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BENJAMIN J. CAYETANO
GOVERNOR

July 17, 2000

The Honorable Clifford S. Jamile
Manager & Chief Engineer
Honolulu Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Jamile:

With this letter, I accept the Supplemental Final Environmental Impact Statement for the Kailua 272' Reservoir, island of Oahu, as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes. The economic, social and environmental impacts, which will likely occur should this project be implemented, are adequately described in the statement. The analysis, together with the comments made by reviewers, provides useful information to policy makers and the public.

My acceptance of the statement is an affirmation of the adequacy of that statement under the applicable laws but does not constitute an endorsement of the proposed action.

I find that the mitigation measures discussed in the environmental impact statement will minimize the negative impacts of the project. Therefore, if this project is implemented, the Honolulu Board of Water Supply and/or its agents should perform these or alternative and at least equally effective mitigation measures at the discretion of the permitting agencies. The mitigation measures identified in the environmental impact statement are listed in the enclosed document.

BENJAMIN J. CAYETANO

Enclosure

c: Honorable Bruce S. Anderson, Ph.D., M.P.H.
Office of Environmental Quality Control

2000 - Oahu - FEIS -
Kailua 272

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FILE COPY

Supplemental Final Environmental Impact Statement

KAILUA 272' RESERVOIR

~

Koolaupoko, Oahu, Hawaii
Tax Map Key: 4-2-03:04 and 4-2-04:37

Proposing Agency:

BOARD OF WATER SUPPLY
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Prepared by:

ENGINEERING CONCEPTS, INC.
1150 South King Street, Suite 700
Honolulu, Hawaii 96814

JUNE 2000

Supplemental Final Environmental Impact Statement

KAILUA 272' RESERVOIR

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Koolaupoko, Oahu, Hawaii
Tax Map Key: 4-2-03:04 and 4-2-04:37

This environmental document has been prepared pursuant to Chapter 343, Hawaii Revised Statutes

Proposing Agency:

BOARD OF WATER SUPPLY
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Responsible Official:

CLIFFORD S. JAMILE, Manager and Chief Engineer

6.27.00
Date

Prepared by:

ENGINEERING CONCEPTS, INC.
1150 South King Street, Suite 700
Honolulu, Hawaii 96814

JUNE 2000

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CHAPTER 1
INTRODUCTION AND SUMMARY

1.1 PURPOSE OF THIS DOCUMENT

The City and County of Honolulu Board of Water Supply (BWS) proposes to construct a 4.0 million gallon (MG) reinforced concrete reservoir on Kalae o Kaiwa ridge, south of its two Pohakupu 272 reservoirs No. 1 and 2. The BWS had previously planned to construct the 4.0 MG reservoir on Puu o Ehu, a nearby ridge of suitable elevation. An environmental impact statement (EIS) was prepared for the Puu o Ehu site. The document entitled, *Final Environmental Impact Statement for the Kailua 272 Reservoir,* was accepted by Mayor Jeremy Harris on July 2, 1996. Community opposition to construction of the reservoir at the Puu o Ehu site has resulted in a reconsideration of alternative locations for the project.

The purpose of this supplemental environmental impact statement (EIS) is to address construction of the project at a location on Kalae o Kaiwa ridge. Construction at this location was not previously addressed in the 1996 EIS.

An environmental assessment (EA) for the proposed reservoir at Kalae o Kaiwa ridge was prepared in April 1999. The EA was submitted to the Office of Environmental Quality Control as an EIS Preparation Notice, due to the determination by the BWS that the project has the potential to generate significant environmental impacts. ***A supplemental draft EIS was prepared in September 1999. Comments on the supplemental draft EIS have been incorporated in this document.***

Revisions to the text of the supplemental draft EIS appear in bold italic type.

1.2 SUMMARY OF DEVELOPMENT

Proposing Agency:
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Contact: Mr. Barry Usagawa
Long Range Planning Section
Ph: 527-5235
Fax: 527-5703

Accepting Authority:	Governor State of Hawaii
Project Title:	Kailua 272' Reservoir
Proposed Action:	Construction of a 4.0 M.G. reinforced concrete reservoir, access road, transmission main and associated appurtenances.
Location:	Kailua, Oahu, Hawaii TMK: 4-2-03:04 & 08, and 4-2-04:37
Land Owners:	State of Hawaii (TMK: 4-2-03:04) City and County of Honolulu (TMK: 4-2-03:08) Gale F. and Gail P. Berengue (TMK: 4-2-04:37)
Project Area:	5 Acres (±)
Existing Use:	undeveloped land
State Land Use:	Conservation and Urban
Zoning:	Restricted Preservation (P-1) and General Preservation (P-2)

1.3 PROJECT OBJECTIVES

The objectives of the Board of Water Supply (BWS) are to manage and operate Oahu's municipal water system in a reliable and sound manner. To this end, the objectives of this project are to:

- Increase storage capacity of the Kailua low service area (part of the Windward Low Service System) as a step in achieving the standards of BWS;
- Provide reliable water service to consumers; and
- Supply water during peak demand periods and for fire fighting purposes.

The total reservoir capacity needed for the Kailua low service area is 9.6 million gallons (MG), based on the BWS municipal system standard for reservoir storage volume. This standard requires a reservoir storage volume which can sustain the maximum day demand of the service area. The existing effective reservoir system capacity is 6.3 MG, or 3.3 MG less than required by BWS standard.

Adequate storage provides operational flexibility and reliability. The existing reservoirs cannot accommodate peak hour demands without being supplemented by increasing pumpage from other sources. Adequate storage allows water sources to be pumped at a steady state which provides consistent water quality. Increased fluctuating pumpage from the relatively thin windward aquifers could cause up-coning of brackish water which degrades the water source. Adequate storage capacity will also ensure that fire protection services will be available to Kailua residents during maximum day demands. With substandard storage, pumps would have to provide supplemental water during fires. Main breaks may disrupt water service and reduce the level of fire protection since the water sources serving Kailua are as distant as Punaluu.

1.4 PROJECT AND SITE DESCRIPTION

The project site is located on Kalae o Kaiwa ridge, approximately 850 feet south of the BWS Pohakupu 272 reservoirs (see **Figures 1-1** and **1-2**). Major elements of the proposed project include construction of a 4.0 MG reinforced concrete reservoir, paved access road, perimeter road, transmission piping, landscaping, drainage system, electrical instrument building and security fencing. In addition, a separate construction access road will be built to facilitate transport of materials to and from the project site and Kalanianaole Highway.

1.5 ALTERNATIVES CONSIDERED

In addition to "no action", alternatives to the proposed action included construction of a 4.0 MG reservoir at other locations and alternate reservoir configurations (including multiple tanks of smaller diameter, taller tank, underground tank and elevated tank). Other considerations included replacing the existing 1.0 MG Pohakupu 272 reservoir with a 5.0 MG tank, refurbishing abandoned reservoirs, and installing emergency power generators at well sites.

Four alternatives to the proposed temporary construction access road alignment were also considered.

1.6 SUMMARY OF POTENTIAL IMPACTS

Regional Impacts

- Positive impact on municipal water system (Windward Low Service System).
- Alteration of the ridge line, which is remotely visible from the Pali Highway.
- Short-term increase in haul truck traffic on regional roads during construction.

Soil Erosion

- Short-term increase in soil erosion potential during construction.

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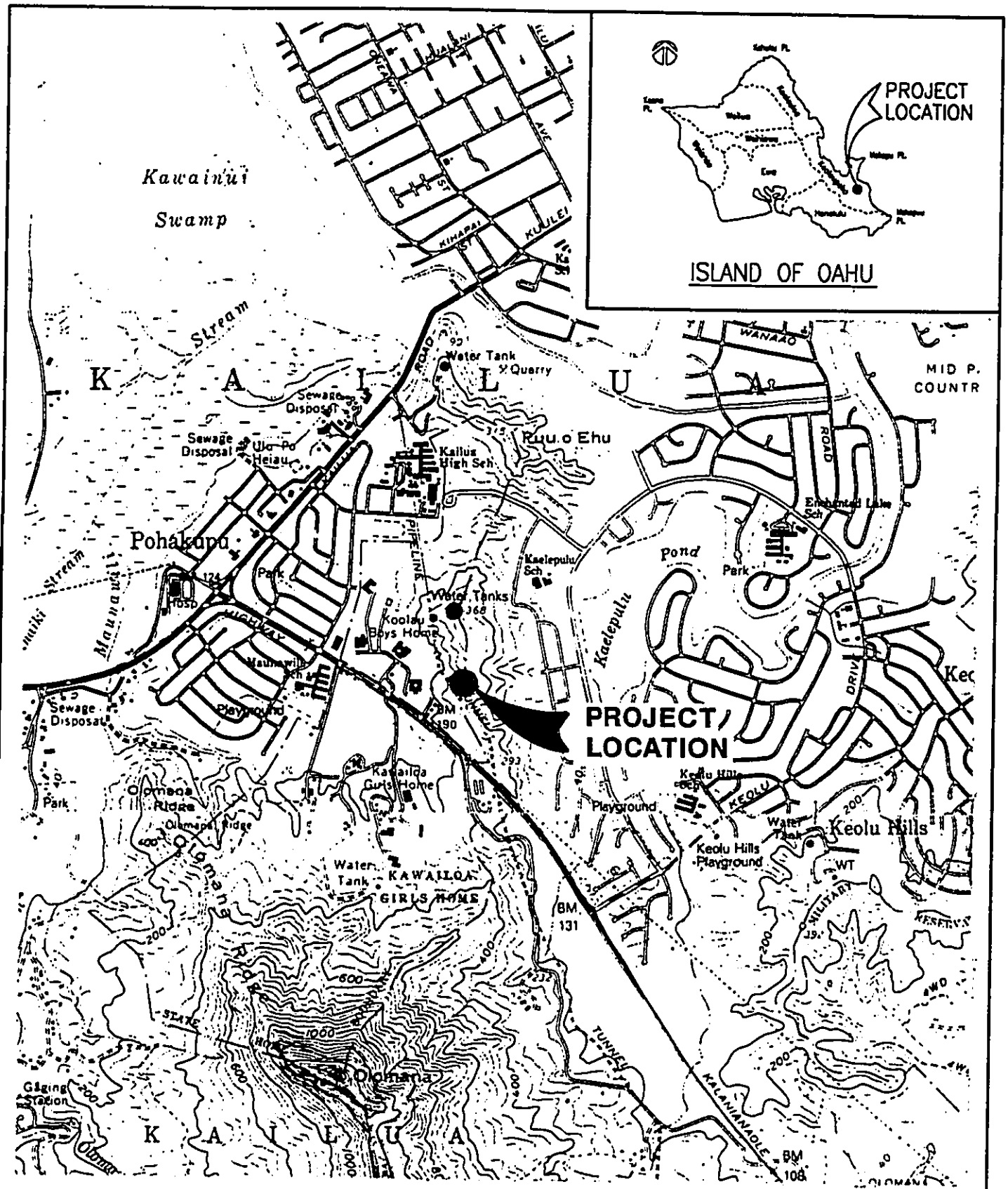

Reference:
USGS Makapu &
Koko Head Quad. Maps.

FIGURE 1-1

VICINITY MAP

C:\DOCUMENTS\DGN\KAILUA272 SUPP EIS\LOCATION.DGN

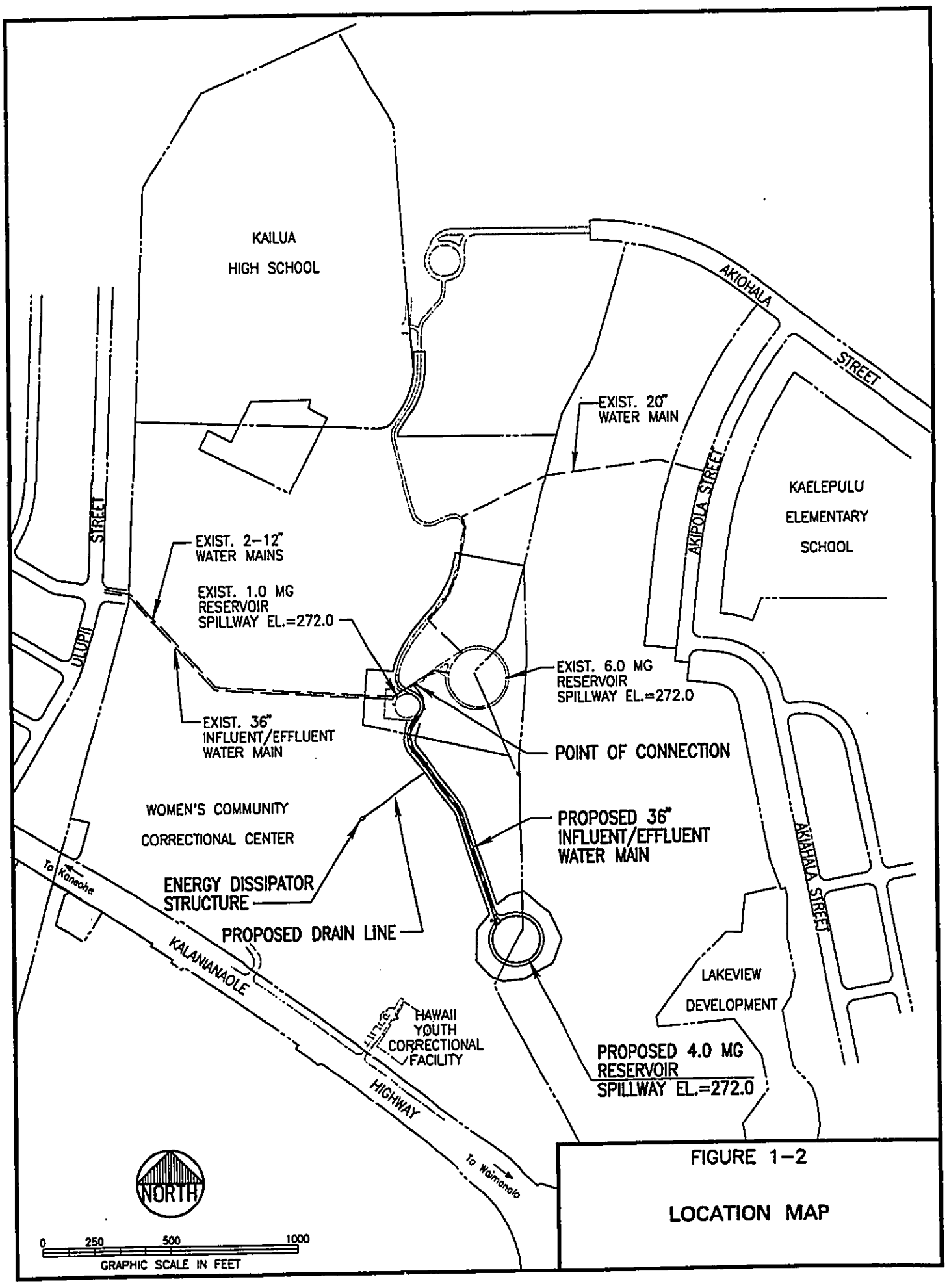

FIGURE 1-2

LOCATION MAP

- Short-term degradation of receiving water quality if sediment is transported offsite during construction.

Drainage
- Alteration of existing drainage pattern.
- Increase in runoff quantity due to increased impervious surfaces.
- Drainage from tank directed to storm drain system (occasional impact).

Archaeological and Historic Resources
- Presence of tunnel 10, part of SIHP No. 50-80-15-4042, in the vicinity of the project site.

Air Quality
- Short-term increase in fugitive dust and exhaust emissions from construction vehicles during construction.

Noise and Vibration
- Short-term increase in noise generated during construction.
- Short-term annoyance of low frequency vibration generated by blasting, if employed by the contractor to aid in excavating basalt.

Visual Resources
- Grading a knoll on the ridge, resulting in a visual impact of flattening its top by about 40 feet at the highest point.
- Grading along the western face of the ridge to build the access road.

Traffic
- Short-term increase in traffic congestion on Kalanianaole Highway fronting the project site due to construction vehicles accessing the site.

Land Issues
- State-owned and privately-owned lands will need to be acquired.
- Proposed modification of ceded lands necessitates consultation with native Hawaiian groups.

1.7 UNAVOIDABLE ADVERSE IMPACTS

The following unavoidable adverse impacts have been identified:

- Short-term impacts will be associated with construction activities, including increased noise, decreased air quality (due to dust and vehicle emissions) and increased traffic (due to trucks hauling excavated materials and concrete). These impacts will terminate upon completion of construction.

- Alteration of the appearance of the ridge resulting from construction of the reservoir will be an unavoidable long-term impact of the project.

- Land will need to be acquired from the State of Hawaii and private land owners in order to develop the project. The state-owned lands have been identified as ceded lands.

1.8 SUMMARY OF PROPOSED MITIGATIVE MEASURES

Regional Impacts

- Maintain community relations to keep the public informed about the project and its construction, including presentations at community meetings and publication in newspapers.

Soil Erosion

- Construction compliance with applicable city and state ordinances and regulations.
- Implementation of control measures as outlined in an approved erosion control plan.
- Compliance with NPDES and Conservation District Use Permit conditions.

Drainage

- Construction of drainage system to collect and convey runoff/tank drainage offsite in a controlled manner.

Archaeological and Historic Resources

- Selection of temporary construction access road alternative which is unlikely to impact tunnel 10.
- Alert contractor of presence of tunnel 10 and the need to cease activities and contact the State Historic Preservation Division if the tunnel or other historic site are unearthed during construction.

Air Quality

- Construction compliance with applicable air pollution control regulations.
- Implementation of an effective dust control plan.
- Control of vehicle exhaust emissions.

Noise and Vibration

- Construction compliance with applicable noise control regulations.
- Use of noise control devices on vehicles.
- Construction of noise barriers or shields.
- Develop a monitoring program to identify a safe level of air blast and ground vibration; schedule blasting during warm periods of the day; publicize blasting times.

Visual Resources

- Recessed construction of the reservoir in a "bowl" to screen the tank itself from public view.
- Landscaping the perimeter of the project site and access road with native trees and shrubs to blend with the natural vegetation and screen the facilities from public view.

Traffic

- Adjust normal construction hours, delaying start times to after the morning traffic peak on Kalanianaole Highway when construction is anticipated to generate heavy truck traffic.
- Preparation of a traffic control plan to address the project construction entrance at Kalanianaole Highway.

Land Issues

- Land acquisition will be negotiated and compensated.
- Discussions with native Hawaiian groups will be coordinated through the Office of Hawaiian Affairs.

1.9 RELATIONSHIP BETWEEN SHORT-TERM USES OF ENVIRONMENTAL RESOURCES AND LONG-TERM PRODUCTIVITY

Construction of the 4.0 MG reservoir at Kalae o Kaiwa ridge will enhance long-term productivity and reliability of the water supply. The proposed reservoir will increase the BWS's total storage capacity in the Windward District. There are no long-term risks to public health or safety anticipated as a result of the proposed project.

1.10 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible and irretrievable resources committed to the project include funds, labor, energy and raw materials required to construct and operate the facility. Permanent changes to the ridge will result from excavation for construction of the reservoir.

1.11 COMPATIBILITY WITH LAND USE PLANS AND POLICIES

The project will be compatible with State of Hawaii and City and County of Honolulu land use plans and policies.

1.12 UNRESOLVED ISSUES

The following issues remain unresolved:

- The method of excavation for removal of approximately 85,000 cubic yards of material will be determined by the contractor.

- The project site is located on privately-owned lands which will need to be acquired for development of the reservoir.

- The project site is located on ceded lands. The implications of this condition will be coordinated with the Office of Hawaiian Affairs.

- ***The ultimate site for disposal or reuse of excavated material is unresolved and left to the discretion of the contractor, who will also be responsible to obtain associated permits, approvals and environmental clearances.***

1.13 NECESSARY PERMITS AND APPROVALS

Permits and approvals required for construction of the project are listed in **Table 1**. These permits and approvals will be obtained as planning and design of the project proceeds. To date, none of the permit applications have been submitted to the respective permitting authority for processing.

The Army Corps of Engineers, in their letter of April 28, 1999, determined that a Department of the Army permit would not be required for the project, due to the absence of streams or wetlands in the project area (see **Appendix B**).

TABLE 1-1
PERMITS AND APPROVALS

AGENCY	PERMIT/APPROVAL
City & County of Honolulu Dept. of Planning and Permitting	• Development Plan Amendment, Public Facility • construction plan approval • Grubbing, Grading and Stockpiling Permit • Building Permit
City & County of Honolulu Dept. of Environmental Services	• Effluent Discharge Permit
State of Hawaii Dept. of Health	• NPDES Permit for Discharge of Storm Water Associated with Construction Activity • NPDES Permit for Discharge of Hydrotesting Water • Variance from Pollution Controls • ***Community Noise Permit for Construction Activities***
State of Hawaii Dept. of Land & Natural Resources	• Conservation District Use Permit
State of Hawaii ***Dept. of Transportation***	• ***construction plan approval for work within the state highway right-of-way*** • ***traffic control plan approval***

CHAPTER 2
PROJECT DESCRIPTION

2.1 NEED FOR THE PROJECT

2.1.1 Background

As the water purveyor for the City and County of Honolulu, the Board of Water Supply (BWS) is responsible for the management, control, and operation of Oahu's municipal water system. The BWS is charged with furnishing communities a reliable water supply that, in quality, is safe for human consumption and sustenance and that, in quantity, is ample both for everyday domestic uses and for emergency protection of life and property in the event of fire.

To accomplish these objectives, the BWS develops and operates wells and tunnels that yield high quality water, which in turn feed large transmission pipelines that deliver potable water to a network of water mains and storage reservoirs. Situated at strategic elevations near the serviced community, reservoirs basically serve a dual purpose. First, as storage tanks, reservoirs must maintain an adequate amount of water for consumption and fire fighting use, especially during times of power outages which cripple and prevent well pumps from sustaining the water supply system. Second, as elevated distribution tanks, reservoirs operate solely by gravity to reliably produce acceptable pressure levels in the mains for delivering water to users' taps and street hydrants. In having elevated reservoirs of adequate capacity, communities are ensured that water demand for all purposes will be met, especially during extended time periods of power loss and disruption to the transmission network.

2.1.2 Current Reservoir Capacity of the Kailua Low Service System

Presently, wells and high level tunnels supply water to a number of reservoirs in the BWS's Windward Oahu service district, which extends from Punaluu in the north to Waimanalo in the south. The Kailua low service area is part of the Windward Oahu service district and is comprised of the communities of Aikahi, Kalaheo, Maunawili, Coconut Grove, Kailua Town, Lanikai, Enchanted Lake, Olomana, Kukanono, and Pohakupu.

The locations of reservoirs serving the Kailua low service area are shown on **Figure 2-1**, while a schematic profile of water sources and reservoirs in the Kailua and Kaneohe service areas is shown on **Figure 2-2**.

CAD\GUY\KAILUA272 SUPP EIS\TYP-SECTIONS.DGN

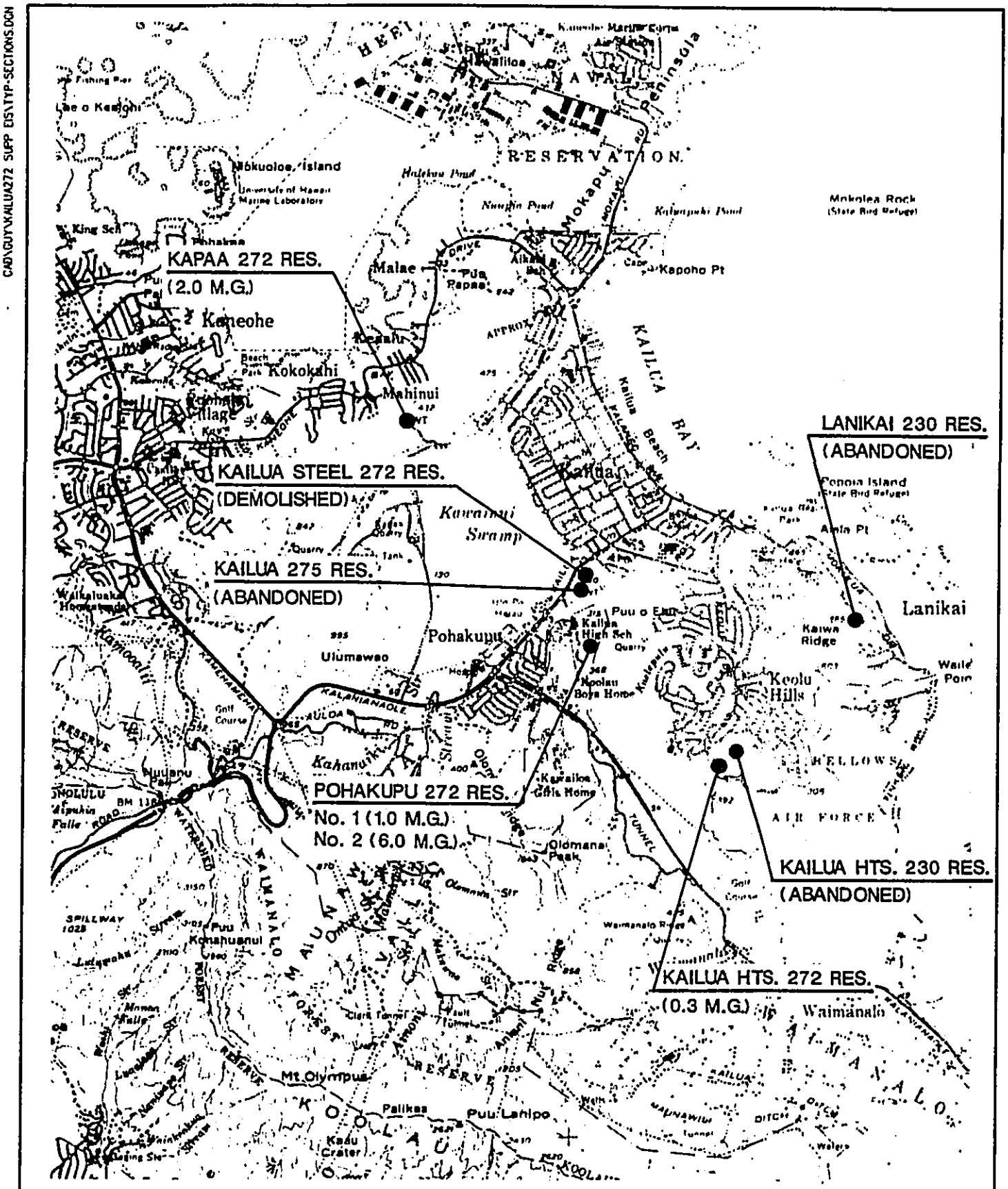

FIGURE 2-1

WINDWARD LOW SERVICE SYSTEM RESERVOIRS IN KAILUA AREA

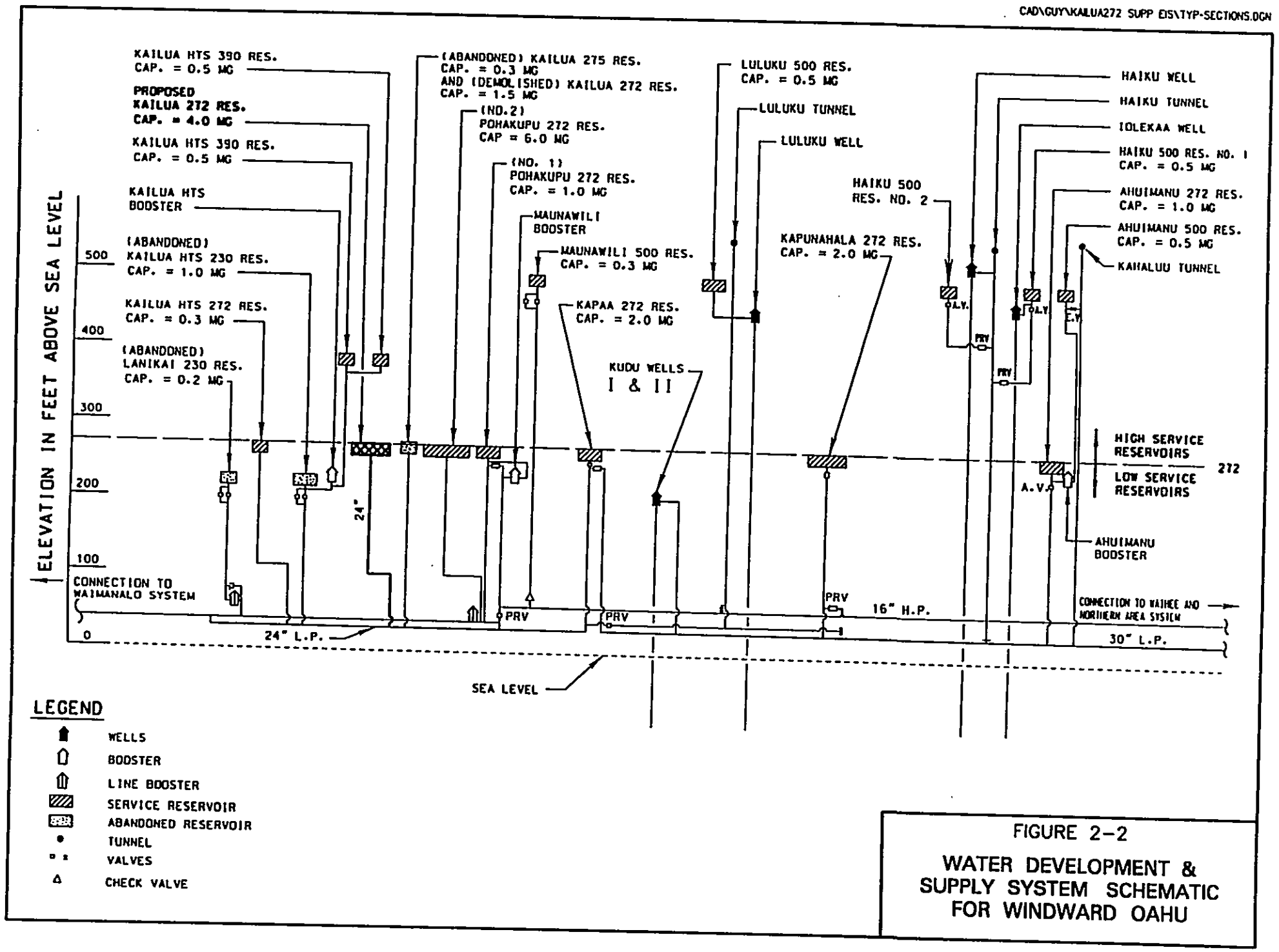

FIGURE 2-2

WATER DEVELOPMENT & SUPPLY SYSTEM SCHEMATIC FOR WINDWARD OAHU

Reservoir capacities in the Kailua low service system are listed below.

Reservoir	Reservoir Capacity (MG)	Effective Capacity (MG)
Kailua Heights 272	0.3	0.3
Pohakupu 272 No. 1	1.0	1.0
Pohakupu 272 No. 2	6.0	3.0
Kapaa 272	2.0	2.0
Total	9.3	6.3

The Pohakupu 272 No. 2 reservoir has a volume capacity of 6.0 million gallons (MG). However, 3.0 MG of storage capacity is already committed to regional operational requirements to provide water to Waimanalo, with any excess water conveyed to Hawaii Kai. This 3.0 MG is not available for Kailua's storage needs. Hence, the effective reservoir capacity allocated to Kailua is 3.0 MG for Pohakupu 272 No. 2.

The reservoirs identified in the above list are limited to those servicing areas located in Kailua below the 172-ft elevation. This list does not include the Kailua Heights No. 1, Kailua Heights No. 2, and the Maunawili 500 reservoirs, which service areas above the 172-ft elevation (commonly referred to as the Kailua high service system). The high and low service zones are operated as separate and distinct systems; otherwise, high level tanks would exert extraordinarily high pressures on the low service system water mains, which would likely rupture water lines and home plumbing fixtures.

2.1.3 Kailua Low Service System Improvements

In 1991, the average water demand imposed on the Kailua low service system was 6.4 million gallons per day (MGD). At this consumption rate, the effective storage capacity of the existing reservoir system is equivalent to slightly less than one day's water supply. An aggregate effective storage capacity of 9.6 MG is actually needed to meet the BWS's storage requirement standard of one and one-half day's supply to meet the maximum day demand.

To alleviate the present shortage in reservoir storage capacity, the BWS is proposing to construct a 4.0 MG reservoir as part of the low service system. This proposed Kailua 272 reservoir will improve the reliability of water supply and enhance fire protection capability afforded to Kailua and other Windward Oahu residents. The "272" designation refers to the maximum water level (or spillway elevation) in feet above mean sea level (MSL) of those reservoirs dedicated to serving the low lying areas. This proposed reservoir will also replace the capacity void of two Kailua low service reservoirs (1.5 MG Kailua 272 and 0.3 MG Kailua 275) that were removed from service in 1986 because of deterioration and age, and abandoned reservoirs at Lanikai (0.2 MG) and Kailua Heights (1.0 MG). Abandonment of the four reservoirs resulted in a 3.0 MG decrease in reservoir storage capacity in the Kailua area.

The proposed 4.0 MG reservoir primarily aims to alleviate an operating shortfall of 3.3 MG in storage capacity. Secondarily, it will also serve with the 6.0 MG Pohakupu No. 2 reservoir as a second main regional tank for the Kailua area, enabling temporary removal of the 6.0 MG tank from service for routine inspection, cleaning, and repair, without risk of loss of fire protection capability or interruption of service to customers during peak water demand episodes.

2.2 PROJECT SITE

The project site is located on Kalae o Kaiwa ridge, approximately 850 feet south of the existing Pohakupu 272 reservoirs (see **Figures 1-1** and **1-2**). The site is presently undeveloped, overlooking the Women's Community Correctional Center (WCCC) and Hawaii Youth Correctional Facility (HYCF) to the west, and residential neighborhoods of Enchanted Lakes and Keolu Hills to the east. Lakeview, a multifamily residential development, is located along the eastern foot of the ridge. The nearest homes are situated southeast of the project site, approximately 700 feet away.

2.2.1 Land Ownership

The project site encompasses portions of three parcels:

Tax Map Key	Land Owner
4-2-03:04	State of Hawaii
4-2-03:08	City and County of Honolulu Board of Water Supply
4-2-04:37	Gale F. and Gail P. Berengue

The majority of the project site is located within the state-owned parcel, which also includes the WCCC. A portion of the proposed reservoir tank will also encroach into the presently undeveloped, privately owned land. The proposed access road will be partially constructed within the BWS parcel at the connection to the road serving the existing Pohakupu 272 reservoirs. Land ownership is illustrated on **Figure 2-3**.

2.2.2 Land Use Designation and Controls

The project site is located within lands designated as Conservation (Limited subzone) and Urban on the State Land Use Designation Boundary Map (see **Figure 2-4**). Principal uses within these designations include public facilities. Therefore, the proposed reservoir is consistent with the existing state land use designations.

The project site is located within land zoned P-1 Preservation (Restricted) and P-2 Preservation (General) by the City and County of Honolulu (see **Figure 2-5**).

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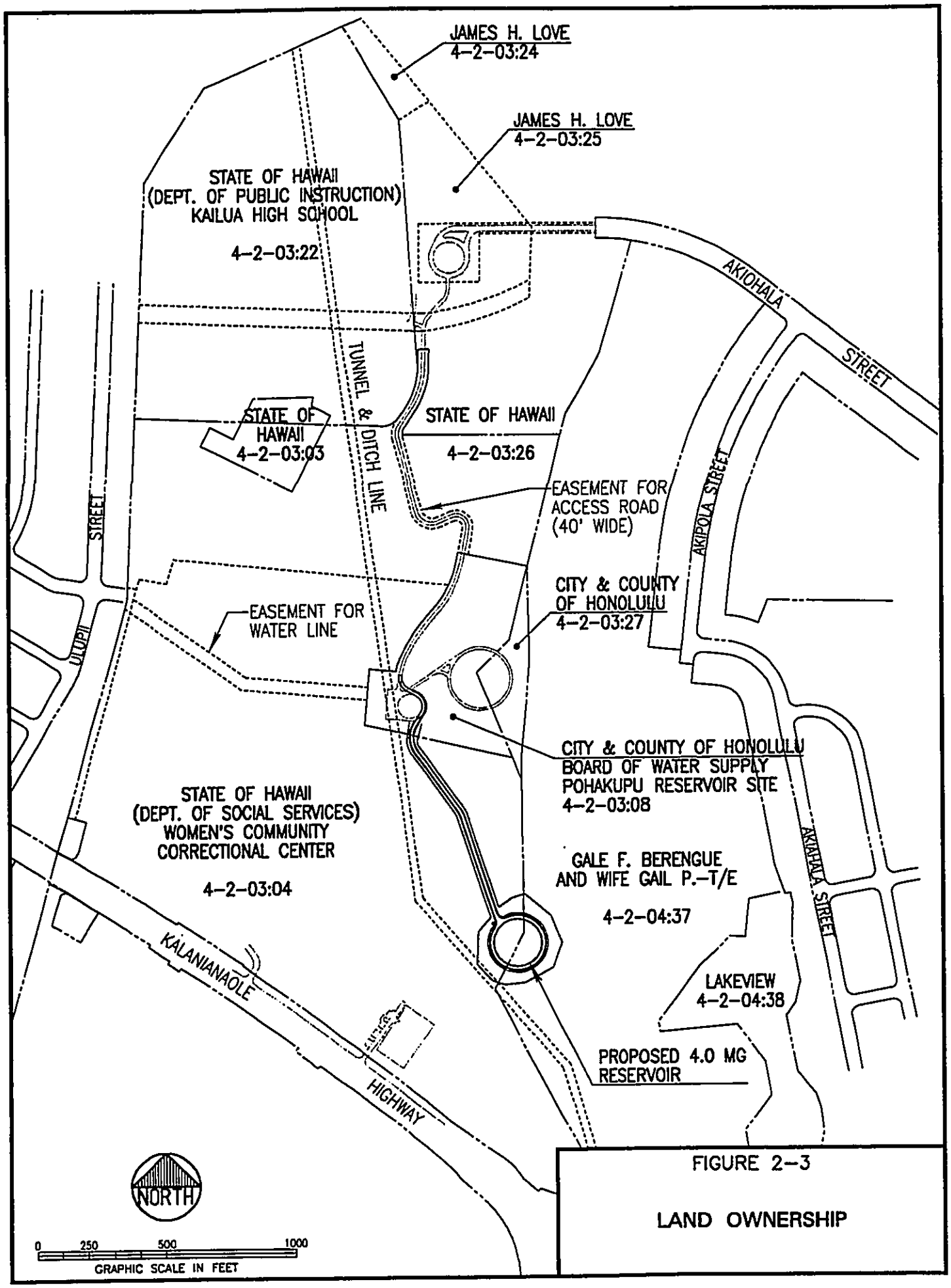

FIGURE 2-3

LAND OWNERSHIP

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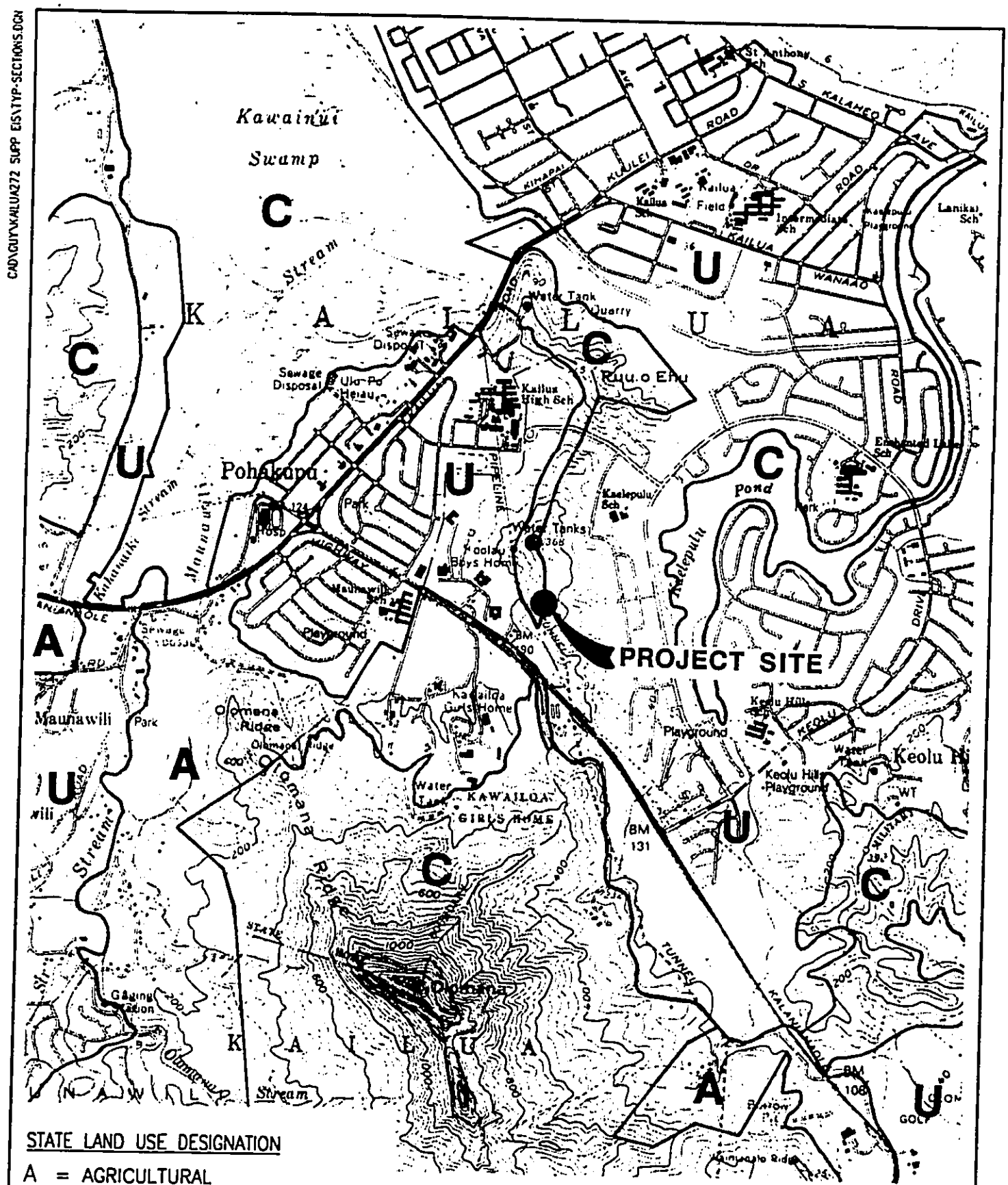


STATE LAND USE DESIGNATION

A = AGRICULTURAL

U = URBAN

C = CONSERVATION

Reference:
Land Use District Boundary
Map O-14 State of Hawaii
Land Use Commission.

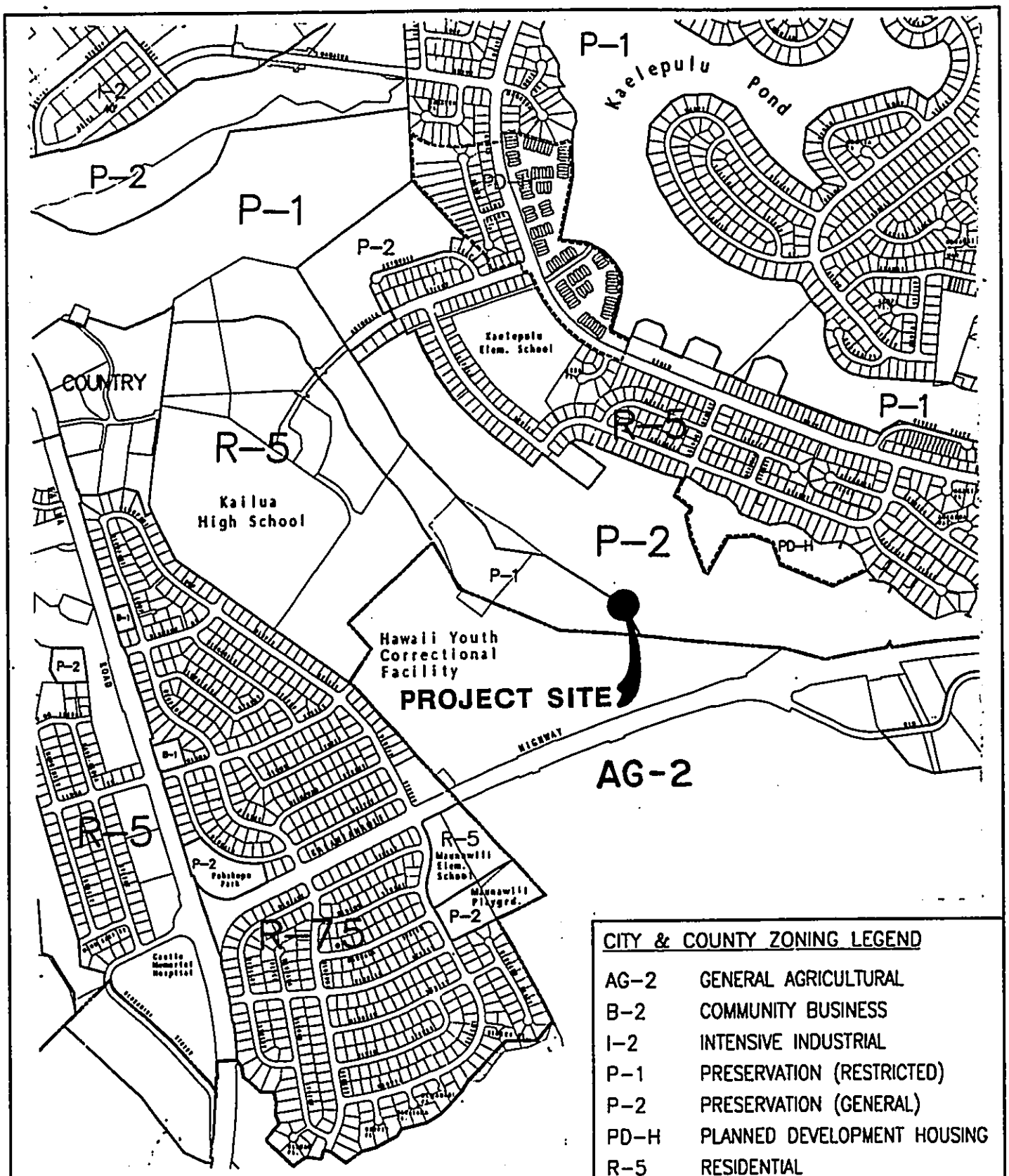
NORTH

0 1000 2000 4000
GRAPHIC SCALE IN FEET

FIGURE 2-4

STATE LAND USE MAP

CAD\GUY\KAILUA272 SUPP EIS\TYP-SECTIONS.DGN



Reference:
Zoning Map No. 23,
Kailua-Lanikai-Keolu
City & County of Honolulu.

CITY & COUNTY ZONING LEGEND

AG-2	GENERAL AGRICULTURAL
B-2	COMMUNITY BUSINESS
I-2	INTENSIVE INDUSTRIAL
P-1	PRESERVATION (RESTRICTED)
P-2	PRESERVATION (GENERAL)
PD-H	PLANNED DEVELOPMENT HOUSING
R-5	RESIDENTIAL
R-7.5	RESIDENTIAL

FIGURE 2-5

CITY & COUNTY ZONING MAP

According to the Department of Planning and Permitting, the project site is not located within the Special Management Area.

2.3 DESCRIPTION OF THE PROPOSED FACILITIES

The project consists of the following elements:

- 4.0 MG capacity reinforced concrete reservoir or tank
- 12-ft wide paved access road extending from the road serving the existing 1.0 MG and 6.0 MG Pohakupu reservoirs to the project site
- 12-ft wide paved perimeter road around the proposed reservoir
- 36-inch diameter influent/effluent water main connecting the proposed reservoir with the existing BWS water system at the existing Pohakupu reservoirs.
- Landscaping
- Drainage system consisting of swales along the perimeter road and access road, drain lines (12-, 18-, 24- and 60-inch diameter) and energy dissipator outlet structure
- Electrical instrument building for housing instrumentation and controls (including water level indicator/recorder/transmitter) and associated modifications to the Maunawili Booster Pump Station
- Security fencing around the site perimeter
- Temporary construction access road, gravel vehicle wash down area and detention basin for vehicle wash water
- Facilities for monitoring residual chlorine levels in the reservoir

The major components of the proposed project are described in greater detail in the following sections. The proposed reservoir, access road, drainage structures, landscaping and perimeter fence will be constructed in accordance with BWS standards.

2.3.1 Reservoir

The proposed reservoir will be a circular concrete tank, 192 feet in diameter and 22 feet in overall height. A concrete cover will protect the water from contamination and deterioration by algal growth stimulated by sunlight. The tank floor will be constructed at 252 feet above MSL and the overflow or spillway elevation will be set at 272 feet above MSL, in conjunction with the Kailua low service system. A reservoir site plan is illustrated on **Figure 2-6**. Typical sections of the site are depicted on **Figures 2-7** and **2-8**.

The centerline of the reservoir nearly coincides with the ridge line since the foundation must be constructed on firm ground. A crater or bowl shape will be cut into the ridge for the proposed reservoir. The top of ridge, at an elevation of 313 feet, will be excavated up to 61 feet to create the "bowl" in which the tank will be erected. Cut slopes of 1.5 H:1V (horizontal to vertical), without benches, will be allowed based on the soils investigation recommendations.

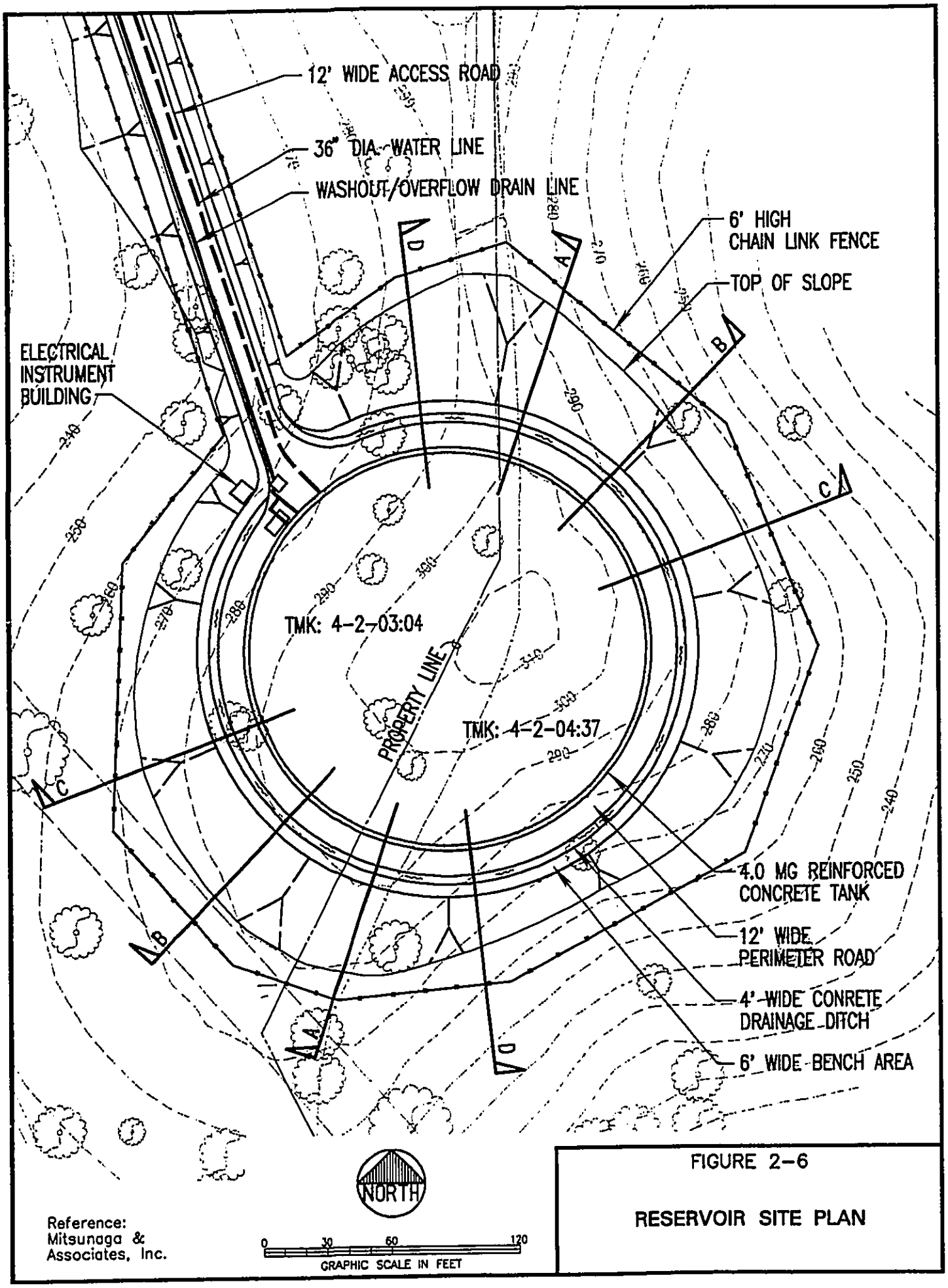


FIGURE 2-6

RESERVOIR SITE PLAN

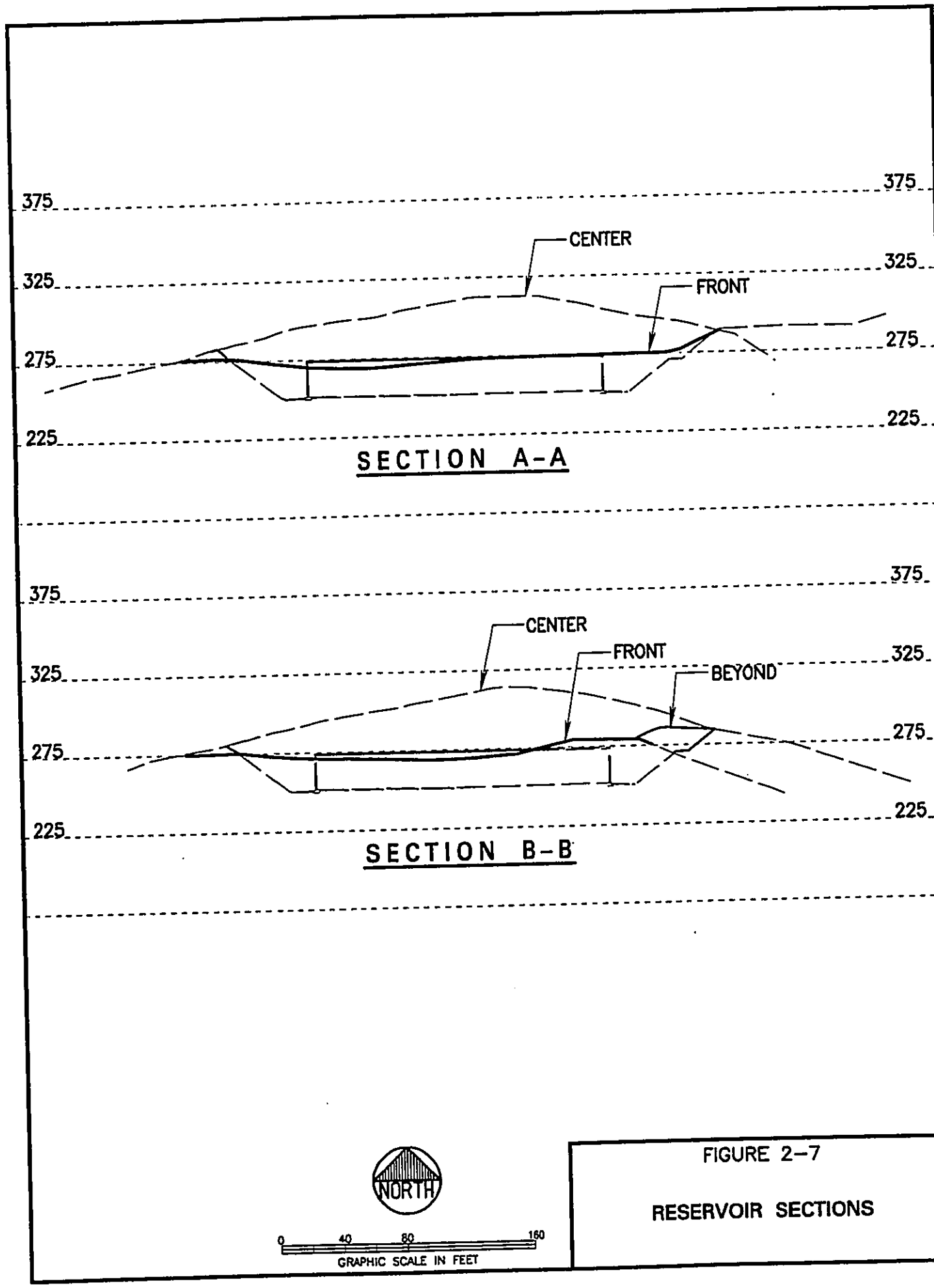


FIGURE 2-7

RESERVOIR SECTIONS

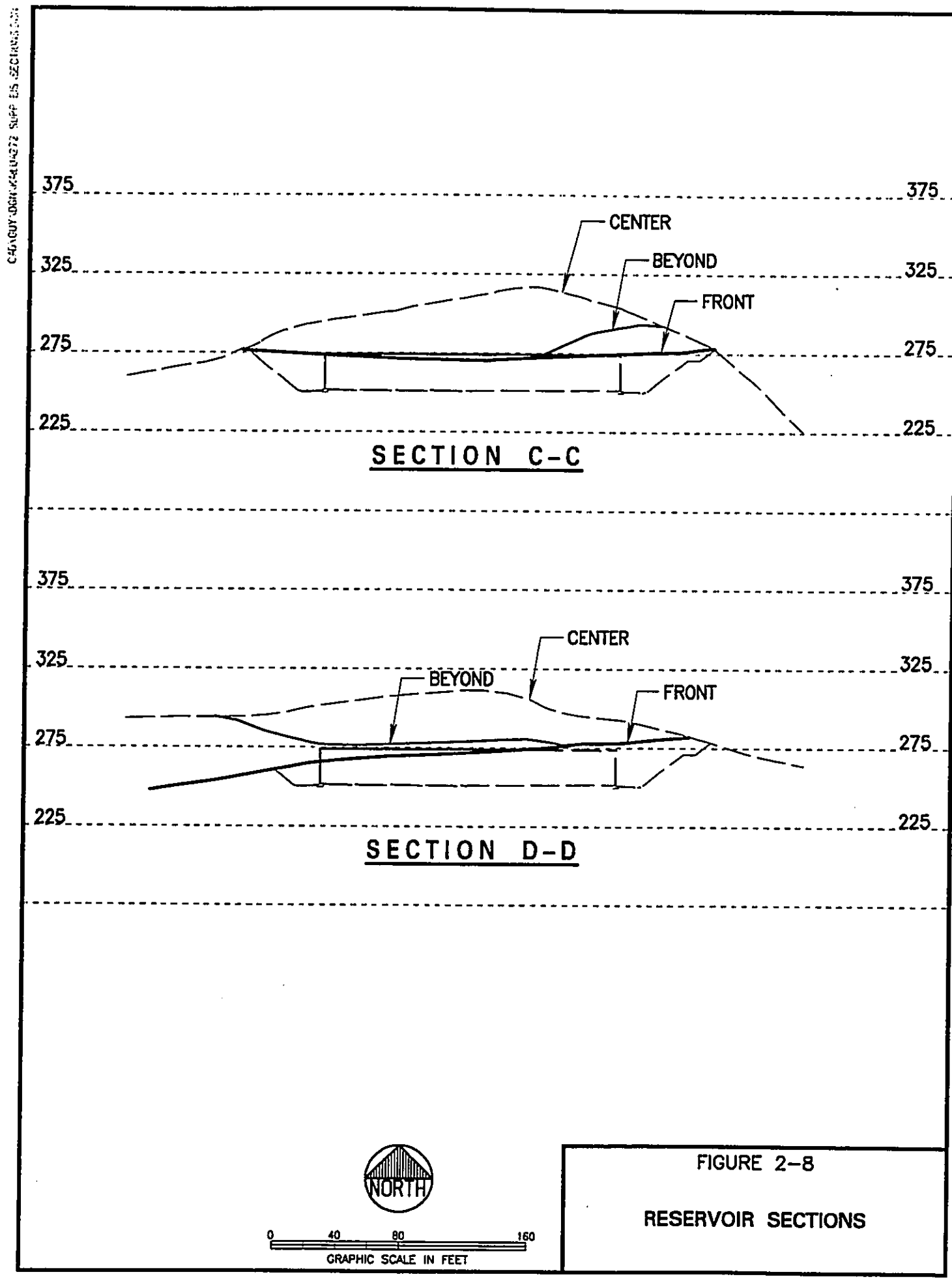


FIGURE 2-8

RESERVOIR SECTIONS

A 12-ft wide perimeter road will encircle the reservoir to allow operations personnel to inspect, maintain and repair the structure and ancillary equipment (see **Figure 2-9**). The perimeter road will be paved with asphalt concrete for an all-weather surface. The pavement will slope away from the tank toward a 4-ft wide concrete drainage ditch which will convey storm runoff to the drainage system.

The proposed reservoir will be structurally designed for Category 3 earthquake loads, which is one level of stringency above the standard for buildings on Oahu.

2.3.2 Access Road

Access to the 1.0 MG and 6.0 MG Pohakupu 272 Reservoirs No. 1 and No. 2 is provided by a road located at the end of Akiohala Street, near Kailua High School. The access road entrance is presently gated for security. The road permits maintenance vehicles to routinely access the reservoir grounds and thereby allow personnel to regularly perform operation and maintenance tasks at the site.

Access to the project site will be provided by construction of a 12-ft wide all-weather road between the existing Pohakupu reservoirs and the project site (see **Figure 2-10**). The new road will be approximately 850 feet long, constructed of either asphalt concrete (flexible pavement) or concrete (rigid pavement), depending on the road slope. Asphalt concrete will be used for slopes up to 12 percent and concrete will be used for slopes over 12 percent. The new road will connect to the existing access road near the 1.0 MG reservoir, encircle the eastern side of the 1.0 MG tank and follow the alignment of an old construction access road originating at Kalanianaole Highway until approaching the project site.

Construction of retaining walls will not be required on either side of the access road. Cut slopes of 1.5:1 (horizontal to vertical) and fill slopes of 2:1 are anticipated (see **Figure 2-11**).

2.3.3 Transmission Main

A single-feed 36-inch water main will be constructed to connect the proposed reservoir to the existing water main at the existing Pohakupu reservoirs site. The water main will be aligned within the proposed access road connecting the new and existing Pohakupu reservoir sites.

2.3.4 Drainage

Storm runoff will be collected in a 4-ft wide drainage swale surrounding the reservoir perimeter road and discharge into an inlet junction box that connects to the access road drainage system. Storm runoff from the western slope of the ridge between the existing reservoirs and project site will be collected in a swale along the shoulder of the reservoir access road. Collected runoff will flow within the shoulder swale to a low point in the access road where it will discharge to the reservoir tank drain, to be installed under the road. Both storm runoff and drainage from the tank

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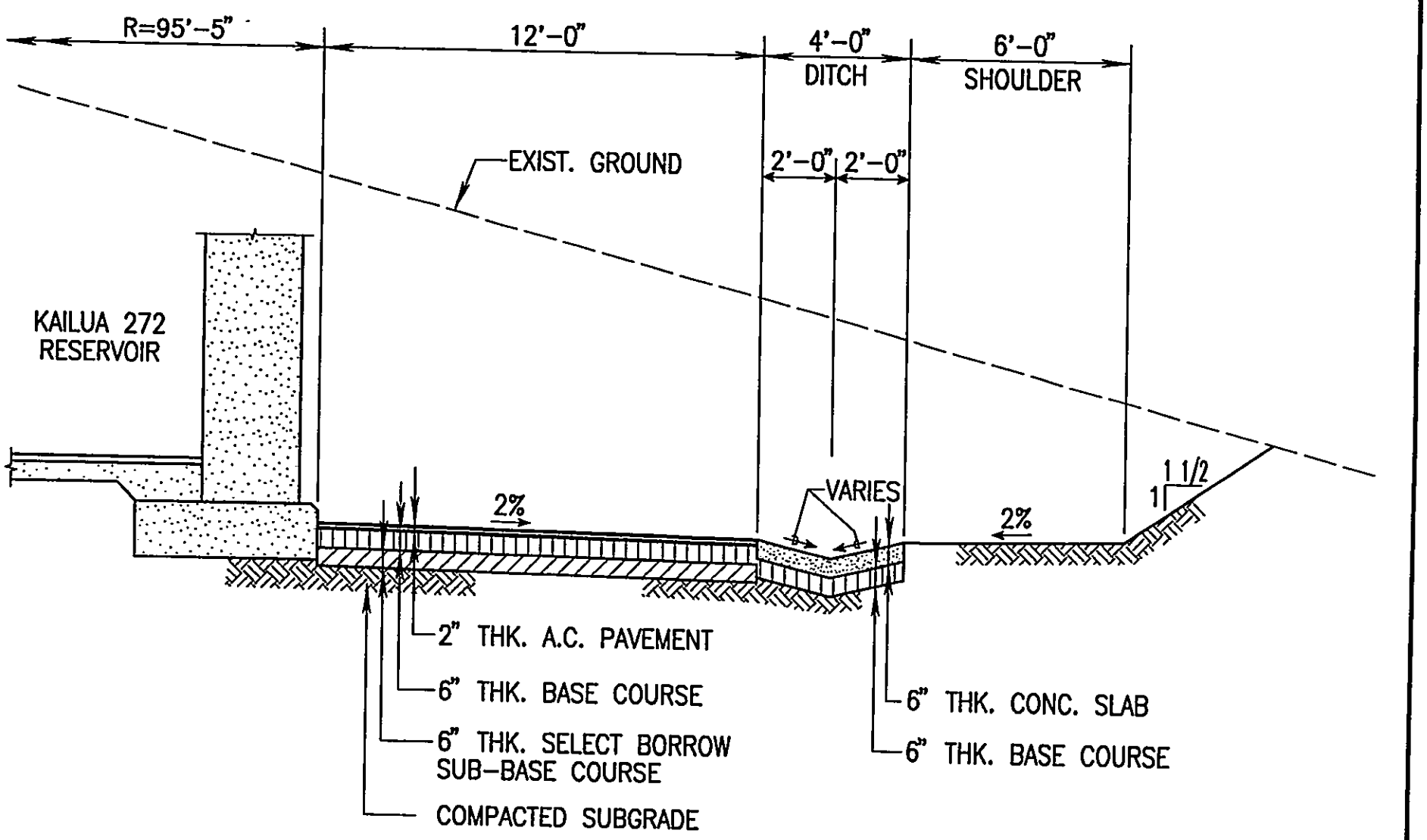

Reference:
Mitsunaga & Associates, Inc.

