u> L. Garcke.	False mallow	X	U	O	O	-	-	-	O	O
<u>Sida fallax</u> Walp.	'Ilima	I	U	O	O	-	-	-	O	O
MYRTACEAE										
<u>Eugenia cominii</u> (L.) Druce	Java plum	X	C	C	C	C	C	A	A	A
<u>Psidium guajava</u> L.	Guava	X	C	C	O	A	-	-	C	C

APPENDIX D
CHECK LIST OF PLANTS

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>STATUS</u>	<u>OVER- All</u>	<u>Transect Section</u>						
				<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>
<u>DICOTYLEDONAE</u>										
<u>OXALIDACEAE</u>										
<u>Oxalis martiana</u> Zucc.	Pink wood sorrel, 'ihi pehu	X	<u>0</u>	<u>0</u>	<u>0</u>	-	-	-	-	-
<u>PASSIFLORACEAE</u>										
<u>Passiflora edulis</u> <u>f. flavicarpa</u> Deg.	Yellow liliko'i	X	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	-	-	-
<u>Passiflora foetida</u> L.	Scarlet-fruited passionflower, pohapoha	X	<u>0</u>	<u>0</u>	<u>0</u>	-	-	-	-	-
<u>RUBIACEAE</u>										
<u>Morinda citrifolia</u> L.	Noni	P	<u>0</u>	-	<u>0</u>	<u>0</u>	-	-	-	-
<u>Paederia foetida</u> L.	Maile pilau, stink vine	X	<u>U</u>	<u>U</u>	<u>U</u>	-	-	-	-	-
<u>Plantago major</u>	Broad-leaved plantain	X	-	-	-	-	-	-	-	-
<u>STERCULIACEAE</u>										
<u>Waltheria americana</u> L.	Hi'aloa, 'uha-loa	I	<u>0</u>	-	-	-	-	-	<u>0</u>	<u>0</u>
<u>UMBELLIFERAE</u>										
<u>Centella asiatica</u> L.	Asiatic pennywort	X	<u>0</u>	<u>0</u>	<u>0</u>	-	-	-	-	-
<u>VERBENACEAE</u>										
<u>Stachytarpheta urticae</u> <u>folia</u> (Salisb.) Sims.	Nettle-leaved vervain	X	<u>C</u>	<u>C</u>	<u>C</u>	-	<u>C</u>	-	-	-

APPENDIX D

CHECK LIST OF FAUNA

[Fauna observed, likely present, or which would possibly visit the site]

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>STATUS</u>
<u>CLASS AVES</u>		
ARDEIDAE		
<u>Bubulcus ibis</u>	Cattle egret	X
COLUMBIDAE		
* <u>Streptopelia chinensis</u>	Lace-necked dove	E
* <u>Geopelia striata</u>	Barred dove	E
FRINGILLIDAE		
CARDUELINAE		
* <u>Carpodacus mexicanus</u>	House finch; linnet	X
RICHMONDENINAE		
<u>Richmondia cardinalis</u>	Cardinal	X
PLOCEIDAE		
PASSERINAE		
<u>Passer domesticus</u>	House sparrow	X
TURDIDAE		
* <u>Copsychus malabaricus</u>	Shama thrush	X
STURNIDAE		
<u>Acridotheres tristis</u>	Mynah	X
ZOSTEROPIDAE		
* <u>Zosterops japonica</u>	Japanese white-eye	X
<u>CLASS MAMMALIA</u>		
MURIDAE		
<u>Mus musculus</u>	House mouse	X
<u>Rattus rattus</u>	Roof rat	X
CANIDAE		
<u>Canis familiaris</u>	Dog	X

APPENDIX D

CHECK LIST OF FAUNA - Continued

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>STATUS</u>
<u>CLASS MAMMALIA - Cont'd.</u>		
VIVERRIDAE		
<u>Herpestes auropunctatus</u>	Mongoose	X
FELIDAE		
<u>Felis catus</u>	Cat	X

APPENDIX E

ALTERNATIVE DISPOSAL/PROCESSING METHODS

APPENDIX E
ALTERNATIVE DISPOSAL/PROCESSING METHODS

Disposal of refuse can occur either on land or at sea. However, ocean disposal of solid waste is currently prohibited by the U. S. Environmental Protection Agency.