FIGURE 2-9

RESERVOIR PERIMETER ROAD
TYPICAL SECTION

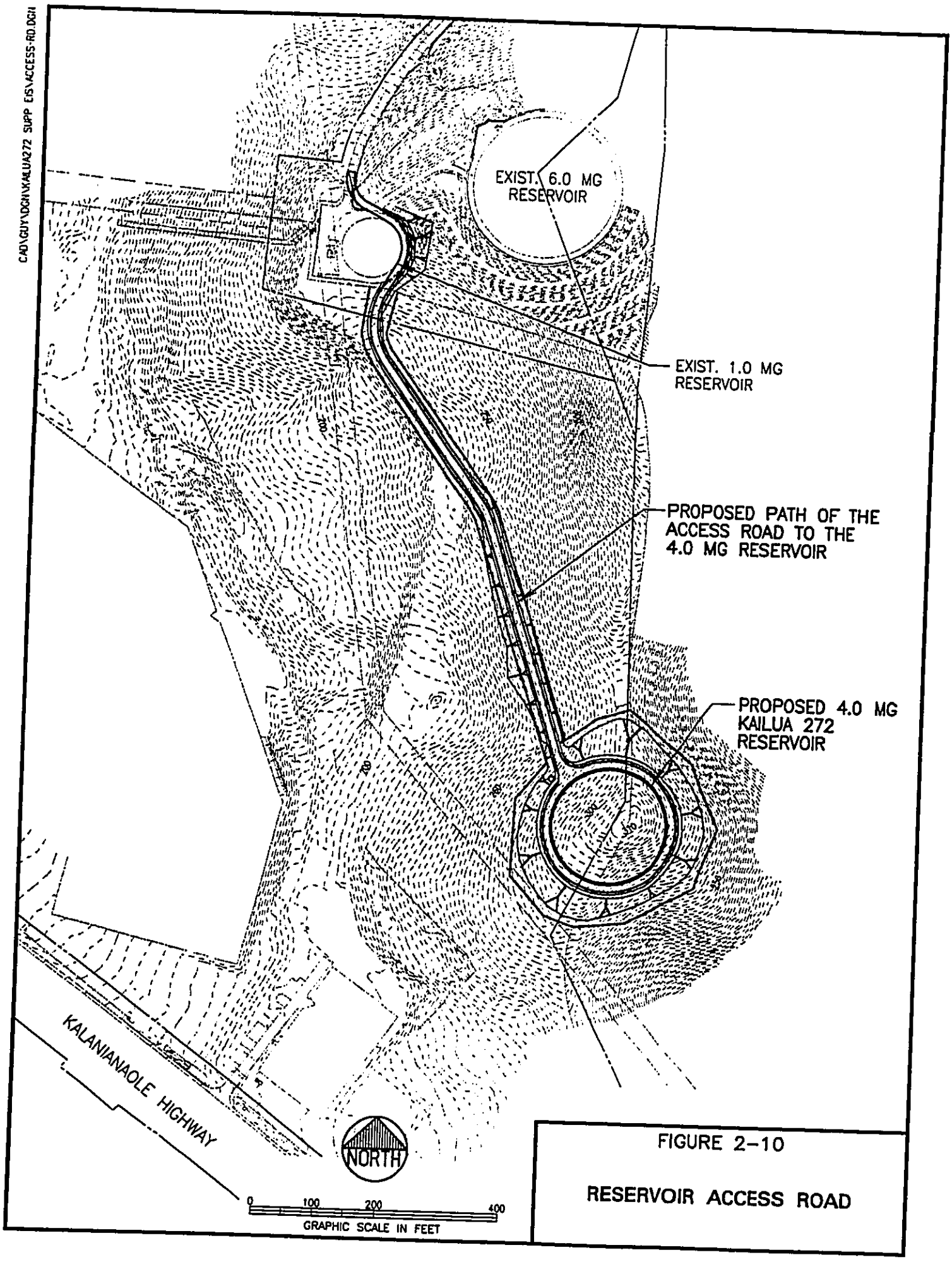

FIGURE 2-10

RESERVOIR ACCESS ROAD

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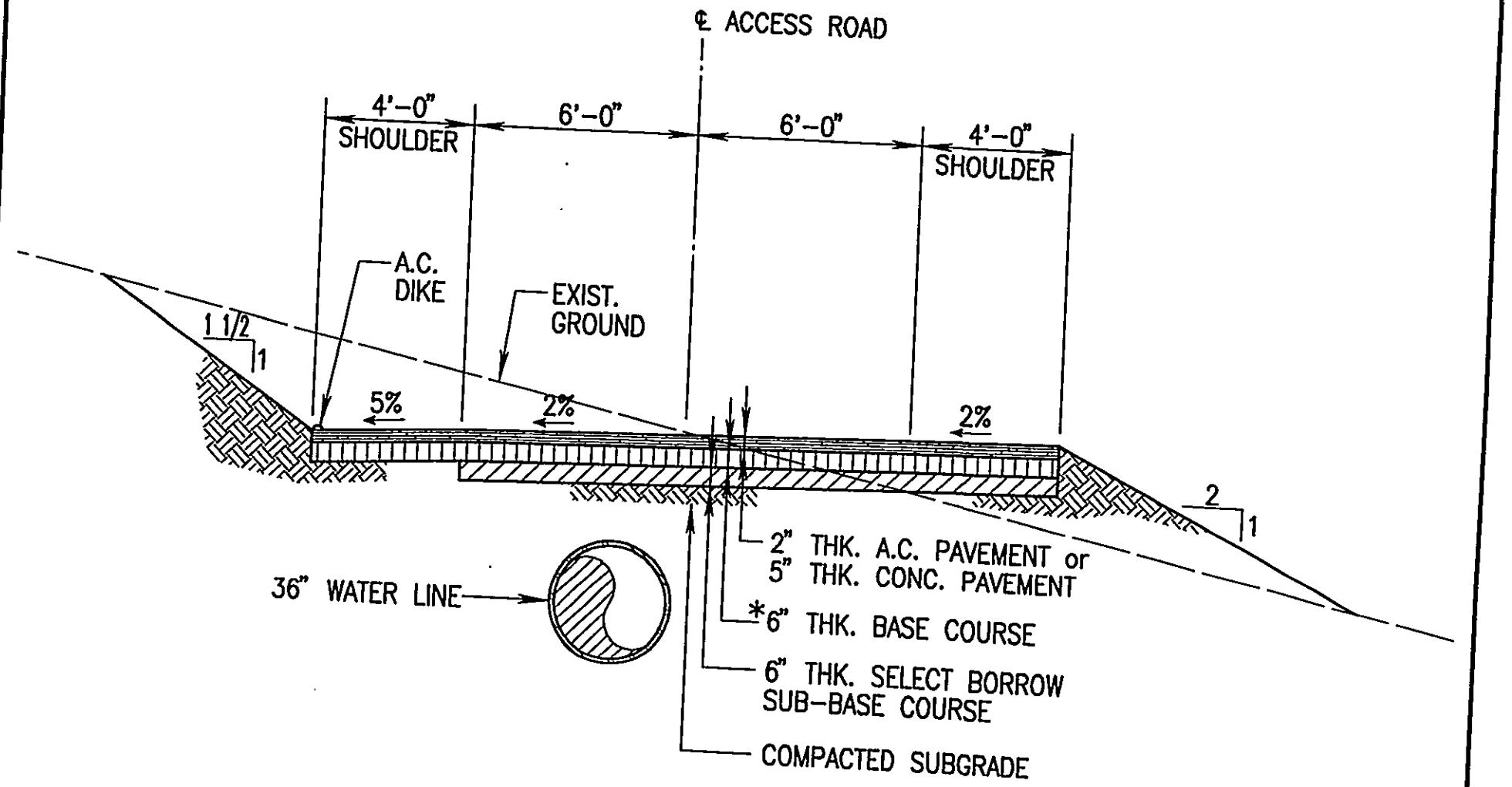

*BASE COURSE REQUIRED FOR A.C. PAVEMENT ONLY.

Reference:
Mitsunaga & Associates, Inc.

FIGURE 2-11

ACCESS ROAD
TYPICAL SECTION

will be conveyed through underground drain pipe to an energy dissipator outlet structure located near the Women's Community Correctional Center (WCCC) perimeter fence. Runoff will discharge to an existing drainage swale adjacent to the WCCC. This drainage swale conveys runoff to Kawainui Marsh.

2.3.5 Landscaping

In recent years, with an emphasis on facility aesthetics, the BWS has given increased attention to the landscaping of its facilities. Plants for ground cover and trees for visual screening are selected according to the aesthetic needs of each project. Landscaping features plant species that are tolerant to dry conditions for year round growth and species that will adequately ameliorate the visual effects of the reservoir and surrounding slopes.

For this project, tank periphery and access road plantings will incorporate species that will blend with the existing landscape of Kalae o Kaiwa ridge. Landscaping will be low maintenance, to stabilize cut slopes and screen the tank and access road (see **Figure 2-12**). A ground cover such as buffalo grass is proposed for planting on cut slopes around the tank to retain and stabilize the soil. Input from concerned community groups identified the need to plant low profile shrubs or small trees for screening around the reservoir (rather than large trees) due to high winds at the top of the ridge that tend to crop trees from growing more than four or five feet tall. Planting of koaie is being considered for this purpose. A larger variety of trees, shrubs and grasses will be considered for landscaping along the access road since the existing species are more varied. Formosa koa and kawaia (a lowland koa) are species under consideration. Species selection will continue to be coordinated with the Lani-Kailua Outdoor Circle and other concerned community organizations.

Soil conditioners, fertilizers and a reliable water supply will be specified in the construction documents to ensure that revegetation is undertaken as rapidly as possible. Fertilizer and soil amendments recommended in the soil analysis by the Agricultural Extension Service shall be applied prior to planting.

Temporary irrigation will be provided for establishment of landscaping. The irrigation system will include spray heads for grass and ground cover, and a drip system for trees. No permanent irrigation system is planned since the existing foliage has a dry appearance.

2.3.6 Electrical Power and Instrumentation

Electrical service to the project site will be provided by underground ductlines and pullboxes located along the shoulder of the proposed access road. Power and instrumentation circuits will extend from the Maunawili Booster Pump Station located within the 1.0 MG Pohakupu reservoir site to the proposed instrument building within the project site. Additional provisions will be required within at the Maunawili Booster Pump Station facility to modify the telemetry system and controls for operation of the new reservoir.

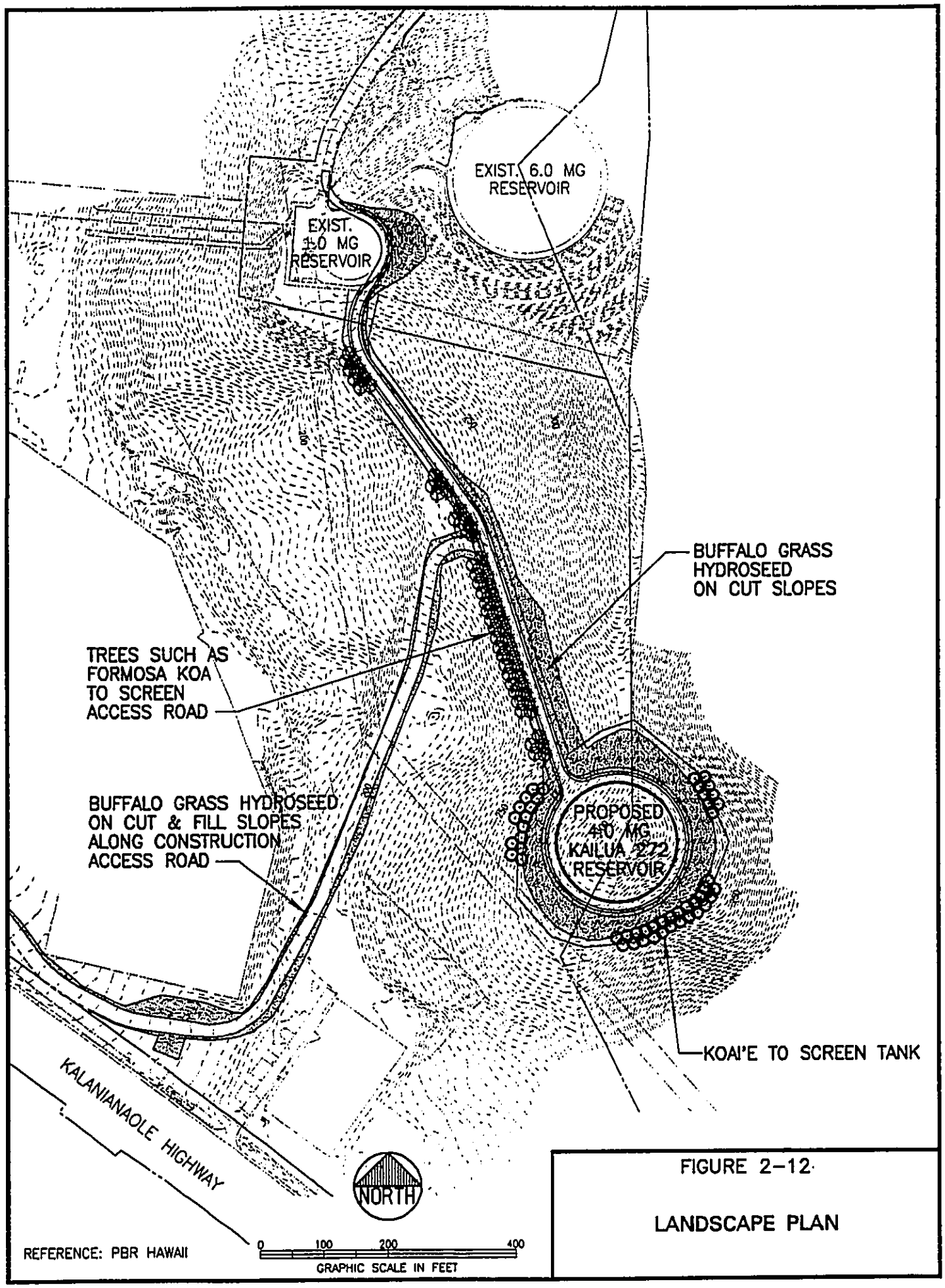

FIGURE 2-12

LANDSCAPE PLAN

2.3.7 Other Facilities

It is anticipated that the federal government will eventually require chlorination of the water supply. Once enacted, the BWS will implement the rule, including monitoring of residual chlorine levels in the reservoir. Sampling ports will be provided for this purpose. Sodium hypochlorite (rather than chlorine gas) will be used as necessary.

A perimeter fence will encircle the reservoir site and access road for security. The fence will be 6 feet high and of chain-link fabrication topped with barbed wire. A locked gate will control unauthorized entry into the reservoir grounds. Approximately five acres will be fenced.

2.4 CONSTRUCTION ACTIVITIES

A description of the major aspects of the proposed construction follows.

2.4.1 Grading

Excavation and grading will be required to prepare a suitable foundation for the proposed reservoir. Prior to earthmoving activities, the area within the grading limits will be cleared and grubbed of all vegetation and debris, and a temporary silt fence or other appropriate perimeter control will be constructed to minimize offsite sediment transport.

Initially, the top of the ridge will be truncated by the grading activities. Once an elevation of about 275 feet is achieved, grading will focus on excavating the "bowl" in which the reservoir will be constructed. It should be noted that once earthmoving equipment are excavating the "bowl", they should not be visible from surrounding lands and much of the associated dust and noise will be contained.

Side slopes for excavation at the reservoir site will be constructed at 1.5H:1V (horizontal to vertical) according to findings of a soils investigation performed at the site. With these side slopes, the approximate earthwork quantity for excavation of the reservoir site is 85,000 cubic yards. Existing ground elevations range from about 270 feet above MSL along the perimeter of the proposed tank, to 313 feet at the top of the knoll. Excavation will extend below the elevation of the finished tank floor level (252 feet), with maximum excavated depths in excess of 61 feet.

2.4.2 Facilities Construction

Following grading, work on the reservoir structure will proceed with laying of interior piping and reinforcing steel and concrete forms for the reservoir floor. Ready-mix concrete will then be trucked to the reservoir site and placed in the forms in several pours. After curing of the foundation, the concrete walls and columns will be erected, followed by the concrete roof. Construction of the drainage system, paved access road, electrical building, landscaping, and

security fencing; and clean-up and testing will be the final steps of this project. Some flexibility is possible in construction methods and sequence whereby some work may be done in sections in combination with other site work.

2.4.3 Construction Access Road

A temporary road will be constructed for this project to allow construction vehicles access to the project site (see **Figures 2-13** and **2-14**). ***Construction vehicles will access the project site via the designated construction access road off of Kalanianaole Highway. Construction access from Akiohala Street will not be allowed to minimize the project's impacts on the surrounding area residents.*** The road will be paved to withstand truck traffic and minimize dust and erosion. Several alternative alignments were considered, and are presented in **Chapter 3**. The selected alignment, (identified as Alternative 3) uses the WCCC entrance and perimeter road, property currently owned by the State of Hawaii. An advantage to use of the WCCC entrance is that full turning movements are provided at Kalanianaole Highway. Portions of the selected alignment also follow the alignment of an old access road used during construction of the 6.0 MG Pohakupu reservoir.

The WCCC perimeter road is paved with gravel and travels counterclockwise around the facility. The entrance at Kalanianaole Highway is paved with asphalt concrete. Since the existing entrance and a portion of the perimeter road can be used, the area of clearing required to construct the temporary construction access road will be minimized. However, existing roadway lights and wiring at the Kalanianaole Highway entrance will be relocated to accommodate widening the road for construction vehicles.

In conjunction with the construction access road, a gravel vehicle wash down area will be constructed along side the road near Kalanianaole Highway. Use of the wash down area will reduce dust and tracking of debris onto the highway. Runoff from the vehicle wash down area will be directed to a detention basin to prevent water from entering the WCCC facility.

The Department of Public Safety has granted permission for construction of the temporary access road and associated vehicle wash down area at the WCCC. A copy of the correspondence is included in **Appendix A**. Upon completion of construction, the temporary road will be removed and the area will be restored to previously existing conditions as requested by WCCC.

2.5 PROJECT SCHEDULE, CONSTRUCTION COST AND FINANCING

The project has been funded for fiscal year 1998-1999. The start of construction will be dependent on obtaining the required permits and approvals. It is anticipated that construction activities will begin in ***April 2001*** and require 18 months for completion. Site preparation and grading activities are expected to last six months, to be followed by construction of the reservoir and its associated appurtenances over the next 12 months. The estimated construction cost for

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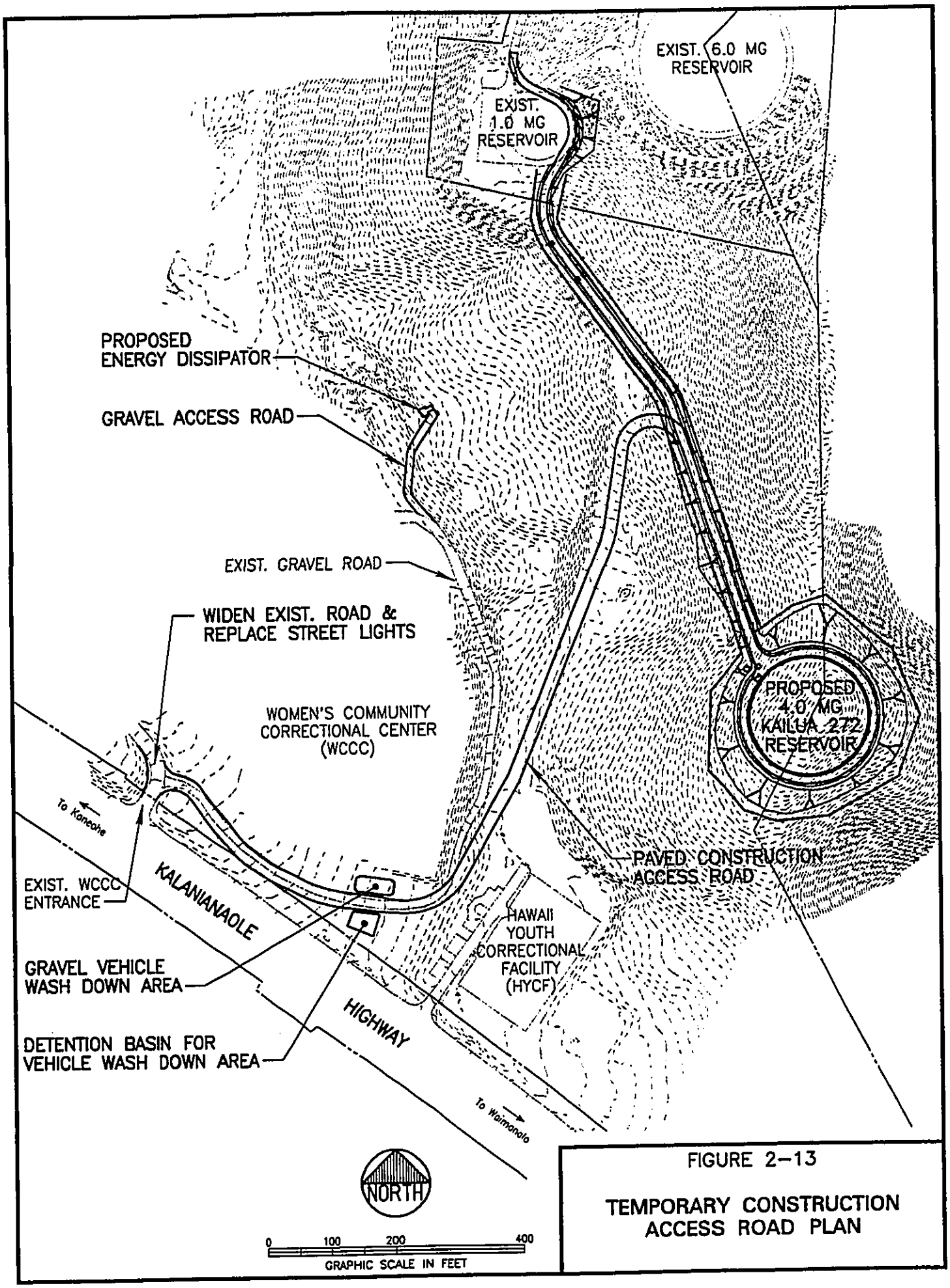

FIGURE 2-13

TEMPORARY CONSTRUCTION ACCESS ROAD PLAN

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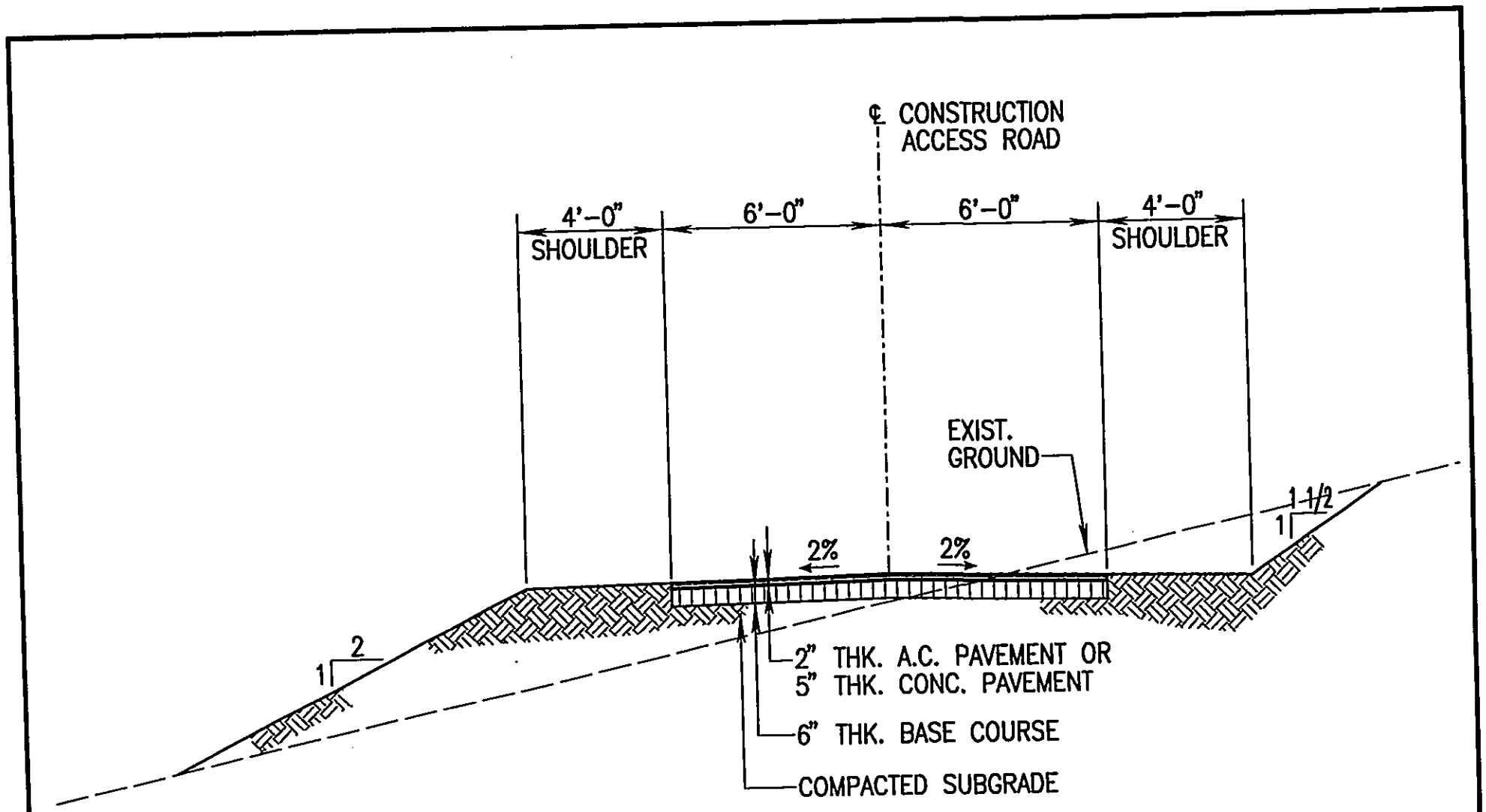

Reference:
Mitsunaga & Associates, Inc.

FIGURE 2-14

TEMPORARY CONSTRUCTION
ACCESS ROAD
TYPICAL SECTION

the project is $13,200,000.00, to be funded by the BWS water system facilities charges account and other revenues. This project will not result in an increase in the water rate.

CHAPTER 3
ALTERNATIVES CONSIDERED

This chapter discusses alternatives against which the proposed action was evaluated. The alternatives were rejected for their inability to meet the project objectives (no action) or attainment of the objectives at a higher cost or at a less desirable location.

To restate, the Board of Water Supply's overall objectives for this project are to:

- increase water storage capacity in the Kailua area to closely approximate BWS operating standards for reliability and fire protection; and
- provide uninterrupted water service to Windward Oahu customers under both normal and emergency operating conditions.

Also included in this chapter is a discussion of alternatives considered for the temporary construction access road for the project (**Section 3.7**).

3.1 NO ACTION

Under the "no action" alternative, water service to Windward Oahu in the area extending from Kailua to Kaneohe will continue to operate significantly below the BWS standard, which requires reservoir capacities equal to 1.5 times the average daily use. Consequently, the likelihood of residents being without water during extended power outages would continue, and fire fighting water may not be available in volume and pressure.

As the municipal water demand increases due to economic expansion, population growth, and higher rate of per capita consumption, this shortfall in reservoir capacity will be exacerbated, placing public health and safety at higher risk.

Since the present storage capacity in the Windward District is significantly "below standard", failure to act in a timely manner to remedy the shortage would not be an acceptable course of action.

3.2 ALTERNATE RESERVOIR LOCATIONS

Construction of the 4.0 million gallon (MG) reservoir at other locations has been considered. These alternate sites are indicated on **Figure 3-1**. As part of an integrated water system, the new

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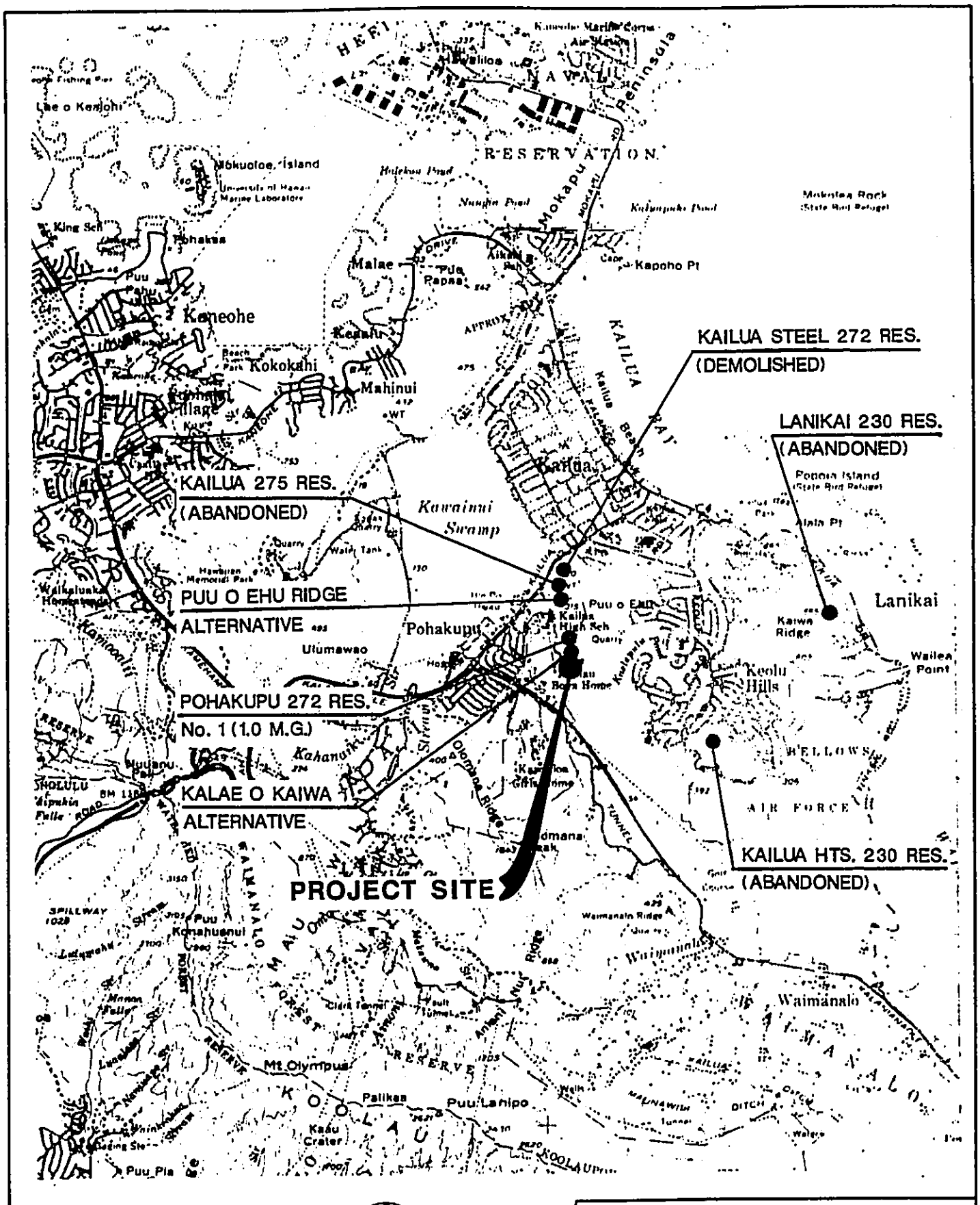

FIGURE 3-1

ALTERNATIVE
RESERVOIR SITES

reservoir must be placed at a specific elevation. In this case, the reservoir spillway elevation must be set at 272 feet above mean sea level in conjunction with the Kailua low service system.

Ridge locations at Kailua Heights and Lanikai were evaluated. However, both locations were situated well away from the large water transmission mains which must connect to the reservoir for distribution service. In addition, both the Kailua Heights and Lanikai ridge sites were not close enough to Kailua town, where population and water demands are concentrated.

A discussion of alternate locations for the proposed reservoir at Puu o Ehu ridge and Kalae o Kaiwa ridge is presented in the following sections.

3.2.1 Puu o Ehu Ridge

The primary alternative site is construction of the reservoir on Puu o Ehu ridge, adjacent to the abandoned Kailua 275 reservoir site. This site was strongly considered by the BWS for construction of the proposed 4.0 MG reservoir. The site was favored due to its elevation, location near existing large transmission mains and the demand center of Kailua town. From a financial standpoint, the Puu o Ehu site was also favorable. Earthwork costs at Puu o Ehu ridge would be less than costs for the proposed action. Approximately 55,000 cubic yards of material would need to be excavated and removed at Puu o Ehu ridge, compared to 85,000 cubic yards for the proposed action at Kalae o Kaiwa ridge. Also, since Puu o Ehu ridge was the site of a previously used reservoir, an access road already exists; while at Kalae o Kaiwa a new road is needed.

An environmental impact statement (EIS) was prepared for construction of the reservoir on Puu o Ehu ridge, and an application for a Special Management Area Use Permit was under review by the Honolulu City Council. Due to the visual impact concerns of some community groups on preserving the entrance to Kailua town, the BWS agreed to reevaluate alternative sites for the project, resulting in preparation of this supplemental EIS. The relocation of the project site from Puu o Ehu ridge illustrates willingness of the BWS to work with all community groups to achieve a mutually acceptable, beneficial public works project.

3.2.2 Site of Old Abandoned Kailua 272 and 275 Reservoirs

Also located on Puu o Ehu ridge are two former BWS reservoir sites. The Kailua Steel 272 tank has been demolished. The tank was located on a site approximately100 feet by 100 feet in area. Nearby is an abandoned concrete tank (Kailua 275 reservoir) on a site approximately 100 feet by 125 feet in size. The physical features of these former reservoir sites restrict the dimensions of any new tank to a diameter of no more than 100 feet. Considering the existing base elevation, a single 1.5 MG reservoir approximately 30 feet high could be constructed on the combined land area. However, construction of a smaller tank at this site would require that a second 2.5 MG reservoir be constructed to augment the overall storage capacity.

The BWS abandoned and demolished the Kailua Steel 272 reservoir because of rust and exorbitant maintenance and repair costs. An additional factor in decommissioning the tank was a problem of undermining the footing along the cliff fronting Hamakua Drive. For structural stability reasons, reuse of this site for an new concrete tank is undesirable.

3.2.3 Alternate Kalae o Kaiwa Ridge Site

The EIS prepared for construction of the proposed reservoir at Puu o Ehu ridge evaluated another alternate reservoir site on Kalae o Kaiwa ridge. Kalae o Kaiwa ridge has been considered a strategic location for a new tank since both the 6.0 MG and 1.0 MG Pohakupu reservoirs are part of the Kailua 272 low service system. This alternative considered excavation of the largest knoll (Kalae o Kaiwa) on the ridge, located immediately adjacent to the existing Pohakupu reservoirs. Approximately 150,000 to 200,000 cubic yards of material would need to be excavated and removed from this site. In addition, the cut face is estimated to be 80 feet high. This site would require extensive excavation due to the massive size of the knoll. The major disadvantages of the alternate Kalae o Kaiwa ridge site are the higher construction cost, associated with the increased quantity of excavation, and the visual impact of the 80-foot cut face.

3.3 ALTERNATE RESERVOIR CONFIGURATIONS

3.3.1 Construction of Smaller Reservoirs

Significant impacts are primarily associated with the need for extensive excavation of the ridge to construct the reservoir spillway at an elevation of 272 feet above mean sea level. Smaller diameter reservoirs could be constructed; however the earthwork requirement to situate multiple tanks at either Puu o Ehu ridge or Kalae o Kaiwa ridge would be more than for a single 4.0 MG tank. A tank of 2.0 MG capacity would have a diameter of approximately 130 feet, compared with the 192-ft diameter of the proposed 4.0 MG tank. To provide the needed increase in reservoir capacity, two 2.0 MG tanks would have to be constructed, which would actually cover a larger area than a single 4.0 MG tank, and hence, would likely have more of a visual impact.

3.3.2 Construction of Taller Reservoirs

An option of constructing a taller reservoir of smaller diameter in the mountainside was considered as a way to reduce the size of cuts and avoid encroachment into the ridge line. This alternative would require design of a thicker base and tank sides for the high hydraulic pressures to be exerted on the structure. A suitable foundation of hard rock would have to be located, or concrete piles would need to be driven to depths resting on such strata. A 100-ft diameter tank would have to be 70 feet tall, or 10 stories high. Multiple small diameter tanks of shorter heights tucked into the mountainside are not possible because of steep terrain.

From an operational standpoint, the spillway elevation of any new tank in the Kailua low service system must be at the 272-ft elevation. The reason for this is that the height of each reservoir needs to match that of other tanks in the same service zone. If the reservoir heights are unequal, the reservoir with the highest water level would be the first to drain before the others are used. Since reservoir water levels seldom get this low in normal operation, the lower reservoirs within the same service zone would effectively be "locked out", going virtually unused, and its water would stagnate. This alternative is not hydraulically feasible since only the top 20 feet could be effectively utilized. Water levels would not likely drop to make use of the bottom 50 feet since other reservoirs in the system would drain first.

3.3.3 Construction of Underground Reservoirs

Construction of underground or partially buried reservoirs are not favored by the BWS due to difficulties in maintaining and repairing buried facilities. Board of Water Supply standards require storage tanks to be accessible around their entire perimeters. Reservoirs that are fully or partially buried have reduced sanitary control. Water quality problems result (mainly microbiological) and therefore, reduce the level of quality water service.

3.3.4 Construction of Elevated Tanks

Elevated tanks are often used for storage and pressure in flat areas of the mainland where hills and mountains cannot be used to advantage. As a permanent facility, this option is not viable for Kailua because of unacceptable visual impacts, potential hazards to aircraft, dangers posed in case of steel tank malfunction or catastrophic rupture or damage from wind forces, and difficulty in maintenance and repair.

3.4 REPLACE 1.0 MG POHAKUPU RESERVOIR WITH 5.0 MG STRUCTURE

In contrast to adding a third reservoir on Kalae o Kaiwa ridge, consideration was given to replacing the existing 1.0 MG reservoir with a larger, 5.0 MG tank. The 1.0 MG reservoir is fully functional. In fact, the tank was recently refurbished and has an estimated life of over 20 years remaining. Demolition of this functional reservoir prior to reaching its life expectancy is not cost effective or preferable.

3.5 REFURBISH EXISTING ABANDONED RESERVOIRS

Abandoned reservoirs at Kailua Heights and Lanikai both have spillway elevations of 230 feet, which would be undesirable in conjunction with the 272 reservoir system. Reactivating the abandoned 230 reservoirs will reduce the available water pressure to homes located at the upper fringes of the Lanikai and Kailua Heights area. These homes, situated at elevations from 130 feet to 170 feet above mean sea level, would experience low water pressure. In addition, topographic

features preclude the sites from being used for new reservoirs without extensive grading and/or structural facilities.

3.6 INSTALL EMERGENCY POWER GENERATORS AT WELL SITES

Emergency generators can be installed at the well sites to operate the pumps in the event of an electrical power outage. The BWS already has several large, portable generators for use during emergencies. While the alternative will allow a continued supply of water to the Kailua system in the event of electrical power outage, it will not supply water to Kailua in the event of a transmission line break and or repair between the well site and demand centers in Kailua. In comparison, the proposed reservoir will provide a reserve supply of water near the point of use.

The Board of Water Supply notes that the transmission system serving Kailua is about 25 miles long with portions submerged in ocean water. Age, susceptibility to corrosion, coupled with the fact that the Windward Low Service System has the highest pumping pressures on Oahu, creates situations where main breaks occur relatively frequently. Therefore, adequate storage is critical to maintaining reliable water service to the area.

3.7 CONSTRUCTION ACCESS ROAD ALTERNATIVES

A temporary paved road will be built for this project to allow construction vehicles passage to the site. The proposed alignment (Alternative 3), described in **Section 2.4.3**, was selected after careful evaluation of several alternatives. Alternative alignments that were considered for the temporary construction access road are presented in **Figure 3-2** and are discussed in the following sections.

3.7.1 Alternative 1 - Use of Old Construction Access Road Entrance and Alignment

During construction of the 6.0 MG reservoir on Kalae o Kaiwa ridge, a temporary access road was constructed from Kalanianaole Highway to the reservoir site. Hookipa Cottage, part of the Hawaii Youth Correctional Facility (HYCF) is adjacent to the entrance of this old construction access road at Kalanianaole Highway. In fact, the HYCF has maintained the old road near the highway for its use to access the highway, and for parking. Beyond Hookipa Cottage, the path of this old construction access road is still evident due to the younger vegetation which has taken root over the once cleared alignment.

Use of the old construction access road was favored since the route would minimize disturbance to the ridge by following a previously disturbed alignment. Clearing would be required, but the vegetation along the old alignment would be younger and smaller than surrounding areas. A major disadvantage of this alternative is the impact of construction vehicles on daily operations at the HYCF. Construction traffic would be a major distraction to the youth inmates or wards

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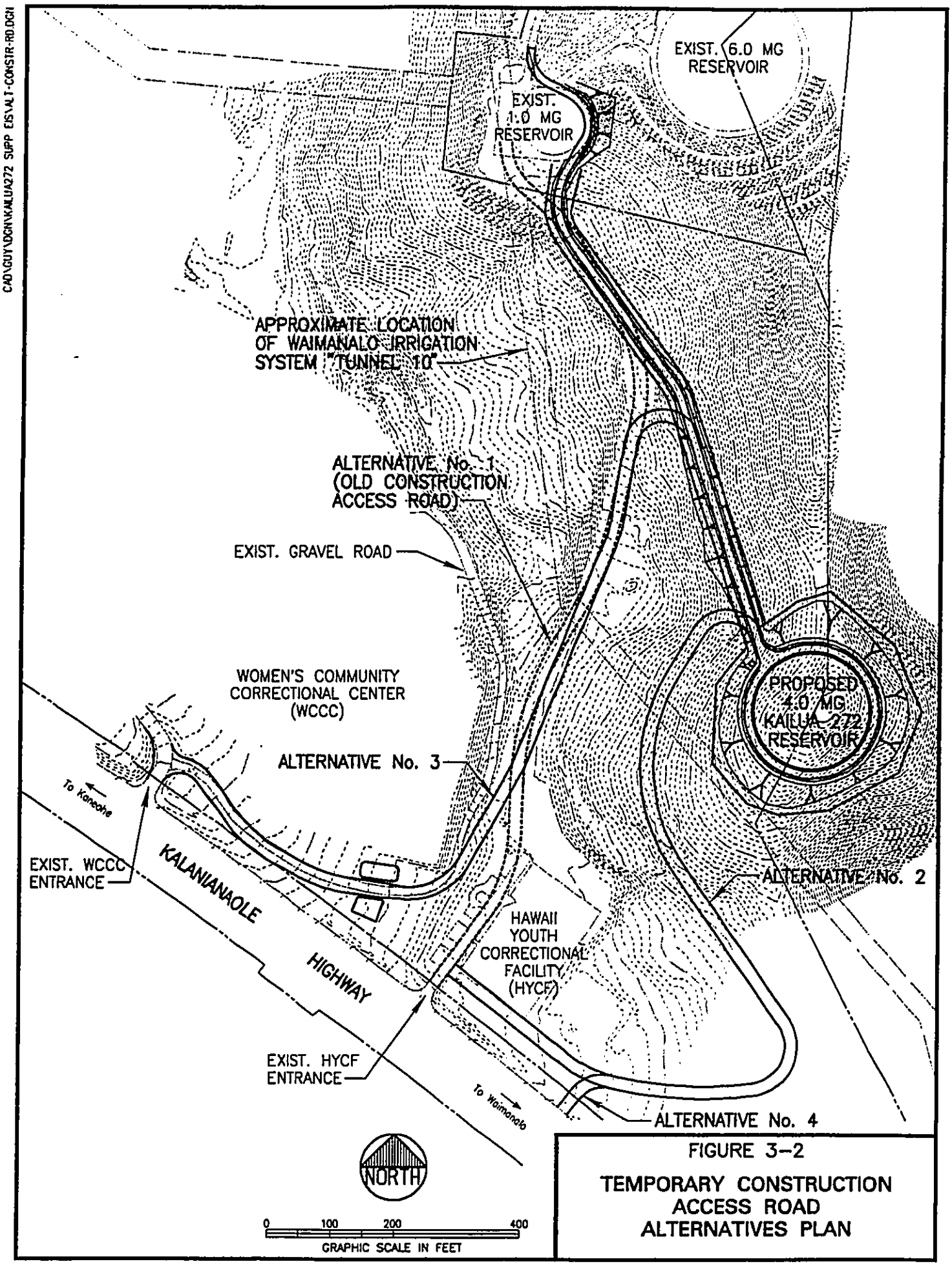

FIGURE 3-2

TEMPORARY CONSTRUCTION ACCESS ROAD ALTERNATIVES PLAN

which reside at Hookipa Cottage, and may create a safety hazard. Based on a meeting with HYCF officials, it was determined that this alternative would not be feasible (see **Appendix A**).

3.7.2 Alternative 2 - Use of Old Construction Access Road Entrance

To minimize impact to the HYCF parking area, Alternative 2 considered use of only the old construction road entrance from Kalanianaole Highway. As illustrated on **Figure 3-2**, the Alternative 2 alignment is southeast, parallel to Kalanianaole Highway to minimize impact to Hookipa Cottage and its parking area. The alignment would then turn east toward the 250-ft elevation, continuing north along this contour and accessing the project site on the north side of the proposed reservoir.

This alternative was not favored for several reasons. First, impact to Hookipa Cottage was a primary consideration. Officials from the HYCF were concerned that the alignment would be too close to the cottage and require removal of fruit trees growing between the cottage and highway. Second, the State Historic Preservation Division raised concerns over the adverse effect this alignment may have on Tunnel 10, a component of the Waimanalo Irrigation System and a significant historic site. Third, this alignment would increase the amount of clearing required to construct the road. Thus, it was determined that Alternative 2 was not a viable option.

3.7.3 Alternative 3 - Use of WCCC Entrance and Perimeter Road

Alternative 3 utilizes an existing access from Kalanianaole Highway that presently serves the Women's Community Correctional Center (WCCC). The entrance is located approximately 500 feet northwest of the HYCF entrance at Hookipa Cottage. The WCCC perimeter road begins at the highway entrance and travels counterclockwise around the facility. Near the reservoir site, the temporary construction access road will be constructed along the permanent access road alignment.

This alternative was favored for several reasons. First, the Department of Public Safety has granted permission for construction of the temporary construction access road within the WCCC grounds in a letter dated May 19, 1999 (see **Appendix A**). Second, the State Department of Transportation, in their letter of June 3, 1999 (see **Appendix A**), favored this alternative since it utilizes an existing access to Kalanianaole Highway where full turning movements are available. Third, by using the existing entrance and the perimeter road, the quantity of clearing and paving for construction of the temporary construction access road can be reduced. Alternative 3 is the proposed alignment for the temporary construction access road described in **Section 2.4.3**.

3.7.4 Alternative 4 - New Entrance From Kalanianaole Highway

Potential impacts to the WCCC and HYCF can be minimized by creating a new entrance from Kalanianaole Highway. The path of the construction access road would travel east toward the 250-ft contour as shown in **Figure 3-2**. The road would then travel northwest along the 250-ft

contour to the proposed reservoir site. The amount of clearing would be similar to Alternative 2. Temporary access to Kalanianaole Highway was approved by the State Department of Transportation, subject to several conditions (see letter in **Appendix A**). These conditions include limiting access to right turns in and out; meeting sight distance requirements; and providing traffic controls. Although this path will reduce the impact to the HYCF and WCCC, the location of the new entrance may affect motorist safety. The new entrance would be located near a crest in the highway alignment, limiting sight distance which could lead to dangerous traffic situations.

3.7.5 Alternative 5 - Permanent Reservoir Access Road

Although this alternative was not presented in the EIS preparation notice, it was considered during preparation of the Draft EIS in the event that construction access to Kalanianaole Highway would not be allowed. The alternative utilizes the existing BWS access to its 6.0 MG and 1.0 MG reservoirs from the end of Akiohala Street, behind Kailua High School. The alignment of the temporary construction access road would essentially be the same as the proposed permanent access road alignment. A disadvantage of this alignment would be the need for large construction vehicles to maneuver around the 6.0 MG and 1.0 MG tanks. In addition, a major concern would be the need for construction vehicles to traverse through a residential neighborhood (Akiohala Street) in order to reach the project site. This alternative was no longer considered feasible once approval was granted by the State Department of Transportation and the Department of Public Safety for Alternative 3.

CHAPTER 4
DESCRIPTION OF THE AFFECTED ENVIRONMENT

The intent of this chapter is to describe the existing physical and social environment which is affected by the proposed action. Potential impacts which may result from development of the proposed reservoir, and mitigation measures which will be employed to minimize negative impacts, are described in **Chapter 5**.

4.1 CLIMATE

The climate in the Kailua area is affected by its windward and coastal location. Tradewinds from the east or northeast are not obstructed by land forms and provide good ventilation. When the tradewinds are absent or weak, land or sea breezes or mountain-induced circulation may develop. Extreme temperatures may range from the mid-50's to the low-90's, while the average range is 68 to 79 degrees F. There are only two seasons: summer (between May and October) and winter (between November and April).

Spatial and temporal distributions of rainfall are pronounced in the Kailua area. The orographic effect of the Koolau Range produces most intense rainfall in areas nearest the summits of ridge lines. Average annual rainfall ranges from 45 to 75 inches. The wet season is usually from October to April, with the highest rainfall in March and the lowest rainfall in June. Winter storms from October to April bring the heaviest rains to the island.

Kailua is subject to moisture-laden tradewinds about 75 percent of the year. Wind speeds range between 10 and 25 miles per hour, with prolonged periods of calm and low velocity wind patterns.

4.2 GEOLOGY AND TOPOGRAPHY

The island of Oahu was formed by the Waianae and Koolau volcanoes. In the ancient Hawaiian system of land division (ahupua'a), the Kailua District, which is located in the center of the extinct Koolau Volcano, extended from the top of the Koolau Range to the shore along two high ridges. The Ahupua'a of Kailua included Waimanalo in the southeast to inshore of Mokulua Islands to the east. Kailua formerly contained two ocean embayments-- the remains of which are Kawainui Marsh and Enchanted Lake (formerly Kaelepulu Pond).

Two series of lava flows comprise the greater part of the Koolau Range. The Kailua volcanic series, a dense volcanic plug, covers most of Kailua Town and Kawainui Marsh, while the Koolau volcanic series comprises the greater part of the Koolau Range.

The process of erosion has created a topography characterized by relatively steep slopes and irregular ridges. Elevations range from sea level at Kailua Bay to over 2,000 feet at the crest of the Koolau Range.

The proposed site is located on ***top of a knoll at*** the southern end of Kalae o Kaiwa ridge. ***The knoll slopes down toward the east and west at a gradient of about two horizontal to one vertical (2H:1V) and 3H:1V, respectively.*** Elevations at the site range from 260 to 310 feet above mean sea level. The slopes range from 10 percent to as high as 60 percent. The steepest areas of the ridge are located along its southern and eastern faces.

4.3 SOILS

According to the *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii,* prepared by the U.S. Department of Agriculture Soil Conservation Service, the near surface soil in the area of the proposed project can be classified as Alaeloa silty clay, ***40 to 70 percent slopes (ALF)***. This soil type is well-drained and is formed in material weathered from basic igneous rock. The pH of the soil can range between 5.1 and 6.0. The surface layer tends to be moderately acidic while the subsoil can be strongly acidic.

The surface layer is dark reddish-brown silty clay. Beneath the surface lies a dark red to red silty clay with a subangular blocky structure. The substratum is soft, weathered basic igneous rock.

Due to the severe slopes along the southern and eastern face of the ridge, runoff from the site can be very rapid with a possibility of severe erosion hazard. The permeability of the soil can range from 2.0 to 6.3 inches per hour. The soil has a moderate shrink-swell potential.

A geotechnical engineering exploration was conducted by Geolabs-Hawaii in May 1999. Soil borings were drilled to depths of 65 feet at the project site to gather information on the material to be uncovered during construction excavation. The field exploration encountered saprolite soils overlying weathered basalt rock at greater depths. The saprolite soils are described as very stiff and dense; while the basalt formation is described as highly to moderately weathered and medium hard to hard. At the proposed reservoir foundation elevation, the basalt formation is anticipated to be severely to slightly fractured.

4.4 DRAINAGE

Due to its location spanning the crest of the ridge, existing drainage patterns flow in two general directions: eastward, toward residential development; and westward, toward the WCCC. The City and County of Honolulu maintains a municipal separate storm sewer system in the Lakeview residential development which presently intercepts runoff flowing eastward from the ridge. Runoff in the westward direction flows toward the WCCC and into a drainage swale within the state-owned lands. The swale conveys storm water runoff toward Kailua High School and a drainage system which eventually discharges at Kawainui Marsh.

4.5 FLOOD AND TSUNAMI HAZARDS

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map, the project site is located within Zone X, areas determined to be outside of the 500-year flood plain.

According to Tsunami Evacuation Oahu Map 6: Waimanalo to Kailua, the project site is not situated within a tsunami evacuation area.

4.6 FLORA AND FAUNA

A botanical survey of the project site was conducted by Char & Associates in April 1999 to describe the vegetation; inventory the flora; and search for threatened or endangered species, as well as species of concern. A copy of the report is included in **Appendix D**.

Two vegetation types were recognized at the site. The proposed access road site contained a dense thicket of Christmas berry (*Schinus terebinthifolius*) and koa haole (*Leucaena leucocephala*) with scattered, emergent trees. Vegetation within the proposed reservoir site was more open and grassy with scattered trees and shrubs.

> Christmas berry/Koa haole thicket. This vegetation type consists of 15- to 25-ft tall Christmas berry, which is a large shrub to tree, and smaller scattered patches of koa haole shrubs, 15 to 20 feet tall. Guava shrubs (*Psidium guajava*) and taller, emergent trees (20 to 35 feet tall) including Java plum (*Syzygium cumini*), octopus tree (*Schefflera actinophylla*), and Chinese banyan (*Ficus microcarpa*) were occasionally encountered. A few commonly used landscape tree species have escaped cultivation and naturalized on the hillside, including: Victorian box or orange pittosporum (*Pittosporum undulatum*), pink tecoma (*Tabebuia pentaphylla*) and fern tree (*Filicium decipiens*). Ground cover varies from clumps of grasses and scattered smaller shrubs in areas where the Christmas berry is taller, to dense tangles of vines where the Christmas berry forms a low, much-branching growth, 12 to 15 feet tall. Wedelia (*wedelia trilobata*), a commonly planted ground cover

plant, is abundant under the thicket near the existing reservoirs. Throughout the thicket, Guinea grass (*Panicum maximum*) and sourgrass (*Digitaria insularis*) form scattered clumps or small patches. Coral berry, a 2- to 3-ft tall herbaceous plant with bright red berries, is abundant. Other plants found under the thicket include: hairy abutilon (*Abutilon grandifolium*), comb hyptis (*Hyptis pectinata*), Chinese violet (*Asystasia gangetica*), Spanish clover (*Desmodium incanum*), and purple potato vine (*Solanum seaforthianum*). Huehue haole (*passiflora suberosa*) and maile-pilau (*Paederia foetida*) form tangled masses where the Christmas berry is low growing. Several ornamental species, including mock orange (*Murraya paniculata*), Mickey Mouse plant (*Ochna kirkii*), asparagus fern (*Asparagus setaceus*), sacred bamboo (*Nandina domestica*), and a palm– *Ptychosperma* sp. have also established small populations on the hillside.

Open Scrub Vegetation. As the proposed access road approaches the proposed reservoir site, the vegetation becomes open, grassy scrub with scattered trees and shrubs. Guinea grass is the most abundant grass, forming dense tufts from 3 to 4 feet tall. Thatching grass (*Hyparrhenia rufa*), molasses grass (*Melinis minutiflora*) and sourgrass are locally abundant in some places. Shrubs and trees scattered through the grassy scrub vegetation include: lantana (*Lantana camara*), guava, Christmas berry, Java plum, koa haole, Victorian box, and Formosan koa (*Acacia confusa*). Common herbaceous species and smaller shrubs include nettle-leaved vervain (*Stachytarpheta urticifolia*), pohapoha (*Passiflora foetida*), Spanish clover, hairy horseweed (*Conyza bonariensis*), and partridge pea (*Chamaecrista nictitans*).

On the moderately sloping to somewhat level reservoir site, the substrate is eroded with patches of exposed shallow soil or subsoil. In this area broomsedge grass (*Andropogon virginicus*), molasses grass, and golden beardgrass (*Chrysopogon aciculatus*) form large mats.

Char concluded that the project site is dominated by introduced or alien plant species. Of a total of 62 plant species inventoried during the field survey, 55 are introduced, 6 are native and 1 is originally of Polynesian introduction. The native species are all indigenous (native to the Hawaiian Islands and elsewhere), and can be found in similar environmental habitats throughout the islands. The indigenous species are: huehue (Cocculus orbiculatus), 'ulei (Osteomeles anthyllidifolia), popolo (Solanum americanum), 'uhaloa (Waltheria indica), golden beardgrass (Chrysopogon aciculatus) and pili (Heteropogon contortus). None of the plants is a threatened or endangered species; nor is any plant considered a species of concern.

It is unlikely that the project site provides suitable habitat for any significant bird or wildlife species. Although none were observed, it is anticipated that the area would be at least occasionally utilized by typical introduced mammals such as the small Indian mongoose, rats, mice, and possibly feral cats. Alien bird species commonly found in the surrounding urban areas are expected to be present in the project area as well; including the common mynah, doves, sparrows, red-crested cardinal, red-vented bulbul, and Japanese white-eye.

4.7 ARCHAEOLOGICAL AND HISTORIC RESOURCES

An archaeological inventory survey investigation was conducted by Cultural Surveys Hawaii in March 1999. The report is included in **Appendix E**. The purpose of the investigation was to identify and inventory any archaeological historic properties in the project area in order to determine the presence of significant historic properties. Background research revealed no archaeological projects had been previously conducted along the Kalae o Kaiwa ridge line. Based on documentary research, it was concluded that the site was used historically for grazing and it was doubtful that the site was ever intensively utilized prehistorically.

The project site was inspected by pedestrian sweeps. The field survey noted an overgrown, rusted barbed-wire fence atop the ridge, presumably extending the length of the ridge from Puu o Ehu in the north to Kalanianaole Highway in the south. Although the fence may be over 50 years old, it is in no way unique or especially representative of a time period, and not considered eligible for the State or National Register of Historic Places (SRHP/NRHP) based on the criteria of the Hawaii Register of Historic Places. With the exception of the barbed-wire fence, no historic or archaeological features were observed. No signs of traditional Hawaiian land use were observed.

In 1923, a combination tunnel, pipeline and ditch system was constructed to carry water from Kawainui Marsh to sugar lands in Waimanalo. The Waimanalo Irrigation System remained in operation until the mid-1950's, pumping water from Kawainui Marsh up to the Kailua Ditch which feeds water into Waimanalo. Remnants of this irrigation system have been designated as a state historic site (State Site No. 50-80-15-4042). Tunnel 10, a portion of the irrigation system, apparently crosses the project site, though its underground location was not evident during the field survey. The irrigation tunnel is completely defunct and valueless, according to the State Department of Agriculture, who has controlling interest of the system. However, the irrigation system is a significant historic property under SRHP/NRHP criteria A (association with broad patterns of history– namely the sugar industry in Hawaii) and criteria D (for its information content regarding historic irritation technology and practices)..

4.8 AIR QUALITY

Ambient air quality has been monitored by the State Department of Health (DOH) since 1957. The primary purpose of the monitoring is to measure ambient air concentrations of six pollutants: carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, ozone, and particulate matter that is 10 microns or less in aerodynamic diameter (PM_{10}). National Ambient Air Quality Standards (NAAQS) have been promulgated by the United States Environmental Protection Agency (USEPA) for these six criteria pollutants. However, the state standards for ozone, carbon monoxide and nitrogen dioxide are more stringent than the NAAQS. The DOH presently operates 12 monitoring stations, with nine located on the island of Oahu. Data from the DOH monitoring stations indicates that the levels for all of the criteria pollutants have consistently remained below federal and state air quality standards.

The station closest to the project site is located at the Waimanalo Sewage Treatment Facility (41-1069 Kalanianaole Highway). The DOH has been monitoring ambient air concentrations of PM_{10} at the Waimanalo station since 1989. There are no other ambient air quality monitoring stations on the windward side. This absence can be attributed to two primary factors: the lack of industry or other generator of high levels of pollutants, and the presence of tradewinds which tend to convey pollutants generated on the windward side to the leeward side of the island. However, air quality in the Kailua area can be predominately affected by vehicle emissions, with elevated carbon monoxide concentrations near traffic congested areas.

4.9 NOISE

The project site is located on an undeveloped knoll overlooking residential subdivisions and state-operated corrections facilities. The closest structures, situated between 700 and 1,000 feet away, include the Lakeview townhouse development, the buildings used by the WCCC and HYCF, and the existing 1.0 MG and 6.0 MG Pohakupu reservoirs (see **Figure 4-1**). Due to the distance from neighboring land uses and the undeveloped nature of the site, existing noise levels at the site are expected to be low. Typical sound levels encountered in common activities are listed in **Table 4-1**.

4.10 VISUAL RESOURCES

The project site is located on Kalae o Kaiwa ridge, above the Women's Community Correctional Center and Hawaii Youth Correctional Facility. The highest elevation within the project site is a knoll, approximately 313 feet above MSL. Kalae o Kaiwa, the highest point on the ridge, is situated approximately 700 feet north of the project site, at an elevation of over 366 feet above MSL. As described in **Section 4-6**, the reservoir site is characterized by open, grassy scrub with scattered trees and shrubs. The ridge is highly visible from Kalanianaole Highway to the south and the Keolu Drive/Enchanted Lakes area to the east. Visibility from Kailua Road to the west is obscured by trees within Pohakupu Park and the residential subdivision. Similarly, visibility of the project site from Kailua town to the north is hindered by Puu o Ehu ridge, and the larger knoll of Kalae o Kaiwa itself. While the project site is visible from scenic overlooks along the Pali Highway, the great distance (over 2 miles away), obscures details. In addition, the project site is not an outstanding feature in the overall field of view.

4.11 TRAFFIC

Traffic data was obtained from the State Department of Transportation (SDOT) Highways Division. Existing traffic along Kalanianaole Highway in the vicinity of the project site can be estimated by traffic counts taken at the two major intersections of Kalanianaole Highway. These intersections are Kalanianaole Highway at Kailua Road and Ulukahiki Street (Castle Hospital) and

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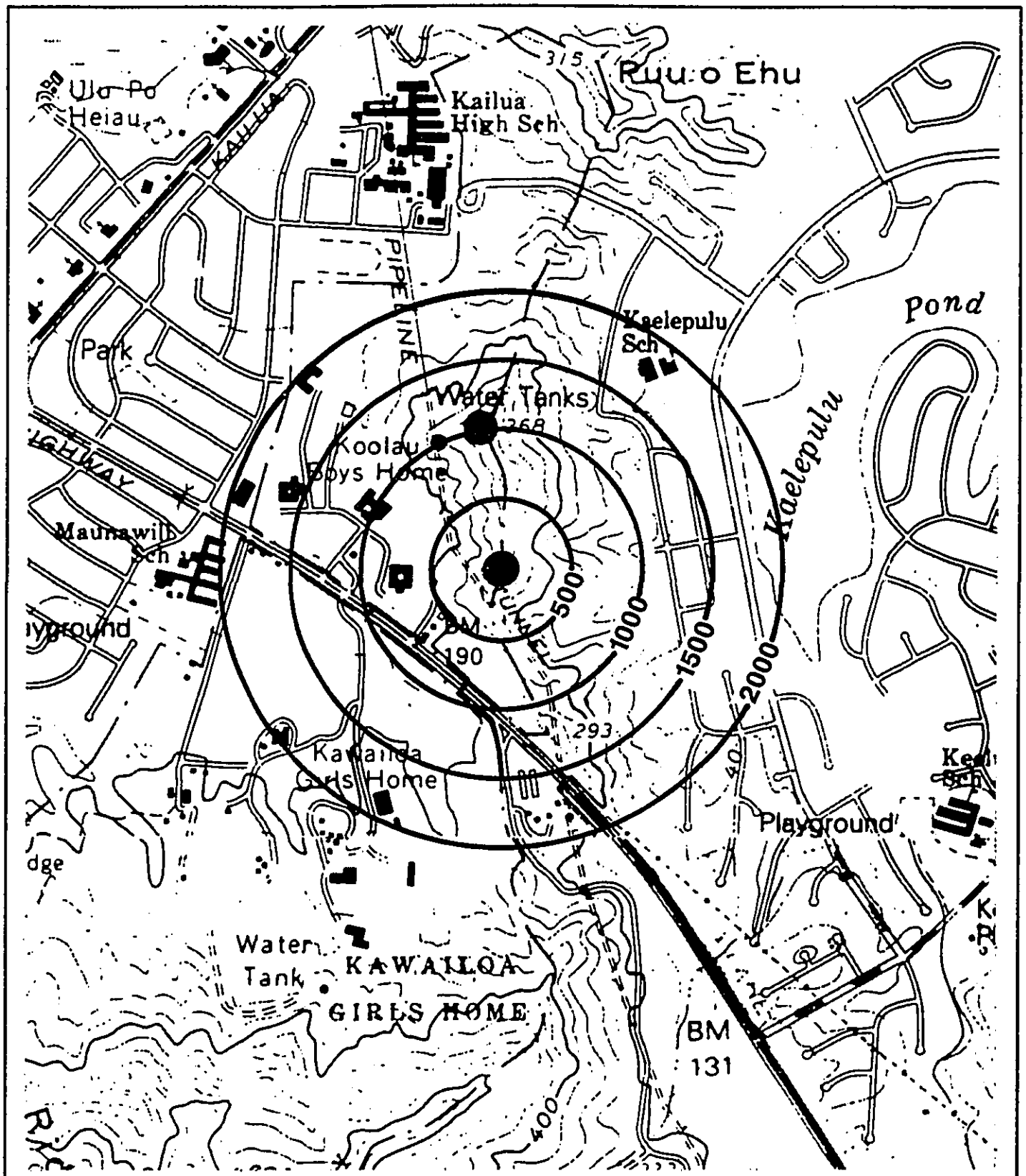


FIGURE 4-1

LOCATION OF
EXISTING STRUCTURES IN
PROXIMITY TO PROJECT SITE

TABLE 4-1
TYPICAL SOUND LEVELS ENCOUNTERED IN COMMON ACTIVITIES

SOURCE/LOCATION	dBL	SOUND LEVEL
Jet Takeoff (200 feet)	120	Intolerable
Shout	100	Very Noisy
Urban Street	80	
Automobile Interior	70	Noisy
Normal Conversation (3 feet)	60	
Office, Classroom	50	Moderate
Living Room	40	
Bedroom at Night	30	Quiet
Rustling Leaves	10	Barely Audible

Reference: Thomas D. Rossing, *The Science of Sound*, 1990.

Kalanianaole Highway and Keolu Drive (to Enchanted Lake). For descriptive purposes, east-bound traffic on Kalanianaole Highway is labeled "Waimanalo-bound", and west-bound traffic is labeled "Honolulu-bound". Traffic counts are depicted on **Figure 4-2.**

Information on peak traffic periods and vehicle counts was extracted from the SDOT data:

Morning Commuter Period. The highest traffic volumes on Kalanianaole Highway during the morning commuter period (5:00 a.m. to 9:00 a.m.) occurred from 6:30 a.m. to 7:30 a.m. at the intersection with Keolu Drive (1,762 vehicles), and from 6:45 a.m. to 7:45 a.m. at the Castle Hospital intersection (1,860 vehicles). Morning traffic in the Honolulu-bound direction peaked from 6:15 a.m. to 7:15 a.m., exceeding 1,300 vehicles. The peak in the Waimanalo-bound direction occurred from 7:30 a.m. to 8:30 a.m., exceeding 500 vehicles.

Daytime Non-Commuter Period. During the daytime non-commuter period (9:00 a.m. to 3:00 p.m.), the two-directional peak on Kalanianaole Highway occurred between 2:00 p.m. and 3:00 p.m. Traffic volumes exceeded 1,600 vehicles during this peak one-hour period. The directional peak in the Waimanalo-bound direction also occurred during this one-hour period, at approximately 900 vehicles. In the Honolulu-bound direction, the peak occurred from 9:00 a.m. to 10:00 a.m. at the Keolu Drive intersection (881 vehicles), and from 11:00 a.m. to 12:00 noon at the Castle Hospital intersection (926 vehicles).

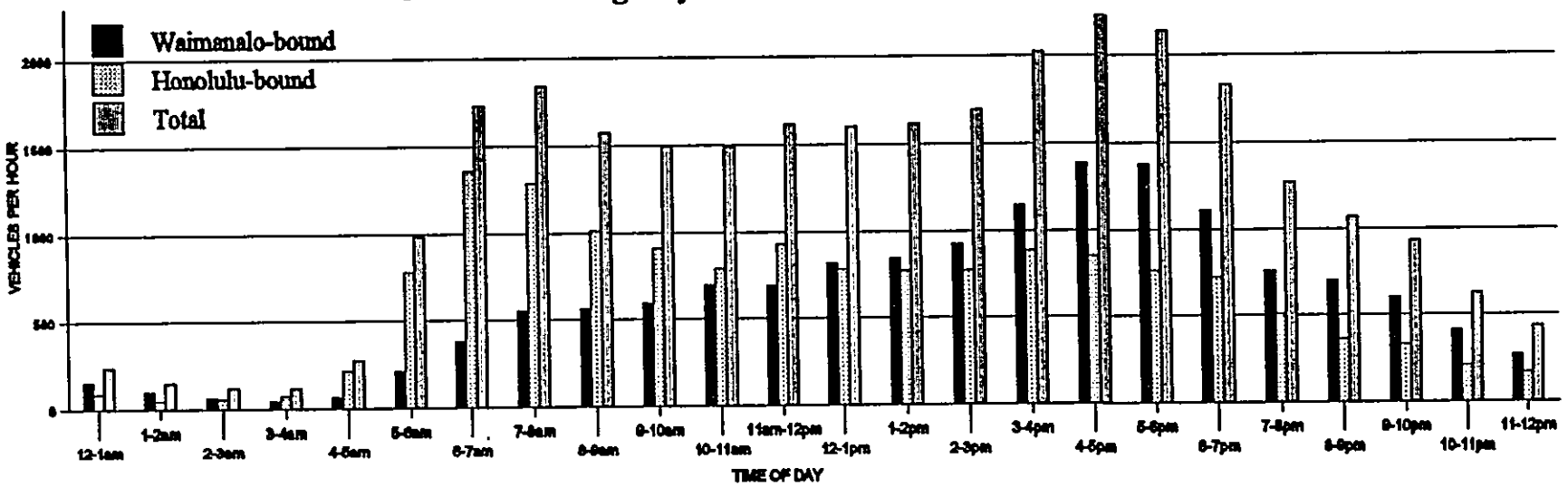
Afternoon Commuter Period. The two-directional peak afternoon commuter traffic on Kalanianaole Highway during the afternoon commuter period (3:00 p.m. to 7:00 p.m.) occurred from 4:00 p.m. to 5:00 p.m. at both intersections. At the Castle Hospital intersection, the vehicle count was 2,228 while 2,109 vehicles were counted at the intersection with Keolu Drive. The directional peak in the Waimanalo-bound direction was 1,289 vehicles, and 820 vehicles in the Honolulu-bound direction for the intersection with Keolu Drive. At the Castle Hospital intersection, the Honolulu-bound directional peak was 882 vehicles, from 3:00 p.m. to 4:00 p.m.; and 1,393 vehicles in the Waimanalo-bound direction from 5:15 p.m. to 6:15 p.m.

4.12 POPULATION AND ECONOMY

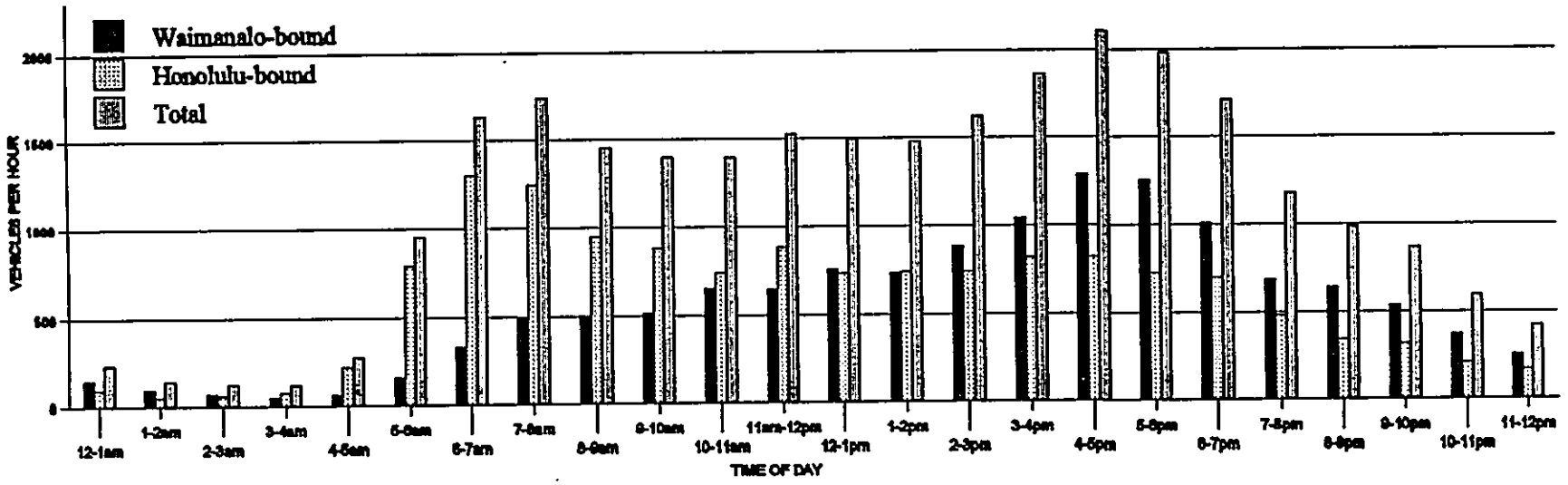
Kailua is a suburban residential community with supporting retail services that provide employment to local residents. Population and housing have grown slowly due to a lack of development and the City's General Plan directing growth to Leeward Oahu.

The residents in the Kailua area are generally characterized as long-time Hawaii residents. Other characteristics of the population of Kailua based on the 1990 census include: percent of college graduates above the island average and higher than average median household income. In 1995, the population in the Koolaupoko District was 121,990 (State of Hawaii Data Book, 1997). In

Kalanianaole Highway at Kailua Road & Ulukahiki Street



Kalanianaole Highway at Keolu Drive



Source: State of Hawaii Department of Transportation
June 15, 1998 Survey Date

FIGURE 4-2
KALANIANAOLE HIGHWAY TRAFFIC COUNTS

the Kailua Census Designated Place (CDP), the population was 36,818, based on the 1990 census.

4.13 PUBLIC FACILITIES AND SERVICES

Water Service

Water service to this part of Kailua is primarily being provided by the Pohakupu 272 reservoirs. Prior to 1986, water service was provided by the Kailua 272 Steel Reservoir, which has been taken out of service.

Fire Protection

Olomana Fire Station is located across Kalanianaole Highway from the project site. Other nearby fire stations are Kailua Fire Station, at the corner of Kuulei Road and Kainalu Drive in Kailua town, and Aikahi Fire Station at the entrance to Kaneohe Marine Corps Base Hawaii.

Schools

Educational institutions in the vicinity of the project site include Olomana School, Kailua High School, Maunawili Elementary School and Kaelepulu Elementary School.

CHAPTER 5
IDENTIFICATION OF POTENTIAL IMPACTS AND PROPOSED MITIGATIVE MEASURES

This chapter identifies the major impacts attributable to the proposed project and the means proposed to mitigate negative impacts. Impacts are categorized as "short-term" (normally of short duration, confined to the construction period) or "long-term" (prolonged or lasting impacts, resulting from reservoir operational activities).

5.1 REGIONAL IMPACTS

5.1.1 Potential Impacts

Long-term regional impacts due to development of the proposed 4.0 MG reservoir are generally positive, as described below:

Impact on Municipal Water System. Construction of a 4.0 MG reservoir on Kalae o Kaiwa ridge would have a positive impact on the municipal water system and the population it serves. From the water system standpoint, the positive regional impacts of this project will extend throughout the Windward Low Service System, with direct impacts to the Kailua low service area.

Impact on Population Growth. Development of the proposed reservoir will bring the present shortfall in water storage capacity up to BWS standards. The project is not expected to stimulate population growth in the region..

Generally, the long-term visual impact of the proposed reservoir on Kalae o Kaiwa ridge will decrease with distance from the site. The tank itself will be barely visible due to the recessed construction and landscaping. Refer to **Section 5.8** for additional discussion on the impact of visual resources and its mitigation.

Potential short-term regional impacts due to construction of the proposed 4.0 MG reservoir on Kalae o Kaiwa ridge may be limited to increased traffic on regional roads during earthmoving activities. Refer to **Section 5.9** for additional discussion on traffic impacts and its mitigation. The extent of regional traffic impacts will be dependent on the location of the disposal site for excess fill material. Hauling operations will result in large trucks traversing regional roads between the project site and disposal site. Traffic generated by concrete trucks may also result in a regional impact, during scheduled concrete pours.

5.1.2 Mitigative Measures

The BWS is committed to community relations and keeping the public informed about the proposed project and its construction. The following mitigative measures are proposed to maintain community relations and allay any negative regional impacts (perceived or actual) which may arise:

- Maintain communication throughout the construction period with the adjacent WCCC and HYCF, Kailua Neighborhood Board, and nearby community associations.
- Publicize construction in the daily newspapers and in newsletters published by the neighborhood board and community associations.
- Maintain a procedure whereby questions, concerns, and complaints about the project will be handled expeditiously.
- Inform the public about the project's benefits, to gain public understanding of the need for the reservoir and that it is an integral part of the overall Windward Low Service System.

5.2 SOIL EROSION

5.2.1 Potential Impacts

The potential for soil erosion will temporarily increase during the construction period and decrease after completion. The increase in soil erosion potential will result from removal of existing vegetation during grading activities. However once construction is completed, a reduction in erosion potential is expected due to the increase in impervious surfaces (reservoir and road) and establishment of permanent landscaping.

Another potential impact associated with soil erosion is degradation of receiving water quality which may result from sediment transport to storm drains and streams by surface runoff.

Soil amendments and fertilizers will be applied prior to planting to promote rapid establishment of ground cover and trees. Additional application of fertilizers will occur during the maintenance period.

5.2.2 Mitigative Measures

Clearing and grubbing will be conducted in accordance with Chapter 23, "Grading, Soil Erosion and Sediment Control," of the Revised Ordinances of Honolulu, 1978, as amended (Ordinance

No. 81-13). In addition, grubbing will be performed in accordance with Hawaii Administrative Rules, Chapter 11-54, "Water Quality Standards" and Chapter 11-55, "Water Pollution Control".

An erosion control plan will be prepared for the proposed construction (see **Figure 5-1**). The erosion control plan will identify specific best management practices (BMPs) which will be employed to minimize erosion and offsite sediment transport from the project site. Additionally, construction activities will be subject to conditions of the state's National Pollutant Discharge Elimination System (NPDES) general permit authorizing discharges of storm water associated with construction activity if the graded area encompasses five acres or more. Minimizing site erosion and associated sediment transport to state waters is a primary objective of this permit.

The proposed temporary construction access road will be paved, minimizing erosion and dust generation by truck traffic. In addition, a graveled wash down area will be constructed near the construction entrance off of Kalanianaole Highway to enable the contractor to rinse dirt and debris from trucks prior to entering the highway. Drainage from the graveled wash down area will be directed to a detention basin where debris will settle and can be removed by the contractor.

Other mitigation measures that may be employed include hydromulching with seeds or placement of erosion control matting to stabilize slopes and exposed surfaces. Silt fences, berms and other means of preventing offsite sediment transport to protect water quality may be utilized to prevent discharge of sediment-laden storm runoff to storm drains and state waters.

Care will be taken to minimize transport of the applied fertilizers and soil amendments in surface runoff. Irrigation of landscaped areas will be monitored. To ensure active growth, planted areas will be irrigated until moist but not saturated. Irrigation will be regulated to avoid erosion and gullying. A permanent irrigation system has not been proposed for the project site.

Due to construction within the Conservation District, construction activities will also be subject to conditions of the Conservation District Use Permit. Applicable standard conditions pertaining to erosion control include:

13-5-42(a)(17)	During construction, appropriate mitigation measures shall be implemented to minimize impacts to offsite roadways, utilities, and public facilities;
13-5-42(a)(18)	Cleared areas shall be revegetated within thirty days unless otherwise provided for in a plan on file with and approved by the department;
13-5-42(a)(19)	Use of the area shall conform with the program of appropriate soil and water conservation district or plan approved by and on file with the department, where applicable.

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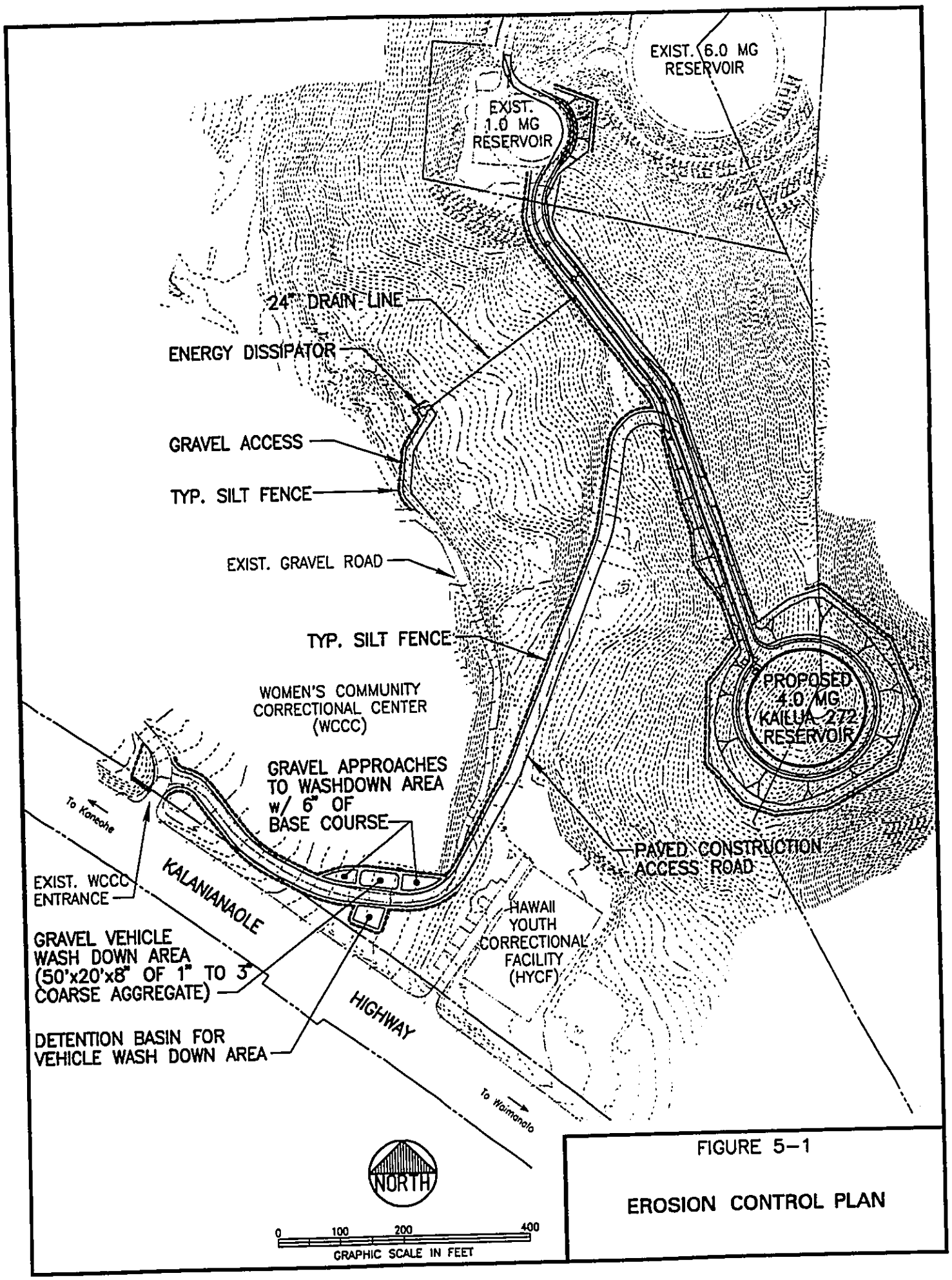

FIGURE 5-1

EROSION CONTROL PLAN

5.3 DRAINAGE

5.3.1 Potential Impacts

Construction of the proposed reservoir will result in alteration of existing drainage patterns at the project site. Presently, the project site spans two watersheds, due to its location at the top of the ridge. After development of the reservoir, ***approximately 1.2 acres of the project site, extending east from the ridge line*** which presently flows toward the municipal storm drains serving the residential community to the east will discharge toward the WCCC to the west. The amount of runoff discharging toward the west will further increase due to the addition of impervious surfaces at the previously undeveloped site. ***Approximately 3.9 cfs of runoff would result from this area in association with a 10-year, 1-hour rainfall event.***

In addition, during non-storm conditions, the proposed onsite drainage system will accept reservoir tank overflow and tank wash water. However, such occasions seldom occur in routine operations. The reservoir will be drained only during instances where interior cleaning work is required, such as to rid the tank of accumulated sediment or to perform interior structural inspections.

5.3.2 Mitigative Measures

The impact of additional storm water runoff will be mitigated by construction of a drainage system to collect and convey runoff to offsite facilities in a controlled manner. Tank drainage will also be conveyed offsite by the proposed drainage system.

During inclement weather, storm water runoff will flow to the onsite drainage system. During non-storm conditions, the onsite drainage system will receive reservoir tank overflow and tank wash water. Tank drainage can be controlled by opening and closing valves, to limit the discharge rate to the drainage system. To reduce the drainage and as a conservation measure, most of the tank will be consumed/drained into the water system first, with the remainder directed to the drainage system. The proposed energy dissipator outlet structure will dampen the runoff velocity to the downstream drainage system.

5.4 FLORA AND FAUNA

Based on the botanical survey of the project site, Char concluded that the proposed project is not expected to have a significant negative impact on botanical resources. The native species identified during the field survey are all indigenous and can be found in similar environmental habitats throughout the Hawaiian Islands. None of the plants is a threatened or endangered species; nor is any plant considered a species of concern.

The proposed project is not expected to have any significant adverse impact on bird or wildlife species.

5.5 ARCHAEOLOGICAL AND HISTORIC RESOURCES

Cultural Surveys Hawaii concluded that with the exception of the Waimanalo Irrigation System "tunnel 10", a portion of State Inventory of Historic Places (SIHP) No. 50-80-15-4042, there are no significant historic properties within the project area. During the field survey, no sign of the tunnel was observed, and its depth below the surface is unknown.

5.5.1 Potential Impacts

If SIHP No. 50-80-15-4042 can be avoided during construction, the project will have no effect on significant historic sites. The State Historic Preservation Division (SHPD), in their letter of June 3, 1999 (see **Appendix B**), concurred with Cultural Surveys Hawaii's conclusions. Further, the SHPD stated that only the Alternative 4 alignment for the temporary construction access road, which traverses previously undisturbed land on the hillside (see **Figure 3-2**), appears to impact the historic irrigation tunnel. The SHPD had no concerns regarding the other temporary construction access road alignments, including Alternative 3, the proposed alignment.

5.5.2 Mitigative Measures

Alternative 3, which is located along the alignment of the old construction access road for the Pohakupu 6.0 M.G. reservoir (built in the early 1980's), has been selected by BWS to mitigate impacts to tunnel 10. Information on the approximate location of tunnel 10 will be included in the construction documents to alert the contractor. In the unlikely event that the irrigation tunnel or other historic sites ***(including human burials, artifacts or other cultural remains or deposits)*** are discovered during construction activities, all work in the vicinity will cease and the SHPD will be contacted for direction.

5.6 AIR QUALITY

5.6.1 Potential Impacts

No long-term air quality impacts are expected from operation of the proposed reservoir. During construction, short-term impacts may be expected due to generation of fugitive dust and exhaust emissions from construction equipment and vehicles.

Dust will be heaviest during excavation, which is expected to take six months, depending on the method of excavation. Trucks and other construction vehicles will also generate dust as they traverse unpaved areas of the project site. The potential for generation of fugitive dust will

decrease once excavation and earthmoving activities are completed, and the reservoir and other facilities are under construction.

Areas expected to be most affected by fugitive dust during construction are the adjacent Women's Community Correctional Center and Hawaii Youth Correctional Facility.

5.6.2 Mitigative Measures

State air pollution control regulations require no visible fugitive dust emissions at the property line. To ensure compliance with these regulations, the following mitigation measures will be implemented:

- Dust minimization will be considered when planning construction phases to minimize dust-generating materials and activities, centralize onsite vehicular traffic routes, and locate potentially dusty equipment in areas of the least impact.
- An adequate water source will be provided prior to the start-up of construction activities.
- Bare areas, including slopes, will be grass-mulched or landscaped as soon as physically possible, starting from the initial grading phase.
- The majority of the construction access road will be paved for traction, safety and to control dust.
- Adequate dust control measures will be provided during weekends, after hours, and prior to daily start-up of construction activities.
- Dust from debris being hauled away from the site will be controlled by covering truck beds and providing a vehicle washdown area.

An effective dust control plan must be implemented by the contractor. Dust control measures may include watering the work area, using wind screens, keeping the construction access road and adjacent roads clean, and covering open-bodied trucks. Other dust control measures may include limiting the area that can be disturbed at any given time and/or mulching or stabilizing inactive areas. Paving and landscaping early in the construction schedule will also reduce fugitive dust. The contractor will be required to comply with the provisions of Chapter 11-60.1, "Air Pollution Control", Section 11-60.1-33 on Fugitive Dust.

In addition, the contractor will be required to implement measures to minimize air quality degradation by other sources, including vehicle exhaust emissions. Exhaust emissions may be mitigated by inspecting construction vehicles and moving construction vehicles and equipment during off-peak hours.

The BWS requires all construction work to comply with dust and exhaust emission limits set forth by the State DOH. Should these limits be exceeded, the contractor's work will be stopped until corrective measures are taken.

5.7 NOISE AND VIBRATION

The transmission of sound from the project site to surrounding areas is influenced by three broad types of natural effects: distance, atmospheric and terrain/vegetation. In addition, structures such as barriers and buildings influence the transmission of sound to neighboring areas. The natural effects in outdoor sound propagation are described below.

Distance Effects. Sound from a localized source (construction equipment) spreads out as it travels away from the source, and the sound pressure levels drop off with the distance according to the "inverse square law". In traveling twice the distance from the source, the sound energy per unit area decreases by a factor of four. Stated differently, doubling the distance from the source reduces the sound energy to one-fourth; tripling the distance reduces the sound level to one-ninth, etc. The sound pressure level roughly decreases at the rate of 6 decibels for each doubling of distance from the source. In addition, the air absorbs a certain amount of sound energy by molecular absorption.

Atmospheric Effects. Wind and temperature variations can cause bending of sound waves and influence changes in sound levels at large distances. A steady, smooth flow of wind at all altitudes would have no noticeable effect on sound transmission. In reality, however, wind speeds are slightly higher above the ground than at the ground. The resulting wind speed gradients tend to "bend" sound waves over large distances. Sound traveling with the wind is bent down toward the earth, while sound traveling into the wind is bent upward above the ground. When there is no wind, the principal sound arrives at the receiver in a direct path, although the ground, vegetation, and trees can absorb some of the sound. Downwind currents can reduce some of the attenuating effects of terrain and vegetation, or of solid barriers that otherwise intercept sound paths. In contrast, a strong, persistent upwind condition can cast a "shadow zone" that can account for up to about a 25 decibel sound level reduction for sound travel distances greater than about 1,000 feet at wind speeds about 10 to 15 miles per hour or more. Constant temperature with altitude produces no effect on sound transmission, but temperature gradients can produce bending in much the same way as wind gradients do. Air temperature above the ground is normally cooler than at the ground, and the denser air above tends to bend sound waves upward. With temperature inversions, the warm air above the surface bends the sound waves down to earth. At short distances, these effects are negligible, but they may amount to several decibels at distances over one-half mile. The various atmospheric effects discussed above are illustrated on **Figure 5-2**.

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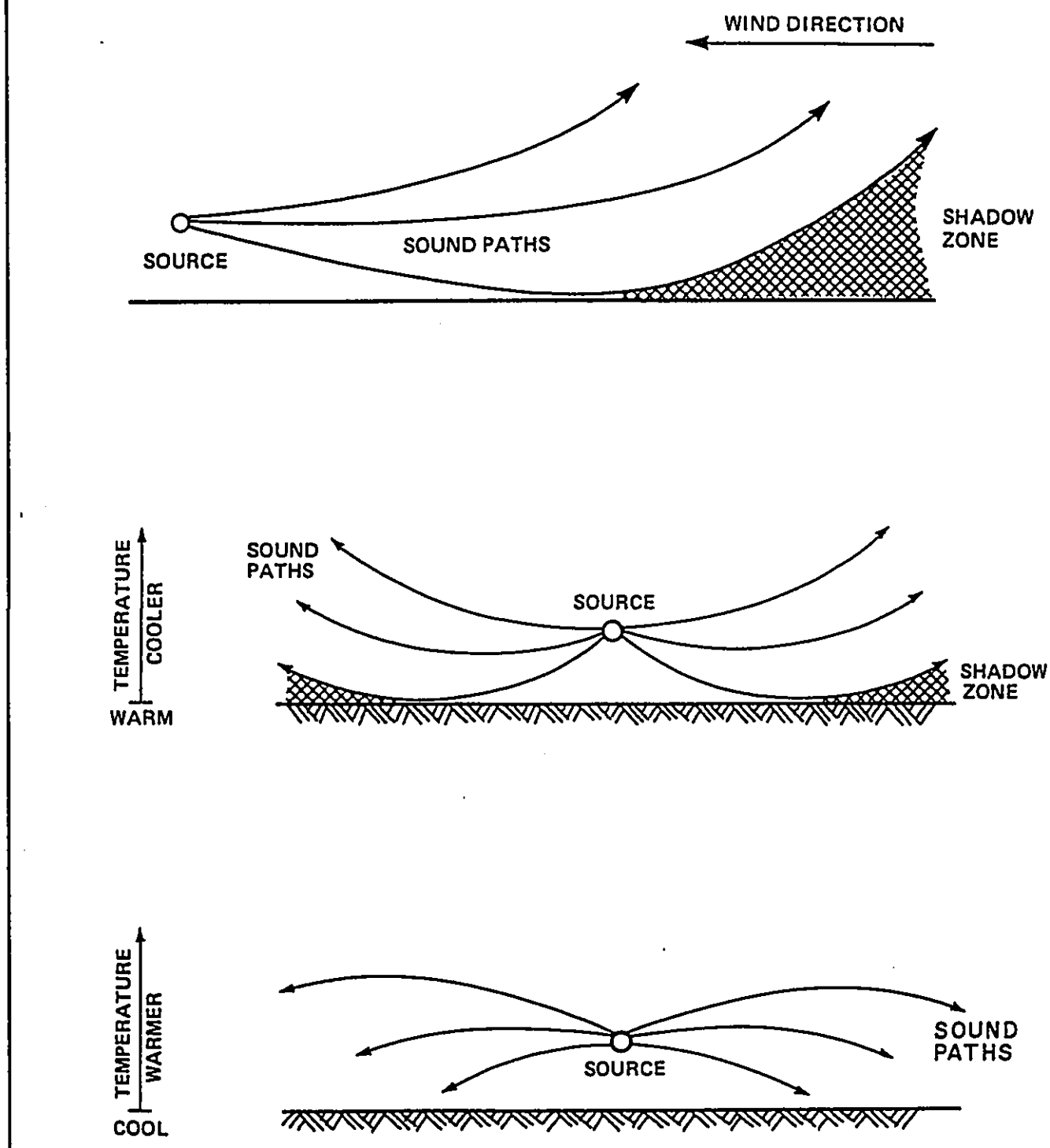


SOURCE: NOISE AND VIBRATION CONTROL FOR MECHANICAL EQUIPMENT U.S. GOVERNMENT, DECEMBER 1983

FIGURE 5-2

CLIMATIC INFLUENCES ON SOUND

Terrain and Vegetation Effects. The ground-reflected sound may arrive at the receiver either in-phase or out-of-phase with the direct sound path and can increase or decrease the received sound level. A hard ground surface reflects sound; a soft ground surface absorbs sound. When a direct path is virtually eliminated, there remains sound levels that are about 20 to 25 decibels below the levels of the direct or reflective ground path. A medium-dense wooded area through which sound must pass directly can reduce sound by 3 to 5 decibels.

Construction activities to excavate soil and rock to finish grade will generate different levels and pitches of noise. The project site has saprolite soils overlying weathered basalt rock. Vehicular noise will emanate from engines of heavy equipment such as backhoes, dozers, and trucks used for earthmoving activities. Excavation of basalt rock by hoe ram equipment will also generate noise. Due to the quantity and type of excavation involved, it may be desirable (for economic and time element reasons) to use the faster method of small explosives blasting to fracture the basalt. Detonation of small explosives to fragment rock will induce noise and vibration effects at the job site and immediate surrounding environs. The most expeditious manner of construction will mitigate the duration of noise exposure and construction-related impacts.

5.7.1 Potential Impacts

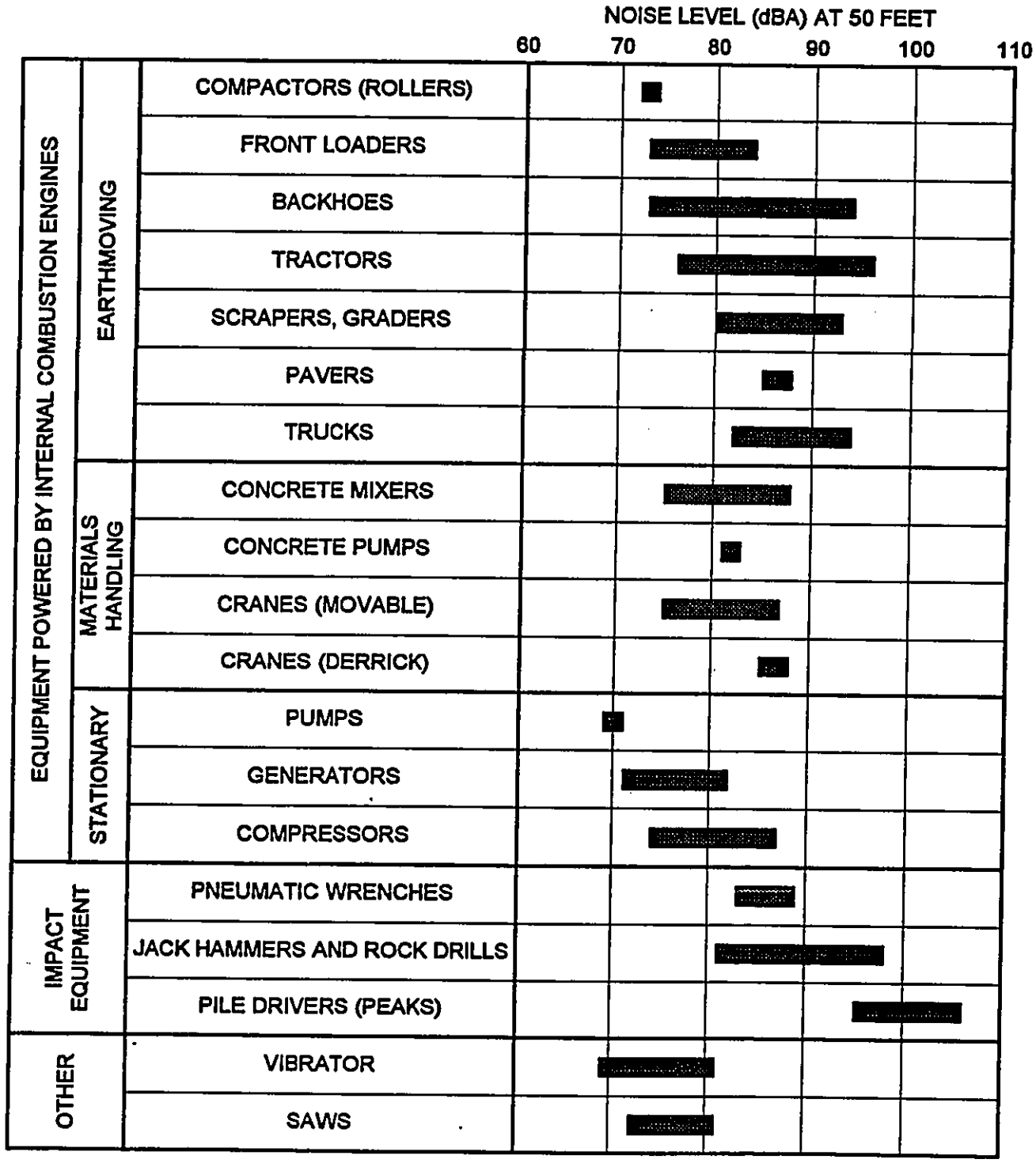
Noise generated by construction equipment would be a short-term environmental impact. As for long-term impacts following construction, reservoir operations will generate virtually no noise. There will be no loud electrical or mechanical equipment associated with daily operations.

Construction activities may generate significant amounts of equipment noise; with the actual levels being dependent upon the methods employed during each stage of construction by the contractor. The noise levels generated by some typical construction equipment are presented in **Table 5-1**. Vehicles such as engine-driven, tread-tracked bulldozers and trailer trucks will emit noise at 85 to 95 decibels during earthmoving operations or when traversing an inclined roadway. Pneumatic jackhammers used for rock breaking may also generate noise up to 98 decibels.

While it is likely that more than one noise-producing vehicle or equipment will be in operation at any given time, the cumulative effect on noise levels by more than one noise generator is not directly additive. For example, if two different equipment operate simultaneously, with one being more than 10 decibels louder than the other, the resultant noise level is the level associated with the louder equipment. The cumulative effect of two equipment producing the same level of noise is an increase of only 3 decibels. The cumulative effect of four equipment producing the same level of noise is an increase of 6 decibels.

Buildings within the Women's Community Correctional Facility and Hawaii Youth Correctional Facility are situated approximately 500 feet from the project site on the western side of the ridge. The nearest residential area is the Lakeview townhouse development, located on the eastern side of the ridge, about 700 feet away. Other nearby, noise-sensitive facilities include Maunawili and

TABLE 5-1
CONSTRUCTION EQUIPMENT NOISE RANGES



NOTE: BASED ON LIMITED AVAILABLE DATA SAMPLES

Kaelepulu Elementary Schools, both located about 1,800 feet away. Based only on the earlier described distance affect principle of outdoor sound propagation and sound transmission attenuation and analyzing the situation where the noise source is in direct line of sight to a sound receiver, it is estimated that construction sound levels will be reduced about 20 to 30 decibels at such sites (see **Table 5-2**). For comparison, long term land use compatibility and sound levels are presented in **Table 5-3**. Hawaii Administrative Rules, Chapter 11-46 "Community Noise Control" states the maximum permissible sound levels for various zoning districts. The allowable noise level for residential and preservation districts during daytime hours (7:00 a.m. to 10:00 p.m.) is 55 dBA.

As in most development projects, construction noise will likely exceed the allowable limits in the regulations of Chapter 11-46 since noise standards are set and measured at the job site property line. Consequently, a ***Community Noise Permit for Construction Activities*** will be obtained from the Hawaii State Department of Health (DOH) that will specify the allowable conditions under which noise-producing operations can occur (i.e. restricted time periods of the day, restricted days, etc.). Construction equipment that emit exhaust gas or air and roadway transit vehicles must be equipped with mufflers to meet the noise level limits of Chapter 11-42, "Vehicular Noise Control for Oahu".

Should blasting be performed, the following additional impacts may result:

Blast-induced ground and air vibrations have the potential to startle or disturb surrounding residents and facilities, and damage structures. The air blasts associated with blasting are concussion type, low frequency vibrations that are of short duration (or impulsive) and are generally characterized in terms of peak overpressure in pounds per square inch (psi) or in dBL. The dominant sources of the air blast are the Air Pressure Pulse, which is cause by the large displacement of the ground surface near the explosive charge, and the Stemming Release Pulse, which is cause by gas pressure ejecting the stemming material placed in the bore hole to set the explosive charge.

When exposed to high peak overpressure levels exceeding 141 dBL, large plate glass windows may break. At peak overpressure levels over 171 dBL, most windows can be expected to break. For these reasons, blasting activities are generally conducted in a manner to limit air blast levels to below the 141 dBL level, thus controlling and minimizing risks of damage to structures.

The low frequency characteristic of air blast noise tends to induce vibrations in structures, sometimes causing complaint reactions. In contrast, high frequency sounds of equal amplitude to blast noise generally do not induce vibrations and/or cause physical damage to structures. Low frequency air blast sounds are inaudible to humans, but structures that vibrate from shock waves can produce secondary audible effects such as rattling sounds of fixtures, doors, etc. Sound levels at which these secondary audible effects occur vary with the weight and the stiffness of the structure. In general, the inception point of sound-

TABLE 5-2
TRANSMITTED NOISE LEVEL

Location	Distance to Noise Source (feet)	Estimated Noise Level (decibels)*	
		Tractors, Trucks, Jack Hammers	Front Loaders, Backhoes, Concrete Mixers
Project site	0	95	75
WCCC/HYCF	500	75	55
Lakeview residences	700	72	52
Maunawili Elementary School Kaelepulu Elementary School Ulupii Street residences	1,800	64	44

* Estimated noise level reduction due to distance effect alone. Excludes effects of atmosphere and terrain/vegetation.

TABLE 5-3
SOUND LEVELS LAND USE COMPATIBILITY RELATIONSHIP

LAND USE	Yearly Day-Night Average Sound Level (dBL) 50	60	70	80	90
Residential - Single Family, extensive outdoor use					
Residential - Multiple Family, moderate outdoor use					
Residential - Multi-Story, limited outdoor use					
Transient Lodging					
School Classrooms, Libraries, Religious Facilities					
Hospitals, Clinics, Nursing Homes, Health-Related Fac.					
Auditoriums, Concert Halls					
Music Shells					
Sports Arenas, Outdoor Spectator Sports					
Neighborhood Parks					
Playground, Golf, Riding Stables, Water Rec.,Cemeteries					
Office Bldg., Personal Services, Business and Professional					
Commercial - Retail, Movie Theaters, Restaurants					
Commercial - Wholesale, Some Retail, Ind., Mfg., Utilities					
Livestock Farming, Animal Breeding					
Agriculture (except livestock)					
Extensive Natural Wildlife and Recreation Areas					

REFERENCE: ACOUSTICAL SOCIETY OF AMERICA, 1980

LEGEND

COMPATIBLE

WITH INSULATION

MARGINALLY COMPATIBLE

INCOMPATIBLE

induced vibration is difficult to establish, but it may occur at levels as low as 80 dBL. These levels are significantly below the peak air blast levels of 120 to 136 dBL, which have been associated with low risk of damage to structures. Thus, sound-induced secondary audible effects that may be felt are not necessarily associated with effects of damage to structures.

Ground vibrations, or seismic waves, are also generated during blasting operations and are generally described in terms of peak particle velocity in inches per second. Most of the seismic energy remains confined to the ground, but some energy is released as an overpressure pulse into the air (or Rock Pressure Pulse). Typically, the ground vibrations as well as the airborne Rock Pressure Pulse are expected to be less intrusive that the Air Pressure and Stemming Release Pulses.

Predictions of peak overpressure or ground vibration levels versus distance from the blast are not precise, with initial uncertainties for a given location in the order of 20 to 30 dBL. For this reason, it is standard practice to employ site-specific seismograph monitoring of air and ground vibrations during actual blasting operations with a 3-axis geophone instrument to monitor ground vibrations and a microphone to monitor air vibrations.

In conducting blasting operations, the construction industry generally requires seismograph monitoring at the structures closest to the bore holes. Based on the monitoring data, explosive charge sizes (or weights) are adjusted in order to limit peak overpressures of the airblasts to levels below the threshold of possible damage to structures.

A summary of the vibration effects associated with ground blasting is presented on **Figure 5-3.**

5.7.2 Mitigative Measures

Construction noise can be controlled using noise control devices (exhaust mufflers, intake silencers) and barriers (partition shields) and by scheduling construction activities during off-peak hours to avoid inconveniences to motorists, residents and neighboring facilities.

Sound levels emanating from any stationary equipment will be attenuated to comply with the provisions of Hawaii Administrative Rules, Chapter 11-46 "Community Noise Control".

The BWS requires all construction work to comply with noise limits set forth by the State DOH. Should these limits be exceeded, the contractor's work will be stopped until corrective measures are taken.

Since complaints resulting from airblast noise levels could occur at levels considerably below those necessary to cause damage to structures (120 to 136 dBL), additional mitigation measures

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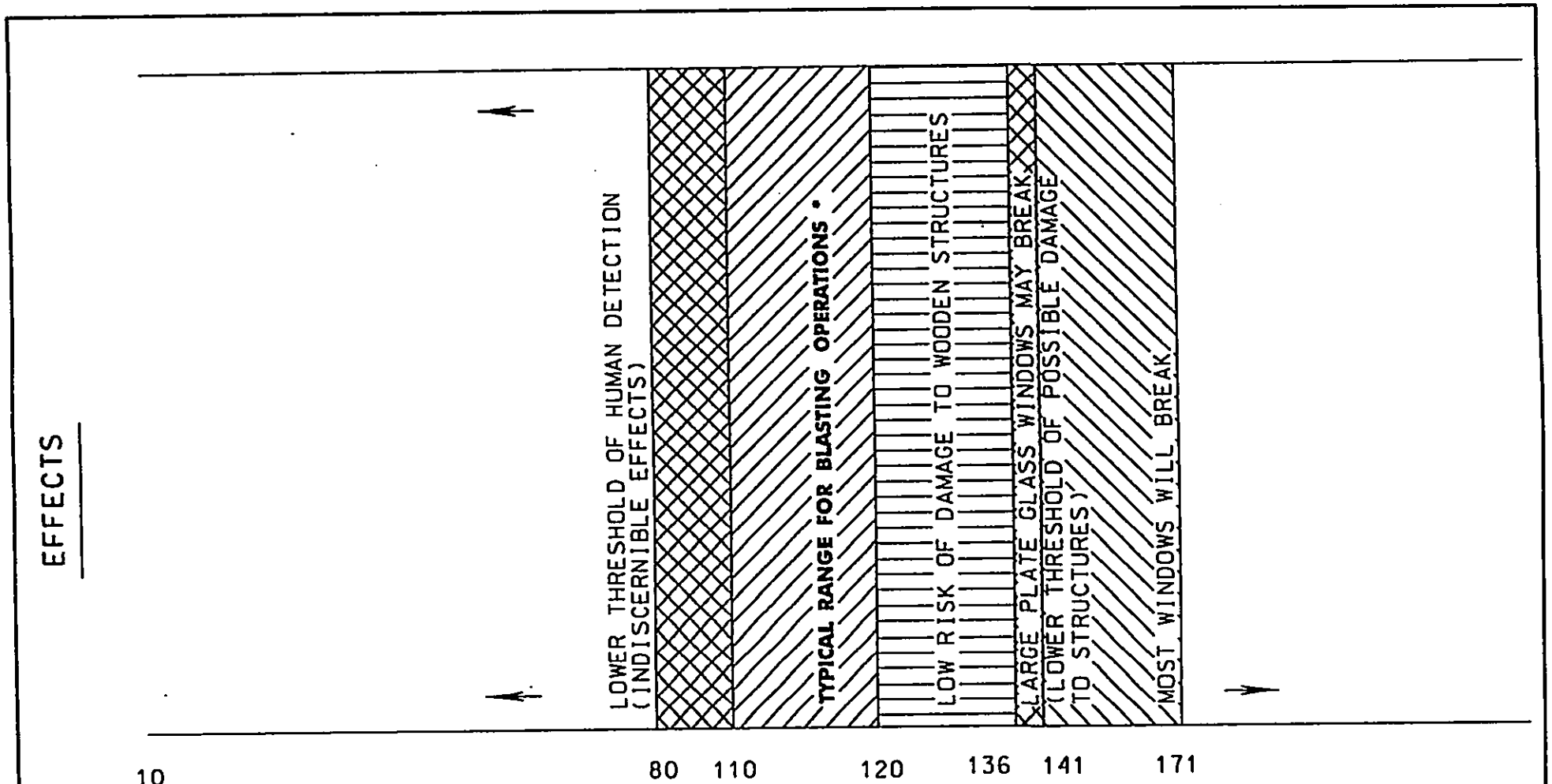

NOT TO SCALE

* MONITORED BY GEOPHONE INSTRUMENTS DURING BLASTING OPERATIONS

FIGURE 5-3

VIBRATION EFFECTS OF EXCAVATION BLASTING

will probably be required to minimize risks of annoying neighbors. These recommended mitigation measures are described as follows:

- Develop a monitoring program to identify a safe level of air blast and ground vibration simultaneously on both sides of the ridge at homes and facilities which are closest to the source of blast.

- For initial blasts, prior to the establishment of a data base of airblast levels versus scaled distance, use a maximum charge weight (in equivalent pounds of TNT) per delay of less than $(D/102)^2$ pounds, or distance divided by 102 and the quantity squared, where D is the distance in feet between the charge and the nearest noise sensitive residence or structure. This should probably not exceed 5 pounds of charge.

- If practicable, reduce maximum airblast levels to less than 110 dBL at the nearest noise sensitive residences in response to airblast complaints. Possible methods of accomplishing this are to (1) reduce the charge size, (2) increase the delay intervals, (3) increase hole depths, (4) orient bore holes to direct the Stemming Release Pulse away from noise sensitive properties, (5) truck in high quality material to minimize stemming blowouts, and (6) filling (sandbagging) over the area to be blasted and the detonating chord.

- Schedule actual blasting during the warm periods of the day to minimize the possibility of thermal ducting and focusing of airblast noise at large distances from the blast. If possible, schedule blasting during fixed time periods which are publicized and made known to area residents.

- Restrict blasting operations which exceed 95 dBL at residences to the hours of 9:00 a.m. to 5:30 p.m. of the same day, and to weekdays only (excluding holidays). For other noise sources associated with excavation operations, follow State Department of Health permit procedures and requirements for construction activities.

- The contractor shall be responsible for conducting a pre-blast survey of the area and shall remove potential falling boulders.

- Construct temporary perimeter barriers to contain any loose material that may be dislodged during blasting.

- During blasting operations, any animals grazing on the ridge may need to be relocated.

5.8 VISUAL RESOURCES

The *Coastal View Study* prepared by the (former) City and County of Honolulu Department of Land Utilization examines views from public viewpoints and coastal roadways in the Special

Management Area. As stated in this study, a view analysis performed for a proposed project should take into consideration the following visual qualities of an area:

Vividness	Memorability of a landscape derived from contrasting landscape components combining to create distinctive visual patterns
Unity	Degree to which visual resources of a landscape scene join together to form a coherent, harmonious visual pattern
Intactness	Extent to which landscape is free from visually encroaching features

Relevant visual characteristics in the case of the proposed reservoir appear to be vividness and unity. The mountains and ridges provide a high degree of contrast in this suburban setting.

The *Coastal View Study* also identifies view concerns and opportunities, taking into consideration the following situations:

- Where views of exceptional visual quality should remain unaltered
- Where significant views may be lost or diminished due to future development
- Where limited or no views are presently available but enhancement opportunities may be possible

The view of the project site does not appear applicable in this situation. Kalae o Kaiwa ridge is only one of many landforms in the area, the dominant one being the Koolau Mountain Range. Views of the Koolaus would not be altered by the proposed project. Enhancement opportunities may exist but would probably be limited.

The Special Provisions of the Development Plan (City and County of Honolulu Department of Land Utilization) identifies significant open spaces and public views. Section 24-6.2, Urban Design Principles and Controls for Koolaupoko, lists important public views that should be protected whenever possible. The panoramic view of the Pali and view of Puu o Ehu ridge and Olomana from the Kaelepulu Pond area are listed. Although views of Kalae o Kaiwa ridge have not been specifically mentioned, views of major landmarks from public places should be protected whenever possible.

The Koolaupoko Sustainable Communities Plan, presently under review by the City Council, has been prepared by the City and County of Honolulu Department of Planning and Permitting in accordance with Charter-prescribed requirements for development plans and is to be accorded force and effect as such for all Charter- and ordinance-prescribed purposes. The sustainable communities plan states: "Views of ridgelines or upper slopes of coastal headlands and mountains from the vantage points of coastal waters, major roads, parks and other public places...should be kept free from significant land disturbance or the encroachment of structures." The plan goes on to state that the visual integrity of mountains and coastal headlands should be preserved due to

their prominent visibility from long distances and because they are a fundamental element of the regional identity. Guidelines pertaining to mountain areas states that structures should be located at higher elevations of slopes only for purposes of public safety or compelling public interest, and be permitted only after a view impact analysis has determined that the specific site and design of the structure has incorporated every available means to avoid visibility within the significant viewplanes; that unavoidable impacts have been suitably mitigated; and that the public agency or utility has demonstrated there is no feasible alternative to fulfill the public need.

In recent years, the BWS reinstituted its attention to aesthetics in the design of reservoirs. Emphasis is placed on appearance and beautification of facilities and the surrounding environs, with attention given to landscaping. From fiscal year 1985-86, the BWS implemented a reservoir and building painting and repair program. Landscaping improvements have been made at various reservoirs.

Examples of existing reservoirs in the Kailua area are shown on **Photos 1, 2, 3** and **4**. The Pohakupu 272 reservoirs are the least visible, due to recessed construction within a "bowl" atop the ridge and landscaping to provide a visual screen.

5.8.1 Potential Impacts

The proposed reservoir will be 192 feet in diameter and 22 feet high. The ridge will sustain cuts up to 60 feet deep to create a "bowl" in which the reservoir will be constructed. The 6.0 MG Pohakupu reservoir was erected in a similar "bowl" excavated along the ridge (**Photo 5**). Visually, the knoll will be truncated or leveled at the top by nearly 40 feet. Based on observations from numerous locations in Kailua, the graded knoll will be evident from two primary locations: from Kalanianaole Highway and Keolu Drive/Enchanted Lakes. In general, the significant view planes impacted by the reservoir are located in the immediate vicinity of the project site. Distant views will be less affected.