Methods to process waste include: 1) shredding, 2) incineration, 3) baling and 4) waste utilization, including composting, pyrolysis, recycling and steam and energy generation. These alternative processes, however, cannot totally dispose of solid waste; a landfill, therefore, is still required to dispose of waste that cannot be processed or to dispose of residues resulting from processing. Of the alternatives, incineration is the only method for which there is extensive data on operation, efficiency and cost.

The newest method of solid waste processing is resource recovery. Since success of any resource recovery program is dependent on market demand for products generated, the feasibility of these programs on Oahu is evaluated in this section in terms of existing or potential markets for recovered materials, soil conditioner and energy, as well as in terms of environmental impact.

I. SHREDDING [E.1]

Shredding reduces the volume of solid waste and turns it into a relatively homogeneous material. There are many basic types of size reduction equipment commercially available. The most common kind of size reduction used is the hammermill.

The size of the particles produced is quite important to the effectiveness of the step or steps following shredding (energy recovery, landfill disposal, or a combination of both). The shredding system must be capable of meeting the particular size requirements. Until recently, shredding was used to prepare solid waste for immediate disposal, but it is now considered a beneficial first step to other processing methods.

Advantages of Shredding:

- Reduces the volume of solid wastes significantly, with bulky waste being reduced around 90%.
- Shredded waste does not attract vectors, support combustion, have an objectionable odor, or lead to littering.
- When compacted in a landfill, shredded waste has fewer voids than unprocessed waste; the density is 25% to 60% greater depending on whether daily coverage is required.
- Shredding produces a more uniform fuel for incineration; the problem of agitation of the fuel to prevent uneven fire-beds is minimized.
- Shredding is essential to process solid wastes for efficient mechanical separation.
- Shredding produces uniform material, so it is a common prerequisite for composting.
- Shredded waste is easily compacted and can extend the life of the landfill.
- Because shredding reduces the volume of bulky waste, it provides an advantage in hauling,
- Public acceptance to shredding facilities has been relatively good compared to acceptance of more conventional solid waste processing or disposal facilities.
- A large portion of the total solid waste load can be shredded.

Disadvantages of Shredding:

- Some waste cannot be put through a shredder because of size or density or because it is hazardous, has a high moisture content, or has other qualities that normally call for specialized handling in any system.
- Jamming of the shredder and uneven feeding can significantly reduce the output of the mill.
- Municipal solid waste has a high percentage of flammable materials which have caused, on occasion, fires in the shredder.

- There is a potential for explosion within a shredder due to explosive materials that may enter the facility.
- Shredders are noisy and produce dust, so the entire operation must be enclosed and dust collectors must be installed.

In deciding whether a shredding operation should be installed, it is necessary to consider the total benefits of shredding versus the cost of the operation. For projects in which the EPA has been involved, cost per ton ranged from \$8.60 up to \$10.60 in 1974 dollars, including hauling and disposal. One operation in Madison, Wisconsin (1974) reported \$8.60 TPD, based on a processing rate of 180 TPD, including hauling and disposal cost. Another operation in New York registered a cost of \$10.60 per ton including disposal, with an average annual output of 284 TPD. One county in Georgia has been shredding waste since 1973. Its two installations have shown lower operating costs, with one installation operating at a cost of \$4.80 per ton at 534 TPD and \$4.35 per ton for at 400 TPD facility. In the same year a facility in South Carolina estimated a \$4.10 per ton cost, including hauling and disposal. This facility processes 1,000 TPD.

During the design phase of the City and County of Honolulu's Keehi Transfer Station, the possibility of including a shredding operation was considered; however, a feasibility analysis indicated that the operation's capital and operating costs would be only partially offset by lower transportation costs and extended landfill life. In addition, as resource recovery was also being considered at that time, it was felt that shredding equipment should not be installed at a location separate from the resource recovery facility.