Representations of the reservoir, associated grading and landscaping, were superimposed by computer on photographs to aid in the assessment of the visual impact of the project. Existing and "expected" views of the project site have been included from public vantage points with significant view planes. The approximate location of these photographs is indicated on **Figure 5-4**. A description of these affected views follows:

> Existing and expected view from Kalanianaole Highway fronting the Women's Community Correctional Center. The photograph of the existing condition was taken from a position over the chain link fence which separates the WCCC from the highway (**Photo 6**). The actual view from the highway would include the fence and a row of utility poles along the highway shoulder. The combination of these structures in the foreground and the WCCC buildings beyond somewhat distract from the background view of the ridge. The project site is the knoll located to the right of Kalae o Kaiwa, the highest point on the ridge. The reservoir access road will extend from the existing 1.0 MG Pohakupu

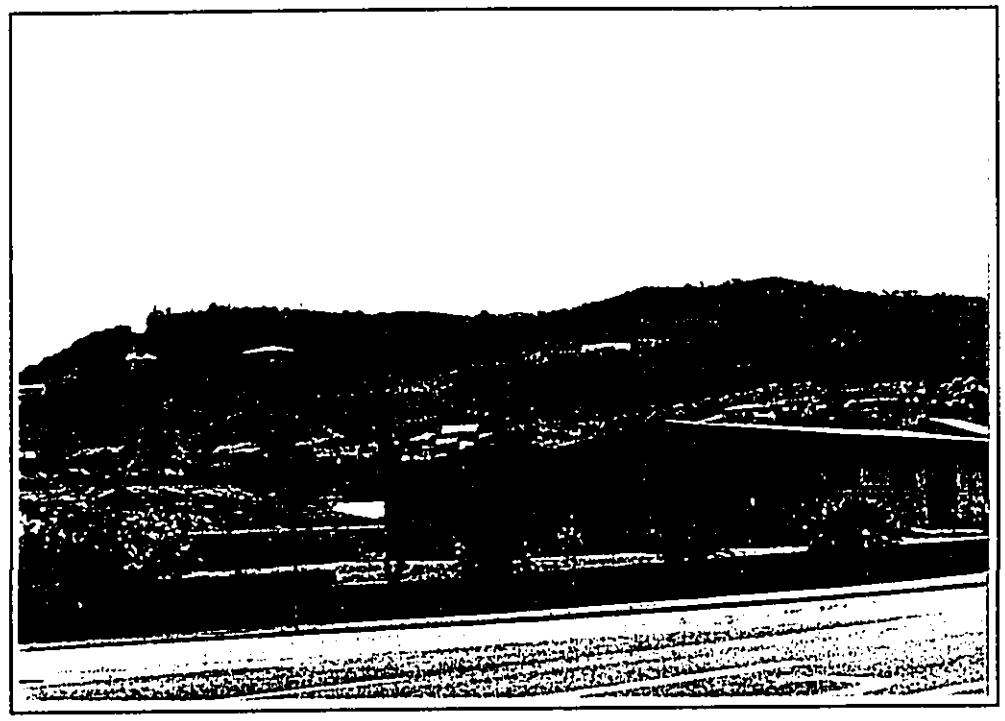

PHOTO 1 - 0.3 MG Kailua Heights 272 Reservoir

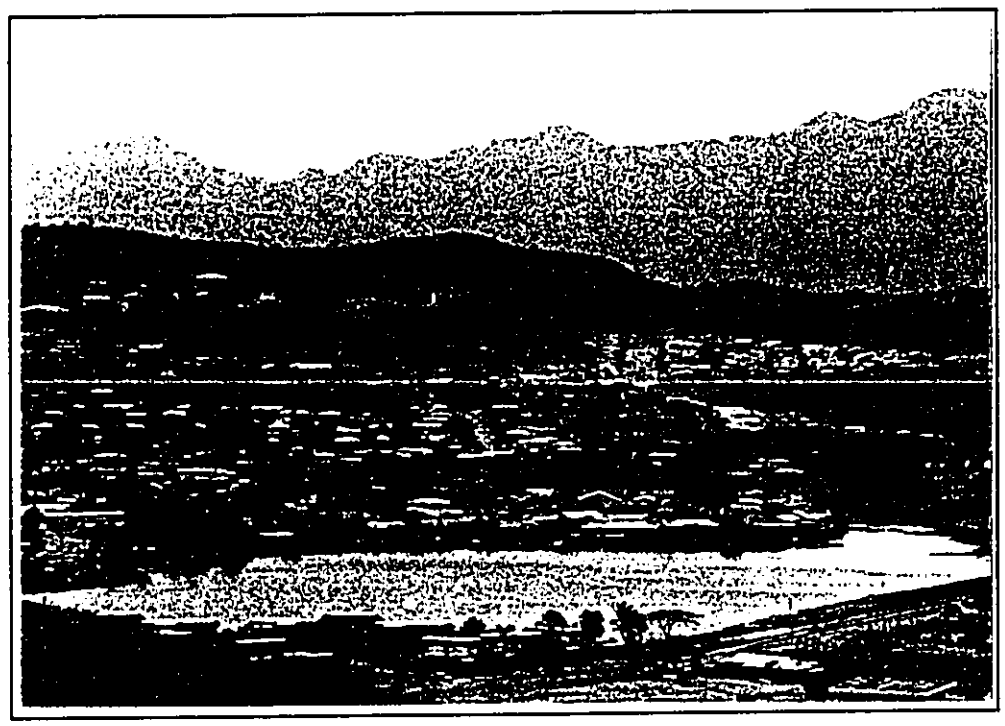

PHOTO 2 - 0.3 MG Kailua Heights 272 Reservoir

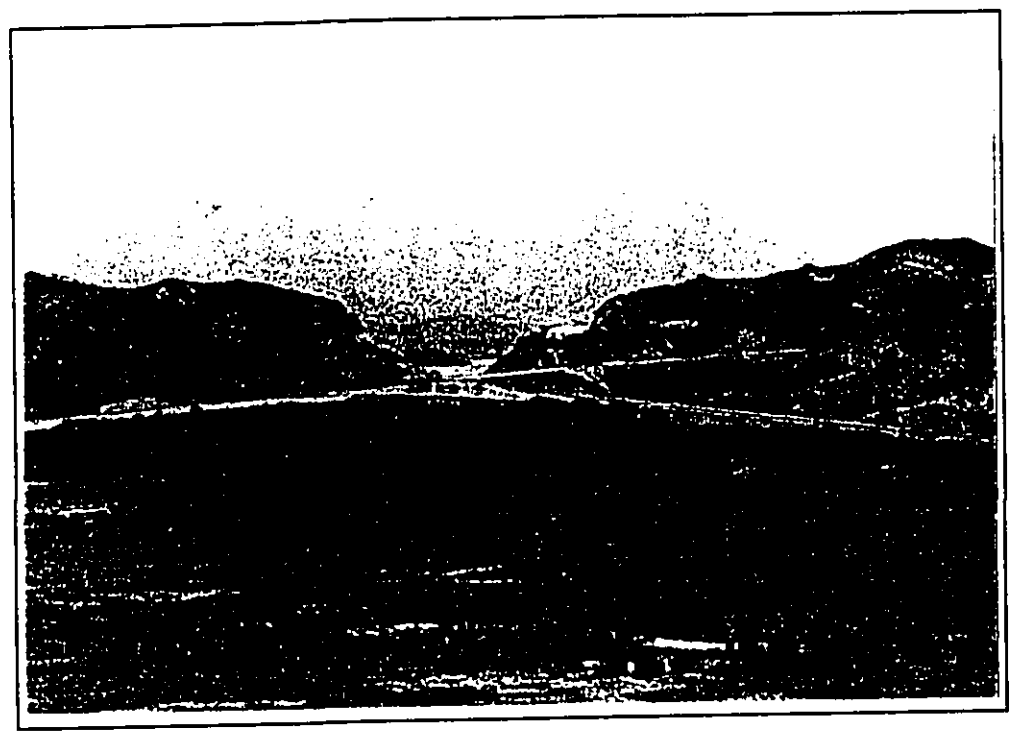

PHOTO 3 - 2.0 MG Kapaa 272 Reservoir

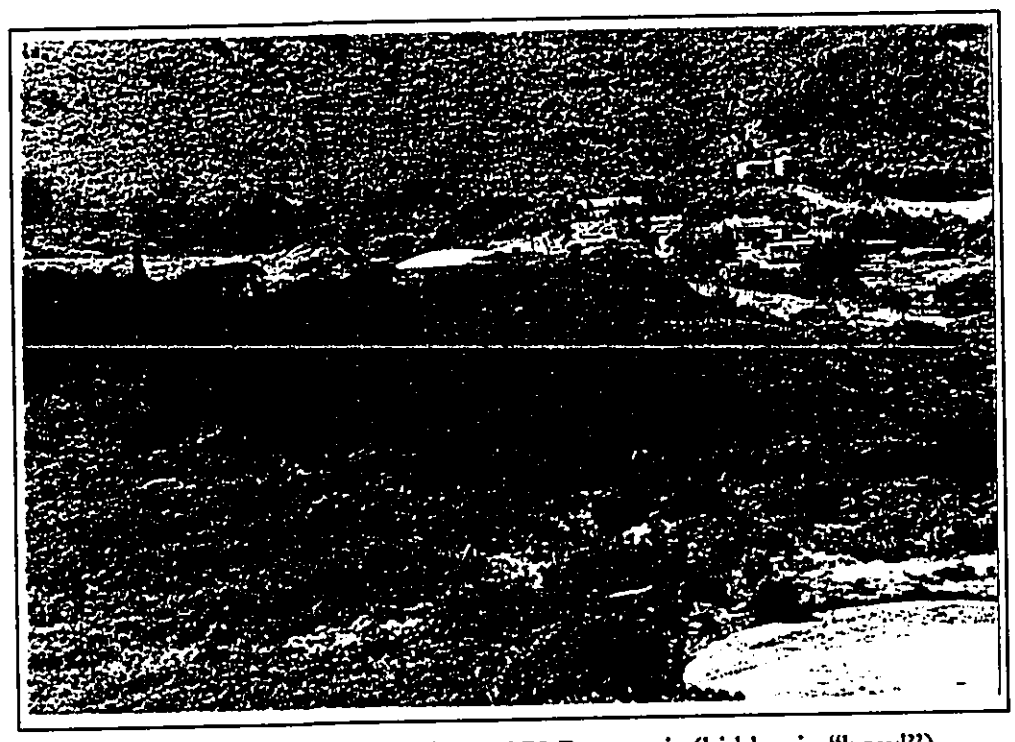

PHOTO 4 - 6.0 MG Pohakupu 272 Reservoir (hidden in "bowl")
and 1.0 MG Pohakupu 272 Reservoir (domed roof)

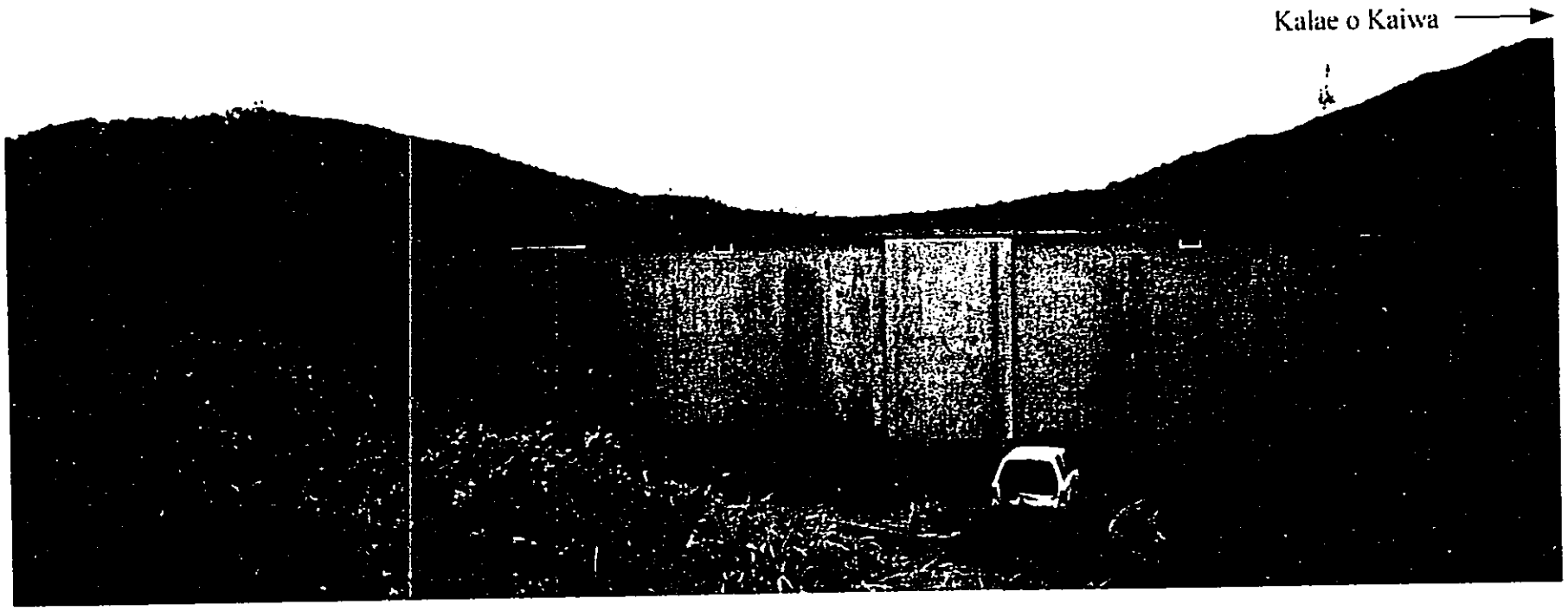

PHOTO 5 - 6.0 M.G. Pohakupu 272 Reservoir (hidden within a recessed "bowl" atop the ridge)

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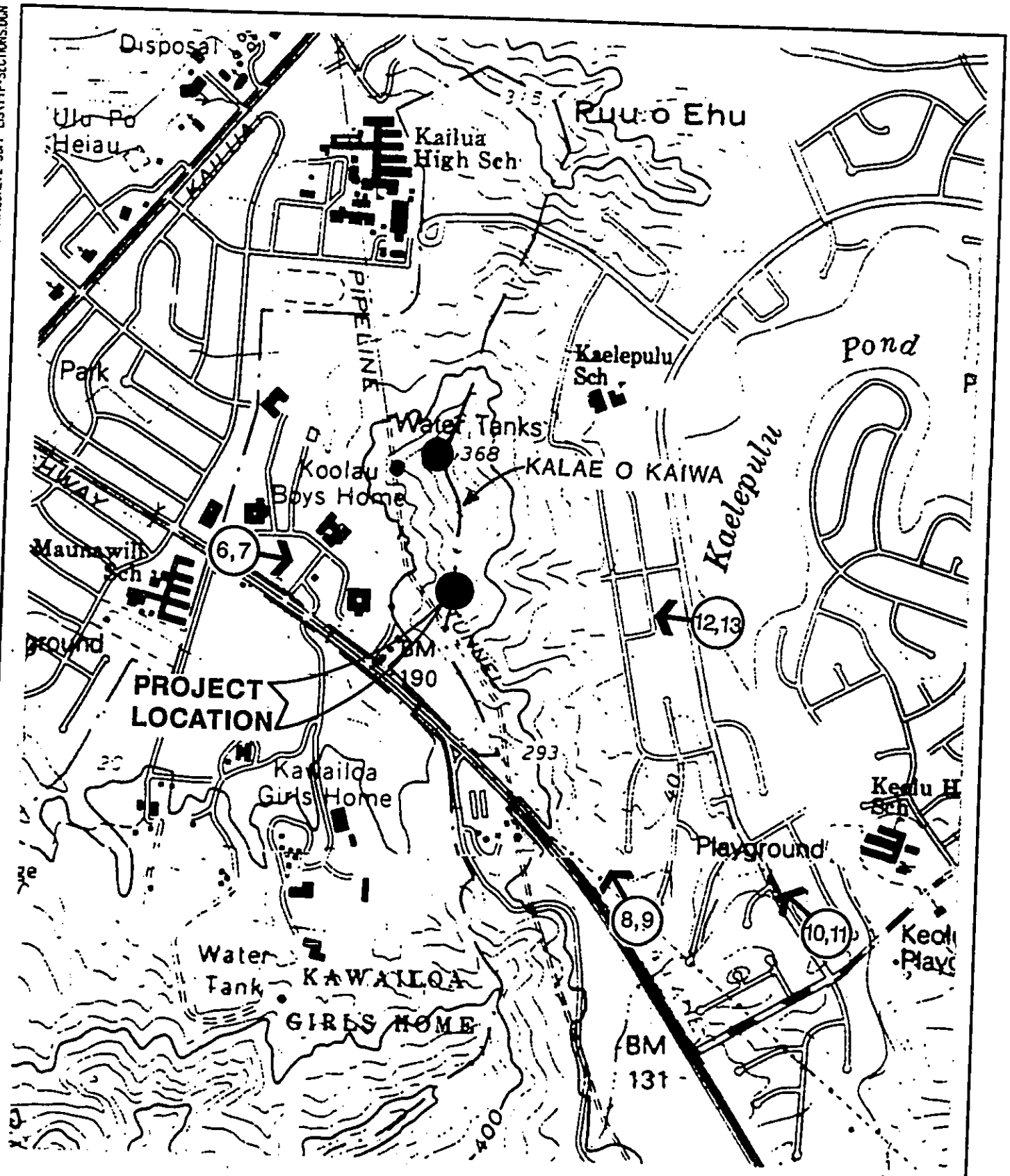

FIGURE 5-4

PHOTO LOCATION MAP

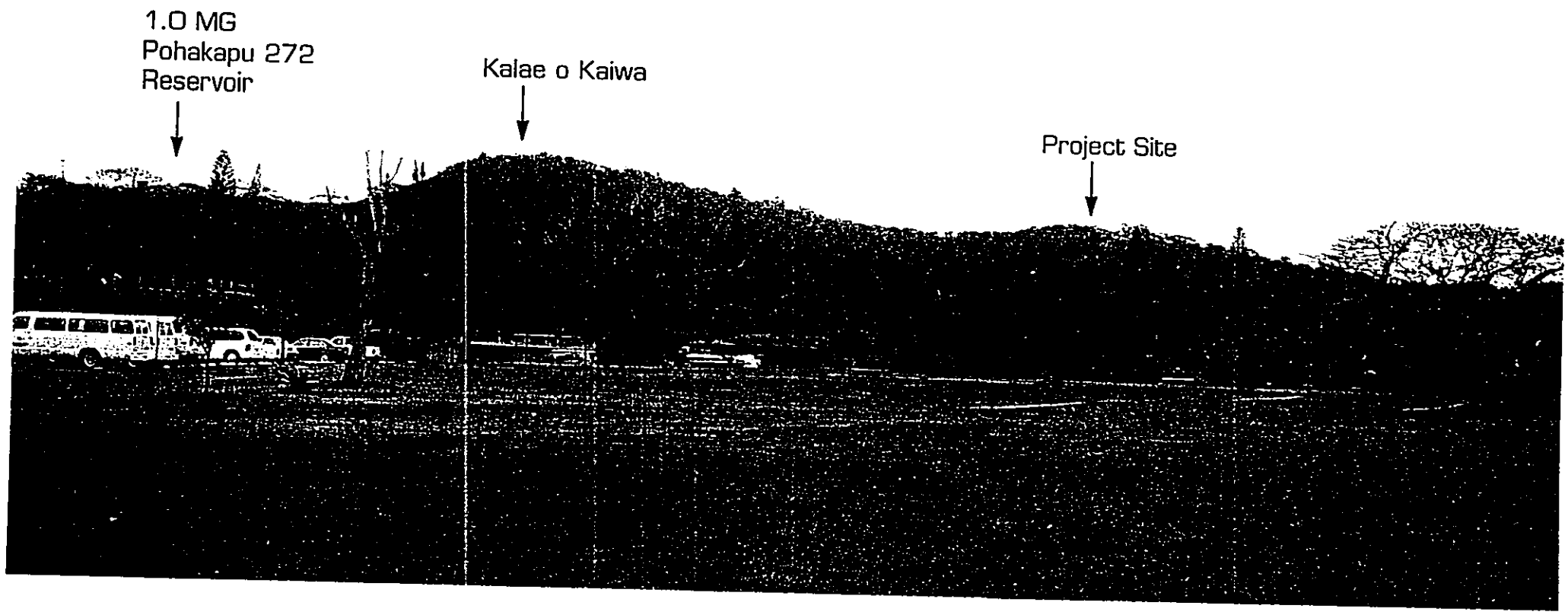

PHOTO 6 - Existing view from Kalanianaole Highway fronting the Women's Community Correctional Center

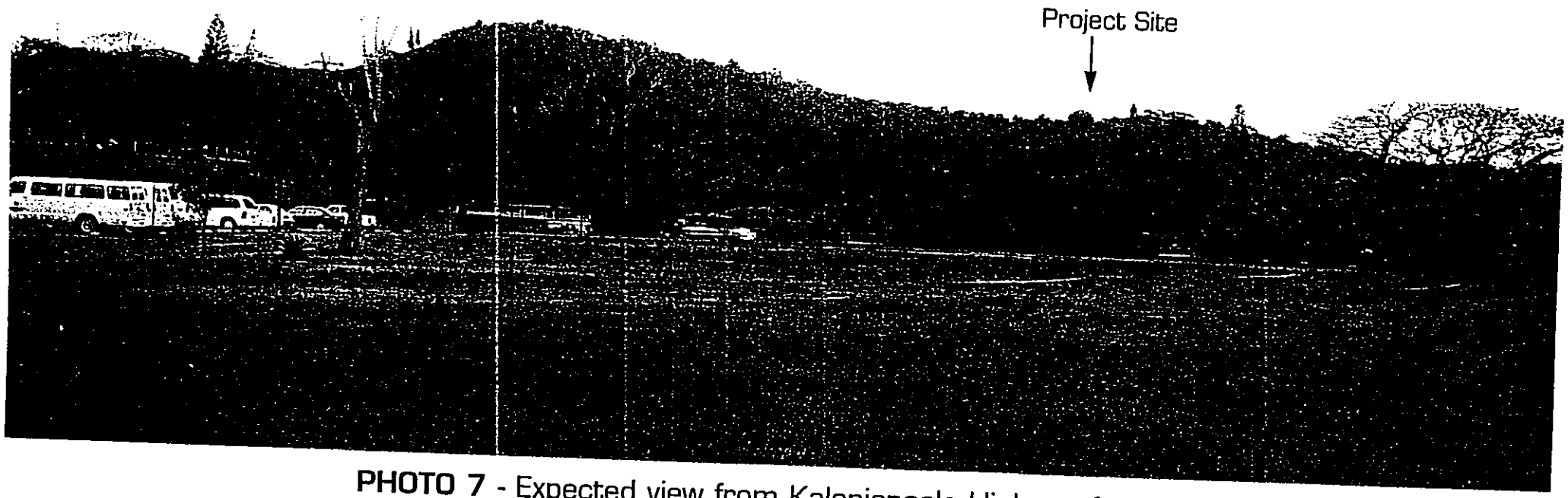

PHOTO 7 - Expected view from Kalanianaole Highway fronting the Women's Community Correctional Center

reservoir site (to the left of Kalae o Kaiwa), to the project site. After construction, the knoll will be leveled to an elevation near the elevation of the tank roof (**Photo 7**). However, due to the upward angle of view and landscape planting, the tank is not expected to be visible from the highway. The access road alignment will also be landscaped.

Existing and expected view from Kalanianaole Highway near intersection with Keolu Drive. The project site is visible from this vantage point, approximately one-half mile away, due to a clearing in vegetation along the highway shoulder (**Photo 8**). After construction, it is expected that the view of the knoll will be flattened (**Photo 9**).

Existing and expected view from Keolu Drive near traffic signals. The photograph of the existing condition was taken near the signalized intersection of Keolu Drive and Keolu Drive, at a distance of about 3,500 feet from the project site (**Photo 10**). After construction, the flattened knoll is expected to blend in with Kalae o Kaiwa beyond (**Photo 11**).

Existing and expected view from Keolu Drive immediately beneath the project site. The photograph of the existing condition was taken from Enchanted Lake, beneath the project site, approximately 1,700 feet away (**Photo 12**). The proposed reservoir is not expected to be visible, even from this close proximity due to construction in the recessed "bowl" (**Photo 13**), similar to the existing 6.0 MG reservoir located to right of Kalae o Kaiwa.

5.8.2 Mitigative Measures

To maintain the unity and vividness of the view, the following measures will be implemented:

- Construction of the reservoir within an excavated "bowl" to screen the tank from surrounding views. Existing vegetation will remain on the exterior face of the excavated "bowl".
- Additional landscaping around the exterior face of the "bowl" and downslope fronting the access road. Vegetation will be selected to blend with the existing surroundings to enhance the natural screening effect.
- Landscaping all exposed excavation cuts to control erosion and mitigate the visual impact of cut slopes.
- Painting the reservoir with earth tone colors to blend with the surrounding environment.
- Conducting maintenance and repainting on a regular basis.

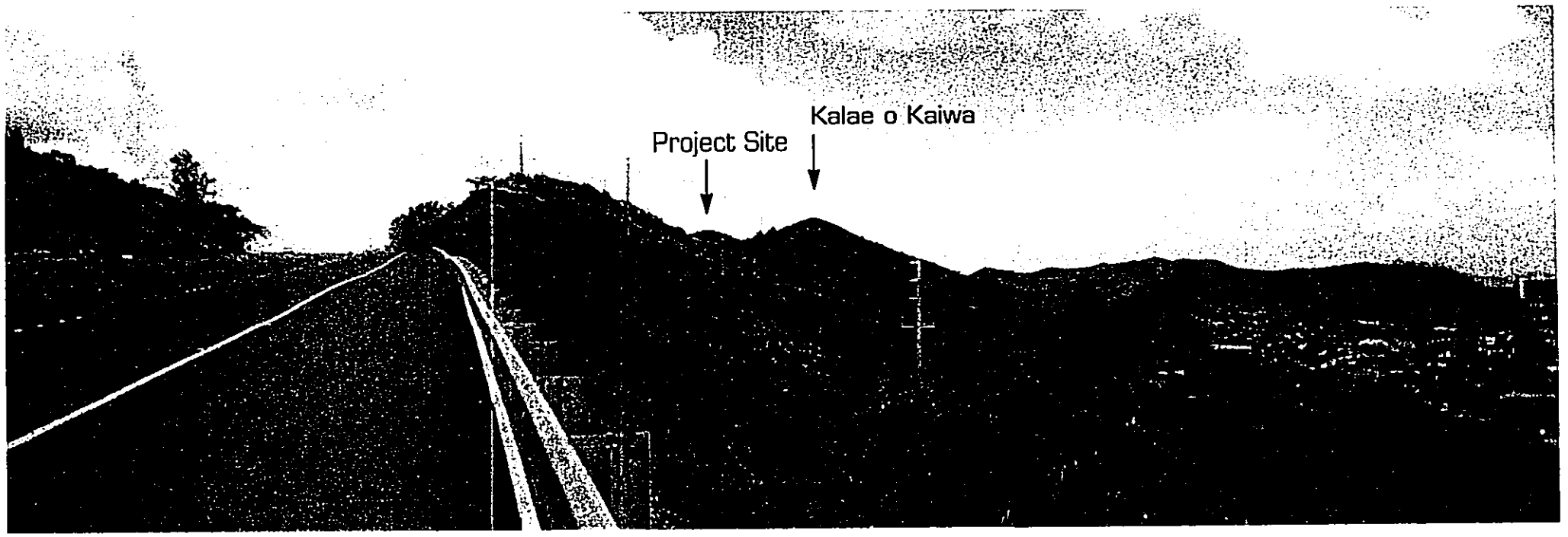

PHOTO 8 - Existing view from Kalanianaole Highway near Keolu Drive

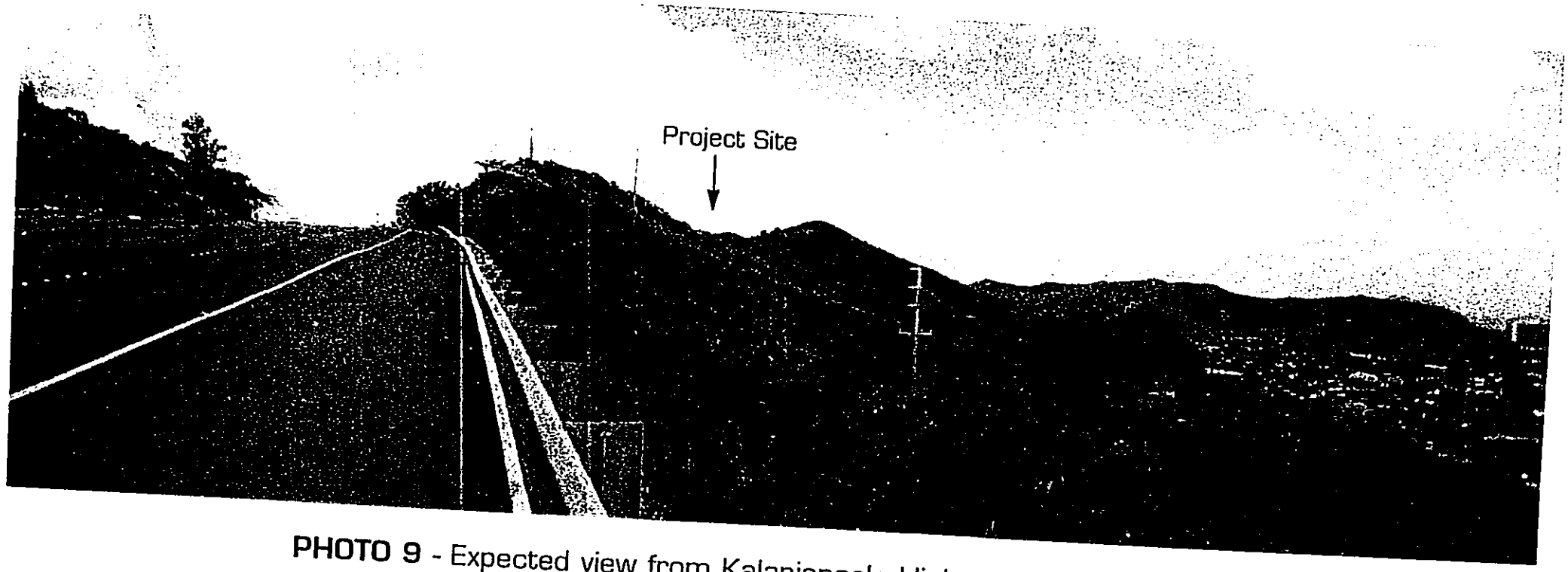

PHOTO 9 - Expected view from Kalanianaole Highway near Keolu Drive

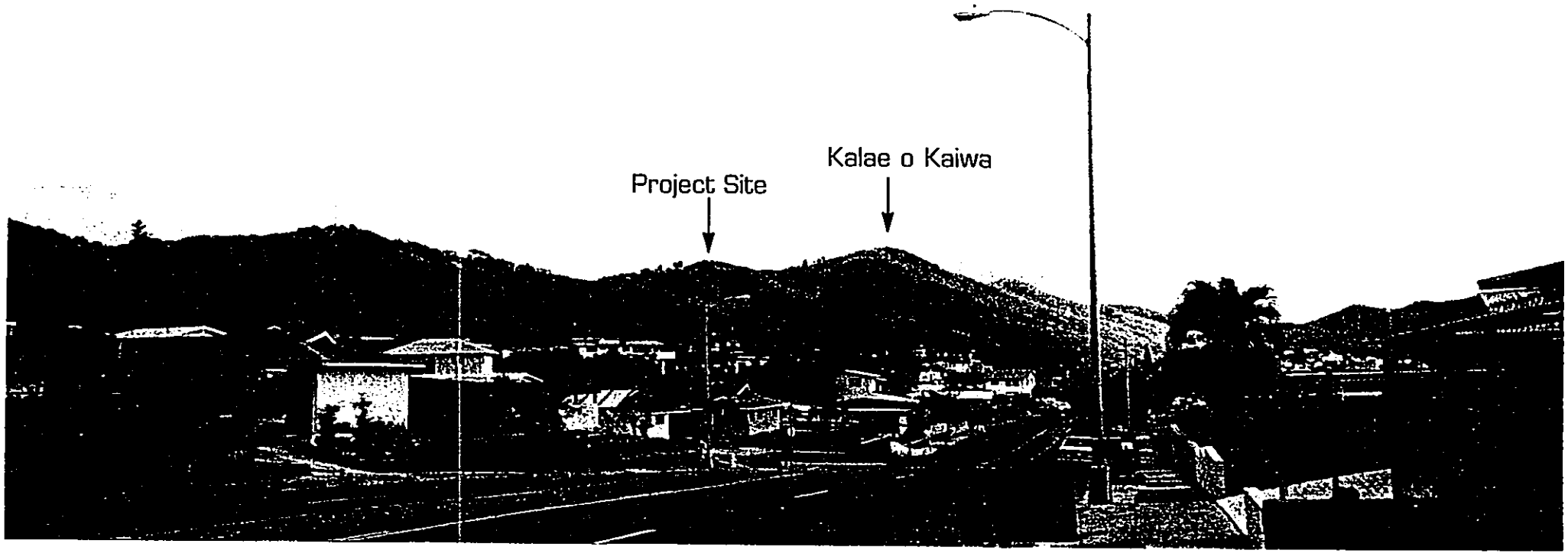

PHOTO 10 - Existing view from Keolu Drive near traffic signals

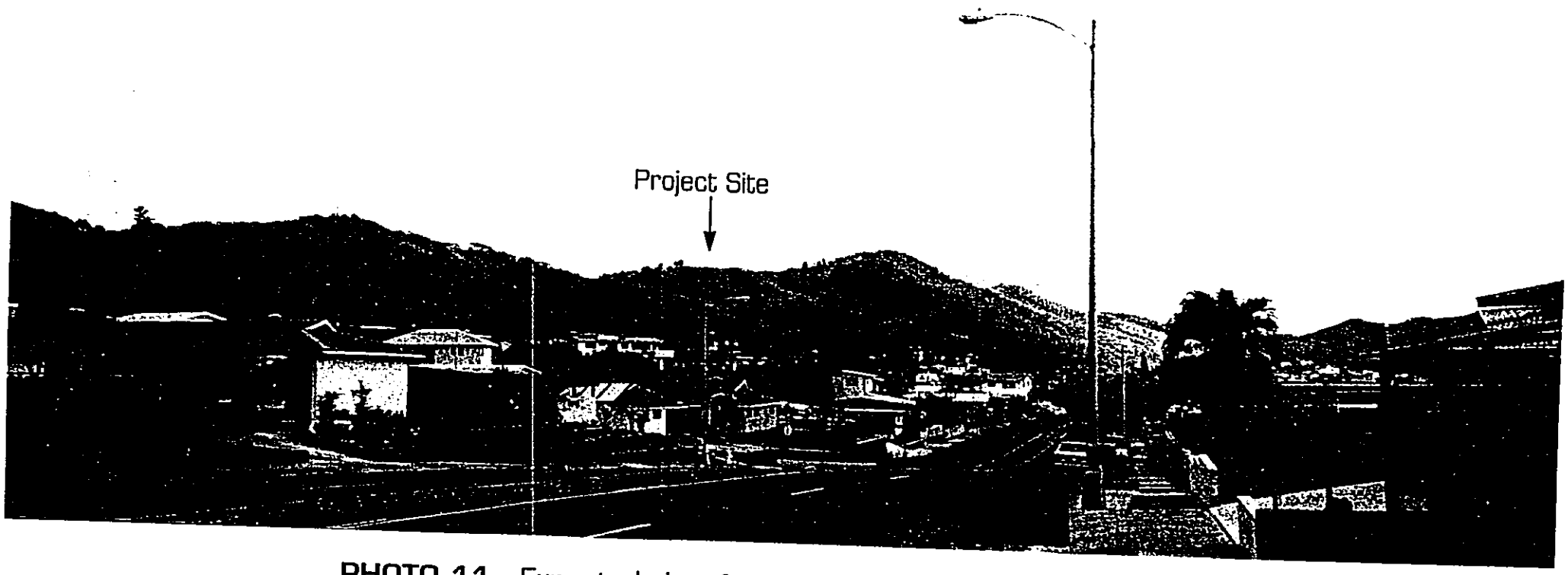

PHOTO 11 - Expected view from Keolu Drive near traffic signals

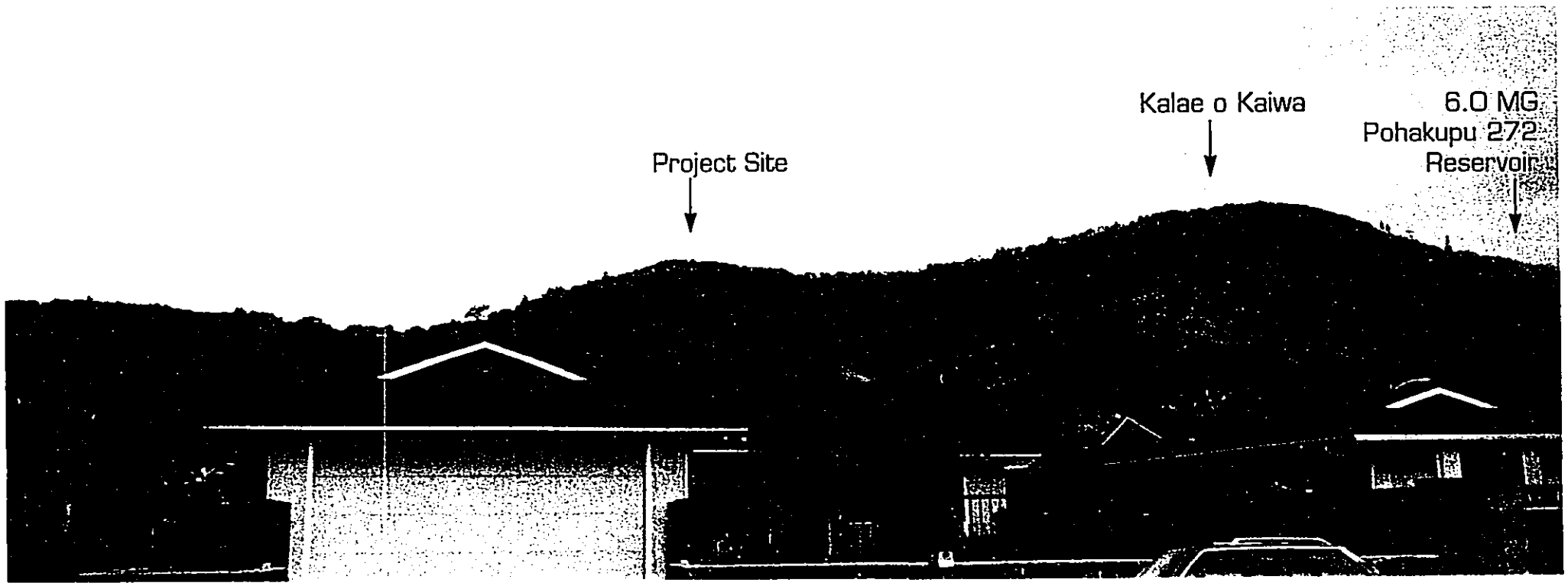

PHOTO 12 - Existing view from Keolu Drive fronting Enchanted Lake

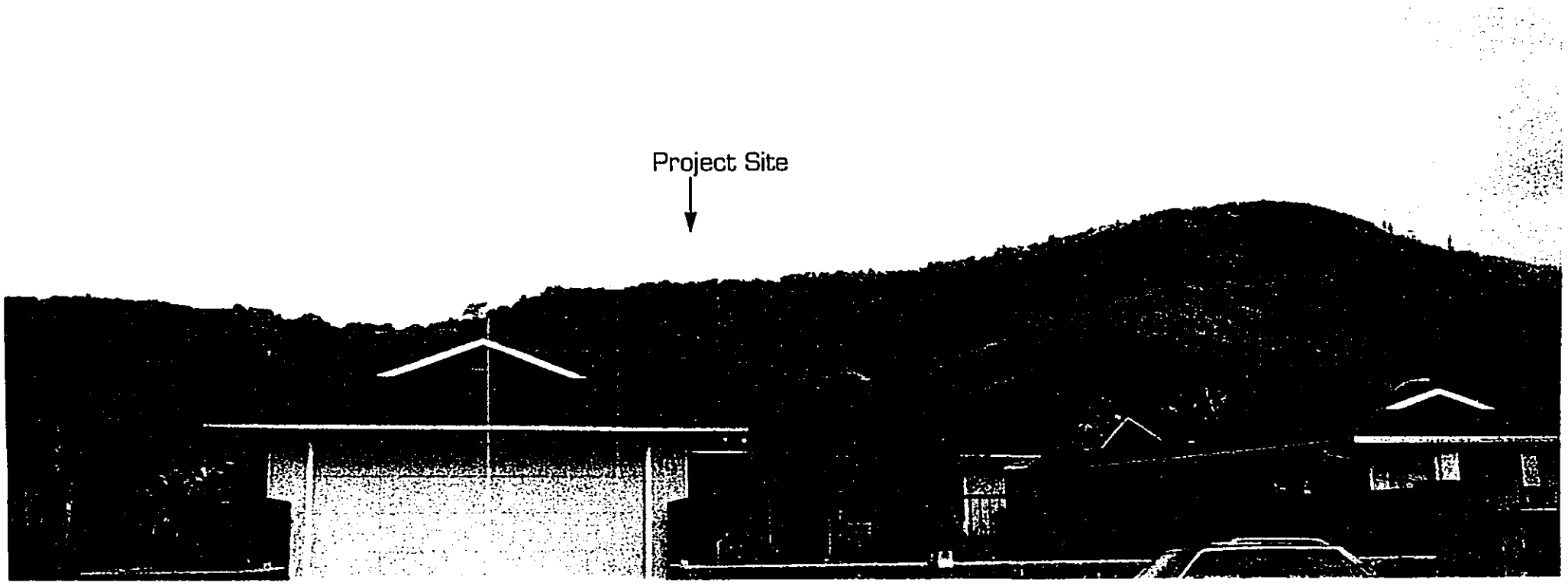

PHOTO 13 - Expected view from Keolu Drive fronting Enchanted Lake

5.9 TRAFFIC

The project will generate construction vehicle traffic for the duration of the various phases of work, starting with site preparation (including excavation, grading, and roadway paving) and erection of the concrete reservoir.

An estimate of the number of trips to be made by large trucks during the site preparation phase is based on the following assumptions:

excavation volume = 85,000 cubic yards
average truck capacity = 18 to 20 cubic yards
number of truck loads per hour = 8 to 10

Based on these assumptions and with hauling operations between the hours of 8:30 a.m. and 3:30 p.m. (7 hours per day), approximately 56 to 70 truck trips per day will be required to dispose of excess excavated material. The volume hauled will be approximately 1,000 to 1,400 cubic yards per day. At this rate, hauling operations will last approximately 60 to 85 days. However, depending on the site-specific plan developed by the contractor for staging excavated materials and staging haul truck traffic, the overall time for sitework preparation could vary from the projected time period.

After sitework, the reservoir erection and pipeline construction phases will follow. The number of construction trucks coming to and leaving the project site is expected to be reduced substantially in comparison to the sitework phase, except for the days when concrete will be poured for the floor, walls and roof of the reservoir. Light and heavy trucks will frequent the job site, hauling various construction materials for the duration of the project.

Concrete pours will probably take place in increments over several weeks and consist of a series of partial pours for the concrete floor, followed by the reservoir walls, and finally the tank roof. Concrete truck capacities vary from 8 to 10 cubic yards. The concrete plant at Kapaa Quarry will probably supply the materials.

Pipeline construction will involve trucks transporting pipe, concrete, reinforcing steel bars, select fill and other materials to the site.

5.9.1 Potential Impacts

The proposed project will affect traffic in the short term. Construction vehicles will temporarily increase the number of vehicles using Kalanianaole Highway to and from the temporary construction access road. It should be noted that, once constructed, the reservoir will generate virtually no traffic aside from occasional operation and maintenance trips by BWS personnel vehicles. Due to use of the existing Pohakupu reservoirs access road and the close proximity to the existing reservoirs, it is likely that operation and maintenance will be coordinated.

It may be necessary for the contractor to stage haul trucks along Kalanianaole Highway during periods of high truck traffic. Portions of Kalanianaole Highway may need to be coned off and police hired to direct traffic during these periods.

Long-term traffic impact will be negligible since there should only be one vehicle per day for operation and maintenance of the reservoir, similar to existing conditions for the 1.0 MG and 6.0 MG Pohakupu tanks.

5.9.2 Mitigative Measures

To avoid inconvenience to motorists, the normal construction hours of 7:00 a.m. to 3:30 p.m. will be adjusted when operations generate heavy truck traffic. Hauling operations will be scheduled to begin after the morning peak commuter traffic on Kalanianaole Highway fronting the project site has subsided. This would result in delaying start times to 8:30 a.m., after the morning peak.

The contractor will be required to take all necessary precautions to operate his vehicles in a safe manner and to comply at all times with the safety standards of the State Division of Occupational Safety and Health.

A traffic control plan will be prepared, in response to concerns by the Honolulu Police Department (see **Appendix B**). The traffic control plan will identify the location of signs and/or coning along Kalanianaole Highway, to be installed for the safety of motorists fronting the project site.

5.10 LAND ISSUES

The project site encompasses lands owned in fee by the State of Hawaii and private land owners.

Cultural Surveys Hawaii, in their research of the historic background of the project site, reported on the history of land ownership. The project site is located within the Ahupua'a of Kailua, which was awarded to Queen Hazalelepono Kalama at the time of the Mahele. Within the Ahupua'a, the Crown took for itself the 'ili (land division within the Ahupua'a) of Kawailoa, which includes the project site. Crown land became territory of Hawaii and state land when Hawaii became part of the United States. The Office of Hawaiian Affairs, in their letter of May 28, 1999, confirmed that the project site is located within ceded lands.

The development potential of the project site for other uses is minimal due to location and topography. The site is located in the Conservation District, situated at the top of a ridge. No water sources exist to serve the site since its elevation is above the 172-foot service zone for the BWS system in the area.

5.10.1 Potential Impacts

Privately-owned lands. Acquisition of privately-owned lands may be a negative impact to the land owners if they are unwilling to sell the property.

Ceded lands. The Office of Hawaiian Affairs strongly suggests that native Hawaiians be consulted before any efforts to use, lease, transfer, destroy or otherwise modify ceded lands be undertaken.

5.10.2 Mitigative Measures

Privately-owned lands. Land acquisition will be negotiated. Fair market value will be paid in compensation for land acquisition.

Ceded lands. Consultation with native Hawaiian groups will be coordinated through the Office of Hawaiian Affairs. Land acquisition will be negotiated. Fair market value will be paid in compensation for land acquisition and easements. The proposed reservoir will benefit Hawaiian Home Lands by enhancing regional water service to Waimanalo. Location of the proposed reservoir at Kalae o Kaiwa (rather than Puu o Ehu) ridge results in the ability to provide local and regional storage operations.

5.11 POPULATION AND ECONOMY

The proposed project will not affect the character of the Kailua community. Development of the proposed 4.0 MG reservoir will solve the existing substandard storage problem in Kailua and therefore, will not contribute to any increase in the residential population.

5.12 PUBLIC SERVICES AND FACILITIES

The positive impact of the proposed project on the municipal water system has already been discussed. Construction of the proposed reservoir will also have a positive impact on fire protection service for the Kailua area by supplying a reliable storage volume of water for fire fighting purposes.

5.12.1 Potential Impacts

Potential impacts to neighboring schools and corrections facilities will be short-term, related to construction activities.

5.12.2 Mitigative Measures

Mitigative measures for fugitive dust, noise, and traffic impacts have previously been disclosed in the respective section of this chapter. Due to the length of construction, anticipated to extend over an 18-month period, it is not reasonable to limit earthmoving operations to times when classes are not in session. Neighboring schools, institutions and residents will be informed of scheduled construction activities.

CHAPTER 6
RELATIONSHIP BETWEEN SHORT-TERM USES OF ENVIRONMENTAL RESOURCES AND LONG-TERM PRODUCTIVITY

Construction of the proposed 4.0 million gallon reservoir at Kalae o Kaiwa ridge will enhance long-term productivity and reliability of the water supply. The proposed reservoir will increase the Board of Water Supply's total storage capacity in the Windward District. There are no long-term risks to public health or safety anticipated as a result of the proposed project.

CHAPTER 7
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES THAT WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

Development of the proposed 4.0 million gallon reservoir, its access road and other associated appurtenances will result in an irreversible commitment of approximately five acres of land which is presently undeveloped open space. Permanent changes to the existing ridge would result from the proposed excavation.

Construction materials will be irretrievably committed, with a limited salvage value expected. Monetary funds, human resources, time and energy will also be irretrievably committed to the project. The Board of Water Supply will have a long-term public and financial commitment to maintain the reservoir and its associated facilities once they are constructed.

CHAPTER 8
RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS, POLICIES AND CONTROLS FOR THE AFFECTED AREA

This chapter examines conformance of the proposed project with a number of state and local laws, regulations, policies and guidance plans which have been developed to guide physical, social and economic development and to encourage protection of natural and manmade resources.

8.1 STATE LAND USE LAW

The State Land Use Law (Chapter 205, Hawaii Revised Statutes), adopted in 1961, establishes the framework of land use management in Hawaii. All lands in the state are classified into one of four land use districts: Urban, Rural, Agricultural or Conservation.

The project site is situated on land classified as Urban (U) and Conservation (C). The Urban classification generally includes land characterized by a city-like concentration of people, structures, and services. The counties primarily have jurisdiction over urban lands through their ordinances and regulations.

The Conservation classification primarily includes lands in existing forests and water reserve zones. It also includes areas necessary for the protection of watersheds and water sources; scenic and historic areas; parks; wilderness; open space; recreational areas; habitats of endemic plants, fish and wildlife; and all submerged lands seaward of the shoreline. Lands subject to flooding and soil erosion are also included. The Conservation District is controlled by the State Board of Land and Natural Resources, and its uses are governed by the rules of the Department of Land and Natural Resources. A Conservation District Use Permit will need to be obtained for this project.

The project site is located in the limited (L) subzone of the Conservation District. The objective of this subzone is to limit uses where natural conditions suggest constraints on human activities. Land uses in the limited subzone also include those land uses permitted in the protective subzone. Development of the reservoir would fall under the following permitted uses:

- Landscaping, defined as alteration (including clearing) of plant cover.
- Land uses undertaken by the City and County of Honolulu to fulfill a mandated governmental function, activity or service for public benefit and in accordance with public policy and the purpose of the Conservation District.
- Demolition, grading, removal or alteration of topographic features.

The proposed project is consistent with existing land use designations.

8.2 HAWAII STATE PLAN

The Hawaii State Plan (Chapter 226, Hawaii Revised Statutes) establishes a system for the planning, coordination, and integration of major State and County activities. Part I of the Plan lists the State's long-range goals, objectives, policies, and priorities. Applicable sections are discussed below. Part II establishes a statewide planning system to coordinate and implement the plan, and Part III establishes priority guidelines to address areas of statewide concern. None of the priority guidelines listed in Part III relate to the proposed project.

§226-4 State goals.

(2) A desired phyical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.

Discussion: The proposed reservoir will be consistent with the goals of the State. The site will be landscaped and the reservoir painted to blend with the surrounding natural environment. Measures will be taken to reduce the effects of noise, dust and traffic associated with construction activities. Once constructed, the effects of noise, dust, and traffic should be minimal.

§226-11 Objectives and policies for the physical environment-- land-based, shoreline, and marine resources.

(a) Planning for the State's physical environment with regard to land-based, shoreline, and marine resources shall be directed towards achievement of the following objectives:
- *(1) Prudent use of Hawaii's land-based, shoreline, and marine resources.*
- *(2) Effective protection of Hawaii's unique and fragile environmental resources.*

(b) To achieve the land-based, shoreline, and marine resources objectives, it shall be the policy of this State to:
- *(1) Exercise an overall conservation ethic in the use of Hawaii's natural resources.*
- *(3) Take into account the physical attributes of areas when planning and designing activities and facilities.*
- *(4) Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage.*

(8) Pursue compatible relationships among activities, facilities and natural resources.

Discussion: The proposed reservoir will be compatible with existing activities, facilities, and natural resources. There will be no irreparable environmental damages to biological or natural resources. The physical attributes of the site were considered in selecting the location for the reservoir.

§226-12 Objectives and policies for the physical environment-- scenic, natural beauty, and historic resources.

(a) Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawaii's scenic assets, natural beauty, and multi-cultural/historical resources.

(b) To achieve the scenic, natural beauty, and historic resources objective, it shall be the policy of this State to:

(1) Promote the preservation and restoration of significant natural and historic resources.

(3) Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features.

(5) Encourage the design of developments and activities that complement the natural beauty of the islands.

Discussion: The proposed alignment for the temporary construction access road was selected in order to minimize impact to the historic irrigation tunnel which traverses the area. In addition, due to the prominent location of the project site on the ridge, special emphasis on appearance and beautification of the facilities will be given to minimize the visual impact of the project. This issue is discussed in **Chapter 5**.

§226-13 Objectives and policies for the physical environment-- land, air, and water quality.

(a) *Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives:*

(1) Maintenance and pursuit of improved quality in Hawaii's land, air and water resources.

(2) Greater public awareness and appreciation of Hawaii's environmental resources.

(c) To achieve the land, air, and water quality objectives, it shall be the policy of the State to:

(2) Promote the proper management of Hawaii's land and water resources.
(3) Promote effective measures to achieve desired quality in Hawaii's surface, ground, and coastal waters.
(6) Encourage design and construction practices that enhance the physical qualities of Hawaii's communities.
(8) Foster recognition of the importance and value of the land, air, and water resources to Hawaii's people, their cultures, and visitors.

Discussion: The proposed project is consistent with the City and County of Honolulu Land Use Ordinance and Development Plan for Koolaupoko. Construction of the proposed reservoir will be beneficial to residents since the BWS will be able to improve water service in the area. Adherence to the State's land, air and water quality objectives will be assured through proper design and construction practices.

§226-14 Objective and policies for facility systems-- in general.

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

(b) To achieve the general facility systems objective, it shall be the policy of this State to:
(1) Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.
(2) Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.
(3) Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user.

Discussion: The proposed project will be consistent with State and County plans. Major concerns of the BWS are furnishing a reliable and safe drinking water supply and meeting the needs of the communities with regard to the quality and quantity of its water supply. The proposed reservoir will replace four abandoned reservoirs in the Kailua area and is necessary to increase reservoir storage capacity in the Windward Low Service System to BWS standard.

§226-16 Objective and policies for facility systems– water.

(a) Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capacities.

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

(4) Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use.

Discussion: Construction of the proposed reservoir will increase the BWS's storage capacity in the district. This increase in storage capacity will provide additional reliability and flexibility to the existing water distribution system. This reservoir will also replace four reservoirs taken out of service over the past ten years.

8.3 STATE FUNCTIONAL PLANS

The primary means of implementing the goals, objectives, and policies of the Hawaii State Plan are set forth in State functional plans. These functional plans delineate the policies and actions that need to be addressed in the short-term in these specific areas: agriculture, conservation lands, education, employment, energy, health, higher education, historic preservation, housing, human services, recreation, tourism, and transportation. They are intended to act in a coordinated fashion with the County General Plans and Development Plans but are not to be interpreted as law or as mandatory county or private sector actions.

Each functional plan sets forth the policies, statewide guidelines, and priorities within a specific field of activity, when such activity or program is proposed, administered, or funded by any agency to the State (Chapter 226, Section 226-2. Hawaii Revised Statutes). Of the functional plans adopted by the State, the Conservation Lands functional plan was examined to determine its applicability to the proposed project. This plan primarily affects State operations. The project is consistent with the State's goals to assure adequate municipal water supply.

8.4 OAHU GENERAL PLAN

The General Plan for the City and County of Honolulu is a statement of long-range social, economic, environmental, and design objectives for Oahu. It addresses (1) population; (2) economic activity; (3) natural environment; (4) housing; (5) transportation and utilities; (6)

energy; (7) physical development and urban design; (8) public safety; (9) health and education; (10) culture and recreation; and (11) government operations and fiscal management.

Natural Environment

Objective A: To protect and preserve the natural environment.

- *Protect Oahu's natural environment, especially the shoreline, valleys, and ridges, from incompatible development.*
- *Require development projects to give due consideration to natural features such as slope, flood and erosion hazards, water-recharge areas, distinctive land forms, and existing vegetation.*
- *Design surface drainage and flood-control systems in a manner which will help preserve their natural setting.*
- *Protect the natural environment from damaging levels of air, water, and noise pollution.*

Discussion: Potential impacts associated with storm water runoff, erosion hazards, drainage and pollution will be considered in design of the project. These issues have also been addressed in **Chapter 5**.

Objective B: To preserve and enhance the natural monuments and scenic views of Oahu for the benefit of both residents and visitors.

- *Project Oahu's scenic views, especially those seen from highly developed and heavily traveled areas.*
- *Locate roads, highways, and other public facilities and utilities in areas where they will least obstruct important views of the mountains and the seas.*

Discussion: Design of the proposed reservoir will take into consideration measures to blend the structure with its natural environment. The visual impact of the project is discussed in **Chapter 5**.

Transportation and Utilities

Objective B: To meet the needs of the people of Oahu for an adequate supply of water and for environmentally sound systems of waste disposal.

- *Develop and maintain an adequate supply of water for both residents and visitors.*
- *Encourage the development of new technology with will reduce the cost of providing water and the cost of waste disposal.*

Discussion: The project will improve the water system in the Kailua area by providing additional system reliability and flexibility in meeting the water demand of residents in the area.

Objective C: To maintain a high level of service for all utilities.

- *Maintain existing utility systems in order to avoid major breakdowns.*
- *Provide improvements to utilities in existing neighborhoods to reduce substandard conditions.*
- *Provide for the timely and orderly expansion of utility systems.*

Discussion: Presently, the reservoir system storage capacity in the Windward Low Service System does not meet BWS standards. The project will improve the reliability of fire fighting capabilities.

Objective D: To maintain transportation and utility systems which will help Oahu continue to be a desirable place to live and visit.

- *Give primary emphasis in the capital improvement program to the maintenance and improvement of existing roads and utilities.*

Discussion: The project has been included in the BWS's Capital Improvement Program for fiscal year 1998-1999. Social, economic and environmental impacts of the project are evaluated in the EIS process.

Physical Development and Urban Design

Objective A: To coordinate changes in the physical environment of Oahu to ensure that all new developments are timely, well-designed, and appropriate for the areas in which they will be located.

- *Plan for the construction of new public facilities and utilities in the various parts of the island according to the following order of priority: first, in the primary urban center; second, in Ewa; and third, in the urban-fringe and rural areas.*

Discussion: In addition to providing a flexible and reliable water system, the proposed project will replace abandoned reservoirs in the Kailua area.

Objective D: To create and maintain attractive, meaningful, and stimulating environments throughout Oahu.

- *Design public structures to meet high aesthetic and functional standards and to complement the physical character of the communities they will serve.*

Discussion: The project will incorporate aesthetic and functional standards in the design. Mitigation measures to complement the physical character of the reservoir with its environment are addressed in **Chapter 5.**

Objective E: To promote and enhance the social and physical character of Oahu's older towns and neighborhoods.

- *Provide and maintain roads, public facilities, and utilities without damaging the character of older communities.*

Discussion: The reservoir and associated appurtenances will be constructed in such a way that the character of the surrounding community is not damaged.

Government Operations and Fiscal Management

Objective A: To promote increased efficiency, effectiveness, and responsiveness in the provision of government services by the City and County of Honolulu.

- *Maintain City and County government services at the level necessary to be effective.*
- *Ensure that government attitudes, actions, and services are sensitive to community needs and concerns.*

Discussion: As previously stated, the BWS is concerned with providing a safe and reliable water supply and meeting the needs of the community in terms of quality and quantity of the water supply. This project is consistent with these objectives.

8.5 DEVELOPMENT PLAN

The City and County of Honolulu Development Plans provides a framework for implementing the Oahu General Plan objectives. The desired sequence, pattern, and characteristics of development are set forth in public facilities maps for each development plan area.

Part I: Development Plan Special Provisions for Koolaupoko

Koolaupoko extends from Makapuu Point to Kaoio Point at the northern end of Kaneohe Bay and is bounded by the Koolau mountain range and the sea. Kailua is described as an "urban-fringe" area. The Special Provisions identifies significant open spaces and public views that should be protected whenever possible.

§24-6.2(a)(1) Open Space. The visibility, preservation, enhancement and accessibility of open space areas as defined in Section 24-1.4 of the development plan common provisions shall be given high priority in the design of adjacent and nearby developments in Koolaupoko.

Discussion: The proposed reservoir will be concealed from surrounding views due to its siting within an excavated "bowl" atop the ridge. Landscaping designed to blend with existing vegetation will further shield the proposed project

from view. ***The reservoir tank and cover will be painted an appropriate color and finish to blend with the surrounding vegetation.***

§24-6.2(a)(2) Public Views. In order to promote pleasing and attractive living environments and panoramic mauka and makai views from public places, views of major landmarks from public places shall be protected whenever possible.

Discussion: Public view planes will be protected as much as possible. Refer to the visual impact analysis included in **Chapter 5** for further information.

Part II: Development Plan Maps for Koolaupoko

Public facilities maps identify the general locations of proposed facilities. The general time frame (i.e. within six years, beyond six years) for land acquisition and/or construction are also shown on the maps.

Ordinance No. 92-14 dated March 10, 1992 amended the Koolaupoko Development Plan Public Facilities Map by the addition of a water reservoir symbol for a location on Puu o Ehu ridge, the initially proposed project site. Amendment to the facilities map will be made to address the new project site.

Koolaupoko Sustainable Communities Plan (SCP)

The Koolaupoko SCP is currently under consideration by the Honolulu City Council and will replace the Koolaupoko Development Plan upon its adoption. Sections of the Koolaupoko SCP that are pertinent to the proposed action are:

- ***Section 4.2.3 [Water Systems Development] General Policies, which reads in part:***

  "Where new reservoirs and other above ground infrastructure is necessary, avoid impacts to significant scenic resources; where such impacts are unavoidable, appropriate mitigation measures should be implemented."

- ***Figure 2-4, Significant Scenic Features and Viewplanes in Koolaupoko, indicates that the project site may impact an identified "continuous panoramic view".***

Implementation of the proposed measures for screening the reservoir (i.e. location within a "bowl" atop the ridge, landscape planting, and painting) will achieve consistency with the policies contained in the Koolaupoko SCP.

8.6 LAND USE ORDINANCE

The Land Use Ordinance (LUO) of the City and County of Honolulu regulates land use in accordance with adopted policies such as the Oahu General Plan and the Development Plans. The LUO provides development and design standards regarding location, height, size of structure, open spaces, use of structure and land, etc.

Section 21-3.10 of the LUO establishes zoning districts. The project is in the area zoned Restricted Preservation (P-1) and General Preservation (P-2). The purpose of the Preservation District is to preserve and manage major open space and recreation lands and lands of scenic and other natural resource value. Within the P-1 district, all uses, structures, and development standards shall be governed by the appropriate State agencies. ***A "public use and structure" is defined as "uses conducted by or structures owned or managed by the...city to fulfill a governmental function, activity or service for public benefit and in accordance with public policy." The proposed reservoir is considered a "public use and structure" which is permitted as a principal use in all zoning districts.***

8.7 HAWAII COASTAL ZONE MANAGEMENT PROGRAM

The objectives of the Hawaii Coastal Zone Management Program (Section 205A-2, HRS) are to protect the valuable and vulnerable coastal resources such as coastal ecosystems, special scenic and cultural values, and recreational opportunities. The objectives of the program are also to reduce coastal hazards and to improve the review process for activities proposed within the coastal zone.

The relationship of the proposed project to the program objectives and policies is summarized below.

§205A-2(b)(1) Recreational resources

Objective: *Provide coastal recreational opportunities accessible to the public.*

Discussion: N/A

§205A-2(b)(2) Historic resources

Objective: *Protect, preserve, and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.*

Discussion: An archaeological inventory survey investigation of the project site concluded that if SIHP No. 50-80-15-4042 can be avoided during construction, the project will have no effect on significant historic sites. The State Historic Preservation Division concurred with this conclusion. Avoidance of the historic irrigation tunnel was a key factor in selection of the temporary construction access road alignment.

§205A-2(b)(3) Scenic and open space resources

Objective: *Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources.*

Discussion: The project site is located inland, not in a coastal area. Construction of the reservoir within a "bowl" on the ridge will minimize its visual impact.

§205A-2(b)(4) Coastal ecosystems

Objective: *Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.*

Discussion: Construction activities will be performed in compliance with conditions of the various permits, including NPDES and Conservation District Use Permit.

§205A-2(b)(5) Economic uses

Objective: *Provide public or private facilities and improvements important to the State's economy in suitable locations.*

Discussion: N/A

§205A-2(b)(6) Coastal hazards

Objective: *Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.*

Discussion: The long term impact of the project will be a reduction of onsite erosion potential due to reduction of erodible surfaces. A storm drain system will be constructed to convey storm water runoff and tank drainage in a controlled manner to prevent flooding of downstream areas.

§205A-2(b)(7) Managing development

Objective: *Improve the development review process, communication, and public participation in the management of coastal resources and hazards.*

Discussion: N/A

§205A-2(b)(8) Public participation

Objective: *Stimulate public awareness, education, and participation in coastal management.*

Discussion: N/A

§205A-2(b)(9) Beach protection

Objective: *Protect beaches for public use and recreation.*

Discussion: The project site is located in an elevated, inland area.

§205A-2(b)(10) Marine resources

Objective: *Implement the State's ocean resources management plan.*

Discussion: N/A

CHAPTER 9
UNRESOLVED ISSUES

This supplemental environmental impact statement (EIS) has disclosed potential impacts associated with construction of the proposed reservoir on Kalae o Kaiwa ridge and mitigative measures to alleviate public concerns relating to these potential impacts. The purpose of the EIS process is disclosure of information. Resolution of issues and concerns will continue throughout the planning, permitting and design phases prior to construction. At this time, ***four*** issues remain unresolved.

9.1 METHOD OF EXCAVATION

The method of excavation to be employed for removal of approximately 85,000 cubic yards of earth and rock remains unresolved. Two alternatives under consideration are use of blasting or hoe ram equipment. Due to the quantity and type of excavation involved, the use of small explosives would appear to be more economical and would shorten the construction period. However, the contractor hired to construct the reservoir will determine whether blasting or excavation equipment will be used, after considering the advantages and disadvantages of each method. If blasting is selected, the contractor must adhere to specific Board of Water Supply procedures to minimize vibration. Additional information on the construction method will be submitted for processing of the Conservation District Use Application.

9.2 LAND ACQUISITION

The project site is located on lands owned in fee by the State of Hawaii and private land owners. The Board of Water Supply will need to acquire these lands for development of the project.

9.3 CEDED LANDS

The Office of Hawaiian Affairs (OHA) has stated that the project site is located within ceded lands. Coordination with OHA officials will be undertaken to discuss the implications of this issue on development of the proposed reservoir.

9.4 DISPOSAL OF EXCAVATED MATERIAL

The ultimate site for disposal or reuse of the approximately 85,000 cubic yards of excavated

material remains unresolved. The decision to dispose of the material or reuse it as fill at another site is left to the discretion of the contractor. The contractor will be responsible for obtaining all permits and approvals associated with disposal and/or reuse of the excess excavated material as fill, including compliance with environmental impact statement rules and regulations.

CHAPTER 10
CONSULTATION

10.1 PARTICIPANTS

This supplemental environmental impact statement (EIS) was prepared for the City and County of Honolulu Board of Water Supply (BWS). The following organizations were involved in the preparation of this document.

Organization	*Individual(s)*	Area of Expertise
Engineering Concepts, Inc.	***Kenneth Ishizaki***	***Civil/Environmental Engineering***
Char & Associates	***Winona P. Char***	Botanical Resources
Cultural Surveys Hawaii, Inc.	***Hallett H. Hammatt***	Archaeological/Historical Resources
	Victoria S. Creed	
	Matt McDermott	

10.2 PARTIES CONSULTED DURING PREPARATION OF THE DRAFT EIS

Sixty-three (63) copies of the EIS Preparation Notice were mailed to agencies, organizations and other interested parties. A complete listing of these consulted parties is included in **Sections 10.2.1** through **10.2.4**. In addition, copies of the EIS Preparation Notice were distributed to the libraries listed in **Section 10.2.5** for public review.

Availability of the EIS Preparation Notice was published in the April 23, 1999 edition of *The Environmental Notice* by the Office of Environmental Quality Control. A total of ***20*** comment letters were received as of June 14, 1999 (although the 30-day public comment period officially ended on May 24, 1999). Agencies and other interested parties responding to the request for comments are indicated with an asterisk (*) in the lists which follow. Those who responded with "no comments" are indicated with a plus (+).

10.2.1 Federal Government

* U.S. Army Engineer District, Honolulu
U.S. Fish and Wildlife Service
\+ U.S. Geological Survey, Water Resources Division
National Marine Fisheries Service

10.2.2 State Government

Senate President Norman Mizuguchi
Senator Marshall Ige, 24th District
Senator Whitney T. Anderson, 25th District
House Speaker Calvin K.Y. Say
Representative Cynthia Thielen, 49th District
Representative David A. Pendleton, 50th District
Representative Kenny Goodenow, 51st District
* Department of Accounting and General Services, Division of Public Works
* Department of Business, Economic Development and Tourism
Department of Defense
Department of Education
\+ Department of Hawaiian Home Lands, Hawaiian Homes Commission
* Department of Health, Environmental Planning Office
Office of Environmental Quality Control
* Office of Hawaiian Affairs
Department of Human Services
* Department of Land and Natural Resources
* State Historic Preservation Division
Department of Public Safety
* Department of Transportation
University of Hawaii Environmental Center

10.2.3 City and County Government

Council Chair Mufi Hannemann
* Councilmember Steve Holmes, District II
Councilmember John Henry Felix, District III
Department of Design and Construction
* Department of Environmental Services
\+ Department of Parks and Recreation
* Department of Planning and Permitting
* Department of Transportation Services
\+ Honolulu Fire Department
* Honolulu Police Department

10.2.4 Other Interested Parties

* Hawaiian Electric Company, Inc.
GTE Hawaiian Telephone Company, Inc.
\+ Oceanic Cable
The Gas Company

Kailua Neighborhood Board No. 31
Enchanted Lakes Community Association
Lanikai Community Association
Maunawili Community Association
Old Kukanono Community Association
Olomana Community Association
Pohakupu-Kukanono Community Association
Kailua Chamber of Commerce
Kailua Community Council
Kailua Urban Design Task Force
Kawainui Marsh Association
Lani-Kailua Outdoor Circle
Hawaii Audubon Society
Hawaii's Thousand Friends
Sierra Club, Hawaii Chapter
Gale F. and Gail P. Berengue
* Jan Reichelderfer

10.2.5 Libraries

Kailua Public Library
Waimanalo Public & School Library

10.3 COMMENTS ON THE EIS PREPARATION NOTICE

Reproduced in **Appendix B** are letters commenting on the EIS Preparation Notice and letters prepared by the BWS in response to the comments.

10.4 PARTIES CONSULTED DURING PREPARATION OF THE FINAL EIS

Eighty (80) copies of the Supplemental Draft EIS were mailed to agencies, organizations, and other interested parties. A complete listing of these consulted parties is included in **Sections 10.4.1** through **10.4.4**. In addition, copies of the Draft EIS were distributed to the libraries listed in **Section 10.4.5** for public review.

Availability of the Draft EIS was published in the October 23, 1999 edition of *The Environmental Notice* by the Office of Environmental Quality Control. A total of 25 comment letters were received as of January 27, 2000 (although the 45-day comment period officially ended on December 7, 1999). Agencies and other interested parties responding to the request for comments are indicated with an asterisk (*) in the lists which follow. Those who responded with "no comments" are indicated with a plus (+).