II. BALING [E.2]

Baling is a method used to reduce the volume of refuse, by forming raw solid waste into dense blocks of material. It potentially can achieve cost savings if transfer and long haul are necessary prior to disposal, and when land disposal space is at a premium. It also can potentially make waste easier to handle and transport. The decision to implement baling would have to be based in part upon the economic and environmental features of a given community.

The cost for establishing baling operations can range anywhere from about two-million dollars to four-million dollars. Baling projects with which the EPA has been involved range in cost from \$6.38 per ton for a 425 TPD processing facility to \$9.20 per ton for a 78 TPD processing facility.

Advantages of Baling:

- Baling nearly doubles the life of the land disposal site and reduces the number of times a city government must go through the difficult process of acquiring a new disposal site. Densities vary from 1,000 to more than 1,700 pounds per cubic yard, depending on the type of baler used.
- Balers can handle most types of wastes.
- While the cost is comparable to that of other forms of solid waste processing, bulk reduction makes long hauls more economical.
- Bales are easier to handle and transport than unprocessed waste; they are therefore more convenient for operations such as rail hauling.
- Baling should permit more immediate use of the disposal site upon completion, since minimal settling is anticipated.
- In shredding/baling operations, ferrous metal can be recovered from recycling via magnetic separation of the shredding. Also, corrugated containers and white goods can be hand-picked, baled separately and sold.

Disadvantages of Baling:

- Facilities which include baling involve a greater initial investment than conventional transfer stations handling the same tonnage.
- Baling precludes resource recovery once the bale is formed.
- There is incomplete knowledge about the economics of baling and effects of baling on decomposition in landfills, gas and leachate formation, and settling.
- Baling is not a final disposal process; bales must be disposed in a landfill situation.

III. WASTE UTILIZATION

A. Composting [E-2]

Composting is a volume-reducing process in which organic solid wastes, after separation from the inorganic fraction, are biochemically decomposed at a rapid rate (15-21 days) in open windrows or within confined tanks. The end product is a humus-like substance that primarily is used to condition soil.

In the United States, composting has not proven to be economically viable; its extremely high cost limits the number of markets for the compost materials. Consequently, composting as a processing method is slowly being phased out.

Advantages of Composting:

- Reduces volume and weight of refuse
- Can be used as soil conditioner to improve soil characteristics, thereby recycling solid wastes back to the soil
- Can prolong use of sanitary landfill

Disadvantages of Composting:

- Municipal refuse does not contain sufficient nitrogen to ensure proper digestion, so most compost media must be supplemented with additional nitrogen.
- Requires large land areas for processing
- Attracts flies and rodents
- Generates odor
- Requires separation of non-compostable material so does not account for total waste disposal
- High cost of application to land has made it uneconomical for large-scale use.
- Dependent on market conditions

The following is an excerpt from Handbook of Solid Waste Disposal [E.4]:

Despite considerable investment and technical knowhow, not one large-scale composting plant has operated economically long

enough in the United States to indicate that the process is feasible. As of 1972, there had been 18 attempts at composting in the United States and of those 18 only one or two were operating, and they existed under special circumstances. Composting has failed in the United States for four main reasons: (1) no steady market for the end product has been found, (2) initial investment and operating costs are generally high compared to other disposal methods, (3) a high quality end product usually cannot be derived from refuse in the United States without excessive expense, and (4) the separation of noncompostables requires a secondary method of disposal.

Many composting plants have been operated by private contractors who in turn charge the city an amount that defrays operating costs. Profits for the contractor are helped to be realized from the sale of the end product. Operators usually charge the city from \$1.00 to \$5.00 (1967) per ton, while the costs for composting refuse usually range from \$5.00 to \$10.00 per ton. The operators must make up the balance of the costs and any profits from the sale of the compost. To date this has not been possible.

B. Pyrolysis

Pyrolysis is the physical and chemical decomposition of organic materials in the absence and near-absence of oxygen at high temperatures. "The high temperature and the 'starved-air' situation causes a breakdown of the materials into three parts: (1) a gas consisting primarily of hydrogen, methane, and carbon monoxide; (2) a liquid fuel that includes organic chemicals such as acetic acid, acetone and methanol; (3) a char consisting of almost pure carbon, plus any glass, metal, or rock that may have been processed." [E.6] Pyrolysis processing is under development by many private and public organizations. The ultimate goal of this system is to convert solid waste into a storable, transportable fuel, either liquid or gas.

There are basically two types of pyrolysis processes: a gas pyrolysis process, and oil pyrolysis. There are different types of gas pyrolysis but the principle is essentially the same:

as refuse moves through the pyrolysis reactor, it is exposed to successively higher temperatures and is destructively distilled. In some processes, there is sufficient recovered fuel to be used as auxiliary fuel in fossil fuel boilers (medium Btu gas systems). In other systems the gas is of low Btu value and cannot be transported off-site; thus, it must be used as a fuel in a waste heat boiler to produce steam or electric power. Oil pyrolysis differs from gas pyrolysis in the temperatures to which the refuse is exposed.

According to a study by MITRE [E.8], cost estimates for a gas pyrolysis system range from \$33.90 per ton for a thousand TPD facility to \$25.44 per ton for a 2,000 TPD facility. MITRE's cost estimates for an oil pyrolysis system range from \$30.64 per ton for a 500 TPD facility to \$23.16 per ton for a 2,000 TPD facility [6.11].

Advantages of Pyrolysis:

- Reduces refuse volume and weight to facilitate solid waste handling
- Prolongs life of landfill site
- Processing is not affected by weather conditions
- Processing can produce fuel in the form of gas and oil

Disadvantages of Pyrolysis:

- Requires skilled operators
- Requires prior shredding and separating if fuels are to be produced efficiently
- Can produce operational impacts of noise, dust, thermal discharge into the atmosphere, and contaminated wastewater
- Cost for the process is high.

During the bidding for the HPOWER contract, no bidder proposing a pyrolytic system could guarantee a minimum of a year of trouble-free, full-scale operation as stipulated by the request for proposals.

C. Recycling [E.9]

Certain types of marketable materials can be recovered from solid waste, either before materials are placed in a collection vehicle, or later, from mixed municipal refuse.

Examples of materials that can be recovered from refuse through "source separation" are paper, glass and metal containers. These can be separated at their point of generation, be it at the home, office or other place of business. Once these materials have been separated out they can be transported to a secondary materials dealer or directly to a manufacturer.

Recovery of materials by source separation has been practiced only in a few instances prior to 1970. Since then this method has grown rapidly as a means of recovering paper, primarily newsprint and aluminum, from municipal refuse. Source separation has been used widely for recovery of waste paper. Recovery of glass and cans by this method has been used only in a few communities; the economic balance of these systems have been poor to date. The following table (Table E-1) gives a breakdown of the estimated percentages of paper, glass, ferrous metals, and other materials that compose total municipal solid refuse.

There are three basic approaches to implement the recovery of marketable materials from mixed municipal refuse. The first approach is to add shredding and ferrous metal recovery systems to landfill operations. Shredding can improve landfill operations and reduce requirements for landfill volume, and can also be an important first step in separating out various components. The second approach would be to recover non-combustible materials either before or after energy recovery takes place. The third approach is to recover as many of the components of the waste as is economically feasible.

Materials recovery offers several advantages: (1) conserving resources; (2) reducing of the quantity of refuse to be disposed, thus lengthening the life of a landfill; (3) lowering municipal disposal costs by the sale of recovered material; and (4) siting of resource recovery facilities would encounter less community opposition than conventional disposal facilities.

There are still many disadvantages and risks associated with recycling of materials. The degree of risk varies with the complexity of the system, but in general the methods used to recover

Table E-1
 COMPOSITION OF MUNICIPAL SOLID WASTE, AS DISCARDED,
 UNITED STATES, 1973^{1,2}

Component	Amount (millions of tons)	Percent of total
Paper	44.2	32.8
Newspaper	8.0	6.0
Corrugated	11.8	9.0
Office paper	5.4	4.0
Other	19.0	14.1
Glass	13.2	9.9
Ferrous metals	11.0	8.2
Nonferrous metals	1.4	1.0
Food waste	22.4	16.6
Yard waste	25.0	18.5
Other	17.2	12.8
Total	134.8	100.0

¹SMITH, F.A., U.S. Environmental Protection Agency.
 Unpublished data.