10.4.1 Federal Government

\+ U.S. Army Engineer District, Honolulu
\+ U.S.D.A. Natural Resources Conservation Service
U.S. Fish and Wildlife Service

10.4.2 State Government

Senator Marshall Ige, 24th District
Senator Whitney T. Anderson, 25th District
Representative Cynthia Thielen, 49th District
Representative David A. Pendleton, 50th District
Representative Kenny Goodenow, 51st District
* Department of Accounting and General Services, Division of Public Works
\+ Department of Agriculture
Department of Business, Economic Development and Tourism
\+ DBEDT Office of Planning
\+ DBEDT Energy, Resources and Technology Division
Department of Defense
\+ Department of Education
\+ Department of Hawaiian Home Lands, Hawaiian Homes Commission
\+ Department of Health, Environmental Planning Office
* Office of Environmental Quality Control
* Office of Hawaiian Affairs
\+ Department of Human Services
\+ Department of Land and Natural Resources, Land Division
* State Historic Preservation Division
Department of Public Safety
* Department of Transportation
* University of Hawaii Environmental Center
University of Hawaii Water Resources Research Center

10.4.3 City and County Government

Councilmember Steve Holmes, District II
Councilmember John Henry Felix, District III
Department of Design and Construction
\+ Department of Environmental Services
* Department of Parks and Recreation
* Department of Planning and Permitting
* Department of Transportation Services
* Honolulu Fire Department
* Honolulu Police Department

10.4.4 Other Interested Parties

Hawaiian Electric Company, Inc.
GTE Hawaiian Telephone Company, Inc.
* The Gas Company
Honolulu Star Bulletin
Honolulu Advertiser
Kailua Neighborhood Board No. 31
Enchanted Lakes Community Association
Lanikai Community Association
Maunawili Community Association
Old Kukanono Community Association
Olomana Community Association
Pohakupu-Kukanono Community Association
Kailua Chamber of Commerce
Kailua Urban Design Task Force
Kawainui Heritage Foundation
Lani-Kailua Outdoor Circle
Hawaii Audubon Society
Hawaii's Thousand Friends
Sierra Club, Hawaii Chapter
Gale F. and Gail P. Berengue
* Jan Reichelderfer
* Patrick G. O'Malley

10.4.5 Libraries

Hawaii State Library
Hamilton Library
Legislative Reference Bureau
DBEDT Library
Municipal Reference and Records Center
Kaimuki Public Library
Kaneohe Public Library
Pearl City Public Library
Hawaii Kai Public Library
Hilo Public Library
Wailuku Public Library
Lihue Public Library
Kailua Public Library
Waimanalo Public & School Library

10.5 COMMENTS ON THE DRAFT EIS

Reproduced in **Appendix C** are letters commenting on the Draft EIS and letters prepared by the BWS in response to the comments.

REFERENCES

Engineering Concepts, Inc., *Environmental Assessment for the Kailua 272' Reservoir*, prepared for the City and County of Honolulu Board of Water Supply, March 1993.

Engineering Concepts, Inc., *Final Environmental Impact Statement for the Kailua 272 Reservoir*, prepared for the City and County of Honolulu Board of Water Supply, July 1996.

Federal Emergency Management Agency, "Flood Insurance Rate Map, City and County of Honolulu Community-Panel Number 150001 0090C", revised September 28, 1990.

Geolabs-Hawaii, *Geotechnical Engineering Exploration, Kailua 272 Reservoir, Kailua, Oahu, Hawaii*, prepared for Mitsunaga & Associates, Inc., June 10, 1999.

Hawaii State, Department of Business, Economic Development and Tourism, *The State of Hawaii Data Book, 1997*.

Hawaii State, Department of Health, *Title 11, Department of Health Administrative Rules*, "Chapter 42 - Vehicular Noise Control for Oahu", October 24, 1981.

Hawaii State, Department of Health, *Title 11, Department of Health Administrative Rules*, "Chapter 46 - Community Noise Control", September 23, 1996.

Hawaii State, Department of Health, *Title 11, Department of Health Administrative Rules*, "Chapter 60.1 - Air Pollution Control", October 29, 1993.

Hawaii State, Department of Health, Clean Air Branch, *Annual Summary Hawaii Air Quality Data 1997*.

Hawaii State, Office of Planning, *Hawaii Revised Statutes*, "Chapter 226, The Hawaii State Plan", 1991.

Hawaii State, *Hawaii Revised Statutes*, "Chapter 205A, Coastal Zone Management", 1995.

Helber Hastert & Fee, *Draft Environmental Impact Statement for Kailua Gateway Development*, March 1992.

Honolulu, City and County of, *Oahu General Plan*, 1987.

REFERENCES

Honolulu, City and County of, "Article 6. Koolaupoko, Part I: Development Plan Special Provisions for Koolaupoko".

Honolulu, City and County of, Department of Land Utilization, *Land Use Ordinance*, 1997.

Honolulu, City and County of, Department of Planning and Permitting, *Koolaupoko Sustainable Communities Plan Public Review Draft*, June 1999.

Jamile, Clifford S. Letter to the State of Hawaii Board of Land and Natural Resources regarding the collection of design data for the proposed Kailua 272 reservoir site. Board of Water Supply, City and County of Honolulu. March 3, 1999.

Mitsunaga and Associates, Inc., *Conceptual Report for the Kailua 272' Reservoir*, prepared for the City and County of Honolulu Board of Water Supply, June 1999.

Thumann, Albert and Richard K. Miller, *Fundamentals of Noise Control Engineering, Second Edition*, 1990.

U.S. Department of Agriculture Soil Conservation Service, *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, August 1972.

APPENDIX A

MISCELLANEOUS CORRESPONDENCE

MEMORANDUM

TO: File
FROM: H. Takemoto
DATE: 5/5/99

SUBJECT: Meeting for Kailua 272' Reservoir and 36" Water Main (C99-769)

Date/Time: May 4, 1999 @ 1pm

Present: Buddy Yeehoy, Melvin Ando, John Shinkawa, Greg Lee, Ed Iida and Harold Takemoto

Meeting was held to discuss the possibility of installing a paved temporary construction access road from Kalanianaole Highway through the youth facility to the proposed reservoir located to the north of the youth cottage. The meeting was held at the Human Services Hawaii Youth Correctional Facility in Kailua. Buddy Yee Hoy (Operations Administrator), Melvin Ando (Acting Corrections Administrator) and John Shinkawa (CIP and Policy Administrator) represented the Hawaii Youth Correctional Facility (HYCF). Greg Lee represented the Board of Water Supply (BWS). Ed Iida and Harold Takemoto represented Mitsunaga & Associates (MA).

MA presented 3 optional alignments for the access road:

Option 1: Use the existing driveway and roadway between the youth cottage and the parking area.

Result: Not feasible. HYCF felt that the access road would interfere with the daily operations. Also, the roadway is too close to the cottage, may create a safety hazard.

Option 2: Using the existing driveway but turning right, before the youth cottage, and continuing between the cottage and Kalanianaole Highway.

Result: Not feasible. HYCF felt that this area was not wide enough. The access road would be too close to the cottage. Road would require the removal of trees between the cottage and Kalanianaole Highway. HYCF doesn't want trees removed. The wards eat the fruit off these trees.

Option 3: A new temporary driveway on Kalanianaole Highway located about 300 feet east from the existing driveway. The road would continue behind the cottage.

Result: HYCF felt that this option is okay because it should not disrupt facility operations. State DOT approval is required for a new driveway on Kalanianaole Highway. HYCF informed us that the sight distance for the existing driveway is limited. The cars speed as they come from the Enchanted Lakes direction and it is difficult to exit the area. (Note: Sight distance is limited at new driveway per site check conducted after meeting.)

Recommendations:

HYCF informed us that there is an existing construction access just inside the Woman's Correctional Facility entrance, which was used during construction of one of the new buildings. MA needs to check with the Woman's Correctional Facility if a construction access road can be placed in their property.

H. Takemoto

BENJAMIN J. CAYETANO
GOVERNOR

TED SAKAI
DIRECTOR

STATE OF HAWAII
DEPARTMENT OF PUBLIC SAFETY
WOMEN'S COMMUNITY CORRECTIONAL CENTER
42-477 Kalanianaole Highway
Kailua, Hawaii 96734

EDWIN T. SHIMODA
WARDEN

CPT. MALCOLM LEE
CHIEF OF SECURITY

KELLY KNOWLES
ACTING OFFENDER
SERVICES ADMINISTRATOR

JOSEPH LOHMEIER
INSTITUTIONAL FACILITIES
SUPERINTENDENT

No. _____

May 19, 1999

Mr. Harold Takemoto
Mitsunaga & Associates, Inc.
747 Amana Street
Suite 218
Honolulu, Hawaii 96814

RE: Kailua 272' Reservoir - Temporary Construction Access

Dear Mr. Takemoto:

Permission is granted for the construction of a temporary paved road and wash down area as indicated on your plot plan with the following conditions:

1. The vehicle wash down area be constructed so as to contain all water used to washing the vehicles;

2. The drivers of the vehicles refrain from conversing or communicating with the inmates who will be working on the opposite side of the security fence;

3. Information be provided as to how you will access the water needed for washing down your vehicles; and,

4. That the temporary road be removed upon the completion of the job and the area be restored to its previous existing condition.

Please contact Joe Lohmeier, Institutional Facilities Superintendent, should you have any further needs or questions.

Sincerely,

Edwin T. Shimoda
Warden

"An Equal Opportunity Employer/Agency"

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
RIGHT-OF-WAY BRANCH
601 KAMOKILA BOULEVARD, #691
KAPOLEI, HAWAII 96707

IN REPLY REFER TO:
HWY-RM
3.74643

MAY 27 1999

Mr. Edward Iida, P.E.
Mitsunaga and Associates, Inc.
747 Amana Street, Suite 216
Honolulu, Hawaii 96814

Dear Mr. Iida:

Subject: Kalanianaole Highway, FAP No. F-72-1(5)
Kailua Junction towards Waimanalo, Kailua and Waimanalo,
TMK: 4-2-03:27
Temporary Access Request

We have reviewed your request and approve your temporary access on to Kalanianaole Highway subject to the following conditions:

1. Board of Water Supply (BWS) must comply with all applicable statutes, ordinances, rules, and regulations of the Federal, State, and County governments.

2. BWS shall defend, hold harmless and indemnify the State, from and against all claims or demands for damage, bodily injury or death.

3. Name the State of Hawaii as an additional insured in a Comprehensive General Liability policy with a combined minimum single limit of not less than Five Hundred Thousand and No/100 Dollars ($500,000.00) per occurrence for bodily injury and property damage with respect to this request.

4. Temporary access is limited to right turn in and right turn out.

5. Temporary access must meet adequate sight distance requirements.

6. Have a sign posted to alert the drivers that there's construction work ahead to avoid any potential rear end collisions that could occur because of the prevailing speed of vehicles, or create a decelerate lane. Please show it on the construction plans.

7. Temporary access radius must accommodate largest vehicles.

8. Temporary access must be secured during non-construction periods.

9. Temporary access is limited to one year from the date of construction notice to proceed.

10. Kalanianaole Highway must be kept clean of mud and any potentially hazardous debris. BWS must respond to claims for property damage or injury.

11. Kalanianaole Highway must be restored by BWS to a condition similar to that which existed prior to construction of the Temporary access.

12. Existing drainage pattern must not be altered.

13. Contractor must minimize to the greatest extent possible the spread of dust and construction debris in the vicinity of the project site and along the access route to the project site in accordance with Rules and Regulations of State of Hawaii, Department of Health, Clean Air Branch.

14. Submit three (3) sets of construction plans to our Highways Traffic Branch, Permits Section (601 Kamokila Boulevard, Rm 602, Kapolei, Hawaii 96707) for their review and approval.

15. Upon approval of your construction plans, submit two (2) sets to our Oahu District Engineer (727 Kakoi Street, Honolulu, Hawaii 96819) to obtain a permit to begin construction.

If you have any questions please call me at 692-7338.

Very truly yours,

Angela C. Naito

Angela C. Naito
Right-of-Way Agent
Property Management

[redacted]

[redacted]

June 30, 1999

TO: Record

FROM: Long Range Planning

SUBJECT: Kailua 272' Reservoir, (Pohakupu Site), Landscaping Meeting of June 29, 1999

Attendance: Lani-Kailua Outdoor Circle: Carol Ann Ellett, Peggy Froome
Federation of Garden Clubs & Xeriscape: Mary Wichenden
Kailua Neighborhood Board: Faith Evans, Terry Carroll
Kailua Urban Design Task Force: Steve Mechler
BWS: Barry Usagawa, Denise DeCosta, Greg Lee,
BWS Consultants: Harold Takemoto, Russell Chung

In previous discussions with the Kailua community we had indicated that the BWS will seek community input on the landscaping plan for the Kailua reservoir. Now that the reservoir has been resited to the Pohakupu ridge, and the reservoir re-design is on-going, it is timely to seek the community's input on the landscaping plan.

The landscape design could take two directions: 1) Blend with the existing landscape of Pohakupu Ridge or 2) Become a community showcase for utilizing native Hawaiian plants.

It was agreed to blend the landscaping plan with the existing ridge. Make it better than it is now, (in terms of landscaping) while not drawing any attention to the site. There are public access and security concerns for the adjacent Women's Community Correctional Center, so just hide the reservoir.

Since the reservoir will be sited within a bowl, and only partially visible from three identified view points, the landscaping around the reservoir should be low profile, either shrubs or small trees. At the top of the ridge, the high winds tend to crop trees from growing more than 4-5 feet tall.

The permanent access road, along the Kalanianaole Highway side of the ridge, has a larger variety of trees, shrubs and grasses. Therefore, the landscaping along the permanent access road can use a variety of plantings and larger trees to screen any roadway cuts.

Suggested plant species are Formosan Koa and Kawaia (a lowland Koa), along the access road and Naio, a sturdy shrub for around the reservoir. Our landscaping architect consultant will be providing the attendees with a list of potential plant species based on color, availability, drought tolerance, etc. Comments on the plant selections will assist in the choice of plantings to be incorporated into the landscaping plan.

Other issues raised was what could be done to screen the existing 1.0 mg Pohakupu reservoir with the domed roof. This work is outside of the scope of work for the new reservoir. BWS will submit a request to paint the reservoir a darker earth tone.

The reservoir will generate about 85,000 cubic yards of material and it was suggested to investigate if the community could use the material. Suggestions were a ball field, or to build a berm screening the correction facility from Kalanianaole Highway. These options are unlikely, but will be discussed with the State corrections and the future construction contractor. The contractor is responsible for properly disposing of excavated material and obtaining the necessary permits.

A presentation of the project, with emphasis on the visual impact, will be requested for the September 1999 Kailua Neighborhood Board meeting: Community members present offered to lend support during the NHB meeting.

BL:
cc: Attendees

APPENDIX B

EIS PREPARATION NOTICE
COMMENTS AND RESPONSES

P-826/99

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF

April 28, 1999

Civil Works Technical Branch

Mr. Barry Usagawa
City and County of Honolulu
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Usagawa:

Thank you for the opportunity to review and comment on the Environmental Impact Statement Preparation Notice for the Kailua 272 Reservoir, Kailua, Oahu (TMKs 4-2-3: 4 and 4-2-4: 37). The following comments are provided in accordance with Corps of Engineers authorities to provide flood hazard information and to issue Department of the Army (DA) permits.

a. Based on the information provided, no streams or wetlands are present in the project area; therefore, a DA permit will not be required for the project.

b. The flood hazard information provided on page VI-2 of the environmental assessment is correct.

Sincerely,

Paul Mizue, P.E.
Acting Chief, Civil Works
Technical Branch

Copy Furnished:

Mr. Kenneth Ishizaki
Engineering Concepts, Inc.
250 Ward Avenue, Suite 206
Honolulu, Hawaii 96814

MAY 12 8 28 AM '99

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

RECEIVED
MAY 27 1999
ENGINEERING CONCEPTS

May 20, 1999

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
FORREST C. MURPHY, Vice Chairman
KAZU HAYASHIDA
JAN M.L.Y. AMI
BARBARA KIM STANTON
CHARLES A. STED

CLIFFORD S. JAMILE
Manager and Chief Engineer

COPY

Mr. Paul Mizue, P.E., Acting Chief
Civil Works Technical Branch
U. S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

Dear Mr. Mizue:

Subject: Your Letter of April 28, 1999 Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kailua 272 Reservoir at Pohakupu Ridge, Kailua, Hawaii, TMK: 4-2-03: 04, 08, and 4-2-04: 37

Thank you for your letter regarding the Environmental Impact Statement Preparation Notice for the proposed reservoir project.

We acknowledge that a Department of the Army permit will not be required since there are no streams or wetlands in the project area. In addition, we note that the flood hazard information presented in the document is correct.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S JAMILE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

P-789/99

United States Department of the Interior

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

April 27, 1999

Mr. Barry Usagawa
Long Range Planning Section
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Usagawa:

Subject: Environmental Impact Statement Preparation Notice (EISPN), Kailua 272' Reservoir, Kailua, Hawaii, Oahu, Koolaupoko, Tax Map Key: 4-2-03:04 and 4-2-04:37

The staff of the U.S. Geological Survey, Water Resources Division, Hawaii District Office, has reviewed the subject EISPN and we have no comments to offer at this time.

Thank you for allowing us the opportunity to review and comment on this document.

Sincerely,

William Meyer
District Chief

cc: Office of Environmental Quality Control
Mr. Kenneth Ishizaki, Engineering Concepts, Inc.

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

RECEIVED
MAY 27 1999
ENGINEERING CONCEPTS

May 20, 1999

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
FORREST C. MURPHY, Vice Chairman
KAZU HAYASHIDA
JAN M.L.Y. AMI
BARBARA KIM STANTON
CHARLES A. STED

CLIFFORD S. JAMILE
Manager and Chief Engineer

COPY

Mr. William Meyer, District Chief
Water Resources Division
U.S. Geological Survey
United States Department of the Interior
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii 96813

Dear Mr. Meyer:

Subject: Your Letter of April 27, 1999 Regarding the Environmental Impact Statement Preparation Notice for the Proposed Kailua 272 Reservoir, Kailua, Oahu, TMK: 4-2-03: 04 and 4-2-04: 37

Thank you for reviewing the Environmental Impact Statement Preparation Notice for the proposed Kailua 272 Reservoir project.

We acknowledge that you have no comments to offer at this time.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

P-905/99

LETTER NO (P)1354.9

MAY 19 1999

Mr. Barry Usagawa
Long Range Planning Section
Board of Water Supply
City and County of Honolulu
650 South Beretania Street
Honolulu, Hawaii 96843

MAY 25 11 46 AM '99

Dear Mr. Usagawa:

Subject: Environmental Impact Statement Preparation Notice (EISPN) for Kailua 272' Reservoir Kailua, Hawaii
TMK: 4-2-03:04 and 4-2-04:37

Thank you for the opportunity to review the subject EISPN which we received with your memorandum dated April 23, 1999.

The proposed project does not affect any of our existing or proposed facilities. However:

1. A concern is that the project's construction will invariably increase traffic, along Kalanianaole Highway in particular, which serves as a major access road to and from the Youth Correctional Facility and the Women's Correctional Center.

2. Also a concern is that excavation activities at the site will result in noise impacts to the two institutions and to the Kaelepulu Elementary School.

3. As a result of the anticipated traffic and noise impacts, we suggest close and continued coordination with the Department of Human Services and the Department of Education.

If you should have any questions, please contact Mr. Ronald Ching of our Planning Branch at 586-0490.

GORDON MATSUOKA
Public Works Administrator

RC/ET:jy
c: OEQC
Mr. Kenneth Ishizaki, Engineering Concepts, Inc.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

RECEIVED
JUL 16 1999
ENGINEERING CONCEPTS

July 1, 1999

COPY

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
FORREST C. MURPHY, Vice Chairman
JAN M.L.Y. AMI
BARBARA KIM STANTON
CHARLES A. STED

KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

Mr. Gordon Matsuoka, Public Works Administrator
Division of Public Works
Department of Accounting and General Services
State of Hawaii
P. O. Box 119
Honolulu, Hawaii 96810-0119

Dear Mr. Matsuoka:

Subject: Your Letter of May 19, 1999 Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kailua 272 Reservoir at Pohakupu Ridge, Kailua, Hawaii, TMK: 4-2-03: 04, 08 and 4-2-04: 37

Thank you for your letter regarding the Environmental Impact Statement Preparation Notice for the proposed reservoir project.

We provide the following response to your comments:

1. The location of the proposed access road has been coordinated with officials from the Hawaii Youth Correctional Facility and the Women's Community Correctional Center. We are also coordinating with the State Department of Transportation and the City's Department of Transportation Services to address traffic concerns on Kalanianaole Highway and other roads.

2. The contractor will be required to comply with all state and county rules and regulations concerning noise control including Hawaii Administrative Rules, Chaper 11-46 "Community Noise Control" and the grading permit requirements.

3. We will continue to coordinate this project with the neighboring schools, correctional facilities and the associated departmental offices.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

Pure Water . . . our greatest need - use it wisely

BENJAMIN J. CAYETANO
GOVERNOR
SELBY P. MAYA
DIRECTOR
BRADLEY J. MOSEMAN
DEPUTY DIRECTOR
David W. Blane
DIRECTOR, OFFICE OF PLANNING

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

OFFICE OF PLANNING
235 South Beretania Street, 6th Fl., Honolulu, Hawai'i 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Tel.: (808) 587-2846
Fax: (808) 587-2824

Ref. No. P-8049

'99 APR 33 P1:44

April 26, 1999

OEQC

MEMORANDUM

TO: Gary Gill, Director
Office of Environmental Quality Control

FROM: David W. Blane
Director, Office of Planning

SUBJECT: Environmental Impact Statement Preparation Notice, Kailua 272' Reservoir, Kailua, Oahu, Hawaii, TMK: 4-2-03:04 and 4-2-04:37

We do not have any objections to the proposed project.

Our primary interest is that it is designed and implemented in compliance with the statutory Coastal Zone Management (CZM) objectives and policies. In this regard, the environmental impact statement should describe the measures that will be taken to prevent polluted runoff during and after construction. It should also assess the project's conformance with the CZM objectives and policies as provided for in the Office of Environmental Quality Control's administrative rule

If there are any questions about this, please contact Steve Olive of our CZM Program at 587-2877.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

October 21, 1999

JONIAH HARRIS, Mayor

EDDIE FLORES, JR., Chairman
CHARLES A. STED, Vice Chairman
JAN M. L. Y. AHU
HERBERT S. K. KAOPUA, SR.
BARBARA KIM STANTON

KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

Mr. David W. Blane, Director
Office of Planning
Department of Business, Economic
Development & Tourism
State of Hawaii
P. O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Blane:

Subject: Your Memorandum of April 26, 1999 to the Office of Environmental Quality Control Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kailua 272 Reservoir at Kalae O Kaiwa Ridge, Kailua, Hawaii, TMK: 4-2-03: 04, 08 and 4-2-04: 37

Thank you for your memorandum to the Office of Environmental Quality Control (OEQC) (Ref. No. P-8049) regarding the Environmental Impact Statement (EIS) Preparation Notice for the proposed reservoir project. We were unaware of your comment letter and only recently received it from OEQC.

We understand that the Office of Planning has no objections to the proposed project. Your concerns regarding prevention of polluted runoff and conformance with the Coastal Zone Management objectives and policies have been addressed in the Draft EIS.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.
Jeyan Thirugnanam, Office of Environmental Quality Control

BU:js
cc: B. Usagawa

Pure Water ... my greatest need - use it wisely

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P O BOX 1879
HONOLULU, HAWAII 96805

P-828/99

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

April 30, 1999

PLANNING BRANCH
MAY 12 8 28 AM '99

Mr. Barry Usagawa
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, HI 96843

Dear Mr. Usagawa:

Subject: Kailua 272' Reservoir, Environmental Assessment,
TMK 4-2-3:04, 4-2-4:37, Kailua, Oahu, Dated
April, 1999

Thank you for the opportunity to review the subject application. The Department of Hawaiian Home Lands has no comment to offer.

If you have any questions, please call Daniel Ornellas at 586-3836.

Aloha,

for Raynard C. Soon, Chairman
Hawaiian Homes Commission

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

RECEIVED
MAY 27 1999
ENGINEERING CONCEPTS

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
FORREST C. MURPHY, Vice Chairman
KAZU HAYASHIDA
JAN M.L.Y. AMII
BARBARA KIM STANTON
CHARLES A. STED

CLIFFORD S. JAMILE
Manager and Chief Engineer

May 20, 1999

COPY

Mr. Raynard C. Soon, Chairman
Hawaiian Homes Commission
Department of Hawaiian Home Lands
State of Hawaii
P. O. Box 1879
Honolulu, Hawaii 96805

Dear Mr. Soon:

Subject: Your Letter of April 30, 1999 Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kailua 272 Reservoir at Pohakupu Ridge, Kailua, Hawaii, TMK: 4-2-03: 04, 08, and 4-2-04: 37

Thank you for your letter regarding the Environmental Impact Statement Preparation Notice for the proposed reservoir project.

We acknowledge that you have no comments to offer at this time.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

In reply, please refer to:
File:

P-933/99

May 20, 1999

91-244D/epo

Mr. Barry Usagawa
Long Range Planning Section
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Usagawa:

Subject: Environmental Impact Statement Preparation Notice (EISPN)
Kailua 272' Reservoir
Kailua, Oahu
TMK: 4-2-3: 4 and 37

Thank you for allowing us to review and comment on the new location for the subject reservoir. We do not have any new comments to offer except for the following:

Noise

Chapter 11-43 "Community Noise Control" was incorrectly referenced on page IV-2 of the Environmental Assessment. Chapter 11-43 was superseded by Chapter 11-46, Hawaii Administrative Rules, "Community Noise Control" on September 23, 1996. Activities associated with the construction of the project must comply with Chapter 11-46.

Sound levels emanating from stationary equipment such as water pumps or generators must be attenuated to comply with the provisions of the Department of Health's Administrative Rules, Chapter 11-46.

Should there be any questions on this matter, please call Mr. Jerry Haruno, Environmental Health Program Manager, Noise, Radiation and Indoor Air Quality Branch at 586-4701.

Fugitive Dust

Construction activities must comply with provisions of Hawaii Administrative Rules, Chapter 11-60.1, "Air Pollution Control," Section 11-60.1-33, Fugitive Dust.

The contractor should provide adequate measures to control dust from the road areas and during the various phases of construction. These measures include, but are not limited to:

a. Planning the different phases of construction, focusing on minimizing the amount of dust generating materials and activities, centralizing on-site vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact;

b. Providing an adequate water source at the site prior to start up of construction activities;

c. Landscaping and rapid covering of bare areas, including slopes, starting from the initial grading phase;

d. Controlling of dust from shoulders and access roads;

e. Providing adequate dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and

f. Controlling of dust from debris being hauled away from project site.

If you have any questions regarding these issues on fugitive dust, please contact the Clean Air Branch at 586-4200.

Sincerely,

GARY GILL
Deputy Director for
Environmental Health

c: OEQC
Engineering Concepts
NR&IAQB
CAB

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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ENGINEERING CONCEPTS

June 17, 1999

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JEREMY HARRIS, Mayor
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ROSS S. SASAMURA, P.E.
BARBARA KIM STANTON
CHARLES A. STED
KAZU HAYASHIDA, Ex-Officio
CLIFFORD S. JAMILE
Manager and Chief Engineer

Mr. Gary Gill
Deputy Director for Environmental Health
Department of Health
State of Hawaii
P. O. Box 3378
Honolulu, Hawaii 96801

Dear Mr. Gill:

Subject: Your Letter of May 20, 1999, (91-244D/epo) Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kailua 272' Reservoir at Pohakupu Ridge, Kailua, Hawaii, TMK: 4-2-03: 4, 8 and 4-2-04: 37

Thank you for your letter (91-244D/epo) regarding the Environmental Impact Statement (EIS) Preparation Notice for the proposed reservoir project.

We provide the following response to your comments:

A. Noise

The Draft EIS will refer to Chapter 11-46, Hawaii Administrative Rules, "Community Notice Control", which supersedes Chapter 11-43. The Draft EIS will state that sound levels emanating from any stationary equipment will be attenuated to comply with the provisions of Chapter 11-46.

B. Fugitive Dust

1. The Draft EIS will state that construction activities will comply with provisions of Hawaii Administrative Rules, Chapter 11-60.1, "Air Pollution Control", Section 11-60.1-33, Fugitive Dust.

2. The Draft EIS will include the following mitigative measures to control dust during construction:

   a. Dust minimization will be considered when planning construction phases to minimize dust-generating materials and activities, centralize onsite vehicular traffic routes, and locate potentially dusty equipment in areas of the least impact.

   b. An adequate water source for dust control will be provided prior to the start-up of construction activities.

   c. Bare areas, including slopes, will be grass-mulched or landscaped as soon as physically possible, starting from the initial grading phase.

   d. The majority of the construction access road will be paved for traction, safety, and to control dust.

   e. Adequate dust control measures will be provided during weekends, after hours, and prior to daily start-up of construction activities.

   f. Dust from debris being hauled away from the site will be controlled by covering truck beds and providing a vehicle washdown area.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAMILE
FOR Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

P-965/99

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPIOLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

'99 JUN 9 06 AM PLANNING BRANCH

May 28, 1999

Mr. Barry Usagawa
Long Range Planning Section
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, HI 96843

doc. # EIS (99) 299

Re: Environmental Assessment/Environmental Impact Statement Preparation Notice for Kailua 272' Reservoir. TMK (1) 4-2-003:004 and (1) 4-2-004:37

Dear Mr. Usagawa:

Thank you for the opportunity to comment on the Environmental Assessment/ Environmental Impact Statement Preparation Notice for Kailua 272' Reservoir. The Office of Hawaiian Affairs (OHA) has the following comments about the proposed project.

Part of the proposed project site, including TMK (1) 4-2-003:003, 004, 008, and 026 are classified as ceded lands by the Department of Land and Natural Resources. The ceded status of these and possibly other parcels associated with the project should be stated clearly in the Environmental Impact Statement. OHA strongly suggests that Native Hawaiians be consulted before any efforts to use, lease, transfer, destroy, or otherwise modify ceded lands.

We look forward to reviewing the completed EIS. Should you have any questions concerning our comments, please contact Nami Ohtomo, Natural Resources Specialist at 594-1755. Please refer to the document number noted at the top of this letter in any future correspondence.

Sincerely,

Colin Kippen
Deputy Administrator

Sebastian Aloot
Land and Natural Resources Division Officer

cc: BOT
Office of Environmental Quality Control
Kenneth Ishizaki, Engineering Concepts, Inc.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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July 1, 1999

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JEREMY HARRIS, Mayor
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CHARLES A. STED

KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

Mr. Colin Kippen, Deputy Administrator
Office of Hawaiian Affairs
State of Hawaii
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawaii 96813

Dear Mr. Kippen:

Subject: Your Letter of May 28, 1999 Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kailua 272 Reservoir at Pohakuou Ridge, Kailua, Hawaii, TMK: 4-2-03: 04, 08 and 4-2-04: 37

Thank you for your letter (doc.#EIS(99)299) regarding the Environmental Impact Statement (EIS) Preparation Notice for the proposed reservoir project.

We provide the following response to your comments:

1. The Draft EIS will state that portions of the proposed reservoir site (TMK: 4-2-03: Parcels 4 and 8) are classified as ceded lands by the Department of Land and Natural Resources.

2. We have no objections to consulting with native Hawaiian groups to construct the proposed reservoir which is located on ceded lands. We feel the proposed reservoir benefits Hawaiian Home Lands with increased levels of reliable water service. We would like to coordinate our discussions through the Office of Hawaiian Affairs.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

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

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

Ref:PS:EH

MAY 25 1999

Mr. Barry Usagawa
Long Range Planning Branch
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Usagawa:

Subject: Draft Environmental Assessment (DEA) for the Kailua 272' Reservoir, Kailua, Oahu
TMKs: 4-2-03:04 and 4-3-04:37

We have reviewed the subject DEA document and offer the following comments for your consideration.

Engineering Branch:

The proposed project site, according to FEMA Community Panel Map No. 150001 0090 C, is located in Zone X. This is an area determined to be outside the 500-year flood plain.

Planning Section:

We note that portions of the proposed project are located within the State Conservation District, Limited Subzone, and that a Conservation District Use Permit will be required.

It is our understanding that the DLNR State Historic Preservation Office has been contacted directly regarding the proposed project.

Thank you for the opportunity to review the subject document.

Should you have any questions or require further assistance, please contact staff planner Ed Henry at 587-0380.

Very truly yours,

TIMOTHY E. JOHNS
Chairperson

c.c. OEQC
Engineering Concepts
Attn. Kenneth Ishizaki
Engineering Branch

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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FORREST C. MURPHY, Vice Chairman
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BARBARA KIM STANTON
CHARLES A. STED
KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio
CLIFFORD S. JAMILE
Manager and Chief Engineer

Mr. Timothy E. Johns, Chairperson
Department of Land and Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Johns:

Subject: Your Letter of May 25, 1999 Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kailua 272 Reservoir at Pohakupu Ridge, Kailua, Hawaii, TMK: 4-2-03: 04, 08 and 4-2-04: 37

Thank you for your letter regarding the Environmental Impact Statement (EIS) Preparation Notice for the proposed reservoir project.

We provide the following response to your comments:

1. The Draft EIS will include a statement that the project site is located in an area determined to be outside the 500-year flood plain.

2. We understand that a Conservation District Use Permit will be required due to the location of a portion of the project site within the State Conservation District, Limited Subzone.

3. The proposed project is being coordinated directly with the State Historic Preservation Office.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

Pure Water ... our greatest need – use it wisely

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

TIMOTHY E. JOHNS, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JANET E. KAWELO

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS
WATER RESOURCE MANAGEMENT

June 3, 1999

Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96813
ATTN: Mr. Barry Usagawa, Long Range Planning Section

LOG NO: 23545
DOC NO: 9906SC04

Dear Mr. Usegawa:

SUBJECT: Chapter 6E-8 Historic Preservation Review of an Environmental Impact Statement Preparation Notice (EISPN) for the Proposed Kailua 272 Reservoir
Kailua, Ko'olau Poko, O'ahu
TMK: 4-2-003: 004 and 4-2-004: 037

Thank you for the opportunity to review the EISPN for the proposed construction of the Kailua 272 Reservoir in Kailua, O'ahu. Our review is based on historic reports, maps, and aerial photographs maintained at the State Historic Preservation Division; no field inspection was made of the subject parcel.

We recently completed a review of a report documenting an archaeological inventory survey of the subject property (*Archaeological Inventory Survey of Kailua 272 Reservoir and Access Road Kailua, Ahupua'a of Kailua, Island of O'ahu. TMK: 4-2-03: 04, 08; 4-2-04: 37*. 1999. CSH). The survey found one significant historic site. A portion of Tunnel #10, a component of the Waimanalo Irrigation System (SIHP No. 50-80-15-4042, lies underground, beneath part of the project area. Judging from information in the EISPN, it appears that the temporary construction access road depicted in Alternative 4 may have an "adverse effect" on Tunnel #10 if its construction extends to the depth of the tunnel below ground surface. If this will be the case, then mitigation of some form will need to be undertaken prior to beginning construction activities, including the building of temporary roads. The other three alternatives proposed for a temporary construction access road will have "no effect" on significant historic sites.

Should you have any questions, please feel free to call Sara Collins at 692-8026.

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

SC:jk

c: Office of Environmental Quality Control, 235 S. Beretania Street, Room 702, Honolulu, HI 96813-2437
Mr. Kenneth Ishizaki, Engineering Concepts, Inc., 250 Ward Avenue, Suite 206, Honolulu, HI 96814

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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June 30, 1999

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BARBARA KIM STANTON
CHARLES A. STED

KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

COPY

Mr. Don Hibbard, Administrator
Historic Preservation Division
Department of Land and Natural Resources
State of Hawaii
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

Dear Mr. Hibbard:

Subject: Your Letter of June 3, 1999 Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kailua 272 Reservoir at Pohakupu Ridge, Kailua, Hawaii, TMK: 4-2-03: 04, 08 and 4-2-04: 37

Thank you for your letter regarding the Environmental Impact Statement Preparation Notice for the proposed reservoir project.

We understand your concerns on the Waimanalo Irrigation System Tunnel #10 which is a registered State historic site. Field inspections by our design and archaeological consultants could not locate any remnants of Tunnel #10. However, to minimize impacts to Tunnel #10 and to meet access requirements to Kalanianaole Highway, our preferred temporary construction access road alignment is Alternative 3, which utilizes the existing Womens' Correction Facility entrance and the old Pohakupu reservoir construction access road. We believe this alternative avoids all impacts to the old Waimanalo Irrigation System.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

Pure Water ... ever-growing need - use it wisely

P-966/99

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
HWY-PS
2.4007

JUN -3 1999

JUN 9 1 53 PM '99
PLANNING BRANCH

Mr. Barry Usagawa
Long Range Planning Section
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Usagawa:

Subject: EISPN and EA, Kailua 272' Reservoir

Thank you for the opportunity to review the subject document.

We have the following comments:

1. The preferred temporary access for construction is Alternative #3, the Women's Community Correctional Center existing entrance. The existing access to Kalanianaole Highway can be utilized. Full turning movements are available.

2. We understand that our Highways Division Right-of-Way Branch has already received a request to use Alternative #1 for construction access. If Alternative #1 is selected, only right turns in and right turns out will be permitted. The applicant must verify that adequate sight distance exists. The turning radii at the access should accommodate the largest vehicle using the area. Access should be secured during non-construction periods.

If you have any questions, you may contact Antonie Wurster, Highways Planning Branch, at 587-1842 or Ronald F. Tsuzuki, Head Planning Engineer, Highways Division, at 587-1830.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

c: OEQC
Engineering Concepts, Inc.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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JEREMY HARRIS, Mayor
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BARBARA KIM STANTON
CHARLES A. STED

KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

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

Dear Mr. Hayashida:

Subject: Your Letter of June 3, 1999 Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kailua 272 Reservoir at Pohakupu Ridge, Kailua, Hawaii, TMK: 4-2-03: 04, 08 and 4-2-04: 37

Thank you for your letter regarding the Environmental Impact Statement (EIS) Preparation Notice for the proposed reservoir project.

We provide the following response to your comments:

1. We acknowledge that Alternative #3 is preferred by your department for the construction access road due to utilization of the existing entrance to the Women's Community Correctional Center from Kalanianaole Highway and the availability of full turning movements. The Draft EIS will state that this alternative is the preferred alignment.

2. Our favorable discussions with the corrections officials allow us to use the Alternative #3 access, instead of Alternative #1. The Draft EIS will disclose the conditions that will be imposed for the Alternative #1 construction access.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. IAMILE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

STEVE HOLMES
COUNCILMEMBER
Phone: (808)547-7002
Fax: (808)523-4220
E-mail: holmes@co.honolulu.hi.us

CITY COUNCIL

CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII 96813-3065 / TELEPHONE 547-7000

May 24, 1999

Mr. Barry Usagawa
Long Range Planning Section
Board of Water Supply
630 South Beretania Street
Honolulu, HI 96843

Dear Mr. Usagawa:

Subject: Comments on Kailua 272 Reservoir Environmental Assessment

I would like to commend the Board of Water Supply for working with the community and rethinking the location of the Kailua 272 Reservoir. Your willingness to compromise and adapt to the wishes of the community is very much appreciated. After reviewing the Kailua 272 Reservoir Environmental Assessment prepared by Engineering Concepts, Inc. in April, 1999, I offer the following comments.

This site behind the Women's Community Correctional Center is preferable to the former proposed site on Puu O Ehu Ridge. Visual impacts appear to be minimized by constructing the 4.0 MG Reservoir in the "bowl" of the ridge, similar to construction of the existing Pohakupu 6.0 MG Reservoir.

The construction hours of 7:00 a.m. to 3:30 p.m. may need to be adjusted in order to accommodate the high level of traffic on Kalanianaole Highway on weekday mornings. This adjustment may only be necessary when the construction site generates a higher level of traffic due to trucks used during the excavation phase. When the traffic control plan is prepared, please consider informing the neighboring community groups: the Kailua Neighborhood Board, the Olomana Community Association, and the Pohakupu-Kukanono Community Association.

Thank you for this opportunity to comment.

Sincerely,

STEVE HOLMES
Councilmember

SH:ac

xc: Office of Environmental Quality Control
Engineering Concepts, Inc.
Kailua Neighborhood Board
Olomana Community Association
Pohakupu-Kukanono Community Association

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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FORREST C. MURPHY, Vice Chairman
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BARBARA KIM STANTON
CHARLES A. STED

KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

COPY

The Honorable Steve Holmes
Councilmember, District II
City Council
530 South King Street, Room 202
Honolulu, Hawaii 96813

Dear Councilmember Holmes:

Subject: Your Letter of May 24, 1999 Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kailua 272 Reservoir at Pohakupu Ridge, Kailua, Hawaii, TMK: 4-2-03: 04, 08 and 4-2-04: 37

Thank you for your letter regarding the Environmental Impact Statement Preparation Notice for the proposed reservoir project.

We provide the following response to your comments:

1. We acknowledge your preference for location of the reservoir at Pohakupu Ridge. We concur with your comment that the visual impact of the proposed reservoir will be minimized due to the construction of the tank in the "bowl" of the ridge, similar to the existing 6.0 MG tank.

2. Construction hours will be adjusted on weekday mornings when higher levels of construction traffic are scheduled. This will avoid impacts to the peak morning traffic.

3. We will inform the neighborhood board and the adjacent community associations of the proposed traffic controls as they are developed.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

DEPARTMENT OF ENVIRONMENTAL SERVICES
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 3RD FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 527-6663 • FAX: (808) 527-6675

JEREMY HARRIS
Mayor

KENNETH E. SPRAGUE, P.E., Ph.D.
Director

BARRY FUKUNAGA
Deputy Director

ENV 99-55

APR 30 1999

MAY 3 10 42 AM '99
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MAY 3 4 01 PM '99

MEMORANDUM

TO: CLIFFORD JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTENTION: BARRY USAGAWA

FROM: KENNETH E. SPRAGUE, DIRECTOR
DEPARTMENT OF ENVIRONMENTAL SERVICES

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
KAILUA 272' RESERVOIR
TMK: 4-2-03:04 AND 4-2-04:37

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

1. The Environmental Impact Statement Preparation Notice (EISPN) should address best management practices (BMPs) to mitigate discharge of pollutants during construction.

2. Effluent discharge permits from the State Department of Health and the City Department of Environmental Services may be required.

Should you have any questions, please contact Mr. Alex Ho, Environmental Engineer, at extension 4150.

cc: Office of Environmental Quality Control
Engineering Concepts, Inc. (Kenneth Ishizaki)

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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MAY 27 1999
ENGINEERING CONCEPTS

JEREMY HARRIS, Mayor

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FORREST C. MURPHY, Vice Chairman
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JAN M.L.Y. AMB
BARBARA EIM STANTON
CHARLES A. STED

CLIFFORD S. JAMILE
Manager and Chief Engineer

May 20, 1999

COPY

TO: MR. KENNETH E. SPRAGUE, DIRECTOR
DEPARTMENT OF ENVIRONMENTAL SERVICES

FROM: CLIFFORD S. JAMILE

SUBJECT: YOUR MEMORANDUM OF APRIL 30, 1999 REGARDING THE ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE BOARD OF WATER SUPPLY'S PROPOSED KAILUA 272 RESERVOIR AT POHAKUPU RIDGE, KAILUA, HAWAII,
TMK: 4-2-03: 04, AND 4-2-04: 37

Thank you for your memorandum regarding the Environmental Impact Statement Preparation Notice for the proposed reservoir project.

We provide the following responses to your comments:

1. The Draft Environmental Impact Statement will address best management practices to mitigate discharge of pollutants during construction. An erosion control plan is being developed as part of the design.

2. The need for effluent discharge permits will be coordinated with the State Department of Health and the City Department of Environmental Services as planning and design of the project proceeds.

If you have any questions, please contact Barry Usagawa at 527-5235.

cc: Kenneth Ishizaki - Engineering Concepts, Inc.

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 10TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 523-4182 • FAX (808) 523-4054

P-903/99

JEREMY HARRIS
MAYOR

WILLIAM D. BALFOUR, JR.
DIRECTOR

MICHAEL T. ANN
DEPUTY DIRECTOR

May 20, 1999

MAY 25 11 45 AM '99

TO: BARRY USAGAWA
LONG RANGE PLANNING SECTION
BOARD OF WATER SUPPLY

FROM: WILLIAM D. BALFOUR, JR., DIRECTOR

SUBJECT: KAILUA 272' RESERVOIR, KAILUA, HAWAII

We have reviewed the Environmental Impact Statement Preparation Notice for the above-referenced project and find that the project will not impact any of our recreational programs or facilities. We do not have anything else to add to the draft environmental assessment at this time.

Thank you for the opportunity to express our concerns on the proposed draft environmental assessment.

Should you need further information, please contact Mr. John Eveland, Executive Assistant, at 527-6038.

W. D. Balfour, Jr.

WILLIAM D. BALFOUR, JR.
Director

WDB:cu
(99-0983GT)

cc: Office of Environmental Quality Control
Mr. Kenneth Ishizaki, Engineering Concepts, Inc.

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

June 14, 1999

JEREMY HARRIS, Mayor
EDDIE FLORES, JR., Chairman
FORREST C. MURPHY, Vice Chairman
JAN M. L. Y. AMI
ROSS S. SASAMURA, P.E.
BARBARA KIM STANTON
CHARLES A. STED
KAZU HAYASHIDA, Ex-Officio
CLIFFORD S. JAMILE
Manager and Chief Engineer

COPY

RECEIVED
JUN 25 1999
ENGINEERING CONCEPTS

TO: MR. WILLIAM D. BALFOUR, JR., DIRECTOR
DEPARTMENT OF PARKS AND RECREATION

FROM: CLIFFORD S. JAMILE

SUBJECT: YOUR MEMORANDUM OF MAY 20, 1999 REGARDING THE ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE BOARD OF WATER SUPPLY'S PROPOSED KAILUA 272 RESERVOIR, KAILUA, OAHU

Thank you for reviewing the Environmental Impact Statement Preparation Notice for the proposed Kailua 272 Reservoir project.

We acknowledge that the proposed project will not impact any recreational programs or facilities.

If you have any questions, please contact Barry Usagawa at 527-5235.

cc: Ken Ishizaki, Engineering Concepts, Inc.

P.

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET • HONOLULU, HAWAII 96813
TELEPHONE (808) 523-4414 • FAX (808) 527-6743

P-906/99

JEREMY HARRIS
MAYOR

JAN NAOE SULLIVAN
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

May 24, 1999

1999/CLOG-2735(ST)
'99 EA Comments - Zone 4

MAY 25 3 17 PM '99
BD OF WATER...

MEMORANDUM

TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTN: BARRY USAGAWA, PROJECT MANAGER

FROM: JAN NAOE SULLIVAN, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE (EISPN)
KAILUA 272' RESERVOIR, KAILUA, OAHU
TAX MAP KEYS: 4-2-3: 4; 4-2-4: 37

We have reviewed the EISPN information for the above-referenced project and our comments are as follows:

- A drainage report may be required with construction plans when they are submitted.
- The Draft Environmental Impact Statement (EIS) should discuss the use of best management practices (BMPs) to reduce and control discharge of pollutants.
- If the proposed drain connection will be made directly to a city-owned separate storm sewer system, a Drain Connection Permit application must be filed with the Department's Civil Engineering Branch.
- The BWS should consult with the Environmental Quality Division, Storm Water Quality Branch of the Department of Environmental Services regarding the proposed effluent discharge resulting from reservoir overflow and washout.
- The project site is located outside the Special Management Area (SMA), and therefore will not require the approval of a SMA Use Permit.
- A discussion should be included on all applicable City and County of Honolulu Development and General Plan Objectives and Policies.

- The proposed Kailua 272' Reservoir is designated Preservation on the current Koolaupoko Development Plan Urban Land Use Map. However, we note that the Department is in the process of revising the City's Development Plans. It should also be noted that the preliminary draft of the revised Koolaupoko Sustainable Communities (Development) Plan recommends that the area of the proposed project site be maintained in Preservation and the scenic resource of the Puu be protected. The Draft EIS should address potential visual impacts of the proposed reservoir.
- Insofar as the proposed site is located on a State Urban and Conservation District Boundary, we suggest that a copy of the Draft EIS be routed to the State Land Use Commission for their input.
- Any future subdivision or designation of easements for the urban district portion of the project site will require the submission of a Subdivision application in accordance with the Subdivision Rules and Regulations. Any subdivision within the State Conservation District will require approval from the Board of Land and Natural Resources.
- Because the equipment and supplies may be air lifted to the project site, the Draft EIS should address potential noise impacts this activity would have on the area residents.

Thank you for the opportunity to comment on this matter. Should you have any questions, please contact Steve Tagawa of our staff at Extension 4817.

for JAN NAOE SULLIVAN
Director of Planning
and Permitting

JNS:am

cc: Kenneth Ishizaki, Engineering Concepts, Inc.
Office of Environmental Quality Control

g:\cd\elspa272.sht

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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June 30, 1999

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JEREMY HARRIS, Mayor
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BARBARA KIM STANTON
CHARLES A. STED

KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

TO: MS. JAN NAOE SULLIVAN, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

FROM: CLIFFORD S. JAMILE

SUBJECT: YOUR LETTER OF MAY 24, 1999 REGARDING THE ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE BOARD OF WATER SUPPLY'S PROPOSED KAILUA 272 RESERVOIR AT POHAKUPU RIDGE, KAILUA, HAWAII, TMK: 4-2-03: 04, 08 AND 4-2-04: 37

Thank you for your memorandum regarding the Environmental Impact Statement (EIS) Preparation Notice for the proposed reservoir project.

We provide the following response to your comments:

1. We acknowledge that a drainage report may be required when the construction plans are submitted for review.

2. The Draft EIS will discuss the use of best management practices to reduce and control the discharge of pollutants.

3. A Drain Connection Permit application will be filed with the Civil Engineering Branch if the design requires a direct connection to a city-owned separate storm sewer system. At this time, we do not anticipate that a direct drainage connection will be needed.

4. We will consult with the Environmental Quality Division, Storm Water Quality Branch regarding effluent discharge associated with reservoir overflow and washout. However, the Board of Water Supply (BWS) maintains a current blanket National Pollutant Discharge Elimination System permit for all discharges resulting from BWS operations and maintenance activities.

5. We understand that a Special Management Area (SMA) Use Permit will not be required for the project due to its location outside the SMA.

6. The Draft EIS will include a discussion on all applicable City and County of Honolulu Development and General Plan Objectives and Policies. We understand the Koolaupoko Sustainable Community plan has not been adopted at this time.

7. The Draft EIS will include a visual analysis to address potential impacts to scenic ridgeline resources due to the proposed reservoir construction. We understand that although the preliminary draft of the revised Koolaupoko Sustainable Communities Plan recommends that Preservation-zoned lands be maintained and scenic resources be protected, the proposed project, as a public facility, is not inconsistent with the Plan. The preservation of scenic resources was an important reason why BWS decided to relocate the reservoir from the Puu O Ehu Ridge to the Pohakupu Ridge.

8. A copy of the Draft EIS will be furnished to the State Land Use Commission for their review.

9. We understand that a subdivision application will be required for the subdivision or the designation of easements within the Urban portion of the project site. We further understand that the subdivision within the Conservation District will require approval from the Board of Land and Natural Resources.

10. The Draft EIS will address potential noise impacts associated with construction. During construction, all equipment and materials will be trucked to the project site along the access road. Airlifting is not anticipated.

A copy of your comment letter and this response will be included in the Draft EIS. If you have any questions, please contact Barry Usagawa at 527-5235.

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

DEPARTMENT OF TRANSPORTATION SERVICES

CITY AND COUNTY OF HONOLULU

PACIFIC PARK PLAZA • 711 KAPOLANI BOULEVARD SUITE 1200 • HONOLULU, HAWAII 96813
PHONE (808) 523-4926 • FAX (808) 523-4730

P-895/99

JEREMY HARRIS
MAYOR

May 19, 1999

TPD99-00319

MEMORANDUM

TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTN: BARRY USAGAWA, LONG RANGE PLANNING SECTION

FROM: CHERYL D. SOON, DIRECTOR

SUBJECT: KAILUA 272' RESERVOIR

In response to the April 23, 1999 letter from Engineering Concepts, Inc., the environmental impact statement preparation notice for the subject project was reviewed. The following comments are the result of this review:

1. The major roadway impact would appear to occur on Kalanianaole Highway, a State Department of Transportation (SDOT) facility. As such, coordination with SDOT will be imperative.

2. The "Traffic" section on Page IV-2 states that the normal construction hours of 7:00 a.m. to 3:30 p.m. can be adjusted to avoid inconvenience to motorists. If construction work is proposed during the morning peak period (i.e., before 8:30 a.m.), it should be demonstrated that the traffic flow will not be adversely affected.

Should you have any questions regarding these comments, please contact Faith Miyamoto of the Transportation Planning Division at Local 6976.

CHERYL D. SOON

cc: Office of Environmental
Quality Control
Mr. Kenneth Ishizaki
Engineering Concepts, Inc.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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June 30, 1999

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BARBARA KIM STANTON
CHARLES A. STED

KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

TO: MS. CHERYL D. SOON, DIRECTOR
DEPARTMENT OF TRANSPORTATION SERVICES

FROM: CLIFFORD S. JAMILE

SUBJECT: YOUR LETTER OF MAY 19, 1999 REGARDING THE ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE BOARD OF WATER SUPPLY'S PROPOSED KAILUA 272 RESERVOIR AT POHAKUPU RIDGE, KAILUA, HAWAII, TMK: 4-2-03: 04, 08 AND 4-2-04: 37

Thank you for your memorandum regarding the Environmental Impact Statement (EIS) Preparation Notice for the proposed reservoir project.

We provide the following response to your comments:

1. Planning and design of the proposed project is presently being coordinated with the State Department of Transportation to minimize impacts to Kalanianaole Highway. The State has granted the use of the Women's Correctional Facility entrance for temporary construction access. The permanent access will be via the existing Pohakupu reservoir site.

2. The Draft EIS will disclose an adjustment of normal construction hours to avoid inconvenience to motorists during the morning peak period. Construction activities will begin after the morning peak period, when impacts to neighboring roadways, including Kalanianaole Highway, are anticipated.

If you have any questions, please contact Barry Usagawa at 527-5235.

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

3375 KOAPAKA STREET, SUITE H425
HONOLULU, HAWAII 96819-1869

JEREMY HARRIS
MAYOR

ATTILIO K. LEONARDI
FIRE CHIEF

JOHN CLARE
DEPUTY FIRE CHIEF

April 29, 1999

TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTN: BARRY USAGAWA, LONG-TERM PLANNING SECTION

FROM: ATTILIO K. LEONARDI, FIRE CHIEF

SUBJECT: KAILUA 272' RESERVIOR
ENVIRONMENTAL ASSESSMENT
TMK: 4-2-3: 04 AND 4-2-04: 037
HFD INTERNAL NO. OL 99-081

This is in response to the letter we received from Engineering Concepts, Inc., dated April 23, 1999, regarding the subject project. We foresee no significant impact with the subject project.

Should you have any questions, please call Battalion Chief Charles Wassman of our Fire Prevention Bureau at 831-7778.

Attilio K. Leonardi

ATTILIO K. LEONARDI
Fire Chief

AKL/CW:bh

cc: Office of Environmental Quality Control
Kenneth Ishizaki, Engineering Concepts, Inc.

MAY 4 11 15 AM '99

MAY 3 8 24 AM '99

BD OF WATER SUPPLY
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BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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ENGINEERING CONCEPTS

JEREMY HARRIS, Mayor

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FORREST C. MURPHY, Vice Chairman
KAZU HAYASHIDA
JAN M.L.Y. AMI
BARBARA KIM STANTON
CHARLES A. STED

CLIFFORD S. JAMILE
Manager and Chief Engineer

May 20, 1999

COPY

TO: MR. ATTILIO K. LEONARDI, FIRE CHIEF
FIRE DEPARTMENT

FROM: CLIFFORD S. JAMILE

SUBJECT: YOUR MEMORANDUM OF APRIL 29, 1999 REGARDING THE ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PROPOSED KAILUA 272 RESERVOIR, KAILUA, OAHU, TMK: 4-2-03: 04, AND 4-2-04: 37

Thank you for reviewing the Environmental Impact Statement Preparation Notice for the proposed Kailua 272 Reservoir project.

We acknowledge that you foresee no significant impact with the project.

If you have any questions, please contact Barry Usagawa at 527-5235.

cc: Kenneth Ishizaki - Engineering Concepts, Inc.

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

801 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813 - AREA CODE (808) 529-3111

P-892/99

JEREMY HARRIS
MAYOR

OUR REFERENCE CS-DL

May 17, 1999

LEE D. DONOHUE
CHIEF

WILLIAM B. CO
MICHAEL CARI
DEPUTY CHI

BOARD OF WATER SUPPLY
99 MAY 19 AM 7:52

TO: CLIFFORD JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTENTION: BARRY A. USAGAWA, LONG RANGE PLANNING SECTION

FROM: LEE D. DONOHUE, CHIEF OF POLICE
HONOLULU POLICE DEPARTMENT

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
KAILUA 272' RESERVOIR, KOOLAUPOKO, OAHU
TMK: 4-2-03:04 AND 4-2-04:37

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

In spite of mitigation measures, construction dust and noise may have an effect on the facilities surrounding the construction area. In addition, construction vehicles and equipment exiting and entering Kalanianaole Highway may cause traffic safety concerns. These factors could generate calls for police service and have an impact on our workload.

If there are any questions, please call me at 529-3255 or Lieutenant John Thompson of District 4 at 235-7621.

LEE D. DONOHUE
Chief of Police

By
EUGENE UEMURA
Assistant Chief
Support Services Bureau

cc: Ofc. of Environmental Quality Control
Engineering Concepts, Inc.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

COPY

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
FORREST C. MURPHY, Vice Chairman
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CLIFFORD S. JAMILE
Manager and Chief Engineer

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JUN 17 1999
ENGINEERING CONCEPTS

May 28, 1999

TO: MR. LEE D. DONOHUE, CHIEF OF POLICE
HONOLULU POLICE DEPARTMENT

FROM: CLIFFORD S. JAMILE

SUBJECT: YOUR MEMORANDUM OF MAY 17, 1999 REGARDING THE ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE KAILUA 272' RESERVOIR, KOOLAUPOKO, OAHU

Thank you for reviewing the Environmental Impact Statement Preparation Notice regarding the Kailua 272' Reservoir. We understand your concerns on noise, dust and traffic and provide the following response:

1. The Board of Water Supply currently requires all construction work to comply with dust and noise limits set forth by the Department of Health. should these limits be exceeded, the contractor's work will be stopped until corrective measures are taken.

2. Traffic concerns along the preferred construction access route will be addressed with the approved traffic control plan.

If you have any questions, please contact Barry Usagawa at 527-5235.

cc: Engineering Concepts, Inc.

Board Water our greatest need – use it wisely

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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July 1, 1999

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JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
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BARBARA KIM STANTON
CHARLES A. STED

KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

TO: MR. LEE D. DONOHUE, CHIEF
HONOLULU POLICE DEPARTMENT

FROM: CLIFFORD S. JAMILE

SUBJECT: YOUR MEMORANDUM OF MAY 17, 1999 REGARDING THE ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE BOARD OF WATER SUPPLY'S PROPOSED KAILUA 272 RESERVOIR AT POHAKUPU RIDGE, KAILUA, HAWAII, TMK: 4-2-03: 04, 08 AND 4-2-04: 37

Thank you for your memorandum (CS-DL) regarding the Environmental Impact Statement Preparation Notice for the proposed reservoir project. We acknowledge your comment that despite the implementation of mitigation measures, the proposed construction may generate calls for police service resulting from dust, noise and traffic concerns. These construction related impacts will be minimized as much as possible and will be temporary during the construction period. We will continue to coordinate this project with the Police Department and provide a schedule of construction activities, when available.

If you have any questions, please contact Barry Usagawa at 527-5235.

cc: Kenneth Ishizaki - Engineering Concepts, Inc.

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

P-934/99

Scott W.H. Seu, P.E.
Manager
Environmental Department

May 26, 1999

Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, HI 96813
Attention: Mr. Barry Usagawa

Dear: Mr. Usagawa

Subject: Kailua 272' Reservoir

Thank you for the opportunity to comment on your April 1999 Environmental Impact Statement Preparation Notice for the Kailua 272' Reservoir, as proposed by the Board of Water Supply. We have reviewed the subject document and it appears that any new electrical service to the new well site will traverse consevation district (P-1 zone) which is a restricted zone that does not allow power lines without DLNR approval. HECO request that the EIS incorporates an environmental assessment addressing the impacts of a power line if one is so needed.

Our point of contact for this project, and the originator of these comments, is Francis Hirakami (543-7536) Principal Engineer. I suggest your staff and consultants deal directly with Francis to coordinate HECO's continuing input on this project.

Sincerely,

cc: OEQC

Engineering Concepts, Inc.
250 Ward Avenue, Suite 206
Honolulu, HI 96814
Attn: Mr. Kenneth Ishizaki

F. Hirakami

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

JEREMY HARRIS, Mayor
EDDIE FLORES, JR., Chairman
FORREST C. MURPHY, Vice-Chairman
JAN M. L. Y. AMI
ROSS S. SASAMURA, P.E.
BARBARA KIM STANTON
CHARLES A. STED
KAZU HAYASHIDA, Ex-Officio
CLIFFORD S. JAMILE
Manager and Chief Engineer

COPY

June 17, 1999

Mr. Scott W. H. Seu, P.E., Manager
Environmental Department
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840-0001

Attention: Francis Hirakami, Principal Engineer

Subject: Your Letter of May 26, 1999 Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kailua 272' Reservoir at Pohakupu Ridge, Kailua, Hawaii, TMK: 4-2-03: 4, 8 and 4-2-04: 37

Thank you for your letter regarding the Environmental Impact Statement (EIS) Preparation Notice for the proposed reservoir project.

The Draft EIS will disclose that electrical service to the project site will be provided by underground lines located within the paved reservoir access road. All necessary improvements for the reservoir project will be included in the conservation district use application.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAMILE
FOR Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

MAY 05 '99 10:38AM OCEANIC CABLEVISION 8086255888 P.1/1

Oceanic

Engineering and Design Department
200 Akamainui St.
Mililani, Hawaii 96789
(808) 625 – 2100
FAX (808) 625 – 5888

TO: Mr. Barry Usagawa

OFFICE# 5275235

FAX# 5919010

FROM: *LEONA L. PORTER*

OFFICE# 625-8457

DATE: May 5, 1999

SUBJECT: Kailua 272' Reservoir

Number of pages including cover sheet: 1

Comments: Thank you for sending us information regarding your plan. We do not have any distribution of our cables in the area of your project. There will be no need to send us any other correspondence pertaining to this job.

Mahalo,

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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JEREMY HARRIS, Mayor

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KAZU HAYASHIDA
BARBARA KIM STANTON
CHARLES A. STED

CLIFFORD S. JAMILE
Manager and Chief Engineer

May 20, 1999

COPY

Ms. Leona L. Porter
Engineering and Design Department
Oceanic Cable
200 Akamainui Street
Mililani, Hawaii 96789

Dear Ms. Porter:

Subject: Your Fax of May 5, 1999 Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kailua 272 Reservoir at Pohakupu Ridge, Kailua, Hawaii, TMK: 4-2-03: 04, 08 and 4-2-04: 37

Thank you for your fax regarding the Environmental Impact Statement Preparation Notice for the proposed reservoir project.

We acknowledge that there are no distribution cables in the area and further coordination with Oceanic Cable is not needed.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

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P-904/99

May 20, 1999

Barry Usagawa
BWS
630S. Beretania
Honolulu 96843

Dear Mr. Usagawa:

I am writing to comment on the EISPN for Kailua 272' Reservoir. There are a number of items as a nearby resident I would like to see addressed in the DEIS. I lived in faculty housing when the BWS constructed the reservoirs above Dole Street and am aware of how significantly this type of construction will impact us.

Dust
The DEIS should contain a detailed assessment of the dust created during construction and its impacts on the nearby residents. During construction at WCCC, we had a constant film of gritty, red dirt on our windows, floors and any horizontal surface. Mitigation measures could include water trucks, wind screens, crusting agents on exposed surfaces, erosion control fabric, limits on stockpiling at the site, etc. The plan to control dust must be described in the DEIS. An intensive monitoring program to assure that fugitive dust does not reach our neighborhood should also be described in the DEIS.

Construction Methods
The EISPN does not mention potential construction methods. The DEIS should describe the potential construction methods and clearly indicate that blasting will not be allowed.

Noise
As stated in the EISPN, work hours for the contractor must be restricted. Noise impacts of the proposed project should be fully addressed because the work is in an area with many sensitive receptors—WCCC, residential neighborhoods, and several schools. Work during the day will have an impact on the learning environment in the schools and WCCC.

Alternative Analysis
Given that the actual need for such a large water tank exists (DEIS should document this fully), it seems the BWS has evaluated a very limited number of sites. It would appear from looking at a topographic map, that there are plenty of locations in and around Kailua at the correct elevation. The DEIS should explain why the BWS has focused on such a small area when selecting potential locations.

I would like to be placed on the mailing list for any public meetings and to receive a DEIS.

Thank you.

Jan Reichelderfer
1317 Ulupii St
Kailua 96734

99 JUN 25 11:45 AM

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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ENGINEERING CONCEPTS

June 29, 1999

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FORREST C. MURPHY, Vice Chairman
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BARBARA ANN STANTON
CHARLES A. STED

KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

Ms. Jan Reichelderfer
1317 Ulupii Street
Kailua, Hawaii 96734.

Dear Ms. Reichelderfer:

Subject: Your Letter of May 20, 1999 Regarding the Environmental Impact Statement Preparation Notice for the Board of Water Supply's Proposed Kailua 272 Reservoir at Pohakupu Ridge, Kailua, Hawaii, TMK: 4-2-03: 04, 08 and 4-2-04: 37

Thank you for your letter regarding the Environmental Impact Statement Preparation Notice (EISPN) for the proposed reservoir project.