²Includes wastes generated in households, commercial and business establishments, and institutions (schools, hospitals, etc.); excluded are industrial process wastes, agricultural and animal wastes, construction and demolition wastes, mining wastes, abandoned automobiles, ashes, street sweepings, and sewage sludge. Wastes now being recycled are also excluded.

Source: E.1

marketable materials are still in the early stage of development. Therefore, cost and performance information on commercially available equipment is not well documented. Economic feasibility of recycling is primarily based on projected maintenance costs, the separation systems' recovery rate, and an assumed value for the product. There are also marketing considerations since the feasibility of a recovery system would depend upon the sale, at a reasonable price, of the extracted materials.

Even with full use of mechanical separating equipment and with full reuse of all separated materials, recycling can never utilize 100 percent of the solid waste. There will always be materials which must be disposed through other means because of contamination some materials and because of inefficiencies in the separation of others. For example, paper contaminated with grease or oil cannot be reprocessed into a new paper product and must be disposed of by incineration, or landfilling.

Market Conditions in Hawaii. Hawaii is not a major manufacturing center, so there is little local demand for secondary materials. Markets in the Orient and on the Mainland for recycled materials exist, but the cost of shipping added to the cost of separation has not made the recycling of most waste materials feasible here.

Ferrous Metals: The recovery of metal cans from solid waste appears to be promising, as there is a Mainland market for steel. Before metal cans can be used for their steel content, however, the tin in the metal must be removed. Detinning of cans from Hawaii presently occurs in Seattle. No detinning operations are planned for Oahu, and it is uncertain whether such an operation would be economically feasible here. The two major operators of detinning plants for the recovery of tin and ferrous metals in the United States are M & T Chemicals, and the Vulcan Materials Company. Both firms have expressed an interest in securing ferrous materials recovered in Hawaii from solid waste. There are, however, a number of restrictions imposed by both Vulcan Materials Company

and M & T Chemicals which must be considered prior to entering an agreement with either of these firms. Each of the firms requires the following:

- a. Metal shall be relatively free of trash, paper, plastics and other foreign contaminants.
- b. Iron content of the material is to be approximately 95 percent.
- c. Cans cannot be balled or nuggetized but must be shredded in a manner to provide maximum surface area.
- d. A price penalty will apply to scrap that has not been subject to air cleanup operation for removal of loose materials.

Locally, recycling of ferrous metals is accomplished by Flynn-Learner and by Hawaiian Western Steel. Neither of these firms accepts metal cans, because of their tin content.

The Dole Company bales old defective cans and sells them to mainland concerns as scrap. Any cans to be recycled are sent locally to the Recycling Group.

Aluminum: The Recycling Group, Inc. receives aluminum and pays \$0.17/pound. They take in about 60,000-70,000 pounds per month and send the aluminum to Reynolds Aluminum. There are also branches on Maui and on Kauai that ship aluminum to the Oahu office. This particular group also accepts metal cans (\$0.01/pound), compacts them and ships them to M and T Chemicals (Division of American Can Company). Primo and Schlitz bottles are accepted (\$0.60/case) and returned to the brewery. Newspaper (\$0.01/ pound) is shipped to the Far East at an average rate of 60-70 tons/week.

Rags: The demand for cotton rags on Oahu is substantial. The largest Hawaii distributor sells more than 16,000 pounds of rags a week, most of which are used for wiping purposes in various island industries. Cloth rags must be salvaged at the point of refuse generation (home), since there is no way of salvaging cloth after it has entered the waste stream.

REFERENCES TO APPENDIX E

- [E.1] Decision-Makers Guide in Solid Waste Management. 1976. Environmental Protection Agency.
- [E.2] Ibid.
- [E.3] Handbook of Solid Waste Disposal, 1975. Joseph L. Pavoni, et al.
- [E.4] Ibid.
- [E.5] Op. Cit. [E.1]
- [E.6] Op. Cit. [E.1]
- [E.7] Analysis of the Feasibility of Resource Recovery for Honolulu. April 1977. Prepared for the State of Hawaii by the MITRE Corporation.
- [E.8] Ibid.
- [E.9] Op. Cit. [E.1]