We provide the following responses to your comments:

1. Dust. The Draft Environmental Impact Statement (EIS) will include a section of fugitive dust to address potential impacts and mitigation. The Board of Water Supply (BWS) currently requires all construction work to comply with dust limits set forth by the Department of Health (DOH). Should these limits be exceeded, the contractor's work will be stopped until corrective measures are taken.

   Implementation of a fugitive dust monitoring program is not a standard construction practice. Should fugitive dust become an actual problem during construction, please call BWS Construction Section at 527-5205 to report the situation.

2. Construction Methods. The Draft EIS will describe proposed construction methods, including whether or not blasting will be required. Potential impacts and mitigation measures will be addressed for the proposed construction methods.

3. Noise. The Draft EIS will include a section on noise to address potential impacts and mitigation. The BWS currently requires all construction work to comply with noise limits set forth by DOH. Should these limits be exceeded, the contractor's work will be stopped until corrective measures are taken.

4. Alternatives Analysis. The need for the reservoir was addressed in a previous report entitled, "Final Environmental Impact Statement for the Kailua 272 Reservoir" which was prepared in 1996. The report focused on constructing the reservoir at Puu O Ehu, a nearby ridge. This EISPN and the Draft EIS presently being prepared are supplemental documents to the 1996 report. Although Pohakupu Ridge was included as an alternative site, this knoll of the Pohakupu Ridge was a recent addition and not specifically identified in the 1996 EIS. The BWS agreed to relocate the reservoir from the Puu O Ehu Ridge to address some community concerns that the Puu O Ehu Ridge should be preserved.

A copy of the EIS will be furnished to you as requested. If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

APPENDIX C

DRAFT EIS COMMENTS AND RESPONSES

DEPARTMENT OF THE ARMY
U S ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF

Civil Works Technical Branch

P-1578/99

November 2, 1999

Nov 5 | 48 PM '99

Nov 8 8 08 AM '99

Mr. Barry Usagawa
City and County of Honolulu
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Usagawa:

Thank you for the opportunity to review and comment on the Supplemental Draft Environmental Impact Statement for the Kailua 272 Reservoir, Koolaupoko, Oahu (TMKS 4-2-3: 4 and 4-2-4: 37). We do not have any additional comments to offer beyond those previously provided in our letter dated April 28, 1999.

If you require additional information, please feel free to contact Ms. Jessie Dobinchick of our Civil Works Technical Branch staff at 438-8876.

Sincerely,

James K. Hatashima
Acting Chief, Civil Works
Technical Branch

Copy Furnished:

Mr. Kenneth Ishizaki
Engineering Concepts, Incorporated
1150 South King Street, Suite 700
Honolulu, Hawaii 96814

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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JEREMY HARRIS Mayor
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BARBARA KIM STANTON

KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

December 8, 1999

Mr. James K. Hatashima, Acting Chief
Civil Works Technical Branch
Department of the Army
U.S. Army Engineer District, Honolulu
Ft. Shafter, Hawaii 96858-5440

Dear Mr. Hatashima:

Subject: Your Letter of November 2, 1999 Regarding the Supplemental Draft Environmental Impact Statement for the Board of Water Supply's Proposed Kailua 272 Reservoir on Kalae O Kaiwa Ridge

Thank you for your letter regarding the Supplemental Draft Environmental Impact Statement for the proposed reservoir project.

We acknowledge that you have no comments to offer at this time.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Engineering Concepts, Inc.

Pure Water . . . our greatest need - use it wisely

United States
Department of
Agriculture

Natural
Resources
Conservation
Service

P.O. Box 50004
Honolulu, HI
96850

USDA

Our People...Our Islands...In Harmony

November 24, 1999

City and County of Honolulu
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Attn: Mr. Barry Usagawa

Dear Mr. Usagawa:

Subject: Supplemental Draft Environmental Impact Statement for Kailua 272' Reservoir, Koolaupoko, Oahu, Hawaii

We have reviewed the above mentioned document and have no comments to offer at this time.

Thank you for the opportunity to review this document.

Sincerely,

KENNETH M. KANESHIRO
State Conservationist

cc:
Governor, State of Hawaii, c/o Office of Environmental Quality Control, 235 South Beretania Street, Suite 702, Honolulu, Hawaii 96813
Engineering Concepts, Inc., 1150 South King Street, Suite 700, Honolulu, Hawaii 96814, Attn: Mr. Kenenth Ishizaki

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

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BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
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ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

December 21, 1999

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

Dear Mr. Kaneshiro:

Subject: Your Letter of November 24, 1999 Regarding the Supplemental Draft Environmental Impact Statement for the Proposed Kailua 272' Reservoir, Kailua, Oahu, TMK: 4-2-03: 04, 08 and 4-2-04: 37

Thank you for reviewing the Supplemental Draft Environmental Impact Statement for the proposed Kailua 272' Reservoir project.

We acknowledge that you have no comments to offer at this time.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

P-1702/99

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO (P)1852.9

DEC 9 1999

Dec 16 4 14 PM '99

Mr. Barry Usagawa
Board of Water Supply
Long Range Planning Section
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Usagawa:

Subject: Supplemental Draft Environmental Impact Statement (DEIS) for Kailua 272' Reservoir
Kailua, Hawaii
TMK 4-2-03:04 and 4-2-04:37

Thank you for the opportunity to review the subject Supplemental DEIS, which we received with your memorandum dated October 23, 1999.

Our comments are similar to the ones we provided in our May 19, 1999, letter. Again, the project will not impact on any of our existing or proposed facilities. However:

1. Section 2.3.2 of the Supplemental DEIS indicates that construction vehicles will access the site from Akiohala Street (via Keolu Drive). However, construction vehicles that are on the road during morning drop-off and afternoon pick-up hours at the Kaelepulu Elementary School jeopardize the safety of small children (and other pedestrians) in the vicinity.

2. In addition, the wind and excavation activities at the construction site will result in noise and dust pollution at the two correctional institutions and at the Kaelepulu Elementary School.

3. As a result of the anticipated impacts, we again, suggest close and continued consultation with the Department of Human Services and the Department of Education throughout the duration of the project.

In the future, when actions described by Environmental Assessments, Environmental Impact Statement Preparation Notices, Environmental Impact Statements, Plan Review Use, etc., do not impact on specific State plans or facilities, we, for work reasons, will not provide a "no comment" or a "good planning principles" type of response. But, since we are still interested in knowing what is going on planning-wise in our State, we would still appreciate the opportunity to review all such documents.

Should you have any questions, please have your staff contact Mr. Ronald Ching of the Planning Branch at 586-0490.

GORDON MATSUOKA
Public Works Administrator

RC/ET:mo
c: Office of Environmental Quality Control
Mr. Kenneth Ishizaki, Engineering Concepts, Inc.

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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BARBARA KIM STANTON
KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio
CLIFFORD S. JAMILE
Manager and Chief Engineer

COPY

February 15, 2000

Mr. Gordon Matsuoka
Public Works Administrator
Department of Accounting and General Services
State of Hawaii
P. O. Box 119
Honolulu, Hawaii 96810-0119

Dear Mr. Matsuoka:

Subject: Your Letter of December 9, 1999 Regarding the Supplemental Draft Environmental Impact Statement for the Board of Water Supply's Proposed Kailua 272' Reservoir, Kailua, Oahu, TMK: 4-2-03: 04, 08 and 4-2-04: 37

Thank you for reviewing the Supplemental Draft Environmental Impact Statement (EIS) for the proposed Kailua 272' Reservoir project.

We have the following comments to your concerns:

1. Section 2.3.2 of the Supplemental Draft EIS refers to the existing access road which will be used by Board of Water Supply operations and maintenance personnel once the proposed reservoir is constructed. Traffic on this road will be minimal since maintenance personnel typically visit reservoirs on a weekly or less frequent basis. Personnel may use the access road on a daily basis for short periods of time while painting, landscaping, or other periodic maintenance projects are undertaken at the site. Construction vehicles will not utilize this existing access road to minimize traffic impacts to Akiohala Street and its surrounding area residents. Instead, construction vehicles will use a temporary construction access road off of Kalanianaole Highway as described in Section 2.4.3.

2. Mitigative measures will be employed to minimize the impacts of construction-related noise and fugitive dust on the neighboring correctional institutions and elementary schools. The contractor will also be required to comply with all state and county regulations.

3. Both the Department of Human Services and the Department of Education were provided a copy of the EIS Preparation Notice and the Supplemental Draft EIS for review. We will continue to keep these agencies informed throughout the duration of the project.

If you have any questions, please contact Kathryn Kami at 527-5221.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Dana Arakaki, Engineering Concepts, Inc.

BENJAMIN J. CAYETANO
Governor

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawaii 96814-2512

JAMES J. NAKATANI
Chairperson, Board of Agriculture

LETITIA N. UYEHARA
Deputy to the Chairperson

Mailing Address:
P.O. Box 22159
Honolulu, Hawaii 96823-2159

Fax: (808) 973-9613

October 28, 1999

Nov 3 3 29 PM '99

Mr. Clifford S. Jamile
Board of Water Supply
City and County of Honolulu
630 South Beretania St.
Honolulu, Hawaii 96843

Dear Mr. Jamile:

RE: Kailua 272' Reservoir - Draft Environmental Impact Statement

Thank you for the opportunity to review the above project. The Department of Agriculture supports this project and has no objections or comments at this time.

Sincerely,

JAMES J. NAKATANI
Chairperson, Board of Agriculture

c: Office of Environmental Quality Control
Engineering Concepts, Inc.

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BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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December 8, 1999

COPY

Mr. James K. Nakatani
Department of Agriculture
State of Hawaii
1428 South King Street
Honolulu, Hawaii 96814-2512

Dear Mr. Nakatani:

Subject: Your Letter of October 28, 1999 Regarding the Supplemental Draft Environmental Impact Statement for the Board of Water Supply's Proposed Kailua 272 Reservoir on Kalae O Kaiwa Ridge

Thank you for your letter regarding the Supplemental Draft Environmental Impact Statement for the proposed reservoir project.

We acknowledge that you have no objections to offer at this time.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Engineering Concepts, Inc.

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BENJAMIN J. CAYETANO
GOVERNOR
SELJI F. NAYA, Ph.D.
DIRECTOR
BRADLEY J. MOSSMAN
DEPUTY DIRECTOR
DAVID W. BLANE
DIRECTOR, OFFICE OF PLANNING

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

OFFICE OF PLANNING
235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824

Ref. No. P-8343

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October 29, 1999

Dear Project Manager:

Subject: Environmental Assessment and Environmental Impact Statement Reviews

For your information, the Hawaii Coastal Zone Management (CZM) Program is no longer routinely reviewing environmental assessment and environmental impact statement reports. If there are any questions, please call John Nakagawa of our CZM Program at (808) 587-2878.

Sincerely,

David W. Blane
Director
Office of Planning

ENGINEERING CONCEPTS, INC.
Consulting Engineers

OCT 2 [illegible]
[illegible]
55477

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OCT 25 1999
DBEDT-DIRECTOR'S OFFICE

October 23, 1999

Dear Participant:

Subject: Supplemental Draft Environmental Impact Statement for
Kailua 272' Reservoir
Koolaupoko, Oahu, Hawaii
TMK: 4-2-03:04 and 4-2-04:37

Attached for your review is a Supplemental Draft Environmental Impact Statement (DEIS) which was prepared pursuant to the EIS law (Hawaii Revised Statutes, Chapter 343) and the EIS rules (Administrative Rules, Title 11, Chapter 200).

Please review the Supplemental DEIS and address your written comments to the Proposing Agency:

City and County of Honolulu
Board of Water Supply
630 South Beretania Street
Honolulu, HI 96843
Attention: Mr. Barry Usagawa
(phone: 527-5235; fax: 52

Copies of your comments should also be furnished to th

Accepting Authority: Governor, State of Hawaii
c/o Office of Environmenta
235 South Beretania Stree
Honolulu, HI 96813
(phone: 586-4185; fax: 58

Consultant: Engineering Concepts, Inc.
1150 South King Street, S
Honolulu, HI 96814
Attention: Mr. Kenneth Ish
(phone: 591-8820; fax: 5

The 45-day comment period ends on December 7, 1999. Comments must be received postmarked by that date.

Thank you for participating in the environmental review process.

1150 South King Street, Suite 700 Honolulu, Hawaii 96814
Tel: (808) 591-8820 Fax: (808) 591-9010 E-Mail Address: eci@gte.net

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OCT 27 1999

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BENJAMIN J. CAYETANO
Governor
SEIJI F. NAYA
Director
BRADLEY J. MOSSMAN
Deputy Director

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT, AND TOURISM

Energy, Resources, and Technology Division, Energy Planning & Policy Group, 235 South Beretania Street, 5th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804 PH: (808) 587-3806 FX: (808) 587-3839

DATE: October 26, 1999

TO: Engineering Concepts, Inc.

FROM: Maurice H. Kaya

____ *FYI*
____ *As requested*
____ *Please return*
____ *Comment and return*
____ *Please call re attached*

As attached document is not an electricity nor energy project, DBEDT, Energy, Resources, and Technology Division have not comment.

BENJAMIN J. CAYETANO
GOVERNOR

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

P-1619/99

PAUL G. LeMAHIEU, Ph.D.
SUPERINTENDENT

OFFICE OF THE SUPERINTENDENT

November 9, 1999

Nov 18 9 34 AM '99

Mr. Barry Usagawa
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Usagawa:

Subject: Kailua 272' Reservoir Supplemental Draft EIS

The Department of Education has no comment on the supplemental draft environmental impact statement.

Thank you for the opportunity to respond.

Very truly yours,

Paul G. LeMahieu, Ph.D.
Superintendent of Education

PLeM:hy

cc: The Honorable Benjamin J. Cayetano, Governor
Office of Business Services
Mr. Kenneth Ishizaki, Engineering Concepts, Inc.

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BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

December 21, 1999

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EDDIE FLORES, JR., Chairman
CHARLES A. STEC, Vice Chairman
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HERBERT S.K. KAOPUA, Sr.
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ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

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Paul G. LeMahieu, Ph.D., Superintendent
Department of Education
State of Hawaii
P. O. Box 2360
Honolulu, Hawaii 96804

Dear Dr. LeMahieu:

Subject: Your Letter of November 9, 1999 Regarding the Supplemental Draft Environmental Impact Statement for the Proposed Kailua 272' Reservoir, Kailua, Oahu, TMK: 4-2-03: 04, 08 and 4-2-04: 37

Thank you for reviewing the Supplemental Draft Environmental Impact Statement for the proposed Kailua 272' Reservoir project.

We acknowledge that you have no comments to offer.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

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BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

P-1546/99

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

October 29, 1999

Mr. Barry Usagawa
City and County of Honolulu
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Usagawa:

Subject: Supplemental Draft Environmental Impact Statement for Kailua 272' Reservoir

The Department of Hawaiian Home Lands has reviewed the subject supplemental draft environmental impact statement which proposes to construct a 4.0 million gallon concrete reservoir on Kalae O Kaiwa ridge in Kailua, Oahu. We have no comments to offer at this time.

If you have any questions, please call Rebecca Alakai of our Planning Office at 587-6423.

Aloha,

for Rayhard C. Soon, Chairman
Hawaiian Homes Commission

NOV 1 2 11 PM '99

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
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KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

November 17, 1999

Mr. Raynard C. Soon, Chairman
Department of Hawaiian Home Lands
State of Hawaii
P. O. Box 1879
Honolulu, Hawaii 96805

Dear Mr. Soon:

Subject: Your Letter of October 29, 1999 Regarding the Supplemental Draft Environmental Impact Statement for the Board of Water Supply's Proposed Kailua 272 Reservoir on Kalae O Kaiwa Ridge

Thank you for your letter regarding the Supplemental Draft Environmental Impact Statement for the proposed reservoir project.

We acknowledge that you have no comments to offer at this time.

Very truly yours,

FOR CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Engineering Concepts, Inc.

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BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

In reply, please refer to:
File:

P-1637/99

November 17, 1999

91-244E/epo

Nov 24 8 45 AM '99

Mr. Barry Usagawa
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Usagawa:

Subject: Supplemental Draft Environmental Impact Statement
Kailua 272' Reservoir
Kailua, Oahu
TMK: 4-2-03: 4

Thank you for allowing us to review and comment on the subject document. We do not have any comments to offer at this time.

Sincerely,

GARY GILL
Deputy Director for
Environmental Health

c: OEQC
Engineering Concepts

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
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CLIFFORD S. JAMILE
Manager and Chief Engineer

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December 21, 1999

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Mr. Gary Gill
Deputy Director for Environmental Health
Department of Health
State of Hawaii
P. O. Box 3378
Honolulu, Hawaii 96801

Dear Mr. Gill:

Subject: Your Letter of November 17, 1999 Regarding the Supplemental Draft Environmental Impact Statement for the Proposed Kailua 272' Reservoir, Kailua, Oahu, TMK: 4-2-03: 04, 08 and 4-2-04: 37

Thank you for reviewing the Supplemental Draft Environmental Impact Statement for the proposed Kailua 272' Reservoir project.

We acknowledge that you have no comments to offer at this time.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

P-1685/99

GENEVIEVE SALMONSON
DIRECTOR

DEC 9 3:05 PM '99

December 6, 1999

Mr. Clifford S. Jamile, Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Jamile:

Subject: Draft Environmental Impact Statement for the Kailua 272' Reservoir, Oahu

Thank you for the opportunity to review the subject document. We have the following comments.

1. Please show on figure 3-2 the most likely location of "tunnel 10" of the Waimanalo Irrigation System.

2. Please identify all persons, firms, or agencies who are preparing the EIS.

3. Please sign the EIS and indicate that the documents were prepared under the signatory's direction.

4. Please describe the feasibility of demolishing the abandoned reservoirs shown in figure 3-1 to improve the visual quality of the surrounding area.

5. OEQC would like to commend the BWS for choosing a new site for the Kailua 272' Reservoir after the community opposed the earlier site.

Should you have any questions, please call Jeyan Thirugnanam at 586-4185.

Sincerely,

Genevieve Salmonson
Director

c: Engineering Concepts

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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December 30, 1999

JEREMY HARRIS, Mayor
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HERBERT S. K. KAOPUA, SR.
BARBARA KIM STANTON

KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
State of Hawaii
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

Subject: Your Letter of December 6, 1999 Regarding the Supplemental Draft Environmental Impact Statement for the Board of Water Supply's Proposed Kailua 272 Reservoir on Kalae O Kaiwa Ridge

Thank you for your letter regarding the Supplemental Draft Environmental Impact Statement (DEIS) for the proposed reservoir project.

We provide the following response to your comments:

1. As requested, the Final EIS will include the most likely location of the Waimanalo Irrigation System "tunnel 10" on Figure 3-2 (Temporary Construction Access Road Alternatives Plan).

2. Firms involved in preparation of the Draft EIS were identified in Section 10.1 (Participants). The Final EIS will be revised to identify individuals as well:

Organization	Individual(s)	Area of Expertise
Engineering Concepts, Inc.	Kenneth Ishizaki	Civil/Environmental Engineering
Char & Associates	Winona P. Char	Botanical Resources
Cultural Surveys	Hallett H. Hammatt Victoria S. Creed Matt McDermott	Archaeology/Historical Resources

3. The Final EIS will include the following signature block:

Responsible Official:

CLIFFORD S. JAMILE, Manager and Chief Engineer — Date

Pur. Water... [illegible]

4. Demolition of the abandoned Kailua 275, Lanikai 230 and Kailua Heights 230 reservoirs would likely improve the visual quality of the surrounding area. However, such demolition work is beyond the scope of this project. Should demolition of the abandoned reservoirs be undertaken in the future, the action will be addressed in a separate environmental document.

5. Thank you for your commendation regarding selection of a new site for the proposed reservoir. We are committed to working with the community in providing a mutually acceptable project that both serves their needs and is sensitive to their concerns.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAHLE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

PHONE.(808) 594-1888

P-1688/99
FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

DEC 10 11 19 AM '99

November 26, 1999

City and County of Honolulu
Board of Water Supply
630 South Beretania Street
Honolulu, HI 96843
Attention: Mr. Barry Usagawa

EIS #299

Subject: Supplemental Draft Environmental Impact Statement (DEIS) for
Kailua 272' Reservoir
Ko'olaupoko, O'ahu, Hawai'i
TMK: 4-2-03:04 and 4-2-04:37

Dear Mr. Usagawa,

Thank you for the opportunity to comment on the above referenced project. According to the DEIS, the City and County of Honolulu is proposing to construct a 4.0 million gallon (MG) reinforced concrete reservoir on Kalae o Kaiwa ridge, south of its two Pohakupu 272 reservoirs No. 1 and 2.

The botanical survey within the DEIS indicated no rare, threatened, or endangered flora or fauna species found on the proposed project site. In addition, the archaeological field survey indicated no historic or archaeological features on the parcel, nor were there any signs of traditional Hawaiian land use.

However, we caution that the State Historic Preservation Division should be contacted if any human burials, artifacts, or other cultural remains or deposits are encountered during the construction period of the project.

The DEIS also addresses the concerns of the Office of Hawaiian Affairs (OHA) regarding portions of the proposed project being on ceded lands. Consultation with native Hawaiian groups will be coordinated through OHA, land acquisition will be negotiated, fair market value will be paid in compensation for land acquisition and easements. The proposed reservoir is expected to benefit Hawaiian Home Lands by enhancing water service to Waimanalo.

If you have any questions, please contact Mark A. Mararagan, Policy Analyst-Government Regulations at 594-1945.

Sincerely,

Colin C. Kippen, Jr.
Deputy Administrator

cc: OHA Board of Trustees
Governor, State of Hawai'i (OEQC)
Mr. Kenneth Ishizaki, Engineering Concepts, Inc.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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JAN 1 0 2000

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December 30, 1999

JEREMY HARRIS, Mayor

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EDDIE FLORES, JR., Chairman
CHARLES A. STED, Vice Chairman
JAN M.L.Y. AHN
HERBERT S.K. KAOPUA, SR.
BARBARA KIM STANTON

KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

Mr. Colin C. Kippen, Jr.
Deputy Administrator
Office of Hawaiian Affairs
State of Hawaii
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawaii 96813

Dear Mr. Kippen:

Subject: Your Letter of November 26, 1999 Regarding the Supplemental Draft Environmental Impact Statement for the Board of Water Supply's Proposed Kailua 272 Reservoir on Kalae O Kaiwa Ridge

Thank you for your letter regarding the Supplemental Draft Environmental Impact Statement (EIS) for the proposed reservoir project.

In response to your comment, the following revision will be included in Section 5.5.2 (Archaeological and Historic Resources, Mitigative Measures) of the Supplemental Final EIS:

"In the unlikely event that the irrigation tunnel or other historic sites (including human burials, artifacts, or other cultural remains or deposits) are discovered during construction activities, all work in the vicinity will cease and the State Historic Preservation Division will be contacted for direction."

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

Pure Water ... our greatest need ... as it needs

BENJAMIN J. CAYETANO
GOVERNOR

F-1577/99
SUSAN M. CHANDLER, M.S.W., Ph.D.
DIRECTOR
KATHLEEN G. STANLEY
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF HUMAN SERVICES
P. O. Box 339
Honolulu, Hawaii 96809-0339

November 1, 1999

Mr. Barry Usagawa
City and County of Honolulu
630 South Beretania Street
Honolulu, HI 96843

Dear Mr. Usagawa,

I refer to your Supplemental Draft Environmental Impact Statement (DEIS) for Kailua 272' Reservoir. This Department has no comments

Thank you for referring the draft for us to comment.

Sincerely,

Kathleen G Stanley
Deputy Director

AN EQUAL OPPORTUNITY AGENCY

NOV 5 1 49 PM '99
NOV 8 9 09 AM '99

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

December 8, 1999

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ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

Ms. Kathleen G. Stanley, Deputy Director
Department of Human Services
State of Hawaii
P. O. Box 339
Honolulu, Hawaii 96809-0339

Dear Ms. Stanley:

Subject: Your Letter of November 1, 1999 Regarding the Supplemental Draft Environmental Impact Statement for the Board of Water Supply's Proposed Kailua 272 Reservoir on Kalae O Kaiwa Ridge

Thank you for your letter regarding the Supplemental Draft Environmental Impact Statement for the proposed reservoir project.

We acknowledge that you have no comments to offer at this time.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Engineering Concepts, Inc.

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BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

P-1593/99

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DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
ENGINEERING BRANCH
P.O. BOX 373
HONOLULU, HAWAII 96809

NOV -5 1999

NOV 10 1 37 PM '99

Mr. Barry Usagawa
Long Range Planning Section
Board of Water Supply
City and County of Honolulu
630 South King Street
Honolulu, Hawaii 96843

Dear Mr. Usagawa:

Supplemental Draft Environmental Impact Statement for
Kailua 272' Reservoir
Koolaupoko, Oahu, Hawaii
TMK: 4-2-03:04 and 4-2-04:37

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

We have previously reviewed the draft environmental assessment, and have no additional comments to offer at this time.

Should you have any questions, please contact Mr. Eric Yuasa of the Project Planning Section at 587-0229.

Sincerely,

Eric T. Yuasa

ANDREW M. MONDEN for
Chief Engineer

DI:ka

c: OEQC
Kenneth Ishizaki, Engineering Concepts

Kailto65.doc

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December 8, 1999

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CLIFFORD S. JAMILE
Manager and Chief Engineer

Mr. Andrew M. Monden
Department of Land and Natural Resources
Land Division
Engineering Branch
State of Hawaii
P. O. Box 373
Honolulu, Hawaii 96809

Dear Mr. Monden:

Subject: Your Letter of November 5, 1999 Regarding the Supplemental Draft Environmental Impact Statement for the Board of Water Supply's Proposed Kailua 272 Reservoir on Kalae O Kaiwa Ridge

Thank you for your letter regarding the Supplemental Draft Environmental Impact Statement for the proposed reservoir project.

We acknowledge that you have no comments to offer at this time.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Engineering Concepts, Inc.

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PLN-107/44

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

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BOARD OF LAND AND NATURAL RESOURCES

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CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS
WATER RESOURCE MANAGEMENT

November 19, 1999

Mr. Barry Usagawa
City and County of Honolulu
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

LOG NO: 24411
DOC NO: 9911EJ06

DEC 2 3 24 PM '99

Dear Mr. Usagawa:

SUBJECT: Chapter 6E-8 Historic Preservation Review -- Supplemental Draft Environmental Impact Statement for Kailua 272' Reservoir
Kailua, Ko'olaupoko, O'ahu
TMK: 4-2-03:04, 4-2-04:37

Thank you for the opportunity to review the Supplemental DEIS for the Kailua 272' Reservoir project. The Supplemental DEIS correctly incorporates our earlier comments regarding historic sites in Section 5.5 and in Appendix B. Our earlier comments stated that we believed that the construction of the reservoir and three of the four construction access roads (Alternatives 1, 2, 3) would have "no effect" on historic sites. Our concern was with alternate access road #4 which had the potential to have an "adverse effect" on underground tunnel #10 associated an historic site (SIHP 50-80-15-4042). We understand that alternate road #3 has been selected as the preferred route in order to mitigate this possible "adverse effect". Therefore, we believe that this project will have "no effect" on historic Sites.

If you have any questions please call Sara Collins at 692-8026 or Elaine Jourdane at 692-8027.

Aloha,

Don Hibbard, Administrator
State Historic Preservation Division

EJ:jk

c: Governor, State of Hawaii, OEQC, 235 S. Beretania St., Suite 702, Honolulu, HI 96813
Mr. Kenneth Ishizaki, Engineering Concepts, Inc.. 1150 S. King St., Suite 700, Honolulu, HI 96814

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
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June 6, 2000

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Manager and Chief Engineer

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Mr. Don Hibbard, Administrator
State Historic Preservation Division
Department of Land and Natural Resources
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

Dear Mr. Hibbard:

Subject: Your Letter of November 19, 1999 Regarding the Supplemental Draft Environmental Impact Statement for the Board of Water Supply's Proposed Kailua 272 Reservoir on Kalae O Kaiwa Ridge

Thank you for your letter regarding the Supplemental Draft Environmental Impact Statement (DEIS) for the proposed reservoir project.

We acknowledge that the Supplemental DEIS has correctly incorporated your previous comments and that the project will have "no effect" on historic sites.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.
Office of Environmental Quality Control

Pure Water [illegible]

BENJAMIN J. CAYETANO
GOVERNOR

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
669 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

IN REPLY REFER TO
HWY-PS
2.6970

Jan 27 2 00 PM '00

City and County of Honolulu
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Attention: Mr. Barry Usagawa

Dear Sir:

Subject: Supplemental Draft Environmental Impact Statement for Kailua 272' Reservoir, Koolaupoko, Oahu, Hawaii, TMK: 4-2-03: 04 and 4-2-04: 37

Thank you for the opportunity to review the subject document.

We have the following comments:

1. Section 3.7 identifies the construction access road as a temporary paved road, but it was a dirt road in the EISPN and Environmental Assessment. The segments of the road planned for removal after project completion should be specified and shown in a figure.

2. The traffic control plan must be submitted for our review and approval and must be specified in Table 1-1, Permits and Approvals;

3. Construction plans for work in the State highway right-of-way must be submitted for our review and approval and the permit specified in Table 1-1; and

4. No further storm water discharge will be permitted in the State highway right-of-way.

If you have any questions, you may contact Ronald F. Tsuzuki, Head Planning Engineer, Highways Division, at 587-1830.

Very truly yours,

Kazu Hayashida

KAZU HAYASHIDA
Director of Transportation

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

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CLIFFORD S. JAMILE
Manager and Chief Engineer

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

Dear Mr. Hayashida:

Subject: Your Letter of January 25, 2000 Regarding the Supplemental Draft Environmental Impact Statement for the Board of Water Supply's Proposed Kailua 272' Reservoir, Kailua, Oahu, TMK: 4-2-03: 04, 08 and 4-2-04: 37

Thank you for reviewing the Supplemental Draft Environmental Impact Statement (DEIS) for the proposed Kailua 272' Reservoir project.

We have the following comments to your concerns:

1. The temporary construction access road alignment was illustrated on Figure 2-13 of the Supplemental DEIS. The temporary road will be removed and the area will be restored to previous conditions, as requested by the Women's Community Correctional Center (WCCC), Section 2.4.3, page 2-22. However, we understand the WCCC may prefer to retain the widened and paved roadway which will extend from the Kalanianaole Highway entrance to the vehicle washdown area. The portion of pavement over previously undeveloped lands extending from just beyond the vehicle washdown area/detention basin to the hairpin turn, will be removed and restored. Beyond the hairpin turn, the construction road alignment overlaps the permanent access road to the reservoir site.

2. Table 1-1 (Permits and Approvals) will be revised to include traffic control plan approval by Department of Transportation (DOT).

3. Table 1-1 will be revised to include construction plan approval by DOT for work in the state highways right-of-way.

4. We understand that no further storm water discharge will be permitted in the state highway right-of-way.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Dana Arakaki, Engineering Concepts, Inc.

University of Hawai'i at Mānoa

Environmental Center
A Unit of Water Resources Research Center
2550 Campus Road • Crawford 317 • Honolulu, Hawai'i 96822
Telephone: (808) 956-7361 • Facsimile: (808) 956-3980

December 7, 1999
RE:0698

Mr. Barry Usagawa
City and County of Honolulu
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Barry Usagawa:

Supplemental Draft EIS
Kailua 272' Reservoir
Koolaupoko, Oahu, Hawaii

The Board of Water Supply (BWS) of the City and County of Honolulu is proposing to construct a 4.0 million gallon (MG) reinforced concrete reservoir, an access road, a transmission main, and associated appurtenances on Kalae o Kaiwa ridge in Kailua, Oahu. This is an alternative to the previously proposed 4.0 MG reservoir on Puu o Ehu ridge which resulted in strong community opposition. The reservoir is necessary to manage and operate Oahu's municipal water system in a reliable and sound manner by increasing the storage capacity of the Kailua low service area, which currently has an effective system capacity, which is 3.3 MG less than required by BWS standards. This project is a step towards achieving the standards of the BWS, which would allow for the provision of reliable water service during peak demand periods, and for fire fighting purposes.

This review was conducted with the assistance of Paul Ekern, Agronomy and Soils Emeritus; and Sherri Hiraoka of the Environmental Center.

General Comments

Overall, our reviewers found that the Supplemental Draft EIS was fairly complete. However, several specific issues were raised that deserve further consideration. In particular, there is a need for additional information on landscaping plans, geological features, soil characteristics and drainage, and potential impacts associated with the disposal of excavated materials.

Landscaping

The document calls attention to the need to control erosion and possible sediment loss during excavation and mentions that steps will be taken to establish ground covers such as

buffalo grass on the cut slopes to retain and stabilize the soil. The need for further discussion of potential landscaping problems with replanting on saprolite subsoils should be addressed in the Final EIS. Provisions should be made for soil conditioners and fertilizers as well as a reliable water supply to assure that revegetation is undertaken as rapidly as possible.

The source of the information on wind damages to trees at the top of the ridge (2.3.5) is not referenced. Perhaps the enclosed paper by Noguchi will be helpful as it provides maps and a discussion of such wind damage to trees on windward Oahu. (Noguchi, Y. 1979. *Deformation of Trees in Hawaii and Its Relation to Wind.* Journal of Ecology. 67: p. 611-628).

The air quality portion of the document did not recognize the problem of expected salt spray as it may affect landscaping and revegetation. A 1955 paper by C. P. Sideris (*Effects of Sea Water Sprays on Pineapple Plants*) provides some idea of the problem. There is also a 1965 paper by R. L. Fox, et. al. (*Sulfur in Soils, Rainwater, and Forage Plants of Hawaii*) that helps to bring this problem into scale. The complete references for these papers are as follows:

- Sideris, C. P. 1955. Effects of Sea Water Sprays on Pineapple Plants. Phytopathology. 45(11): p. 590-594.
- Fox, R. L., D. G. Moore, J. M. Wang, D. L. Plucknett, and R. D. Furr. 1965. Sulfur in Soils, Rainwater, and Forage Plants of Hawaii. *Hawaii Farm Science.* 14 (31): p. 9.

Geology

More information on the ridge proper (in 4.2) would be beneficial in describing the project site. We note that construction will be designed to the Category 3 earthquake load, which should reduce the potential for structural failure due to ground movements. However, the Final EIS should also include emergency drainage plans, in the event of catastrophic failure, so that lives and property are not jeopardized.

Soils and Drainage

Section 4.3 should include the specific soil types, in particular the Alaeloa and the ALF phase, to aid in defining the nature of the site setting. This information may be found in the site Soil Survey maps (Oahu sheet 65; description Alaelon series 0 26-27; and table 3, pages 168-169 on engineering properties).

The draft also did not address landscaping difficulties associated with replanting on saprolite subsoil. Our reviewers note that in similar settings, no vegetation regrowth occurred on bare soil until extensive fertilization (particularly phosphates) occurred. In considering fertilization, the Final EIS should also take into account any potential impacts of fertilizers on the environment in terms of runoff, health hazards, and nutrient overload into the ecosystem. We note that run-off will ultimately be channeled to Kawainui Marsh, so care should be given to minimize non-point source pollution to that environment.

Board of Water Supply
December 7, 1999
Page 3

The Supplemental Draft EIS fails to recognize any long term impacts of this project on soil erosion. Our reviewers note that long term impacts to soils and drainage depend on the direction of surface flows derived from the proposed diversions. Since run-off will be redirected westward, it is important to carefully assess any potential flooding that might be caused by this change in run-off. Furthermore, how will the removal of the existing eastern drainage patterns, affect the biota of that area? These issues should be addressed in the Final EIS.

Design Construction

Perhaps one of the most serious deficiencies of this Draft EIS is the discussion of disposal of the excavated materials. Certainly the disposal of some 85,000 cubic yards of materials may well generate significant impacts depending on the disposal site selected. The description of grading actions (2.4.1), and provisions for the disposal of the excavation spoil should be included in the Final EIS. Depending on the characteristics of this material a low lying area in need of fill, or other responsible re-use of the material should be employed in contrast to merely "disposal" at the nearest acceptable landfill. With this thought in mind, we might suggest that the most mauka section of the Ka Iwi area, where the large boulders were dumped during construction of the homes on Mariner's ridge in Hawaii Kai, might be a suitable location. However, this action would need to be carefully assessed to assure that significant impacts would not be generated.

Summary and Conclusion

A response to the issues and deficiencies we have identified should be addressed in the Final EIS. Thank you for the opportunity to comment on this Supplemental Draft EIS.

Sincerely,

Jacquelin N. Miller, Ph.D.
Associate Environmental Coordinator

Enclosure
cc: OEQC
James Moncur
Paul Ekern
Sherri Hiraoka

Ekern

With best wishes
Yasuo Noguchi

Yasuo

Journal of Ecology (1979), 67, 611-628

DEFORMATION OF TREES IN HAWAII AND ITS RELATION TO WIND

YASUO NOGUCHI*

Department of Geography, University of Hawaii, Honolulu, Hawaii 96822, U.S.A.

SUMMARY

(1) The reliability of the use of wind-deformed trees as indicators of wind direction and magnitude was examined at 390 sites in Hawaii, where the NE tradewind is persistent throughout the year.
(2) The consistency in magnitude and direction of tree-deformation shown by individual trees of the same and of different species at a given site was studied.
(3) After adjustments had been made for five notably wind-resistant or wind-sensitive species, observations on the fifteen most frequently encountered species were used to delineate estimated wind patterns for the islands of Oahu and Maui.
(4) Comparison of the wind patterns based on the observation of wind-deformed trees with those based on instrumental observations showed a reasonable agreement; any discrepancies were probably attributable to the differences in the periods of time represented by the data on which the maps were based.

INTRODUCTION

In windswept areas, particularly in alpine-subalpine or coastal environments, trees deformed by the wind create unusual natural landscapes (Lawrence 1939; Daubenmire 1943; Richmond & Mueller-Dombois 1972; Smith 1972). Recent studies on wind-deformed trees have indicated that observations of these trees provide useful information on patterns of wind distribution where data for direct measurement of wind direction and speed are not available (Sekiguti 1951; Onodera 1964; Yoshino 1964; Holroyd 1970; Holtmeier 1971; Owada & Yoshino 1971; Yoshimura 1971; Thomas 1973; Yoshino *et al.* 1976a, b).

There can be no doubt that the wind is the principal factor which causes tree deformation. However, wind-deformed trees can only be used as indicators of wind direction and speed in places where accurate causal relationships between the wind and tree deformation have been established; and the relationships may involve particular components only of the seasonal wind pattern. Thus prevailing wind during the growing season may be more important in some areas as a cause of tree deformation (Sekiguti 1951; Holroyd 1970). In alpine-subalpine regions, Lawrence (1939) and Yoshino (1973) reported the development of different types of tree deformation by summer and winter winds respectively, while Wardle (1968) and Ogawa (1974) discussed the importance of desiccating winds under severe winter conditions as a possible cause of tree deformation. As the abrasion by wind-blown ice and snow particles adds complexity to the wind/tree-deformation relationship in high mountain areas (Klikoff 1965), so in coastal areas salt spray plays another important role in tree deformation (Wells & Shunk 1938; Smith

* Present address: EWC Box 1234, 1777 East-West Rd., Honolulu, Hawaii 96822, U.S.A.

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1974). The deposition of airborne salt has been discussed in relation to wind speed and exposure by Edwards & Claxton (1964), Rutter & Edwards (1968) and Sloet van Oldruitenborgh & Heeres (1969). According to Moss (1940) and Edlin (1957) salt particles in sufficient quantity to damage vegetation are carried as far as 45 to 50 km inland from the coast under extreme conditions.

There is clearly a need for more exact answers to the mechanism of deformation through more detailed field observations and long-term physiological experiments. But it also seems necessary, for this method to have wider application, to examine the reliability of the method in terms of the consistency of the magnitude and direction of tree-deformation of different individuals both of the same and of different species, at a site where the local circulation of air is nearly homogeneous and where the wind direction is fairly consistent all the year round. Since trees of different species or different life-forms at a site have been reported to show different responses to wind (Lawrence 1939; Putnam 1948; Onoden 1964; Holroyd 1970; Thomas 1973) and to salt spray (Moss 1940; Oosting 1945; Tagami 1976), the non-selective use of all the different species found at a site may reduce the reliability of the method.

The islands of Hawaii, which receive persistent NE tradewinds throughout the year, should provide an ideal location for a study of this sort, where the consistency of tree deformation under a single prevailing wind type can be examined and the wind-sensitivities of different species calibrated. The study was undertaken on the islands of Oahu and Maui, where the road network provides easy accessibility and a relatively uniform coverage of the islands.

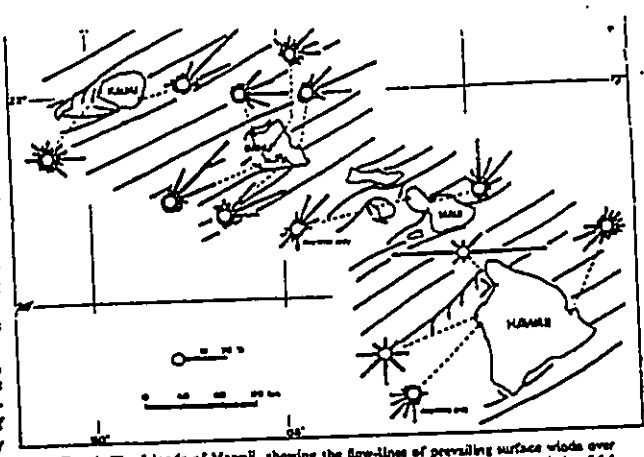


FIG. 1. The Islands of Hawaii, showing the flow-lines of prevailing surface winds over the ocean under tradewind conditions; dark areas of the windrose show winds of 5·1 m s^{-1} or more, while areas 3·4 m s^{-1} or less (after Armstrong (1973)). Note: wind flow over the islands is not depicted due to lack of data in some areas and complexity of flow.

STUDY AREA

The islands of Oahu and Maui are two of the eight major islands in the State of Hawaii, and are located between longitudes 155 and 159°W and latitudes 20 and 22°N (Fig. 1). Both islands are similar in size—1541 km² for Oahu and 1864 km² for Maui—but are topographically quite different. Oahu has two mountain ranges of moderate elevation (maximum altitude 1212 m), aligned approximately parallel to each other and at right angles to the NE tradewinds; Maui consists of two large separate mountain masses, reaching a maximum elevation of 3007 m at the summit of Haleakala on East Maui (Fig. 2).

The general dominance of tradewind flow in Hawaii, especially at elevations below the tradewind inversion layer, is shown by the occurrence of NE winds for 80–90% of the period May to September, and 50–80% of the period from October to April in terms of average monthly values (Blumenstock & Price 1967). Figure 1 and Table 1 present a general idea of variations in wind speed and direction in Hawaii.

TABLE 1. Mean wind data for the Honolulu International Airport, 1951–60; (a) wind direction (% frequency), (b) wind speed (% frequency); data from Blumenstock & Price (1967)

	Jan.	Aug.		Jan.	Aug.
(a) NNE to E	50	93	(b) 0–5·4 m s^{-1}	68	38
ESE to S	19	4	5·8–10·7 m s^{-1}	29	58
SSW to W	10	1	11·2 m s^{-1} and over	2	3
WNW to N	20	3			
Calm	2	1			

Other wind systems of much less importance than the tradewinds in Hawaii include 'Kona storms', which occur several times during the winter season and which are associated with the passage of cold fronts and subtropical cyclones, and are characterized by heavy rain and wind from the SW or SSW. Land- and sea-breezes develop on a much more local scale, and on Oahu and Maui are confined to the areas on the SW side of the islands sheltered topographically from the NE tradewinds.

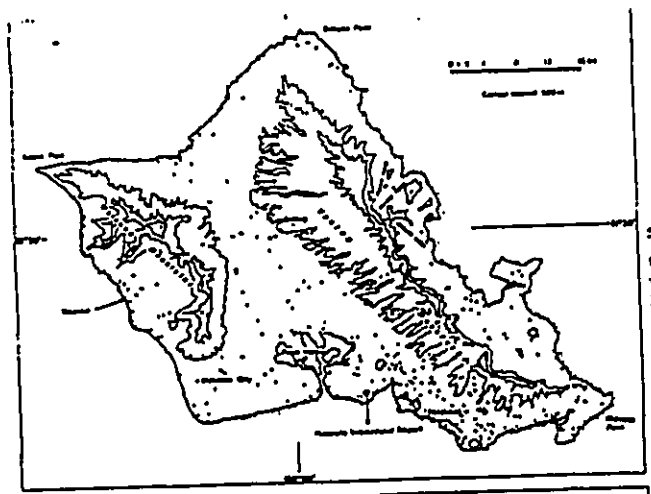
The movement of moisture-laden tradewinds up the mountain slopes results in large amounts of orographic rainfall in the mountain areas of Oahu and West Maui and on the windward side of Haleakala in East Maui, with mean annual rainfall of more than 10 000 mm in some areas, while rainshadow areas on the leeward side of the mountains are very dry, with mean annual rainfall of less than 500 mm (State of Hawaii 1973).

METHODS

Sampling

One thousand and forty-five trees at 390 sites on Oahu and Maui were measured and classified by shape (Table 2). All sixty species sampled were dicotyledons.

An attempt was made to select sites distributed over the entire area of Oahu and Maui (Fig. 2). The local density of sampling sites depended on whether the surface was flat or not; city areas and rugged terrain required a closer network of sampling sites because of the limited representativeness of each sampling site in these areas.



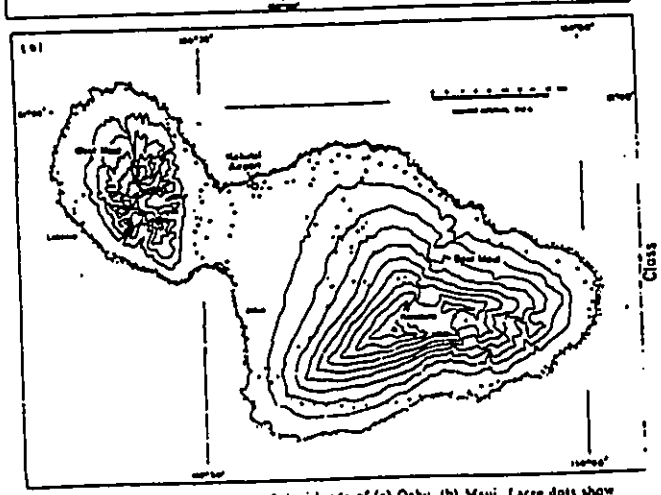


FIG. 2. Topographical features of the islands of (a) Oahu, (b) Maui. Large dots show sampling sites where one or more of the fifteen most frequently observed tree species

TABLE 2. Numbers of sampling sites, trees and species sampled on the islands of Oahu and Maui, Hawaii

		Oahu	Maui	Total
No. of sampling sites		393	195	590
No. of individual trees		704	341	1045
No. of different species		50	35	60
More than one tree sampled at a site	No. of sample sites	195	90	285
	Total no. of trees	506	229	735
More than one tree of the same species sampled at a site	No. of sample sites	44	39	83
	Total no. of trees	93	82	175

This sampling ideal was not always achieved because of the inaccessibility or absence of trees in some areas and of unsuitable samples in other areas. Access to mountain areas was limited to several ridges with trails. Sugarcane and pineapple plantations left some large areas without any observable trees.

Samples taken from any given site consisted of a single tree or of a number of trees of one or more species. All trees sampled were isolated independent trees, and some trees near buildings or in forests were sampled. When more than one tree was sampled at a site, sampling was confined to an area of 10–50 m diameter depending on the local topography. Particular attention was paid in city areas to possible artefacts resulting from tree-trimming.

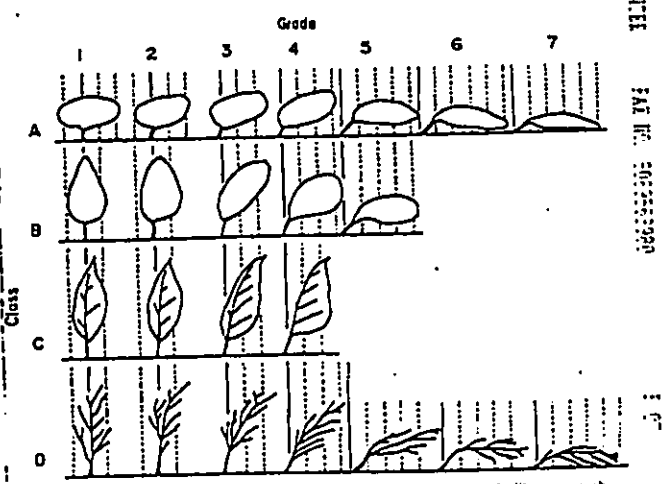


FIG. 3. Classification of tree deformation. A = large-crowned umbrella-like trees, such as *Ficus retusa*, *Prosopis pallida* and *Samanea saman*. B = trees with ordinary cone-shaped crowns, such as *Grevillea robusta* or *Tabebuia pentaphylla*. C = trees which develop into flag-shaped trees such as *Eucalyptus* spp. D = *Casuarina equisetifolia*

having relatively strong winds in Fig. 9, while Fig. 8 does not show any evidence of strong wind in these areas.

Figure 10 shows the estimated wind pattern of Maui based on wind-deformed trees. The wind pattern of Maui is more locally diversified than that of Oahu, because of the high elevations of the two mountain masses on the island and their alignment relative to the tradewind direction.

(a) On the eastern edge of the island, the winds are separated around Mount Haleakala; one branch takes a northwestward direction along the contour lines and then curves towards the SW around the northern ridge of the mountain, while the other branch follows a southwestward direction across the southern slope of the mountain before passing out over the Pacific Ocean.

(b) In the area between the two mountains, the NE wind curves toward the south and finally to the SE, except for a branch which curves southwestward around the southeastern edge of West Maui.

(c) Some winds pass through the corridors formed by the large valleys of West Maui, and out over the Pacific Ocean on the leeward side of the mountain.

(d) In the northwestern part of the island, striking curvatures of wind direction along the coastline are evident.

As regards estimated wind speed, the areas of greatest tree-deformation (> grade 3) are found where winds converge, while low deformation occurs in the windshadow areas on the leeward side of the island.

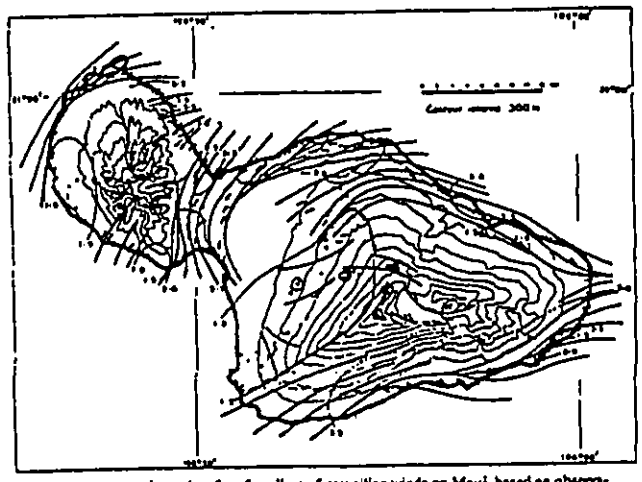


FIG. 10. The estimated surface flow-lines of prevailing winds on Maui, based on observations of wind-deformed trees: isolines of grades of tree-deformation are shown.

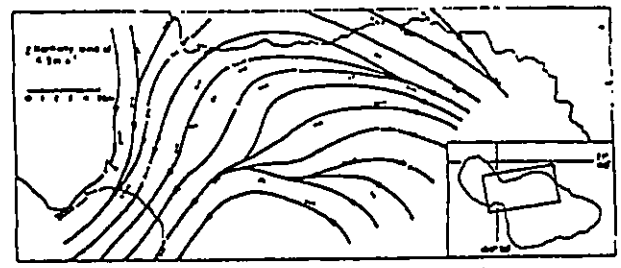


FIG. 11. Estimated mean wind vectors and flow-lines for central Maui for 7–26 August 1976, based on mobile observations by Daniels *et al.* (1976).

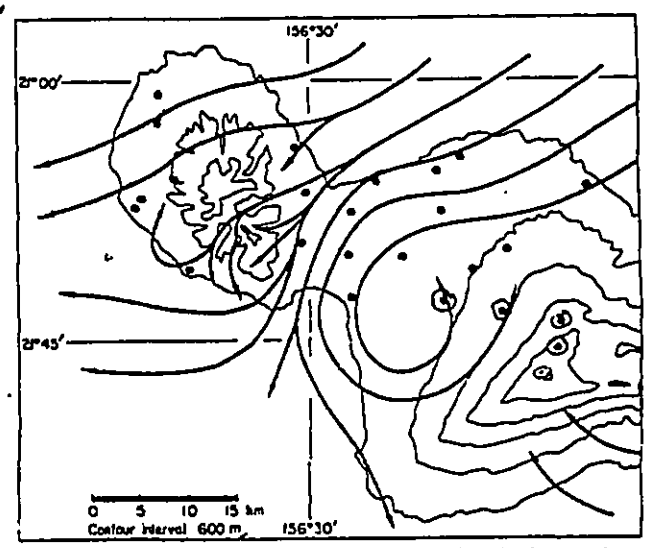


FIG. 12. Daytime surface tradewind flow-lines for western Maui, based on instrumental observations from August to December 1963 by Peterson (1966).

A comparison of this estimated wind pattern with the maps based on measured data (Figs 11 & 12) again shows an overall agreement in wind direction, with small variations between them.

Figure 11 shows the estimated average wind vectors and flow-lines for 7–26 August 1976, based on mobile observations (Daniels *et al.* 1976). One significant difference between Figs 10 and 11 is the increased southerly component to the east of Kahului Airport (Fig. 2) in Fig. 10, while in Fig. 11 the east wind prevails in the same area, with a consequent northward location of maximum curvature. Figure 12 shows daytime surface tradewind flow-lines based on instrumental observations from August to December 1963 (Peterson 1966). These flow-lines show a close resemblance to those in Fig. 10, except for a much stronger curvature in Fig. 10 along the western coastal areas of West Maui. Both Figs 10 and 12 show upslope components on the western slope of Haleakala, with good directional coincidence with the sea-breeze, as depicted by Leopold (1949).

The wind speed is comparable between Figs 10 and 11 only in the isthmus area between East Maui and West Maui. Both maps show strong NNE winds around the SE corner of West Maui. Other high-grade areas in Fig. 10 do not show up clearly in Fig. 11.

DISCUSSION

The level of consistency of tree-deformation in any climatic regime may depend on one or more of the following factors:—

(a) Seasonal or more frequent variation in wind speed and direction.

(b) Different sensitivities of tree species, due to physiological, morphological and phenological differences.

(c) Different sensitivities of individual trees within the same species.

(d) Errors in measurement.

(e) Deformation caused by factors other than wind, including chance effects.

In the present study the two groups of sample sites examined had all but (b) in common. The lower consistency in the grade of deformation in the second group of fifteen species must, therefore, have resulted from the inclusion of several resistant and sensitive species in the group. Any decrease in consistency would depend not only on the total number of species sampled but also on whether both resistant and sensitive species occurred in the same samples, and on their relative frequencies. Consequently, it seems necessary, when using more than one species to indicate wind speed, to compare the gradings of each species and to adjust appropriately the criteria of deformation. A simple application of one criterion to different species, even if their crown shapes under normal conditions look similar, may lead to errors.

A comparison of the estimated wind patterns based on observations of wind-deformed trees with the wind patterns based on instrumental readings shows that, in spite of the short periods of instrumental observations, there is a reasonable agreement between the two sets of patterns, with only minor differences in wind direction.

Thus if careful sampling is performed and adjustments are made for species with different sensitivities to wind-action, wind-deformed trees can serve as good indicators of local wind patterns, particularly under climatic conditions such as in Hawaii where the wind direction is consistent throughout the year. Since the method is likely to show the results of surface wind integrated over a long period of time, it may be used effectively for reconnaissance studies. In Hawaii the results may be relevant to enquiries into the association of vegetation and wind, the prediction of air selection of sites for wind-power plants.

ACKNOWLEDGMENTS

I thank Drs Jen-hu Chang and John M. Street of the Geography Department, University of Hawaii, and Dr Masatoshi M. Yoshino, Institute of Geoscience, University of Tsukuba, Japan, for their critical reviews of the manuscript; Dr Kent W. Bridges, Botany Department, University of Hawaii, for his comments on an earlier draft of this paper; and N. Balakrishnan, Botany Department, University of Hawaii, for his help in plant identification.

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BOARD OF WATER SUPPLY

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Manager and Chief Engineer

May 4, 2000

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MAY 11 2000
ENGINEERING CONCEPTS

Jacquelin N. Miller, Ph.D.
Associate Environmental Coordinator
Environmental Center
University of Hawaii
2550 Campus Road
Crawford 317
Honolulu, Hawaii 96822

Dear Dr. Miller:

Subject: Your Letter of December 7, 1999 Regarding the Supplemental Draft Environmental Impact Statement for the Board of Water Supply's Proposed Kailua 272 Reservoir on Kalae O Kaiwa Ridge

Thank you for your letter and related references regarding the Supplemental Draft Environmental Impact Statement (EIS) for the proposed reservoir project.

We provide the following response to your comments:

Landscaping

1. Environmental conditions which may pose potential landscaping problems have been considered by a licensed landscape architect during design of the project. The contractor will ultimately be responsible for dealing with existing site conditions in establishing and maintaining plant growth. Plant materials will be guaranteed by the contractor for a period of one year after the normal maintenance period, against defects including death and unsatisfactory growth.

2. Section 2.3.5 (Landscaping) of the Supplemental Final EIS will include the following statement:

   Soil conditioners, fertilizers and a reliable water supply will be specified in the construction documents to ensure that revegetation is undertaken as rapidly as possible. Fertilizer and soil amendments recommended in the soil analysis by the Agricultural Extension Service shall be applied prior to planting.

3. The tendency of the wind to crop trees at the top of the ridge was brought up during a meeting with the Lani-Kailua Outdoor Circle, Federation of Garden Clubs & Xeriscape, Kailua Neighborhood Board and Kailua Urban Design Task Force on June 29, 1999. A record of the discussion was included in Appendix A of the Supplemental Draft EIS.

4. The impact of salt spray on landscaping/revegetation has been considered by the landscape architect. The plants selected for landscaping are either known to be salt tolerant or already exist on the site.

Geology

1. Section 4.2 (Geography and Topography) of the Supplemental Final EIS will be expanded as follows:

   "The proposed site is located on top of a knoll at the southern end of Kalae o Kaiwa ridge. The knoll slopes down toward the east and west at a gradient of about two horizontal to one vertical (2H:1V) and 3H:1V, respectively."

2. The Board of Water Supply conducts frequent inspections of their reservoirs as part of the regular maintenance program. Reservoir repairs can be made early, avoiding the potential for structural failure.

Soil and Drainage

1. Section 4.3 (Soils) of the Supplemental Final EIS will be revised as follows:

   "...the near surface soil in the area of the proposed project can be classified as Alaeloa silty clay, 40 to 70 percent slopes (ALF)."

2. The potential impact of fertilizers on the environment will be addressed by the following revisions to the Supplemental Final EIS:

   Add to Section 5.2.1 (Soil Erosion, Potential Impacts):

   Soil amendments and fertilizers will be applied prior to planting to promote rapid establishment of ground cover and trees. Additional application of fertilizers will occur during the maintenance period.

   Add to Section 5.2.2 (Soil Erosion, Mitigative Measures):

   Care will be taken to minimize transport of the applied fertilizers and soil amendments in surface runoff. Irrigation of landscaped areas will be monitored. To ensure active growth, planted areas will be irrigated until moist but not saturated. Irrigation will be regulated to avoid erosion and gullying. A permanent irrigation system has not been proposed for the project site.

3. Long-term impacts of soil erosion resulting from the proposed project were addressed in Section 5.2.1 (Soil Erosion, Potential Impacts) of the Supplemental Draft EIS, which states:

   "...once construction is completed, a reduction in erosion potential is expected due to the increase in impervious surfaces (reservoir and road) and establishment of permanent landscaping."

4. Section 5.3.1 (Drainage, Potential Impacts) of the Supplemental Final EIS will be revised as follows:

   "After development of the reservoir, approximately 1.2 acres of the project site, extending east from the ridge line runoff which presently flows toward the municipal storm drains serving the residential community to the east, will discharge toward the WCCC to the west. The amount of runoff discharging toward the west will further increase due to the addition of impervious surfaces at the previously undeveloped site. Approximately 3.9 cfs of runoff would result from this area in association with a 10-year, 1-hour rainfall event."

   The proposed alteration of runoff pattern will result in only a slight increase in runoff toward the west, and should not affect the potential for flooding or impact biota. The average annual rainfall for the area is 25 inches, which is relatively low and consistent with the arid nature of the site.

Design Construction

1. Since the disposal of excavated material is left to the discretion of the contractor, it will be included in the Supplemental Final EIS as an unresolved issue. The following section will be added:

   9.4 Disposal of Excavated Material

   The ultimate site for disposal or reuse of the approximately 85,000 cubic yards of excavated material remains unresolved. The decision to dispose of the material or reuse it as fill at another site is left to the discretion of the contractor. The contractor will be responsible for obtaining all permits and approvals associated with disposal and/or reuse of the excess excavated material as fill, including compliance with environmental impact statement rules and regulations.

2. Section 2.4.1 (Grading) of the Supplemental Final EIS will be expanded to include the following description of the site grading:

   Initially, the top of the ridge will be truncated by the grading activities. Once an elevation of about 275 feet is achieved, grading will focus on excavating the "bowl" in which the reservoir will be constructed. It should be noted that once earthmoving equipment are excavating the "bowl", they should not be visible from surrounding lands and much of the associated dust and noise will be contained.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. HAMILL
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

DEPARTMENT OF ENVIRONMENTAL SERVICES
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 3RD FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 527-6663 • FAX: (808) 527-6675 • Website: www.co.honolulu.hi.us

JEREMY HARRIS
Mayor

KENNETH E. SPRAGUE, P.E., Ph.D.
Director

BARRY FUKUNAGA
Deputy Director

P-1576/99

ENV 99-119

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NOV 5 12 30 PM '99

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MEMORANDUM

TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTENTION: BARRY USAGAWA

FROM: KENNETH E. SPRAGUE, DIRECTOR
DEPARTMENT OF ENVIRONMENTAL SERVICES

SUBJECT: SUPPLEMENTAL DRAFT ENVIRONMENTAL IMPACT STATEMENT (SDEIS)
KAILUA 272' RESERVOIR
TMK: 4-2-3: 4 AND 4-2-4: 37

We have reviewed the subject SDEIS and have no additional comments to offer at this time.

Should you have any questions, please contact Alex Ho at 523-4150.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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CLIFFORD S. JAMILE
Manager and Chief Engineer

TO: MR. KENNETH E. SPRAGUE, DIRECTOR
DEPARTMENT OF ENVIRONMENTAL SERVICES

FROM: CLIFFORD S. JAMILE

SUBJECT: YOUR MEMORANDUM OF NOVEMBER 4, 1999 REGARDING THE SUPPLEMENTAL DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE BOARD OF WATER SUPPLY'S KAILUA 272 RESERVOIR PROJECT, TMK: 4-2-3: 4, 4-2-4: 37

Thank you for your memorandum regarding the Supplemental Draft Environmental Impact Statement for the proposed reservoir project.

We acknowledge that you have no comments to offer at this time.

cc: Engineering Concepts, Inc.

P

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 10TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 523-4182 • FAX: 523-4084

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JEREMY HARRIS
MAYOR

WILLIAM D. BALFOUR, JR.
DIRECTOR

MICHAEL T. AMII
DEPUTY DIRECTOR

Dec 9 2 44 PM '99

December 3, 1999

TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTENTION: BARRY USAGAWA

FROM: WILLIAM D. BALFOUR, JR., DIRECTOR

SUBJECT: SUPPLEMENTAL DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR KAILUA 272' RESERVOIR, KOOLAUPOKO, OAHU, HAWAII
TMK: 4-2-03:04 AND 4-2-04:37

We have reviewed the above-referenced document and find that the project will not affect any of our recreation facilities or programs.

Thank you for the opportunity to comment on the proposed reservoir construction. Should you need further information, please contact Mr. John Eveland, Executive Assistant, at 527-6038.

W.D. Balfour

WILLIAM D. BALFOUR, JR.
Director

WDB:cu
(99-2814GT)

cc: Governor, State of Hawaii
c/o Office of Environmental Quality Control
Mr. Kenneth Ishizaki, Engineering Concepts, Inc.

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

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Manager and Chief Engineer

December 27, 1999

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TO: MR. WILLIAM D. BALFOUR, JR., DIRECTOR
DEPARTMENT OF PARKS AND RECREATION

FROM: CLIFFORD S. JAMILE

SUBJECT: YOUR MEMORANDUM OF DECEMBER 3, 1999 REGARDING THE SUPPLEMENTAL DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE BOARD OF WATER SUPPLY'S PROPOSED KAILUA 272 RESERVOIR PROJECT, TMK: 4-2-3: 4, 4-2-4: 37

Thank you for your memorandum regarding the Supplemental Draft Environmental Impact Statement for the proposed reservoir project.

We acknowledge that the proposed project will not affect any recreation facilities or programs.

cc: Engineering Concepts, Inc.

Long Range

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET • HONOLULU, HAWAII 96813
TELEPHONE (808) 523-4414 • FAX (808) 527-6743

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JEREMY HARRIS
MAYOR

JAN NAOE SULLIVAN
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

DEC 6 10 23 AM '99

December 2, 1999

1999/CLOG-7095(JP)

DEC 3 3 03 PM '99

MEMORANDUM

TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTN: BARRY USAGAWA

FROM: JAN NAOE SULLIVAN, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

SUBJECT: SUPPLEMENTAL DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE 272' RESERVOIR PROJECT, KOOLAUPOKO, OAHU, HAWAII
TAX MAP KEYS 4-2-3: 4 AND 4-2-4: 37

This responds to your request dated October 23, 1999 for comments on the Supplemental Draft Environmental Impact Statement (DEIS) for your Kailua 272' Reservoir project. We have the following comments:

1. DEIS Figure 2-12, Landscape Plan: Landscape screening should be continued along the south-west periphery of the proposed water tank (facing Kalanianaole Highway).

2. DEIS Section 5.5, Development Plan:

   a. DEIS Section 5.5 (Part 1), [Koolaupoko] Development Plan Special Provisions. Under the discussion of measures to be taken to screen the water tank [Section 24-6.2(a)(1), Open Space], we urge that the reservoir tank and cover be painted an appropriate color and finish to blend with the surrounding vegetation.

   b. The Development Plan section should include a discussion of the Koolaupoko *Sustainable* Communities Plan (SCP), which will replace the Koolaupoko Development Plan upon its adoption. The Koolaupoko SCP is currently under consideration by the City Council. Of particular note, the DEIS should cite

Koolaupoko SCP Section 4.2.3, [Water Systems Development] General Policies, which reads in pertinent part: "*Where new reservoirs and other above ground infrastructure is necessary, avoid impacts to significant scenic resources; where such impacts are unavoidable, appropriate mitigation measures should be implemented.*" In addition, Koolaupoko SCP Figure 2-4, Significant Scenic Features and Viewplanes in Koolaupoko, indicates that the project site may impact an identified "continuous panoramic view." The preceding suggestions concerning screening of the proposed water tank should be mentioned as adequate measures to achieve consistency with the policies contained in the Koolaupoko SCP.

3. DEIS Section 5.6, Land Use Ordinance:

   a. Zoning districts are no longer established in Article 2 of the Land Use Ordinance (LUO). Pursuant to revisions to the LUO under Ordinance No. 99-12, effective as of May 10, 1999, zoning districts are now established in Section 21-3.10.

   b. A Board of Water Supply water tank is considered a "public use and structure" for LUO purposes, not a "utility installations, Type A." "Public uses and structures" are defined as "*uses conducted by or structures owned or managed by the . . . city to fulfill a governmental function, activity or service for public benefit and in accordance with public policy.*" A public use and structure is permitted as a principal use in all zoning districts.

Thank you for the opportunity to review and comment on this DEIS. Please contact Jamie Peirson of our staff at extension 5754 if you have any questions concerning our response.

for JAN NAOE SULLIVAN
Director of Planning and Permitting

JNS:fm
cc: Engineering Concepts, Inc.
Office of Environmental Quality Control

POSSE doc. no. 17172

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
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ROSS S. SASAMURA, Ex-Officio
CLIFFORD S. JAMILE
Manager and Chief Engineer

COPY

TO: MR. RANDALL K. FUJIKI, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

FROM: CLIFFORD S. JAMILE

SUBJECT: YOUR MEMORANDUM OF DECEMBER 2, 1999 REGARDING THE SUPPLEMENTAL DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE BOARD OF WATER SUPPLY'S PROPOSED KAILUA 272' RESERVOIR, KAILUA, OAHU, TMK: 4-2-03: 04 AND 4-2-04: 37

Thank you for reviewing the Supplemental Draft Environmental Impact Statement (EIS) for the proposed Kailua 272' Reservoir project.

We provide the following comments to your concerns:

1. Landscaping Plan:

   Perimeter landscaping has been proposed along view corridors where the tank may be visible. The location of additional landscaping along the southwest periphery fronting Kalanianaole Highway is not needed to screen the tank from view. The southwest side of the tank which faces Kalanianaole Highway should not be visible from the highway because the grades at that area are higher than the top of the tank. The Board of Water Supply prefers to maintain the natural vegetation of the ridge whenever possible, rather than add unnecessary landscaping.

2. Development Plan:

   a. The Supplemental Final EIS will be revised to include the following statement under Section 8.5, Open Space Discussion:

      The reservoir tank and cover will be painted an appropriate color and finish to blend with the surrounding vegetation.

Pure Water . . . our greatest need . . . if we use it wisely.

   b. The Supplemental Final EIS will be revised to include the following statement under Section 8.5, Koolaupoko Sustainable Communities Plan (SCP):

      The Koolaupoko SCP is currently under consideration by the Honolulu City Council and will replace the Koolaupoko Development Plan upon its adoption. Sections of the Koolaupoko SCP that are pertinent to the proposed action are:

      Section 4.2.3. [Water Systems Development] General Policies, which reads in part: "Where new reservoirs and other above ground infrastructure is necessary, avoid impacts to significant scenic resources; where such impacts are unavoidable, appropriate mitigation measures should be implemented."

      Figure 2-4, Significant Scenic Features and Viewplanes in Koolaupoko, indicates that the project site may impact an identified "continuous panoramic view".

   Implementation of the proposed measures for screening the reservoir (i.e. location within a "bowl" atop the ridge, landscape planting, and painting) will achieve consistency with the policies contained in the Koolaupoko SCP.

3. Land Use Ordinance:

   a. The Supplemental Final EIS will be revised to include the following statement under Section 8.6, Land Use Ordinance (LUO).

      Section 21-3.10 of the LUO establishes zoning districts.

b. Section 8.6, Land Use Ordinance, of the Supplemental Final EIS will be further revised to state:

> A "public use and structure" is defined as "uses conducted by or structures owned or managed by the ...city to fulfill a governmental function, activity or service for public benefit and in accordance with public policy." The proposed reservoir is considered a "public use and structure" which is permitted as a principal use in all zoning districts.

If you have any questions, please contact Kathryn Kami at 527-5221.

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

Long Range

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU

P-1670/99

PACIFIC PARK PLAZA • 711 KAPIOLANI BOULEVARD SUITE 1200 • HONOLULU, HAWAII 96813
TELEPHONE (808) 523-4529 • FAX (808) 523-4730

JEREMY HARRIS
MAYOR

CHERYL D SOON
DIRECTOR

JOSEPH M. MAGALDI, JR.
DEPUTY DIRECTOR

Dec 6 11 23 AM '99

December 2, 1999

TPD10/99-05354R

MEMORANDUM

TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTN: BARRY USAGAWA, LONG RANGE PLANNING SECTION

FROM: CHERYL D. SOON, DIRECTOR

SUBJECT: KAILUA 272' RESERVOIR

Dec 3 3 03 PM '99

In response to the October 23, 1999 letter from Engineering Concepts, Inc., the supplemental draft environmental impact statement for the subject project was reviewed.

The selected alignment, Alternative 3, for the temporary paved access road will allow construction vehicles to access the project site from Kalanianaole Highway. In order to minimize the project's impact on the surrounding area residents, it should be stipulated that all construction vehicles are to access the project site via this access road and not use Akiohala Street.

Should you have any questions regarding this matter, please contact Faith Miyamoto of the Transportation Planning Division at Local 6976.

Cheryl D Soon
CHERYL D. SOON

cc: Office of Environmental
Quality Control
Mr. Kenneth Ishizaki
Engineering Concepts, Inc.

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

RECEIVED
FEB 29 2000
ENGINEERING CONCEPTS

JEREMY HARRIS, Mayor
EDDIE FLORES, JR., Chair
CHARLES K. STILL, Vice Chair
JAN M. L. Y. SAM
HERBERT S. K. KAOPUA, SR.
BARBARA KIM STANTON
KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio
CLIFFORD S. JAMILE
Manager and Chief Engineer

COPY

February 11, 2000

TO: MS. CHERYL D. SOON, DIRECTOR
DEPARTMENT OF TRANSPORTATION SERVICES

FROM: CLIFFORD S. JAMILE

SUBJECT: YOUR MEMORANDUM OF DECEMBER 2, 1999 REGARDING THE SUPPLEMENTAL DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE BOARD OF WATER SUPPLY'S PROPOSED KAILUA 272' RESERVOIR, KAILUA, OAHU, TMK: 4-2-03: 04 AND 4-2-04: 37

Thank you for reviewing the Supplemental Draft Environmental Impact Statement (DEIS) for the proposed Kailua 272' Reservoir project.

Section 2.4.3 of the Supplemental DEIS will be revised to include the following statement:

> Construction vehicles will access the project site via the designated construction access road off of Kalanianaole Highway. Construction access from Akiohala Street will not be allowed to minimize the project's impacts on the surrounding area residents.

If you have any questions, please contact Kathryn Kami at 527-5221.

cc: Dana Arakaki, Engineering Concepts, Inc.

FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

3375 KOAPAKA STREET, SUITE H425
HONOLULU, HAWAII 96819-1869

P-1687/99

JEREMY HARRIS
MAYOR

ATTILIO K. LEONARDI
FIRE CHIEF

JOHN CLARK
DEPUTY FIRE CHIEF

November 30, 1999

DEC 10 11 31 AM '99
PLANNING BRANCH

TO: BARRY USAGAWA
BOARD OF WATER SUPPLY

FROM: ATTILIO K. LEONARDI, FIRE CHIEF

SUBJECT: SUPPLEMENTAL DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR KAILUA 272' RESERVOIR
KOOLAUPOKO, OAHU, HAWAII
TMK: 4-2-03: 04 AND 4-2-04: 37

We received the letter from Engineering Concepts, Inc., dated October 23, 1999, regarding the Kailua 272' Reservoir project.

The Honolulu Fire Department requests compliance with the following:

1. Maintain fire apparatus access throughout the construction site for the duration of the project.
2. Notify the Fire Communication Center (523-4411) of any interruption in the existing fire hydrant system during the project.

Should you have any questions, please call Acting Battalion Chief Lloyd Rogers of our Fire Prevention Bureau at 831-7778.

ATTILIO K. LEONARDI
Fire Chief

AKL/LR:jl

cc: Governor, State of Hawaii
Kenneth Ishizaki, Engineering Concepts, Inc.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

JEREMY HARRIS

COPY

EDDIE FLORES, JR., Chairman
CHARLES A. STEC, Vice Chairman
JAN M. L. Y. AHU
HERBERT S. K. KAOPUA, SR.
BARBARA KIM STANTON

KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

December 27, 1999

RECEIVED
JAN 3 1999
ENGINEERING CONCEPTS

TO: MR. ATTILIO K. LEONARDI, FIRE CHIEF
FIRE DEPARTMENT

FROM: CLIFFORD S. JAMILE

SUBJECT: YOUR MEMORANDUM OF NOVEMBER 30, 1999 REGARDING THE SUPPLEMENTAL DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE BOARD OF WATER SUPPLY'S PROPOSED KAILUA 272 RESERVOIR PROJECT, TMK: 4-2-3: 4, 4-2-4: 37

Thank you for your memorandum regarding the Supplemental Draft Environmental Impact Statement for the proposed reservoir project.

We have the following comments to your concerns:

1. Fire apparatus access will be maintained throughout the construction site for the duration of the project.
2. The Fire Communication Center will be notified of any interruption in the existing fire hydrant system during the project.

If you have any questions, please contact Barry Usagawa at 527-5235.

cc: Engineering Concepts, Inc.

Pure Water ... our greatest need – use it wisely

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

801 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813 • AREA CODE (808) 529-3111
http://www.honolulupd.org

cc: cjldk

JEREMY HARRIS
MAYOR

LEE D. DONOHUE
CHIEF

MICHAEL CARVALHO
DEPUTY CHIEFS

OUR REFERENCE CS-DL

December 2, 1999

Mr. Barry Usagawa
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96813

Dear Mr. Usagawa:

Subject: Supplemental Draft Environmental Impact Statement for
Kailua 272' Reservoir
Koolaupoko, Oahu, Hawaii
TMK: 4-2-03:04 and 4-2-04:37

Thank you for the opportunity to review the subject document. We have the same comments as stated in our previous response.

In spite of mitigation measures, construction dust and noise may have an effect on the surrounding area. Construction vehicles and equipment entering and exiting Kalanianaole Highway may cause traffic safety concerns. These factors could generate calls for police service to the area and thus have an impact on our workload.

If there are any questions, please call me at 529-3255 or Lieutenant John Thompson of District 4 at 235-7621.

Sincerely,

LEE D. DONOHUE
Chief of Police

By
EUGENE UEMURA
Assistant Chief
Support Services Bureau

cc: Ofc. of Environmental Quality Control

Mr. Kenneth Ishizaki
Engineering Concepts, Inc.

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

RECEIVED
JAN 10 2000
ENGINEERING CONCEPTS

December 30, 1999

COPY

JEREMY HARRIS, Mayor
EDDIE FLORES, JR., Chairman
CHARLES A. STED, Vice Chairman
JAN M. L. Y. AHN
HERBERT S. K. KAOPUA, SR.
BARBARA KIM STANTON

KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

TO: MR. LEE D. DONOHUE, CHIEF OF POLICE
POLICE DEPARTMENT

FROM: CLIFFORD S. JAMILE

SUBJECT: YOUR MEMORANDUM OF DECEMBER 2, 1999 REGARDING THE SUPPLEMENTAL DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE BOARD OF WATER SUPPLY'S PROPOSED KAILUA 272 RESERVOIR PROJECT, TMK: 4-2-3: 4, 4-2-4: 37

Thank you for your memorandum regarding the Supplemental Draft Environmental Impact Statement for the proposed reservoir project.

We have the following comments to your concerns:

1. We acknowledge that in spite of mitigation measures, construction dust and noise may have an effect on the surrounding area, and construction vehicles and equipment entering and exiting Kalanianaole Highway may cause traffic safety concerns. We understand that these factors may generate calls for police service to the area and have an impact to your workload.

2. We will continue to coordinate the project with your department and provide a schedule of construction activities when available.

If you have any questions, please contact Barry Usagawa at 527-5235.

cc: Engineering Concepts, Inc.

P-1592/99

THE GAS COMPANY
Citizens Energy Services

November 2, 1999

City and County of Honolulu
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Attention: Mr. Barry Usagawa

Gentlemen:

Subject: Supplemental Draft Environmental Impact Statement for
Kailua 272' Reservoir
Plan Review and Comment

We refer to your letter dated October 23, 1999, requesting comments for the subject project. Based on our review of the Supplemental Draft Environmental Impact Statement (DEIS) provided, it has been determined that the area is currently clear of utility gas facilities.

Thank you for the opportunity to review the DEIS for the proposed project. Should there be any questions or if additional information is desired, please call me at 594-5574.

Very truly yours,

The Gas Company

Keith K. Yamamoto
Supervisor, Engineering

KKY:krs
99-212

THE GAS COMPANY
515 Kamakee Street Honolulu Hawaii 96814
PO Box 3000 Honolulu Hawaii 96802-3000
Telephone 808 531 5800 Facsimile 808 594 5830 Saves

NOV 10 1 37 PM '99

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

RECEIVED
DEC 13 1999

December 8, 1999

COPY

JEREMY HARRIS, Mayor
EDDIE FLORES, JR.
CHARLES A. STEC, Vice Chairman
JAN M. L. Y. AHU
HERBERT S. K. KAOPUA, Sr.
BARBARA KIM STANTON

KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

Mr. Keith K. Yamamoto
The Gas Company
515 Kamakee Street
Honolulu, Hawaii 96814

Dear Mr. Yamamoto:

Subject: Your Letter of November 2, 1999 Regarding the Supplemental Draft Environmental Impact Statement for the Board of Water Supply's Proposed Kailua 272 Reservoir on Kalae O Kaiwa Ridge

Thank you for your letter regarding the Supplemental Draft Environmental Impact Statement for the proposed reservoir project.

We acknowledge that the project area is currently clear of any utility gas facilities.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Engineering Concepts, Inc.

PLN-120/99

December 1, 1999

Attention: Barry Usagawa
Board of Water Supply

Comments on SDEIS for Kailua 272' Reservoir

NOISE
Overall, even without an actual assessment of noise (no measurements have been taken for the preparation of the SDEIS – everything is based on generalities), one can conclude that the project will create a significant noise impact which will not be mitigated. The SDEIS should not be finalized until the noise issues have been resolved. Engineering Concepts did not subcontract a noise expert and it is unclear whether this firm has the experience and knowledge to evaluate noise impacts.

Tables 5-1 and 5-2 do not agree. Backhoes are listed in Table 5-1 as having a dBA of about 95 at 50 ft, Concrete Mixers at 75 dBA and Front End Loaders are shown as 85 dBA. However, on Table 5-2, these numbers have been reduced to 75 decibels at the project site. Therefore, the estimates given for the affected sites are incorrect and should be revised to be much higher. In addition, there seems to be no accounting for the additive effects of the noise. These pieces of equipment will be operating at the same time and noise levels will increase beyond the individual levels.

There is a general discussion of wind, terrain, etc effects on noise transmission along with some diagrams. However, no attempt is made to relate this information to the project except to utilize the distance effect.

For the homes in Lakeview, Table 5-3 shows that the noise levels created by project construction will be incompatible with residences. WCCC and the Girls HYCF are even closer. Overall, noise levels created by this project are going to disturb the activities at peoples' homes, the correctional facilities and the schools. However, no actual mitigation measures, beyond truck mufflers, intake silencers and partition shields (located where?), to control these noise levels are proposed. How can construction activities be scheduled off-peak when the inmates at WCCC and HYCF don't leave? The ACLU might object to the inmates being exposed to incompatibly high noise levels on a daily basis for several months. The facility administrations and the community should be concerned about the irritating effects of constant noise levels on the incarcerated populations.

Based on the imprecise data provided, noise levels at the schools will be marginally compatible. Will there be restrictions during school hours? How will the noise affect the learning environment in the local schools?

Using the same imprecise data sets, I can conclude that being around my home (on Ulupii St.) during the day will be "marginally compatible" with residential living. (Does Table 5-3 from the Acoustical Society of America take into account the fact that homes in Hawaii generally differ from those on the mainland? – single wall construction exposes occupants to much greater noise levels.). According to State Administrative rules the allowable noise level in the community should be 55 dBA during the day. Even if the DOH issues a permit to limit the hours when noise producing operations can occur, some of us (retirees, families with infants, people who work at home) are often home during these times.

Once the information in this section has been corrected, the actual noise impacts have been assessed and meaningful mitigation has been proposed, there should be another chance for the community and affected institutions to comment.

CONSTRCTION ACTIVITIES
Section 2.4 is misleading and too general to be useful to the concerned reader. Section 2.4.1 is headed "grading" but excavation is a primary activity which will cause impacts for the community. 85,000 cubic yards of material should not come under the heading of 'grading'. The section does not even mention that excavation is likely to be accomplished by blasting. It is also unclear in this section as to why all areas must be cleared and grubbed prior to any further work. This would seem to enhance erosion and dust. Many job sites require that the area to be disturbed be limited to avoid impacts inherent in exposing cleared land.

DUST
Page 2-17 notes that high winds on the ridge top preclude planting tall trees on top of the ridge. However, winds in the climate section are only discussed in a cursory manner. The high winds mentioned under section 2.3.5 occur and will be a significant factor in moving dust from the project site to adjacent communities. As noted in section 4.3 on Soils, the soil is a red silty clay that will be effectively carried by the wind. Section 5.6.1 states that WCCC and HYCF will be most affected by the dust. There should be concern for the health impacts of constant dust exposure for the inmates with respiratory issues. Besides affecting these public facilities, the homes in the neighborhoods will be impacted by red dust for many months during grading and excavation activities. The mitigation plan for dust under section 5.6.2 lists only a few general measures which will be implemented. Measures that would actually help control the dust, such as watering the work area, erecting wind screens, keeping roads clean, covering open trucks and limiting disturbed areas have been relegated to the MAY list, to be implemented at the contractors discretion. These dust control actions need to be required. Otherwise, dust control should be included in Chapter 9 under Unresolved Issues.

SITE SELECTION
With all the impacts to the surrounding community, schools and facilities, one would suggest that the BWS look at their site selection process once again. The SDEIS should show a map with the large water transmission mains which must connect to the reservoir for distribution service (referred to on page 3-3) and all the locations with elevations above 272'. Systematically, the BWS should then eliminate potential locations in a document available to the public (such as the SDEIS). The current location is too close to homes, facilities and schools.

PUBLIC PARTICPATION
I am concerned that meaningful coordination has not occurred with the surrounding facilities and community since the new site was selected. Have the noise and dust implications of blasting and excavation been fully explained to the local school administrations and the facility management of WCCC and HYCF? There is no list in chapter 10 of any meetings held by the BWS with interested parties. Why wasn't there a public hearing on the project for the SDEIS? A new site affects new people and institutions and relying on any previous public hearings should not fulfill public informational requirements.

Sincerely,

Jan Reichelderfer
1317 Ulupii St.
Kailua, HI 96734

CC
OEQC
Engineering Concepts
PKCA

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

April 28, 2000

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MAY 5 2000
ENGINEERING CONCEPTS

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JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
CHARLES A. STED, Vice-Chairman
JAN M.L.Y. ASHI
HERBERT S.K. KAOPUA, SR.
BARBARA KIM STANTON

KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

Ms. Jan Reichelderfer
1317 Ulupii Street
Kailua, Hawaii 96734

Dear Ms. Reichelderfer:

Subject: Your Letter of December 1, 1999 Regarding the Supplemental Draft Environmental Impact Statement for the Board of Water Supply's Proposed Kailua 272 Reservoir on Kalae O Kaiwa Ridge

Thank you for your letter regarding the Supplemental Draft Environmental Impact Statement (EIS) for the proposed reservoir project.

We provide the following response to your comments:

Noise

Engineering Concepts, Inc. subcontracted Y. Ebisu and Associates, Acoustical Engineers, to address impacts and mitigation associated with construction of the proposed reservoir on Puu O Ehu ridge. Much of the information provided by Y. Ebisu could be applied to the site at Kalae O Kaiwa ridge as well.

The intent of Table 5-1 was to present a noise range associated with specific construction equipment. Just as not all cars sound alike, noise generated by construction equipment varies dependent on make, model and age. The intent of Table 5-2 was to depict reduction in decibel levels as distance from the construction site increases. The intent of the heading "Tractors, Trucks, Jack Hammers" used in Table 5-2 was representative of louder equipment (95 decibels); while the heading "Front Loaders, Backhoes, Concrete Mixers" was representative of equipment in the 75-decibel range. It is not the intent of the headings to suggest that the front loaders, backhoes and concrete mixers would be in operation at the same time.

Regarding your concern on the additive effects of noise, the Supplemental Final EIS will include the following statement:

> While it is likely that more than one noise-producing vehicle or equipment will be in operation at any given time, the cumulative effect on noise levels by more than one noise generator is not directly additive. For example, if two different equipment operate simultaneously, with one being more than 10 decibels louder than the other, the resultant noise level is the level associated with the louder equipment. The cumulative effect of two equipment producing the same level of noise is an increase of only 3 decibels. The cumulative effect of four equipment producing the same level of noise is an increase of 6 decibels.

The proposed project has been coordinated with the neighboring institutions. The governing agencies are aware of the proposed action and have the opportunity to express their comments and concerns.

As stated in the Supplemental Draft EIS, construction noise exceeds the allowable regulation limits for most development projects, resulting in the need for a noise permit from the State Department of Health (DOH). The Supplemental Draft EIS also disclosed that the Board of Water Supply requires construction compliance with DOH. If permitted noise limits are exceeded, work will be stopped until corrective measures are taken.

Construction Activities

"Grading" is an accepted term for earthmoving activities which includes both excavation and embankment. Grading permits are issued for excavation, including quantities as large as 85,000 cubic yards. Impacts and mitigation associated with excavation by blasting was addressed in the Supplemental Draft EIS under Section 5.7 (Noise and Vibration), and further in Section 9.1 (Method of Excavation) as an unresolved issue to be decided by the contractor during construction.

"Clearing and grubbing" precedes other grading activities. Erosion control measures will be erected at the onset of construction, prior to clearing and grubbing, to minimize impacts associated with all grading activities.

Dust

An effective dust control plan will be implemented by the contractor. Dictating the control measures that should be used will limit the contractor, and may not result in the most effective dust control plan for this specific situation. Construction activities must comply with the provisions of the State DOH, Chapter 11-60.1, Hawaii Administrative Rules, "Air Pollution Control," regarding fugitive dust.

Site Selection

It is desirable to locate reservoirs near the water users (i.e. homes, schools and other facilities) that are served by the water system. Locating reservoirs in remote areas is not feasible due to the additional expense of constructing and maintaining water transmission pipelines, and additional friction losses associated with long transmission pipelines which would reduce water pressure at the user's tap.

Public Participation

Sixty-three (63) copies of the EIS Preparation Notice were provided to agencies, organizations and other interested parties, including the State Department of Education, Department of Human Services, and over a dozen community groups. Refer to Chapter 10 of the Supplemental Draft EIS for a complete listing. In addition, eighty (80) copies of the Supplemental Draft EIS were provided to agencies, organizations and other interested and/or affected parties. While there is no formal requirement for a public hearing associated with the EIS process, the proposed project was presented to the Kailua Neighborhood Board on November 4, 1999. Additional public meetings will be held in conjunction with the Conservation District Use Application process of the State Department of Land and Natural Resources.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

P-1628/99

PAT'S

KAILUA BEACH PROPERTIES
204 S. KALAHEO AVENUE
KAILUA, HAWAII 96734

PATRICK G. O'MALLEY (R)
Principal Broker

ELIZABETH H. O'MALLEY (RA)
Manager/Accountant

(808) 261-1653
(808) 262-4128
(808) 263-6000
FAX (808) 261-0893

Nov 22 10 36 AM '99

November 15, 1999

Nov 17 11 40 AM '99
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BD OF WATER SUPPLY

Board of Water Supply
630 South Beretania Street
Honolulu, HI 96843
Attention: Mr. Clifford S. Jamile

Dear Mr. Jamile,

Thank you for the invitation to attend one of your public meetings to discuss your plans for upgrading the water system for the Kailua area. I am unable to attend the meeting due to health reasons. However, I have reviewed your draft environmental impact statement for the reservoir planned for Kalae o Kaiwa ridge. My family and I are very much in favor of your plans to increase and improve water storage in the Kailua water system. Your efforts toward lessening the visual impact of the water tank are much appreciated. Your continuing efforts to build the water tank and improve the water system serving Kailua, even in the face of some public opposition, are commendable and much appreciated. I encourage you to keep up your efforts for the Kailua community.

Sincerely,

Patrick G. O'Malley

CC: Office of Environmental Quality Control

PROPERTY MANAGEMENT REAL ESTATE SALES RENTALS

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

JEREMY HARRIS, Mayor
EDDIE FLORES, JR., Vice-Chairman
CHARLES A. STECK, Vice-Chairman
JAN M. L. Y. AHN
HERBERT S. K. KAOPUA, SR.
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KAZU HAYASHIDA, Ex-Officio
ROSS S. SASAMURA, Ex-Officio

CLIFFORD S. JAMILE
Manager and Chief Engineer

COPY

December 21, 1999

RECEIVED
JAN 3 1999
ENGINEERING CONCEPTS

Mr. Patrick G. O'Malley
Pat's Kailua Beach Properties
204 South Kalaheo Avenue
Kailua, Hawaii 96734

Dear Mr. O'Malley:

Subject: Your Letter of November 15, 1999 Regarding the Supplemental Draft Environmental Impact Statement for the Proposed Kailua 272' Reservoir, Kailua, Oahu, TMK: 4-2-03: 04, 08 and 4-2-04: 37

Thank you for reviewing the Supplemental Draft Environmental Impact Statement for the proposed Kailua 272' Reservoir project.

We acknowledge that you are in favor of the proposed project. We appreciate your positive comments.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kenneth Ishizaki, Engineering Concepts, Inc.

APPENDIX D

BOTANICAL SURVEY
by Char & Associates

BOTANICAL SURVEY
KAILUA 272' RESERVOIR
KO'OLAU POKO DISTRICT, O'AHU

by

Winona P. Char

CHAR & ASSOCIATES
Botanical Consultants
Honolulu, Hawai'i

Prepared for: ENGINEERING CONCEPTS, INC.

April 1999

BOTANICAL SURVEY
KAILUA 272' RESERVOIR
KO'OLAU POKO DISTRICT, O'AHU

INTRODUCTION

The Board of Water Supply, City and County of Honolulu, proposes to construct a 4.0 M.G. reservoir, access road, temporary access road, and other appurtenances on the Pohakupu'u site. The project site is located on the hillside above Kalaniana'ole Highway and the Hawaii Youth Correction Facility. The 4.0 M.G. reservoir will be located at the 272-foot elevation. An existing 6.0 M.G. reservoir and 1.0 A.C. reservoir are located to the north of the project site.

Field studies to assess the botanical resources on the project site were conducted on 13 April 1999 by two botanists. The primary objectives of the survey were to:

1) describe the vegetation on the site;
2) inventory the flora;
3) search for threatened and endangered species as well as species of concern; and
4) identify areas of potential environmental problems or concerns and propose appropriate mitigation measures.

SURVEY METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator with other botanical studies conducted in the general area. Topographic maps and soil maps were examined to determine terrain

characteristics, access, boundaries, and reference points. The project site (proposed access road, reservoir, and temporary access road) were accessed from the existing reservoirs. The proposed roads and reservoir site were flagged and staked by the survey engineers prior to our field studies.

A walk-through (pedestrian) survey method was used. Notes were made on plant associations and distribution, substrate types, drainage, exposure, disturbances, topography, etc. Plant identifications were made in the field; plants which could not be positively identified were collected for later determination in the herbarium (Bishop Museum), and for comparison with the recent taxonomic literature.

The species recorded are indicative of the season ("rainy" vs. "dry") and the environmental conditions at the time of the survey. A survey taken at a different time of the year and under varying environmental conditions would no doubt yield slight variations in the species list, especially of the weedy, annual species.

DESCRIPTION OF THE VEGETATION

Two vegetation types are recognized on the site. A dense thicket of Christmas berry (Schinus terebinthifolius) and koa haole (Leucaena leucocephala) with scattered, emergent trees is found on the access road. On the reservoir site and temporary access road, the vegetation is more open and grassy with scattered trees and shrubs. These two vegetation types occur on soils of the Alaeloa series. These are well-drained, dark reddish-brown, silty clay soils which occur on the side slopes and toe slopes in upland areas (Foote et al. 1972).

A more detailed description of the Christmas berry/koa haole thicket and open scrub vegetation follows. An inventory of all the plants found during the survey is presented in the checklist at the end of the report.

Christmas Berry/Koa Haole Thicket

This vegetation type consists of 15 to 25 feet tall Christmas berry, which is a large shrub to tree, and smaller scattered patches of koa haole shrubs, 15 to 20 feet tall. Guava shrubs (Psidium guajava) are occasionally encountered. Scattered throughout the thicket are taller, emergent trees, 20 to 35 feet tall; these include Java plum (Syzygium cumini), octopus tree (Schefflera actinophylla), and Chinese banyan (Ficus microcarpa). A few commonly used landscape tree species have escaped cultivation and naturalized on the hillside. The most commonly observed of these is the Victorian box or orange pittosporum (Pittosporum undulatum). Other escaped landscape trees found here include pink tecoma (Tabebuia pentaphylla) and fern tree (Filicium decipiens).

Ground cover varies from clumps of grasses and scattered smaller shrubs in areas where the Christmas berry is taller to dense tangles of vines where the Christmas berry forms a low, much-branching growth, 12 to 15 feet tall. Wedelia (Wedelia trilobata), a commonly planted ground cover plant, is abundant under the thicket near the existing reservoirs. Throughout the thicket, Guinea grass (Panicum maximum) and sourgrass (Digitaria insularis) form scattered clumps or small patches here and there. Coral berry, a 2 to 3-foot tall herbaceous plant with bright red berries, is abundant. Other plants found under the Christmas berry/koa haole thicket include hairy abutilon (Abutilon grandifolium), comb hyptis (Hyptis pectinata), Chinese violet (Asystasia gangetica), Spanish clover (Desmodium incanum), and purple potato vine (Solanum seaforthianum). Huehue haole (Passiflora suberosa),

a member of the passion fruit family with small, dark purple-black fruits, and maile-pilau (Paederia foetida), a foul-smelling vine, form tangled masses where the Christmas berry is low growing.

Several ornamental species besides the trees mentioned earlier have also established small populations on the hillside. These include mock orange (Murraya paniculata), Mickey Mouse plant (Ochna kirkii), asparagus fern (Asparagus setaceus), sacred bamboo (Nandina domestica), and a palm -- Ptychosperma sp.

Open Scrub Vegetation

As the proposed access road approaches the reservoir site, the vegetation becomes open, grassy scrub with scattered trees and shrubs. Guinea grass is the most abundant grass, forming dense tufts from 3 to 4 feet tall. In some places though, thatching grass (Hyparrhenia rufa), molasses grass (Melinis minutiflora), and sourgrass may be locally abundant. Scattered through the grassy scrub vegetation are shrubs and trees of lantana (Lantana camara), guava, Christmas berry, Java plum, koa haole, Victorian box, and Formosan koa (Acacia confusa). Common herbaceous species and smaller shrubs include nettle-leaved vervain (Stachytarpheta urticifolia), pohapoha (Passiflora foetida), Spanish clover, hairy horseweed (Conyza bonariensis), and partridge pea (Chamaecrista nictitans).

On the moderately sloping to somewhat level reservoir site, the substrate is eroded with patches of exposed shallow soil or subsoil. In this area, broomsedge grass (Andropogon virginicus), molasses grass, and golden beardgrass (Chrysopogon aciculatus) form large mats.

DISCUSSION AND RECOMMENDATIONS

The vegetation found on the project site is dominated by introduced or alien plant species such as Christmas berry, koa haole, Guinea grass, guava, and lantana. Introduced species are all those plants which were brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact, that is, Cook's discovery of the islands in 1778. A few of the plants such as the Victorian box, pink tecoma, and fern tree are species which are used for landscaping, but have escaped and established on the hillside.

Of a total of 62 plant species inventoried during the field studies, 55 (88.8%) are introduced, 6 (9.6%) are native, and 1 (1.6%) is originally of Polynesian introduction. The native species are all indigenous species, that is, they are native to the Hawaiian Islands and elsewhere. The indigenous species are: huehue (Cocculus orbiculatus), 'ulei (Osteomeles anthyllidifolia), popolo (Solanum americanum), 'uhaloa (Waltheria indica), golden beardgrass (Chrysopogon aciculatus), and pili (Heteropogon contortus). These plants can all be found in similar environmental habitats throughout the Hawaiian Islands. None of the plants is a threatened and endangered species; nor is any plant considered a species of concern (U.S. Fish and Wildlife Service 1999).

Given the findings above, the proposed project is not expected to have a significant negative impact on the botanical resources. Of some concern is increased erosion which would occuronce the vegetative cover is removed. It is recommended that the areas disturbed by construction be grassed over and landscaped as soon as possible to prevent soil loss.

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Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1990. Manual of the flowering plants of Hawai'i. 2 vols. University of Hawai'i Press and B.P. Bishop Museum Press, Honolulu. B.P. Bishop Museum Special Publication 83.

PLANT SPECIES LIST -- Kailua 272' Reservoir, O'ahu

The following checklist is an inventory of all the plants observed on the project site during the field studies. The plant names are arranged alphabetically by families within each of three groups: Ferns, Dicots, and Monocots. The taxonomy and nomenclature of the Ferns follow Lamoureux (1988), while the flowering plants are in accordance with Wagner et al. (1990). The few recent name changes for the flowering plants follow those reported in the Hawaii Biological Survey series (Evenhuis and Miller, eds., 1995-1998).

For each species, the following information is provided:

1. Scientific name with author citation.
2. Common English and/or Hawaiian name(s), when known.
3. Biogeographic status. The following symbols are used:
   - I = indigenous = native to the Hawaiian Islands and also elsewhere throughout the Pacific and/or tropics.
   - I? = questionably indigenous = data not clear if dispersal by natural or human-related mechanisms, but weight of evidence suggests probably indigenous.
   - P = Polynesian = plants originally of Polynesian introduction prior to Western contact, that is, Cook's discovery of the Hawaiian Islands in 1778.
   - X = introduced or alien = all those plants brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact.
4. Presence (+) or absence (-) of a particular species within each of two vegetation types recognized on the project site (see text for discussion):
   - c = Christmas Berry/Koa Haole Thicket
   - o = Open Scrub Vegetation

Scientific name	Common name	Status	Vegetation type c	Vegetation type o
FERNS				
POLYPODIACEAE (Common fern family)				
Phymatosorus scolopendria (Burm.) Pic.-Ser.	laua'e, lauwae	X	+	-
THELYPTERIDACEAE (Wood-fern family)				
Christella parasitica (L.) Levl.	wood-fern	X	+	-
FLOWERING PLANTS				
DICOTS				
ACANTHACEAE (Acanthus family)				
Asystasia gangetica (L.) T. Anderson	Chinese violet, coromandel	X	+	-
Thunbergia fragrans Roxb.	thunbergia	X	+	-
ANACARDIACEAE (Mango family)				
Schinus terebinthifolius Raddi	Christmas berry	X	+	+
APOCYNACEAE (Periwinkle family)				
Carissa macrocarpa (Eckl.) DC	Natal plum, carissa	X	+	-
ARALIACEAE (Ginseng family)				
Schefflera actinophylla (Endl.) Harms	octopus tree, umbrella tree	X	+	+
ASTERACEAE (Daisy family)				
Conyza bonariensis (L.) Cronq.	hairy horseweed, ilioha	X	-	+
Emilia fosbergii Nicolson	pualele	X	-	+
Pluchea indica (L.) Less.	Indian pluchea, Indian fleabane	X	+	-
Wedelia trilobata (L.) Hitchc.	wedelia	X	+	-

Scientific name	Common name	Status	Vegetation type c	Vegetation type o
BERBERIDACEAE (Barberry family)				
Nandina domestica Thunb.	sacred bamboo, Japanese fire bush	X	+	-
BIGNONIACEAE (Bignonia family)				
Tabebuia pentaphylla (L.) Hemsl.	pink tecoma	X	+	+
BORAGINACEAE (Borage family)				
Ehretia acuminata R. Br.	ehretia	X	+	-
CLUSIACEAE (Mangosteen family)				
Clusia rosea Jacq.	autograph tree, copey, Scotch attorney	X	+	+
CUCURBITACEAE (Gourd family)				
Coccinia grandis (L.) Voigt	coccinia, ivy gourd	X	+	-
FABACEAE (Pea family)				
Acacia confusa Merr.	Formosan koa	X	-	+
Acacia farnesiana (L.) Willd.	klu	X	-	+
Chamaecrista nictitans (L.) Moench	partridge pea, lauki	X	+	+
Desmodium incanum DC	Spanish clover, ka'imi	X	+	+
Leucaena leucocephala (Lam.) de Wit	koa haole, ekoa	X	+	+
Mimosa pudica var. unijuga (Duchass. & Walp.) Griseb.	sensitive plant, sleeping grass, puahilahila	X	-	+
Senna pendula (Humb. & Bonpl. ex Willd.) H. Irwin & Barneby		X	+	+
LAMIACEAE (Mint family)				
Hyptis pectinata (L.) Poit.	comb hyptis	X	+	+
MALVACEAE (Mallow family)				
Abutilon grandifolium (Willd.) Sweet	hairy abutilon, ma'o	X	+	-

Scientific name	Common name	Status	Vegetation type c	Vegetation type o
MENISPERMACEAE (Moonseed family)				
Cocculus orbiculatus (L.) DC	huehue, hue	I	+	+
MORACEAE (Mulberry family)				
Ficus microcarpa L.f.	Chinese banyan	X	+	-
MYRTACEAE (Myrtle family)				
Psidium cattleianum var. littorale (Raddi) Fosb.	waiawi	X	-	+
Psidium guajava L.	guava, kuawa	X	+	+
Syzygium cumini (L.) Skeels	Java plum	X	+	+
OCHNACEAE (Ochna family)				
Ochna kirkii Oliver	Mickey Mouse plant	X	+	-
PASSIFLORACEAE (Passion flower family)				
Passiflora foetida L.	running pop, pohapoha	X	-	+
Passiflora suberosa L.	huehue haole	X	+	+
PHYTOLACCACEAE (Pokeweed family)				
Rivina humilis L.	coral berry, rouge plant	X	+	-
PITTOSPORACEAE (Pittosporum family)				
Pittosporum undulatum Venten.	Victorian box, orange pittosporum	X	+	+
ROSACEAE (Rose family)				
Osteomeles anthyllidifolia (Sm.) Lindl.	'ulei, u'ulei	I	-	+
RUBIACEAE (Coffee family)				
Paederia foetida L.	maile-pilau	X	+	-
RUTACEAE (Citrus family)				
Murraya paniculata (L.) Jack	mock orange	X	+	-

Scientific name	Common name	Status	Vegetation type c	Vegetation type o
SAPINDACEAE (Soapberry family)				
Filicium decipiens (Wight & Arnott) Thwaites ex J.D. Hook.	fern tree	X	+	+
SOLANACEAE (Nightshade family)				
Solanum americanum Mill.	popolo, glossy nightshade	I?	+	-
Solanum seaforthianum Andr.	blue potato vine	X	+	-
STERCULIACEAE (Cacao family)				
Waltheria indica L.	'uhaloa, hi'aloa, kanakaloa	I?	-	+
VERBENACEAE (Verbena family)				
Citharexylum caudatum L.	fiddlewood	X	-	+
Lantana camara L.	lantana, lakana	X	-	+
Stachytarpheta dichotoma (Ruiz & Pav.) Vahl	owi, oi	X	-	+
Stachytarpheta urticifolia (Salisb.) Sims	nettle-leaved vervain, owi, oi	X	+	+
MONOCOTS				
AGAVACEAE (Agave family)				
Cordyline fruticosa (L.) A. Chev.	ti, ki	P	+	+
ARECACEAE (Palm family)				
Ptychosperma sp.		X	+	-
COMMELINACEAE (Spiderwort family)				
Commelina diffusa N.L. Burm.	honohono	X	-	+
LILIACEAE (Lily family)				
Asparagus setaceus (Kunth) Jessop		X	+	-

Scientific name	Common name	Status	Vegetation type c	Vegetation type o
ORCHIDACEAE (Orchid family)				
Spathoglottis plicata Blume	Chinese ground orchid, Philippine ground orchid	X	-	+
POACEAE (Grass family)				
Andropogon virginicus L.	broomsedge	X	-	+
Chrysopogon aciculatus (Retz.) Trin.	golden beardgrass, pilipili-'ula	I?	-	+
Digitaria insularis (L.) Mez ex Ekman	sourgrass	X	+	+
Digitaria pentzii Stent	pangola grass	X	-	+
Heteropogon contortus (L.) P. Beauv. ex Roem. & Schult.	pili, pili grass	I?	-	+
Hyparrhenia rufa (Nees) Stapf	thatching grass, jaragua	X	-	+
Melinis minutiflora P. Beauv.	molasses grass	X	-	+
Panicum maximum Jacq.	Guinea grass	X	+	+
Paspalum conjugatum Bergius	Hilo grass, mau'u Hilo	X	+	+
Pennisetum clandestinum Chiov.	Kikuyu grass	X	-	+
Pennisetum polystachion (L.) Schult.	feathery pennisetum	X	-	+

APPENDIX E

ARCHAEOLOGICAL INVENTORY SURVEY
by Cultural Surveys Hawaii

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

TIMOTHY E. JOHNS, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JANET E. KAWELO

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS
WATER RESOURCE MANAGEMENT

August 9, 1999

Mr. Matt McDermott
Cultural Surveys Hawaii, Inc.
733 North Kalaheo Avenue
Kailua, Hawaii 96734

LOG NO: 23868
DOC NO: 9908SC01

Dear Mr. McDermott:

SUBJECT: ***Chapter 6E-8 Historic Preservation Review of a Revised Report on the Inventory Survey for the Proposed Kailua 272 Reservoir and Access Roads***
Kailua, Ko'olaupoko, O'ahu
TMK: 4-2-003: 004, 008; 4-4-004: 037

Thank you for the prompt submission of revisions made to the report documenting the archaeological inventory survey done for the proposed Kailua 272 Reservoir and access roads (Archaeological Inventory Survey of Kailua 272 Reservoir and Access Road Kailua Ahupua'a of Kailua, Island of O'ahu. TMK 4-2-03: 04, 08 & 4-2-04: 37. CSH. 1999).

We believe that the requested revisions have been made, and we can accept the report as final. We concur with your recommendation that no further work is needed. The report will be placed in our library for the public's use and benefit.

Should you have any questions, please feel free to call Sara Collins at 692-8026.

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

SC:jk

Archaeological Inventory Survey of

Kailua 272 Reservoir and Access Road

Kailua, *Ahupua`a* of Kailua, Island of O`ahu

TMK 4-2-03:04, 08 & 4-2-04:37

by

Hallett H. Hammatt, Ph.D.
Victoria S. Creed, Ph.D.
and
Matt McDermott, B. A.

for

Engineering Concepts, Inc.

Cultural Surveys Hawaii
April 1999
revised
July 1999

Abstract

At the request of Mr. Ken Ishizaki of Engineering Concepts, Inc., Cultural Surveys Hawaii, carried out an archaeological inventory survey for the proposed alternate site 2 of Kailua "272" Reservoir, in the *Ahupua`a* of Kailua, district of Ko`olaupoko, Island of O`ahu (TMK 4-2-03:04, 08 & 4-2-04:37). The project parcel is located on the steeply sloping ridge line that separates the Women's Correctional Facility from Kaelepulu Pond (Enchanted Lake), southwest of Kailua Town. The proposed construction for the 272 Reservoir consists of an access road alignment, the reservoir construction site itself, and a temporary access road alignment (to be used during reservoir construction). Two possible alignments of the temporary access road were investigated. The inventory survey investigations consisted of 100%.pedestrian inspection of the proposed construction site as well as historical document and oral history research for the *Ahupua`a* of Kailua in general, and more specifically of the construction site and its vicinity. No archaeological sites were observed during the pedestrian field inspection and historic research indicated that there was probably never any significant utilization (i.e., agricultural or habitation) along the ridge line. A deteriorating barbed-wire fence that runs along the ridge line attests to the past use of the area for livestock grazing. Historic document research did reveal the existence of a single historic feature that crosses through the project area, a portion of state site # 50-80-15-4042. This subsurface water tunnel was constructed in 1923 as part of the Waimanalo Sugar Company's irrigation system. The tunnel, combined with a pipeline, carried pumped water from Kawainui Marsh up to the Kailua Ditch, which supplied water from Kawainui and Maunawili to the Waimanalo sugar fields. During the pedestrian inspection of the project area, no sign of this subsurface feature was observed, however, maps show this feature crossing through the project area. Based on the results of historical document research and the pedestrian field inspection of the project area, it appears that this portion of site # 50-80-15-4042 is the only historic property within the project area. The proposed construction of reservoir will have no adverse effect on this historic property. No further historic preservation work is recommended for the project.

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Introduction

This archaeological inventory survey investigation of the proposed 272 Reservoir in Kailua is intended to fulfill the requirements outlined in the draft "Rules Governing Procedures for Historic Preservation Review" (1996, Hawaii administrative Rules, Title 13, Department of Land and Natural Resources, Subtitle 13, State Historic Preservation Division Rules, Chapter 276--"Rules Governing Minimal Standards for Archaeological Inventory Survey and Reports"). According to these rules an archaeological inventory survey is required "to identify and inventory any archaeological historic properties in a project area, in order to determine if significant historic properties are present." An archaeological inventory survey must 1) identify all historic properties within a parcel and 2) provide sufficient information from field documentation and historical background research to evaluate each historic property's significance. The five steps required for an archaeological inventory survey are:

1. Historical background research
2. Archaeological background research
3. Archaeological field survey
4. Consultation with individuals knowledgeable about the project area's history, in projects greater than 30 acres in size
5. Preparation of the archaeological inventory survey report, which presents the findings of the above four steps (13-276-3).

This archaeological inventory survey report has been prepared to fulfill the requirements outlined in chapter 13-276-8 "Archaeological inventory survey report."

Project Background

In December, 1998, Cultural Surveys Hawaii (CSH)was contacted by Mr. Ken Ishizaki of Engineering Concepts Inc., to draw up a proposal for archaeological inventory survey investigations of an approximately 0.65 acre area proposed as the "Alternate site 2 of Kailua '272' Reservoir". The inventory survey was also to include the alignments of the permanent access road and the temporary access road, of which there were two possibilities, one of which will be used during construction. Previously, in 1992, CSH had carried out archaeological inventory survey investigations for a different proposed location for the 272 Reservoir, also for Engineering Concepts, Inc. The results of this earlier inventory survey are reported in *Archaeological Inventory Survey of Kailua 272 Reservoir and Access Road, Kailua, Ahupua`a of Kailua, Island of O`ahu, TMK 4-2-03:9, 16 and a portion of 17* (Hammatt, Pfeffer and Creed 1993).

Historical background and previous archaeological research for the current inventory survey was accomplished in early March, 1999. This work consisted primarily of updating the 1993 Hammatt, Pfeffer, and Creed Inventory Survey information. Field work for the Alternate site 2 was conducted on March 16th, and June 30th, 1999. A total of one day of field work with an archaeological crew of two archaeologists, Matt McDermott, B. A., and Ka`ohulani McGuirre, B. A., was required. This work was conducted under the overall guidance of the project director, Hallett Hammatt, Ph.D.

Project Area Description

The project area is located just south of Kailua Town, in the *Ahupua`a of* Kailua, district of Ko`olaupoko, island of O`ahu (TMK 4-2-03:04, 08 & 4-2-04:37). It lies on the steeply sloping ridge line that separates Kaelepulu Pond (Enchanted Lake) from the Women's Correctional Facility (labeled "Kawailoa Girls Home" on the 1983 U. S. G. S. Kailua Quadrangle, see Figure 3). This ridge line is an extension of the same ridge that overlooks Kailua Town and parallels Hamakua Drive. Pu`u o Ehu, the high point of that ridge, is northeast of Kalae o Kaiwa, the high point of the ridge line for the proposed 272 Kailua Reservoir. Two existing reservoirs, Pohakupu 272 Reservoirs #1 and 2, are located immediately north of the project area, on the northeastern slope of Kalae o Kaiwa. The proposed location of the 272 Kailua Reservoir is the next peak south of Kalae o Kaiwa. Kailua High School is approximately a third of a mile to the north-northwest and the project area is approximately 1.75 miles inland of Kailua Beach, see Figures 1, 2, and 3.

The project area consist of four parts: 1) the permanent access road that will connect the Kailua 272 Reservoir site with the existing access road to the Pohakupu Reservoirs #1 and #2; 2) the reservoir site itself, atop the peak immediately south of Kalae o Kaiwa; 3) the proposed temporary access road alignment (not selected for use) east of the Woman's Correctional Facility; and 4) the second, selected, temporary access road alignment. The selected access road alignment follows the alignment of a previous access road used during the construction of the Pohakapu 272 Reservoirs, immediately east of the Woman's Correctional Facility. The temporary access road will be used only during reservoir construction and will connect the 272 reservoir site with Kalanianaole Highway, immediately south and east of the Women's Correctional Facility (see Figure 3). The two Pohakupu reservoirs are accessed by a paved one-lane road-way that extends from the reservoir site north to the grounds of Kailua High School and Akiohala Street.

Elevations within the project area range between 200 feet, at Kalanianaole Highway, and 320 feet A. M. S. L., at the reservoir site itself. Vegetation is generally a fairly dense combination of *haole koa* (*Leucaena leucocephala*), Christmas Berry (*Schinus terebinthifolius*), California grass (*Brachiaria mutica*), and various introduced species of weeds and vines. Other species observed included Monkey Pod (*Albizia saman*), Banyan (*Ficus* sp.), and a few specimens of Ti (*Cordyline fruticosa*). Figures 7 through 11 show the vegetation within the project area. A few small barren areas were observed which exposed the underlying eroding soil and decomposing bedrock that make up the ridge line substrate (see Figure 7). The soils within the project area are Alaeloa silty clay and slopes are between 15 and 70 percent (Foot *et al.* 1972). Rainfall in the Kailua area averages 1000 mm. (40 inches) per year (Giambelluca et al. 1986).

Scope of Work/Methods

One hundred percent of the project area was covered by systematic pedestrian sweeps during the survey. All work was done in accordance with the standards for inventory survey outlined by the Department of Land and Natural Resources/State Historic Preservation Division (DLNR/SHPD).

The work accomplished consisted of the following steps:

1. Research on historic and archaeological background, including search of historic maps, written records, Land Commission Award documents. Oral traditions and mythological accounts dealing with the region were also examined. This research focused on the specific area with general background on the *Ahupua'a* and district and emphasized settlement patterns. This research established a cultural, historic, and archaeological context for the project area and served as a predictive model for the types of historic properties that might be encountered within the project area.

2. A complete pedestrian ground survey of the entire project area for the purpose of site inventory. The distance between the two crew archaeologists was determined by vegetation primarily and to a lesser extent by terrain and topography--all factors that determine visibility of archaeological surface features. The interval between archaeologists varied but was generally between 5 and 10 meters. All previously recorded sites and/or former site areas (in the case of sites that have been destroyed) were located and evaluated for modifications. No new sites were recorded.

3. Preparation of a survey report which includes the following:

   a. A topographic map of the survey area showing all archaeological sites and site areas;

   b. Description of all archaeological sites with selected photographs, scale drawings, and discussions of function;

   c. Historical and archaeological background sections summarizing prehistoric and historic land use as they relate to the archaeological features;

   d. A summary of site categories, their significance in an archaeological and historic context;

   e. Recommendations based on all information generated which will specify what steps should be taken to mitigate impact of development on archaeological resources - such as data recovery (excavation) and preservation of specific areas. These recommendations will be developed in consultation with the client and the State agencies.

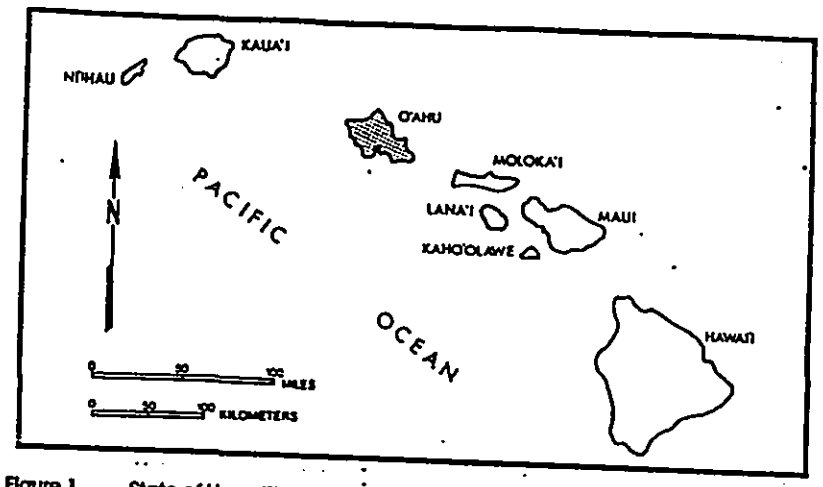

Figure 1 State of Hawai'i

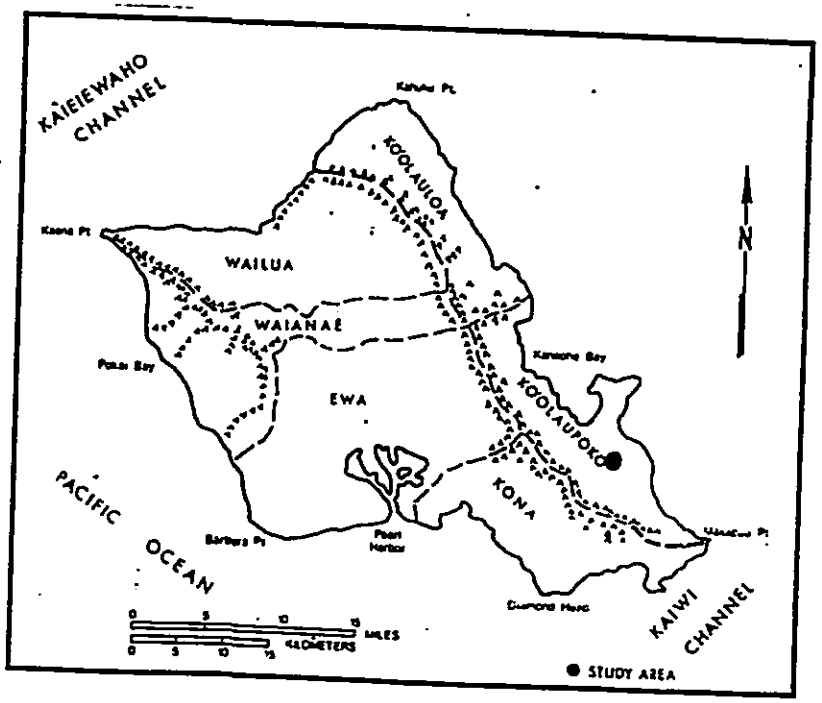

Figure 2 O'ahu Island Location Map

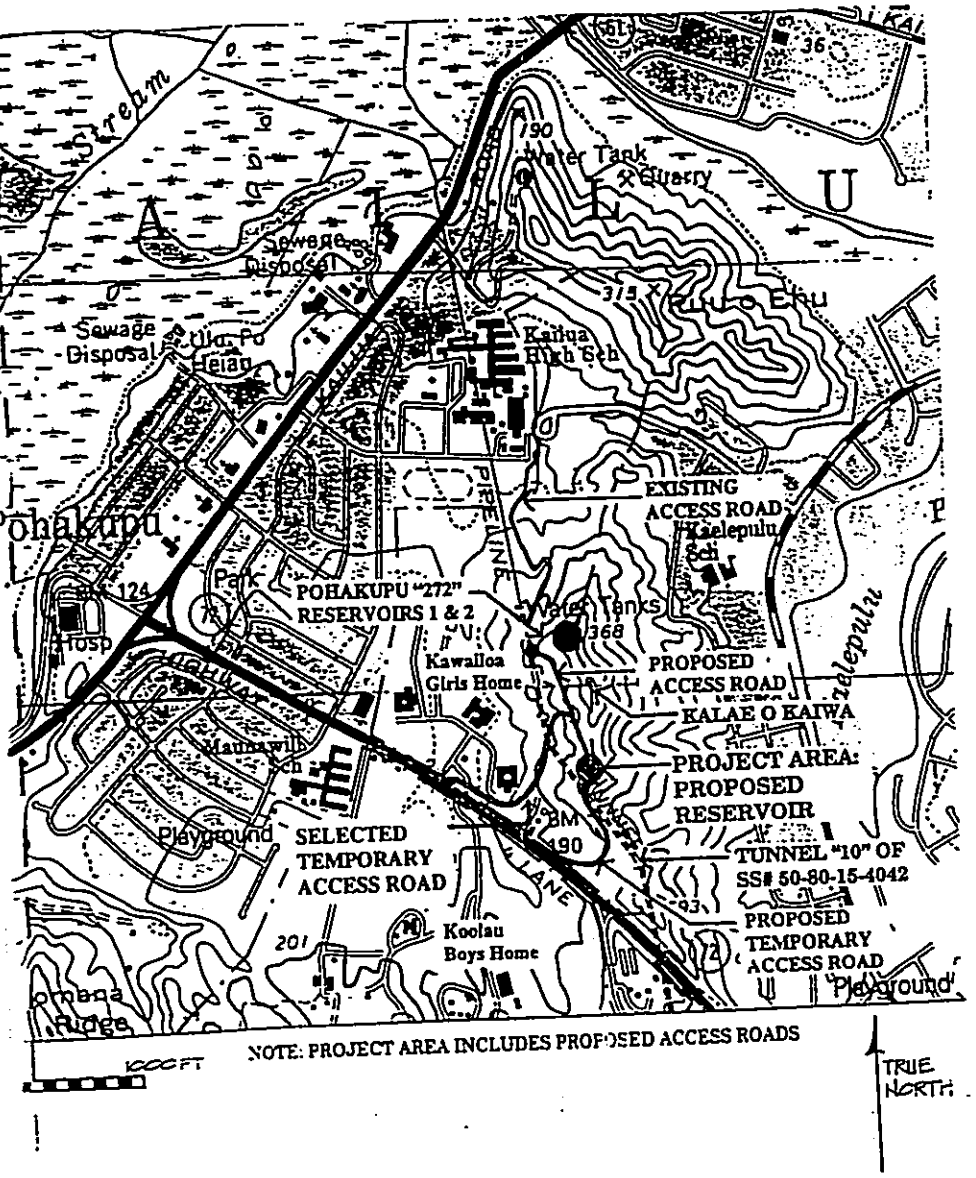

Figure 3 200 % Enlargement of the 1983 USGS Map Mokapu Quad Showing Project Area of Kailua 272 Reservoir and Other Features Mentioned in Text.

Cultural Setting and Historic Background: Kailua *Ahupua`a*

The history of the Kailua region of O`ahu has been documented in a number of studies including, but not limited to, Hall's(1997?) "The History of Kailua", Creed and Chiogioji's (1991) "Facets of Maunawili Valley and Kailua *Ahupua`a* History", and Kelly and Nakamura's (1981) "Historical Study of Kawainui Marsh Area, Island of O`ahu". All of these studies detail the legendary history and oral traditions, the legendary rulers and personalities, the early historic accounts, land ownership and utilization changes during and following the Mahele, and the changes in land use from traditional to modern times. With so many sources already documenting Kailua's rich historical and cultural past, the purpose of this section is only to orient the present project area within the overall historical and cultural setting. For more detailed accounts of Kailua's past, the reader is referred to the above sources, as well as the ones cited in the following text.

Setting

Kailua *Ahupua`a* is the largest valley on the windward side of O`ahu, and the largest *Ahupua`a* of the Ko`olaupoko District (approximately 15 km by 11 km). Flanked by the *Ahupua`a* of Waimanalo on the southeast, Kaneohe on the northwest and Honolulu to the south, the *Ahupua`a* of Kailua is shaped like a rectangle. From the Ko`olau ridge line it extends down two descending ridge lines which provide the natural boundaries for the sides of the *Ahupua`a*. The fourth side of the rectangle is the reef line of Kailua Bay.

The natural environment includes the sand barrier upon which Kailua Town stands, the mountainous upland terrain and alluvial valleys of Maunawili, the largest fresh water marsh in Hawai`i (Kawainui Marsh), another inland pond (Kaelepulu), approximately 18 permanent and intermittent streams, a freestanding mountain halfway between the shore and the Ko`olau (Olomana--1,643 ft.), several low ridge lines, and off-shore the Mokulua Islands, Mokolea Rock, and Popoia Island. It comprises 11,885 acres of land according to the Boundary Commission Review of the mid-19th century, but in fact extends beyond the shore approximately a mile out to sea, to the reef.

During the estimated 1000 to 1500 years since initial Polynesian settlement, the sand barrier that forms the shore at Kailua Bay has provided a desirable location for residences with a sunny, dry beach area. The well-watered interior lands, including the two marsh/pond areas of Kaelepulu and Kawainui and the many springs and streams of Maunawili, provided bountiful agricultural and resource gathering areas. During the 15th and 16th centuries Kailua O`ahu was the center of a large royal complex with ample playgrounds for sports and physical training, and recreation (Sterling and Summers 1978:231-232). Supporting this large complex was a most bountiful garden hinterland where fish, fowl, and vegetables were plentiful (*Ibid.*:227-228).

Mele or chants about Kailua frequently mention the two fishponds famous for their mullet and awa. They also tout the taro gardens of the area (see Beckwith 1979 and Drigot (1982), legends of Hi`iaka, Kahinahinanui, Makalei Tree, Ka`ulu are a few). Early visitors (Bowser

(1880), in particular) to the island also mention a wealth of birds in the area.

Beside a sunny beach area and uplands watered by frequent showers, other resources were easily available in Kailua. As the center of the caldera of the ancient Ko'olau Volcano (MacDonald and Abbott 1974:363) a basalt quarry (the present Ameron Quarry is built upon the site of the pre-contact quarry) for material for lithic tools was near at hand. Kailua was a residential district surrounded by *Ahupua'a* that were also highly cultivated and capable of providing ample resources for a large resident and visiting population. Kailua apparently also was a *pu'uhonua* (place of refuge) before Kamehameha I conquered the island of O'ahu. After this time the ancient *pu'uhonua* were abolished.

Oral Traditions and Legends

Legends and oral history provide stories for many of the place names and also give specific beliefs Hawaiians held and hold about the land. The name Kailua, meaning "two seas", apparently refers to the two large inland waters, Kaelepulu Pond and Kawainui Pond (Pukui *et al.* 1986:69; Quebral 1991:14). That Kailua was a "fat" land, a land of plentiful food in all times, is suggested by several legends. The *Makalei*, or Fish-Attracting Tree was a mythological tree or stick which could summon fish from Kawainui. Reportedly located near the present day Hamakua Bridge, it was described as a never failing source of a plentiful supply of food (Beckwith 1970:279-280 and Pukui and Elbert 197:382, cited in Kelly and Nakamura 1981:5). Another tradition of the ample productivity of the Kailua region involves the edible, *haupia*-like mud, called *lepo'ai 'ai*, which was available from Kawainui Marsh (Kelly and Nakamura 1981:5). This legend implies a bountiful Kailua where even the mud is edible.

Kailua is one of the places where, following their arrival on O'ahu from Kahiki, the *menehune* were assigned to live. These legendary workers are credited with the construction of numerous fish ponds and religious structures. Fornander points out that the term *menehune* in Tahitian had become the name for the lowest laboring class of people--suggesting a Tahitian origin for the term for the legendary workers (Fornander 1969:23).

There are legendary accounts of the prominent Mount Olomana, that is named after a great mythological giant and/or chief (Kelly and Nakamura 1981:1) Tradition also says Kawainui was inhabited by a *mo'o* (large dragon-like mythical creature) called Hauwahine, whose name literally means "female ruler". Her residency at Kawainui follows Haumea's, the earth-mother goddess whose name literally means "red ruler". She made sure all the people of the *Ahupua'a* shared in the pond's wealth and punished those who were greedy (Beckwith 1970:126).

Oral history notes that the stones overlooking Kawainui on Pu'u 'o 'Ehu are sacred to Hauwahine and her companion (Paki, 1976). The reason for this is connected to the ancient Hawaiian notion that the channel/canal beneath Pu'u o Ehu connects Kawainui and Kaelepulu and was considered to be the coital connection between the two fishponds, giving the area great *mana*. Kawainui Marsh was considered male and Kaelepulu Pond, female.

They mated at Kawailoa according to a Hawaiian tradition (Pilahi Paki 1976).

Traditional history credits Kailua as the residence of many prominent O'ahu ruling chiefs. There is 'Olopana "who with his brother Kahikiula came to O'ahu from Kahiki . . . He is said to have established several *heiau* in Kaneohe and Kailua, including Pahukini and Holomakani in the Kawainui area" (Kelly and Nakamura 1981:3). One of the earliest great chiefs to reside in Kailua was Kakuhihewa, who built himself a great house at 'Alele in Kailua (*Ibid.*:5). At approximately the same time (the 16th century) another prominent chief, Kuali'i, born at Kalapawai, Kailua, and raised in Kualoa and Kailua, had his navel cutting ceremony at the *heiau* of Alala (present day Lanikai point), and, after being the hero of many battles, became the high chief of all O'ahu (*Ibid.*:6) In early historic times the conquering chiefs Kahekili followed by Kamehameha I resided in Kailua for a time (*Ibid.*:6-7).

Early Population Estimates

The drastic depopulation of the Hawaiian Islands following the introduction of Western disease has been documented in a number of sources (Bingham 1848; Stannard 1989; and Bushnell 1993). According to one estimate the population of Hawaiians and part-Hawaiians fell from approximately 300,000 in 1778 to 82,593 by 1850 (Schmitt 1968:43, 74, cited in Kelly and Nakamura 1981:10). Population counts from the 1830s place the population of Kailun at approximately 760 individuals (Schmitt 1973:19 cited in Kelly and Nakamura 1981:10). This low population figure is incongruous with the productivity of the region, but well in keeping with population decline estimates due to western disease. Westerners passing through Ko'olaupoko in the mid 1840's made note of the cold and flu symptoms among the native Hawaiians and that much formerly productive land appeared abandoned (Wyllie 1948:20 cited in Kelly and Nakamura 1981:10).

Mahele Records

Mahele records are an important resource for determining land-use during the first half of the 19th century. In the great division of lands among Kamehameha III and his people between 1848 and 1853, 171 Land Commission Awards (LCAs) were claimed before the Board of Commissioners to Quiet Land Titles (Land Commission) in Kailua. Many persons claimed their land from the time of their *makuakane* (ancestors) but no one indicates any time farther back than the time of Kaloli (contemporaneous with Kamehameha I). The most recent claims are probably those granted by Governor Kekuanaoa. Not all claimants told how long they had occupied the land but of those who do they refer primarily to the ruling chiefs and then some refer to the local *konohiki*.

Many Kailua claimants list kings, queens, kahina nui or governors to provide a time frame for when they received their land. The earliest such reference appears to be Kaloli, the wife of Kalaniopuu who lived from 1752 to 1782 (Kuykendall 1980, vol I:30-32), followed by Kamehameha I, *Mo'i* or king and conqueror of O'ahu in 1795 (p.87), Liholiho, King

Kamehameha II in the 1820s, Kaomi, the Tahitian companion of Kamehameha III who died in 1833 (p. 135), Boki, governor in 1820s and his wife Liliha, *kuhina nui* - after 1829 and during the 1830s, Kinau, Queen from 1832-1839, Ka`ahumanu, Queen and *kuhina nui* in 1820s and Kekoakoaoa, the governor of O`ahu in the 1830s and 40s (p. 286), Paki, a high chief during the same period (p. 285), and Kamehameha III during the early 1840s. Some claimants give specific dates and these range from 1828-1848. Thus, the people established in Kailua by 1848-1853 only ascribe their roots to the land for the period of the 60-70 years before the Land Commission Awards. While some claimant's lands may have been in their family for longer periods, it would not have been politic in the land commission claims for land offered to them by Kamehameha III to refer to rulers prior to the Kamehameha dynasty.

At the time of the Mahele, it would appear that Kailua, Kaneohe and Waimanalo were considered choice locations for these *Ahupua`a* were awarded to the Crown, the royal family, and then to important *ali`i*, particularly warrior chiefs for Kamehameha I. The entire *Ahupua`a* of Kailua was awarded to Queen Hazalelepono Kalama. Within the *Ahupua`a* the Crown took for itself the *`ili* of Kawailoa which surrounds the Olomana peaks, with a portion in Maunawili Valley and the major portion descending to the sand barrier and yet another detached portion of this *`ili* is found along the shoreline. Kawailoa encompasses the current project area. Princess Victoria Kamamalu was awarded the *`ili* of Kaelepulu which has both a down land and upland portion.

At the time of the Mahele land claimants testified before the Land Commission. This testimony provides valuable information in terms of land use circa 1850 and before. The LCAs records for Kailua document a thriving area of garden areas clustered along its 18± permanent and intermittent streams. The Maunawili/Kahanaiki Stream delta is a large, marshy low-lying area with no more than a 6% slope, with fertile soils along stream beds with many taro *lo`i*. Kapa`a Valley is narrow but also had many gardens along its stream. Other fertile areas are on the *mauka* side of Kaelepulu Pond (modern fill now surrounds most of the former pond) going toward Waimanalo; and several very fertile areas are found within the present-day MidPac Country Club. The two great lagoonal fish ponds joined underneath the lookout point of Pu`u o Ehu and a few LCAs are found nearby. Another area between Keolu Hills, just to the southeast of the Pond/Lake, which shows fertile soils but does not have recorded Hawaiian farming there. This isn't to say that farming wasn't taking place there, merely that we have no record of it. A very narrow fertile area sits on the Pohakupu upland about the location of Kailua High School. These fertile soil areas are the location of most of the awards in the LCAS Native Register, Foreign Testimony and Native Testimony.

`Ili* are the land divisions within the *Ahupua`a and these were governed by the lesser chiefs and *konohiki*. The *`ili* of Kailua are shown in Figure 4, a portion of a map prepared by John Donn in 1902. Land divisions came about supposedly under the reign of Ma'ilikukahi (born about 1360 A.D.), one of the chiefs who spent time in Kailua. There were approximately 70-80 *`ili* exploited in Kailua at the time of the Mahele. The reservoir project area is in the *`ili* of Kawailoa, which was crown land, land to remain with the crown. Crown land became territory of Hawaii and state land when Hawaii came under American sovereignty. A

majority of the *`ili* in Kailua, O`ahu were divided up among 41 of Kamehameha III's high chiefs. Others (39 *konohiki* awards) received *`ili* or partial *`ili* from Kamehameha III (13 or 20% of the 60 *ali`i* granted land in Kailua). These 39 are given 38 *`ili* (two each get a half of Pohakupu). Thirteen of the 60 high chiefs and *ali`i* retained the majority of the 70-80 *`ili*. At least two of the descendants of these chiefs still live on their land in Kailua; the descendants of Kuke (Tute) and the descendants of Peleleu.

In addition to the names of those persons applying for a claim, we have witnesses' names and names of neighbors. Field boundaries are described by naming the neighboring cultivators, and many of these names did not appear on the LCAS list. Some claimants mention where they are cultivating under the aegis of another. In all, there are about 251 names given in the Native Register, Foreign and Native Testimony in the claims dealing with the Kailua, O`ahu area. Of these 251, 200 persons are mentioned tilling the land in Kailua Ko`olaupoko in some way. About 65% of those working the land actually applied for an award.

In the Mahele records, 123 house lots are mentioned in the awards. This, probably does not offer a true reflection of habitations, as the majority of 171 claimants probably lived within the *Ahupua`a*. Where "kahuahale" or homes are mentioned the location of these house lots is typically bounded "on all sides by upland." However, although they were close to the fields, they had to be out of the wetlands. There are several house lots and gardens in the neighborhood of the project area, down slope from the ridge line.

Ali`i in Kailua don't specify what use they are making of their land in the LCAs. Most land use information is comes from the LCAs, mostly (kuleana) belonging to commoners. In Kailua most claims include taro patches. All the many upper and lower valley streams are lined with taro *lo`i*. Upper valley springs also have their taro patches. Some 1255± taro lo`i are listed in the LCAs. (Where Native Register and Foreign Testimony differ, the smaller number was used for conservative estimation, (cf Kelly 1981:27)). Kelly researched both the *`ili* of Olohana and Kumu and found no boundaries ever defined, the LCAs listed there all claimed taro *lo`i*. Although we don't have information on the size of the taro patches, we know that there were 1255 taro *lo`i* being tilled by some 200 claimants at the time of the Mahele in Kailua, O`ahu.

Kailua LCAs list other crops: *malas* of *wauke* or tapa fields, bananas, sugarcane, `awa, sweet potatoes and gourd fields; coconut, hala, kukui, koa, and fruit trees and one in

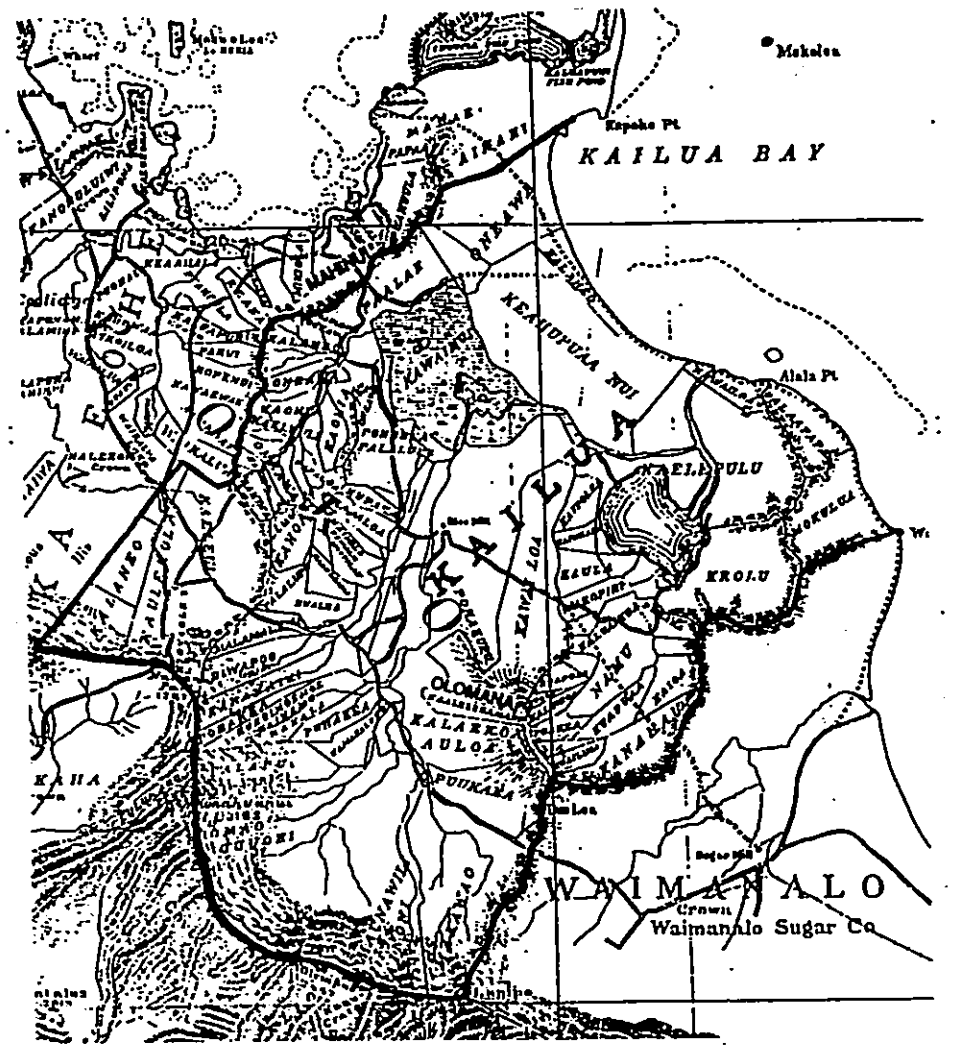

Figure 4 Portion of map prepared by John M. Donn, 1902, Hawaii Territory Survey, showing Kailua *Ahupua'a* with its *'ili* land divisions. The project area is located in Kawailoa, immediately north of mount Olomana.

Kukanono mentions cotton growing. An upland *'ili* is named for a koa pit, which would indicate that at some time in the past, koa existed in the area. Other woods mentioned in the *'ili* names are noni (Ainoni - "to eat noni"), koa (Kalaikoa - "to hew koa"), ohia (Kaohia), kukui (Kuikuimoemoe - kukui and sleep or ambush), and kamani (Kalelekamani - "where the kamani trees sway."). Wauke (paper mulberry) Melons and potatoes, potatoes or sweet potatoes and *'awa* are some crops mentioned in the LCAs. Four *'ili* in Kailua have names associated with tapa/kapa. Kapaloa (long kapa), (LCAs 2464, 8799 mention a *mo'o* or *kula* without specifying what kind of cultivation) Kapa'ele (dark kapa), Kapalai (silent kapa), Kapalepo (dirty kapa). There are many *mo'o* (garden plots) mentioned in the LCAS testimonies with no crop designated. According to local farmers (Rocky Mikami, pers. comm.) the small piles of rocks in rows that one encounters on hillsides in Kailua are a sign of sweet potato patches and because sweet potatoes were a staple of the Hawaiian diet, it would make sense that these *mo'o* where crops are unspecified were mostly being used to grow sweet potatoes.

No mention of livestock shows up in the claims, but presumably there was some. Mention is made of numerous fisheries and pools where fish would have been raised. Early 20th century testimony (S. Mahoe) indicates that the fishermen at the shore traded ocean fish for taro with the upland farmers and this is probably a long-established pattern.

Ranching

In the early 1900s Kaneohe Ranch comes to dominate land holdings in the Kailua and Kaneohe area. Included within this acreage is much ranch land which has been bought, sold, let and used as ranch land by numerous parties since the mid-1850s. Kelly and Nakamura's history (1981:34-35) mentions that Government land sales amounting to 3,000 acres were sold to 21 buyers in Kailua between the years 1849 and 1863. The largest parcel went to William Jarrett of the *'ili* of Maunawili in 1849. The second largest was 399.5 acres to T. Cummins in Mokulua. Both parcels were used for ranching. Other land holdings which were turned into ranch land in the mid-1850s included the *'ili* of Mokapu and Oneawa (by William Sumner and J. I. Dowsett) and the *'ili* of Puanea and Ohuauli (by the son of Paula Marin, Paul F. Manini). These large land holdings were used for years as ranch lands before becoming part of the Castle's Kaneohe Ranch. Cattle, sheep, and horses, were thus allowed to roam at will through may parts of Kailua, and would have destroyed many gardens and abandoned habitation areas. Kelly and Nakamura point out that although specific records are not available, based on tax information, it is not unreasonable to estimate that several thousand head of cattle were grazing in Kailua by 1875 (1981:69).

Kaneohe Ranch (Castle Trust) eventually acquired much of the land in Kailua (Hall 1997:84). Kaneohe Ranch, in addition to ranching, grew pineapple and sugar cane. The Pu'u o Ehu/Kalae of Kaiwa ridge is part of lands purchased by Kaneohe Ranch in 1917. With the decline of rice farming around the margins of Kawainui, cattle stock move onto the abandoned agricultural lands. Ranching in Kailua continues to this day, albeit on a drastically reduced scale, along Pu'u o Ehu ridge.

Growth of Cash Crops in Kailua

For the nearly 100 years following the *Mahele* Kailua grew into an important area of commercial agriculture. Until the early 1900s, rice was the major crop. Rice was followed by truck farming of taro and Western crops. The truck farming gave way to surburbanization, as Kailua became the premier bedroom community for growing Honolulu.

The Reciprocity Treaty between the United States and the Kingdom of Hawaii allowed for the duty free exportation of Hawaiian sugar to the U. S. This 1876 treaty greatly fanned the flame of the already smoldering Hawaiian export sugar industry. The duty free export of rice was also covered under the treaty, however, it was the growing Asian population, first Chinese and later Japanese, brought to Hawaii to supply labor to the escalating export sugar industry, that provided the main impetus for the expansion of rice growing. With local consumption steadily growing, and duty-free export, rice growing in Hawaii had a boom period of its own.

Unlike the adjacent *Ahupua`a* of Ko`olaupoko, Kailua's main cash crop became rice rather than sugar. Kailua's numerous abandoned taro *lo'i* in the former taro lands of Maunawili and Kawainui provided perfect areas for the expansion of rice. At one time there were multiple rice mills functioning in Kailua *Ahupua`a*. By the first part of the 20th century, rice growers in California were using more modern production methods to reduce their costs. This lead to the rapid decline in rice farming in Hawaii (Kelly and Nakamura 1981:51-63).

Sugar never became an important crop in Kailua itself, but the need for water for the adjacent sugar lands of Waimanalo was an important factor in the transformation of the Kailua water shed. Following the 1876 Reciprocity Treaty the adjacent *Ahupua`a* of Waimanalo became the site of rapid sugar development, what became the extensive Waimanalo Sugar Company's fields. The development of these fields relied upon water from Kailua. As early as the late 1870's a system of flumes, ditches, and tunnels were built in the *mauka* portions of adjacent Maunawili to collect water from the abundant springs and streams. By 1881 close to 1,000 acres of sugar had been planted and milling operations were underway in Waimanalo (Kelly and Nakamura 1981:76). Expansion in acreage continued, increasing the need for water. By the 1920s improvements to the Waimanalo Irrigation System included catchment tunnels that were excavated into the base of the Ko`olau in Maunawili to increase flow.

Also, completed in 1923, was a system of pumps, pipelines, tunnels, and ditches, that conducted water from Kawainui Marsh into the Kailua ditch, a portion of the Waimanalo Irrigation System, see Figures 5 and 6. This system continued to supply Kawainui water to Waimanalo until the early 1950s (Harland, Bartholomew, and Associates 1959:53-54; Hall 1997:94; Kelly and Nakamura 1981:778-79;). A portion of this system,

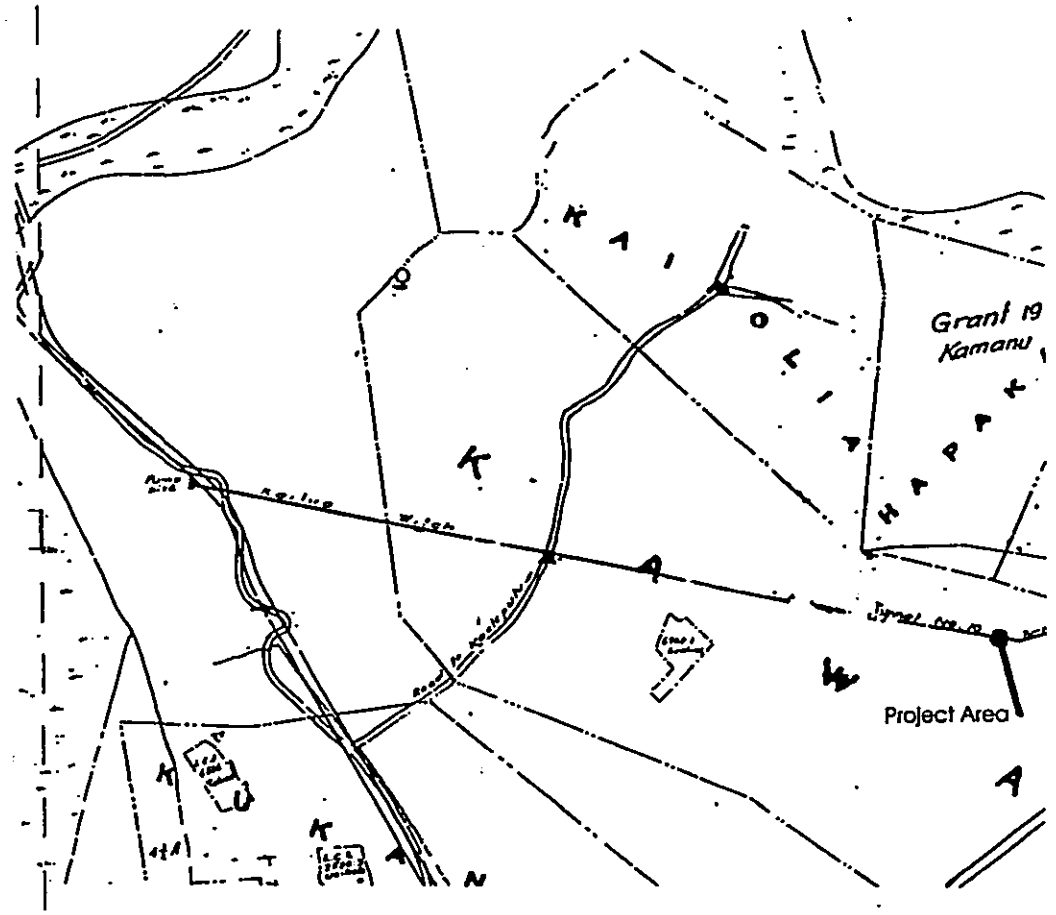

Figure 5 Portion of a map of Kailua, dated 1919, showing the alignment of "Tunnel 10", a portion of State Site # 50-80-15-4042, crossing through the *'ili* of Kawalloa, underneath a portion of the present project area, from Kelly and Nakamura 1981:80.

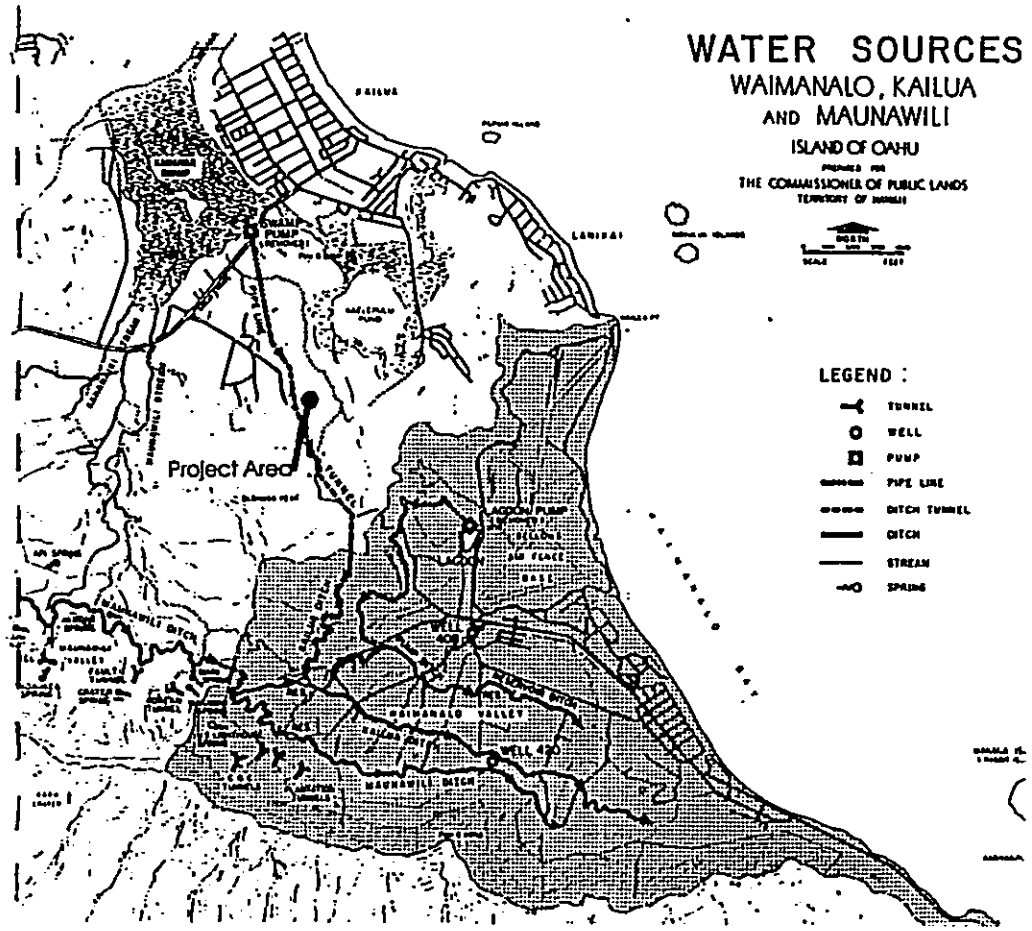

Figure 6 Map of the water sources of Waimanalo, Kailua, and MAUNAWILI, and of State Site # 50-80-15-4042, of which "Tunnel 10", used to pump water from Kawainui Marsh, is a part (from Harland Bartholomew and Assoc. 1959:52)

labeled "tunnel 10" in Figure 5, runs beneath the current project area, see alignment of "tunnel" with overlay of the project area on Figure 3. According to Wilcox (1996:111) two pumps lifted water from Kawainui and took it to the head of a 10,000-foot system of small tunnels, most through stone or hard earth, into a reservoir in Waimanalo. Tunnel 10, as part of the Waimanalo Irrigation System, was nominated to the National and State Register's of Historic Places in 1992 (Creed, application 1992). The system was given state site # 50-80-15-4042, but the site was not placed on the State or National registers.

In 1909 the Hawaiian Copra Company is established on the sandy area that is today bounded by Kalaheo and Oneawa Streets. Over 130 thousand trees were planted in an operation that involved leveling "the sand dunes and smooth[ing] out the sand hillocks" (*Honolulu Star Bulletin*, Sept. 12, 1931 cited in Kelly and Nakamura 1981:100; Hall 1997:77-78). The name Coconut Grove stuck, referring to most of the sand barrier area of Kailua. Clearly this leveling and smoothing of former dune areas had a great impact on the archaeological record of this area of Kailua.

The most prominent inroad made by sugar agriculture in Kailua was the establishment of the Hawaiian Sugar Planter's Association's field laboratory in 1926. It was established in former rice fields in stream bottoms, near present day Kailua Town. By 1946 the laboratory was in the process of moving further *mauka* into Maunawili (Kelly and Nakamura 1981:100).

By the 1950s, the truck farms that had flourished since the turn of the century within the bounds of present day Kailua Town, are slowly replaced by housing, municipal, and retail developments. Kailua is promoted as the bedroom community for Honolulu businessmen, only "8 miles and 20 minutes" from Downtown. Residential developments are planned for more outlying areas of Kailua Town, such as Olomana, Pohakupu, and Oneawa Hills (Hall 1997:141).

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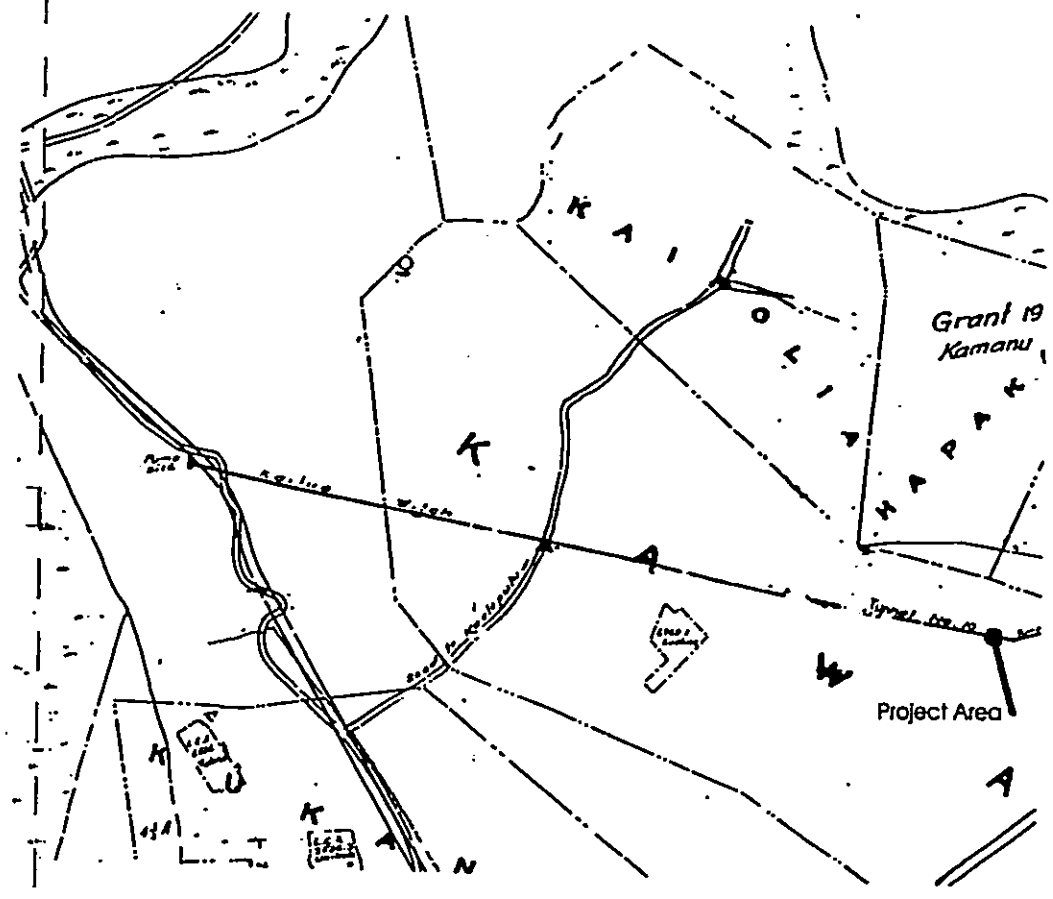

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Previous Archaeology

Twentieth century archaeological findings from inventory surveys, data recovery projects, and inadvertent finds during development are the main source of our knowledge about the archeological record in Kailua. Archaeological work in the last twenty years in Kailua has been fairly extensive. This work has been concentrated along the margins of Kawainui Marsh and within Maunawili Valley for the most part. This is largely due to the fact that most of the *makai* portions of the *Ahupua'a* had been developed prior to the implementation of State and Federal Historic Preservation Rules (Dye 1992). The many archaeological reports dealing with Kailua are listed and briefly summarized in Table 1.

The earliest habitation of the Kailua area is still under debate. A radiocarbon date obtained from a charcoal enriched soil layer has been interpreted as evidence that human habitation of Kailua began somewhere in the neighborhood of 350-650 A. D. (Clarke 1980: 32-33, 77-78). This date is not universally accepted, however, it is fairly well agreed among the archaeological community that by approximately 1200-1300 A. D. dramatic changes in the pollen record are indicative of the expansion of agriculture in the Kailua area, most likely in the well-watered margins of Kawainui Marsh (Hammatt *et al.* 1990; Athens and Ward 1991). Human colonization of the region would clearly have had to precede this agricultural expansion, perhaps by many centuries. It is logical that Kailua, and other regions of Ko'olaupoko, with their abundant marine and terrestrial resources, would have been attractive to the initial Polynesian colonizers.

The work of Hammatt (*et al.* 1990) and Athens and Ward (1991), has largely discredited Kraft's (1980) earlier assertions that Kawainui Marsh was an open water embayment at the time of initial Polynesian colonization. Athens and Ward (1991) suggest the Kawainui Embayment was sealed off during the first millennium B. C. as the result of a drop in sea-level. They correlate the Kawainui event with similar events at the same time in Kahana Valley and Ft. Shafter Flats, O'ahu.

Remains of upland terraces show that taro has been grown extensively and intensively in Kailua since the 13th or 14th century, and possibly earlier (Allen 1981, Williams, Mills and Allen 1995). The work of Cordy (1977 and 1978), Allen (1981, 1986-87), and Athens (1983a) all document the mix of irrigated and dryland agriculture that was carried out in Kailua during prehistory and continuing into the historic period. Dryland agriculture, including yams, gourds, and sweet potato, would have been carried out on slopes and on drier flat-lands. Modification to the landscape would have been variable, ranging from none at all to the construction of terraces and mounds for planting. According to Handy (1940:155) the beach barrier at Kailua (current day Coconut Grove) was famous for its production of sweet potatoes, grown in small mounds. Irrigated agriculture would have been carried out along streams and below springs. Associated landscape modifications would have included construction of terraces and/or pondfields, *'auwai*, and earthen and stacked-stone berms. These types of dryland and irrigated agricultural features have been found in Maunawili and along the margins of Kawainui Marsh.

Table 1. Previous Archaeological Reports *Ahupua'a* of Kailua, Ko'olaupoko, O'ahu

Reference	Location	Description and Results
Thrum, various 1907-1918.	Kailua *Ahupua'a*	In his articles for the *Hawaiian Almanac and Annual* (1907-1918) Thrum is the first to document many of the *heiau* in the *Ahupua'a* of Kailua.
McAllister 1933	Kailua *Ahupua'a*	McAllister's island-wide survey of the major archaeological sites of O'ahu supplies some of the first detailed descriptions, maps, and photographs of Kailua's archaeological remains. He describes 16 sites within Kailua *Ahupua'a*, including Kawainui pond (#370), Kaelepulu fishpond (#377), Ulupo *heiau* (#371), and Pahukini *heiau* (#359). In all eight *heiau* are reported for Kailua.
Handy 1940	Kailua *Ahupua'a*	Handy's discussion of traditional Hawaiian agriculture gives regional descriptions of what crops were planted where within the Hawaiian chain. Kailua *Ahupua'a* is described as a rich, productive, well terraced taro growing area (p. 99). The "sandy plains" of Kailua were planted in sweet potato, using a planting system of small soil mounds (p. 155, plate 8)
Clark and Connolly 1977	Hamakua Drive along Kaelepulu Stream.	This survey identified five stacked-stone alignments, a possible wall alignment, a potential habitation site, two agricultural sites, the remains of an irrigation ditch, and surface midden. A possible *heiau* was also recorded, however, when Hommon (1982) and Morgenstein (1982) revisited this project area, they found no remains of the possible *heiau* structure reported by Clark and Connolly.
Cordy 1977	Kawainui Marsh	Cordy, working for the U. S. Army Corps of Engineers, performed archaeological survey, historic document research, and aerial photograph analysis, for the alignment of a proposed City and County sewer-line along the south and southeastern margin of Kawainui Marsh. He documented historic house sites and both dryland and wetland agricultural features, including terraces.
Cordy 1978, Morgenstein 1977-	Kawainui Marsh	Agricultural features from Cordy's earlier identified "Site 7" (from Cordy 1977) were subjected to excavation to determine the chronology of land use. Previous examination of aerial photographs revealed extensive agricultural fields in this southern extension of Kawainui Marsh. Excavations revealed sequential land use of the area, from prehistoric irrigated taro agriculture, into historic irrigated taro agriculture, into later historic rice agriculture. Prehistoric agricultural features, such as terrace walls, were found buried below sediments, suggesting that they had not been substantially disturbed by later historic rice and livestock grazing activities in the area.
Dye 1979	Kapa'a Ridge	Reports the discovery, mapping and excavation of Bishop Museum site # 50-Oa-G6-31, a combination of terrace remnants and cobble paving, thought to be prehistoric agricultural remnants. The site is located just below the summit of Ulumawao Ridge, in a hanging valley of an intermittent stream. After the work was completed these features were destroyed by the expansion of the Ameron Quarry facility

Reference	Location	Description and Results
Clark 1980	Kawainui Marsh	Clark's work in the area known as "Site F" (just west of Ulupo *Heiau* on Kawainui's southeastern margin) documented over 178 predominantly agricultural features, many of which were previously located by Cordy (1977). Features included 70 dryland agricultural terraces, 6 wetland (irrigated) terraces, and 63 free-standing mounds. A tentative radiocarbon date from a context that is not clearly associated with human activity, dates the land clearance along this margin of the marsh, presumably for agriculture, as early as 350-650 A. D.
Kraft 1980	Kawainui Marsh	John C. Kraft is a specialist in prehistoric and historic coastal land form changes. Based on his research, which included coring various spots around the marsh, Kawainui Marsh was a shallow marine embayment of the coastal reef tract, very similar to present day Kaneohe Bay. Between 6000 and 2800 years B. P., before the Kailua sand berm had formed, corals grew and marine foraminiferal sands and carbonate muds were deposited around the margins of the embayment. Only after 2800 B.P. did the sand berm begin to form, slowly closing off the embayment. Until 400 or 500 years B. P. both the north and south outlets of the embayment (Oneawa and Kaelepulu) remained open. Kraft suggested the possibility that formation of the sand berm could be related to human factors, such as the construction of stacked stone fish ponds within the embayment. According to Kraft's recreation, the terrigenous in filling of the margins of the embayment was a relatively recent development, in the last 400-500 years B. P., with most taking place in the last 200 years.
Allen-Wheeler 1981	Kawainui Marsh	Allen-Wheeler conducted excavations in the Marsh with results that confirmed and refined Krafts' (1980) sequence of Kawainui development from embayment to marsh. Terrestrial in-filling of the marsh began about 650 A.D. with the formation of a peat layer. By 1300 A. D. a layer of alluvial soil had been deposited--possibly the result of human agricultural activity within Maunawili. Rapid alluvial in-filling continued at a rapid rate until the present. Taro cultivation within the marsh could not have taken place until approximately 1200 A.D.
Morgenstein 1982; Hommon 1982	Hamakua Drive adjacent to Kaelepulu Stream	Morgenstein and Hommon report surface survey and subsurface testing conducted to assess the potential of archaeological features along the Kaelepulu truck sewer line. The investigation documented layers of historic fill in the upper layers and the presence of one potential agricultural bund, thought to be associated with rice farming, below.
Neller 1982a	Kawainui, Kukanono area TMK 4-2-13:38	Neller reports the work he undertook in Kukanono as part of a field school on behave of the Sierra Club School Hikers Program and Hawaii Science Teachers Association. These limited subsurface investigations were carried out in the same area reported by Clark (1980) and Athens (1983a). Neller dismisses the early date reported by Clark (1980).

Reference	Location	Description and Results
Neller 1982b-	Maunawili Valley TMK 4-2-09:1	This short letter report documents a field trip to investigate archaeological sites in the back of Maunawili Valley. The reported locations of McAllister's sites 373 (Halaualolo *Heiau*), 374 (Kukapoki *Heiau*), and 375 (house sites, were visited. The extensive agricultural terraces, abandoned *lo`i*, were noted along large portions of both Omao and Maunawili Streams.
Athens 1983a	Pohakupu Kukanono slope S.S. #50-80-11-2022	Working in much the same area documented by Clark (1980), these investigations consisted predominantly of surface collections and subsurface testing. Excavation revealed that the abundant surface features (primarily agricultural mounds and terraces) were built in the most recent soil layers after 1900 A. D. Only one small area of the project area contained undisturbed prehistoric deposits. An earth oven in this prehistoric deposit was dated to the 13th to 15th centuries A. D., calling into question the early dates (4th to 7th century A. D.) obtained by Clark on the same slope of Kawainui. Soil erosion on the Pohakupu-Kukanono slope was apparently intense during the prehistoric period and soil deposition and development was infrequent prior to construction of the historic terraces.
Athens 1983b	83 Kihipai Street, Kailua TMK 4-3-57:65	This report documents the 11 grid units excavated in site 50-Oa-G6-40, the H.A.R.C. site. The site consists of marine midden, and subsurface features including hearths and pits. Radiocarbon dates indicate occupation of the site sometime in the mid- 13th to early 15th century. Midden remains were analyzed and conclusions suggest a change through time in the exploitation pattern. Athens suggests the use of the Kailua accretion barrier for habitation may have started about the same time as the occupation of the site. This site was originally located and excavated by Wheeler (1981)-.
Toenjes and Donham 1985	Maunawili Valley	This reconnaissance for the City and County's Maunawili District Trunk Sewer was located along Maunawili Stream north (*makai*) of Maunawili Road to the southern extent of Kawainui Marsh and Kalaniana'ole Highway. One historic site, a ditch which once carried water from Maunawili Stream to a rice mill, and several potentially prehistoric terrace remnants were discovered within the project area. The authors report previously unreported archaeological features within the vicinity of the project area, associated with Maunawili Stream.
Brennan 1986	Maunawili Valley	This reconnaissance survey was done for Royal Hawaiian Country Club, Inc., for a parcel proposed for a golf course in MAUNAWILI. Brennan located and described 42 sites, some of which had been previously identified. Sites include historic features (a bath site), a *heiau* (which appears to match McAllister's site 374, "*Heiau* on the land of Kukapoki") prehistoric irrigated taro fields, habitations, walls, burials and stream embankments.

Reference	Location	Description and Results
Allen 1986, 1987	Maunawili Valley	These mitigation and data recovery plans and preliminary reports detail the results of archaeological investigations at the site of the Royal Hawaiian Country Club, Inc. golf course. Sites investigated included historic habitations, charcoal kilns, roads and trails, and agricultural sites. The final report for these investigations is forthcoming
Shun, Price-Beggerly, and Athens 1987	Kailua *mauka*, west of the Pali Golf Course	This inventory survey of approximately 200 acres, the site of a proposed golf course, revealed that the area was not used extensively by traditional Hawaiians for habitation, agriculture, or other activites. Historic document research revealed that Pineapple agriculture (c. 1912) and truck farming, in the 1920s, were some of the greatest land uses of the parcels. Sites found included a small terrace complex, two charcoal kilns or seepage wells, a habitation complex, and a rock wall.
Williams 1988	Maunawili	This reconnaissance survey took place to investigate the proposed new location for the displaced Luluku farmers (by H-3 development). 13 sites were recorded in this *mauka* portion of Maunawili (540'-920' elevation), including probable historic charcoal kilns and agricultural complexes.
Szabian and Cleghorn 1989	Foot of Mount Olomana	During this archaeological reconnaissance survey of the proposed site of the Women's Community Correctional Complex (adjacent to Maunawili Elem. School) no new surface or subsurface archaeological sites of deposits were discovered. The authors did remap the remains of Kukuipilau *Heiau* (State Site # 50-80-11-372), which was first reported by Thrum and McAllister (site # 372), and re-discovered by Neller. They also note the freshwater spring "Kawailoa freshwater spring" adjacent to the *heiau*.
Hammatt, *et al.* 1990	Kawainui Marsh	The sediments from sediment cores from 10 locations in the Marsh were analyzed to characterize their "depth, age, and nature". Conclusions: Kawainui was marine bay with open circulation and tidal activity for most of the Holocene. Around the end of the first millennium B. C., in a relatively sudden geological event, the bay was partially blocked by a sand barrier, becoming a lagoon of mixed fresh and saline waters. This change is marked by a 600% increase in sedimentation rates on within the Kawainui basin. The lagoon persisted until as late as 570 A. D. By 1400 A. D. the lagoons outlet to the sea was closed and the Kawainui basin, already largely filled with terrestrial silty clays developed its wetland appears of today. Pollen samples which brackat the periods from bay to marsh show no apparent changes resulting from early Polynesian settlement. At approximately 1400 A. D. there are dramatic changes showing voluminous drops in mixed mesic forest species and an increase in grasses and sedge. These changes may well be the result of increases in Hawaiian subsistence activities.

Reference	Location	Description and Results
Quebral, Orndoff, and Athens 1991	Hamakua Drive and Pu`u o Ehu Ridge	Four most likely historic sites were locate during this inventory survey along the margins of Kaelepulu Stream, in an area that has seen modern in filling. Although background research indicated the importance of the project area for traditional agriculture, no specific indication of traditional Hawaiian land use was found. The project area was used for historic rice cultivation and livestock grazing.
Athens and Ward 1991	Kawainui Marsh	Thirty-seven core/auger units were dug along the eastern margin of Kawainui Marsh, in the vicinity of the drainage control levee. Conclusions: The marsh basin was transformed into a relatively closed, freshwater system at about 200 B. C. Data from other locations on O`ahu (Ft. Shafter Flats and Kahana Valley) support the conclusion that the transformation was due to regional causes, namely a fall in mean sea-level, rather than local forces, as had previously been proposed. The Kailua sand berm begins to form between 600 and 1000 B. C. Until approximately 1000 A. D., the Kailua lowlands were dominated by *Pritchardia*-palm forest. After 1000 A. D. these forests decline rapidly. The vegetation transformation is attributed to rising human population levels and the expansion of agriculture. Counts for cheno-am type and grass pollen rise dramatically after approximately 1200 A. D. These pollen types are indicators of disturbed environments and are thought to be indicators of the expansion of agriculture. Based on increases in sedge pollen after about 1000 A. D., it appears that Kawainui basin was too deep to support a marsh community, exept along its margins, until this time.
Hammatt and Shideler 1991	Maunawili	This inventory survey for the Na Ala Hele Trail Corridor through the *mauka* portion of Maunawili Valley found seven sites. Sites included the Old Pali Road, two probable historic charcoal kilns, and a large agricultural complex. It was unclear if any of the sites were prehistoric.
Hammatt, Pfeffer and Creed 1993	Pu`u o Ehu Ridge TMK 4-2-03:46	This inventory survey for the proposed location of the Kailua 272 Reservoir found no historic properties. Oral history research did reveal the traditional Hawaiian significance of Pu`u o Ehu peak as a spot overlooking the waterway that joined Kaelepulu and Kawainui ponds.
Brennan 1994	Maunawili Valley	This short letter report, address to Dr. Tom Dye, SHPD, documents and explains significance evaluations for 8 newly recorded sites in Maunawili. These sites were found during monitoring for the Royal Hawaii Country Club Golf Coarse. Features include pondfields, firepits, trash dumps, a cemetery documented from oral history, habitations, slope retainers, terraces, and a possible military training bunker.
Hammatt, Creed and Masterson 1994	Maunawill Estates (TMK 4-2-63:31,38)	This reconnaissance survey of a 10 acre parcel revealed no historic properties.

Reference	Location	Description and Results
Williams, Mills, and Allen 1995	Upper Maunawili Valley	Excavations at six sites within upper Maunawili Valley (the location of the Luluku Banana Farmers Relocation) are reported. These six predominantly prehistoric agricultural sites, based on radiocarbon dating results, were constructed between 1260 and 1650 A. D. These radiocarbon dates suggest that extensive agricultural and other cultural activities began in the valley by the 14th century, and possibly a few centuries earlier. No human burials or definite habitation areas were discovered in the six sites, but evidence for pre-Contact habitation was found at a previously unidentified site.
Hammatt and Chiogioji 1997	Auloa Road	This reconnaissance assessment of a 0.8 mile section of Auloa Road, immediately *makai* of Castle Junction, found no historic or archaeological sites, other than the previously recorded Kaneohe Ranch office building and the adjacent war memorial monument (State site 50-80-10-1360).

Previous archaeological investigations in Kailua have located dispersed prehistoric habitation remnants. This is in keeping with the observations of early Westerners in Hawaii that the settlement pattern for the most part was dispersed habitations scattered across the landscape amid agricultural fields. It should be remembered that settlement data is conspicuously absent from the lowland, beach berm areas of Kailua, due to early development of these areas.

McAllister (1933)reported eight *heiau* within the *Ahupua'a* of Kailua, and it is not unreasonable to conclude there were several more of which McAllister's informants had no knowledge. This is well in keeping with Kailua's status as a productive *Ahupua'a*, the residence of *Ali'i*. The two known *heiau* closest to the current project area are McAllister's site 371 Ulupo *Heiau* (located approximately half a mile northwest of the project area) and McAllister's site 372 Kukuipilau *Heiau* (located approximately a third of a mile southwest of the project area). Both of these *heiau* were reported to be agricultural in function.

In the last eleven years over 15 reports of inadvertent finds of human skeletal remains have been made in Kailua, on the sandy beach berm of Coconut Grove and Lanikai. As with other near shore sandy areas in Hawaii, clearly Kailua was used for burial of the dead. These burial remains are not nearly as extensive, however, as the hundreds of human burials discovered from nearby Mokapu peninsula (Snow 1974).

Recent archaeological investigations that are more relevant to the current project include two inventory surveys that were located at least partially on the adjacent Pu'u o Ehu ridge, just north of the current project area. Quebral (et al.1991)did an archaeological inventory of the Hamakua wetland area and northeastern slope of Pu'u of Ehu ridge. They documented a probable prehistoric habitation structure, prebistoric lithic scatters and midden deposits, historic ranching features, and historic rice-growing features. They noted that their project area had been extensively modified during historic agricultural use--namely rice cultivation, but also subsequent truck farming.

Hammatt, Pfeffer, and Creed performed inventory survey on the entire Pu'u o Ehu ridge line immediately north of the current project area. No archaeological remains were found. Oral history research did reveal the traditional significance of Pu'u o Ehu. Ms. Paki mentions that Pu'u o Ehu was a sacred spot--see discussion above. Around the turn of the century the wetlands below Pu'u o Ehu were used for rice growing. Until recently they have been used as pastureland.

No archaeological projects have been conducted along the Kalae o Kaiwa ridge line, the location of the current project area.

Background Research Summary and Predictive Model

The abundant historical and archaeological resources for the *Ahupua'a* of Kailua are more than sufficient to reconstruct the land use and settlement pattern history of Kailua, from prehistoric times up until the present. From archaeological research we know that the margins of Kawainui Marsh and Maunawili Valley were the site of expanding agriculture by the 13th and 14th century A. D. This expansive agriculture is most likely the result of an expanding population, the descendants of original settlers from centuries earlier. That the area was productive is confirmed by oral traditions. Oral traditions also associate Kailua with numerous legendary rulers, implying that the area was important politically as well as agriculturally. The many *heiau* that dot the landscape further attest the productivity and political importance of Kailua. Settlement would have been dispersed, from the beach berm along the coast, up into Maunawili Valley. Agriculture would have been a combination of dryland, on the slopes and drier flat lands, and wetland along the margins of streams. Although we lack early historic population estimates from Kailua, it is reasonable that this productive area would have been well populated.

Western disease was responsible for drastic depopulation of the Hawaiian Islands in early historic times. The earliest accounts of Western visitors to Kailua document the depopulated appearance of the land and sickly native inhabitants of the region. Kailua's first census count, from the 1830s, of 760 individuals is apparently much reduced from pre-contact population figures--based on the number of recently abandoned agricultural terraces noted by visitors. This depopulation was a significant factor in the transformation of land use in Kailua, as abandond land was transformed from traditional use to cash-crop production.

During the Mahele, Kailua's status as a highly desirable location is reaffirmed. Along with other Ko'olaupoko *Ahupua'a*, Kailua land is given to many chiefs. The current project area, as part of the *'ili* of Kawailoa, became crown land. Land Commission records show that approximately 170 land claims were made for agricultural and residential land in Kailua. Kula land, taro *lo'i*, and house lots, were all claimed. No claims were made within the current project area, however.

Cattle grazing and rice growing became large scale commercial pursuits in Kailua following the Mahele. Abandoned taro lands were perfect for the expansion of rice, which was having its own boom period related to the 1876 Reciprocity Treaty with the United States. With the decline of rice farming in the early part of this century, truck farming become popular throughout much of Kailua. Again we have no specific references to land use within the current project area during this time. As a somewhat peripheral area with poor soil, it is unlikely that it was used for much besides cattle grazing. By the 1950s, the suburbanization of Kailua, which began as early as the 1920s, is beginning to displace the truck farmers. This process continues into the present day and Kailua becomes the premier "bedroom community" for downtown Honolulu.

The current project area is located along the ridge line that divides Kawainui Marsh from Kaelepulu. No traditional accounts or legends are ascribed to this section of the ridge,

although immediately to the north, outside the project area, Pu'u o Ehu peak has been described to have had traditional-Hawaiian significance. Historical accounts make no mention of the use of this ridge line. During the Mahele, the project area becomes crown lands as part of the *'ili* of Kawailoa. There are LCAS's claimed in the vicinity of the project area (down slope in the vicinity of present day Kailua High School and along Kaelepulu, in what are clearly more productive agricultural lands), but none along the ridge line itself. Only with the introduction of ranching to Kailua after the Mahele, does it appear that the project area became utilized. With the overthrow of the Hawaiian Monarchy in 1893, Crown Lands became Government Lands. With the rise of cash-crops within Kailua, the project area, as a rocky, eroding ridge, goes unutilized, except for livestock grazing.

The 1923 construction of the tunnel, pipeline, and ditch combination to carry pumped water from Kawainui Marsh to Waimanalo sugar lands was the only significant historic modification of the project area. It is unclear if surface components of this water carrying system (State Site # 50-80-15-4042)will be visible within the project area.

Previous archaeological investigations along Pu'u o Ehu ridge line, which comprises a very similar environment immediately north of he current project area, found no sites on the ridge line or the adjacent eroding slopes (Hammatt, Pfeffer, and Creed 1993; Quebral *et al.* 1991).

Based on background research, it is unlikely that remnants of traditional Hawaiian activites will be encountered within the project area. Possibilities include remnants of dryland agriculture, such as terraces or mounds on the more protected slopes, but, again, this is unlikely. The single historic property that is more likely to be found is some surface indication of the subsurface "tunnel 10" of state site number 50-80-15-4042. There is a good possibility that ranching related material will be located within the project area.

Survey Results

Access to the project area was via both the existing Board of Water Supply access road to the Pohakupu 272 Reservoirs on the north side, and Kalanianaole Highway on the south side of the project area. The Woman's Correctional Facility personnel allowed access through their grounds. Topographic maps provided by Engineering Concepts Inc. were sufficient to orient the survey crew regarding the location of the four components of the project area: 1) the permanent access road that will connect the Kailua 272 Reservoir site with the existing access road to the Pohakupu Reservoirs; 2) the reservoir site itself, atop the peak immediately south of Kalae o Kaiwa; 3) the proposed temporary access road alignment (not selected for use) east of the Woman's Correctional Facility; and 4) the second, selected for use, temporary access road alignment. The selected access road alignment follows the alignment of a previous access road used during the construction of the Pohakapu 272 Reservoirs, immediately east of the Woman's Correctional Facility (see Figure 3). Background research had determined that archaeological sites were unlikely within the project area, however, there was the possibility of ranching structures, remnants of dry-land agriculture, or surface components of "tunnel 10" of the Waimanalo Irrigation System (a portion of State site # 50-80-15-4042), which runs beneath a portion of the project area surface. The pedestrian inspection of the project area was done in four parts, one for each segment of the project area. The ridge line of Kalae of Kaiwa, although outside the project area, was also investigated for surface features. No potential historic properties were observed during the field work.

The survey proceeded from the Pohakupu Reservoirs up the adjacent slope to the high point of Kalae o Kaiwa. The northwest side of this peak has been carved out step-fashion, to stabilize the slope in protection of the two reservoirs immediately below. Running along the ridge top is a barbed-wire fence constructed of stout, well-weathered, wooden posts connected by three strands of rusted barbed-wire. The fence presumably runs the length of the ridge from Pu`u o Ehu to the north to Kalanianaole Highway in the south. It is clearly a ranching feature associated with livestock grazing, which is ongoing on Pu`u o Ehu ridge line to the north of the project area. A portion of the fence is visible in Figures 7 and 8. Although the fence may be older than 50 years, it is in no way unique or especially representative of a time period. It is not considered eligible for the State or National Register of Historic Places.

From Kalae o Kaiwa the survey proceeded south along the ridge line to the next peak, the location of the Kailua 272 Reservoir. With the exception of the barbed-wire fence nothing was observed along the ridge line. The reservoir site (measuring approximately 260 feet (80 meters) in diameter) was inspected by pedestrian sweeps. No historic or archaeological features were observed. The soil and decomposing bedrock substrate of the ridge was exposed in one area, see Figure 7. This peak is approximately 80 feet lower in elevation than the high point at Kalae o Kaiwa and has a less commanding view of the surrounding landscape.

From the 272 Reservoir site the survey continued south to the area of the first proposed temporary access road, which will connect to Kalanianaole Highway. Figures 8 and 9 show the slope and vegetation in this portion of the project area. Systematic inspection of this slope found no historic or archaeological features. The slope appears to have been modified by bulldozing some time in the past. A portion of Tunnel 10 of State Site #50-80-15-4042 appears to run below the proposed alignment of the temporary access road, see Figure 3. No surface traces of this tunnel were observed.

The proposed permanent access road will connect the existing Pohakupu Reservoirs with the Kailua 272 Reservoir site. The alignment of the access road cuts across the slope of Kalae o Kaiwa, in a northwesterly/southeasterly direction. Figures 10 and 11 are taken from opposite ends of this proposed alignment. They show the relatively dense vegetation and the prevailing slope. No potential historic properties were observed within the alignment of the proposed access road.

On June 30th, 1999, the fourth portion of the project area, consisting of the second, selected for use, alignment of the temporary access road was surveyed. This second alignment follows the alignment of the temporary access road that was utilized when the adjacent Pohakupu 272 Reservoirs were constructed. The alignment is easy to follow because it has younger vegetation, has been cut and graded, an has the concrete and asphalt remnants of former paving scattered on its surface. No potential historic properties were located within this alignment.

Figure 7 View northeast of exposed soil and bedrock at the proposed site of Kalua 272 Reservoir (at the peak immediately south of Kalae o Kaiwa). The barbed wire fence is visible along the ridge line.

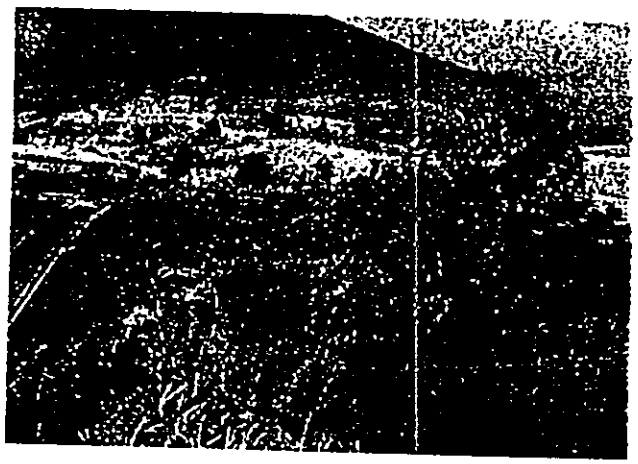

Figure 8 View south from proposed site of Kalua 272 Reservoir along alignment of the proposed temporary access road. The Kapiolani Boys home is visible at the foot of Mount Olympus along with KALANIANAOLE Highway.

Figure 9

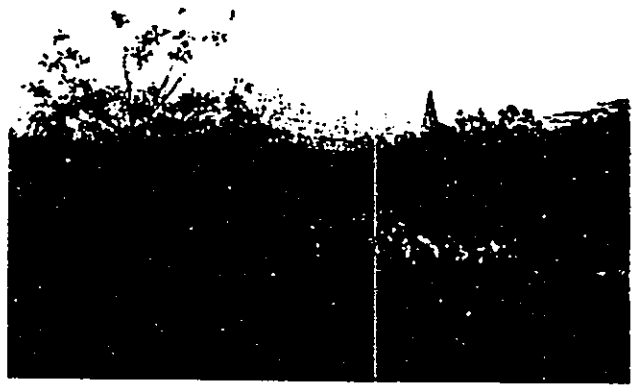

Figure 10 View northwest along alignment of the proposed permanent access road from the proposed site of the Kailua 272 Reservoir to the existing Pohakupu 272 Reservoirs

Figure 11 View southeast along alignment of the proposed permanent access road from the existing Pohakupu 272 Reservoirs to the proposed site of the Kailua 272 Reservoir. The slope of Kala o Kawa is to the left, the proposed [illegible] of the small [illegible] and the southern slope of Mount [illegible]

Project Summary

The parcel of land to be impacted by the construction of the Kailua 272 Reservoir [illegible] eroding ridge that is presently unutilized. One hundred percent of the project area was inspected on foot by a crew of two archaeologists on March 16, 1999. Prior to the field work, documentary research was conducted and a predictive model was developed concerning the potential for historic properties within the project area. Based on documentary research, the project area was only used historically for grazing, and it is doubtful the project area was ever intensively utilized prehistorically. During the field inspection, no signs of traditional-Hawaiian land use were observed. The ridge was fenced barbed-wire fence that runs along the ridge line testifies to the past use of the project area for livestock grazing, an activity that is ongoing immediately north of the project area on Puu o Ehu ridge. Field inspection of the parcel revealed that it contains no significant surface historic properties. The single potential surface historic property, the barbed-wire fence that is potentially over 50 years old, is not considered significant based on the criteria of the Hawaii Register of Historic Places. The fence was not given a State Site number.

The single previously recorded historic property that crosses the project area at the location of the temporary access road) consists of "tunnel 10", a portion of State Site # 50-30-15-4042, the Waimanalo Irrigation System. The tunnel was constructed in 1929. Until the mid-1950s, it conducted pumped water from Kawainui Marsh up to the Kailua ditch, which feeds water into Waimanalo. According to Mr. Paul Matsuo, Administrative Chief Engineer, Agricultural Resource Management Division, of the State Department of Agriculture (SDA), as far as the SDA is concerned the tunnel, which falls under SDA control, is completely defunct and valueless (Mr. Matsuo, personal communication March 25, 1999).

Site Significance

The only historic property located within the project area consists of a portion of State Site # 50-80-15-4042, "Tunnel 10" of the Waimanalo Irrigation System. The entire Waimanalo Irrigation System was nominated for inclusion in the State and National Register of Historic Places (SRHP/NRHP) by Dr. Victoria Creed in 1992. The Department of Agriculture, the controlling interest in the system, lobbied for the denial of inclusion of the site in the State Historic Register (Testimony of Ilima A. Piianaia, Deputy to the Chairperson, Board of Agriculture, July 17, 1992; Dr. Victoria Creed and Mr. Paul Matsuo, Personal Communication, March 25,1999). The matter of the site's inclusion in the State Register of Historic Places has yet to be resolved, as the matter has not yet been voted on (June 3rd letter from Dr. Don Hibbard, Administrator, State Historic Preservation Division, LOG NO: 23544 DOC NO: 9906SC03). Tunnel 10, as part of Site # 50-80-15-4042, is a significant historic property under SRHP/NRHP criteria A (association with broad patterns of history--namely the sugar industry in Hawaii) and D (for its information content regarding historic irrigation technology and practices).

Recommendations

With the exception of "tunnel 10", a portion of Site 50-80-15-4042, there are no significant historic properties within the project area. During the field work no sign of the tunnel was observed and the tunnel's depth below surface and where it intersects the project area is currently unknown. Based on rudimentary overlays of the project area on the 1983 U.S.G.S. Mokapu Quad, which shows the alignment of tunnel 10, the tunnel intersects the project area at the two temporary access roads, see Figure 3. It seems unlikely that construction of a temporary access road on the surface should impact this subsurface feature. Furthermore, the temporary access road that was selected for use during project construction follows a pre-existing temporary access road that was used to build the adjacent Pohakupu 272 Reservoir. Any damage that might have occurred to Tunnel 10 during Kailua 272 construction activities would already have occurred during the previous use of this access road alignment. With the selected temporary access road alignment the construction of the proposed Kailua 272 Reservoir will have no adverse effect on significant historic properties. No further historic preservation work is recommended.

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